2400 5th Avenue S, Suite 200 | Birmingham, Alabama 35233
Tel 205.879.4462 | GMCNETWORK.COM

TRANSMITTAL COVER SHEET

DATE: SEPTEMBER 1, 2023

TO: ALL PLAN HOLDERS OF RECORD

FROM: HUNTER SWATEK, PROJECT MANAGER

PROJECT: ALABAMA COMMUNITY COLLEGE SYSTEM WORKFORCE SKILLS TRAINING CENTER
GMC PROJECT NO. ABHM210048

RE: ADDENDUM NO. 1 AND
ACKNOWLEDGEMENT OF RECEIPT OF ADDENDUM NO. 2

ACKNOWLEDGEMENT OF RECEIPT:

PLEASE PRINT RECIPIENT'S NAME, FIRM, AND DATE RECEIVED.

THEN E-MAIL BACK TO alyssa.martin@gmcnetwork.com FOR OUR RECORDS AND TO ACKNOWLEDGE YOU'RE RECEIPT OF THIS ADDENDUM.

_____
NAME *(PLEASE PRINT)*

_____
FIRM *(PLEASE PRINT)*

_____
DATE RECEIVED *(PLEASE PRINT)*

If there are any problems with this transmittal, please contact sender, at the number listed above.

ADDENDUM NUMBER 02

September 1, 2023

PROJECT: **ALABAMA COMMUNITY COLLEGE SYSTEM WORKFORCE SKILLS TRAINING CENTER**
GMC PROJECT NO. ABHM210048

AD1-1 GENERAL:

A. The following revisions and/or additions to the Drawings and Project Manual are hereby made a part of same, and shall be incorporated in the Work of the Contract the same as if originally included in the Bid and Construction Documents.

B. Bidders shall acknowledge receipt of this Addendum in writing, as provided on the Proposal Form.

C. When a revision and/or addition is called for to the Drawings or Project Manual, they shall be fully coordinated with and carried through all applicable Drawings and portions of the Project Manual, including in part, all related Civil, Landscaping, Architectural, Structural, Plumbing, Mechanical, Electrical, and other Documents.

AD1-2 PROJECT MANUAL AND SPECIFICATIONS:

1. Add new specification Section 23 5000 "Heating and Air Conditioning Equipment and Specialties."
   A. 2.5 AIR COOLED WATER CHILLER UNITS:
      i.Paragraph X, Add: Carrier Model 30RC.
   B. 2.7 LINE MOUNTED PUMPS:
      i.Paragraph A, Add: Armstrong.
   C. 2.9 STANDARD HORIZONTAL OR VERTICAL AIR HANDLING UNITS:
      i.Paragraph L, Revised: Deleted Daikin and added Carrier.
   D. 2.10 SPLIT SYSTEM AIR CONDITIONERS - SMALL:
      i.Paragraph E, Revised: Deleted Daikin and added Carrier.
   E. 2.11 COILS:
      i.Paragraph I, Revised: Deleted Daikin and added Carrier

AD1-3 DRAWINGS:

1. CIVIL:
   A. Reference New Sheet C1.0 - SITE LAYOUT PLAN
   B. Reference Revised Sheet CSI - SITE PHASING PLAN: SUPPLEMENTAL INFORMATION

2. LANDSCAPE:
   A. Reference Revised Sheet L1.01 – PLANTING PLAN
   B. Reference Revised Sheet L1.02 - PLANTING PLAN
   C. Reference Revised Sheet L2.00 - DETAILS

3. Architectural:
   A. Reference Revised Sheet A5.11 – WALL SECTIONS
   B. Reference Revised Sheet A5.12 – WALL SECTIONS
   C. Reference Revised Sheet A8.00 - FINISH LEGEND

4. Structural:
   A. Reference Revised Sheet S1.03 – TYPICAL DETAILS
   B. Reference Revised Sheet S1.07 – TYPICAL DETAILS
   C. Reference Revised Sheet S2.02 – FOUNDATION AND FIRST FLOOR PLAN
   D. Reference Revised Sheet S2.03 – FOUNDATION AND FIRST FLOOR PLAN
   E. Reference Revised Sheet S2.05 – FOUNDATION AND SECOND FLOOR PLAN
   F. Reference Revised Sheet S2.06 – FOUNDATION AND SECOND FLOOR PLAN
   G. Reference Revised Sheet S2.08 – ROOF FRAMING PLAN
   H. Reference Revised Sheet S2.09 – ROOF FRAMING PLAN
   I. Reference Revised Sheet S3.01 – SECTIONS FOUNDATION
   J. Reference New Sheet S3.01A – SECTIONS FOUNDATION
   K. Reference Revised Sheet S3.05 – SECTIONS SECOND FLOOR
   L. Reference Revised Sheet S3.09 – SECTIONS ROOF
   M. Reference Revised Sheet S3.11 – STORM SHELTER DETAILS

5. Mechanical:
   A. Reference Revised Sheet M0.01 - HVAC SCHEDULES, NOTES, AND LEGENDS
   B. Reference Revised Sheet M0.02 - HVAC SCHEDULES
   C. Reference Revised Sheet M1.01 - OVERALL LEVEL 1 HVAC PLAN
   D. Reference Revised Sheet M1.01A - LEVEL 1 HVAC PLAN - PART A
   E. Reference Revised Sheet M1.01B - LEVEL 1 HVAC PLAN - PART B
   F. Reference Revised Sheet M1.02 - OVERALL LEVEL 2 HVAC PLAN
   G. Reference Revised Sheet M1.02A - LEVEL 2 HVAC PLAN - PART A
   H. Reference Revised Sheet M1.02B - LEVEL 2 HVAC PLAN - PART B
   I. Reference Revised Sheet M1.03 - OVERALL ROOF HVAC PLAN
   J. Reference Revised Sheet M1.03A - RPPF HVAC PLAN - PART A
   K. Reference Revised Sheet M1.03B - ROOF HVAC PLAN - PART B
   L. Reference Revised Sheet M2.01 - OVERALL LEVEL 1 HVAC PIPING PLAN
   M. Reference Revised Sheet M2.01B - LEVEL 1 HVAC PIPING PLAN - PART B
   N. Reference Revised Sheet M2.02 - OVERALL LEVEL 2 HVAC PIPING PLAN
   O. Reference Revised Sheet M2.02A - LEVEL 2 HVAC PIPING PLAN - PART A
   P. Reference Revised Sheet M2.02B - LEVEL 2 HVAC PIPING PLAN - PART B
   Q. Reference Revised Sheet M3.01 - STORM SHELTER - HVAC
   R. Reference Revised Sheet M5.01 - CHILLED WATER PIPING AND INSTRUMENTATION DIAGRAM

6. Plumbing:
   A. Reference Revised Sheet P1.00 - OVERALL LEVEL 1 - NON-PRESSURE PLAN
   B. Reference Revised Sheet P1.01 - LEVEL 1 - AREA A - NON-PRESSURE PLAN

C. Reference Revised Sheet P1.02 - LEVEL 1 - AREA B - NON-PRESSURE PLAN
D. Reference Revised Sheet P1.03 - OVERALL LEVEL 2 - NON-PRESSURE PLAN
E. Reference Revised Sheet P1.05 - LEVEL 2 - AREA B - NON-PRESSURE PLAN
F. Reference Revised Sheet P1.06 - OVERALL LEVEL 1 - PRESSURE PLAN
G. Reference Revised Sheet P1.08 - LEVEL 1 - AREA B - PRESSURE PLAN
H. Reference Revised Sheet P1.09 - OVERALL LEVEL 2 - PRESSURE PLAN
I. Reference Revised Sheet P1.11 - LEVEL 2 - AREA B - PRESSURE PLAN
J. Reference Revised Sheet P1.13 - ROOF PLUMBING PLAN

7. Fire Protection:
   A. Reference Revised Sheet FP1.01A - FIRE PROTECTION LEVEL 1 PLAN PART A
   B. Reference Revised Sheet FP1.01B - FIRE PROTECTION LEVEL 1 PART B
   C. Reference Revised Sheet FP2.01A - FIRE PROTECTION LEVEL 2 PART A
   D. Reference Revised Sheet FP2.01B - FIRE PROTECTION LEVEL 2 PART B

AD1-4 MISCELLANEOUS:

A. Bidding RFI Log

B. Subject to compliance with requirements of the Bid and Contract Documents, including single source coordination, the following manufacturer(s) has made proper and timely submittal for consideration of product(s), **or** the following supplier(s) has made proper and timely submittal of its firm(s), and has subsequently been found to be an acceptable manufacturer or supplier:

1. Specification Section 23 6000 – Variable & Constant Volume Terminal Boxes
   Carrier M# 35E - Carrier Corporation shall be **approved**.
   Carrier Corporation-DSO
   Michael DeFrank
   238 Cahaba Valley Road
   Pelham, AL 35124
   205-378-2315 (micheal.defrank@carrier.com)
2. Specification Section 23 5000 – Standard Horizontal or Vertical AHU's/H&V Units
   Air Handling Units/Heating Ventilation Units 39MN - Carrier Corporation shall be **approved**.
   Carrier Corporation-DSO
   Michael DeFrank
   238 Cahaba Valley Road
   Pelham, AL 35124
   205-378-2315 (micheal.defrank@carrier.com)
3. Specification Section 23 5000 – Air Cooled Water Chillers
   Air Cooled Water Chillers 30RC - Carrier Corporation shall be **approved**.
   Carrier Corporation-DSO
   Michael DeFrank
   238 Cahaba Valley Road
   Pelham, AL 35124
   205-378-2315 (micheal.defrank@carrier.com)
4. Specification Section 23 5000 – Split System A/C-Small
   Carrier M#38AUQ/40RUQ - Carrier Corporation shall be **approved**.
   Carrier Corporation-DSO

Michael DeFrank
238 Cahaba Valley Road
Pelham, AL 35124
205-378-2315 (micheal.defrank@carrier.com)

AD1-5 ATTACHMENTS:

A. Bidding RFI Log
B. Revised Specification Section 23 5000
C. Substitution Request - Section 23 6000
D. Substitution Request - Section 23 5000
E. Substitution Request - Section 23 5000
F. Substitution Request - Section 23 5000
G. New Sheet CSI
H. Revised Sheet C1.0
I. Revised Sheet L1.01
J. Revised Sheet L1.02
K. Revised Sheet L2.00
L. Revised Sheet A5.11
M. Revised Sheet A5.12
N. Revised Sheet A8.00
O. Revised Sheet S1.03
P. Revised Sheet S1.07
Q. Revised Sheet S2.02
R. Revised Sheet S2.03
S. Revised Sheet S2.05
T. Revised Sheet S2.06
U. Revised Sheet S2.08
V. Revised Sheet S2.09
W. Revised Sheet S3.01
X. Revised Sheet S3.01A
Y. Revised Sheet S3.05
Z. Revised Sheet S3.09
AA. Revised Sheet S3.11
BB. Revised Sheet M0.01
CC. Revised Sheet M0.02
DD. Revised Sheet M1.01
EE. Revised Sheet M1.01A
FF. Revised Sheet M1.01B
GG. Revised Sheet M1.02
HH. Revised Sheet M1.02A
II. Revised Sheet M1.02B
JJ. Revised Sheet M1.03
KK. Revised Sheet M1.03A
LL. Revised Sheet M1.03B
MM. Revised Sheet M2.01
NN. Revised Sheet M2.01B
OO. Revised Sheet M2.02
PP. Revised Sheet M2.02A
QQ. Revised Sheet M2.02B

RR. Revised Sheet M3.01
SS. Revised Sheet M5.01
TT. Revised Sheet P1.00
UU. Revised Sheet P1.01
VV. Revised Sheet P1.02
WW. Revised Sheet P1.03
XX. Revised Sheet P1.05
YY. Revised Sheet P1.06
ZZ. Revised Sheet P1.08
AAA. Revised Sheet P1.09
BBB. Revised Sheet P1.11
CCC. Revised Sheet P1.13
DDD. Revised Sheet FP1.01A
EEE. Revised Sheet FP1.01B
FFF. Revised Sheet FP2.01A
GGG. Revised Sheet FP2.01B

END OF ADDENDUM NUMBER 02

PREPARED BY

2400 5th Avenue S, Suite 200 | Birmingham, Alabama 35233
Tel 205.879.4462 | GMCNETWORK.COM
Goodwyn Mills Cawood, LLC.

NO.	Asker	Question	ADD #	Response
	*Questions received during the week of *DATE*			
1	BH	Please reference sheet C1.0. Please provide specs, details etc. for the Contech Pedestrian Bridge.	1	Specification to be provided in AD 01.
2	BH	Has any portion of this project been creating in Revit or any other 3D Modeling software? And if so, can the model be provided to the GCs prior to bid for use during the bidding process? Also, can the model be provided to the GC for use during construction and creation of coordination drawings.	1	3D Models will not be available during bidding, but will be provided during construction as requested.
3	BH	Can CAD files for Civil be provided to GCs?	1	CAD files will not be available during bidding, but will be provided during construction as requested.
4	BH	Please reference sheet A5.31 and spec section 057316 Steel Cable Railing System. Lobby Stair A3/A5.31 states R1 Cable Guardrail per Railing Schedule while details for R1 on A1,A4/A5.33 showing 5/8" diameter bar guardrail system. Please advise which railing system is correct steel cable railing or 5/8" diameter bar guardrail system.	1	Steel cable railing is correct. A5.33 to be amended in AD 01.
5	F	Due to this building only being a 2-stop low rise building, will providing a machine roomless hydraulic elevator be acceptable?	1	A machine roomless hydraulic elevator is not accepted.
6	F	Please see attached for substitution request.	1	Anemostat VAV Not Approved
7	F	Can we use type L copper on 2" pipe and smaller instead of schedule 40 black steel pipe?	1	Approved . Dielectric unions required at all connections of dissimilar metals
8	F	What size pipe is going to each chiller 4" or 6"? M5.01 shows 6" and M2.01B shows 4". Please advise.	1	Install per M2.01B
9	F	Please see attached fpr substitution request.	2	Substitution requests will be outlined in AD 02.
10	F	Please see attached explaining RFI for ACM Panels. The architect has these panels at over 5'-1" ver:cal centers and over 6'-0" horizontal centers. The absolute maximum width for an ACM panel is 4'-11¼" in one direc:on; meaning the panel can exceed the 4'-11" in one direc:on but not both directons. A 4'-11" x 15'-11" is possible, but a 5'-0" x 5'-0" or a 6'-0" x 8'-0", or etc. panel is not possible due to sheet/CNC/fabrication limitations.	1	ACM Panel layout has been modififed on A4.01 to meet industry standards for manufacturing. CW mullion layout has also been revised on A6.11. Joint width on the wall sections can be disregarded. A standard joint width is acceptable to be used throughout.
11	BH	May the AISC Certification be omitted as mentioned in section 051200 Structural Steel Framing?	2	This requirement can be omitted with 5 years of experience of similar sized projects.
12	BH	Continuous Footing on Frame Line C is noted at 1/S3.01, but scales out to be 3-0 wide. Same for Frame Line 6/J intersection continuing around to Frame line G/7 interaction.	2	Footing is 30" wide. The 36" wide footing shown on plan is a modeling error and will be corrected in model prior to being shared during construction.
13	BH	AED cabinets are referenced in spec section 10 4300 but their locations are not in the drawings. Please advise on cabinet locations and quantity.	2	2 AED Cabinets are required. Locations to be coordinated with owner during construction.
14	BH	On detail 3/S3.07, it shows HSS tube steel between the joints. Should this be used as a typical detail between all joists bearing on wide flange beams or just at grid line 6?	2	Detail applies only to gridline 6.

NO.	Asker	Question	ADD #	Response
15	BH	In General notes on page G1.02, 5.01 mentions that all embedded steel and edge angle is to be hot dipped galvanized. Is this correct? This would include all composite slab edge angle, deck edge angle, and every embed or bearing plate on this job. This will impact certain embed plates that require welded connections, please advise.	2	Only exposed steel is required to be galvanized.
16	BH	Note on addendum 1, sheet C1.0 states foundation for bridge to be by contractor. If we are to be responsible for foundation design it will be required prior to bid geo tech foundation recommendations, borings at the bridge construction and recommended foundation bearing capacity by geo-tech and/or the project's engineer of record.	2	The bridge contractor shall be responsible for the design. The geotechnical information provided in the geotechnical report can be utilized as a basis of design, but the bridge contractor will need to confirm all site conditions with their own geotechnical report during construction.
17	BH	Spec Section 323413 Fabricated Pedestrian Bridge, item 1.05 requires a bridge mock up. May this requirement be omitted?	2	This requirement may be omitted.
18	BH	We understand that the areas highlighted in GREEN on the attached sheet C1.0 document will be the entire project limits for our work. The GC will have access to all parking lots, roadways, etc. within the limits for the complete duration of the project and no access to the parking lots by the owner or owner access to other areas within the GREEN highlighted area and no phasing requirements. If the comments and highlighted plan attached are not correct, please provide a project limit drawing and/or phasing plan. (see file saved)	2	See updated C1.1 Site Phasing plan in AD 02.
19	BH	Please reference Sheet C0.3. Will the existing Disc Golf targets noted for removal be removed by owner or GC? If removed by GC are we dispose of the items or hand over to owner? If handed over to owner will owner come pick up at job site or will we have to deliver to a location and if GC delivers, how far?	2	Owner will remove these baskets. Scope has been removed from the demo plan in AD 02.
20	F	In General notes on page G1.02, 5.01 mentions that misc. embedded steel including edge angle and embedded plate is to be hot dipped galvanized. Can you please verify what this is including?	2	Refer to RFI 15.
21	F	Are we to figure a Schluter nosing for the hard tile treads at monumental stairs? If so, please clarify which one.	2	A schulter nosing will not be required. See updated finish legend in AD 02 for direction regarding a grooved nosing in the tile.
22	BH	General note 8.1 on sheet S1.01 calls for slab on grade concrete to be 3500psi. Spec section 033010, 2.05, 2a calls for slabs on grade for exposed concrete to be 4000psi. Please clarify which is correct.	2	3500 psi is correct.
23	F	There is a spec section for impact security windows but there does not seem to be any in the drawings. Please confirm that there are no impacted rated windows.	2	This section may be omitted.
24	F	Where can Cherokee Sedge Seed be found and how many lbs per acre is needed for this project?	2	This has been replaced in AD 02. See updated planting schedule.
25	F	What type of ductwork (single wall or double wall, liner thickness for both round and rectangular) is expected for the exposed areas. Also, can we use industry standard for single wall fittings, not welded (both round and rectangular)?	2	Exposed ductwork needs to be double walled with 1.5" liner. Industry standard is acceptable for single wall fittings.

NO.	Asker	Question	ADD #	Response
26	F	Detail 1/S3.01 shows the following in the descriptions. 8" - 18GA metal stud framing 16" o.c. (600S200 - 43 or equal) Please confirm that it should be: (or not) 8" - 18GA metal stud framing 16" o.c. (800S200 - 43 or equal)	2	800S200-43 or equal is correct.
27	F	Addendum 1 references the wet well depth changing, but the elevations are the same. Please advise.	2	Elevations are correct in AD 01.
28	F	Per architectural RCP ceiling plan in the finish legend is ACB-1 Turf Straight Blades, but none are called out within the drawings. Are these to be involved in a specific area and if so, will you be providing an updated drawing to show where they are to be located?	2	See drawings. ACB-1 baffles are called out on RCP sheets A2.01 and A2.02.
29	F	The specs call for type 4 membrane which is hot applied, but typically type 4 is not used where there are turn-up sections. Please confirm type 4 is wanted at the turn up areas, and if not then what type of membrane is wanted there? Please provide a list of manufacturers.	3	Roof parapet details to be revised in AD 03 on 09.05.2023.

SECTION 23 5000

HEATING AND AIR CONDITIONING EQUIPMENT AND SPECIALTIES

PART 1 - GENERAL

1.1 SCOPE:

A. Section 23 0500 – “General Provisions – HVAC” shall apply to and become part of this Section.

PART 2 - EQUIPMENT AND SPECIALTIES

2.1 HOT WATER CONDENSING BOILERS – NATURAL GAS

A. SUMMARY

1. This Section includes packaged, factory-fabricated and assembled, gas-fired, firetube duplex alloy stainless steel ultra-high efficiency condensing boilers, trim and accessories for generating hot water.

B. REFERENCES

1. ASME Section IV
2. CSD-1, Controls and Safety Devices
3. XL GAPS
4. NEC, National Electric Code
5. UL-795 7th Edition
6. AHRI, BTS-2000
7. ASHRAE 90.1

C. SUBMITTALS

1. Product Data: Include performance data, operating characteristics, technical product data, rated capacities of selected model, weights (shipping, installed and operating), installation and start-up instructions, and furnished accessory information.
2. Shop Drawings: For boiler, standard boiler trim and accessories.
    a. End Assembly Drawing: Detail overall dimensions, connection sizes, connection locations, and clearance requirements.

b. Wiring Diagrams: Detail electrical requirements for the boiler including ladder type wiring diagrams for power, interlock and control wiring. Clearly differentiate between portions of wiring that are factory installed and portions to be field installed.

3. Certificate of Product Rating: Submit AHRI Certificate indicating Thermal Efficiency, Combustion Efficiency, Materials of Construction, Input, and Gross Output conform to the design basis.

4. Thermal efficiency curves: Submit thermal efficiency curves between and including minimum and maximum rated capacities, for return water temperatures ranging from 80°F to 180°F.

5. Water side pressure drop curve.

6. Flue gas temperature curves: Submit flue gas temperature curves for minimum and maximum boiler capacity, for return water temperatures ranging from 80°F to 160°F.

a. If submitted flue gas temperatures, minimum or maximum inputs are different from that of the basis of design manufacturer and model, the manufacturer shall be responsible for draft calculations and reselection of the flue gas exhaust system.

7. Source quality-control test reports.

8. Field quality-control test reports: Start-up by a factory authorized service company.

9. Operation and Maintenance Data: Data to be included in Installation and Operation Manual.

10. Warranty: Standard warranty specified in this Section.

D. QUALITY ASSURANCE

1. Manufacturer Qualifications: Firms regularly engaged in the manufacture of condensing hydronic boilers with welded steel pressure vessels, whose products have been in satisfactory use in service for not less than twenty-five (25) years. The manufacturer must be privately owned and headquartered in North America. The specifying engineer, contractor and end customer must have the option to visit the factory during the manufacture of the boilers and be able to witness test fire and other relevant procedures.

2. Aftermarket Support and Service: The manufacturer shall have a factory authorized service training program, where boiler technicians can attend a training class and obtain certification to perform start-up, maintenance and basic troubleshooting specific to the product line.

3. 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.

4. ASME Compliance: Fabricate and label boilers to comply with ASME Boiler and Pressure Vessel Code, Section IV Boilers", for a maximum allowable working pressure of 160 PSIG.

5. CSD-1 Compliance: The boiler shall comply with ASME Controls and Safety Devices for Automatically Fired Boilers (CSD-1).

6. ASHRAE/IESNA 90.1 Compliance: Boilers shall have minimum efficiency according to and Oil Fired Boilers - Minimum Efficiency Requirements."

7. UL Compliance: Boilers must be tested for compliance with UL 795, - Industrial Gas Heating Equipment." Boilers shall be listed and labeled by ETL.

8. AHRI Compliance: Boilers shall be tested and rated according to the BTS-2000 test standard and verified by AHRI.

9. NOx Emissions Compliance: Boiler shall be tested for compliance with SCAQMD and TCEQ.

10. The equipment shall be of the type, design, and size that the manufacturer currently offers for sale and appears in the manufacturer current catalog.

11. The equipment shall fit within the allocated space, leaving ample allowance for maintenance and inspection.

12. The equipment shall be new and fabricated from new materials. The equipment shall be free from defects in materials and workmanship.

13. All units of the same classification shall be identical to the extent necessary to ensure interchangeability of parts, assemblies, accessories, and spare parts wherever possible.

14. In order to provide unit responsibility for the specified capacities, efficiencies, and performance, the boiler manufacturer shall certify in writing that the equipment being submitted shall perform as specified.

E. COORDINATION

1. Mechanical contractor shall coordinate the size and location of concrete bases. Cast anchor-bolt inserts into bases.

F. WARRANTY

1. Standard Warranty: Manufacturer standard form in which manufacturer agrees to repair or replace components of boilers that fail in materials or workmanship within specified warranty period provided the boiler is installed, controlled, operated and maintained in accordance with the Installation, Operation and Maintenance Manual.

   a. Warranty Period for the Pressure Vessel and Heat Exchanger: The boiler manufacturer shall warranty against failure due to:

      1) Flue gas condensate corrosion, and/or defective material or workmanship for a period of ten (10) years, non-prorated, from the date of shipment from the factory.

      2) Thermal shock for the lifetime of the boiler.

   b. Warranty Period for the Burner: The boiler manufacturer shall warranty the mesh burner head against defective material or workmanship for a period of five (5) years, non-prorated, from the date of shipment from the factory.

c. Warranty Period for all other components: The boiler manufacturer will repair or replace any part of the boiler that is found to be defective in workmanship or material for a period of two (2) years, non-prorated, from the date of shipment from the factory.

G. MANUFACTURERS

1. This specification is based on the Endura series boilers featuring PURE Control™ as manufactured by Fulton Heating Solutions, Inc. Equivalent units by LAARS or Lochinvar must meet all performance criteria, and are acceptable.

2. Basis-of-Design Product: Subject to compliance with requirements, provide Fulton Heating Solutions, Inc.

a. Endura model duplex stainless steel firetube condensing boiler.

1) Alternate boilers must equal or exceed all aspects of this specification in its entirety throughout. Boilers seeking an approval shall provide documentation that supports this requirement.

3. The boiler manufacturer shall have the capability to construct an engineered hydronic system, skid mounted, for the above referenced boilers incorporating single point electrical, supply water, return water, fresh water make up, fuel, and drain. The boiler manufacturer shall have the engineering capabilities for all aspects of the mechanical, electrical and control design aspects of the skid mounted system.

H. CONSTRUCTION

1. Description: Factory-fabricated, -assembled, and -pressure tested, duplex stainless steel firetube condensing boiler with heat exchanger sealed pressure tight, built on a steel base; including flue gas vent; combustion air intake connections, water supply, water return, condensate drain, and controls. The boiler, burner and controls shall be completely factory assembled as a self-contained unit. Each boiler shall be neatly finished, thoroughly tested, and properly packaged for shipping. Closed-loop water heating service only.

2. Heat Exchanger: The heat exchanger is defined as the surfaces of the pressure vessel where flue gases transfer sensible and latent heat to the hydronic fluid. The heat exchanger shall be a three-pass firetube design constructed using only duplex alloys of stainless steel.

a. The boiler shall be a firetube design, such that all combustion chamber components are within water-backed areas. Watertube boilers will not be accepted.

b. Furnace: First pass of the combustion chamber shall be constructed of duplex alloy stainless steel with a minimum wall thickness of 0.25”and a minimum bottom head thickness of 0.625”.

c. Firetubes: Second and third passes of the combustion chamber shall be constructed of duplex alloys of stainless steel having a minimum wall thickness of 0.109".

d. Furnace to tube connections shall be constructed with low weld intensity, a tube to tube minimum spacing of 2" center to center, minimum 5/8" tube to tube ligament, and shall not contain any overlapping welds.

e. Heat exchange capability shall be maximized within the heat exchanger via the use of corrugated firetube technology. The corrugation process shall not remove any material from the tubes. Aluminum heat transfer enhancements are dissimilar metals and are unacceptable.

f. Material: The heat exchanger shall have the following material characteristics and properties:

1) The metallic crystalline lattice microstructure shall contain approximately equal amounts of body center cubic (BCC) and face centered cubic (FCC) structures to offer high resistance to intergranular corrosion.

2) A minimum Pitting Resistance Equivalent Number (PREN) of 26.

3) A minimum Yield Strength of 65 ksi at 0.2% plastic strain.

4) A minimum Ultimate Tensile Strength of 94 ksi.

5) To minimize stresses caused by uneven expansion and contraction, the Coefficient of Thermal Expansion at 212°F shall not be less than 7.0 in/in °F 10^{-6} and shall not be greater than 7.5 in/in °F 10^{-6}.

6) To increase resistance to pitting and crevice corrosion, the Chromium content
shall not be less than 21% by mass.

7) For high mechanical strength, the Nitrogen content shall not be less than 0.17% by mass.

8) Boilers with heat exchangers constructed of austenitic stainless steels, such as 316L or 304, and ferritic stainless steels, such as 439, are unacceptable.

9) Boilers with heat exchangers constructed of cast aluminum, mild steel, cast iron or copper finned tube materials are unacceptable.

3. Pressure Vessel: Design and construction shall be in accordance with Section IV of the ASME Code for heating boilers.

a. The shell shall be minimum**:** 0.3125"thick steel, SA-790 or SA-516 Grade 70.

b. The top head shall be a minimum 0.375"thick steel, SA-790 or SA-516 Grade 70.

c. The water side of the pressure vessel shall be a counter-flow design with internal water-baffling plates.

d. The boiler return and supply water connections shall be**:** 4”150# ANSI flanged. The water connections shall not be designed to support an external structural load from the piping system.

e. The water volume of the boiler shall not be less than EDR-1500: 104 Gallons and EDR-2000: 102 Gallons.

1) For boilers with a lower water volume, the boiler manufacturer shall provide a buffer tank and all associated buffer tank ancillaries to make equivalent to the total volume of the design basis.

f. The maximum water pressure drop across the boiler inlet and outlet connections, shall not exceed EDR-1500: 0.9 PSID at 150 GPM and EDR-2000: 1.6 PSID at 200 GPM.

4. Fuel/Air Mixture Combustion System: Air and gas pre-mix on the suction side of the fan.

a. A Flame-by-Wire™ or equivalent electronic combustion control system shall be provided to empower technicians to accurately dial-in positions electronically. The system shall feature O2 Compensation™ or equivalent to continuously tune the burner air-fuel ratio in real time, automatically adjusting for changes in seasonality to maximize combustion efficiency and condensate production for greater energy savings and reduced emissions. Pneumatic (regulation”, governor”) type systems offer far less precision and are not capable of independent air and gas control and are not accepted.

b. The air and gas tolerance shall be no greater than +/- 0.2° to allow for much more precise control of air-fuel ratio compared to linkages that may slip, or pneumatic gas valves which drift over time and have difficulty handling environmental and installation fluctuations.

1) Combustion air flow shall be controlled by fan speed and a servo-motor actuated butterfly valve. Fuel flow shall be controlled by a servo-motor actuated butterfly valve.

c. PURE Control™ algorithms with open-loop instrumentation shall be used for autonomous fuel/air ratio tuning without requiring manual input. O2 feedback or monitoring-only systems cannot adjust for operation variability and are not accepted.

5. Burner: Standard natural gas, forced draft.

a. Burner Head: Shall be a woven fiber premix design.

b. Excess Air: The burner shall operate at no greater than 8.0% excess O^2 over the entire turndown range. Due to significant reductions in combustion efficiency at high levels of excess O^2 boilers exceeding 8.0% excess O^2 at any operating condition shall not be accepted.

c. Emissions: When operating on natural gas, the boiler shall maintain a NOx level of <20 ppm, and CO^2 emissions less than 50 ppm, over the complete combustion range at a 3% O^2 correction.

6. Blower: Variable speed, non sparking, hardened aluminum impeller centrifugal fan to operate during each burner firing sequence and to pre-purge and post-purge the combustion chamber.

a. Motor: Brushless DC variable speed motor with hall effect sensor feedback; internal electronic commutation controller with built in speed control and protection features; long life, sealed, ball bearing with high temperature grease.

b. Variable speed blower: Closed loop PWM signal input with tachometer output.

7. Main Fuel Train:

a. The boiler shall have a pre-mix combustion system, capable of operating at a minimum 4”W.C. incoming natural gas pressure while simultaneously achieving emissions performance, full modulation, and full rated input capacity. Maximum natural gas pressure allowed to the inlet of the fuel train shall be no less than 28” W.C.

b. A factory mounted main fuel train shall be supplied. The fuel train shall be fully assembled complete with high and low gas pressure switches, wired, and installed on the boiler and shall comply with CSD-1 code. The fuel train components shall be enclosed within the boiler cabinet.

c. Standard CSD-1 fuel train shall comply with AXA XL.

8. Ignition: Direct spark ignition with transformer.

9. Boiler Enclosure:

a. Sealed Cabinet: Jacketed steel enclosure with left hinged full height front access door, fully removable latching access panels, gasketed seams to maintain sealed combustion, mounted on a steel skid with steel plate decking.

b. Control Enclosure: NEMA 250, Type 1.

c. Finish: Internally and externally primed and painted or powder coated.

d. Combustion Air: Drawn from the inside of the sealed cabinet, preheating the combustion air.

10. Rigging and Placement: The boiler shall come with lifting eyes and fork hole accessibility for rigging.

11. Exhaust Manifold: Shall be constructed of stainless steel, with an area for the collection and disposal of flue gas condensate.

12. Characteristics and Capacities:

    a. Heating Medium: Closed loop hot water with up to 30% ethylene glycol by volume. Standard capacities shall be based on 100% water.

    b. Design Water Pressure Rating: 160 psig.

    c. Safety Relief Valve Setting: 125 psig.

    d. Minimum Return Water Temperature: No minimum temperature required.

    e. Maximum Allowable Water Temperature: 210°F.

    f. Minimum Water Flow Rate: No minimum flow rate required to protect the heat exchanger.

    g. Maximum Water Flow Rate: No maximum flow rate requirement.

    h. Minimum Delta-T: No minimum delta-T required.

    i. Maximum Delta-T: 100°F

    j. Minimum Side Clearance: Shall not exceed 1” between any number of boilers.

    k. Maximum Allowable Operating Setpoint: 200°F

    l. Jacket Losses: External convection and radiation heat losses to the boiler room from the boiler shall comply with IAW ASHRAE 103-2007, and shall not exceed 0.2% of the rated boiler input at maximum capacity.

13. The boiler shall have its efficiency witnessed and certified by an independent third party, and the efficiency must be listed on the AHRI directory (www.ahridirectory.org) for natural gas operation. The test parameters for efficiency certification shall be the BTS- 2000 standard. The certified thermal efficiency for natural gas firing shall not be less than EDR-1500: 93.5% and EDR-2000: 93.7%.

14. A zero flow or low flow condition shall not cause any harm to the pressure vessel or heat exchanger of the boiler. Flow switches, dedicated circulator pumps, or primary-secondary arrangements shall not be required to protect the boiler from thermal shock. Boilers requiring the use of flow switches or primary-secondary piping arrangements are unacceptable.

15. The dimensions of the boiler shall not be more than (Height x Width x Depth): 80”x 34” x 61”.

16. The dry weight of the boiler shall not be less than EDR-1500: 2,260 lbs and EDR-2000: 2,360 lbs.

17. The equipment shall be in strict compliance with the requirements of this specification and shall be the manufacturer standard commercial product unless specified otherwise. Additional equipment features, details, accessories, etc. which are not specifically identified but which are a part of the manufacturer standard commercial product, shall be included in the equipment being furnished.

I. TRIM

1. Safety Relief Valve: ASME Rated.

2. Pressure and Temperature Gauge: Minimum 3-1/2" diameter, combination pressure and -temperature gauge. Gauges shall have operating-pressure and -temperature ranges so normal operating range is about 50 percent of full range.

   a. Mounted in the field in the boiler supply water piping prior to the first isolation valve by the boiler installer.

3. Combustion Air Inlet Filter: 50 Micron.

4. Flue Gas Condensate Drain Trap: A flue gas condensate drain trap shall be provided to prevent positive pressure exhaust gases from entering the boiler room.

5. Flue Gas Condensate Neutralization: Provide and install manufacturer pH neutralization kit downstream of condensate drain trap.

J. CONTROLS

1. The boiler electrical controls shall include the following devices and features:

   a. 7"color touch screen control display factory mounted on the front cabinet panel door.

      1) The control display shall serve as a user interface for programming parameters, boiler control and monitoring; and shall feature a screen saver, alarm horn speaker, boiler status, configuration, history and diagnostics.

   b. Integral controls power supply.

   c. Flame safeguard control with 9 combustion fuel/air load profile points.

   d. All standard controls shall be factory mounted and wired according to UL requirements.

2. Burner Operating Controls: To maintain safe operating conditions, factory mounted and wired burner safety controls limit burner operation:

   a. High Limit: A manual reset mechanical Aquastat device shall stop the burner if operating conditions rise above maximum boiler design temperature.

   b. Low-Water Cut Off: Electronic probe type mounted in the pressure vessel shall prevent burner operation on low water alarm.

   c. Air Safety Switch: Prevent operation unless sufficient combustion air is proven.

d. Blocked Exhaust: Prevent operation in the event of a blocked flue gas exhaust stack.

3. O2 Compensation: To maximize efficiency throughout seasonality:

a. System shall use algorithms to automatically adjust the fuel/air ratio during operation, optimizing combustion reliability, flame stability, combustion efficiency, and the dewpoint temperature for formation of flue gas condensate.

b. O2 monitoring-only type systems that cannot automatically adjust combustion for seasonal variability shall not be accepted. Systems that trim but at less than a 100% duty cycle are unable to cope with rapid changes in operating conditions and shall not be accepted.

4. Boiler Operating Controls and Features:

a. Inlet Water Temperature Monitoring.

b. Combustion Air Temperature Monitoring.

c. Flue Gas Exhaust Temperature Monitoring: Sensor probe shall be stainless steel.

d. Proportional Integral Derivative (PID) temperature load control capability for hydronic and domestic hot water in standalone or lead/lag operation.

e. Operating temperature sensor for automatic start and stop.

1) The temperature sensor shall have tolerance according to IEC 60751

f. Time of day display.

g. Customizable boiler name display.

h. Two customizable boiler interlock terminals displayed.

i. Alarm history for a minimum 100 most recent alarms including status at time of lockout.

j. Administrative password protection options.

k. Indirect domestic hot water priority.

l. Outdoor air temperature (OAT) reset controls with warm weather shutdown:

1) OAT reset shall automatically adjust the setpoint according to changes in the
outdoor temperature, and disable the boilers above a warm weather shutdown temperature.

2) The boiler manufacturer shall provide an OAT sensor.

3) The temperature sensor shall be field installed in an outdoor area not exposed to direct sunlight or the exhaust of other mechanical equipment, and wired the boiler controller.

4) The control shall be field programmed with the outdoor reset schedule.

m. Variable Speed System (Secondary) Pump Control:

1) When installed in a variable primary flow configuration, the boiler controller shall provide the capability to control two variable speed hydronic heating pumps. One pump shall be duty, and one standby.

2) The duty system pump shall be enabled upon the outdoor air temperature dropping below the warm weather shutdown temperature. Pumps shall be automatically rotated.

3) Variable speed signal shall be provided to modulate pump speed according to hydronic heating loop Delta-T. A user selectable parameter allows for Delta-P in place of Delta-T.

n. Motorized isolation valve control:

1) Upon heat demand for the boiler, the control shall provide an enable/open signal.

2) After the burner is disabled and upon the heat exchanger delta-T dropping to a user programmable delta-T, the signal will be disabled.

a) Boilers which utilize only a time delay close as the only means of valve actuation are unable to optimize for residual heat, and will not be accepted.

3) In variable primary arrangements, the control shall hold the lead boiler isolation valve open at all times.

5. Building Automation System Interface: Hardware and software to enable building automation system (BAS) to monitor, control, and display boiler status and alarms.

a. Hardwired Contacts:

1) Monitoring: Boiler Status, Burner Demand, General Alarm.

2) Control with Factory Installed Jumper: Safety Interlock for External Device, Remote Enable, Emergency Stop (E-Stop).

3) Remote Setpoint Signal: 4-20 mA or 0-10 VDC.

b. Communication Protocol: A communication interface with BAS shall enable BAS operator to remotely enable and monitor the boiler plant from an operator workstation.

1) The boilers will communicate with each other and the Building Automation System via a daisy chain addressed Modbus network. Field wiring between nodes shall be twisted pair low voltage with shielded ground.

2) A BACnet MSTP and IP protocol communication gateway shall be provided. The BACnet gateway is field installed on a boiler. Additional boilers in the lead/lag system shall not require a dedicated BACnet gateway for the BAS to monitor status. A communication point mapping list shall be provided.

3) A LonWorks protocol communication gateway shall be provided. The LonWorks gateway is field installed on a boiler. Additional boilers in the lead/lag system shall not require a dedicated LonWorks gateway for the BAS to monitor status. A communication point mapping list shall be provided.

K. ELECTRICAL POWER

1. Single-Point Field Power Connection: Factory-installed and factory-wired switches, transformers, control and safety devices and other devices shall provide a single-point field power connection to the boiler.
2. Electrical Characteristics:

a. Voltage: 120 V.

b. Phase: Single.

c. Frequency: 60 Hz.

L. VENTING

1. The boiler shall be capable of operating with a stack effect not exceeding -0.04”W.C. and a combined air intake and exhaust venting pressure drop not exceeding +1.50”W.C.

2. Combustion Air Intake: Direct vent the boiler using sealed combustion by drawing combustion air in from the outdoors.

a. Sealed Combustion: Schedule 40 PVC pipe or smooth-walled galvanized steel, vent termination with 1/2”x 1/2”mesh bird screen.

3. Flue Gas Exhaust: The flue gas exhaust stack shall be AL 29-4C or 316L stainless steel, listed and labeled to UL-1738 / C-UL S636 for use with Category II/IV appliances, guaranteed appropriate for the application by the manufacturer and supplier of the venting.

4. Common Exhaust Vents: The draft system shall be designed for Category II and to prevent the backflow of exhaust gases through idle boilers.

5. Condensate drain piping must be galvanized, stainless steel, or Schedule 40 CPVC. Copper, carbon steel, or PVC pipe materials are not accepted.

M. SOURCE QUALITY CONTROL

1. Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code.

2. Each boiler shall be installed and operated in a functioning hydronic system, inclusive of venting, as part of the manufacturing process. A factory test fire report corresponding to the boiler configuration shall be included with each boiler.

N. EXAMINATION

1. Before boiler installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting boiler performance, maintenance, and operations.

   a. Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.

2. Examine mechanical spaces for suitable conditions where boilers will be installed.

3. Proceed with installation only after satisfactory conditions have been verified.

O. BOILER INSTALLATION

1. Install boilers level on concrete pad, minimum 4 inches high.

2. Install gas-fired boilers according to NFPA 54. Equipment and materials shall be installed in an approved manner and in accordance with the boiler manufacturer installation requirements.

3. Assemble and install boiler trim.

4. Install electrical devices furnished with the boiler but not specified to be factory mounted.

5. Install control wiring to field-mounted electrical devices.

P. CONNECTIONS

1. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

2. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.

3. Connect gas piping to boiler gas train inlet with isolation valve and union. Piping shall be at least full size of gas train connection. Provide a reducer if required.

4. Connect hot water supply and return water connections with shutoff valve and union or flange at each connection.

5. Install piping from safety relief valves to the nearest floor drain.

6. Install piping from flue gas condensate drain connection to the condensate drain trap and to the nearest floor drain.

7. Boiler Venting:

   a. Install flue venting and combustion air-intake.

   b. Connect to boiler connections, flue size and type as recommended by the manufacturer.

8. Ground equipment according to Division 26 Section “Grounding and Bonding for Electrical Systems.”

9. Connect wiring according to Division 26 Section -Voltage Electrical Power Conductors and Cables.”

Q. FIELD QUALITY CONTROL

1. Perform tests and inspections and prepare test reports.

   a. After boiler installation is completed, the manufacturer shall provide the services of a field representative to inspect components, assemblies, and equipment installations, including connections and provide startup of the boiler and training to the operator.

   b. Arrange with National Board of Boiler and Pressure Vessel Inspectors for inspection of boilers and piping. Obtain certification for completed boiler units, deliver to Owner, and obtain receipt.

2. Tests and inspections:

   a. Perform installation and startup checks according to manufacturer written instructions.

   b. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.

   c. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.

      1) Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level and water temperature.

      2) Set field-adjustable switches and circuit-breaker trip ranges as indicated.

3. Remove and replace malfunctioning units and retest as specified above.

4. Occupancy Adjustments: When requested within 12 months of startup, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to 2 visits to Project during other than normal occupancy hours for this purpose.

2.2 WATER TREATMENT EQUIPMENT: (SEE SECTION 23 1600 – "HVAC WATER TREATMENT")

A. Provide one shot chemical feeders, 5 gallon capacity, with the following (closed) systems:

1. Hot water.

2. Chilled water.

For each one-shot feeder provide inlet, outlet, fill, vent and drain valves together with fill funnel with hinged cover.

2.3 BOILER VENTS: (See "2.1 HOT WATER CONDENSING BOILERS – NATURAL GAS", Paragraph "L" VENTING.)

2.4 ELECTRIC PIPE LINE HEATERS:

A. Electric heaters equal to "Auto-Trace" or Chromolox "Self-Regulating Freeze Protection" heating cable, wattage as required to prevent freezing in 0°F ambient, equipped with conduit connectors and outdoor thermostat set at 32°F.

B. Extent:

1. All chilled water piping outdoors above grade.

C. Installation: Minimum installation requirements are based on 1-1/2" thick cellular glass insulation over electric pipe line heaters and self-regulating low temperature cable. Provide 1 or 2 straight runs of pipe line heaters as indicated at the heat output noted. Follow manufacturer's recommendations for installation.

Nominal Pipe Size	Electric Heater Output (w/Ft.)	Number Of Straight Runs of Pipe Line Heater Per Pipe
2" and under	3.0	1
2-1/2"	3.0	1
3"	3.0	1
4"	5.0	1
6"	8.0	1

8”	8.0	1
10”	8.0	1
12”	8.0	1

2.5 AIR COOLED WATER CHILLER UNITS:

A. Include multiple microprocessor controlled scroll compressors, condenser and condenser fan and liquid cooler, all enclosed in a single casing. Provide a separate refrigerant circuit for each compressor. Chiller shall have power wiring arranged for a dual power feed to unit. Refrigerant: R-454B. Chillers shall be certified in accordance with the latest Standard AHRI 550/590. Chillers shall have a minimum NPLV of 15.7 EER.

B. Cabinet: heavy gauge aluminum or galvanized steel for outdoor installation. (Galvanized steel casings shall be finished with enamel over bonderizing.) Equip cabinets with access panels, condenser inlet guards and fan outlet guards. Provide padlock connections for power and control panels.

C. Compressors: hermetic scroll-type compressors, including the following:

1. Complaint design for axial and radial sealing.

2. Refrigerant flow through the compressor with 100% suction cooled motor.

3. Large suction side free volume and oil sump to provide liquid handling capability.

4. Compressor crankcase heaters to provide extra liquid migration protection.

5. Annular discharge check valve and reverse vent assembly to provide low-pressure drop, silent shutdown and reverse rotation protection.

6. Initial oil charge.

7. Oil level sightglass.

8. Vibration isolator mounts for compressors.

9. Brazed-type connections for fully hermetic refrigerant circuits.

10. Compressor motor overloads capable of monitoring compressor motor current.

11. Factory-mounted compressor acoustic sound blankets.

D. Condenser coils: all-aluminum microchannel coils.

E. Provide entire chiller (including condenser coil) with factory or field applied seacoast coating. Apply Luvata® Insitu, or equal: protective coating shall be a spray-applied, low VOC, synthetic, water-based coating embedded with 316 stainless steel to all surface areas, Coating shall be flexible when cured and have a dry film thickness of 1.-2. mills of thickness and resistant to cracking due to thermodynamic expansion and contraction.

Coating shall be compliant with EPA standards and registered with the SCAQMD as an environmentally sustainable single part water based coating, registered and permitted with local EPA air management agencies for use as a HVAC protective coating product.

Application company shall be fully permitted, licensed and can demonstrate an association with all major factory brands for a period longer that 5 years and show a history of workmanship compliance excellence with the manufacture of such equipment specified.

Coating applicator shall prove to be in business and financially solvent for a period exceeding the specified warranty of 5 years.

Coating shall have superior hardness characteristics per ASTM D3363-92A and a crosshatch adhesion of 4B-5B per ASTM B3359-93. Humidity and water immersion resistance shall be up to a minimum of 1000 hours (ASTM D2247).

Polymer coating will meet ASTM requirements in relation to microbial contamination as per G-21 and D-3273 testing protocol.

Corrosion durability shall be confirmed through testing of no less than 5,000 hours salt spray per ASTM B117-90.

Provide 5-year written and submitted conditional warranties.

Preferred Product – Luvata “Insitu” (or equal). Recommended Application Company – Luvata Electrofin Inc.

F. Condenser fans: dynamically and statically balanced, direct drive, corrosion resistant glass fiber reinforced composite blades molded into a low noise, full airfoil cross section, providing vertical air discharge and low sound. Each fan in its own compartment.

G. Vibration Isolation: Provide seismic deflection rated vibration isolators sized for operational weight of chillers.

H. Fan Motors: High efficiency, direct drive, rigid mounted, with double sealed, permanently lubricated, ball bearings.

I. Water chiller: shell and tube or shell and coil direct expansion chiller (with a separate refrigerant circuit for each compressor), shell baffles to provide capacity shown, drain connection, 1-1/2” thick evaporator foamed plastic insulation. Paint all foamed plastic insulation with two (2) coats of manufacturer approved weather resistant paint.

J. Interconnecting refrigerant piping: Type L hard copper, wrought copper sweat fittings silfossed, foamed plastic insulation.

K. Provide (liquid receiver if condenser coil will not contain entire system charge where 80% full at 100°F) suction and discharge service valves and liquid stop valve.

L. Controls: factory wired, located in a readily accessible rain and dust tight control cabinet with provision for padlocking.

1. Compressor motor controls: line voltage contactors and both temperature and current sensitive overload devices, cycle timer to limit compressor starts to 5 or 6 minute intervals, oil pressure switch, high and low pressure switches and crank case heater.

2. Chiller controls: solenoid liquid valve for each circuit, operating thermostat to cycle solenoids valves, and low limit chilled water thermostat.

3. Provide automatic reset upon power loss.

M. Pump:

1. Pump package includes: two pumps, expansion vessel, drainage valve, shut-off valve at entering and leaving connections.

2. The pump package is single point power integrated into the chiller unit power with a separate factory wired control panel and separate power for freeze protection.

3. The control of the pump is integrated into the chiller controller. The Symbio (TM) 800 unit control module displays evaporator pump starts and run-times. Freeze protection down to an ambient of -29˚C (-20˚F) is included as standard. The cold parts of the pump package will be insulated. Designed with one redundant pump, it is controlled to operate both pumps through a lead/lag and failure/recovery functionality.

4. A variable speed drive is installed in an additional panel to control the pump. The inverter is adjusted upon start up to balance the system flow and head requirements. The purpose is to save on wasted pump energy caused by a traditional balancing valve.

N. Chillers shall have a minimum 14,000 amps interrupting capacity (AIC) rating.

O. The chiller warranty shall include the entire chiller and shall be for 5 years from start-up date. During the warranty period the manufacturer shall furnish all **parts** and **labor** required for any warranty failure. The warranty shall include any expenses required for travel, lodging, meals, etc. for the technician performing the work or any freight costs for replacement parts.

P. The installation, pressure testing, evacuation, dehydration, charging and initial startup, final assembly and alignment of all refrigeration equipment shall be done under the supervision of the manufacturer's factory trained representative. Include services of a factory trained technician for instructing Owner's operating personnel in machine operation: One (1), Eight (8) hour day. Training shall be scheduled and coordinated with the Owner a minimum of two (2) weeks prior to date of training. Review of factory start-up reports along with operation and maintenance (O&M) manuals shall be included in Owner training.

Q. Provide a minimum of three (3) sets of hard copies and two (2) CD's with PDF files with manufacturer's operating and maintenance (O&M) manuals and parts lists for all equipment and materials furnished. Provide a maintenance schedule listing routine maintenance operations and suggested frequency thereof. Include all warranty dates on equipment and guarantees. Refer to O&M requirements.

R. Verification of Capacity and Efficiency: Chiller shall be run-tested at the manufacturer's plant or laboratory, to check performance (tons and KW), vibration, operating controls, safety cutouts and to confirm reliable operation with no oil loss. The manufacturer shall provide to the Owner a certified test report to confirm that the chiller performs as specified before final payment. Attach a sample test report with the proposal to insure conformance with AHRI 550/590. Each proposal must include a factory sample test report. The performance test shall be run in accordance with AHRI 550/590. The procedures and instrumentation listed below conforms to AHRI 550/590. The guidelines must be followed to insure the accuracy of this performance test.

S. The equipment will be accepted if the test procedures and results are in conformance with AHRI Standard 550/590. If the equipment fails to perform within allowable tolerances, the manufacturer will be allowed to make necessary revisions to his equipment and retest as required. In the event that these revisions do not achieve submitted performance the following penalties will be imposed. If such test revisions are required or the testing is delayed and the travel time is extended at the fault of the manufacturer, the manufacturer will be responsible for all incidental costs associated with such delays (hotel, meals, flight change fees, etc.)

1. Capacity Test: For each ton below AHRI 550/590 tolerance; five hundred dollars per ton will be assessed to the chiller manufacturer or deducted from the contract price.

2. Power Consumption Test: The power consumption penalty shall be based on the tolerances set forth in AHRI Standard 550/590. The power consumption penalty (P.C.P.) will be calculated based upon the following formula:

P.C.P. = [Measured KW - (scheduled KW)] x $1000/KW

T. Mount chiller on seismic vibration isolators on structural steel as shown. Coordinate exact location and mounting with Structural.

U. Provide differential pressure switch with chiller.

V. Provide full integrated BAS connectivity via BACnet® MS/TP. Coordinate requirements with Andover Controls vendor prior to order being placed. See controls sequences on drawings for capabilities. BAS shall have capability of load limiting chiller.

W. Provide 5 year non-prorated compressor parts and labor warranty as part of the chiller warranty.

X. Chillers shall be Trane Model CGAM ***or Carrier Model 30RC***.

2.6 VARIABLE FREQUENCY SPEED CONTROLLERS:

A. For each motor so scheduled provide a variable frequency, AC, solid state, induction motor speed controller. The speed controller shall be self-contained, with all components enclosed in a NEMA 1 cabinet and be capable of operation 1-40 degrees centigrade. The controller shall be capable in operating with ± 10% of system voltage and 60 Hz ± 3% frequency variation. It shall have 10-1 frequency range. The speed controller shall be wall or floor mounted.

B. The speed controller shall be automatically controlled by a pneumatic 3-15 psi signal, 10 volt dc, 4-20 milliamps, control signal. 20 milliamps shall correspond to maximum speed and 4 milliamps shall correspond minimum speed. The controller shall have capability to invert the input signal, if necessary due to process requirements. Coordinate control signal with controls contractor.

C. The VFD's shall limit harmonic distortion reflected onto the utility system to a voltage and current level as defined by IEEE 519 for general systems applications, by utilizing the standard 3% nominal impedance integral ac three-phase line reactor. An isolation transformer or external line reactor may be substituted as an option. Provide line reactor on the output of the drive to limit standing wave and to prevent damage to the VFD and motor. **All VFD's for motors 150 HP or more shall be Active Front End (AFE) utilizing insulated gate bipolar transistors (IGBTs) instead of diodes in the rectifier circuit. Active Front End (AFE) drives shall limit total harmonic distortion to 3%.**

D. Total harmonic distortion shall be calculated under worst case conditions in accordance with the procedure outlined in IEEE Standard 519-1992. Copies of these calculations shall be provided in the submittal. The contractor shall provide any needed information to the VFD supplier three (3) weeks prior to submittal date.

E. If the system cannot meet the IEEE 519-1992 harmonic levels with VFD's provided with the standard input line reactor or optional input isolation transformer, the VFD manufacturer shall supply a twelve pulse, multiple bridge rectifier ac to dc conversion section with a phase shifting transformer.

F. The speed controller shall be completely prewired at the factory and shall have one input power connection and one output power connection to the motor. If isolation transformer, line filters, or other equipment is required external to the speed controller cabinet, then all interconnecting wiring shall be provided at no extra cost to the Owner. See Electrical single line wiring diagram for input wire size and lug size required. Each motor connected to the VFSC in a fan array shall have a Manual Motor Protection (MMP) overload device. Note: VFSC to be supplied separate for each application.

G. Sound power developed by speed controllers shall not numerically exceed NC-75 sound pressure and by motors shall not exceed 4 dB(A) above specific motor across the line delivered sound pressure levels in 2nd through 8th octave bands.

H. VFD programmable parameters shall be adjustable from the keypad. The display shall be alphanumeric, programmable with status indicators. The display shall be in plain English words for parameters, status and diagnostic messages. Alphanumeric codes and/or tables are unacceptable.

I. Standard advanced programming and trouble-shooting functions shall be available by using a personal computer's RS-232 port or RS-485 port and Windows™ based software. In addition, the software shall permit control and monitoring via the VFD's RS-232 port or RS-485 port. VFD manufacturer may offer a BAS serial link and field bus adapter for standard protocols.

J. Provide two (2) programmable Form C contact outputs (one for motor running and one for fault trip) and one (1) programmable 24VDC open collector output (for drive ready).

K. Provide six (6) digital inputs for start/stop, local/remote, external interlock, two preset speeds and run enable.

L. The drive shall record and log faults. The VFD shall display all faults in plain English.

M. The variable frequency drive(s) and all components shall be designed, manufactured and tested and approved in accordance with the latest applicable ANSI, IEC, UL, CUL, CSA and NEMA standards. Each drive shall be rated to withstand a minimum of 65,000 amps fault current. (Verify available fault current with electrical.)

N. The supplier of the drive assembly shall be the manufacturer of the electromechanical power components used within the assembly, such as bypass contactors, circuit breaker, fused disconnect switch devices when specified.

O. The supplier of this equipment shall have produced similar electrical equipment for a minimum period of ten (10) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

P. The VFD's shall be of the Pulse Width Modulated (PWM) design converting the utility input voltage and frequency to a variable voltage and frequency output via a two-step operation. Adjustable Current Source VFD's are not acceptable. Insulated Gate Bipolar Transistors (IGBT's) shall be used in the inverter section. Bipolar Junction Transistors, GTO's or SCR's are not acceptable.

Q. The VFD's shall be capable of operating any NEMA Design B squirrel cage induction motor, regardless of manufacturer, with a horsepower and current rating within the capacity of the VFD. VFD carrier frequency shall be limited to 3-8 kHz for optimum motor performance.

R. The VFD's shall be able to start into a spinning motor. The VFD's shall be able to determine the motor speed in any direction and resume operation without tripping. If the motor is spinning in the reverse direction, the VFD's shall start into the motor in the reverse direction, bring the motor to a controlled stop, and then accelerate the motor to the preset speed.

S. The speed controller shall incorporate the following minimum features:

1. Door interlocked circuit breaker or disconnect switch with input fuses capable of being locking in off/open position.

2. All control inputs isolated from ground and power.

3. Hand-off-automatic selector (on face of panel).

4. Ground fault protection, over current, over voltage, under voltage, over temperature, loss of speed reference, and UL 5086 motor overload protection.

5. Pilot light indication for VFD and bypass modes (on face of panel).

6. Individual acceleration/deceleration adjustments.

7. Maximum and minimum speed adjustments.

8. 120V AC control power transformer for low voltage control that can easily interface with building safe interlock circuits.

9. Solid State microprocessor based logic for starting and stopping motors.

10. One analog output signal for output frequency.

11. Insensitivity to incoming phase rotation.

12. Auto reset with coast down timer with 0.05 second dropout (after power or thermal shutdown).

13. Output current limiters.

14. Motor stall protection.

15. Manufacturer's warranty of 2 years from date of start-up.

16. Output isolation contactor.

17. Bypass contactor mechanically and electrically interlocked with the output isolation contactor.

18. Overload relays for bypass contactor.

T. Provide factory check-out and start-up service.

U. Speed controllers shall be suitable for use with current shown on the Electrical drawings.

V. Speed controllers shall be ABB ACH-580, Danfoss, Reliance, Square D, Cutler-Hammer.

2.7 LINE MOUNTED PUMPS:

A. Line mounted pumps: 1750 rpm spring coupled pumps with iron bodies, bronze trim, stainless steel shafts, sleeve bearings, mechanical seals, resiliently mounted motors and gauge tappings in pump flanges, B&G, Patterson, Taco, ***or Armstrong***.

2.8 BASE MOUNTED PUMPS:

A. Base mounted pumps: enclosed impeller design, arranged to permit removing impeller without dismantling piping. Motors: 1800 rpm, drip proof, high efficiency (see Motors). Provide casings designed for pressure shown, but not less than 175 psig at suction. Provide motors sized to prevent overload at zero head horse power with impeller furnished.

B. Shafts: turned from heat treated carbon steel, key seat for the impeller, threaded for shaft nuts, finish turned over entire surface.

C. Shaft Sleeves: Equip portions of the shafts coming in contact with the water with removable bronze or stainless steel sleeves.

D. Impeller: bronze with machined finish on the outside and smooth surfaces inside, balanced to prevent vibration. Impeller diameters shall not exceed 85% of maximum diameter for volute.

E. Casing wearing rings: bronze, easily replaced, installed to prevent rotation.

F. Equip pumps with mechanical seals suitable for use with design water temperatures. Provide 1 spare shaft seal of each size used on job.

G. Bearings: ball grease lubricated type of ample size to insure cool running without the necessity of water cooling, effectively sealed against the entrance of water, dust or dirt and leakage of grease.

H. Couple motor to pump with flexible coupling equal to Dodge "Paraflex".

I. Mount motor and pump on common rigid steel or cast iron base and grout pump base per manufacturer's recommendations.

J. Pumps shall be Armstrong, Aurora, Bell & Gossett, Paco, Patterson or Taco.

K. Align pump and motor in accordance with manufacturer's instructions. Check alignment after first 8 hours operation.

2.9 STANDARD HORIZONTAL OR VERTICAL AIR HANDLING UNITS:

A. Horizontal or vertical air handling units: factory fabricated units having capacity shown, consisting in general of a mixing box section, a filter section, a preheat coil section, an access section, a cooling coil section, drip pan and drain sections, and supply and return fan sections, all the product of a single manufacturer. Provide all sections of the same frame size with support rails for all sections. Mount units on ribbed neoprene pads on concrete curbs as shown.

B. Casing: not lighter than 18 gauge galvanized steel, all sections of casing insulated with 2" thick 3 lb./cu.ft. coated fiberglass insulation. All sections shall be of double wall construction with perforated 26 gauge galvanized steel liner on air side of all sections except coil section, which shall be solid.

C. Drain pans: double construction with insulation between pans and 16 gauge type 304 stainless steel inner pan.

D. Coil sections shall be double wall solid construction with the coils scheduled. Coils shall comply with the requirements below for coils.

E. Provide spacer sections for installing control bulbs between pre-heat and cooling coils. At least 18" space must be provided between preheat and chilled water coils.

F. Provide pipe access plenums at each coil pipe connection.

G. Provide hinged and latched access doors in casings at fan sections, filter sections, plenum sections, upstream and downstream from cooling coils and elsewhere as shown and/or required for access to equipment and/or controls. Construct doors with 1-1/2" insulation between 2 sheets 24-gauge galvanized steel. Set doors in frames arranged so that doors will be flush with exterior of casing. Equip each door with at least 2 hinges and 2 sets of double acting latches. Latches shall be made from nonferrous metal, with a lever handle on the outside and a lever handle on the inside of the casing. Lever handle on the outside of the casing shall cam over a door pull with a stop. Doors shall be reinforced to prevent wracking and warping. Provide 3" butt hinges and weld to doors and to door frames. Provide galvanized steel nosings on casing insulation at doors. All pressurized access doors shall open into the fan section. Install gaskets at all section connections.

H. Automatic dampers shall comply with the requirements for automatic dampers below.

I. Air filters: see equipment schedule and "Air Filters". Provide side access filter sections, complying with the requirements under "Air Filters".

J. Provide vapor proof marine lights in all sections. Lights shall be factory wired with switches located next to access door. Wiring to be in compliance with NEC and Division 26.

K. Fans: Plug fan forward curved or backward curved blade centrifugal fans, complying with the requirements for "Centrifugal Fans, General" statically and dynamically balanced to a peak vibration velocity of 0.157 inch/second, with corrosion resistant coating. Bearings shall be minimum ***(L_{50} 200,000)*** hour self-aligning grease lubricated ball bearings. Grease fittings shall be extended to accessible locations after units are installed. Fan and fan motor shall be mounted on spring isolated base inside unit, and snubbing isolators shall be provided for discharge flexible connections. Isolators shall comply with the requirements for Vibration Isolators (Section Materials & Methods, HVAC). Fan motor shall be mounted on an adjustable base and shall be equipped with V-belt drive sized for 150% motor nameplate rating, adjustable pitch motor pulley for motors 25 H.P. and smaller. For plug fan section access doors provide time delay door switches, chains and screened wheel guards.

L. AC units shall be Trane, ***Carrier*** or approved equal.

2.10 SPLIT SYSTEM AIR CONDITIONERS - SMALL:

A. Split system air conditioners shall consist of a wall mounted indoor section, outdoor condensing unit, connecting refrigerant piping, and electronic controls. System shall be UL rated.

B. Indoor unit shall consist of centrifugal evaporator fan(s), evaporator coil, drain pan with condensate pump and safety switch, all enclosed in a plastic casing equipped with adjustable supply grille and return air grille. Provide 3 pole disconnect switch.

C. Outdoor unit shall consist of compressor, condenser coil, condenser fan, and controls, all enclosed in a metal grilled cabinet suitable for roof or pad mounting. Provide refrigerant piping kit, pre-insulated, properly sized for capacity shown. (See drawings to determine length.) Provide low ambient operation to 20°Fdb outdoors.

D. Controls shall consist of a wall mounted remote controller utilizing a microprocessor. Functions shall include:

1. Computerized dehumidification.
2. Operation mode setting.
3. Self-diagnostic display.
4. Room temperature display.
5. Twenty-four hour on-off timer.
6. Fan speed indicator.
7. Memory.
8. Low ambient operation.

E. Split system air conditioners shall be Trane-Mitsubishi, ***Carrier*** or approved equal.

2.11 COILS

A. Rated in accordance with ARI Standard 410-72 with capacities and dimensions shown.

B. Provide coils (other than sprayed coils) with aluminum fins and seamless copper tubes.

C. Sprayed coils shall have copper fins and seamless copper tubes. Solder coat fins and tubes.

D. Headers may be iron castings or steel or copper tubing. Braze return bends.

E. Space fins not closer than 10 per inch except that fin spacing may be decreased to maintain maximum coil depth of 8 rows (minimum 4 row coil for chilled water coils).

F. Circuit water coils to maintain pressure drops shown.

G. Prove coils tight with 200 psig under water air test.

H. Coil casings: 16 gauge stainless steel with flanges drilled for mounting.

I. Coils: Trane, ***Carrier*** or approved equal.

2.12 AIR FILTERS:

A. Type Filters: Replaceable. UL Standard 900 - Class II Type Filters. Replaceable filters. Maximum face velocity 300 fpm, maximum initial resistance 0.3" WG, minimum 30% ASHRAE 52-72 test efficiency. Minimum ratio of media area to face area 4.6:1. All components fire retardant and suitable for use in approximately 85% RH atmosphere. Turn system over to Owner with clean filters and furnish two (2) sets of spare filters for each unit. Farr 30/30.

B. Frames: minimum 18 gauge galvanized steel, riveted into banks and sealed air tight between adjacent frames and between frames and casing walls using United Duct Sealer.

C. For each filter bank provide one magnehelic gauge with static pressure tips, shut off and vent cocks, range 0 to 3" WG.

D. Side access housings for filters having efficiencies less than 80% shall have PVC air seals. Side access housings for filters having efficiencies of 80% or greater shall be equipped with camming mechanism to force filter gaskets into edge seal. All housings shall have hinged and latched access doors and slide-in racks for metal panel or throwaway prefilters. Housings: minimum 18 gauge galvanized steel reinforced with galvanized angles or formed shapes. Side access housings downstream from supply fans shall be constructed and gasketed to be air tight under 6" WGSP. Housings downstream from cooling coils shall be insulated with l/2" thick fire retardant foam plastic insulation.

E. Filters for exhaust systems: Replaceable filters in side access housings. Maximum face velocity 250 fpm. Maximum initial pressure drop 1" WG minimum DOP EFFICIENCY 99.97%. All components fire retardant. Side access housings shall be designed for outdoor use and shall be equipped with camming mechanism to force filter gaskets into edge seal. Housing shall be equipped with hinged and latched access doors. Housings shall be constructed of not lighter than 18 gauge galvanized steel reinforced with galvanized angles or formed shapes. Turn systems over to Owner with clean filters (and furnish complete sets spare filters of each size).

F. For each pre-filter bank, each after-filter bank, and each exhaust filter provide one magnehelic gauge with static pressure tips, shut off and vent cocks, range 0 to 3" WG.

2.13 CENTRIFUGAL FANS, GENERAL:

A. Fan ratings: certified in accordance with AMCA Standard 210. Provide Fans of class required for service based on static pressures 20% greater than those scheduled.

B. Provide forward curved blade, radial blade, backward curved blade or air foil blade fans as scheduled. All fans shall be statically and dynamically balanced with L_{50} 200,000 hour rated self-aligning, grease lubricated ball or roller bearings rigidly supported by bearing stands.

C. For all fans furnish adjustable motor bases or rails.

D. Size V-belt drives for 50% overload, and provide adjustable pitch motor pulleys for drives of 15 BHP and smaller.

E. For all fans (outside casings) provide belt and drive guards.

F. Provide scroll access doors with quick-operating latches for all exhaust fans.

G. Equip all fans with flanged outlets and casing drains.

H. Sound power levels shall not exceed those shown.

I. Size fan motors to provide at least 5% drive loss, with motor service factors not exceeding 1.0. Provide high efficiency motors as specified under "Motors".

J. Provide weather hoods for motors, drive, and vibration isolators for fans located outdoors.

K. Where scheduled provide variable inlet vanes with rods extended for connection to control operators.

L. Where scheduled provide corrosion resistant coating consisting of 2 coats of chlorinated rubber base paint on all parts in airstream.

M. Where shown on electrical drawings provide 2 speed separate winding motors (1800/900 rpm).

N. Where shown on electrical drawings provide motors suitable for 2-step increment starting.

O. Vibration isolators: See Section Materials and Methods - HVAC.

P. Fans: Buffalo, Trane, Clarage or Acme.

2.14 IN-LINE CENTRIFUGAL FANS:

A. AMCA approved air and sound rated direct or belt driven fans as scheduled, complete with V-belt drives sized for 50% overload, self aligning grease lubricated ball bearings, adjustable pitch motor pulleys, adjustable motor bases and statically and dynamically balanced backward curved blade wheels, all enclosed in a galvanized steel housing with inlet bell and outlet duct collars. (Fan wheel and motor assembly shall be hinged for access.)

B. Fans shall be Greenheck type SQ, Carnes, Peerless, Acme, Penn or Loren Cook.

2.15 CENTRIFUGAL ROOF EXHAUSTERS:

A. Centrifugal power roof ventilators with AMCA certified air and sound ratings, belt or direct driven as shown. Provide permanently oiled bearings, statically and dynamically balanced backward curved blade wheels and spun aluminum housing with curb cap, disconnect switches, back-draft damper and outlet bird screen. For belt driven fans provide V-belt drive sized for 50% overload, adjustable pitch motor pulley and adjustable motor base. For each fan furnish an 18 gauge galvanized steel insulated prefabricated curb with integral cant. Furnish baffled sound absorbing curbs where required to obtain noise levels specified. Static pressures scheduled are external to sound curbs.

B. Fans shall be Greenheck, Acme, Carnes, Penn or Loren Cook.

2.16 PROPELLER FANS:

A. AMCA rated fans, belt or direct driven as scheduled. Equip belt driven fans with V-belt drives sized for 50% overload, adjustable pitch motor pulleys and adjustable motor bases.

B. Equip each fan with belt and wheel guards and a mounting panel not lighter than 16 gauge.

C. Provide gravity or motor operated shutters where indicated in equipment schedule. Equip motor operated shutters with spring return motors with oil-immersed gear trains.

D. Where indicated on plans provide fans equipped with panels reversed for supply operation.

E. Where shown provide penthouses constructed of not lighter than 18 gauge galvanized steel and 18 gauge galvanized steel prefabricated curbs. Equip penthouses with access doors and internal insulation not lighter than 1" x 3 lb/cu. ft.

F. Fans: Coolair, Greenheck, Acme, Stanley or Loren Cook.

2.17 ELECTRIC WALL HEATERS:

A. UL listed recessed convection heaters with finned sheathed heating elements, resiliently mounted direct driven propeller fan with motor heat shield, concealed thermostat, concealed on-off switch, high limit controls, and junction box for connecting power wiring.

B. Cabinets: 16 gauge steel, with pencil proof welded steel bargrilles (bars 1/16" x 3/8" minimum). Equip cabinet with adjustable recessing frame. Finish: Baked enamel, over bonderizing. Architect will choose color from manufacturer's standard selections.

C. Electric wall heaters: 2 KW and larger, Markel 3400 series, less than 2 KW, Markel Series 3120, Erincraft AWH or equal.

2.18 UNIT HEATERS (ELECTRIC):

A. UL listed electric unit heaters having capacity shown with resiliently mounted direct driven propeller fan with guard, finned-sheathed heating elements, and enameled steel enclosure not lighter than 20 gauge. Heater shall be equipped with automatic reset high limit controls, power contactors and control transformer for 24 volt control, factory wired to terminal strips.

B. For horizontal heaters provide adjustable horizontal louvers. For vertical heaters provide louver.

C. For each unit heater provide room thermostat to cycle contactor and fan.

D. Electric Unit Heater: Chromalox, Erincraft or Berko.

2.19 EXPANSION JOINTS, ANCHORS AND GUIDES:

A. Expansion joints: 150 psig WP controlled flexing bellows type packless joints with stainless steel bellows, compression traverses not less than those shown and extension traverses not less than 1/4". Joints 2" and smaller: screwed with union ends. Joints 2-1/2" and larger: flanged.

B. Alignment guides: prefabricated guides consisting of a steel spider clamped to pipe riding inside a steel cylinder with integral mounting feet. Install guides 4 and 18 pipe diameters upstream and downstream from each expansion joint.

2.20 WATER SPECIALTIES:

A. Install ASME rated pressure relief valves as noted, providing full size drain lines to within 1 ft. of floor. Relief valves: Watts, McDonnell & Miller, or equal.

B. Install 1/2" IPS x 75 psig WP float type automatic air vents in water lines as shown and/or required to prevent air binding. Run 3/8” OD line to outdoors or nearest floor drain or AC system drain line from each vent. Install a 1/2" ball valve ahead of each air vent. Vents shall be Armstrong, or equal.

C. Strainers: 125 psig WP, pot or angle type as shown. Strainers 2" and smaller: bronze or iron bodies with screwed connections; strainers 2-1/2" and larger: iron bodies and flanged connections. Screens: bronze, monel metal or stainless steel with perforations as follows:

Strainer Size	Perforation Size
3/4" to 2" inclusive	1/32"
2-1/2" to 6" inclusive	1/16"
8" to 12"inclusive	1/8"
Over 12"	1/4"

The free area of each screen shall be not less than three times the area of the strainer inlet pipe. Equip each strainer with 1/2" valved drain, and unless the strainer design is devoid of air pockets, a 1/4" air vent cock.

D. Compression and expansion tanks: black steel (bladder) tanks ASME stamped for 125 psig WP. Provide tappings and specialties as shown. (Initial air charge: as required to provide 10 psig fill pressure at top of system.) Taco or American Wheatley.

E. Line mounted air separators: tangential separators with tappings shown, without strainers. Separators shall be Bell & Gossett, Taco or American Wheatley.

F. Install backflow preventers equal to Watts 900 in all (potable) city water connections to HVAC water systems.

G. Install air control fittings equal to Bell & Gosset "Airtrol", in all compression tanks and boilers as shown.

H. Install drain valve with hose connection and air venting provision on each compression tank.

I. Flow control valves: weighted check valves with provision for holding valve open, B&G.

J. Install combination flow control and stop valves equal to B&G "triple duty" valves where shown.

K. Install cast iron suction diffusers with integral strainers, flanged connections, flanged covers and gauge, vent, and drain tappings in pump suctions as shown. Main strainer screens: as specified for strainers, above. Remove start-up screens after system has been flushed.

L. Divertor fittings: B&G monoflo fittings, or equal.

M. Radiator valves: union end, 150 psig WP, brass, composition disc, composition mushroom handle, spring packed.

N. Pressure reducing valves for make up water connections 125 psig WP, iron, bronze trim, set point range as required to provide 10 psig fill pressure at top of system, B&G or equal.

O. Install gauge glass sets with valves, drain cock, and protector rods where shown. Do not install gauge glasses on closed compression tanks.

P. Balancing valves, 2” and smaller: Bronze body, ball type, 125 psig working pressure, 250°F maximum operating temperature, and having threaded ends. Valves shall have fixed orifice or venturi, connections for portable differential pressure meter with integral seals, and be equipped with a memory stop to retain set positions.

Q. Calibrated balancing valves ("Circuit Setter"): 125 psig WP, 2" and smaller bronze, screwed; 2-1/2" and larger IBBM, flanged plug valves. All with indicator for angular position of valve, meter connections with positive shut-off valves and internal seals to prevent leakage around stem. For each valve provide a flow vs. differential pressure vs. angular position calibration chart and pre-formed foam insulation suitable for temperatures from 35 to 250F. Armstrong, B&G, Illinois, Taco or TMI Flow Design or equal.

R. Flow meters: 150 psig WP venturi flow meters, bronze, screwed in sizes 2" and smaller; steel, butt welded in sizes 2-1/2" and larger, 2% accuracy, maximum line pressure drop 1.0 ft. water. Provide quick connect gauge valves for each venturi meter. For entire job provide one portable cased differential pressure meter with shut-off and vent valves and 40 feet of 150 psig WP hose, together with a calibration curve for each meter. Armstrong, Presco.

2.21 REFRIGERANT SPECIALTIES:

A. Install moulded desiccant core filter dryer in each liquid line. Provide throwaway dryers for lines 1/2" and smaller. Provide replaceable core dryers for lines 5/8" and larger. Dryers shall be Sporlan "Catchall". For heat pump units filter dryer to be bi-directional flow.

B. Install moisture indicating sight glass in each liquid line. Install a refrigerant charging valve in each liquid line near each sight glass.

C. Service valves: wing cap valves, Henry.

D. Expansion valves: thermostatic valves with external equalizers, Sporlan.

E. Hot gas bypass valves: self contained valves sized to pass gas flow at last step of compressor unloading and shall discharge between expansion valve outlet and distributor. Sporlan.

END OF SECTION

SUBSTITUTION REQUEST

Project: Calhoun Community College-Workforce Skills Training Center

Substitution Request Number: 2

From: Michael DeFrank-Carrier Corporation

To: Goodwyn Mills Cawood

Date: August 25, 2023

Attn: Alyssa Martin

A/E Project No.:

Re: Prior Approval

Contract For:

Specification Title: Standard Horizontal or Vertical AHU's/H&V Units

Description: AHU's/H&V Units

Section: 235000

Page and Paragraph: page 23 para. 2.9

Proposed Substitution: Air Handling Units /Heating Ventilation Units

Trade Name: Carrier Corporation

Manufacturer: Carrier

Model No.: 39MN

Mfg. Address: Various

City, State, zip:

Phone:

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the date are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: Michael DeFrank

Signed by: Michael DeFrank

Firm: Carrier Corporation-DSO

Address: 238-Cahaba Valley Road

Pelham, Al. 35124

Telephone: 205-378-2315

E-mail: michael.defrank@carrier.com

A/E's REVIEW AND ACTION

- [X] Substitution approved - Make submittals in accordance with Specifications, Substitution Procedures.
- [ ] Substitution approved as noted - Make submittals in accordance with Specifications Substitution Procedures.
- [ ] Substitution rejected - Use specified materials.
- [ ] Substitution Request received too late - Use specified materials.

Signed by: Hunter Swatek

Date: 08.29.2023

Supporting Data Attached: [ ] Drawings [ ] Product Data [ ] Samples [ ] Tests [ ] Reports [ ]

INCOMPLETE INFORMATION WILL BE GROUNDS FOR REJECTION

SUBSTITUTION REQUEST

Project: Calhoun Community College-Workforce Skills Training Center

Substitution Request Number: 1

From: Michael DeFrank-Carrier Corporation

To: Goodwyn Mills Cawood

Date: August 25, 2023

Attn: Alyssa Martin

A/E Project No.:

Re: Prior Approval

Contract For:

Specification Title: Air Cooled Water Chillers

Description: Chillers

Section: 235000

Page and Paragraph: page 16 para. 2.5

Proposed Substitution: Air Cooled Chiller M#30RC

Trade Name: Carrier Corporation

Manufacturer: Carrier

Model No.: 30RC

Mfg. Address: Various City, State, zip: Phone:

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the date are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: Michael DeFrank

Signed by: Michael DeFrank

Firm: Carrier Corporation-DSO

Address: 238-Cahaba Valley Road

Pelham, Al. 35124

Telephone: 205-378-2315 E-mail: michael.defrank@carrier.com

A/E's REVIEW AND ACTION

- [X] Substitution approved - Make submittals in accordance with Specifications, Substitution Procedures.
- [ ] Substitution approved as noted - Make submittals in accordance with Specifications Substitution Procedures.
- [ ] Substitution rejected - Use specified materials.
- [ ] Substitution Request received too late - Use specified materials.

Signed by: Hunter Swatek Date: 08.29.2023

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

INCOMPLETE INFORMATION WILL BE GROUNDS FOR REJECTION

SUBSTITUTION REQUEST

Project: Calhoun Community College-Workforce Skills Training Center

Substitution Request Number: 3

From: Michael DeFrank-Carrier Corporation

To: Goodwyn Mills Cawood

Date: August 25, 2023

Attn: Alyssa Martin

A/E Project No.:

Re: Prior Approval

Contract For:

Specification Title: Split System A/C-Small

Description: Small Split Systems

Section: 235000

Page and Paragraph: page 24 para. 2.10

Proposed Substitution: Carrier M#38AUQ/40RUQ

Trade Name: Carrier Corporation

Manufacturer: Carrier

Model No.: 38AUQ/40RUQ

Mfg. Address: Various City, State, zip: Phone:

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the date are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by:

Signed by:

Firm:

Address:

Telephone: E-mail:

A/E's REVIEW AND ACTION

- [X] Substitution approved - Make submittals in accordance with Specifications, Substitution Procedures.
- [ ] Substitution approved as noted - Make submittals in accordance with Specifications Substitution Procedures.
- [ ] Substitution rejected - Use specified materials.
- [ ] Substitution Request received too late - Use specified materials.

Signed by: Hunter Swatek Date: 08.29.2023

Supporting Data Attached: [ ] Drawings [ ] Product Data [ ] Samples [ ] Tests [ ] Reports [ ]

INCOMPLETE INFORMATION WILL BE GROUNDS FOR REJECTION

SUBSTITUTION REQUEST

Project: Calhoun Community College-Workforce Skills Training Center

Substitution Request Number: 4

From: Michael DeFrank-Carrier Corporation

To: Goodwyn Mills Cawood

Date: August 25, 2023

Attn: Alyssa Martin

A/E Project No.:

Re: Prior Approval

Contract For:

Specification Title: Variable & Constant Volume Terminal Boxes

Description: Terminal Boxes

Section: 236000

Page and Paragraph: page 1 para. 2.2

Proposed Substitution: Carrier M# 35E

Trade Name: Carrier Corporation

Manufacturer: Carrier

Model No.: 35E

Mfg. Address: Various City, State, zip: Phone:

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the date are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: Michael DeFrank

Signed by: Michael DeFrank

Firm: Carrier Corporation-DSO

Address: 238-Cahaba Valley Road

Pelham, Al. 35124

Telephone: 205-378-2315 E-mail: michael.defrank@carrier.com

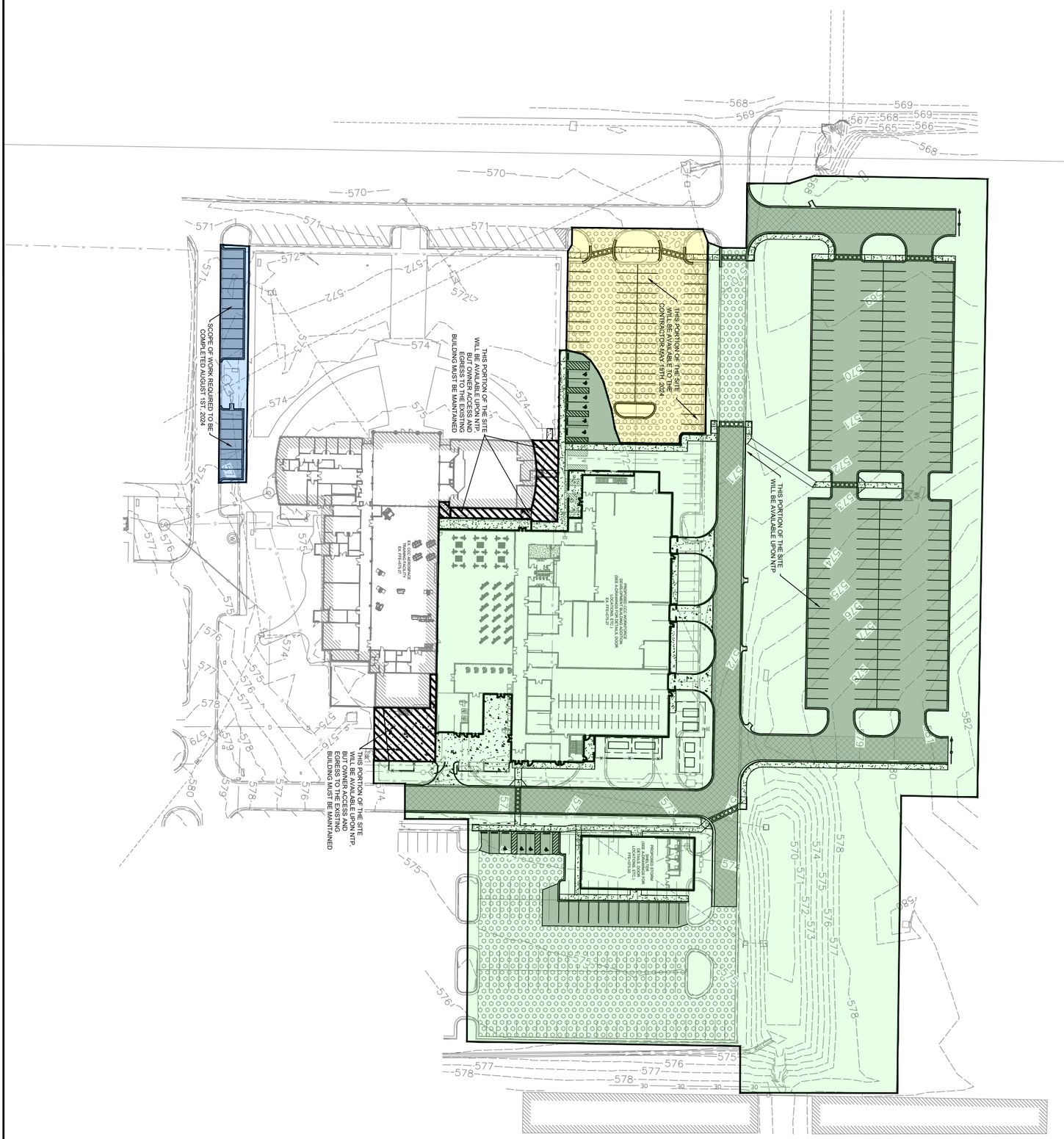
A/E's REVIEW AND ACTION

- [X] Substitution approved - Make submittals in accordance with Specifications, Substitution Procedures.
- [ ] Substitution approved as noted - Make submittals in accordance with Specifications Substitution Procedures.
- [ ] Substitution rejected - Use specified materials.
- [ ] Substitution Request received too late - Use specified materials.

Signed by: Hunter Swatek Date: 08.29.2023

Supporting Data Attached: [ ] Drawings [ ] Product Data [ ] Samples [ ] Tests [ ] Reports [ ]

INCOMPLETE INFORMATION WILL BE GROUNDS FOR REJECTION



SCALE: 1" = 100'

CALHOUN COMMUNITY COLLEGE
WORKFORCE DEVELOPMENT
DECATUR, ALABAMA

SITE PHASING PLAN

CSI

SUPPLEMENTAL INFO.

GMC # CBHM220019
09/01/2023
DRAWN BY: ---

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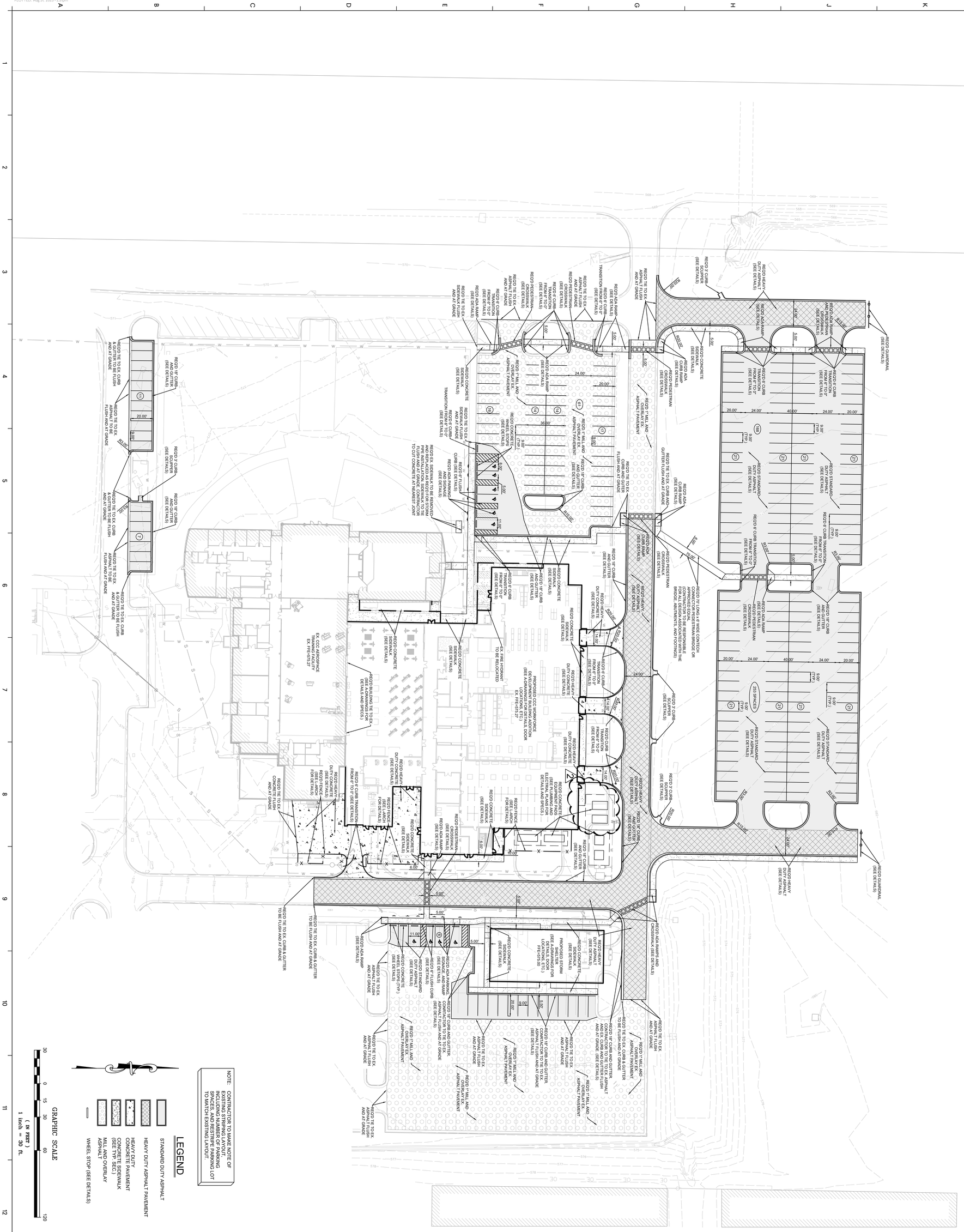
GMC


REQ'D GUARDRAIL (SEE DETAILS)
REQ'D HEAVY DUTY ASPHALT (SEE DETAILS)
REQ'D ADA RAMP AND CROSSWALK (SEE DETAILS)
REQ'D 6" CURB TRANSITION FROM 6" TO 0" (SEE DETAILS)
REQ'D STANDARD DUTY ASPHALT (SEE DETAILS)
REQ'D 3' CURB SCUPPER (SEE DETAILS)
REQ'D 18" CURB AND GUTTER (SEE DETAILS)
REQ'D CONCRETE SIDEWALK (SEE DETAILS)
REQ'D 1" MILL AND OVERLAY EX. ASPHALT PAVEMENT
REQ'D TIE TO EX. CURB AND GUTTER FLUSH AND AT GRADE
REQ'D TIE TO EX. CURB & GUTTER TO BE FLUSH AND AT GRADE
REQ'D TIE TO EX. ASPHALT TO BE FLUSH AND AT GRADE
REQ'D 6" CURB TRANSITION FROM 0" TO 6" (SEE DETAILS)
REQ'D 6" CURB (SEE DETAILS)
REQ'D 18" CURB (SEE DETAILS)
REQ'D CONCRETE SIDEWALK FLUSH AND AT GRADE
REQ'D CONCRETE WHEEL STOPS (TYP.)
REQ'D STANDARD DUTY ASPHALT (SEE DETAILS)
REQ'D HEAVY DUTY CONCRETE (SEE DETAILS)
REQ'D CONCRETE SIDEWALK (SEE DETAILS)
REQ'D ADA RAMP (SEE DETAILS)
REQ'D ADA RAMPS AND CROSSWALK (SEE DETAILS)
REQ'D PEDESTRIAN CROSSWALK (SEE DETAILS)
REQ'D TIE TO EX. CURB AND GUTTER FLUSH AND AT GRADE
REQ'D 18" CURB AND GUTTER TRANSITION (SEE DETAILS)
REQ'D 18" CURB AND GUTTER CONTRACTOR TO TIE TO EX. ASPHALT AND AT GRADE (SEE DETAILS)
REQ'D 1" MILL AND OVERLAY EX. ASPHALT PAVEMENT
REQ'D TIE TO EX. ASPHALT FLUSH AND AT GRADE
REQ'D TIE TO EX. CURB & GUTTER TO BE FLUSH AND AT GRADE
REQ'D TIE TO EX. CURB & GUTTER TO BE FLUSH AND AT GRADE
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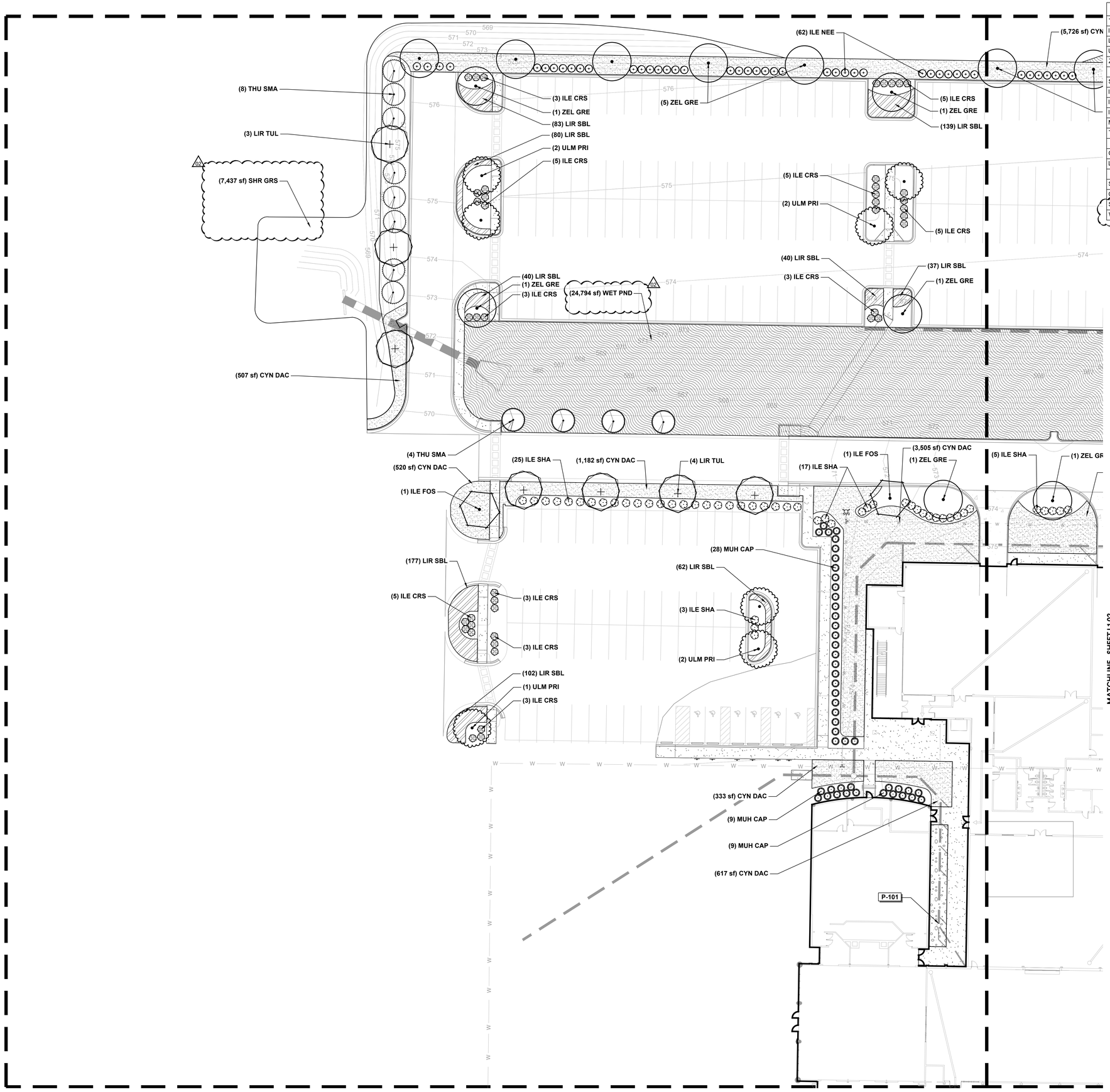
REQ'D TIE TO EX. CURB & GUTTER TO BE FLUSH AND AT GRADE
REQ'D TIE TO EX. ASPHALT

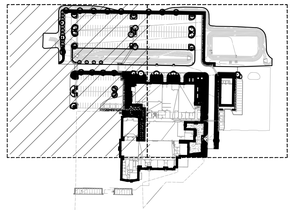


PLANT SCHEDULE

TREES	BOTANICAL NAME	COMMON NAME
ILE FOS	ILEX X ATTENUATA 'FOSTERI'	FOSTER'S HOLLY
LIR TUL	LIRIODENDRON TULIPIFERA	TULIP POPLAR
ULM PRI	ULMUS AMERICANA 'PRINCETON'	PRINCETON AMERICAN ELM
ZEL GRE	ZELKOVA SERRATA 'GREEN VASE'	GREEN VASE JAPANESE ZELKOVA
SHRUBS	BOTANICAL NAME	COMMON NAME
ILE CRS	ILEX CORNUTA 'CARISSA'	CARISSA CHINESE HOLLY
ILE NEE	ILEX CORNUTA 'NEEDLEPOINT'	NEEDLEPOINT CHINESE HOLLY
ILE SHA	ILEX GLABRA 'SHAMROCK'	SHAMROCK INKBERRY HOLLY
MUH CAP	MUHLENBERGIA CAPILLARIS	PINK MUHLY GRASS
THU SMA	THUJA OCCIDENTALIS 'SMARAGD'	EMERALD GREEN ARBORVITAE
GROUND COVERS	BOTANICAL NAME	COMMON NAME
LIR SBL	LIRIOPE MUSCARI 'SUPER BLUE'	SUPER BLUE LILYTURF
SOD/SEED	BOTANICAL NAME	COMMON NAME
CYN DAC	CYNODON DACTYLON	BERMUDAGRASS
SHR GRS	SEED MIX 112 SEED MIX	SO. SHORT GRASS MEADOW MIX
WET PND	SEED MIX 131 SEED MIX	WETLAND AND POND EDGE MIX

REFERENCE NOTES SCHEDULE

	FENCING
SYMBOL	DESCRIPTION
FE-101	VEHICULAR GATE-11FT-DBLE
FE-102	FENCING TO BE 6FT HT, PVC COATED, GALVANIZED CHAIN LINK FENCING, SEE SPECS.
FE-104	4FT WIDE, 6FT TALL CHAIN LINK GATE, DOUBLE
FE-105	4FT WIDE, 6FT TALL CHAIN LINK GATE, SINGLE
	PAVING
SYMBOL	DESCRIPTION
P-101	RIVER ROCK PAVING; 2-4" SIZED STONES, MIXED COLORS; USE WITH GEOTECH FABRIC BELOW ROCK; 4-6" DEPTH LAYER



SITE KEY PLAN
N.T.S.

NORTH

0' 20' 40' 80'
SCALE: 1 IN = 20 FT

GMC

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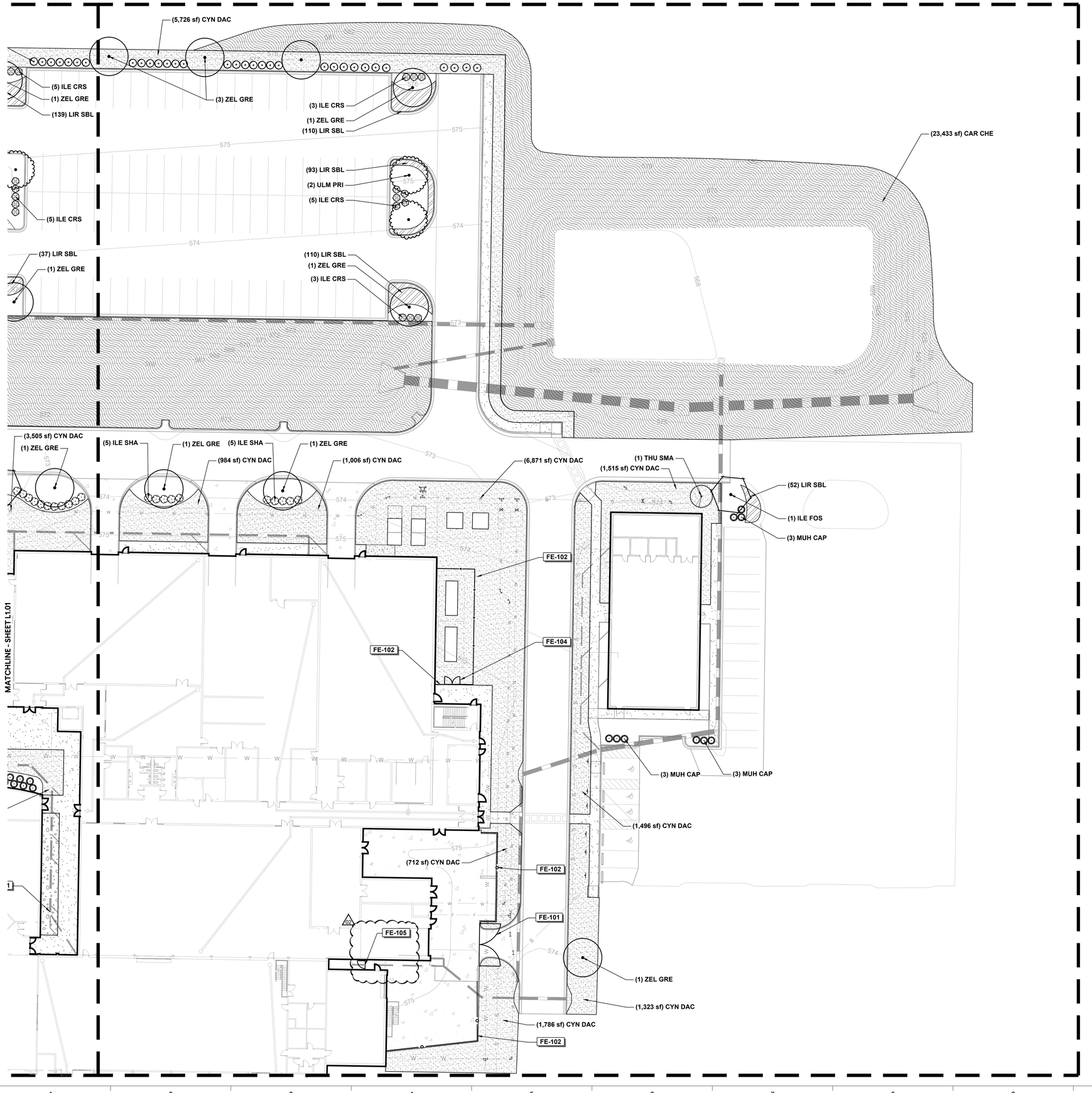
DECATUR, AL

LBHM220016

STATE OF ALABAMA
JOHN BENJAMIN
NUMBER 538
REGISTERED LANDSCAPE ARCHITECT

PLANTING PLAN

L1.01

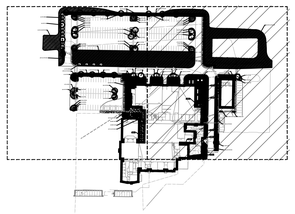


PLANT SCHEDULE

TREES	BOTANICAL NAME	COMMON NAME
ILE FOS	ILEX X ATTENUATA 'FOSTERI'	FOSTER'S HOLLY
LIR TUL	LIRIODENDRON TULIPIFERA	TULIP POPLAR
ULM PRI	ULMUS AMERICANA 'PRINCETON'	PRINCETON AMERICAN ELM
ZEL GRE	ZELKOVA SERRATA 'GREEN VASE'	GREEN VASE JAPANESE ZELKOVA
SHRUBS	BOTANICAL NAME	COMMON NAME
ILE CRS	ILEX CORNUTA 'CARISSA'	CARISSA CHINESE HOLLY
ILE NEE	ILEX CORNUTA 'NEEDLEPOINT'	NEEDLEPOINT CHINESE HOLLY
ILE SHA	ILEX GLABRA 'SHAMROCK'	SHAMROCK INKBERRY HOLLY
MUH CAP	MUHLENBERGIA CAPILLARIS	PINK MUHLY GRASS
THU SMA	THUJA OCCIDENTALIS 'SMARAGD'	EMERALD GREEN ARBORVITAE
GROUND COVERS	BOTANICAL NAME	COMMON NAME
CAR CHE	CAREX CHEROKEENSIS	CHEROKEE SEDGE
LIR SBL	LIRIOPE MUSCARI 'SUPER BLUE'	SUPER BLUE LILYTURF
SOD/SEED	BOTANICAL NAME	COMMON NAME
CYN DAC	CYNODON DACTYLON	BERMUDAGRASS

REFERENCE NOTES SCHEDULE

	FENCING
SYMBOL	DESCRIPTION
FE-101	VEHICULAR GATE-11FT-DBLE
FE-102	FENCING TO BE 6FT HT, PVC COATED, GALVANIZED CHAIN LINK FENCING, SEE SPECS.
FE-104	4FT WIDE, 6FT TALL CHAIN LINK GATE, DOUBLE
FE-105	4FT WIDE, 6FT TALL CHAIN LINK GATE, SINGLE
	PAVING
SYMBOL	DESCRIPTION
P-101	RIVER ROCK PAVING; 2-4" SIZED STONES, MIXED COLORS; USE WITH GEOTECH FABRIC BELOW ROCK; 4-6" DEPTH LAYER



SITE KEY PLAN
N.T.S.

NORTH

0' 20' 40' 80'
SCALE: 1 IN = 20 FT

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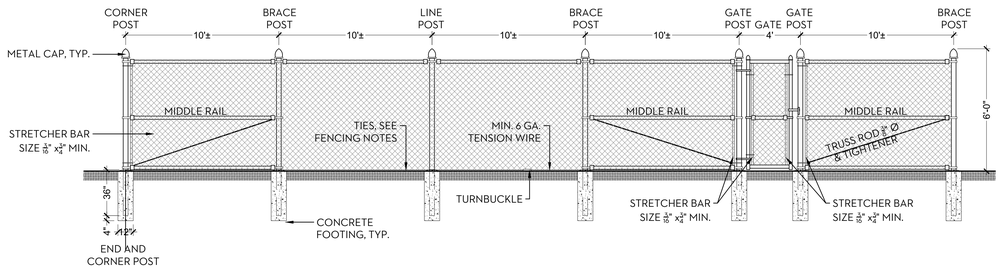
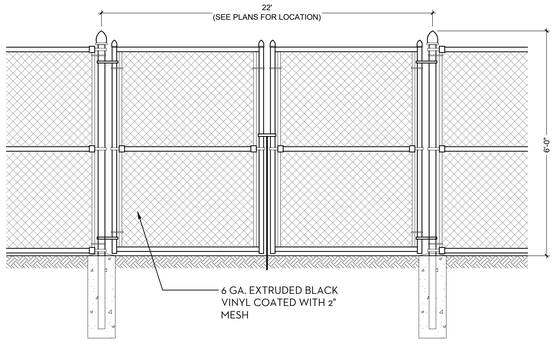
STATE OF ALABAMA
JOHN BERLIN
NUMBER 538
REGISTERED LANDSCAPE ARCHITECT

PLANTING PLAN

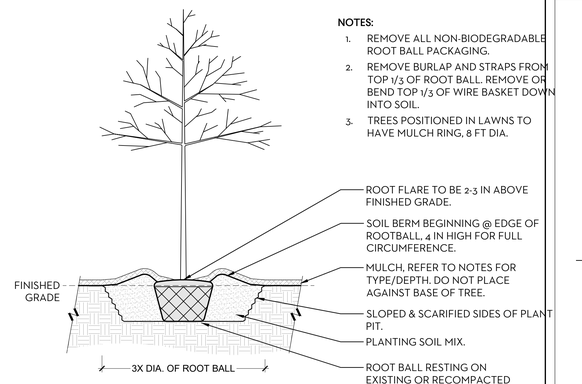
L1.02



1 CHAIN LINK FENCE LINE DETAIL
1/4" = 1'-0"



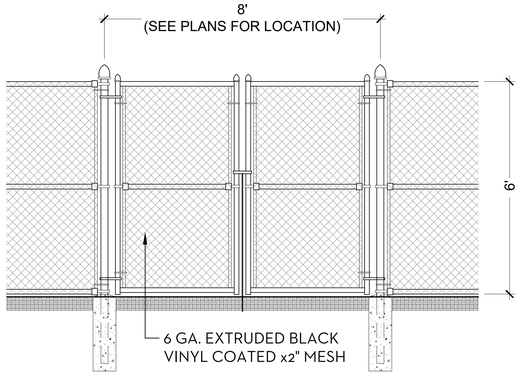
2 DETAIL: 22' WIDE GATE
N.T.S.



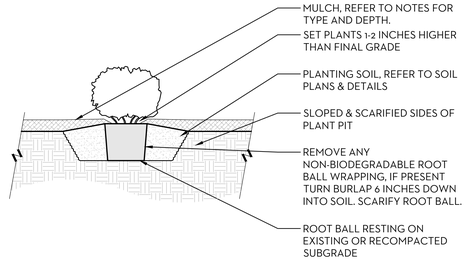
NOTES:
1. REMOVE ALL NON-BIODEGRADABLE ROOT BALL PACKAGING.
2. REMOVE BURLAP AND STRAPS FROM TOP 1/3 OF ROOT BALL. REMOVE OR BEND TOP 1/3 OF WIRE BASKET DOWN INTO SOIL.
3. TREES POSITIONED IN LAWNS TO HAVE MULCH RING, 8 FT DIA.

ROOT FLARE TO BE 2-3 IN ABOVE FINISHED GRADE.
SOIL BERM BEGINNING @ EDGE OF ROOTBALL, 4 IN HIGH FOR FULL CIRCUMFERENCE.
MULCH, REFER TO NOTES FOR TYPE/DEPTH. DO NOT PLACE AGAINST BASE OF TREE.
SLOPED & SCARIFIED SIDES OF PLANT PIT.
PLANTING SOIL MIX.
ROOT BALL RESTING ON EXISTING OR RECOMPACTED SUBGRADE.

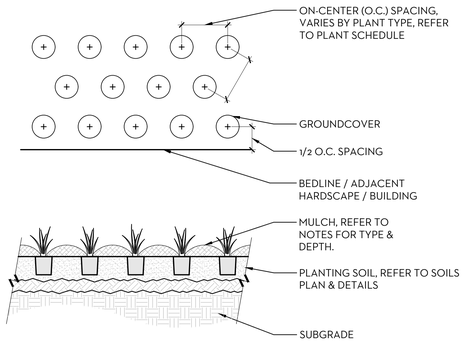
3 TREE PLANTING
3/8" = 1'-0"



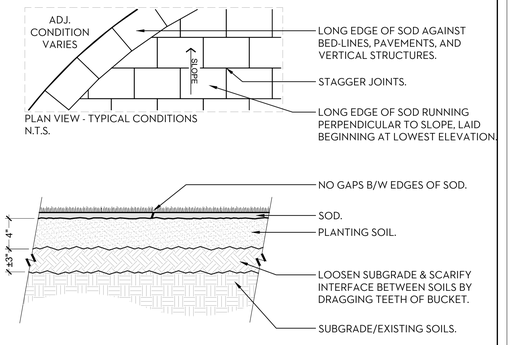
4 DETAIL: 4' WIDE, 6'HT GATE, DBL
N.T.S.



5 SHRUB PLANTING
3/4" = 1'-0"



6 GROUNDCOVER & PERENNIAL PLANTING
3/4" = 1'-0"



7 SOD INSTALLATION
1 1/2" = 1'-0"

PLANT SCHEDULE

TREES	QTY	BOTANICAL NAME	COMMON NAME	CAL. / HT.	ROOTBALL		REMARKS
ILE FOS	3	ILEX X ATTENUATA 'FOSTERI'	FOSTER'S HOLLY	B&B	8-9 FT		TREE FORM
LIR TUL	7	LIRIODENDRON TULIPIFERA	TULIP POPLAR	2.0" CAL.	B&B		
ULM PRI	9	ULMUS AMERICANA 'PRINCETON'	PRINCETON AMERICAN ELM	2.0" CAL.	B&B		
ZEL GRE	18	ZELKOVA SERRATA 'GREEN VASE'	GREEN VASE JAPANESE ZELKOVA	2.0" CAL.	B&B		
SHRUBS	QTY	BOTANICAL NAME	COMMON NAME	SIZE	HT.		REMARKS
ILE CRS	54	ILEX CORNUTA 'CARISSA'	CARISSA CHINESE HOLLY	3 GAL			
ILE NEE	62	ILEX CORNUTA 'NEEDLEPOINT'	NEEDLEPOINT CHINESE HOLLY	3 GAL			
ILE SHA	55	ILEX GLABRA 'SHAMROCK'	SHAMROCK INKBERRY HOLLY	3 GAL			
MUH CAP	55	MUHLENBERGIA CAPILLARIS	PINK MUHLY GRASS	3 GAL			
THU SMA	13	THUJA OCCIDENTALIS 'SMARAGD'	EMERALD GREEN ARBORVITAE	B&B	8-9 FT		
GROUND COVERS	QTY	BOTANICAL NAME	COMMON NAME	TYPE		SPACING	
CAR CHE	55,664 SF	CAREX CHEROKEENSIS	CHEROKEE SEDGE	SEED			
LIR SBL	1,125	LIRIOPE MUSCARI 'SUPER BLUE'	SUPER BLUE LILYTURF	1 GAL		18" o.c.	
SOD/SEED	QTY	BOTANICAL NAME	COMMON NAME	TYPE		SPACING	
CYN DAC	28,083 SF	CYNODON DACTYLON	BERMUDAGRASS	SOD			

REFERENCE NOTES SCHEDULE

	FENCING		
SYMBOL	DESCRIPTION	QTY	DETAIL
FE-101	VEHICULAR GATE-11FT-DBLE	1	2/3.00
FE-102	FENCING TO BE 6FT HT, PVC COATED, GALVANIZED CHAIN LINK FENCING, SEE SPECS.	234 LF ±	1/3.00
FE-104	4FT WIDE, 6FT TALL CHAIN LINK GATE, DOUBLE		4/3.00
FE-105	4FT WIDE, 6FT TALL CHAIN LINK GATE, SINGLE	1	
	PAVING		
SYMBOL	DESCRIPTION	QTY	DETAIL
P-101	RIVER ROCK PAVING; 2-4" SIZED STONES, MIXED COLORS; USE WITH GEOTECH FABRIC BELOW ROCK; 4-6" DEPTH LAYER	567 SF ±	

FENCING NOTES:
1. FABRIC: 48", 72", 96", 6 GA. EXTRUDED VINYL (2" MESH) CHAIN LINK FABRIC.
2. TOP RAIL: 1 ⅝" O.D., 40 WEIGHT-VINYL COATED, 2.27 LBS. PER FOOT. TOP RAIL 21" LENGTH. JOINED W/1 ⅝" VINYL SLEEVE.
3. LINE POST: 2 ½" O.D., 40 WEIGHT-VINYL COATED, 3.65 LBS. PER FOOT. LINE POSTS SET 10' O.C. MAX. SPACING. CONCRETE FOOTING: 8" DIAMETER, 30" DEPTH.
4. TERMINAL POST: 3" O.D., 40 WEIGHT-VINYL COATED, 5.79 LBS. PER FOOT. CONCRETE FOOTING: 12" DIAMETER, 36" DEPTH.
5. BRACING: TERMINAL POSTS BRACED AND TRUSSED TO THE NEAREST LINE POST W/1 ⅜" O.D., 40 WEIGHT-VINYL COATED AND VINYL ⅜" TRUSS ROD AND VINYL TRUSS ROD TIGHTENER.
6. TENSION WIRE: 6 GA. VINYL TENSION WIRE ATTACHED TO BOTTOM OF FENCE FABRIC W/9 GA. VINYL STEEL HOG RING SPACED 18" O.C.
7. FITTINGS: VINYL BRACED BAND AND CARRIAGE BOLT, VINYL RAIL-END, VINYL LOOP-CAP, VINYL ALUMINUM CAP.
8. TIE WIRE 6 ½ VINYL-9 GA. TIE WIRE SPACED 14" O.C. FOR LINE POSTS AND 18" O.C. FOR RAILS.
9. POST FOOTING: 3000 PSI CONCRETE.

GENERAL LANDSCAPE NOTES
1. CONTRACTOR SHALL BE RESPONSIBLE FOR FAMILIARIZING THEMSELVES WITH ALL CONTRACT DOCUMENTS & RELATED EXISTING CONDITIONS, UTILITIES, STRUCTURES, ETC. PRIOR TO BIDDING AND CONSTRUCTION.
2. CONTRACTOR'S BASE BID TO INCLUDE ALL MATERIALS, LABOR, PERMITS, EQUIPMENT, TOOLS, INSURANCE, ETC. TO PERFORM THE WORK AS DESCRIBED IN THE CONTRACT DOCUMENTS.
3. PERFORM ALL WORK IN COMPLIANCE WITH ALL APPLICABLE LAWS, CODES, & REGULATIONS REQUIRED BY AUTHORITIES HAVING JURISDICTION OVER SUCH WORK & PROVIDE PERMITS REQUIRED BY LOCAL AUTHORITIES.
4. CONTRACTOR TO COMPLETE ALL WORK WITHIN SCHEDULE ESTABLISHED BY OWNER.
5. CONTRACTOR IS RESPONSIBLE FOR REPAIRING ALL WORK DISTURBED BY CONSTRUCTION TO A CONDITION BETTER THAN OR EQUAL TO THE CONDITIONS THAT EXISTED PRIOR TO THE BEGINNING OF CONSTRUCTION AT NO ADDITIONAL COST TO OWNER.
6. SEE CIVIL DRAWINGS FOR INFORMATION REGARDING EROSION/SEDIMENT CONTROL, LOCATION OF EXISTING & PROPOSED STRUCTURES, PAVING, DRIVEWAYS, CUT & FILL AREAS, LIMITS OF CONSTRUCTION, EXISTING & PROPOSED UTILITIES OR EASEMENTS.

PLANT INSTALLATION NOTES
1. CONTRACTOR SHALL BE RESPONSIBLE FOR FAMILIARIZING THEMSELVES WITH ALL RELATED EXISTING CONDITIONS, UTILITIES, STRUCTURES, ETC. PRIOR TO BIDDING AND CONSTRUCTION.
2. REMOVE FROM SITE ANY & ALL EXISTING VEGETATION INCLUDING STUMPS & ROOTS IN CONFLICT WITH PLANTING PLAN UNLESS EXPLICITLY DESIGNATED FOR PROTECTION.
3. SEE SPECIFICATIONS & DETAILS FOR PLANTING METHODS, REQUIREMENTS, SOIL TESTING, MATERIALS, EXECUTION, AND PLANT PROTECTION.
4. PLANT NAMES MAY BE ABBREVIATED ON DRAWINGS. REFER TO PLANT SCHEDULE FOR ABBREVIATIONS, BOTANICAL & COMMON NAMES, SIZES, ESTIMATED QUANTITIES AND OTHER REMARKS.
5. CONTRACTOR SHALL VERIFY THE TOTAL QUANTITIES INDICATED IN THE PLANT LIST WITH THE QUANTITIES SHOWN ON THE PLAN. CONTRACTOR SHALL PROVIDE QUANTITIES REQUIRED TO COMPLETE PROPOSED PLANTING AS INDICATED ON THE PLAN.
6. ALL PLANTING BEDS AND TREES SHALL BE MULCHED WITH 3-4 IN. OF SETTLED PINE STRAW THAT IS FREE FROM DEBRIS, LEAVES, TWIGS, INSECTS, GRASSES, WEEDS, PLANTS AND THEIR SEEDS, AND ANY SUBSTANCE HARMFUL TO PLANT GROWTH. PINE STRAW MULCH SHALL BE TUCKED & ROLLED AT ALL EDGES.
   A. TREES PLACED IN SODDED/TURFGRASS AREAS SHALL BE MULCHED WITH AN 8 FT. DIAMETER MULCH RING UNLESS OTHERWISE NOTED ON PLANS.
7. CONTRACTOR IS RESPONSIBLE FOR REPAIRING ALL WORK DISTURBED BY CONSTRUCTION TO A CONDITION BETTER THAN OR EQUAL TO THE CONDITIONS THAT EXISTED PRIOR TO THE BEGINNING OF CONSTRUCTION AT NO ADDITIONAL COST TO OWNER.

PLANTING SOIL & PREPARATION NOTES
1. CONTRACTOR SHALL CONDUCT & SUBMIT TO THE LANDSCAPE ARCHITECT AN ANALYSIS OF A MINIMUM OF (3) SAMPLES OF EXISTING SOIL FROM AREAS TO BE PLANTED . THE ANALYSIS SHALL BE DONE BY A SOIL TESTING LAB APPROVED BY THE LANDSCAPE ARCHITECT IN ADVANCE AND SHALL INCLUDE THE FOLLOWING RESULTS WITH RECOMMENDATIONS:
   A. S1A - ORGANIC MATTER, AVAILABLE PHOSPHORUS, EXCHANGEABLE POTASSIUM, MAGNESIUM, CALCIUM, SOIL pH, CATION EXCHANGE CAPACITY, PERCENT BASE SATURATION OF CATION ELEMENTS.
   B. S3 - SULFUR, ZINC, MANGANESE, IRON, COPPER, BORON
   C. TEXTURE ANALYSIS
2. TOPSOIL (& PLANTING SOIL WHEN DIFFERENT) SHALL BE PROVIDED MIXED AND READY FOR INSTALLATION. TOPSOIL SHALL MEET THE FOLLOWING CRITERIA & STRIPPED/STOCKPILED TOPSOIL MAY BE USED IF IT CAN REASOANBLY BE BROUGHT UP TO THESE CRITERIA.
   A. FERTILE, FRIABLE, NATURALLY OCCURRING, FREE OF TRASH, ROCKS/STONES, & DEBRIS LARGER THAN 2 INCHES IN ANY DIMENSION
   B. FREE OF ANY GRASSES, WEEDS, SEEDS, PLANTS, & ANY SUBSTANCE HARMFUL TO PLANT GROWTH.
   C. pH RANGE OF 5.0-7.0
   D. ORGANIC MATTER: 5-10%
   E. SAND: 50-70%, SILT: LESS THAN 30%, CLAY: 10-25%
   F. PERMEABILITY RATE OF 5X10 (-3) CENTIMETERS OR GREATER AT 85% COMPACTION.
3. CONTRACTOR SHALL COORDINATE WITH OWNER'S REPRESENTATIVE THE LOCATION OF STOCKPILE AREAS FOR STRIPPED TOPSOIL AND PLANTING SOIL PRODUCTS. CONTRACTOR SHALL ENSURE AREA IS PROTECTED FROM CONTAMINATION & DISTURBANCE
4. FINAL GRADES DEPICTED ON THE GRADING PLAN (REFER TO CIVIL DRAWINGS) ARE TO ACCOUNT FOR PLANTING SOIL DEPTHS INDICATED IN THE LANDSCAPE DRAWINGS/DETAILS. CONTRACTOR SHALL ENSURE SUBGRADE IS SCARIFIED PRIOR TO INSTALLING PLANTING SOIL.
5. FINAL FINISHED GRADING SHALL BE REVIEWED BY THE LANDSCAPE ARCHITECT. CONTRACTOR IS RESPONSIBLE FOR ANY ADDITIONAL TOPSOIL REQUIRED TO CREATE A SMOOTH CONDITION SUITABLE FOR PLANTING.
6. ALL TRASH, DEBRIS LARGER THAN 2 INCHES IN DIAMETER IN ANY DIRECTION, ROCK, COBBLE, EXCAVATION SPOILS, & GRAVEL SHALL BE REMOVED AND LEGALLY DISPOSED OF OFF-SITE PRIOR TO THE INSTALLATION OF TOPSOIL/PLANTING SOIL.
7. COORDINATE INSTALLATION OF TOPSOIL/PLANTING SOIL WITH OTHER WORK. PLACEMENT SHALL OCCUR AFTER INSTALLATION OF HARDSCAPE IMPROVEMENTS, IRRIGATION SYSTEMS, UTILITIES, ETC. AND BEFORE PLANT INSTALLATION.
8. PRIOR TO PLANT INSTALLATION, PLANT BEDS AND PITS SHALL BE TESTED FOR PERCOLATION BY THE CONTRACTOR AT NO ADDITIONAL COST TO OWNER. TEST SHALL CONSIST OF 1 FT DIAMETER BY 1 FT DEEP MIN HOLE, OR THE PLANTING PIT, FILLED WITH WATER. IF WATER HAS NOT DISSIPATED BY 50% WITHIN 2 HOURS, NOTIFY THE LANDSCAPE ARCHITECT IN WRITING PRIOR TO INSTALLATION. IN HARDPAN CONDITIONS, INSTALL DRAIN PIPES AS PER PLANTING DETAILS.

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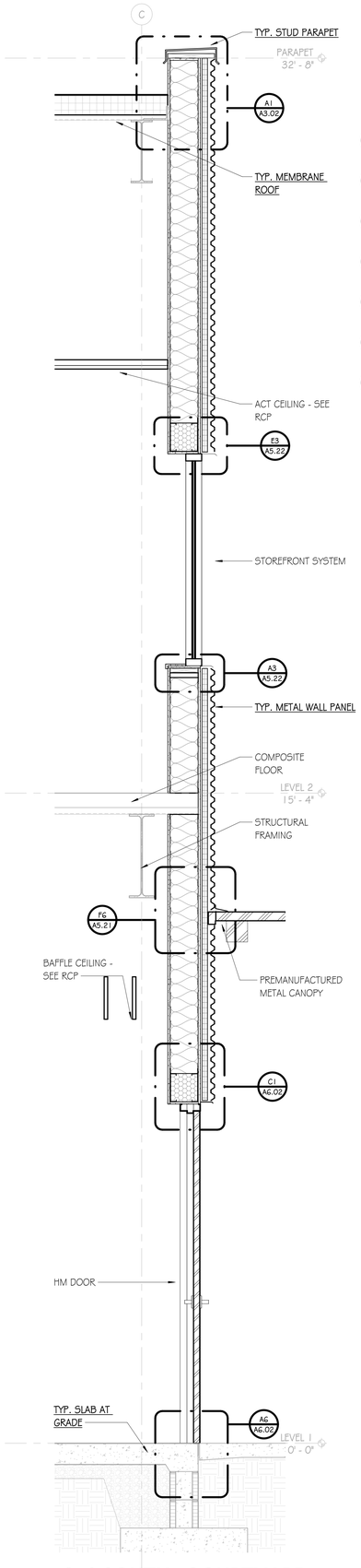
DECATUR, AL

LBHM220016

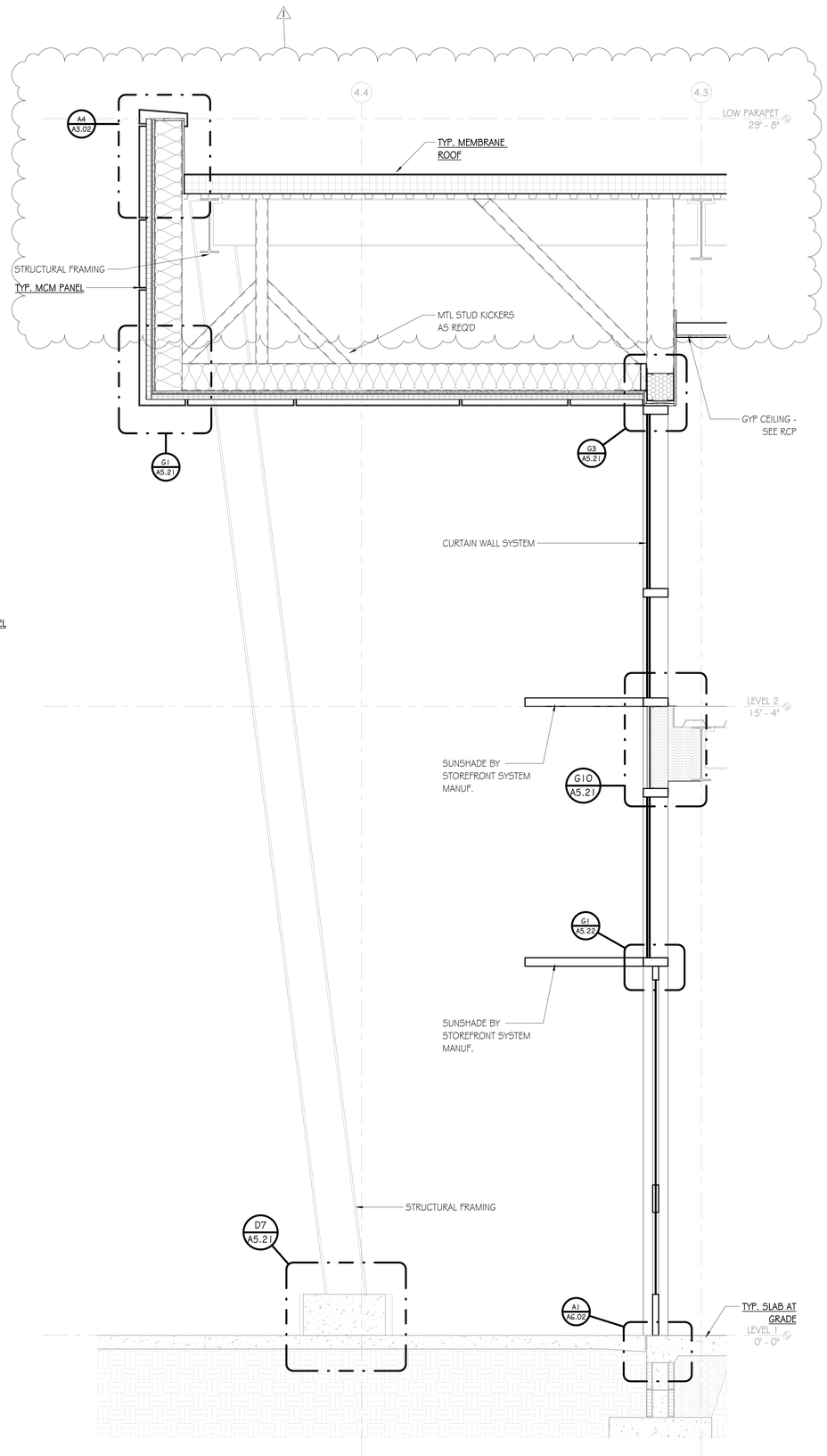
STATE OF ALABAMA · JOHN BRUNK · NUMBER 538 · REGISTERED LANDSCAPE ARCHITECT

DETAILS

L2.00



A1 SOUTH - COURTYARD
SCALE: 3/4" = 1'-0"



A5 SOUTH - ENTRY
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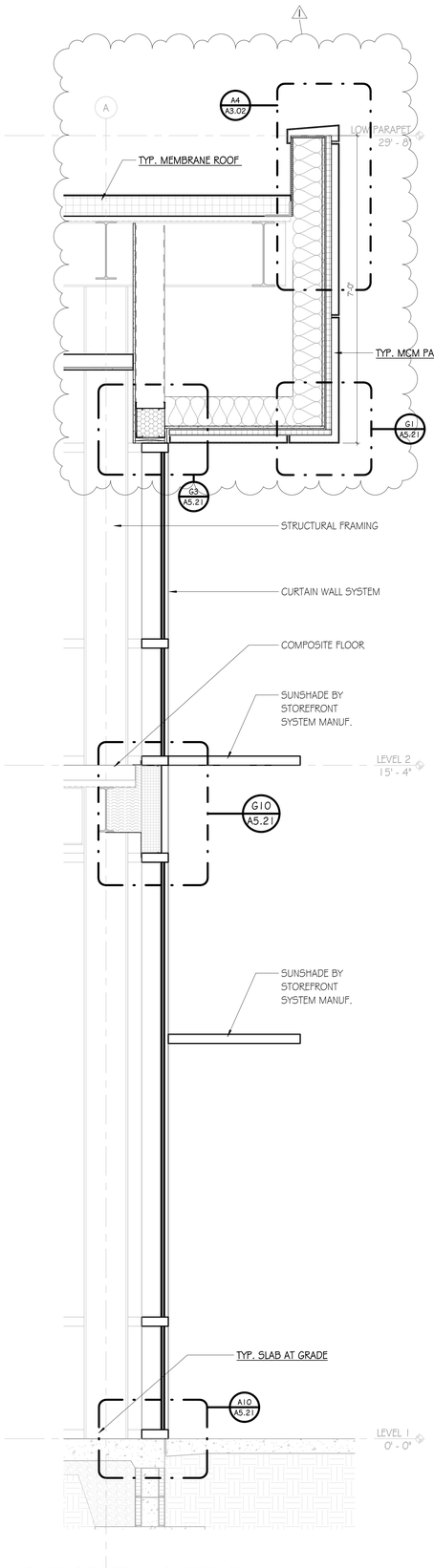

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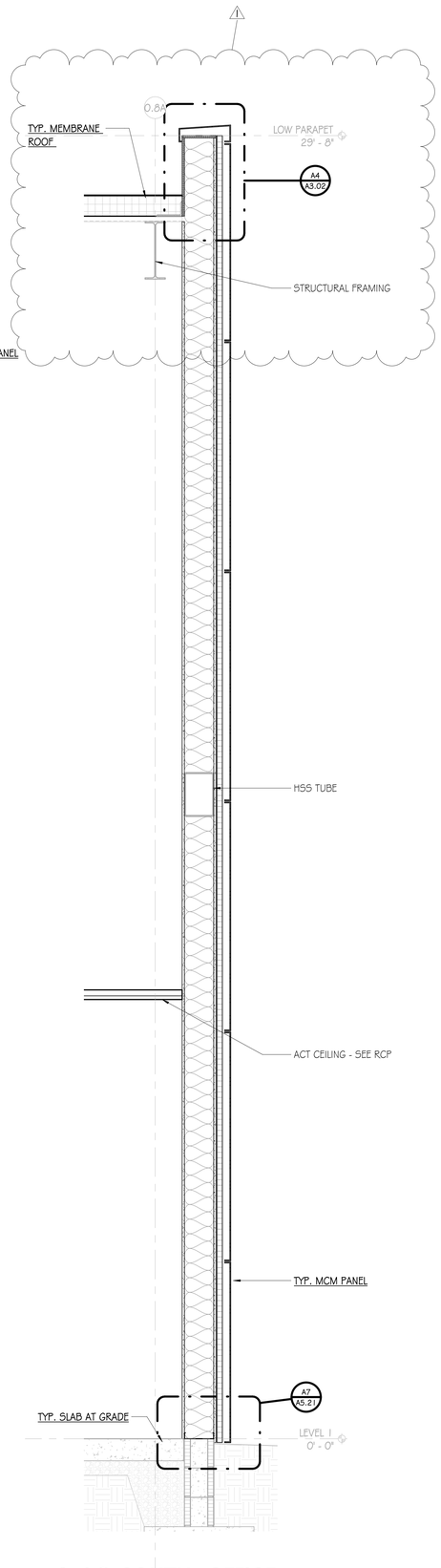

A10 SOUTH - OFFICE
SCALE: 3/4" = 1'-0"

GMC

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2400 5th Avenue South, Suite 200
Birmingham, AL 35233
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GMC ABHM210048

STATE OF ALABAMA
2407
ROBERT W. GRAY
BIRMINGHAM, ALABAMA
REGISTERED ARCHITECT

WALL SECTIONS

A5.11

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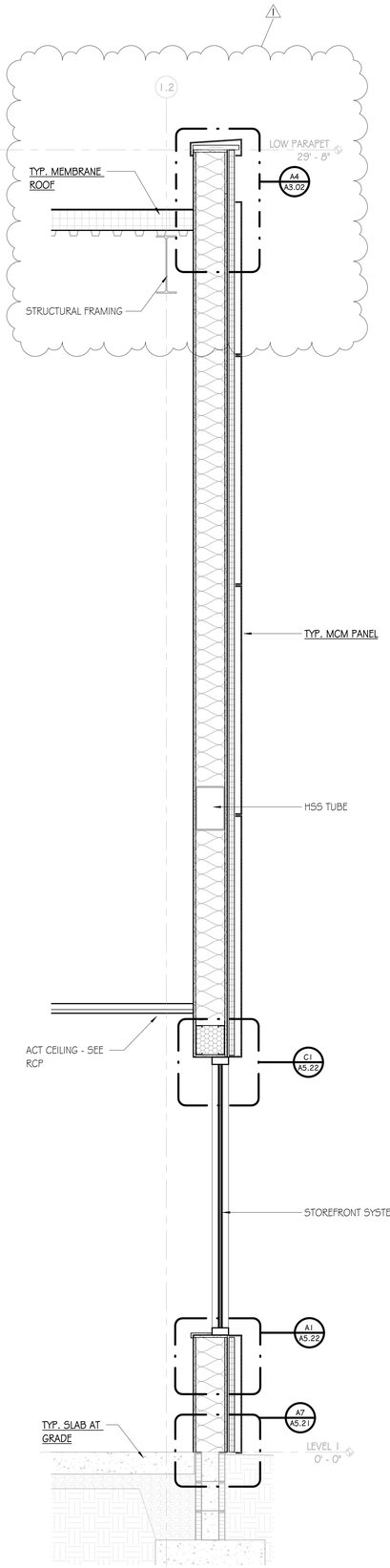
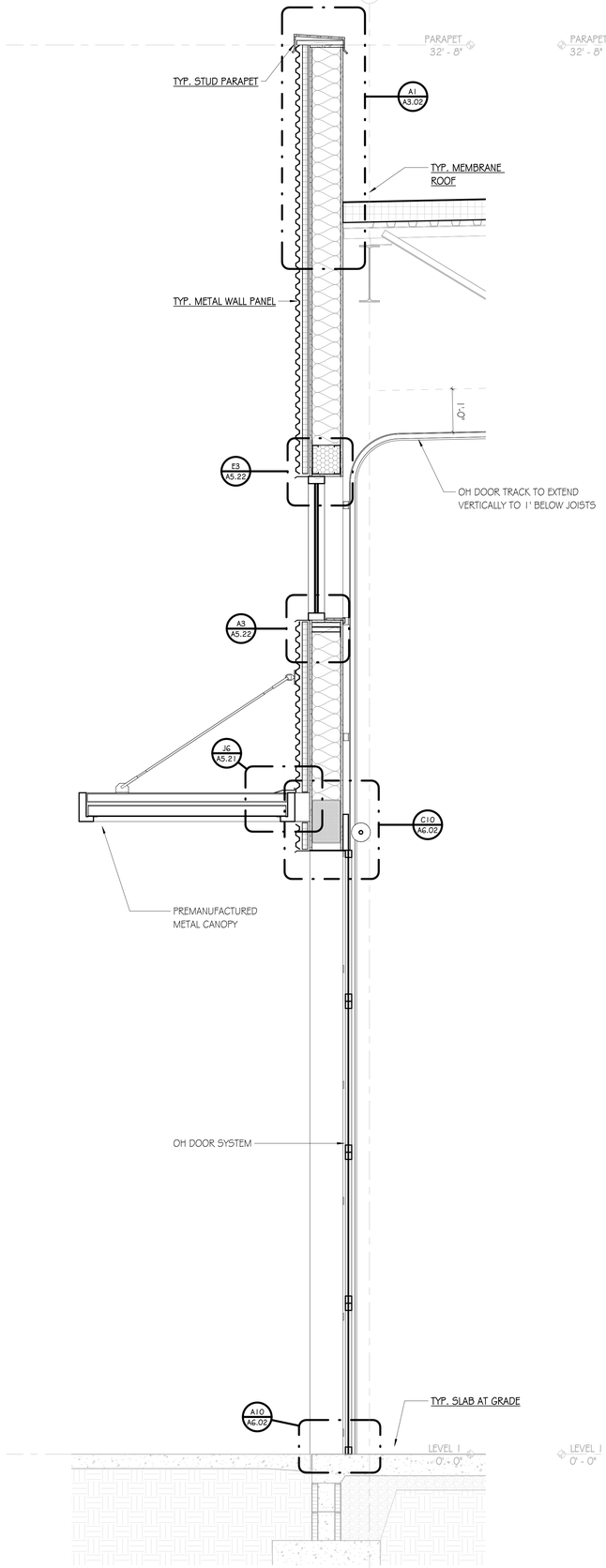
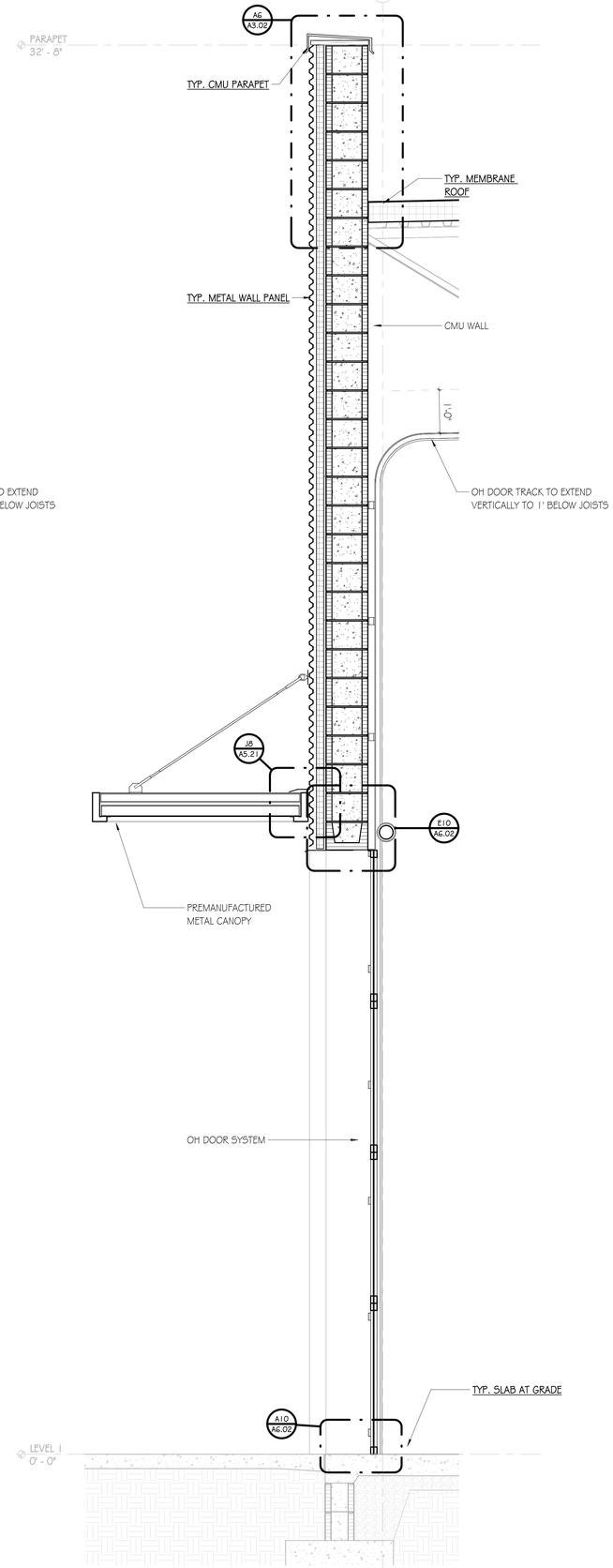


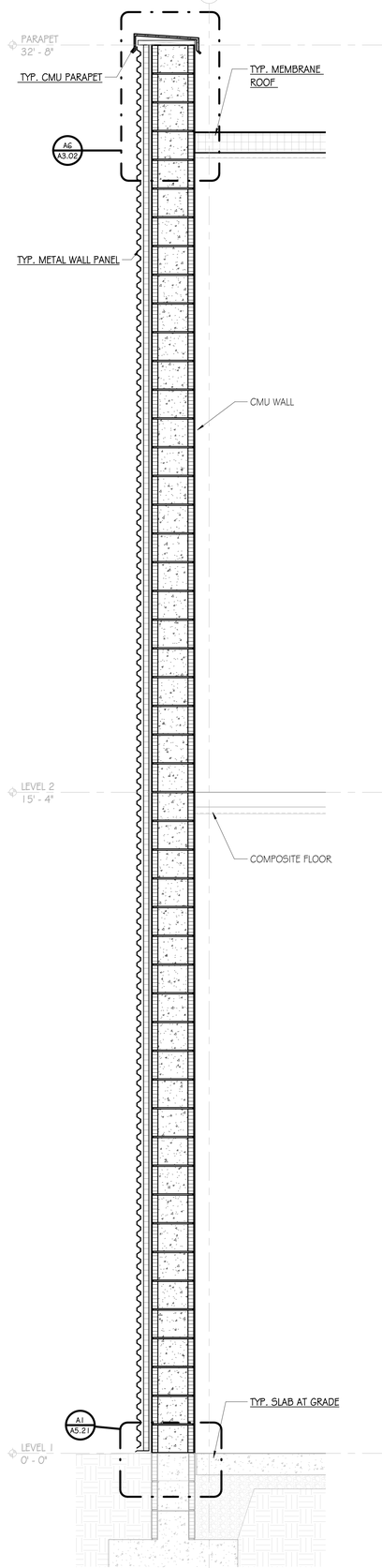
A1 WEST - OFFICE
SCALE: 3/4" = 1'-0"



A3 WEST - STUD WALL OH DOOR
SCALE: 3/4" = 1'-0"



A6 WEST- CMU WALL OH DOOR
SCALE: 3/4" = 1'-0"



A10 NORTH - STAIRS
SCALE: 3/4" = 1'-0"

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ISSUE	DATE
IFB SET	08.14.2023
AD 02	09.01.2023
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CALHOUN COMMUNITY COLLEGE WORKFORCE SKILLS TRAINING CENTER

GMC ABHM210048

STATE OF ALABAMA — GOODWYN MILLS & CAWOOD, LLC — 2407 — ROBERT W. GRAY — BIRMINGHAM, ALABAMA — REGISTERED ARCHITECT

WALL SECTIONS

A5.12

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FINISH NOTES

FLOORS:

- ALL FLOORING TRANSITIONS INCLUDING TRANSITIONS TO SIMILAR MATERIAL OR REDUCER STRIPS AND OTHER THRESHOLDS TO DISSIMILAR MATERIAL SHALL BE LOCATED AT THE CENTERLINE OF DOOR WHEN IN CLOSED POSITION. COLORS SHALL BE SELECTED DURING SUBMITTAL REVIEW. REFER TO DETAILS FOR TRANSITIONS BETWEEN FLOORING MATERIALS. CONTRACTOR TO PROVIDE TRANSITION SIZES APPROPRIATE FOR THICKNESS

- AVOID ALL FLOORING MATERIAL SLIVER CUTS LESS THAN 4" WIDE @ WALL PERIMETERS & MATERIAL TRANSITIONS. CONTACT DESIGNER IF JOBSITE CONDITIONS DIFFER.

- INSTALL FLOORING CONTINUOUS UNDER ALL CASEWORK, MILLWORK, EQUIPMENT, & FURNITURE

- ALIGN VERTICAL GROUT JOINTS IN TILE BASE WITH THOSE IN THE FLOOR TILE UNLESS NOTED OTHERWISE

WALLS:

- ALL HOLLOW METAL DOOR & WINDOW FRAMES TO BE PAINTED (PNT-2) UNLESS OTHERWISE NOTED

- ALL ACCESS PANELS AND MISCELLANEOUS METAL (RETURN AND AIR SUPPLY GRILLES, EXPANSION JOINTS, ETC.) LOCATED ON WALL SURFACES OR CEILING SURFACES TO BE PAINTED WALL OR CEILING COLOR U.N.O.

- WALL BASE TO BE INSTALLED ON ALL WALLS, MILLWORK, AND CASEWORK U.N.O.

- INSTALL FINISH STRIP EQUAL TO SCHLUTER "JOLLY" AT ALL EXPOSED TILE EDGES & CORNERS

MILLWORK / CASEWORK:

- INSTALL 3MM EDGEBAND ON ALL PLASTIC LAMINATE COUNTERTOPS AND CABINETS.

- ALL WINDOWS TO HAVE SOLID SURFACE (SS-2) SILL U.N.O.

- ALL OUTLETS INSTALLED ABOVE CASEWORK TO BE HORIZONTAL

- GROMMET LOCATIONS TO BE COORDINATED WITH OWNER

- FIELD VERIFY ALL DIMENSIONS FOR CASEWORK & MILLWORK PRIOR TO FABRICATION & INSTALLATION

- ALL EXPOSED ENDS AND EXPOSED INTERIORS OF CASEWORK/ MILLWORK TO RECEIVE MATCHING LAMINATES

MISC:

- DO NOT PAINT DOOR LABELS AT RATED DOORS OR FRAMES.

- PROVIDE BLOCKING AS REQUIRED AT ALL TELEVISION LOCATIONS - COORDINATE WITH OWNER'S EQUIPMENT

- PROVIDE BLOCKING FOR ALL GRAB BARS AND TOILET ACCESSORIES

- ROLLER SHADES ARE TAGGED ON THE RCP

- NON ADA TOILET FIXTURES SHALL BE CENTERED IN STALL

- CAULK ALL DOOR FRAMES, MILLWORK, AND VIEW WINDOW FRAMES AFTER WALLCOVERING INSTALLATION IS COMPLETE. COLOR OF CAULK TO MATCH ADJACENT FINISH.

- MARKER BOARDS HEIGHTS TO BE (3'-0" A.F.F.) TO THE BOTTOM OF WRITING SURFACE. GC TO COORDINATE WALL BLOCKING AS REQ'D.

- ALL PARTIES RESPONSIBLE FOR DELIVERING FINISHES TO THE SITE SHALL CHECK AVAILABILITY OF QUANTITIES AND DELIVERY DATES UPON NOTICE TO PROCEED. NO CONSIDERATION WILL BE GIVEN FOR FAILURE TO COMPLY WITH THIS REQUIREMENT.

RCP NOTES:

- ALL SPRINKLER HEADS IN FINISHED CEILINGS ALL SHALL BE CENTERED IN CEILING TILE. SPRINKLER HEADS SHALL NOT BE PAINTED

- INTERIOR CEILING HEIGHTS SHALL BE AS INDICATED ON THE REFLECTED CEILING PLANS

- WHERE EXIT SIGNS ARE LOCATED ABOVE DOORWAYS, CENTER ABOUT DOOR, BUT MAINTAIN MINIMUM OVERHEAD CLEARANCE

- ALL GYP CEILINGS TO BE PAINTED (PNT-3) UNLESS OTHERWISE NOTED

- DO NOT INSTALL CEILING TILE LESS THAN 6" IN ANY DIRECTION - WHEN POSSIBLE CENTER TILE IN ROOM

- COORDINATE WITH OWNER'S A/V CONSULTANT FOR PROJECTION SCREEN AND PROJECTOR LOCATIONS

CASEWORK SCHEDULE

NOTE: CABINET DESIGN SERIES (CDS) NUMBERS BASED ON AWI STANDARDS EDITION 2

"L" INDICATES LOCKABLE CABINETS

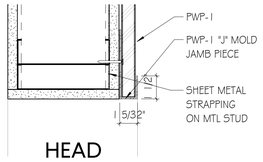
CDS #	CASEWORK TYPE	DESCRIPTION
102	BASE CAB	DBL DOOR
222	BASE CAB	DBL DOORS / DBL DRWRS
402	TALL STG	DBL DOOR - 5 ADJUSTABLE SHELVES
ADA	BASE CAB	ADA SINK

SPECIALTY EQUIPMENT SCHEDULE

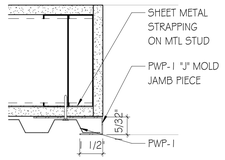
TAG	DESCRIPTION	OFOI/CFCI
513	120" H X 192" W RECESSED PROJECTION SCREEN - MOTORIZED	CFCI
516	8' MARKER BOARD	CFCI
517	12' MARKER BOARD	CFCI
531	TV - WALL MOUNTED -50"	OFOI
532	TV - WALL MOUNTED -60"	OFOI

TOILET ACCESSORIES SCHEDULE

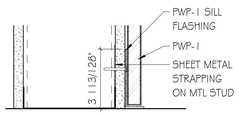
TAG	DESCRIPTION	OFCI/CFCI
TA01	TOILET TISSUE DISPENSER	OFCI
TA03	PAPER TOWEL DISPENSER	OFCI
TA12	WASTE RECEPTACLE, SURFACE MOUNT, SMALL	CFCI
TA16	SOAP DISPENSER	OFCI
TA20	18" VERTICAL GRAB BAR	CFCI
TA21	36" HORIZONTAL GRAB BAR	CFCI
TA22	42" HORIZONTAL GRAB BAR	CFCI
TA29	SANITARY NAPKIN RECEPTACLE	OFCI
TA31	MIRROR, CHANNEL FRAMED WITHOUT SHELF (24 x 36 INCHES)	CFCI
TA45	URINAL PARTITION SCREEN	CFCI
TA55	DIAPER CHANGING STATION, SURFACE-MOUNT	CFCI
TA58	UNDERLAVATORY GUARD	CFCI
TA95	MOP & BROOM HOLDER WITH UTILITY SHELF	CFCI



HEAD



JAMB



SILL

A5 PWP-1 DETAILS

SCALE: 3" = 1'-0"

FINISH LEGEND

FLOOR

NUMBER	TYPE	DETAIL DESCRIPTION
CPT-1	CARPET	MANUFACTURER: MOHAWK GROUP STYLE NAME: LICHEN COMMUNITY - MICRO BLOOM II COLOR: FELTED FRINGE STONE 975 SIZE: 12' x 36" INSTALLATION: ASHLAR LOCATION: ADMIN
EF-1	EPOXY FLOORING	MANUFACTURER: STONEHARD STYLE NAME: STONTECH TRF COLOR: DOVETAIL + 5% F11130 (DARK BLUE) & 5% F9968 (STEEL BLUE) SIZE: 1/4" LOCATION: RESTROOMS
HTF-1	HARD TILE FLOOR	MANUFACTURER: DALTILE STYLE NAME: SOCIETY COLOR: PARK LANE GRAY 5047 - MATTE SIZE: 12" X 24" INSTALLATION: LOCATION: MONUMENTAL STAIR
LVT-1	LUXURY VINYL TILE	MANUFACTURER: INTERFACE STYLE NAME: NORTHERN WOOD COLOR: A0261 1 OAK SATIN SIZE: 25 CM X 1 M INSTALLATION: ASHLAR LOCATION: REFER TO SCHEDULE
PC-1	POLISHED CONCRETE	MANUFACTURER: AMERIPOLISH COLOR: AP GRAY LOCATION: REFER TO SCHEDULE
EGS-1	ENTRANCE GRILLE SYSTEM	MANUFACTURER: C/S CONSTRUCTION SPECIALTIES INC. STYLE NAME: G4 PEDITRED INSERT: CARPET COLOR: TBD SIZE: ENTRANCE VESTIBULES PROVIDE SELF-LEVELER AS RECOMMENDED BY MANUF.
EGS-2	ENTRANCE GRILLE SYSTEM	MANUFACTURER: C/S CONSTRUCTION SPECIALTIES INC. STYLE NAME: G4 PEDITRED INSERT: RUBBER COLOR: TBD SIZE: WHERE NOTED PROVIDE SELF-LEVELER AS RECOMMENDED BY MANUF.
SC-1	SEALED CONCRETE	MANUFACTURER: EUCLID CHEMICAL PRODUCT: EUCO DIAMOND HARD LOCATION: WHERE NOTED
TST-1	TILE STAIR TREAD	MANUFACTURER: DALTILE STYLE NAME: SOCIETY COLOR: PARK LANE GRAY 5047 - MATTE SIZE: 12" X 24" INSTALLATION: LOCATION: MONUMENTAL STAIR NOTE: TREADS TO HAVE GROOVED CHANNELS *FINISH TO BE TILE TREADS AND RISERS

BASE

NUMBER	TYPE	DETAIL DESCRIPTION
RB-1	RUBBER BASE	MANUFACTURER: JOHNSONITE/TARKETT STYLE NAME: BASEWORKS THERMOSET RUBBER COLOR: TA4 GATEWAY SIZE: 4"
EB-1	EPOXY BASE	MANUFACTURER: STONEHARD STYLE NAME: STONTECH TRF COLOR: DOVETAIL + 5% F11130 (DARK BLUE) & 5% F9968 (STEEL BLUE) SIZE: 4" INTEGRAL BASE LOCATION: RESTROOMS

WALL

NUMBER	TYPE	DETAIL DESCRIPTION
PNT-1	[GENERAL/MAIN PAINT]	MANUFACTURER: SHERWIN WILLIAMS COLOR: SW 7005 PURE WHITE
PNT-2	[TRIM PAINT]	MANUFACTURER: SHERWIN WILLIAMS COLOR: SW 7069 IRON ORE
PNT-3	[MAIN CEILING/SOFFIT PAINT]	MANUFACTURER: SHERWIN WILLIAMS COLOR: SW 7005 PURE WHITE
HTW-1	HARD WALL TILE	MANUFACTURER: SOUTH CYPRESS STYLE NAME: FORMATION COLOR: GRIGIO CHIARO SIZE: 12" X 24" INSTALLATION: HORIZONTAL MONOLITHIC GROUT: TBD LOCATION: RESTROOMS
HTW-2	HARD WALL TILE	MANUFACTURER: DALTILE STYLE NAME: MIRAMO COLOR: HORIZON MR48 GLOSSY SIZE: 1X6 INSTALLATION: GROUT: TBD LOCATION: RESTROOM ACCENT
HTW-3	HARD WALL TILE	MANUFACTURER: MARAZZI STYLE NAME: ARTISTIC REFLECTIONS COLOR: TWILIGHT GLOSSY SIZE: 3 X 3 HEXAGON UNDULATED GROUT: TBD LOCATION: WATERCOOLER
PWP-1	PERFORATED WALL PANEL	MANUFACTURER: CENTRIA STYLE NAME: TBD COLOR: TBD INSTALLATION: GROUT: N/A LOCATION: REFER TO FINISH PLAN

MISC

NUMBER	TYPE	DETAIL DESCRIPTION
PL-1	PLASTIC LAMINATE [TYP. FACE]	MANUFACTURER: FORMICA COLOR: BUFF ELM FINISH: NATURAL GRAIN TEXTURE LOCATION: REFER TO SCHEDULE
PL-2	PLASTIC LAMINATE	MANUFACTURER: FORMICA COLOR: 2770-58 SARUM GREY - MATTE LOCATION: SANDING
EPC-1	EPOXY COUNTERTOP	MANUFACTURER: DURACON COLOR: BLACK LOCATION: SANDING
SS-1	SOLID SURFACE	MANUFACTURER: HI-MACS COLOR: BRINA Z202 LOCATION: REFER TO SCHEDULE
SS-2	SOLID SURFACE	MANUFACTURER: CORIAN COLOR: ASH CONCRETE LOCATION: WINDOW SILLS
TP-1	TOILET PARTITIONS	MANUFACTURER: SCRANTON STYLE NAME: HINY HIDER COLOR: CHARCOAL GREY FINISH: ORANGE PEEL LOCATION: RESTROOMS
CG-1	CORNER GUARD	MANUFACTURER: INPRO TYPE: SURFACE MOUNT STAINLESS STEEL CORNERGUARD SIZE: 2" WINGS HEIGHT: 48" NOTE: INSTALL 4" A.F.F. LOCATION: REFER TO FINISH PLAN
RS-1	ROLLER SHADE	TYPE: MANUAL OPENESS: 1% FABRIC: SHEERWEAVE COLOR: TBD LOCATION: REFER TO RCP

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CALHOUN COMMUNITY COLLEGE WORKFORCE SKILLS TRAINING CENTER

GMC ABHM210048

STATE OF ALABAMA
2407
ROBERT W. GRAY
BIRMINGHAM, ALABAMA
REGISTERED ARCHITECT

FINISH LEGEND

A8.00

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COLUMN SCHEDULE

COLUMN DESIGNATION	C1	C2	C3	C4	C5	C6	C7
SIZE	W10X33	W10X45	HSS5X5X1/2	W10X39	W10X39	W8X31	HSS4X4X3/8
BASE PLATE	BP1 - 3/4X14"X1'-2"	BP2 - 1 3/4"X22"X1'-10"	BP3 - 1 1/4"X18"X1'-6"	BP4 - 1"X17"X2'-0"	BP5 - 1"X17"X2'-0"	BP6 - 1 1/2"X14"X1'-2"	BP7 - 3/4"X10"X0'-10"
HEADED ANCHOR BOLTS	(4) 3/4Ø X0'-9"	(8)1 1/4"ØX1'-9"	(8)1"ØX1'-3"	(8)1"ØX1'-3"	(8)1"ØX1'-3"	(8)3/4"ØX1'-9"	(4)3/4"ØX0'-9"
NOTES	1	1	1	1	1	1	1

NOTES:
1. ANCHOR BOLT LENGTHS PROVIDED ARE EMBEDMENT DEPTH INTO FOOTING.
2. BP"X" REFERENCES BASE PLATE LAYOUT. SEE SHEET S1.06.

SLAB/WALL TENSION LAP SPLICE LENGTH

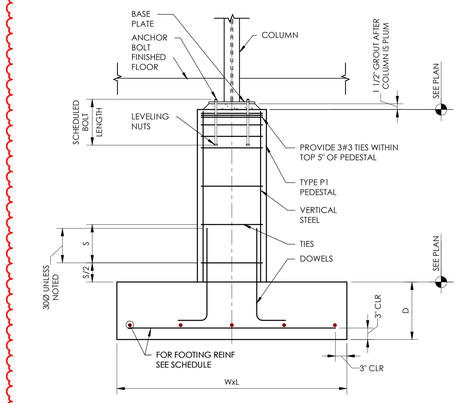
BAR SIZE	f'c = 4000 PSI	
	TOP BARS	OTHER BARS
#3	15"	12"
#4	24"	19"
#5	36"	28"
#6	48"	37"
#7	78"	60"
#8	96"	74"
#9	117"	90"
#10	140"	108"
#11	165"	127"

TOP BARS ARE HORIZONTAL REINFORCEMENT WITH MORE THAN 12" OF CONCRETE CAST BELOW THE REINF.

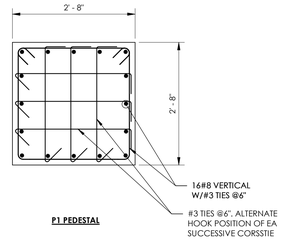
BEAM/FOOTING TENSION LAP SPLICE LENGTH

BAR SIZE	f'c = 3500 PSI	
	TOP BARS	OTHER BARS
#3	28"	22"
#4	37"	29"
#5	47"	36"
#6	56"	43"
#7	81"	63"
#8	93"	72"
#9	105"	81"
#10	118"	91"
#11	131"	101"

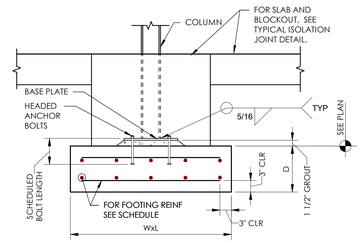
TOP BARS ARE HORIZONTAL REINFORCEMENT WITH MORE THAN 12" OF CONCRETE CAST BELOW THE REINF.



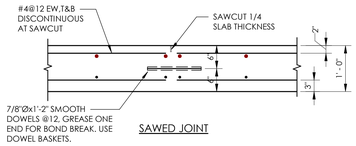
TYPICAL COLUMN BASE PEDESTAL & FOOTING DETAIL



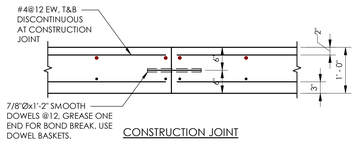
P1 PEDESTAL



TYPICAL COLUMN BASE & FOOTING DETAIL



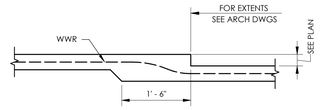
SAWED JOINT



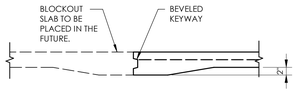
CONSTRUCTION JOINT

TYPICAL 12" SLAB CONTROL JOINT

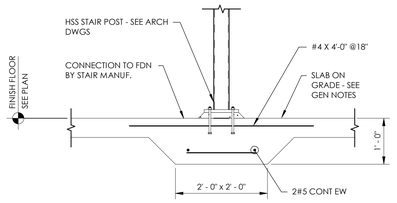
JOINT TYPE IS OPTIONAL



TYPICAL DEPRESSED SLAB ON GRADE

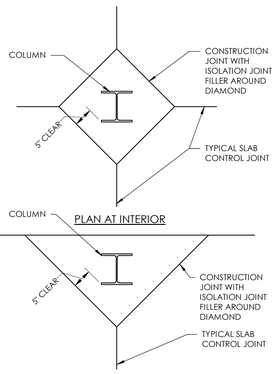


TYPICAL SLAB BLOCKOUT DETAIL

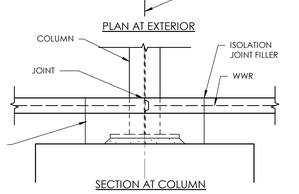


TYPICAL THICKENED SLAB AT STAIR POST DETAIL

NOTES:
1. CENTER THICKENED SLAB BELOW STAIR POST. CONTRACTOR COORDINATE WITH FINAL APPROVED STEEL SHOPS FOR LOCATIONS.



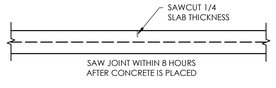
PLAN AT INTERIOR



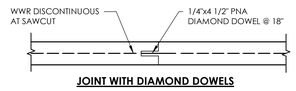
PLAN AT EXTERIOR

SECTION AT COLUMN

TYPICAL ISOLATION JOINT



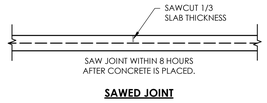
SAWED JOINT



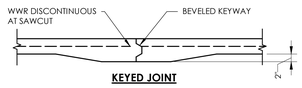
JOINT WITH DIAMOND DOWELS

TYPICAL 6" SLAB CONTROL JOINT

JOINT TYPE IS OPTIONAL



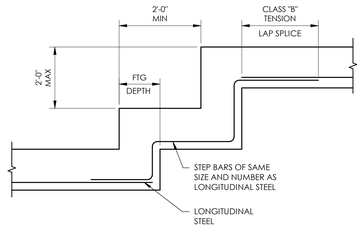
SAWED JOINT



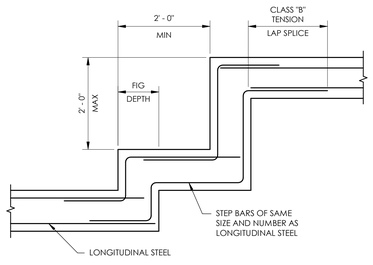
KEYED JOINT

TYPICAL 4" SLAB CONTROL JOINT

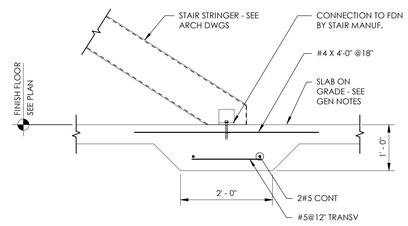
JOINT TYPE IS OPTIONAL



TYPICAL FOOTING STEP

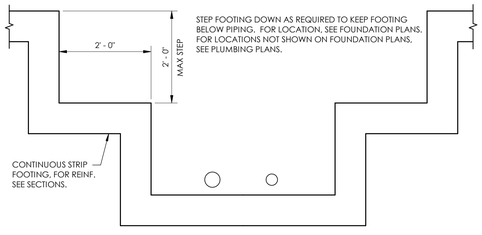


TYPICAL FOOTING STEP

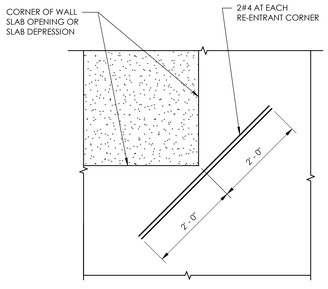


TYPICAL THICKENED SLAB AT STAIR STRINGER DETAIL

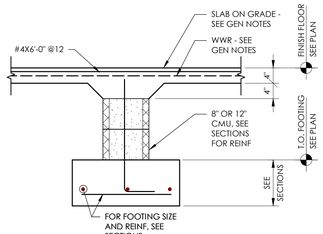
NOTES:
1. CENTER THICKENED SLAB BELOW STRINGER AT BASE OF STAIR. CONTRACTOR COORDINATE WITH FINAL APPROVED STEEL SHOPS FOR LOCATIONS.
2. EXTEND THICKENED SLAB 1'-0" BEYOND STRINGER ON EA SIDE.



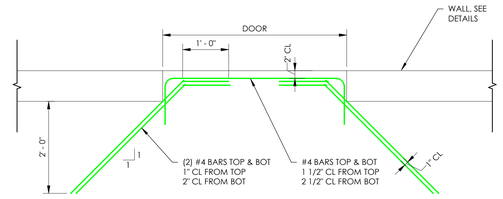
TYPICAL FOUNDATION WALL AT PIPING



TYPICAL RE-ENTRANT SLAB CORNER REINFORCING DETAIL



TYPICAL INTERIOR OPENING SLAB DETAIL



TYPICAL SLAB REINFORCMENT AT DOOR DETAIL

NOTES:
1. TOP BARS ONLY IN 4" SLAB.

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CALHOUN COMMUNITY COLLEGE WORKFOCE SKILS TRAINING

GMC ABHM210048

ALABAMA REGISTERED No. 21338 PROFESSIONAL GREGORY L. TUCKER ENGINEER
08.14.2023

TYPICAL DETAILS

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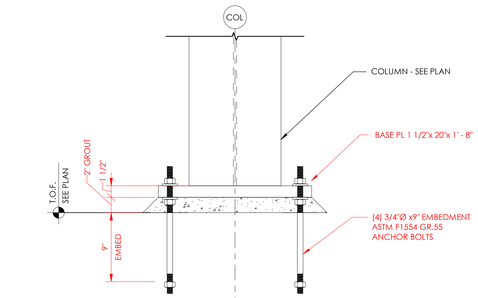

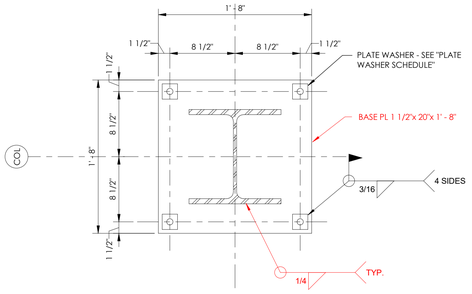

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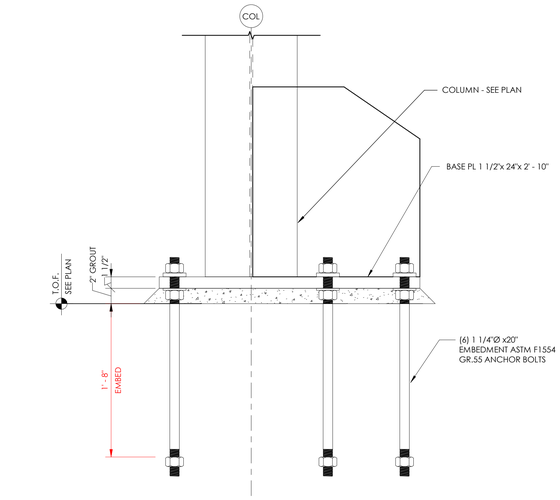

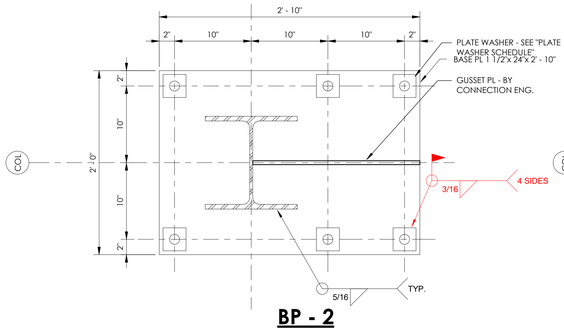

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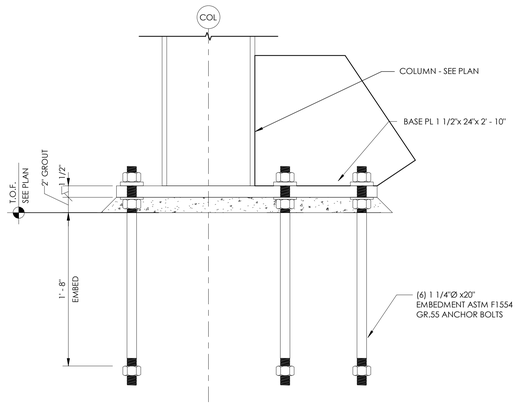

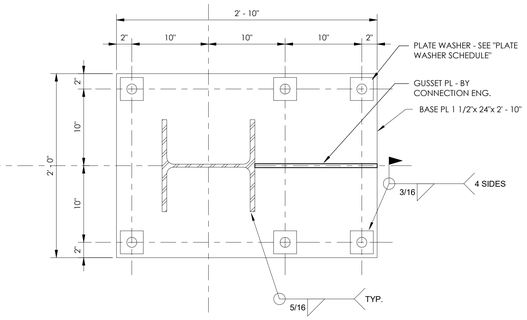

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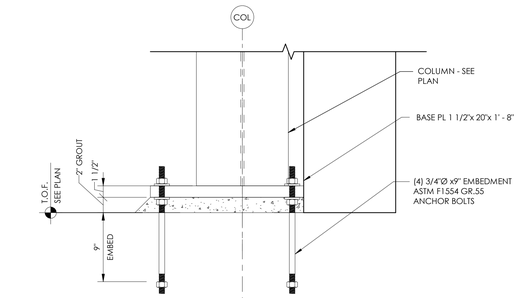

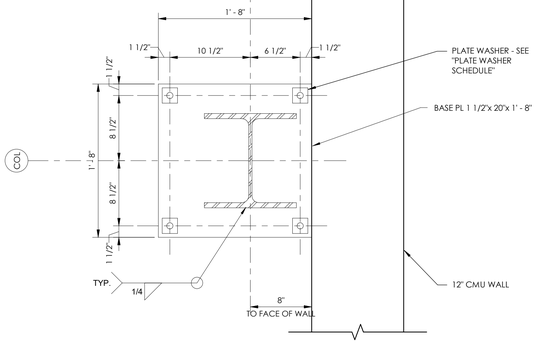

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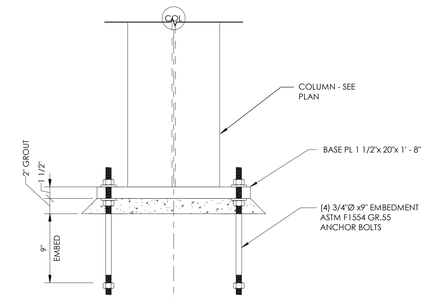

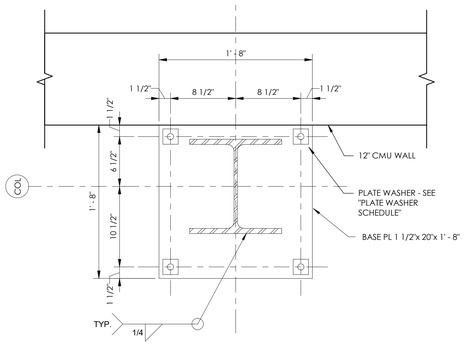

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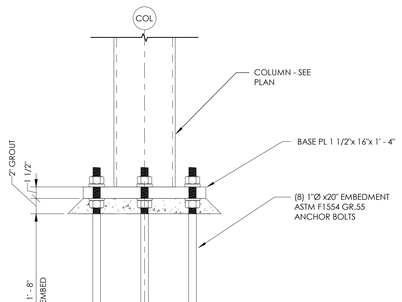

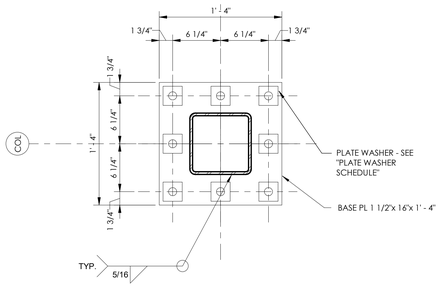

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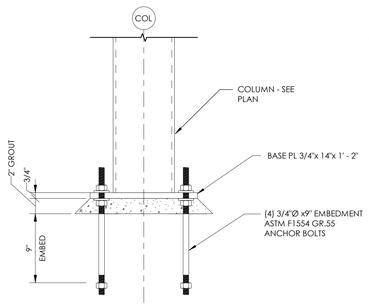

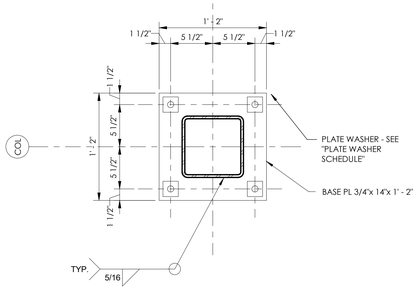

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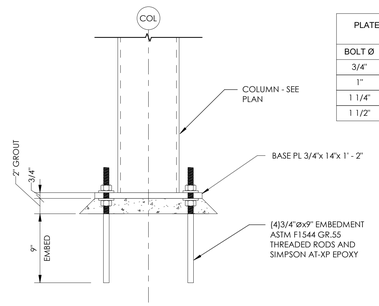

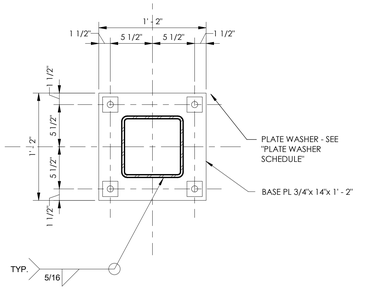

BP - 8

PLATE WASHER AND BASEPLATE HOLE Ø SCHEDULE		
BOLT Ø	HOLE Ø	PLATE WASHER
3/4"	1-5/16"	1/4"x2"x2"
1"	1 13/16"	3/8"x3"x3"
1 1/4"	2-1/16"	1/2"x3"x3"
1 1/2"	2-5/16"	1/2"x3-1/2"x3-1/2"

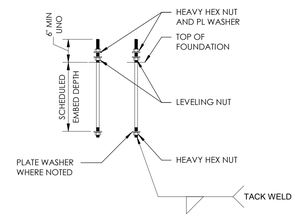

PLATE WASHER SCHEDULE

FOOTING SCHEDULE

FOOTING DESIGNATION	DEPTH	REINF EW.	LENGTH	WIDTH	NOTES
F4.0	1' - 2"	4#5	4' - 0"	4' - 0"	---
F5.0	1' - 2"	4#5	5' - 0"	5' - 0"	---
F5.0A	1' - 2"	4#5	5' - 0"	5' - 0"	1
F6.0	1' - 2"	5#5	6' - 0"	6' - 0"	---
F6.0A	1' - 2"	5#5	6' - 0"	6' - 0"	1
F7.0	1' - 4"	7#5	7' - 0"	7' - 0"	---
F8.0	1' - 6"	9#5	8' - 0"	8' - 0"	---
F9.0	1' - 8"	8#6	9' - 0"	9' - 0"	---
F9.5	2' - 0"	10#6	9' - 6"	9' - 6"	1
F10.0	1' - 10"	10#6	10' - 0"	10' - 0"	---
F10.0A	2' - 0"	10#6	10' - 0"	10' - 0"	1
F11.0	2' - 0"	8#7	11' - 0"	11' - 0"	---
F12.0	2' - 2"	12#7	12' - 0"	12' - 0"	1
F12.5	2' - 2"	12#7	12' - 6"	12' - 6"	1
FSP1	1' - 0"	5#5 LONG, 8#5 SHORT	8' - 0"	5' - 0"	1
FSP2	1' - 2"	5#5 LONG, 10#5 SHORT	10' - 0"	5' - 0"	---

NOTES:
1. PROVIDE NOTED REINFORCEMENT TOP AND BOTTOM.

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CALHOUN COMMUNITY COLLEGE WORKFOCE SKILS TRAINING

GMC ABHM210048

ALABAMA REGISTERED No. 21338 PROFESSIONAL GREGORY L. TUCKER ENGINEER
08.14.2023

TYPICAL DETAILS

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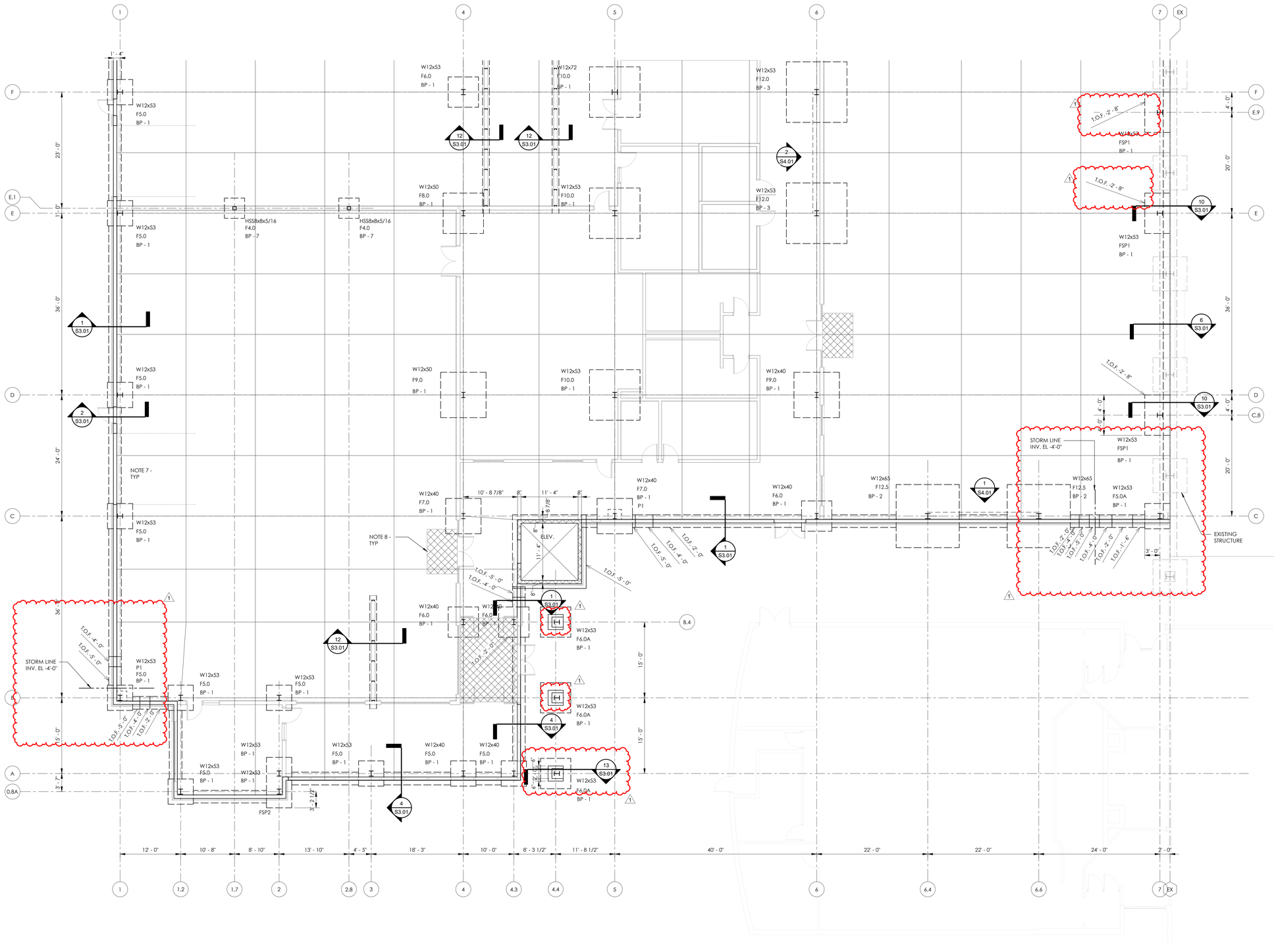
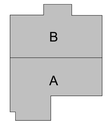


FOUNDATION AND FIRST FLOOR PARTIAL PLAN - PART A

SCALE: 1/8" = 1'-0"

PROJECT NORTH

1. FINISH FLOOR (TOP OF SLAB) ELEVATION 0'-0", UNLESS NOTED.
2. TOP OF INTERIOR FOOTING ELEVATION -2'-0" BELOW FINISH FLOOR, UNLESS NOTED.
3. 6" SLAB ON GRADE, UNLESS NOTED. SEE GENERAL NOTES AND TYPICAL DETAILS.
4. GENERAL CONTRACTOR COORDINATE LOCATION OF ALL FOOTING STEPS WITH CIVIL, UTILITY AND PLUMBING DRAWINGS.
5. GENERAL CONTRACTOR COORDINATE FLOOR DEPRESSION DEPTH, SIZE AND LOCATION WITH ARCHITECTURAL DRAWINGS.
6. GENERAL CONTRACTOR COORDINATE LOCATION OF TILE JOINTS WITH CONTROL JOINTS.
7. SEE ARCH DWGS FOR ADDITIONAL STEEL CHANNEL/PLATE FRAMING REQUIRED AT ROLL-UP DOORS.
8. 1" SLAB RECESS. SEE TYPICAL DETAIL AND ARCH DWGS FOR EXTENT.



BUILDING KEY PLAN

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FOUNDATION AND FIRST FLOOR PARTIAL PLAN - PART A

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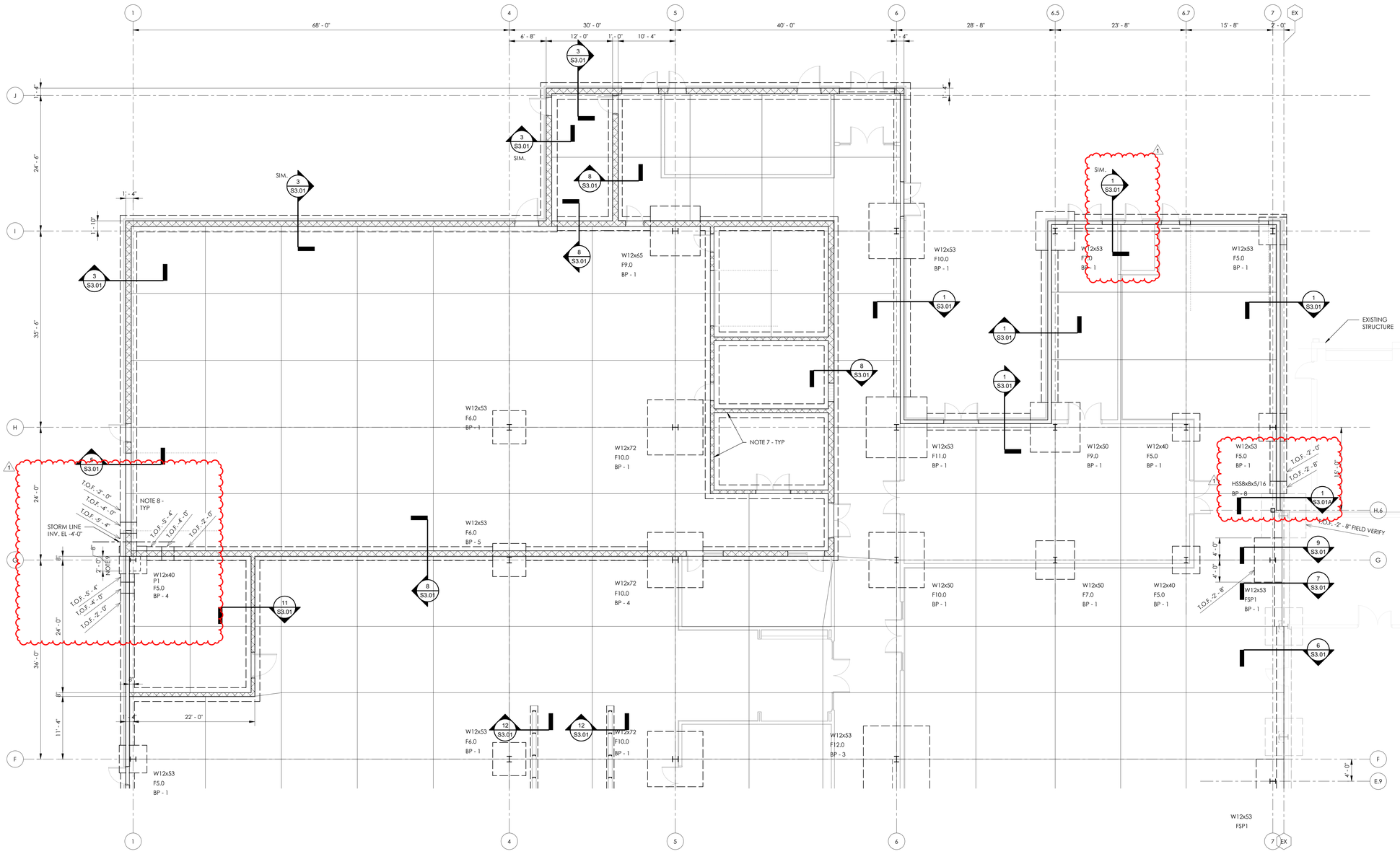
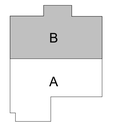


FOUNDATION AND FIRST FLOOR PARTIAL PLAN - PART B

SCALE: 1/8" = 1'-0"

PROJECT NORTH

1. FINISH FLOOR (TOP OF SLAB) ELEVATION 0'-0", UNLESS NOTED.
2. TOP OF INTERIOR FOOTING ELEVATION -2'-0" BELOW FINISH FLOOR, UNLESS NOTED.
3. 6" SLAB ON GRADE, UNLESS NOTED. SEE GENERAL NOTES AND TYPICAL DETAILS.
4. GENERAL CONTRACTOR COORDINATE LOCATION OF ALL FOOTING STEPS WITH CIVIL, UTILITY AND PLUMBING DRAWINGS.
5. GENERAL CONTRACTOR COORDINATE FLOOR DEPRESSION DEPTH, SIZE AND LOCATION WITH ARCHITECTURAL DRAWINGS.
6. GENERAL CONTRACTOR COORDINATE LOCATION OF TILE JOINTS WITH CONTROL JOINTS.
7. SEE TYPICAL DETAIL FOR FOUNDATION AT NON-LOAD BEARING CMU WALL.
8. SEE ARCH DWGS FOR ADDITIONAL STEEL CHANNEL/PLATE FRAMING REQUIRED AT DOOR OPENINGS.
9. PEDESTAL IS NOT CENTERED ON COLUMN. (1)



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FOUNDATION AND FIRST FLOOR PARTIAL PLAN - PART B

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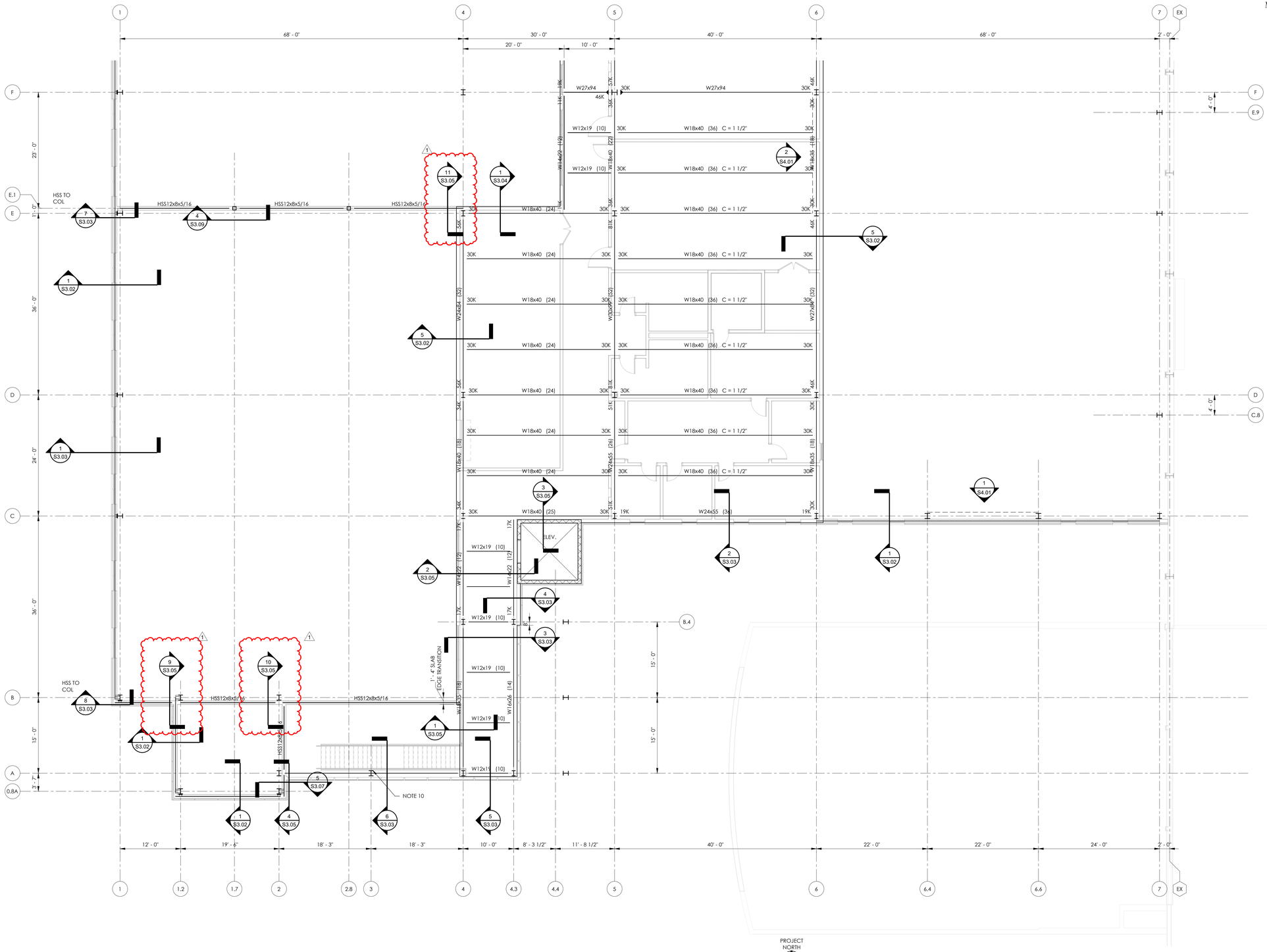
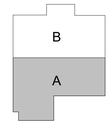


SECOND FLOOR PARTIAL FRAMING PLAN - PART A

SCALE: 1/8" = 1'-0"

PROJECT NORTH

1. FINISH FLOOR (TOP OF SLAB) ELEVATION 15'-4", UNLESS NOTED.
2. TOP OF STEEL ELEVATION 0'-6" BELOW FINISH FLOOR, UNLESS NOTED.
3. FLOOR SYSTEM: 4" CONCRETE SLAB ON 2" COMPOSITE STEEL DECK (6" TOTAL). SEE GENERAL NOTES.
4. ( ) INDICATES NUMBER OF HEADED STUDS SPACED EQUALLY BETWEEN BEAMS.
5. STEEL BEAM CAMBERS INDICATED AS C=X, WHERE "X" IS THE NUMBER OF INCHES.
6. BEAM REACTIONS ARE INDICATED AT ENDS OF BEAMS AS "XK" WHERE "X" IS THE MAGNITUDE OF THE WORKING LOAD SHEAR REACTION IN KIPS. UNLESS NOTED OTHERWISE ON PLAN DESIGN CONNECTIONS FOR SHEAR REACTION OF 10 KIPS.
7. SPACE BEAMS EQUALLY BETWEEN COLUMN CENTERLINES, UNLESS NOTED.
8. CONTRACTOR COORDINATE SIZE AND LOCATION OF MECHANICAL OPENINGS WITH MECHANICAL DRAWINGS AND UNIT MANUFACTURER.
9. "◄" INDICATES MOMENT CONNECTION. SEE TYPICAL DETAILS.
10. STAIR DETAILER TO PROVIDE LATERAL CONNECTION TO STEEL COLUMN.



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SECOND FLOOR PARTIAL FRAMING PLAN - PART A

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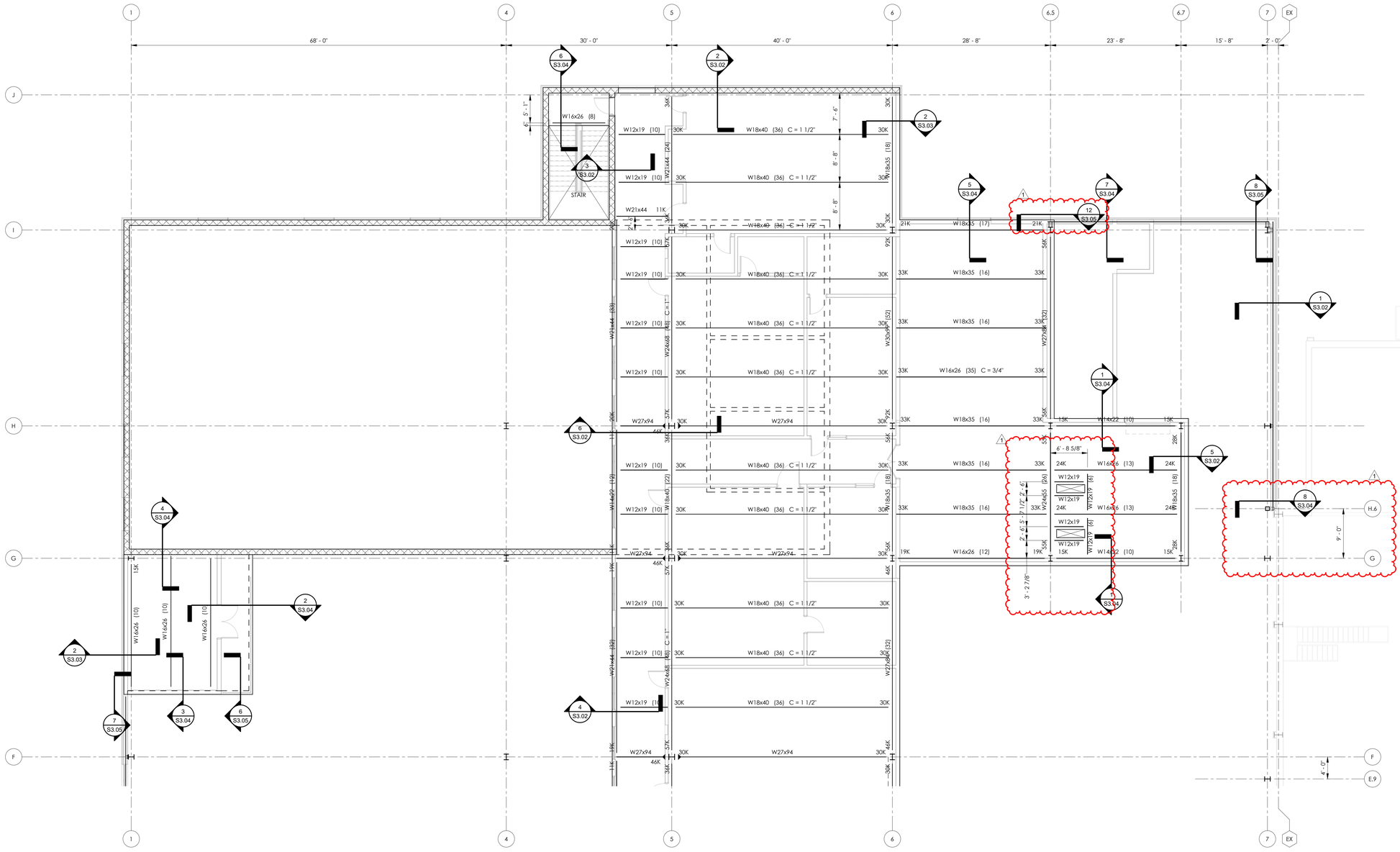

SECOND FLOOR PARTIAL FRAMING PLAN - PART B

SCALE: 1/8" = 1'-0"

1. FINISH FLOOR (TOP OF SLAB) ELEVATION 15'-4", UNLESS NOTED.
2. TOP OF STEEL ELEVATION 0'-6" BELOW FINISH FLOOR, UNLESS NOTED.
3. FLOOR SYSTEM: 4" CONCRETE SLAB ON 2" COMPOSITE STEEL DECK (6" TOTAL). SEE GENERAL NOTES.
4. ( ) INDICATES NUMBER OF HEADED STUDS SPACED EQUALLY BETWEEN BEAMS.
5. STEEL BEAM CAMBERS INDICATED AS C=X, WHERE "X" IS THE NUMBER OF INCHES.
6. BEAM REACTIONS ARE INDICATED AT ENDS OF BEAMS AS "XK" WHERE "X" IS THE MAGNITUDE OF THE WORKING LOAD SHEAR REACTION IN KIPS. UNLESS NOTED OTHERWISE ON PLAN DESIGN CONNECTIONS FOR SHEAR REACTION OF 10 KIPS.
7. SPACE BEAMS EQUALLY BETWEEN COLUMN CENTERLINES, UNLESS NOTED.
8. CONTRACTOR COORDINATE SIZE AND LOCATION OF MECHANICAL OPENINGS WITH MECHANICAL DRAWINGS AND UNIT MANUFACTURER.
9. " ◄ " INDICATES MOMENT CONNECTION. SEE TYPICAL DETAILS.

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SECOND FLOOR PARTIAL FRAMING PLAN - PART B

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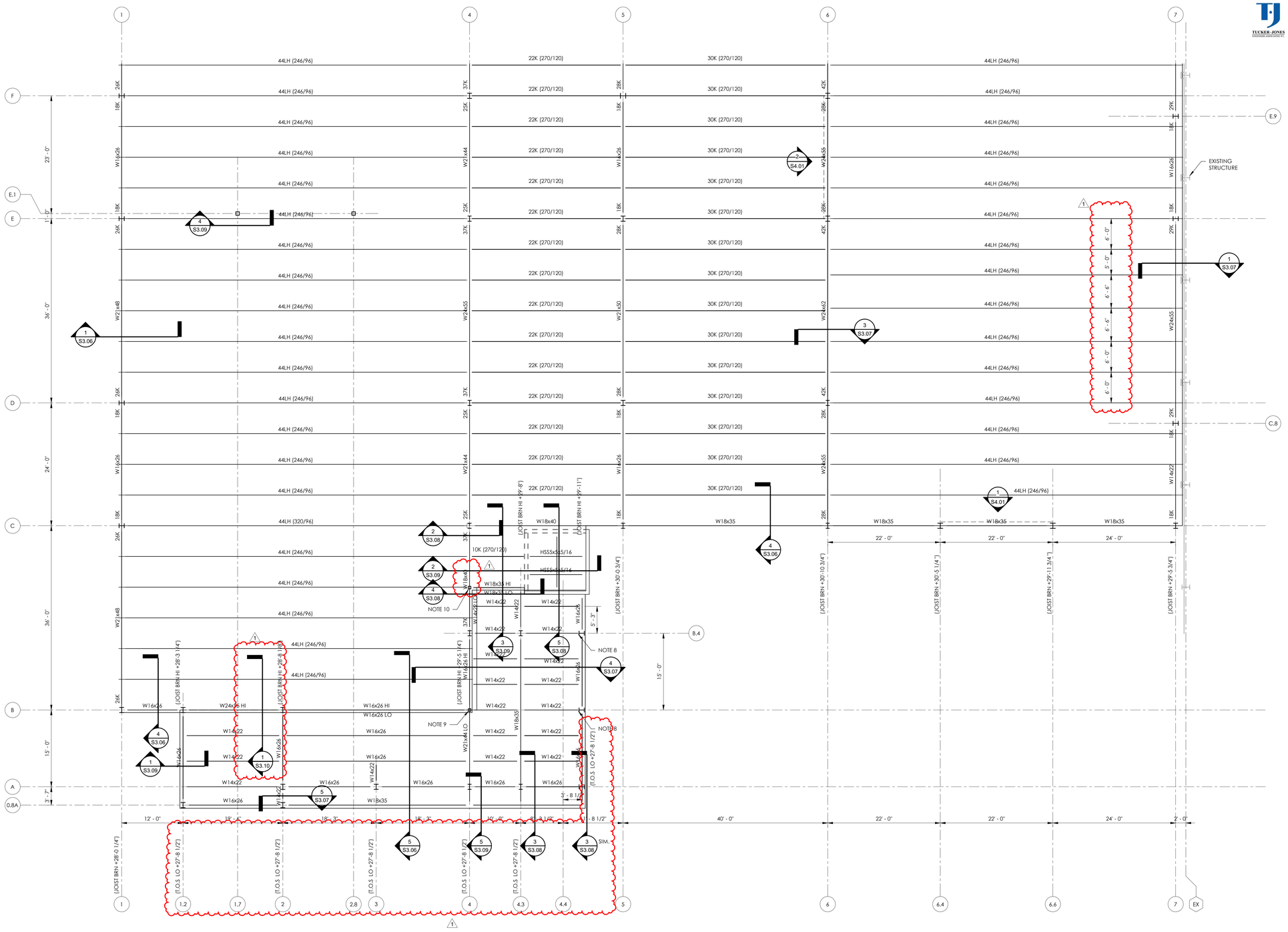

ROOF PARTIAL FRAMING PLAN - PART A

SCALE: 1/8" = 1'-0"

PROJECT NORTH

1. JOIST BEARING (TOP OF STEEL BEAMS) ELEVATION NOTED AS (X'-X") ON PLAN. SEE SECTIONS FOR ADDITIONAL TOP OF STEEL ELEVATIONS.
2. ROOF SYSTEM: 1 1/2" STEEL ROOF DECK ON STEEL JOISTS BEARING ON STEEL BEAMS, UNLESS NOTED. SEE GENERAL NOTES FOR ROOF DECK ATTACHMENT PATTERN.
3. BEAMS PARALLEL TO JOIST ARE 5" HIGHER THAN SUPPORTING MEMBERS.
4. SPACE JOISTS EQUALLY BETWEEN BEAMS OR COLUMN CENTERLINES, UNLESS NOTED.
5. JOIST BEARING ELEVATIONS ARE EITHER LEVEL OR SLOPING UNIFORMLY BETWEEN NOTED ELEVATIONS.
6. BEAM REACTIONS ARE INDICATED AT ENDS OF BEAMS AS "XK" WHERE "X" IS THE MAGNITUDE OF THE WORKING LOAD SHEAR REACTION IN KIPS. UNLESS NOTED OTHERWISE ON PLAN DESIGN CONNECTIONS FOR SHEAR REACTION OF 10 KIPS.
7. "A=XK" INDICATES AXIAL FORCE IN BEAM AT STREGTH LEVEL.
8. DESIGN CONNECTION FOR AN 1K AXIAL LOAD IN ADDITIONAL TO A SHEAR REACTION OF 10 KIP.
9. HSS6x6x5/16 POST-UP COLUMN, SEE TYPICAL DETAIL.
10. HSS6x6x5/16 HANGER COLUMN.

B
A

BUILDING KEY PLAN

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PROJECT #22046

GMC

Goodwyn Mills Cawood, LLC
2400 5th Avenue South, Suite 200
Birmingham, AL 35233
T 205.879.4462
GMCNETWORK.COM

ISSUE	DATE
IFB SET	08.14.2023
AD 02	09.01.2023
1	

DRAWN BY: KA
CHECKED BY: GLT

CALHOUN COMMUNITY COLLEGE WORKFOCE SKILS TRAINING

GMC ABHM210048



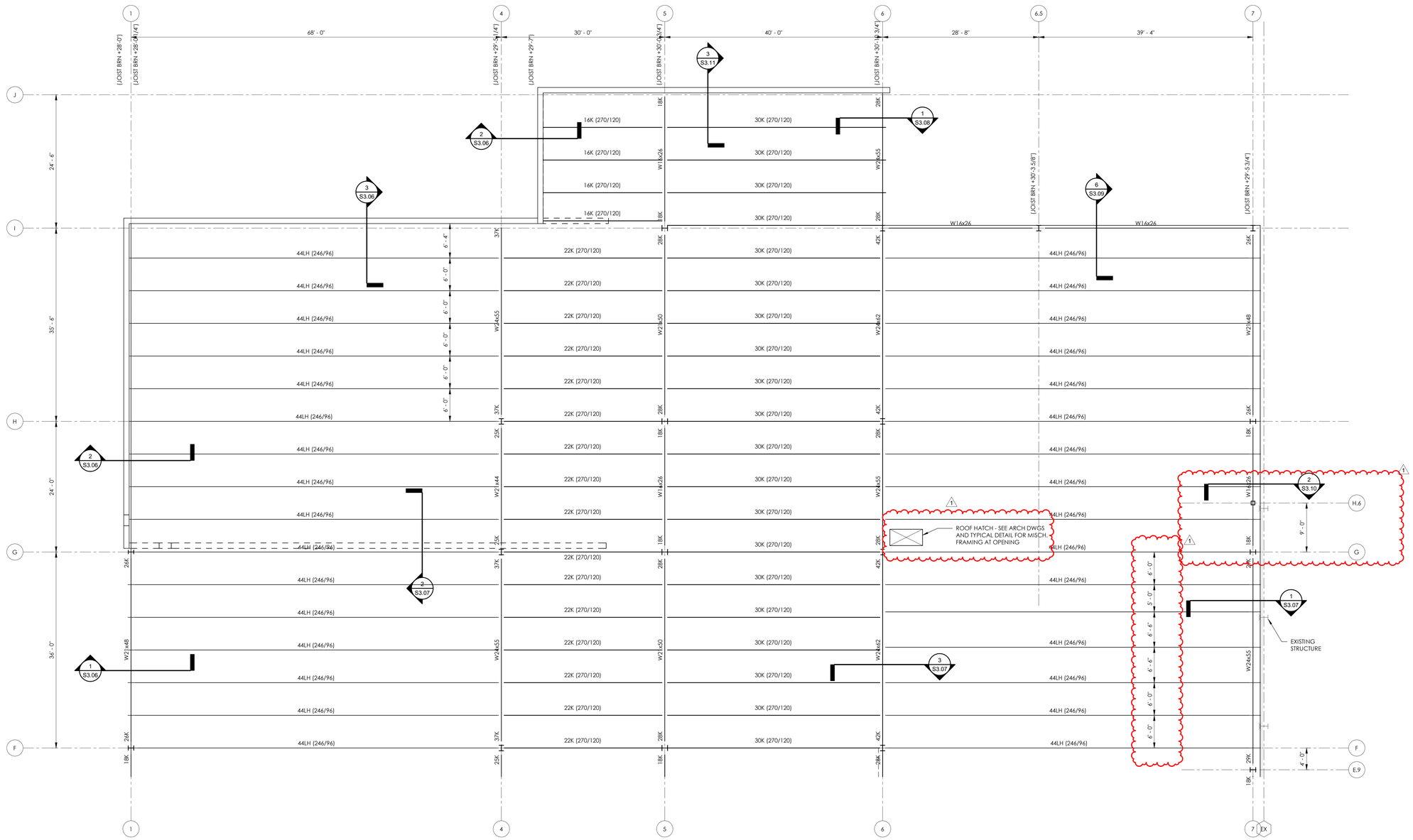
08.14.2023

ROOF PARTIAL FRAMING PLAN - PART A

S2.08

8/31/2023 2:02:07 PM

TUCKER-JONES
3300 CAHABA ROAD, SUITE 210
BIRMINGHAM, ALABAMA 35223
PHONE: 205.879.5660
FAX: 205.879.5606
PROJECT #22046

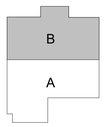


ROOF PARTIAL FRAMING PLAN - PART B

SCALE: 1/8" = 1'-0"

PROJECT NORTH

1. JOIST BEARING (TOP OF STEEL BEAMS) ELEVATION NOTED AS (X'-X") ON PLAN. SEE SECTIONS FOR ADDITIONAL TOP OF STEEL ELEVATIONS.
2. ROOF SYSTEM: 1 1/2" STEEL ROOF DECK ON STEEL JOISTS BEARING ON STEEL BEAMS, UNLESS NOTED. SEE GENERAL NOTES FOR ROOF DECK ATTACHMENT PATTERN.
3. BEAMS PARALLEL TO JOIST ARE 5" HIGHER THAN SUPPORTING MEMBERS.
4. SPACE JOISTS EQUALLY BETWEEN BEAMS OR COLUMN CENTERLINES, UNLESS NOTED.
5. JOIST BEARING ELEVATIONS ARE EITHER LEVEL OR SLOPING UNIFORMLY BETWEEN NOTED ELEVATIONS.
6. BEAM REACTIONS ARE INDICATED AT ENDS OF BEAMS AS "XK" WHERE "X" IS THE MAGNITUDE OF THE WORKING LOAD SHEAR REACTION IN KIPS. UNLESS NOTED OTHERWISE ON PLAN DESIGN CONNECTIONS FOR SHEAR REACTION OF 10 KIPS.
7. "A=XK" INDICATES AXIAL FORCE IN BEAM AT STREGTH LEVEL.



BUILDING KEY PLAN

GMC

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CALHOUN COMMUNITY COLLEGE WORKFOCE SKILS TRAINING

GMC ABHM210048

ALABAMA REGISTERED No. 21338 PROFESSIONAL ENGINEER GREGORY L. TUCKER
08.14.2023

ROOF PARTIAL FRAMING PLAN - PART B

S2.09

8/31/2023 2:02:08 PM

TECHNI-JOINTS
ENGINEERING CONSULTANTS

3300 CAHABA ROAD, SUITE 210
BIRMINGHAM, AL ALABAMA 35223
PHONE: 205.879.5660
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PROJECT #23046

S3.01

SECTIONS - FOUNDATION

CALHOUN COMMUNITY COLLEGE WORKFORCE SKILS TRAINING

GMC ABHM210048



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2400 5th Avenue South, Suite 200
Birmingham, AL 35233
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GMCNETWORK.COM

G·M·C

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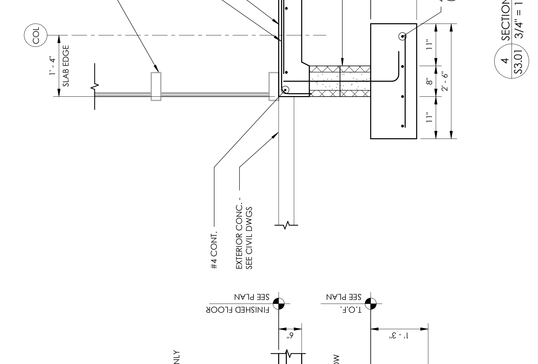
1 SECTION S3.01 / 3/4" = 1'-0"



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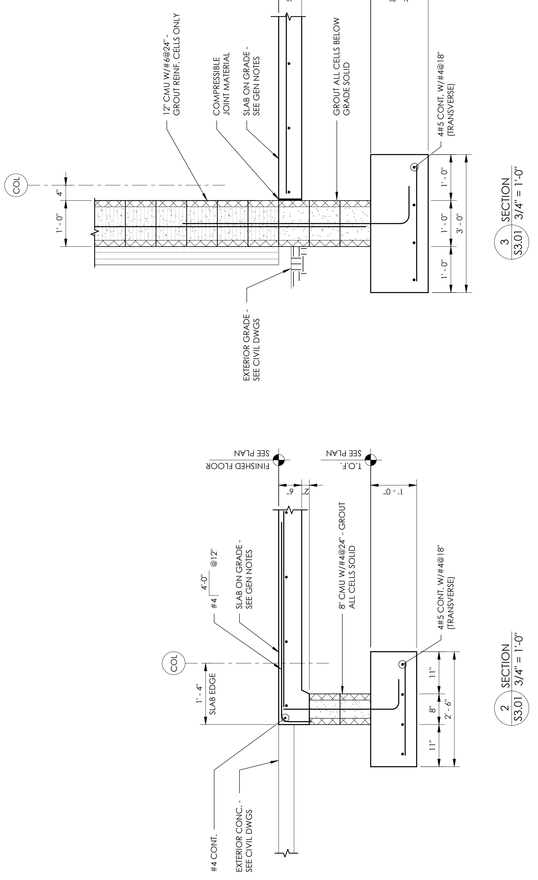

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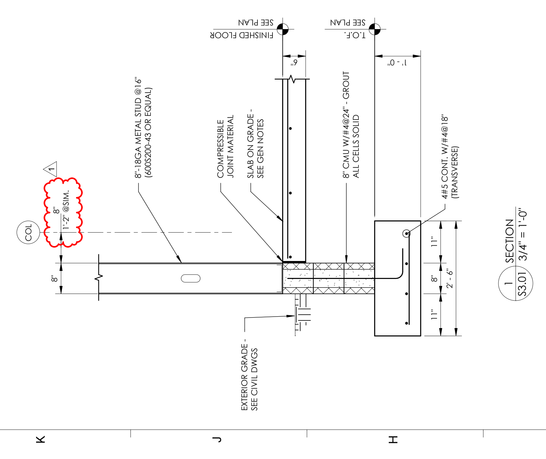
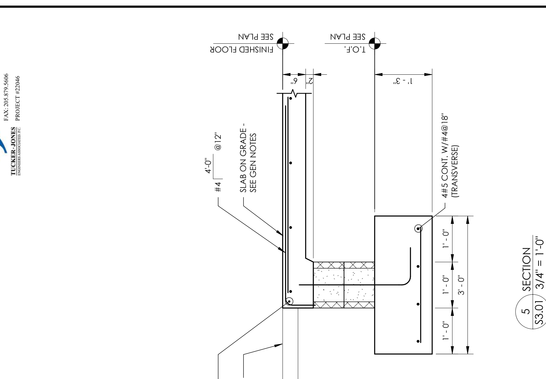
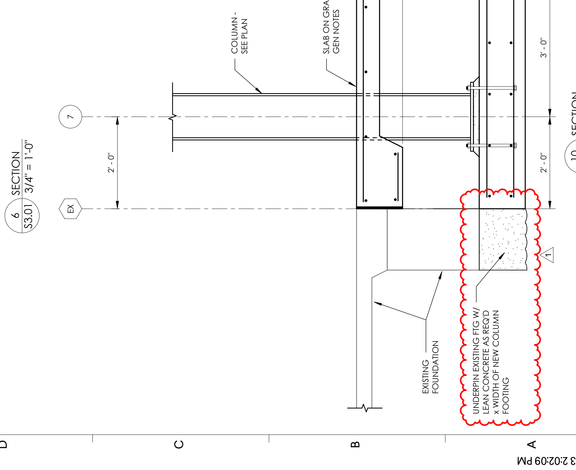


4 SECTION S3.01 / 3/4" = 1'-0"

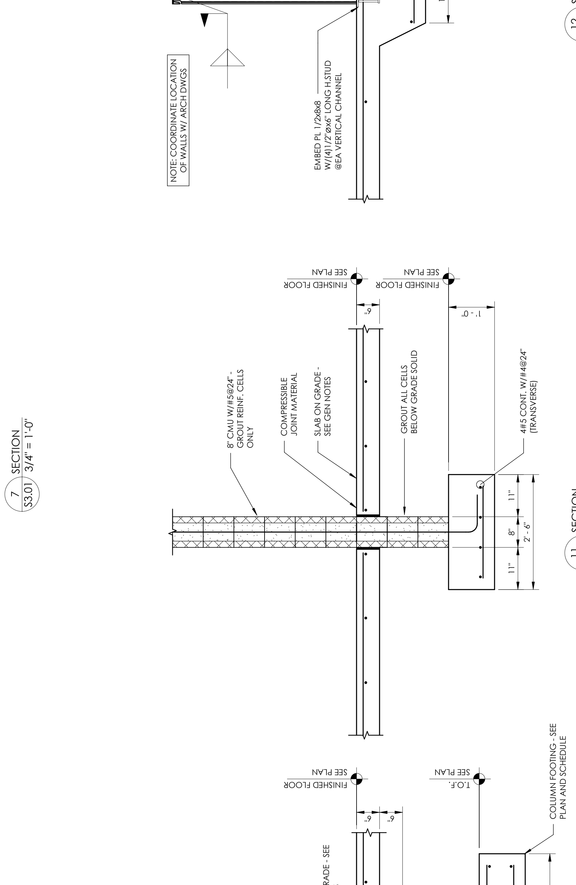
5 SECTION S3.01 / 3/4" = 1'-0"



6 SECTION S3.01 / 3/4" = 1'-0"



7 SECTION S3.01 / 3/4" = 1'-0"



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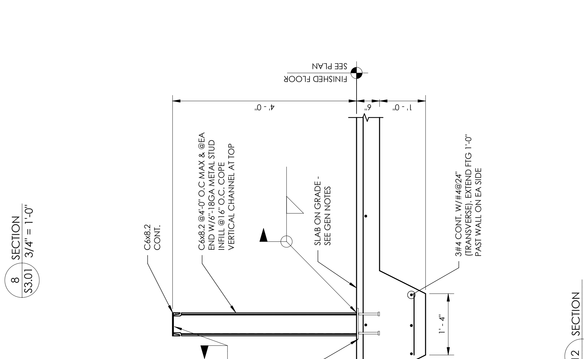
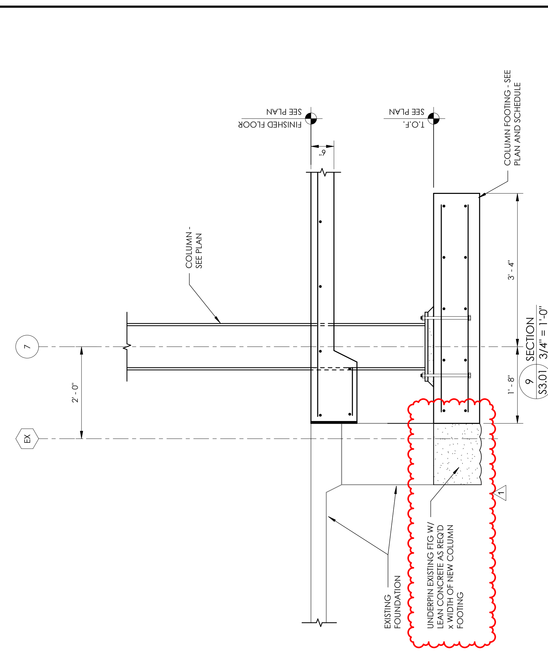


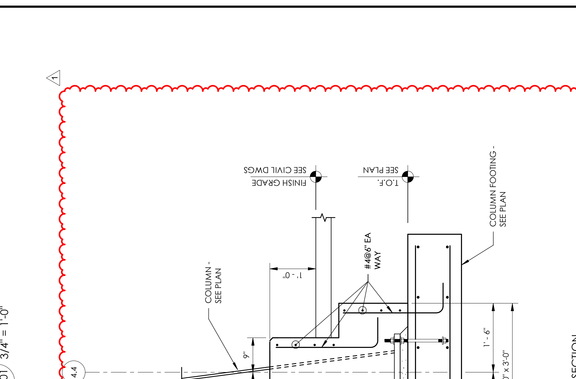
9 SECTION S3.01 / 3/4" = 1'-0"



10 SECTION S3.01 / 3/4" = 1'-0"

11 SECTION S3.01 / 3/4" = 1'-0"

12 SECTION S3.01 / 3/4" = 1'-0"



13 SECTION S3.01 / 3/4" = 1'-0"

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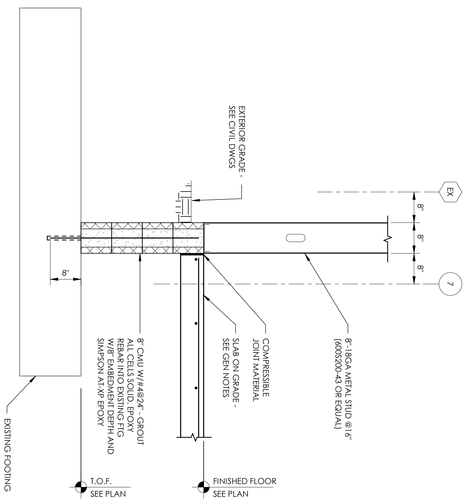

1 SECTION
S3.01A 3/4" = 1'-0"

NEW SHEET

3300 CAHABA ROAD, SUITE 210
BIRMINGHAM, ALABAMA 35223
PHONE: 205.879.5660
FAX: 205.879.5666
PROJECT #:2046
TUCKER-JONES

SECTIONS - FOUNDATION

ALABAMA REGISTERED PROFESSIONAL ENGINEER No. 21338 GREGORY L. TUCKER 08.14.2023

S3.01A

CALHOUN COMMUNITY COLLEGE WORKFOCE SKILS TRAINING

GMC ABHM210048

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1	AD 02	09.01.2023
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	CHECKED BY:	Checker

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SECTIONS - 2ND FLOOR

CALHOUN COMMUNITY COLLEGE WORKFORCE SKILS TRAINING

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S3.05

ISSUE	DATE
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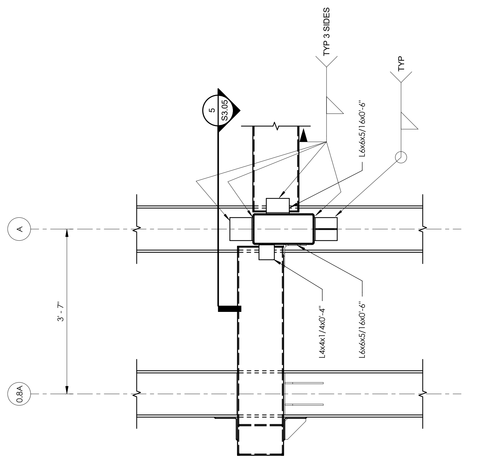
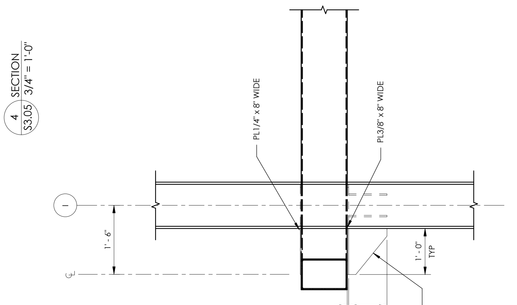
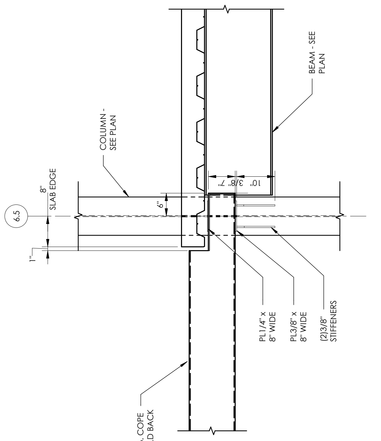
TECHNICAL JOINTS
3304 CAHABA ROAD, SUITE 210
BIRMINGHAM, AL ALABAMA 35223
PHONE: 205.879.5660
FAX: 205.879.5666
PROJECT #25046



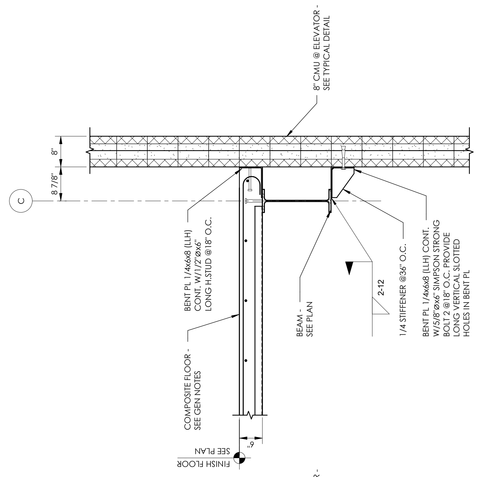


4 SECTION S3.05 3/4" = 1'-0"



8 SECTION S3.05 3/4" = 1'-0"

12 SECTION S3.05 3/4" = 1'-0"



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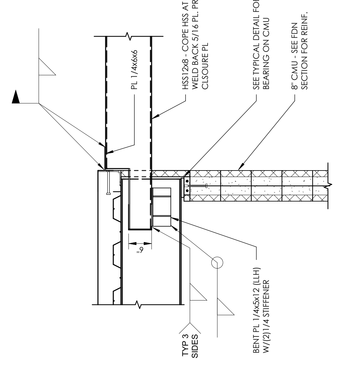
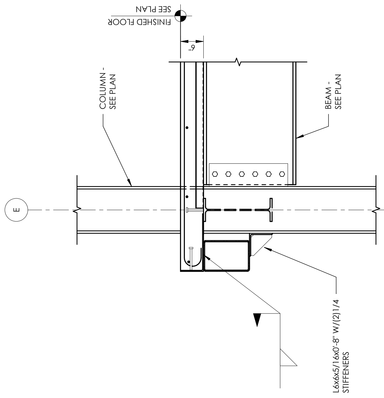
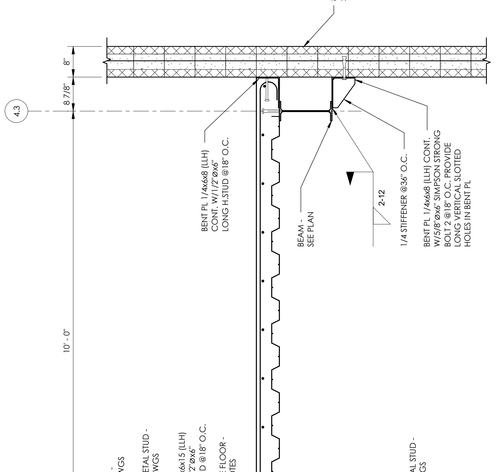


7 SECTION S3.05 3/4" = 1'-0"



11 SECTION S3.05 3/4" = 1'-0"



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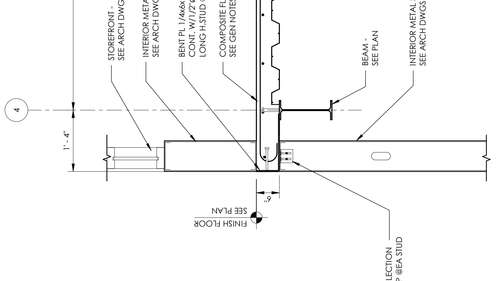
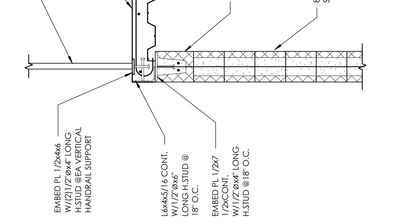


1 SECTION S3.05 3/4" = 1'-0"



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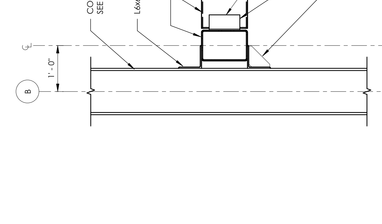

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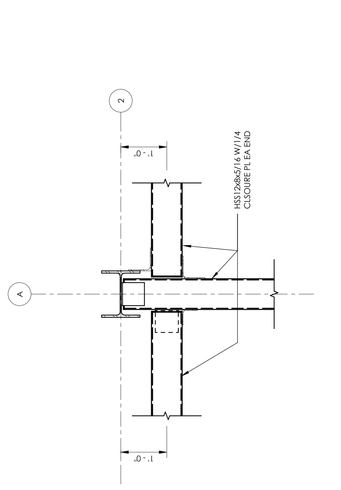
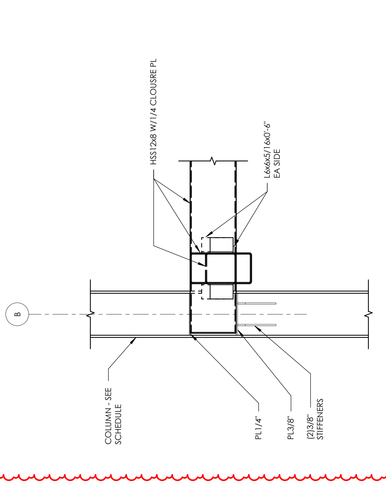


5 SECTION S3.05 3/4" = 1'-0"



9 SECTION S3.05 3/4" = 1'-0"

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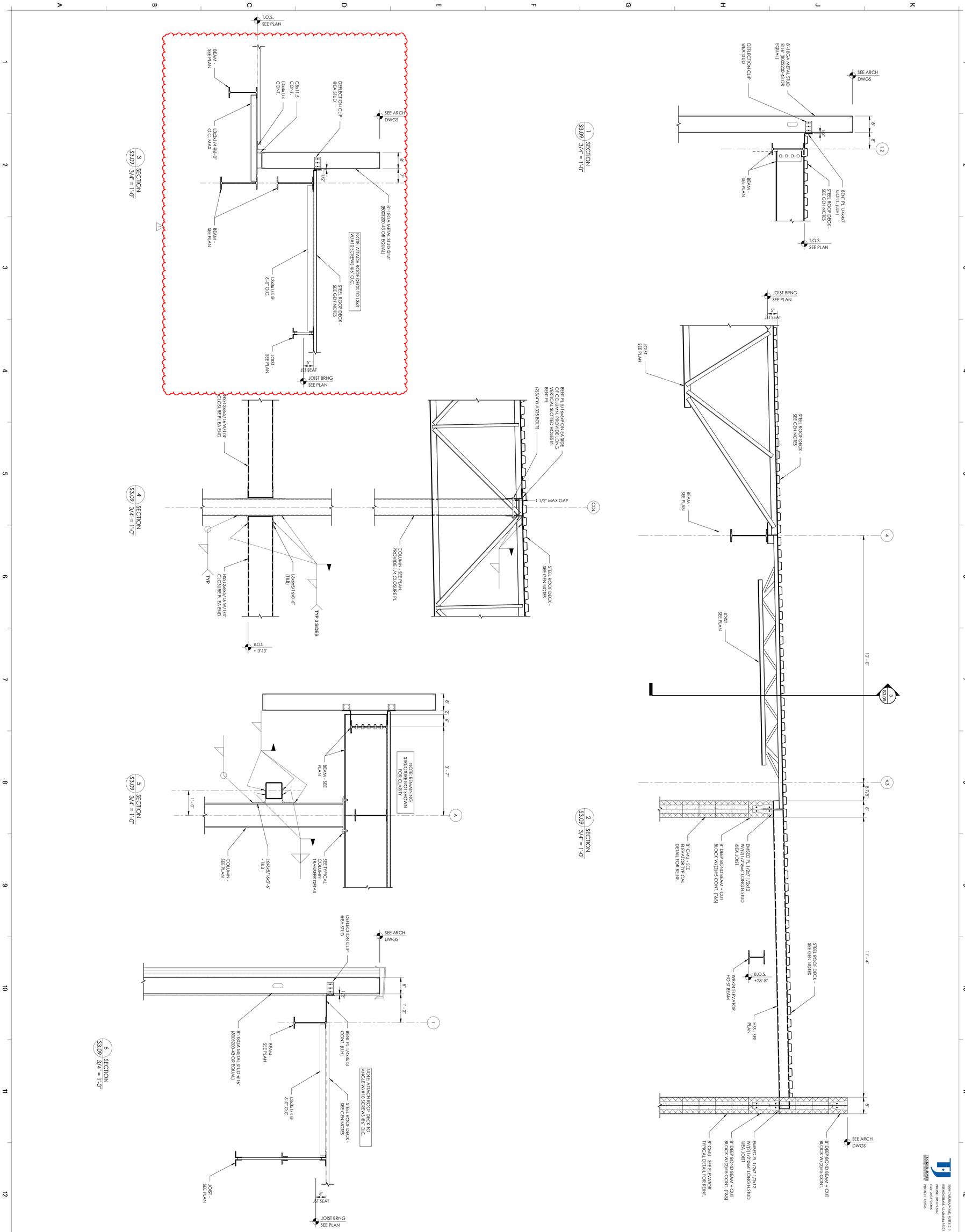

SECTIONS - ROOF

S3.09

CALHOUN COMMUNITY COLLEGE WORKFOCE SKILS TRAINING

GMC ABHM210048

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1 AD 02	09.01.2023
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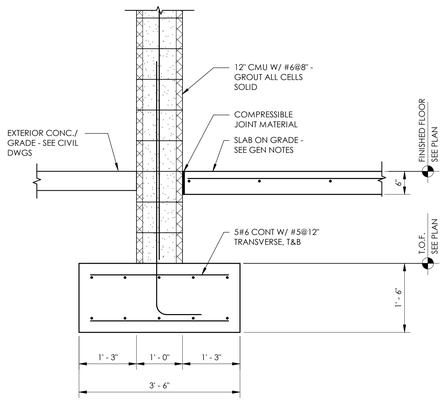
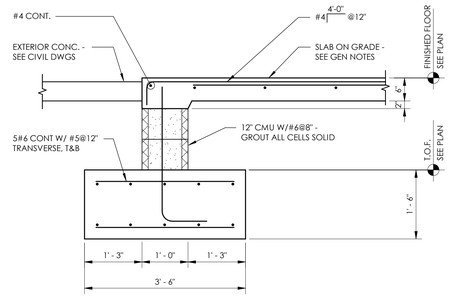


1 S3.11 SECTION 3/4" = 1'-0"



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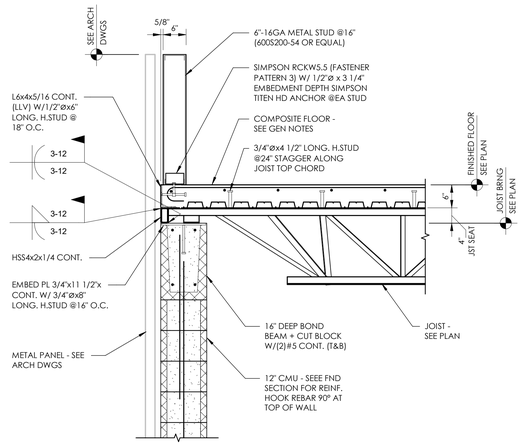
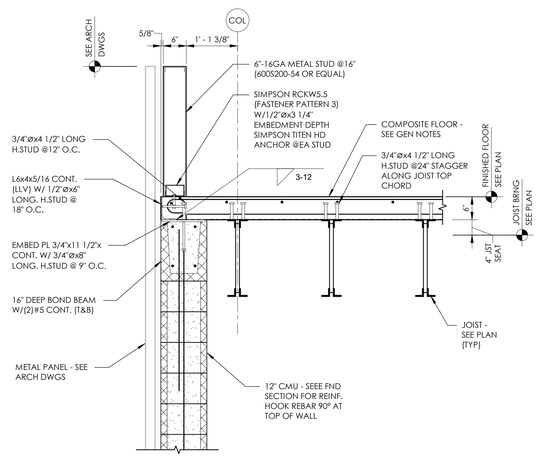


3 S3.11 SECTION 3/4" = 1'-0"



4 S3.11 SECTION 3/4" = 1'-0"

TUCKER-JONES
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BIRMINGHAM, ALABAMA 35223
PHONE: 205.879.5660
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PROJECT #22046

G-M-C

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2400 5th Avenue South, Suite 200
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CALHOUN COMMUNITY COLLEGE WORKFOCE SKILS TRAINING

GMC ABHM210048

ALABAMA REGISTERED No. 21336 PROFESSIONAL ENGINEER
08.14.2023

SECTIONS - STORM SHELTER

S3.11

8/31/2023 2:02:12 PM

HVAC DUCTWORK LEGEND

- NEW DUCTWORK
- CEILING RETURN GRILLE 24X24 CUBE CORE
- LOUVERED FACE CEILING DIFFUSER
- CEILING RETURN OR EXHAUST, REGISTER OR GRILLE
- LAY-IN LOUVERED FACE CEILING DIFFUSER
- SR — SIDEWALL SUPPLY REGISTER
- SUPPLY AIR DUCT SECTION
- RETURN OR EXHAUST AIR DUCT SECTION
- ROUND, 90° ELBOW
- ROUND, 45° ELBOW
- RECTANGULAR, 90° ELBOW WITH TURNING VANES
- RECTANGULAR, 45° ELBOW
- DUCT TURNING DOWN
- DUCT TURNING UP
- RISE OR DROP IN DUCT
- FD — FIRE DAMPER (RATING EQUAL TO WALL RATING) (PROVIDE ACCESS DOOR IN DUCT) (RUSKIN DIBD2 OR EQUAL)
- SFD — COMBINATION SMOKE/FIRE DAMPER (PROVIDE ACCESS DOOR IN DUCT)
- SD — SMOKE DAMPER (RUSKIN SD50 OR EQUAL)
- MD — MANUAL DAMPER (RECT. = RUSKIN MD25 OR EQUAL, RND. = RUSKIN MDRS25 OR EQUAL)
- AD — AUTOMATIC DAMPER (RUSKIN CD50 OR EQUAL)
- MD — RECTANGULAR BRANCH OFF RECTANGULAR DUCT WITH MANUAL DAMPER
- ROUND MEDIUM PRESSURE DUCT TAP OFF RECTANGULAR MEDIUM PRESSURE DUCT WITH BELLMOUTH FITTING. (SEE SPECIFICATIONS)
- FLEXIBLE DUCT

HVAC PIPING LEGEND

- NEW PIPING
- CHS — CHILLED WATER SUPPLY LINES
- CHR — CHILLED WATER RETURN LINES
- D — AC UNIT DRAIN LINES
- HWS — HOT WATER SUPPLY
- HWR — HOT WATER RETURN
- RS — REFRIGERANT SUCTION LINES
- RL — REFRIGERANT LIQUID LINES
- GRADE DOWN IN DIRECTION OF ARROW, 1" IN 20 FT.
- BALL VALVE
- BUTTERFLY VALVE
- GATE VALVE
- STRAINER (Y)
- BRANCH OFF TOP OF MAIN
- BRANCH OFF BOTTOM OF MAIN
- CHECK VALVE
- PRESSURE RELIEF VALVE
- HOSE BIBB
- RISE OR DROP IN PIPE
- BRANCH OFF SIDE OF MAIN
- WATER FLOW METERING DEVICE

GENERAL NOTES:

1. MECHANICAL DRAWINGS ARE DIAGRAMMATIC AND SUBJECT TO REQUIREMENTS OF ARCHITECTURAL DRAWINGS AND CONDITIONS EXISTING IN THE FIELD. MECHANICAL DRAWINGS INDICATE GENERALLY THE LOCATION OF COMPONENTS AND ARE NOT INTENDED TO SHOW ALL FITTINGS OR ALL DETAILS OF THE WORK TO BE PERFORMED.
2. FOLLOW THE DRAWINGS CLOSELY, COORDINATE DIMENSIONS WITH ARCHITECTURAL DRAWINGS AND FIELD CONDITIONS. DO NOT SCALE MECHANICAL DRAWINGS FOR LOCATIONS OF SYSTEM COMPONENTS.
3. COORDINATE CONSTRUCTION OF ALL MECHANICAL WORK WITH ARCHITECTURAL, STRUCTURAL, CIVIL, ELECTRICAL WORK, ETC., SHOWN ON OTHER CONTRACT DOCUMENT DRAWINGS.
4. MAKE NO CHANGES WITHOUT THE ARCHITECT'S WRITTEN PERMISSION. IN CASE OF DOUBT, OBTAIN ARCHITECT'S DECISION BEFORE PROCEEDING WITH WORK. FAILURE TO FOLLOW THIS INSTRUCTION SHALL MAKE THE CONTRACTOR LIABLE FOR DAMAGE TO OTHER WORK AND RESPONSIBLE FOR REMOVING AND REPAIRING DEFECTIVE OR MISLOCATED WORK IN PROPER MANNER.
5. DO NOT SCALE DRAWINGS TO LOCATE DIFFUSERS AND EQUIPMENT. COORDINATE WITH NEW AND EXISTING LIGHTING, ELECTRICAL CONDUIT, AND ALL EXISTING FIELD CONDITIONS.
6. VERIFY ALL EQUIPMENT VOLTAGES WITH ELECTRICAL DRAWINGS AND REPORT ANY INCONSISTENCIES TO THE ARCHITECT PRIOR TO ORDERING EQUIPMENT.
7. PROTECT MECHANICAL EQUIPMENT FROM DAMAGE DURING CONSTRUCTION. WHEN INSTALLATION IS COMPLETE, CLEAN EQUIPMENT AS REQUIRED.
8. INSTALL ALL EQUIPMENT TO PROVIDE NORMAL SERVICE ACCESS TO ALL COMPONENTS. INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. IF MANUFACTURER'S INSTRUCTIONS CONFLICT WITH CONTRACT DOCUMENTS, OBTAIN ARCHITECT'S DECISION BEFORE PROCEEDING.
9. FURNISH ACCESS DOORS FOR VALVES, FIRE DAMPERS, DAMPERS, CONTROLS, AIR VENTS, TRAP CLEAN OUTS, AND OTHER ITEMS LOCATED ABOVE NON-LIFTOUT CEILINGS OR BEHIND PARTITIONS OR WALLS. PROVIDE FIRE DAMPERS IN DUCTWORK, GRILLES, AND REGISTERS WITH FIRE RATING EQUAL TO RATING OF WALL OR CEILING. ALL FIRE DAMPERS MAY OR MAY NOT BE SHOWN ON MECHANICAL DRAWINGS. CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE ALL FIRE RATED WALL AND CEILING LOCATIONS AND RATINGS WITH ARCHITECTURAL DRAWINGS.
10. ALL WORK SHALL COMPLY WITH ALL APPLICABLE CODES AND STANDARDS (SEE SPECIFICATIONS).

AIR DEVICE LEGEND

MARK	DESCRIPTION	(X) SQUARE NECK SIZE		MODEL #
		NECK SIZE	ROUND RUNOUT	
LD(X)	LOUVER FACE 24"X24" LAY-IN CEILING DIFFUSER, 4-WAY THROW UNLESS NOTED OTHERWISE. CFM SHOWN.	6 X 6 9 X 9 12 X 12 15 X 15 18 X 18	6"Ø 8"Ø 10"Ø 12"Ø 14"Ø	TITUS TDC-AA
SD(X)	SAME AS LD, SURFACE MOUNTED.	SQUARE NECK SIZE		TITUS TDC-AA
SR	SIDE WALL SUPPLY REGISTER, SIZE AND CFM SHOWN.	--		TITUS 272
E(X)	CEILING EXHAUST GRILLE. 1/2" X 1/2" X 1/2" ALUMINUM CORE	SQUARE NECK SIZE		TITUS 50F
T(X)	CEILING TRANSFER GRILLE. 1/2" X 1/2" X 1/2" ALUMINUM CORE	SQUARE NECK SIZE		TITUS 50F
R(X)	CEILING RETURN GRILLE. 1/2" X 1/2" X 1/2" ALUMINUM CORE	SQUARE NECK SIZE		TITUS 50F
WRR	WALL RETURN REGISTER, SIZE AND CFM SHOWN.	--		TITUS 350
WER	WALL EXHAUST REGISTER, SIZE AND CFM SHOWN.	--		TITUS 350
WTG	WALL TRANSFER GRILLE. SIZE AND CFM SHOWN.	--		TITUS 350

FANS

MARK	SERVES	TYPE	CFM	E.S.P. (IN. WG)	MIN. WHEEL SIZE (IN.)	MOTOR HP	MOTOR V/Φ/Hz	ACCESSORIES	INTERLOCK W/	DESIGN BASIS
VF-1	WELD	(J)	14,000	0.5	54	3	460/3/60	(2)	BAS	LOREN COOK - EWD
VF-2	WELD	(J)	14,000	0.5	54	3	460/3/60	(2)	BAS	LOREN COOK - EWD
VF-3	WELD	(J)	14,000	0.5	54	3	460/3/60	(2)	BAS	LOREN COOK - EWD
VF-4	SANDING	(J)	1,000	0.5	16	1/4	115/1/60	(2)	MANUAL	LOREN COOK - XWD
VF-5	GRINDING	(J)	2,500	0.5	18	3/4	115/1/60	(2)	MANUAL	LOREN COOK - XWD
VF-6	CUTTING	(J)	1,000	0.5	16	1/4	115/1/60	(2)	MANUAL	LOREN COOK - XWD
EF-1	JAN 105, MEN 108, WOMEN 109	(A)	500	0.5	10	1/8	115/1/60	(1)	BAS	LOREN COOK - ACED 100C
EF-2	MEN 209 WOMEN 210	(A)	300	0.5	9	1/8	115/1/60	(1)	BAS	LOREN COOK - ACED 90C

FAN TYPES:

- (A) CENTRIFUGAL ROOF EXHAUSTER DIRECT DRIVE
- (B) CENTRIFUGAL ROOF EXHAUSTER BELT DRIVE
- (C) PROPELLER EXHAUST FAN DIRECT DRIVE
- (D) PROPELLER EXHAUST FAN BELT DRIVE
- (E) CENTRIFUGAL VENT SET, BELT DRIVE
- (F) IN-LINE CENTRIFUGAL DIRECT DRIVE
- (G) IN-LINE CENTRIFUGAL BELT DRIVE
- (H) CENTRIFUGAL CEILING EXHAUST FAN
- (J) PROPELLER VENTILATION FAN DIRECT DRIVE

FAN ACCESSORIES:

- (1) BIRDSCREEN, ROOF CURB (MINIMUM 8" ABOVE INSULATION), BACKDRAFT DAMPER, DISCONNECT SWITCH, SPEED CONTROLLER.
- (2) WIRE GUARD, WALL COLLAR, GSS WALL SHUTTER, WEATHER HOOD.
- (3) SPRING ISOLATORS, TWO SPEED (1800/900 RPM) MOTOR, QUICK OPENING ACCESS DOOR DRAIN, GRAVITY DISCHARGE SHUTTER, MOTOR AND DRIVE WEATHER HOOD.
- (4) FLEXIBLE CONNECTORS, RUBBER-IN-SHEAR ISOLATORS, SOLID STATE SPEED CONTROL, DISCONNECT SWITCH AND BACKDRAFT DAMPER.
- (5) FLEXIBLE CONNECTORS, SPRING ISOLATORS, DISCONNECT SWITCH, AND BACKDRAFT DAMPER.
- (6) REMOVABLE ALUMINUM CEILING GRILLE, BACKDRAFT DAMPER, SPEED CONTROLLER, RUBBER-IN-SHEAR ISLOATORS, DISCONNECT SWITCH.
- (7) COMBINATION STARTER

HOT WATER BOILERS

MARK	TYPE	INPUT (MBH)	OUTPUT (MBH)	GPM	L.W.T. (°F)	E.W.T. (°F)	MAX. ΔP (FT.)	ELECTRICAL V/Φ/Hz	ACCESSORIES	BASIS OF DESIGN
B-1	(A)	2,000	1,874	125	180	150	20	120/1/60	(1)(2)(3)(4)	FULTON EDR-2000
B-2	(A)	2,000	1,874	125	180	150	20	120/1/60	(1)(2)(3)(4)	FULTON EDR-2000
B-3	(A)	2,000	1,874	125	180	150	20	120/1/60	(1)(2)(3)(4)	FULTON EDR-2000

TYPE:

(A) ASME CERTIFIED, FIRE TUBE CONDENSING BOILER

ACCESSORIES:

(1) LOW WATER CUTOFF, HIGH AND LOW GAS PRESSURE SWITCHES, WATER FLOW SWITCH, VENT TEMPERATURE CUTOFF
(2) OUTDOOR AIR SENSOR, INLET AND OUTLET TEMP. SENSORS, HIGH AND LOW VOTAGE TERMINAL STRIPS, ASME RELIEF VALVE, TEMP. & PRESSURE GAUGES
(3) CONDENSATE NEUTRALIZTION KIT, DIRECT VENTING, BAS GATEWAY, CSD1 COMPLIANT, CSA CERTIFIED, AHRI CERTIFIED, LOW AIR PRESSURE SWITCHES
(4) 10" PVC INTAKE WITH ROOF HOOD WITH BIRDSCREEN AND 8" CAT. II ROUND ROOF VENT WITH CAP.

PUMPS

MARK	TYPE	SYSTEM	GPM	HEAD (FT.)	MOTOR HP	MOTOR V/Φ/Hz	RPM	REMARKS
PHWP-1	PRIMARY HOT WATER PUMP	BOILER	125	30	1.5	460/3/60	1,800	IN-LINE VARIABLE SPEED
PHWP-2	PRIMARY HOT WATER PUMP	BOILER	125	30	1.5	460/3/60	1,800	IN-LINE VARIABLE SPEED
PHWP-3	PRIMARY HOT WATER PUMP	BOILER	125	30	1.5	460/3/60	1,800	IN-LINE VARIABLE SPEED
SHWP-1	SECONDARY HOT WATER PUMP	BOILER	450	100	20	460/3/60	1,800	VFD
SHWP-2	SECONDARY HOT WATER PUMP	BOILER	450	100	20	460/3/60	1,800	VFD

AIR HANDLING UNITS

MARK	TYPE	SUPPLY FAN CFM	SUPPLY FAN W.G. TOT. S.P.	SUPPLY FAN TYPE	MIN. OSA CFM	MOTOR HP	MOTOR V/Φ/Hz	PREHEAT COIL CFM	PREHEAT COIL MBH	PREHEAT COIL AIR ENT °F	PREHEAT COIL MAX. FACE VEL. (FPM)	PREHEAT COIL GPM @ 180°F	COOLING COIL CFM	COOLING COIL AIR ENT. °FDB	COOLING COIL AIR ENT. °FWB	COOLING COIL AIR LVG. °FDB	COOLING COIL AIR LVG. °FWB	COOLING COIL MBH TOTAL	COOLING COIL MBH SENSIBLE	COOLING COIL GPM	COOLING COIL EWT(F)	COOLING COIL MAX. F.V. FPM	MCA	MOCP	FILTERS	ACCESSORIES	WEIGHT
AHU-1	(B)	17,050	3.50"	(2) PLENUM	3,400	(2) 7.5	460/3/60	8,725	107.4	48.6	500	10.8	17,050	80.0	67.0	57.1	56.0	534.0	421.0	106.8	44	500	26.9	45.0	(A)	(1)(2)(3)(4)	4,174 LBS.
AHU-2	(B)	8,600	3.62"	(1) PLENUM	1,720	10	460/3/60	4,900	74.0	51.0	500	7.4	8,600	79.0	66.0	56.3	55.0	348.3	220.0	69.7	44	500	18.15	30.0	(A)	(1)(2)(3)(4)	3,005 LBS.
AHU-3	(B)	9,920	3.57"	(1) PLENUM	1,960	10	460/3/60	5,160	88.6	49.1	500	8.9	9,920	79.0	66.0	55.6	54.0	353.4	248.0	70.7	44	500	18.15	30.0	(A)	(1)(2)(3)(4)	2,675 LBS.
AHU-4	(B)	16,920	3.32"	(2) PLENUM	3,400	(2) 7.5	460/3/60	8,665	107.4	48.5	500	10.8	16,920	79.0	66.0	55.0	54.8	612.9	441.3	122.6	44	500	26.9	45.0	(A)	(1)(2)(3)(4)	4,811 LBS.

TYPES:

- (A) FACTORY FABRICATED, DOUBLE WALL, VARIABLE VOLUME, HORIZONTAL DRAW THROUGH WITH INTERNAL FAN ISOLATION.
- (B) FACTORY FABRICATED, DOUBLE WALL, CONSTANT VOLUME, HORIZONTAL DRAW THROUGH WITH INTERNAL FAN ISOLATION.
- (C) FACTORY FABRICATED, DOUBLE WALL, VARIABLE VOLUME, VERTICAL DRAW THROUGH WITH INTERNAL FAN ISOLATION.
- (D) FACTORY FABRICATED, DOUBLE WALL, CONSTANT VOLUME, VERTICAL DRAW THROUGH WITH INTERNAL FAN ISOLATION.

FILTERS: (SEE SPECS.)

- (A) 2", MERV 13 PRE FILTERS
- (B) 90% CARTRIDGE FINAL FILTERS
- (C) 90% CARTRIDGE FINAL FILTERS
- (D) 90% CARTRIDGE FINAL FILTERS WITH 2" METAL PANEL DUCT MOUNTED PRE FILTERS
- (E) 99.97% HEPA FINAL FILTERS AT LAMIMAR FLOW DIFFUSER.
- (F) 80% BAG PRE FILTERS

ACCESSORIES:

- (1) VARIABLE SPEED DRIVE WITH INVERTER DUTY RATED MOTOR.
- (2) INSULATED DOUBLE CONSTRUCTION DRAIN PANS WITH TYPE 304 STAINLESS STEEL INNER PAN.
- (3) MIXING BOX WITH OPPOSED BLADE AUTOMATIC DAMPERS.
- (4) MARINE LIGHTS IN ALL ACCESSIBLE SECTIONS (FACTORY MOUNTED SWITCH).

NOTES:

- (A) SCHEDULED SUPPLY FAN PRESSURE DROPS INCLUDE THE FOLLOWING AIR PRESSURE DROP IN "WG":
  COOLING COIL: 1.0"
  HEATING COIL: 0.25"
  FILTER: 1.00" (CHANGEOUT)
- (B) MAXIMUM COOLING COIL WATER PRESSURE DROP = 15 FT.
- (C) MAXIMUM HEATING COIL WATER PRESSURE DROP = 10 FT.
- (D) INSTALL VARIABLE FREQUENCY DRIVE (VFD).
- (E)
- (F) PROVIDE 115/1/60 15 AMP FOR RECEPTACLE TO EACH UNIT.

AIR-COOLED CHILLER

MARK	MIN. FULL LOAD EER	MIN. EER IPLV	REFRIGERANT	NOMINAL TONS	GPM	CHILLED WATER ENT. °F	CHILLED WATER LVG. °F	MAX. △P (FEET)	FOULING FACTOR	AMBIENT AIR (°F)	ELECTRICAL INFORMATION – SINGLE POINT CONNECTION V/Φ/Hz	MCA	MOP	MIN. FAULT RATING	OPERATING WEIGHT	BASIS OF DESIGN
CH-1	10.41	15.93	R-454B	100	192	57.4	44.0	15	0.00010	95	460/3/60	227	300	65,000 AIC	8,000	TRANE CGAM
CH-2	10.41	15.93	R-454B	100	192	57.4	44.0	15	0.00010	95	460/3/60	227	300	65,000 AIC	8,000	TRANE CGAM

CHILLER NOTES/ACCESSORIES:

1) U.L. LISTED, ASHRAE 90.1 COMPLIANT, BAS INTERFACE, DUAL INDEPENDENT REFRIGERANT CIRCUITS, SINGLE POINT POWER CONNECTION, CONDENSER COIL PANELS, GRILLES AND END SCREENS, STARTER, FLOW SWITCH, FREEZE PROTECTION PACKAGE, SUCTION LINE INSULATION, SUCTION SERVICE VALVES, NON-FUSED DISCONNECT, SERVICE OPTION, AL FIN/CU TUBE E COAT, ULTRA LOW SOUND OPTION, MINIMUM LOAD CONTROL, HIGH EFFICIENCY VARIABLE SPEED CONDENSER FANS, 115V CONVENIENCE OUTLET.
2) FULL BUILDING AUTOMATION SYSTEM INTERFACE. COORDINATE REQUIRED INTERFACE PROTOCOL WITH CONTROLS VENDOR PRIOR TO ORDER. PROVIDE HARD WIRED ALARM POINTS.
3) PROVIDE 5 YEAR PARTS, LABOR AND REFRIGERANT WARRANTY ON COMPLETE UNIT.
4) PROVIDE LOW AMBIENT ACCESSORY KIT.
   CAPACITIES BASED ON A MIXTURE OF WATER WITH 30% (BY Wt) ETHYLENE GLYCOL AS THE CHILLED FLUID BEING UTILIZED.
5) EACH CHILLER TO HAVE DUAL PUMPS WITH VFD. 10.006 HP, 23.8 AMPS, AVAILABLE HEAD = 90.1 FT H20

HEATING AND VENTILATION AIR HANDLING UNITS

MARK	TYPE	SUPPLY FAN CFM	SUPPLY FAN W.G. TOT. S.P.	SUPPLY FAN TYPE	MIN. OSA CFM	MOTOR HP	MOTOR V/Φ/Hz	PREHEAT COIL CFM	PREHEAT COIL MBH	PREHEAT COIL AIR ENT °F	PREHEAT COIL MAX. FACE VEL. (FPM)	PREHEAT COIL GPM @ 180°F	REHEAT COIL CFM	REHEAT COIL MBH	REHEAT COIL AIR ENT °F	REHEAT COIL MAX. FACE VEL. (FPM)	REHEAT COIL GPM @ 180°F	MCA CURCUIT #1	MOCP CURCUIT #1	MCA CURCUIT #2	MOCP CURCUIT #2	FILTERS	ACCESSORIES	WEIGHT
HV-1	(B)	21,000	3	(2) PLENUM	21,000	(2) 10	460/3/60	21,000	907.2	15.0	500	90.7	21,000	453.6	55.0	500	45.4	36.3	60.0	10.0	15.0	(A)	(1)(4)	4,204 LBS.
HV-2	(B)	21,000	3	(2) PLENUM	21,000	(2) 10	460/3/60	21,000	907.2	15.0	500	90.7	21,000	453.6	55.0	500	45.4	36.3	60.0	10.0	15.0	(A)	(1)(4)	4,204 LBS.

TYPES:

- (A) FACTORY FABRICATED, DOUBLE WALL, VARIABLE VOLUME, HORIZONTAL DRAW THROUGH WITH INTERNAL FAN ISOLATION.
- (B) FACTORY FABRICATED, DOUBLE WALL, CONSTANT VOLUME, HORIZONTAL DRAW THROUGH WITH INTERNAL FAN ISOLATION.
- (C) FACTORY FABRICATED, DOUBLE WALL, VARIABLE VOLUME, VERTICAL DRAW THROUGH WITH INTERNAL FAN ISOLATION.
- (D) FACTORY FABRICATED, DOUBLE WALL, CONSTANT VOLUME, VERTICAL DRAW THROUGH WITH INTERNAL FAN ISOLATION.

FILTERS: (SEE SPECS.)

- (A) 2", MERV 13 PRE FILTERS
- (B) 90% CARTRIDGE FINAL FILTERS
- (C) 90% CARTRIDGE FINAL FILTERS
- (D) 90% CARTRIDGE FINAL FILTERS WITH 2" METAL PANEL DUCT MOUNTED PRE FILTERS
- (E) 99.97% HEPA FINAL FILTERS AT LAMIMAR FLOW DIFFUSER.
- (F) 80% BAG PRE FILTERS

ACCESSORIES:

- (1) VARIABLE SPEED DRIVE WITH INVERTER DUTY RATED MOTOR.
- (2) INSULATED DOUBLE CONSTRUCTION DRAIN PANS WITH TYPE 304 STAINLESS STEEL INNER PAN.
- (3) MIXING BOX WITH OPPOSED BLADE AUTOMATIC DAMPERS.
- (4) MARINE LIGHTS IN ALL ACCESSIBLE SECTIONS (FACTORY MOUNTED SWITCH).

NOTES:

- (A) SCHEDULED SUPPLY FAN PRESSURE DROPS INCLUDE THE FOLLOWING AIR PRESSURE DROP IN "WG":
  HEATING COIL: 0.25"
  FILTER: 1.00" (CHANGEOUT)
- (B) MAXIMUM HEATING COIL WATER PRESSURE DROP = 10 FT.
- (C) VOLTAGE FOR CURCUIT #2 IS 115V/1Φ/60Hz FOR RECEPTACLE TO EACH UNIT.

EXPANSION TANKS

MARK	SYSTEM	VOLUME (GALLONS)	ACCEPTANCE (GALLONS)	DESIGN BASIS
CT-1	CHILLED WATER	11.88	6.9	AMTROL AX-20DDV
ET-1	HOT WATER	211	84	AMTROL AX-280

ELECTRIC UNIT & WALL HEATERS

MARK	QTY.	HEATING CAP. (KW)	V/Ø/Hz	BASIS OF DESIGN
EUH-1	1	3.3	277/1/60	MARKEL 5100
EWH-1	3	5.0	277/1/60	MARKEL 3420

PROVIDE UNIT MOUNTED THERMOSTAT, MOUNTING FRAME, DISCONNECT, HORIZONTAL LOUVERS, CONTACTORS, FUSING, AND CONTROL TRANSFORMER. ALL ELECTRICAL COMPONENTS SHALL BE WIRED TO A SINGLE POINT POWER CONNECTION.

AIR SEPARATOR

MARK	SYSTEM	PIPE CONNECTION	GPM	BASIS OF DESIGN
AS-1	HOT WATER	6"	450	AMTROL 6-AS(L)
AS-2	CHILLED WATER	6"	384	AMTROL 6-AS(L)

ROOF HOODS

MARK	TYPE	MANUFACTURER	DESIGN BASIS	APPROX. WEIGHT
IH-1	(A)	GREENHECK	FGI 48X66 THROAT 42X60	310 LBS.
IH-2	(A)	GREENHECK	FGI 36X60 THROAT 30X54	330 LBS.
IH-3	(A)	GREENHECK	FGI 36X60 THROAT 30X54	330 LBS.
IH-4	(A)	GREENHECK	FGI 48X66 THROAT 42X60	310 LBS.
IH-HV1	(A)	GREENHECK	FGI 42X96 THROAT 36X90	360 LBS.
IH-HV2	(A)	GREENHECK	FGI 42X96 THROAT 36X90	360 LBS.
RH-1	(B)	GREENHECK	FGI 24X66 THROAT 18X60	150 LBS.
RH-2	(B)	GREENHECK	FGI 24X66 THROAT 18X60	150 LBS.

HOOD TYPES:

(A) INTAKE
(B) RELIEF

MW / Davis Dumas & Associates, Inc.
CONSULTING ENGINEERS
4500 Southlake Park, Suite 200
Hoover, Alabama 35244
Phone: (205) 252-0246
www.mwdda.com
Project # 222029

GMC

Goodwyn Mills Cawood, LLC
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ISSUE	DATE
IFB SET	08.14.2023
AD 02	09.01.2023

DRAWN BY: BE
CHECKED BY: JSD

CALHOUN COMMUNITY COLLEGE WORKFORCE SKILLS TRAINING CENTER

GMC ABHM210048

ALABAMA No. 14178 PROFESSIONAL ENGINEER JAMES S. DAVIS, JR.
8/14/2023
222029

HVAC SCHEDULES, NOTES, AND LEGENDS

M0.01

8/31/2023 9:50:00 AM TEMPLATE VERSION: 2022.1

AIR TERMINAL BOXES (AHU-1)

MARK	TYPE	ROUND INLET (IN.)	CFM			COIL CAPACITY		PIPE RUNOUT	POWER V/Φ/Hz
			MAX.	MIN.	HTG.	MBH	GPM		
VAVR-1-1	VVR	14	2,000	1,000	1,000	59.4	6.0	1"	120/1/60
VAVR-1-2	VVR	6	400	200	200	11.8	1.2	3/4"	120/1/60
VAVR-1-3A	VVR	12	1,200	600	600	32.2	3.3	1"	120/1/60
VAVR-1-3B	VVR	12	1,200	600	600	32.2	3.3	1"	120/1/60
VAVR-1-3C	VVR	12	1,200	600	600	32.2	3.3	1"	120/1/60
VAVR-1-3D	VVR	12	1,200	600	600	32.2	3.3	1"	120/1/60
VAVR-1-3E	VVR	12	1,200	600	600	32.2	3.3	1"	120/1/60
VAVR-1-3F	VVR	12	1,200	600	600	32.2	3.3	1"	120/1/60
VAVR-1-4A	VVR	14	1,800	900	900	46.2	4.7	1"	120/1/60
VAVR-1-4B	VVR	10	1,000	500	500	25.6	2.6	3/4"	120/1/60
VAVR-1-4C	VVR	12	1,400	700	700	35.9	3.6	1"	120/1/60
VAVR-1-4D	VVR	10	1,000	500	500	25.6	2.6	3/4"	120/1/60
VAVR-1-4E	VVR	14	1,800	900	900	46.2	4.7	1"	120/1/60
VAV-1-5	CVR	6	450	450	450	17.9	1.8	3/4"	120/1/60

TYPES:
VV = VARIABLE VOLUME - NO COIL
VVR = VARIABLE VOLUME REHEAT - TURN DOWN TO MINIMUM
CVR = CONSTANT VOLUME REHEAT - TURN DOWN TO MINIMUM

NOTES:
(A) ENTERING AIR TEMPERATURE = 55°F.
(B) HEATING CAPACITY BASED ON ENTERING WATER = 180°F.
(C) MAXIMUM WATER PRESSURE DROP = 5 FT.
(D) ALL BOXES STANDARD LINING UNLESS OTHERWISE NOTED.
(E) 120/1/60 CONTROL POWER.

AIR TERMINAL BOXES (AHU-2)

MARK	TYPE	ROUND INLET (IN.)	CFM			COIL CAPACITY		PIPE RUNOUT	POWER V/Φ/Hz
			MAX.	MIN.	HTG.	MBH	GPM		
VAVR-2-1	VVR	12	1,400	700	700	52.5	5.3	1"	120/1/60
VAVR-2-2A	VVR	10	1,000	500	500	47.5	4.8	1"	120/1/60
VAVR-2-2B	VVR	10	1,000	500	500	47.5	4.8	1"	120/1/60
VAVR-2-2C	VVR	10	1,000	500	500	47.5	4.8	1"	120/1/60
VAVR-2-2D	VVR	10	1,000	500	500	47.5	4.8	1"	120/1/60
VAVR-2-2E	VVR	10	1,000	500	500	47.5	4.8	1"	120/1/60
VAVR-2-2F	VVR	10	1,000	500	500	47.5	4.8	1"	120/1/60
VAVR-2-3	CVR	12	1,200	1,200	1,200	48.7	4.9	1"	120/1/60

TYPES:
VV = VARIABLE VOLUME - NO COIL
VVR = VARIABLE VOLUME REHEAT - TURN DOWN TO MINIMUM
CVR = CONSTANT VOLUME REHEAT - TURN DOWN TO MINIMUM

NOTES:
(A) ENTERING AIR TEMPERATURE = 55°F.
(B) HEATING CAPACITY BASED ON ENTERING WATER = 180°F.
(C) MAXIMUM WATER PRESSURE DROP = 5 FT.
(D) ALL BOXES STANDARD LINING UNLESS OTHERWISE NOTED.
(E) 120/1/60 CONTROL POWER.

AIR TERMINAL BOXES (AHU-3)

MARK	TYPE	ROUND INLET (IN.)	CFM			COIL CAPACITY		PIPE RUNOUT	POWER V/Φ/Hz
			MAX.	MIN.	HTG.	MBH	GPM		
VAVR-3-1	VVR	10	1,000	500	500	29.8	3.0	1"	120/1/60
VAVR-3-2	VVR	14	2,000	1,000	1,000	58.6	5.9	1"	120/1/60
VAVR-3-3	VVR	8	520	260	260	15.6	1.6	3/4"	120/1/60
VAVR-3-4	VVR	6	250	125	125	6.6	0.7	3/4"	120/1/60
VAVR-3-5	VVR	10	1,000	500	500	30.2	3.1	1"	120/1/60
VAVR-3-6	VVR	8	500	250	250	14.2	1.5	3/4"	120/1/60
VAVR-3-7	CVR	6	150	150	150	5.7	0.6	3/4"	120/1/60
VAVR-3-8	CVR	6	300	300	300	11.3	1.2	3/4"	120/1/60
VAVR-3-9	VVR	10	1,000	500	500	30.2	3.1	1"	120/1/60
VAVR-3-10	VVR	12	1,200	600	600	35.7	3.6	1"	120/1/60
VAVR-3-11	VVR	14	2,000	1,000	1,000	39.9	4.0	1"	120/1/60

TYPES:
VV = VARIABLE VOLUME - NO COIL
VVR = VARIABLE VOLUME REHEAT - TURN DOWN TO MINIMUM
CVR = CONSTANT VOLUME REHEAT - TURN DOWN TO MINIMUM

NOTES:
(A) ENTERING AIR TEMPERATURE = 55°F.
(B) HEATING CAPACITY BASED ON ENTERING WATER = 180°F.
(C) MAXIMUM WATER PRESSURE DROP = 5 FT.
(D) ALL BOXES STANDARD LINING UNLESS OTHERWISE NOTED.
(E) 120/1/60 CONTROL POWER.

AIR TERMINAL BOXES (AHU-4)

MARK	TYPE	ROUND INLET (IN.)	CFM			COIL CAPACITY		PIPE RUNOUT	POWER V/Φ/Hz
			MAX.	MIN.	HTG.	MBH	GPM		
VAVR-4-1	VVR	12	1,250	625	625	25.6	2.6	3/4"	120/1/60
VAVR-4-2	VVR	12	1,200	600	600	26.5	2.7	3/4"	120/1/60
VAVR-4-3	VVR	12	1,250	625	625	25.5	2.5	3/4"	120/1/60
VAVR-4-4	VVR	6	300	150	150	8.5	0.7	3/4"	120/1/60
VAVR-4-5	VVR	6	300	150	150	5.1	0.6	3/4"	120/1/60
VAVR-4-6	VVR	12	1,350	675	675	26.7	2.7	3/4"	120/1/60
VAVR-4-7	VVR	12	1,500	750	750	29.1	3.0	1"	120/1/60
VAVR-4-8	VVR	10	1,000	500	500	22.0	2.3	3/4"	120/1/60
VAVR-4-9	VVR	12	1,600	800	800	30.9	3.1	1"	120/1/60
VAVR-4-10	CVR	6	125	125	125	3.8	0.6	3/4"	120/1/60
VAVR-4-11	CVR	6	125	125	125	3.8	0.6	3/4"	120/1/60
VAVR-4-12	VVR	8	720	360	360	14.3	1.5	3/4"	120/1/60
VAVR-4-13	VVR	6	200	100	100	4.0	0.6	3/4"	120/1/60
VAVR-4-14	VVR	14	2,000	1,000	1,000	44.1	4.5	1"	120/1/60
VAVR-4-15	VVR	16	4,000	2,000	2,000	88.2	8.9	1-1/4"	120/1/60

TYPES:
VV = VARIABLE VOLUME - NO COIL
VVR = VARIABLE VOLUME REHEAT - TURN DOWN TO MINIMUM
CVR = CONSTANT VOLUME REHEAT - TURN DOWN TO MINIMUM

NOTES:
(A) ENTERING AIR TEMPERATURE = 55°F.
(B) HEATING CAPACITY BASED ON ENTERING WATER = 180°F.
(C) MAXIMUM WATER PRESSURE DROP = 5 FT.
(D) ALL BOXES STANDARD LINING UNLESS OTHERWISE NOTED.
(E) 120/1/60 CONTROL POWER.

INDOOR - DUCTLESS SPLIT SYSTEM

MARK	AREA SERVED	TYPE	OUTDOOR UNIT	MAX CFM	CAPACITY (MBH)		ACCESSORIES	SEER	DESIGN BASIS MODEL
					COOLING @95° F	HEATING @47° F			
AC-1	ELEC 121	(A)	HP-1	738	22.2	---	(1) (2)	20.5	MITSUBISHI MSY-GL24NA-U1
AC-2	DATA 111	(A)	HP-2	738	21.7	---	(1) (2)	20.0	MITSUBISHI MSZ-GL24NA
AC-3	ELEC 110	(B)	HP-2	1,200	34.8	---	(1) (2)	20.0	MITSUBISHI PKA-A36KA6
AC-4	ELECTRICAL 220	(A)	HP-3	738	22.2	---	(1) (2)	20.5	MITSUBISHI MSY-GL24NA-U1
AC-5	DATA 208	(A)	HP-4	738	22.2	---	(1) (2)	20.5	MITSUBISHI MSY-GL24NA-U1

TYPES:
(A) WALL MOUNTED CASSETTE UNIT
(B) CEILING MOUNTED CASSETTE UNIT

ACCESSORIES:
(1) WIRED THERMOSTAT
(2) SINGLE POINT POWER CONNECTION AT OUTDOOR UNIT

OUTDOOR - DUCTLESS SPLIT SYSTEM

MARK	COOLING TOTAL MBH	HEATING TOTAL MBH	UNIT TYPE	CIRCUIT BREAKER CAPACITY (AMPS)	MIN. CIRCUIT AMPS	MOTOR V/Φ/Hz	DESIGN BASIS MODEL
HP-1	22.5	---	COOLING ONLY	20	17.1	208/1/60	MITSUBISHI MUY-GL24NA-U1
HP-2	59.1	---	COOLING ONLY	55	46	208/1/60	MITSUBISHI MXZ-SM60NAM
HP-3	22.5	---	COOLING ONLY	20	17.1	208/1/60	MITSUBISHI MUY-GL24NA-U1
HP-4	22.5	---	COOLING ONLY	20	17.1	208/1/60	MITSUBISHI MUY-GL24NA-U1

NOTES:
SINGLE POINT POWER.
MOUNT OUTDOOR UNIT ON MANUFACTURER RECOMMENDED PLATFORM STANDS.
PROVIDE ALUMINUM JACKET ON OUTDOOR REFRIGERANT PIPING.
PROVIDE A 1-YEAR MANUFACTURER LABOR WARRANTY.

BRANCH CONTROLLERS - SPLIT SYSTEM

MARK	UNIT TYPE	BRANCH QUANTITY	CONNECTED CAPACITY (TONS)	ELECTRICAL			ESTIMATED WEIGHT	DESIGN BASIS MODEL
				V/Φ/Hz	MCA	MOCP		
BC-1	SPLIT SYSTEM	3	5	208/1/60	0.05	15	22 LBS.	MITSUBISHI PAC-MKA32BC

NOTES (APPLIES TO ALL CONTROLLERS)
1. PROVIDE AND INSTALL FACTORY BALL VALVES ON ALL PORTS.
2. ALL UNITS SHALL FULLY INTEGRATE TO CENTRAL CONTROLLER AND BUILDING DDC CONTROLS SYSTEM.
3. ALL PORTS OF BRANCH CONTROLLER SHALL BE LABELED AND IDENTIFIED WITH CONNECTED AC UNIT.
4. INSTALL BRANCH CONTROLLERS AS REQUIRED TO PROVIDE ALL RECOMMENDED CLEARANCES.

LOUVER SCHEDULE

MARK	MOUNT	SIZE	AREA SERVED	MIN. FREE AREA	MINIMUM PRESSURE DROP IN W.G.	CFM	DESIGN BASIS
LV-1	SIDEWALL	72"X96"	AHU-2 & 4 RELIEF AIR	50%	0.20	12,000	RUSKIN ELF375DX
LV-2	SIDEWALL	60"X48"	AHU-3 RELIEF AIR	50%	0.20	9,000	RUSKIN ELF375DX

NOTES:

LOUVER TO INCLUDE FLANGE FRAME AND KYNAR FINISH. (COLOR TO BE SELECTED BY ARCHITECT).

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ALABAMA LICENSED PROFESSIONAL ENGINEER JAMES S. DAVIS, JR. No. 14178 PROFESSIONAL
8/14/2023 222029

HVAC SCHEDULES

M0.02

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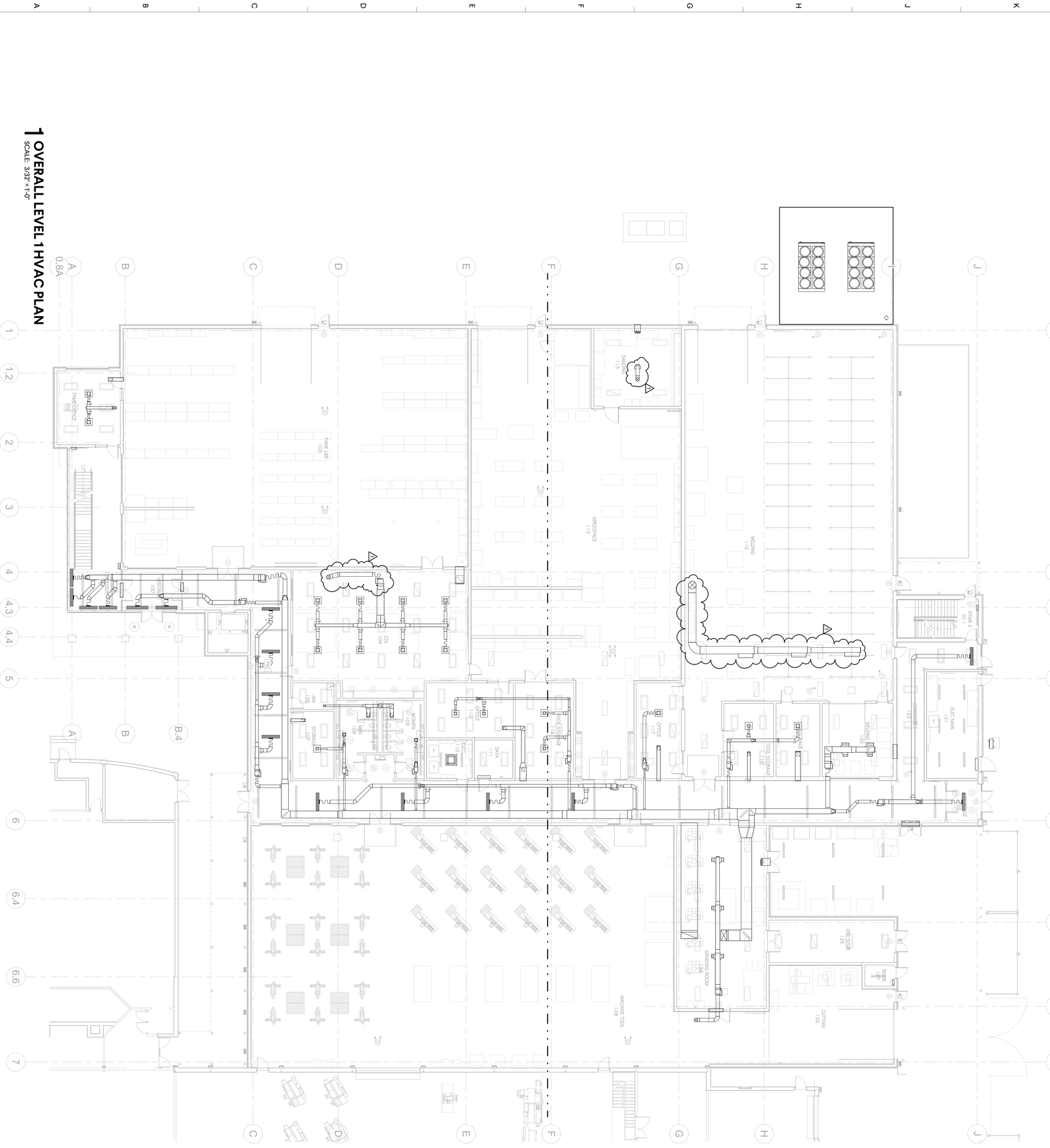

1 OVERALL LEVEL 1 HVAC PLAN

SCALE: 3/32" = 1'-0"

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OVERALL LEVEL 1 HVAC PLAN

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LEVEL 1 HVAC PLAN - PART A

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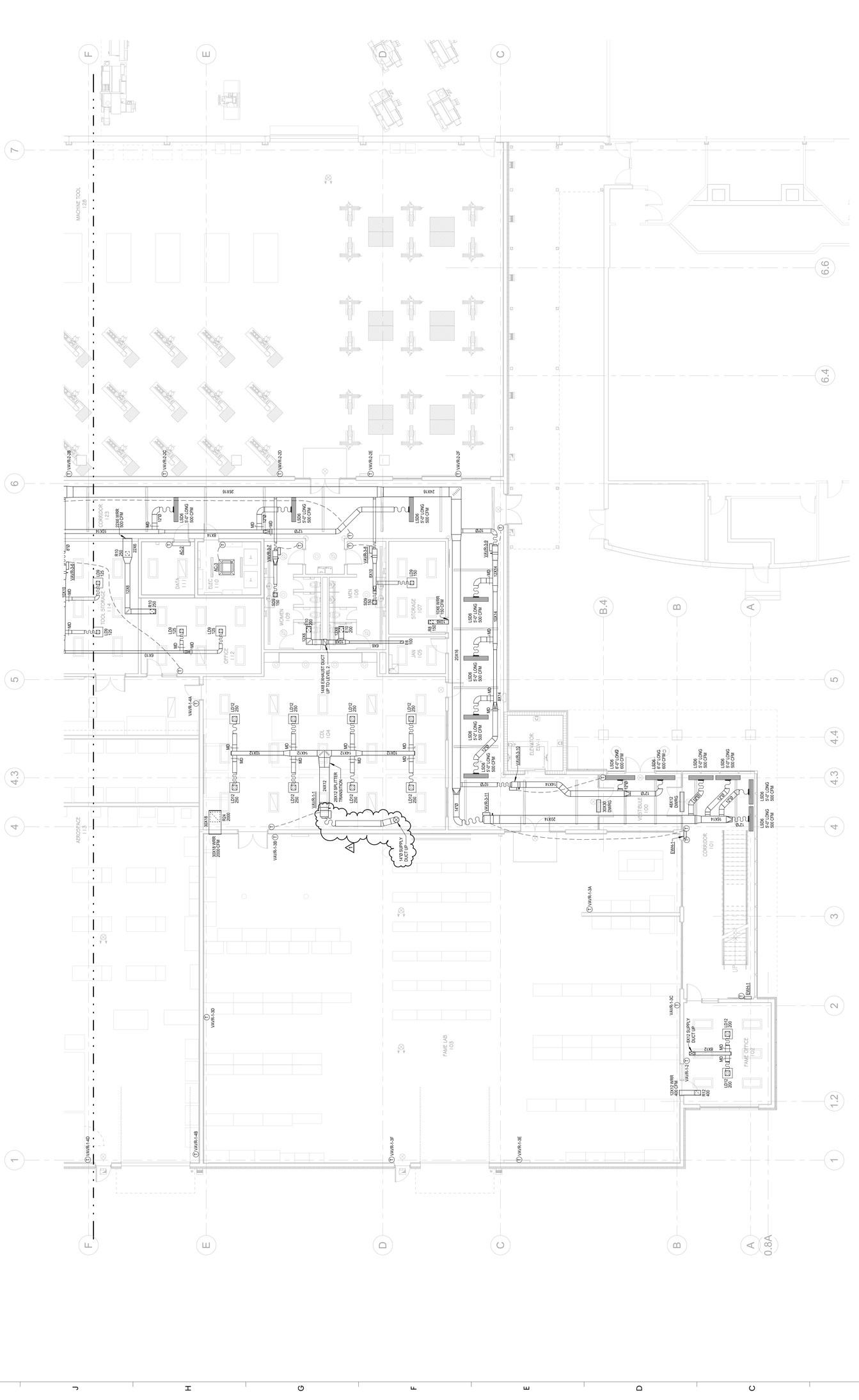
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AEROSPACE 113
TOOL STORAGE 114
DATA 111
ELEC 110
OFFICE 112
WOMEN 109
MEN 108
JAN 107
STORAGE 107
CORRIDOR 104
FAME LAB 103
FAME OFFICE 102
VESTIBULE 100
ELEVATOR ELV-1
CORRIDOR 101
UP
VAV/R-1A
VAV/R-1B
VAV/R-1C
VAV/R-1D
VAV/R-1E
VAV/R-1F
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6X6
4X6
4X4
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1500 CFM
1000 CFM
800 CFM
600 CFM
500 CFM
400 CFM
300 CFM
150 CFM
135 CFM
105 CFM
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LSD6 6'0" LONG 600 CFM
LSD6 6'4" LONG 600 CFM
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LSD6 9'4" LONG 600 CFM
LSD6 10'0" LONG 600 CFM
LSD6 10'4" LONG 600 CFM
LSD6

LEVEL 1 HVAC PLAN - PART B

CALHOUN COMMUNITY COLLEGE WORKFORCE SKILLS TRAINING CENTER

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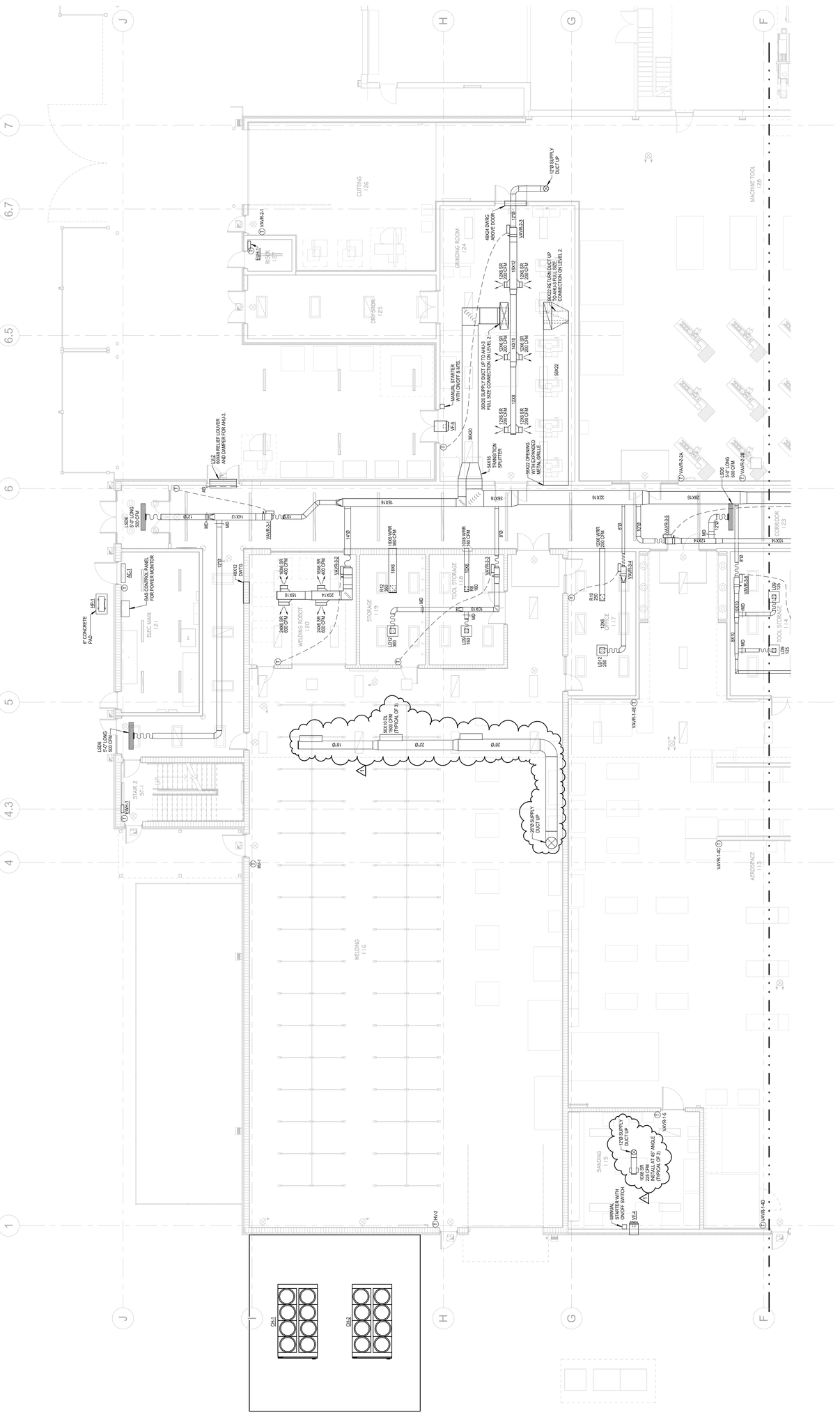
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DRY STOR. 125
MACHINE TOOL 125
WELDING 116
SANDING 115
AEROSPACE 113
CORRIDOR 123
ELEC. MAIN 121
WELDING ROBOT 120
STORAGE 119
TOOL STORAGE 118
TOOL STORAGE 114
STAIR 2 STA 1
MANUAL STARTER WITH ON/OFF & MTS.
MANUAL STARTER WITH ON/OFF SWITCH
36X20 SUPPLY DUCT UP TO AHU-3 FULL SIZE CONNECTION ON LEVEL 2
56X22 RETURN DUCT UP TO AHU-3 FULL SIZE CONNECTION ON LEVEL 2
56X22 OPENING WITH EGGCRATE METAL GRILLE
SAX16 TAKEOFF SPLITTER
40X24 DWSR ABOVE DOOR
12"Ø SUPPLY DUCT UP
10"Ø SUPPLY DUCT UP
8"Ø SUPPLY DUCT UP
10X10 SL 1300 CFM (TYPICAL OF 3)
AHU-1 ROOF
AHU-2
AHU-3
AHU-4
VAV-1-4E
VAV-1-4C
VAV-1-4D
VAV-1-5
VAV-2-3A
VAV-2-3B
VAV-2-3J
VAV-2-4
VAV-2-3
VAV-2-2
VAV-2-1
VAV-R-2-1
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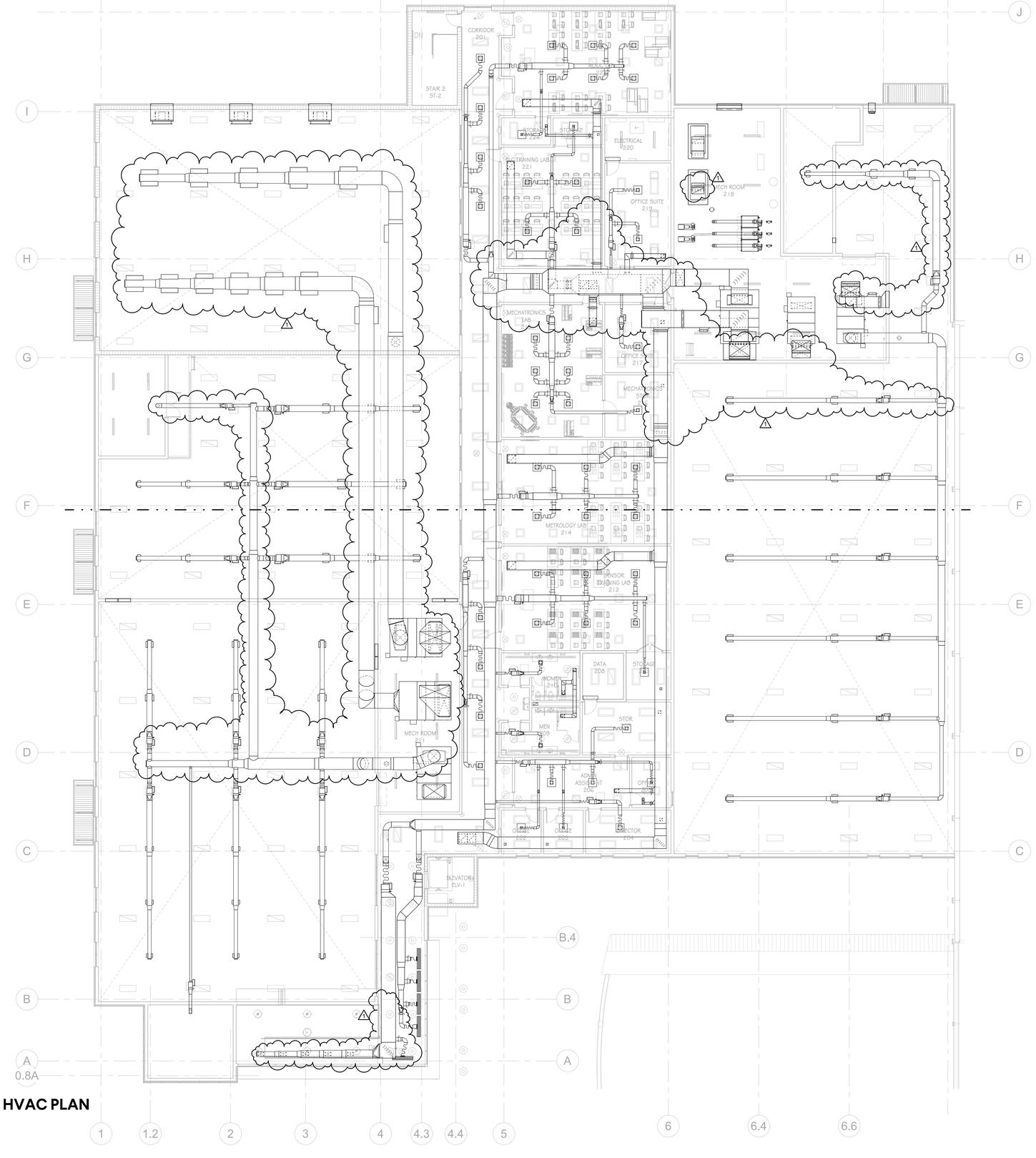

1 OVERALL LEVEL 2 HVAC PLAN

SCALE: 3/32" = 1'-0"

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OVERALL LEVEL 2 HVAC PLAN

M1.02

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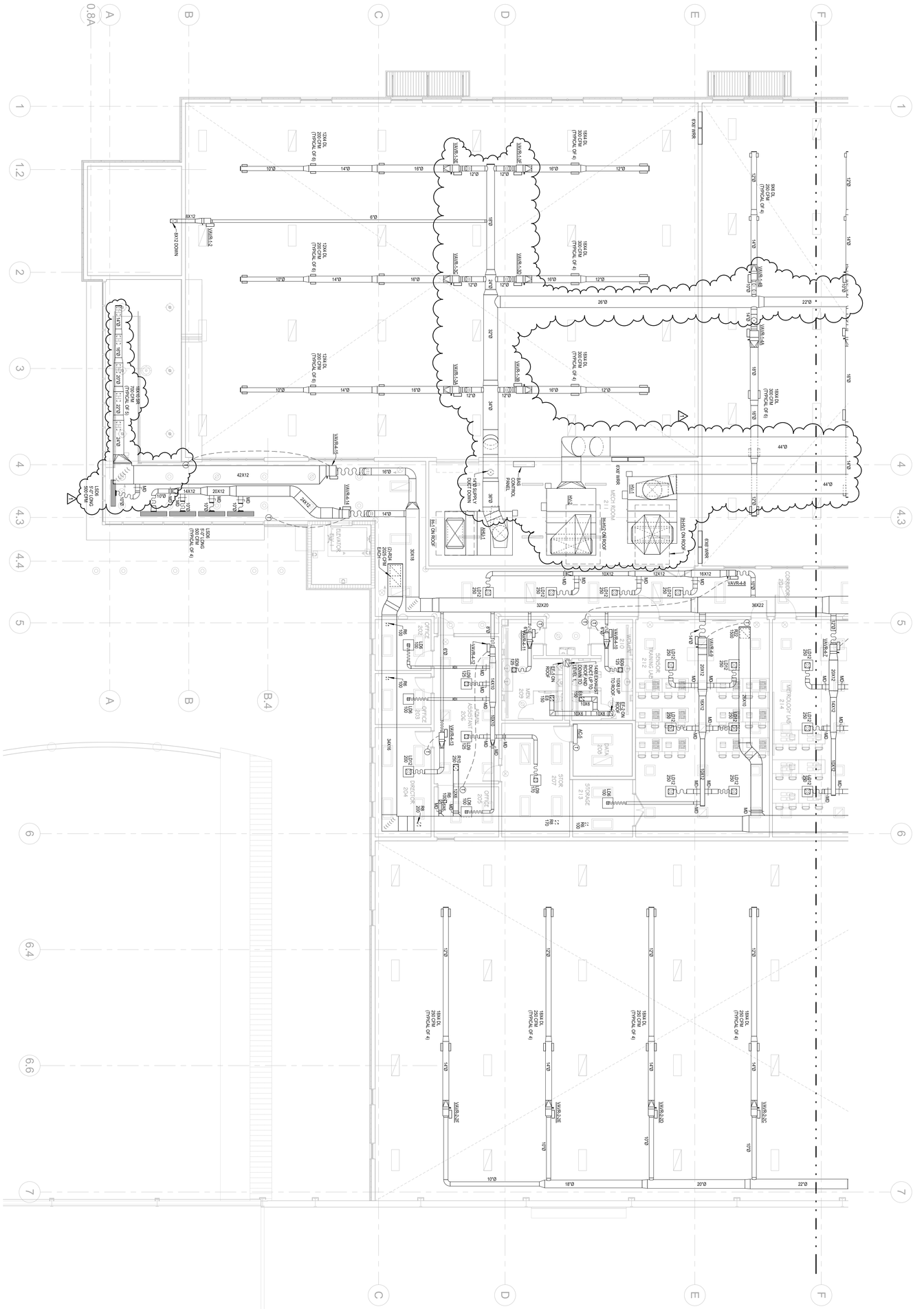

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LEVEL 2 HVAC PLAN - PART A

M1.02A

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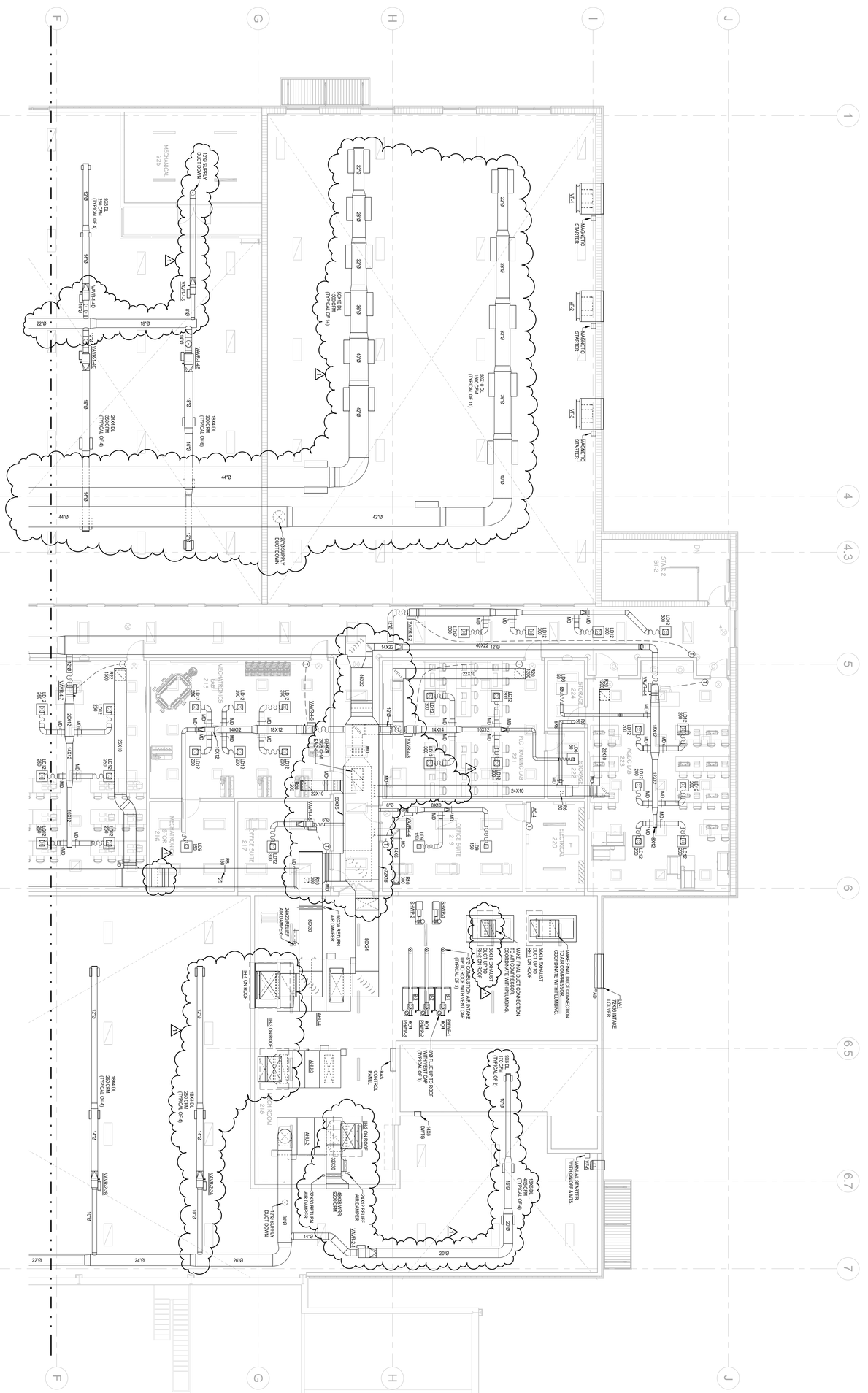
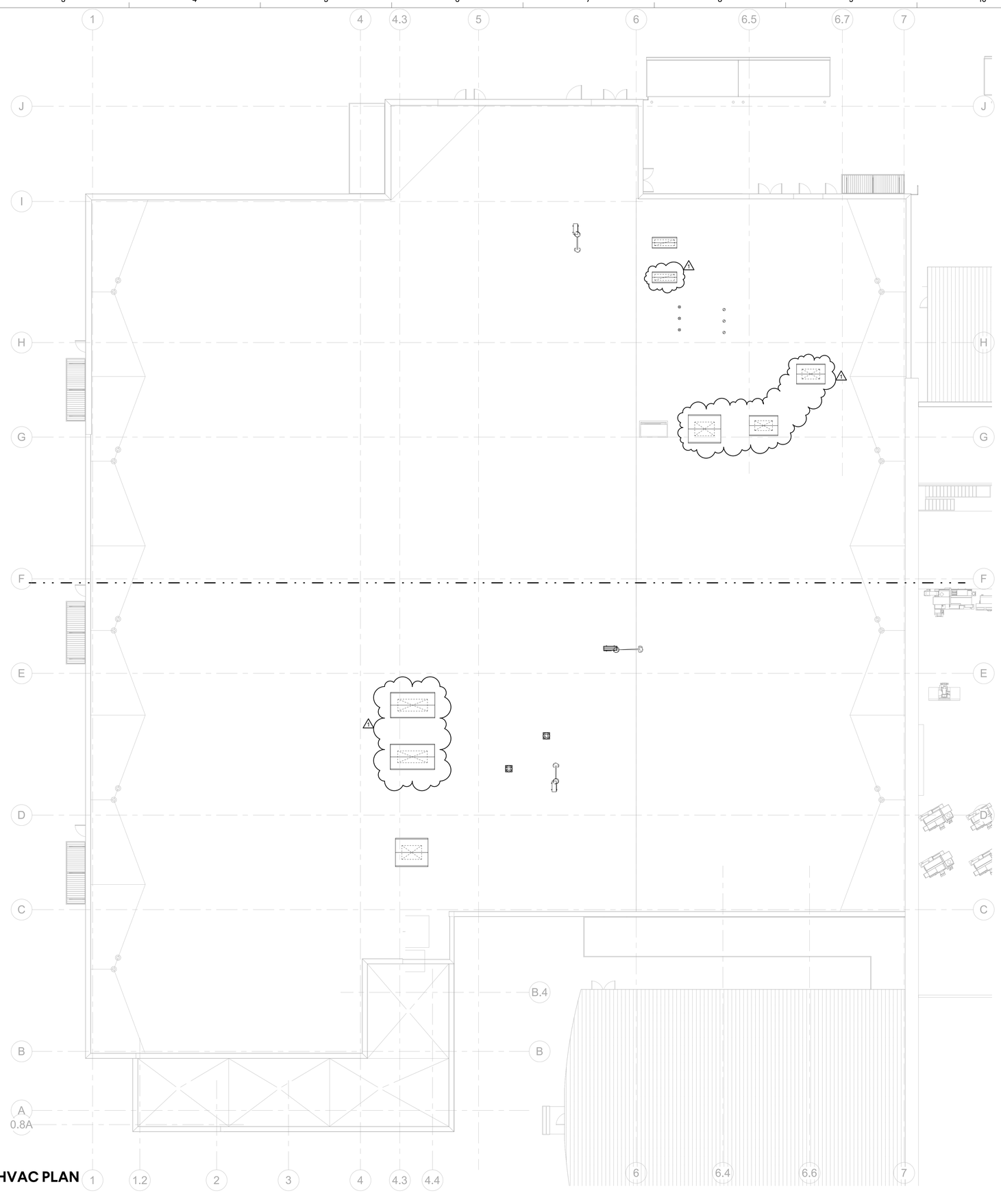
1 LEVEL 2 HVAC PLAN - PART B

SCALE: 1/8" = 1'-0"





1 OVERALL ROOF HVAC PLAN
SCALE: 3/32" = 1'-0"

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ALABAMA
No. 14178
PROFESSIONAL
ENGINEER
JAMES S. DAVIS, JR.
8/14/2023
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OVERALL ROOF HVAC PLAN

M1.03

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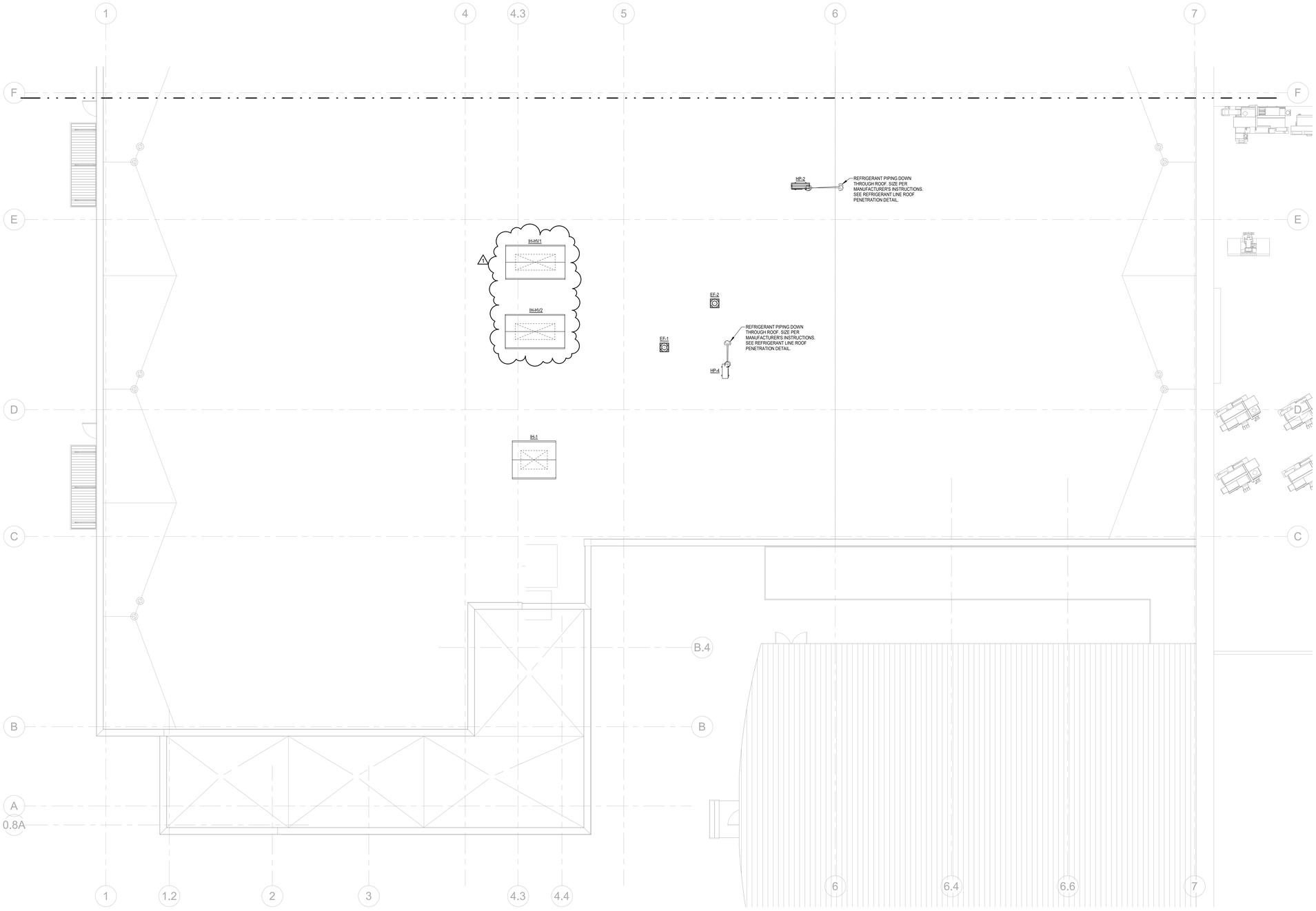

1 ROOF HVAC PLAN - PART A

SCALE: 1/8" = 1'-0"

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ALABAMA No. 14178 PROFESSIONAL ENGINEER JAMES S. DAVIS, JR.

8/14/2023

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ROOF HVAC PLAN - PART A

M1.03A

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M1.03B

ROOF HVAC PLAN - PART B

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1 ROOF HVAC PLAN - PART B
SCALE: 1/8" = 1'-0"

OVERALL LEVEL 1 HVAC PIPING PLAN

M2.01

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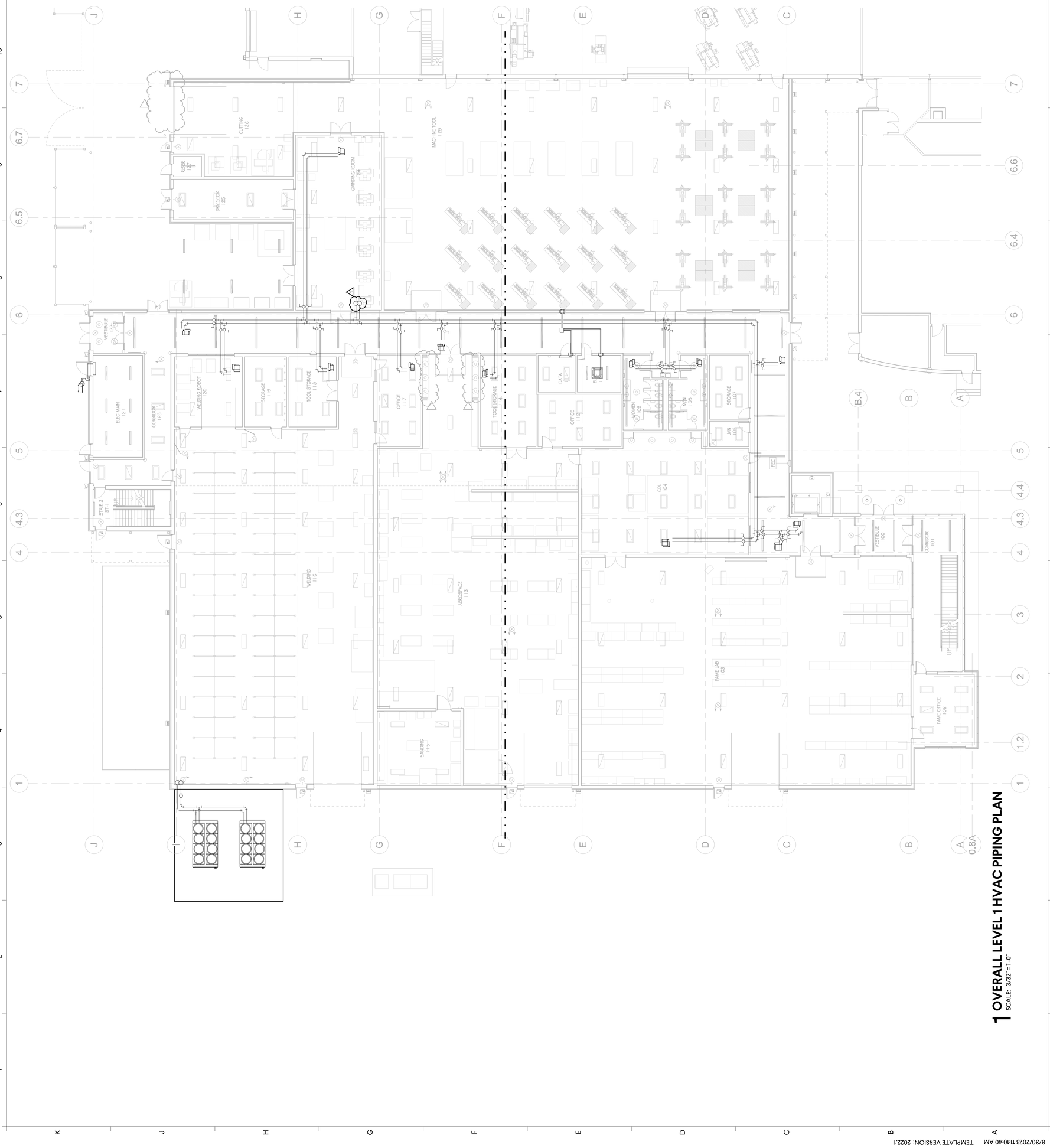

1 OVERALL LEVEL 1 HVAC PIPING PLAN

SCALE: 3/32" = 1'-0"

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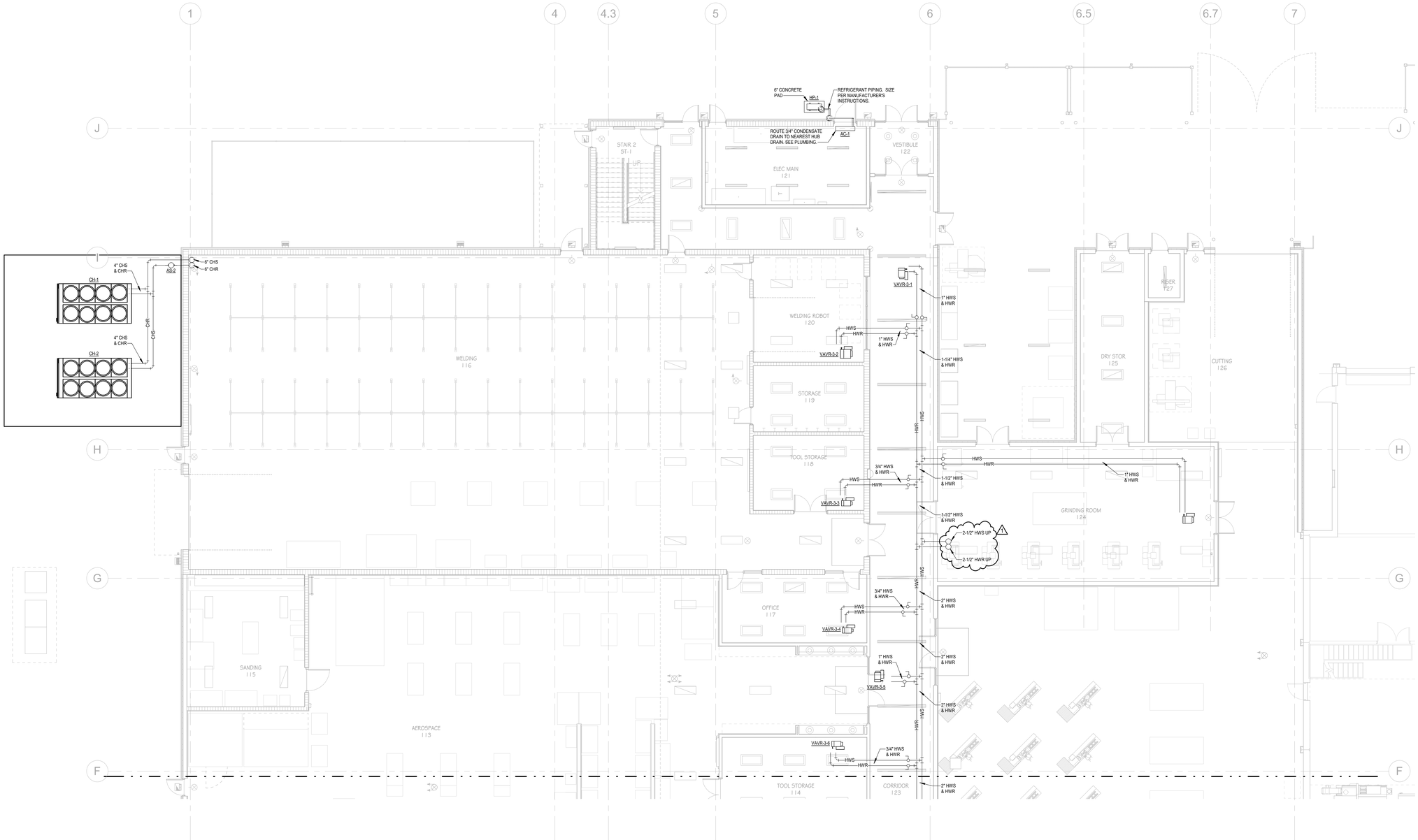

1 LEVEL 1 HVAC PIPING PLAN - PART B

SCALE: 1/8" = 1'-0"

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ALABAMA No. 14178 PROFESSIONAL ENGINEER JAMES S. DAVIS, JR.
8/14/2023
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LEVEL 1 HVAC PIPING PLAN - PART B

M2.01B

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OVERALL LEVEL 2
HVAC PIPING PLAN

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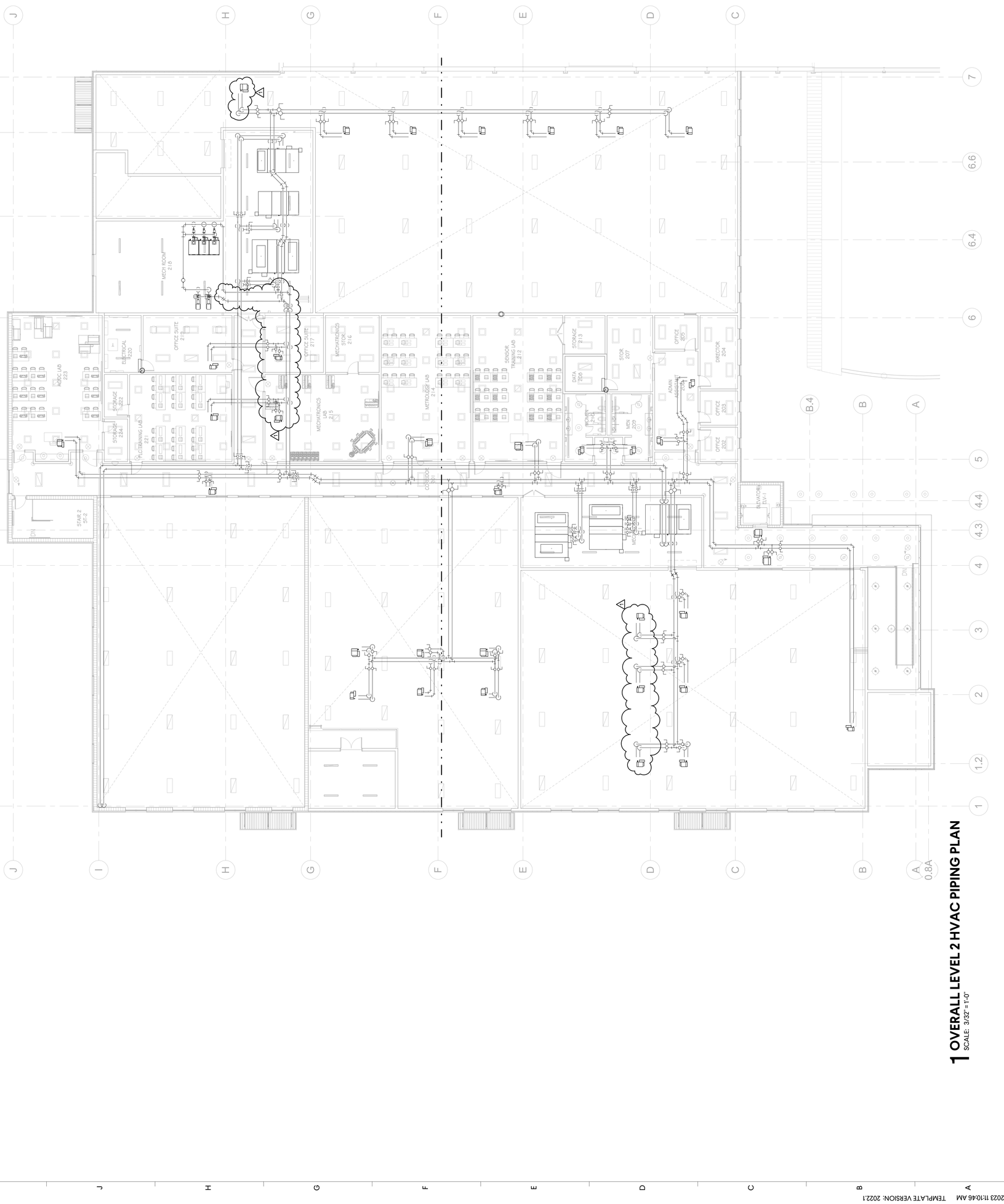
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MECHATRONICS LAB 215
METROLOGY LAB 214
SENSOR TRAINING LAB 212
STORAGE 213
DATA 206
STOR. 207
OFFICE 205
DIRECTOR 204
ADMIN ASSISTANT 203
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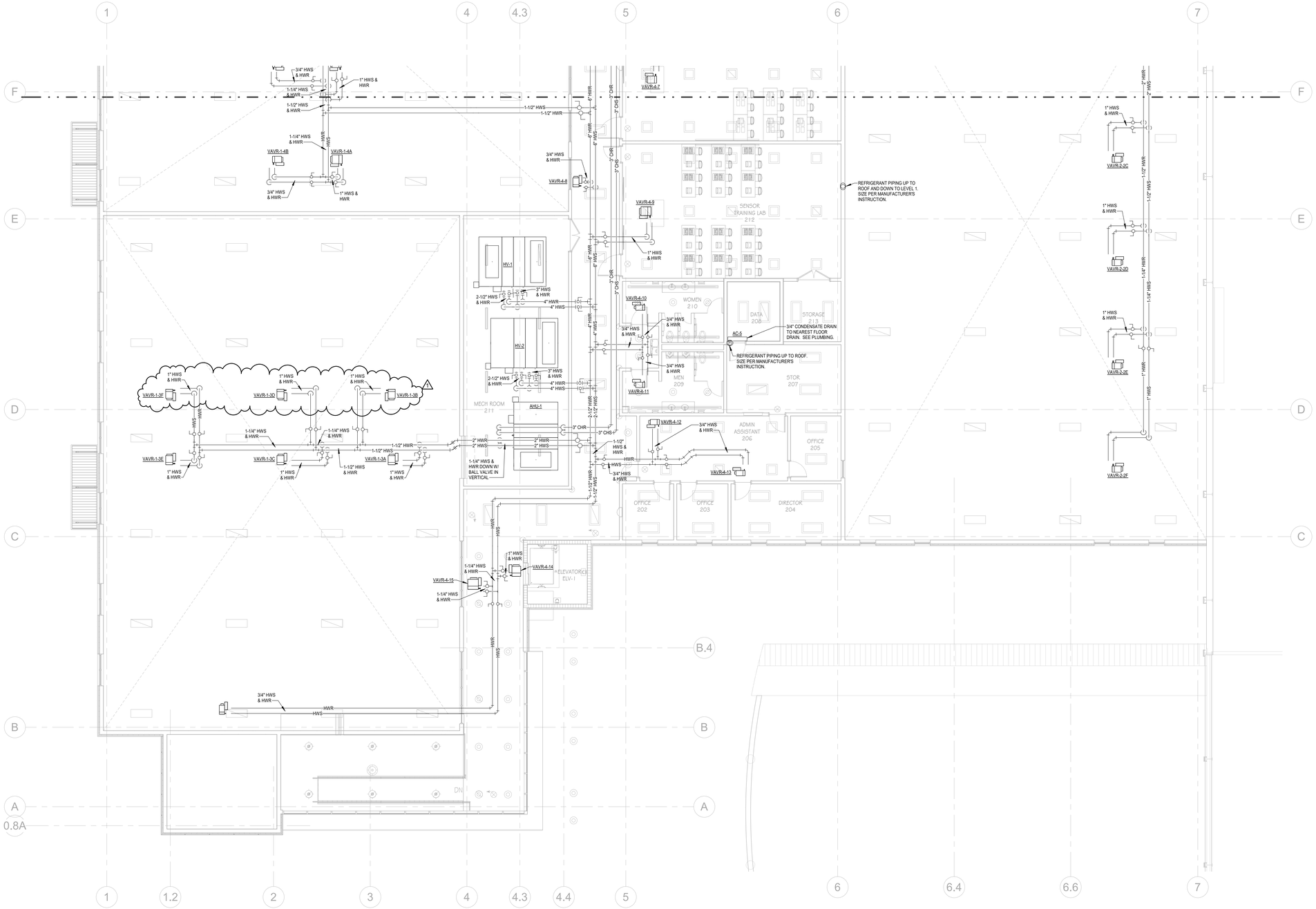
MEN 209
WOMEN 210
CALIB. 211
MECH ROOM 208
ELEVATOR ELV-1
IDF
IDF
IDF



1 LEVEL 2 HVAC PIPING PLAN - PART A
SCALE: 1/8" = 1'-0"

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Project # 222029

GMC

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CALHOUN COMMUNITY COLLEGE WORKFORCE SKILLS TRAINING CENTER

GMC ABHM210048

ALABAMA No. 14178 PROFESSIONAL ENGINEER JAMES S. DAVIS, JR.
8/14/2023 222029

LEVEL 2 HVAC PIPING PLAN - PART A

M2.02A

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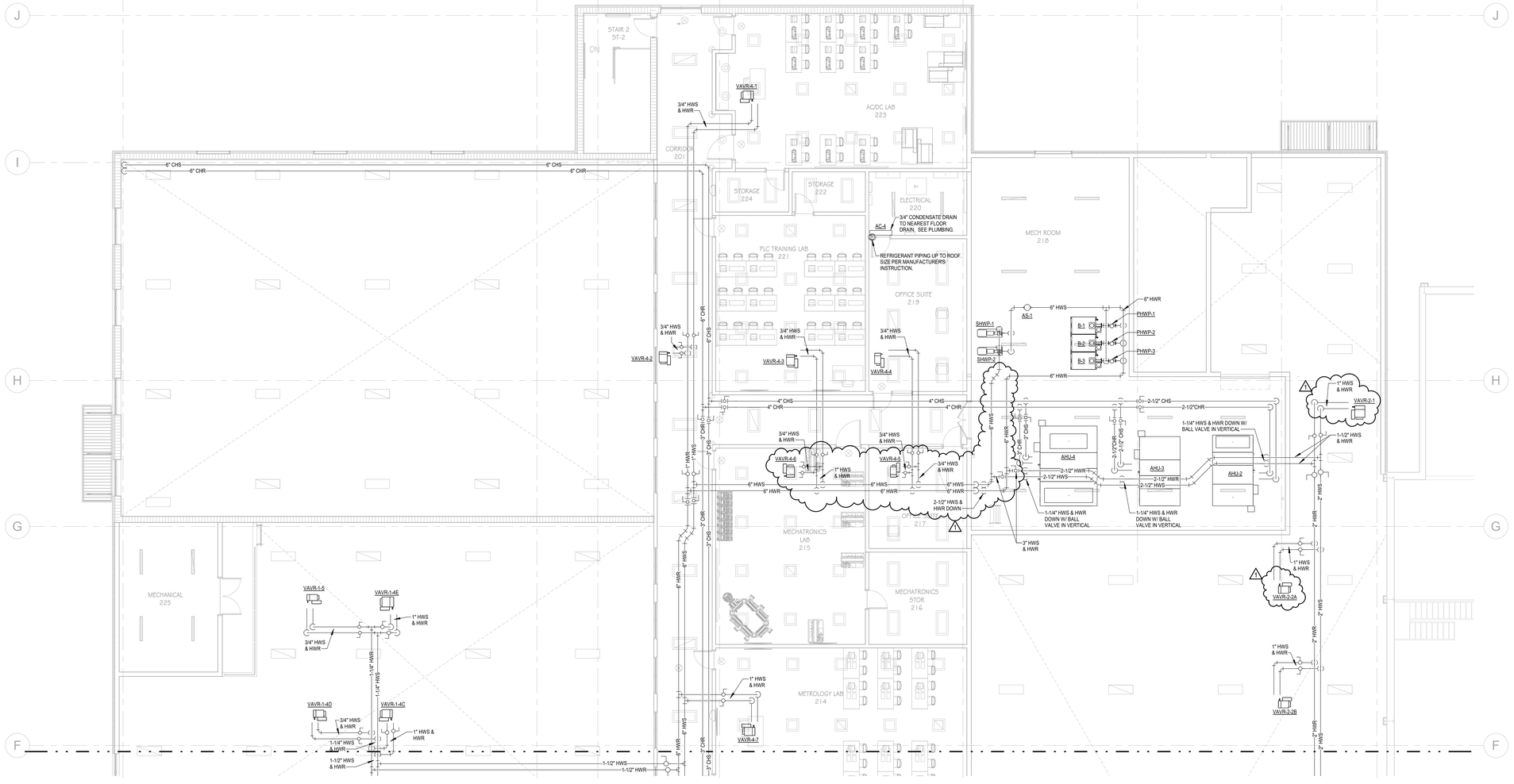

1 LEVEL 2 HVAC PIPING PLAN - PART B

SCALE: 1/8" = 1'-0"

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8/14/2023

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LEVEL 2 HVAC PIPING PLAN - PART B

M2.02B

8/30/2023 11:10:53 AM TEMPLATE VERSION: 2022.1

AIR HANDLING UNIT - INDOOR UNIT - STORM SHELTER

MARK	SERVES	UNIT CONFIGURATION	SUPPLY FAN			COOLING PERFORMANCE				MIN. OSA CFM	ELECT. (V/Φ/Hz)	AUX. HEAT		MCA (AMPS)	MOCP (AMPS)	NOMINAL TONS	BASIS OF DESIGN
			CFM	"W.G. E.S.P	HP	TOTAL (MBH)	SENSIBLE (MBH)	AIR ENT. °FDB	AIR ENT. °FWB			kW	STEPS				
AC-SS1	STORM SHELTER	HORIZONTAL	6000	1.5	5.0	198.4	154.7	80	67	1200	480/3/60	49.84	2	81	90	15.0	TRANE TWE180

AIR HANDLING UNIT GENERAL NOTES

1. CAPACITIES BASED ON 95°F(SUMMER), 47°F(WINTER) OUTDOOR CONDITIONS, AHRI STANDARD 210/240 RATING CONDITIONS
2. UL LISTED.
3. MAX FACE VELOCITY = 500 FPM.

ACCESSORIES

1. SINGLE POINT POWER CONNECTION WITH POWER SOURCE KIT.
2. PHASE PROTECTION.
3. 1" THICK THROWAWAY FILTERS MERV 8.
4. AUXILIARY DRAIN PAN WITH WITH FLOAT SWITCH.
5. PROVIDE FACTORY INSTALLED APR VALVE ON ALL STAGES.
6. 7-DAY PROGRAMMABLE SMART THERMOSTAT WITH WIFI CONNECTIVITY.

HEAT PUMP - OUTDOOR UNIT - STORM SHELTER

MARK	SERVES	ELECT. (V/Φ/Hz)	NOMINAL TONS	MCA (AMPS)	MOCP (AMPS)	MINIMUM IEER	MINIMUM COP	BASIS OF DESIGN TRANE
HP-SS1	AC-SS1	480/3/60	15.0	32	40	13.5	3.3	TWA180

HEAT PUMP UNIT GENERAL NOTES

1. MINIMUM UNIT ONLY SEER AT AHRI STANDARD 210/240 RATING CONDITIONS.
2. CONTRACTOR TO COORDINATE/VERIFY ELECTRICAL REQUIREMENTS WITH EQUIPMENT MANUFACTURER AND FIELD CONDITIONS PRIOR TO ORDERING.
3. REFRIGERANT: R-410A
4. UL LISTED

ACCESSORIES

1. PHASE PROTECTION
2. ISOLATION VALVES
3. BI-FLOW LIQUID LINE DRIER
4. ANTI-SHORT CYCLE TIMER
5. CRANKCASE HEATER
6. HIGH/LOW PRESSURE SWITCHES
7. LOW AMBIENT COOLING TO 0°F
8. FROSTSTAT
9. THERMAL EXPANSION VALVE
10. HAIL/VANDAL GUARDS/PANELS

LOUVER SCHEDULE - STORM SHELTER

MARK	MOUNT	SIZE	AREA SERVED	MIN. FREE AREA	MINIMUM PRESSURE DROP IN W.G.	CFM	DESIGN BASIS
IL	SIDEWALL	48X48	STORM SHELTER	25%	0.20	6000	RUSKIN XP500WD
EL	SIDEWALL	48X48	STORM SHELTER	25%	0.20	6000	RUSKIN XP500WD

NOTES:

LOUVER SHALL COMPLY WITH ICC500, FEMA 320, & FEMA 361 STANDARDS.

FANS - STORM SHELTER

MARK	SERVES	TYPE	CFM	E.S.P. (IN. WG)	MIN. WHEEL SIZE (IN.)	MOTOR HP	MOTOR V/Φ/Hz	ACCESSORIES	INTERLOCK W/	DESIGN BASIS	
SF-1	STORM SHELTER	(F)	4000	0.25	16.5	1.5	208/3/60	(5)	EMERGENCY SWITCH	LOREN COOK - 165SQN11D	NOTE TO BE CONNECTED TO EMERGENCY POWER. SEE ELECTRICAL.
EF-SS1	STORM SHELTER	(F)	150	0.2	7	0.167	115/1/60	(5)	EMERGENCY SWITCH	LOREN COOK - 70SQN17D	

FAN TYPES:

- (A) CENTRIFUGAL ROOF EXHAUSTER DIRECT DRIVE
- (B) CENTRIFUGAL ROOF EXHAUSTER BELT DRIVE
- (C) PROPELLER EXHAUST FAN DIRECT DRIVE
- (D) PROPELLER EXHAUST FAN BELT DRIVE
- (E) CENTRIFUGAL VENT SET, BELT DRIVE
- (F) IN-LINE CENTRIFUGAL DIRECT DRIVE
- (G) IN-LINE CENTRIFUGAL BELT DRIVE
- (H) CENTRIFUGAL CEILING EXHAUST FAN
- (J) PROPELLER VENTILATION FAN DIRECT DRIVE

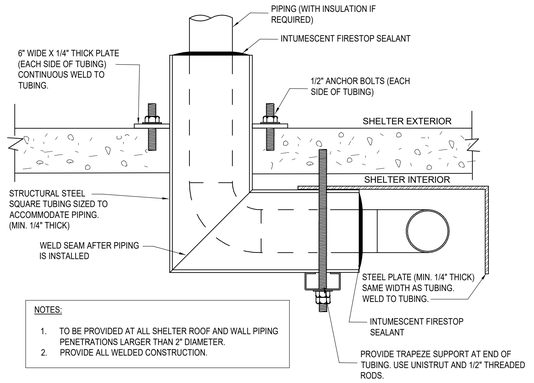
FAN ACCESSORIES:

1. BIRDSCREEN, ROOF CURB (MINIMUM 8" ABOVE INSULATION), BACKDRAFT DAMPER, DISCONNECT SWITCH, SPEED CONTROLLER.
2. MOTOR SIDE GUARD, GRAVITY SHUTTER.
3. SPRING ISOLATORS, TWO SPEED (1800/900 RPM) MOTOR, QUICK OPENING ACCESS DOOR DRAIN, GRAVITY DISCHARGE SHUTTER, MOTOR AND DRIVE WEATHER HOOD.
4. FLEXIBLE CONNECTORS, RUBBER-IN-SHEAR ISOLATORS, SOLID STATE SPEED CONTROL, DISCONNECT SWITCH AND BACKDRAFT DAMPER.
5. FLEXIBLE CONNECTORS, SPRING ISOLATORS, DISCONNECT SWITCH, AND BACKDRAFT DAMPER.
6. REMOVABLE ALUMINUM CEILING GRILLE, BACKDRAFT DAMPER, SPEED CONTROLLER, RUBBER-IN-SHEAR ISLOATORS, DISCONNECT SWITCH.
7. COMBINATION STARTER

ELECTRIC HEATERS (EH) - STORM SHELTER

MARK	QTY.	HEATING CAP. (W)	V/Φ/Hz	AMPS	SERVES	BASIS OF DESIGN
EH-1	1	2000 W	277/1/60	7.2	TLT 902	MARKEL 3420
EH-2	1	2000 W	277/1/60	7.2	TLT 903	MARKEL 3420
EH-3	1	2000 W	277/1/60	7.2	TLT 904	MARKEL 3420

ALL ELECTRICAL COMPONENTS SHALL BE WIRED TO A SINGLE POINT POWER CONNECTION. SUMMER FAN SWITCH, BUILT IN THERMOSTAT.

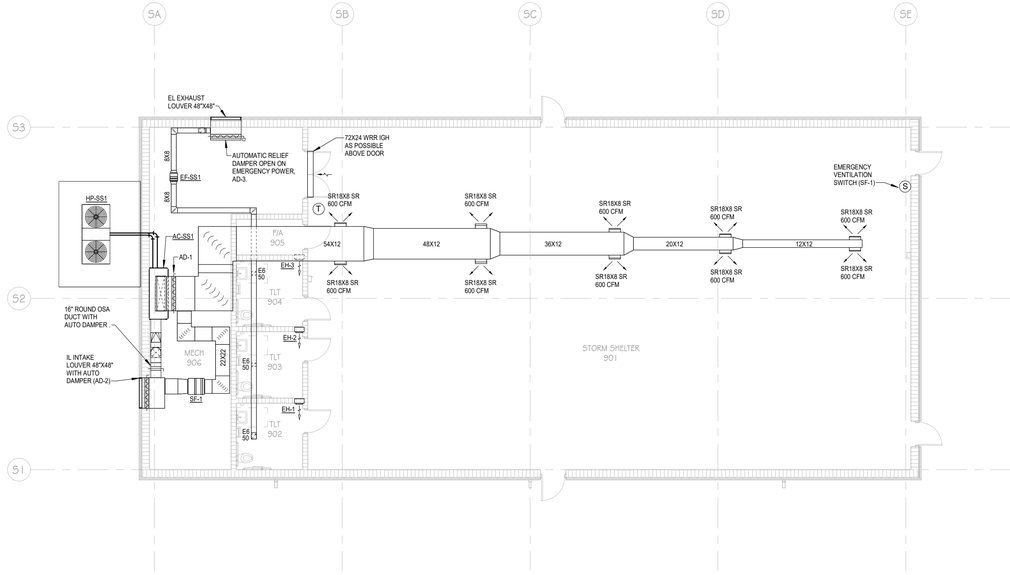


NOTES:

1. TO BE PROVIDED AT ALL SHELTER ROOF AND WALL PIPING PENETRATIONS LARGER THAN 2" DIAMETER.
2. PROVIDE ALL WELDED CONSTRUCTION.

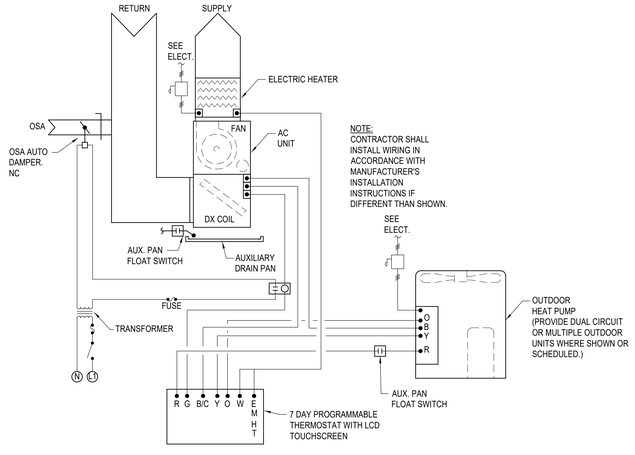
DETAIL OF PIPE PASSING THRU SHELTER WALL OR ROOF

NOT TO SCALE



1 STORM SHELTER - HVAC

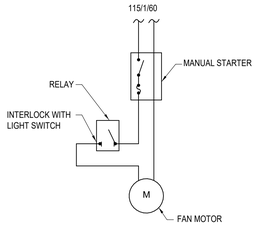
SCALE: 1/8" = 1'-0"



NOTE:
CONTRACTOR SHALL INSTALL WIRING IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS IF DIFFERENT THAN SHOWN.

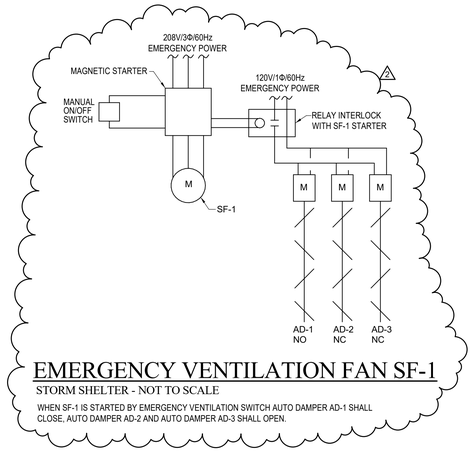
TYPICAL SPLIT SYSTEM HEAT PUMP CONTROLS DIAGRAM

NOT TO SCALE



EF-SS1 STORM SHELTER

NOT TO SCALE



EMERGENCY VENTILATION FAN SF-1

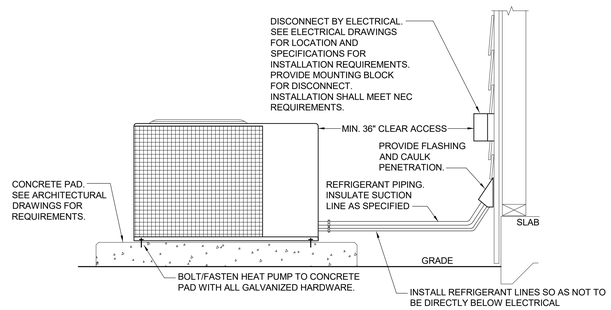
STORM SHELTER - NOT TO SCALE

WHEN SF-1 IS STARTED BY EMERGENCY VENTILATION SWITCH AUTO DAMPER AD-1 SHALL CLOSE, AUTO DAMPER AD-2 AND AUTO DAMPER AD-3 SHALL OPEN.

ON A LOSS OF NORMAL POWER TURN SWITCH "ON" FOR EMERGENCY VENTILATION

EMERGENCY SWITCH NAMEPLATE

STORM SHELTER - NOT TO SCALE



HEAT PUMP MOUNTING DETAIL

NOT TO SCALE

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8/14/2023
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STORM SHELTER - HVAC

M3.01

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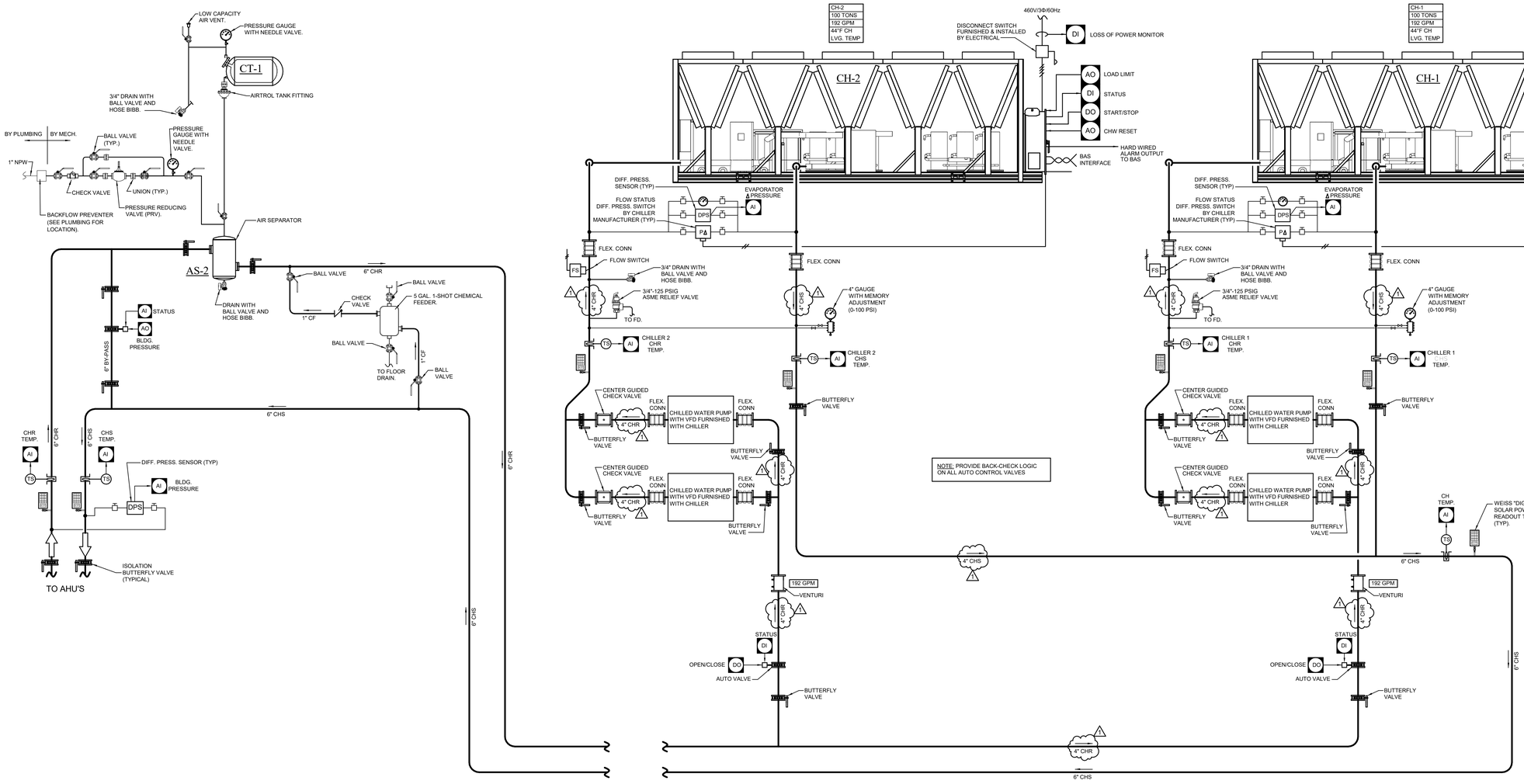

CHILLED WATER PIPING AND INSTRUMENTATION DIAGRAM

NO SCALE

CHILLED WATER SYSTEM CONTROLS SEQUENCES:

GENERAL:

THE SYSTEM IS PROVIDED WITH TWO CHILLED WATER PUMPS. THE CHILLERS AND PUMPS SHALL BE CONTROLLED IN A LEAD/LAG CONFIGURATION BASED ON LOAD AND RUN TIME. THE BAS CONTROLLER SHALL INITIATE LEAD/LAG CHILLER START-UP SUBJECT TO CHILLER SCHEDULE, ALL INTERNAL CHILLER SAFETIES, CHILLED WATER SET POINTS, CURRENT LIMITING SET POINTS, ALARMS AND LOAD LIMITING. CHILLER LOAD LIMITS SHALL BE ABLE TO BE MODIFIED BY BMS FOR LEAD/LAG/CHANGEOVER SEQUENCING. THE CHILLED WATER PLANT IS PROVIDED WITH TWO CHILLERS IN A LEAD/LAG CHILLER SEQUENCE. THE LEAD/LAG CHILLER SEQUENCE SHALL ALSO APPLY FOR CHILLER MAINTENANCE AND EQUAL RUN TIME ROTATION.

LEAD CHILLER START-UP:

THAT BAS SHALL OPEN THE LEAD CHILLER ISOLATION VALVE AND ONCE THE VALVE IS CONFIRMED 100% OPEN BY THE VALVE END SWITCH START LEAD CHILLED WATER PUMP. IF THE END SWITCH IS NOT ENGAGED PROVING THE VALVE IS OPEN OR IF THE CHILLER IS NOT CONFIRMED AS RUNNING BY THE BAS AFTER 5 MINUTES (ADJ.), THE BAS SHALL ALARM THE WORKSTATION AND CONSIDER THE CHILLER FAILED. IF THE LEAD CHILLED WATER PUMP FAILS AS INDICATED BY THE PUMP CURRENT TRANSDUCER THE BAS SHALL START THE LAG CHILLER AND ALARM THE BAS WORKSTATION. ONCE FLOW HAS BEEN PROVEN VIA THE EVAPORATOR DIFFERENTIAL PRESSURE SWITCH, THE BAS SHALL START THE LEAD CHILLER. SEE FLOW RATE CONTROL FOR PUMPING AND BYPASS VALVE CONTROL SEQUENCING. THE LEAVING EVAPORATOR TEMPERATURE SHALL BE MAINTAINED AT 45°F BY THE INTERNAL CHILLER CONTROLS AND VERIFIED VIA THE BAS SUPPLY CHILLED WATER TEMPERATURE SENSOR. IF THE LEAD CHILLER EXCEEDS 90% RUNNING LOAD AMPS FOR 20 MINUTES, THE START SEQUENCE FOR THE LAG CHILLER SHALL BE ACTIVATED.

IF AT ANY TIME THE CHILLED WATER SUPPLY SETPOINT EXCEEDS THE MAXIMUM SUPPLY CHILLED WATER SETPOINT (50°F ADJUSTABLE) AT THE COMMON CHILLED WATER SUPPLY TEMPERATURE SENSOR FOR A PERIOD OF 10 MINUTES (ADJUSTABLE) THE BAS SHALL GENERATE A HIGH CHILLED WATER TEMPERATURE ALARM.

LAG CHILLER START-UP:

THE BAS SHALL TEMPORARILY UNLOAD LEAD CHILLER BY IMPOSING A 50% DEMAND LIMIT TO MINIMIZE HYDRAULIC SYSTEM FLOW EFFECTS. ONCE THE LEAD CHILLER UNLOADS TO 50% RUNNING LOAD AMPS THE BAS SHALL SLOWLY OPEN LAG CHILLER ISOLATION VALVE TO FULL OPEN POSITION AND AFTER A 5 MINUTE TIME DELAY FOR VALVE TO FULLY OPEN THE BAS SHALL START LAG CHILLED WATER PUMP. ONCE THE LAG CHILLER CHILLED WATER FLOW IS PROVEN VIA AN EVAPORATOR DIFFERENTIAL PRESSURE SWITCH THE BAS SHALL START THE LAG CHILLER. THE CHILLERS SHALL STAGE AS NECESSARY TO MATCH COOLING CAPACITY WITH SYSTEM LOAD.

CHILLED WATER PUMP CONTROLS:

UPON A CALL FOR COOLING AND CHILLER ENABLE THE BAS SHALL SLOWLY INCREASE THE LEAD PUMP SPEED TO REACH AND MAINTAIN THE DESIGN DIFFERENTIAL PRESSURE SET POINT AT THE DIFFERENTIAL PRESSURE MONITORING POINT AS SET BY THE TEST AND BALANCE CONTRACTOR AT STARTUP. AT LOW LOAD CONDITIONS THE BAS SHALL OPEN THE LINEAR FLOW BYPASS VALVE AND LIMIT THE MINIMUM PUMP SPEED AS REQUIRED TO ENSURE THE CHILLED WATER FLOW AT THE CHILLED WATER FLOW METER NEVER DROPS BELOW THE REQUIRED CHILLER MINIMUM FLOW AS DETERMINED BY THE CHILLER MANUFACTURER BASED ON THE NUMBER OF CHILLERS OPERATING. WHEN MULTIPLE PUMPS ARE OPERATING THE BAS SHALL CONTROL THE PUMPS AS REQUIRED TO MATCH THE SPEEDS.

UPON FAILURE OF THE LEAD CHILLED WATER PUMP, THE BAS SHALL ALARM THE WORKSTATION, AND SHALL INITIATE START-UP OF THE LAG CHILLED WATER PUMP. A LEAD/LAG SCHEDULE SHALL ALTERNATE THE PUMPS AND CHILLERS ON A WEEKLY BASIS. IF FOR ANY REASON THE PUMP STATUS AT ITS CURRENT SENSOR DOES NOT MATCH THE BAS COMMAND STATUS FOR 1 MINUTE (ADJUSTABLE) THE BAS SHALL DISABLE THE PUMP, ALARM THE WORKSTATION, AND SHALL START THE LAG CHILLED WATER PUMP. THE BAS SHALL ROTATE THE LEAD/LAG CHILLERS AND PUMPS EVERY WEEK OR AS DIRECTED BY THE OWNER TO EQUALIZE CHILLER AND PUMP RUN TIMES.

LAG CHILLER SHUT DOWN:

IF THE COMBINED RUNNING LOAD AMPS OF THE LEAD AND LAG CHILLERS FALL BELOW 40% FOR 20 MINUTES (ADJUSTABLE), THE LAG CHILLER SHALL BE SHUT DOWN AND THE LAG CHILLER'S ISOLATION VALVE SHALL FULLY CLOSE (5 MINUTE SPAN) AND THE LAG CHW PUMP SHALL SHUT DOWN.

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8/14/2023 222029

CHILLED WATER PIPING AND INSTRUMENTATION DIAGRAM

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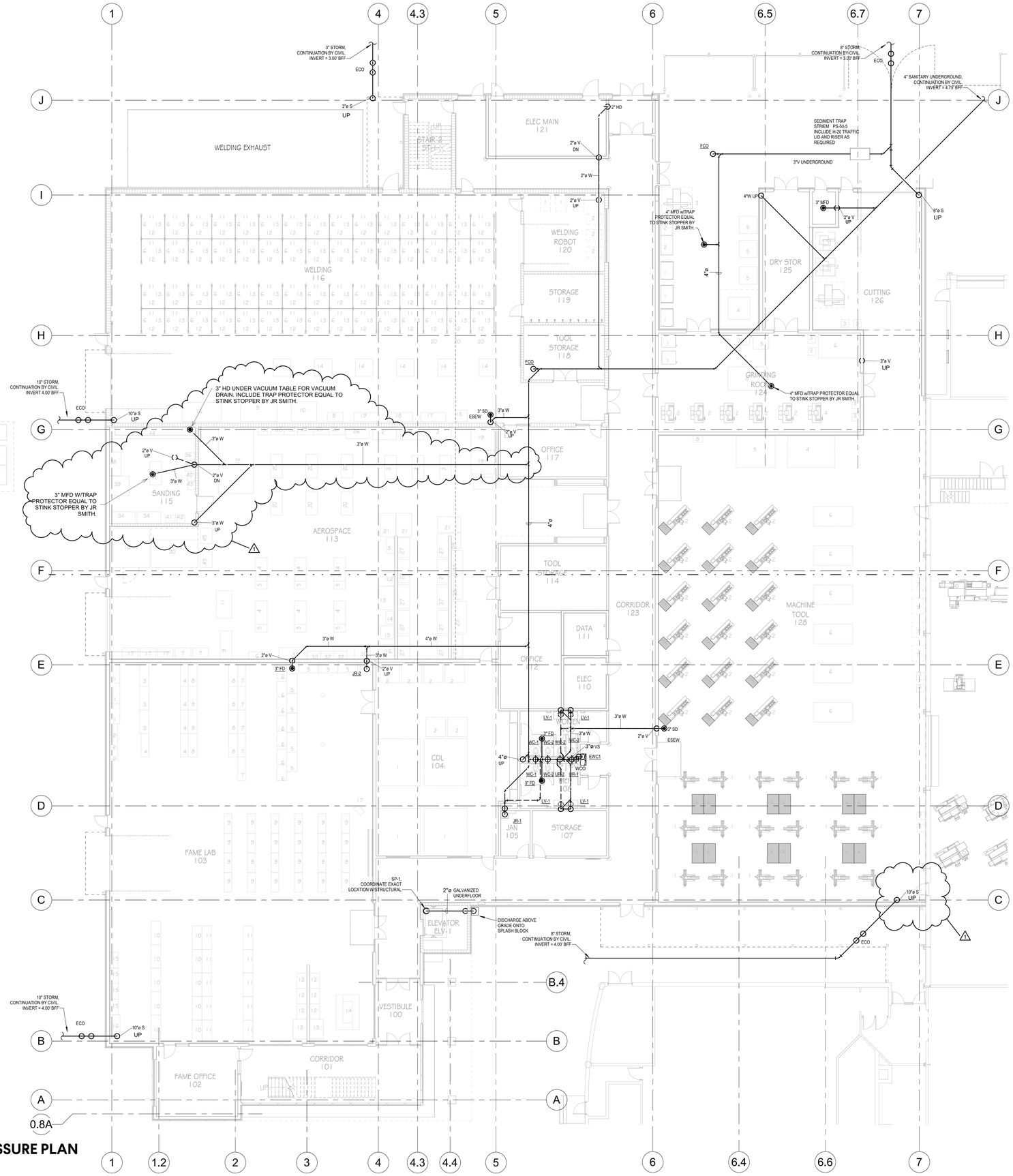

1 OVERALL LEVEL 1 NON-PRESSURE PLAN

SCALE: 3/32" = 1'-0"

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OVERALL LEVEL 1 - NON-PRESSURE PLAN

P1.00

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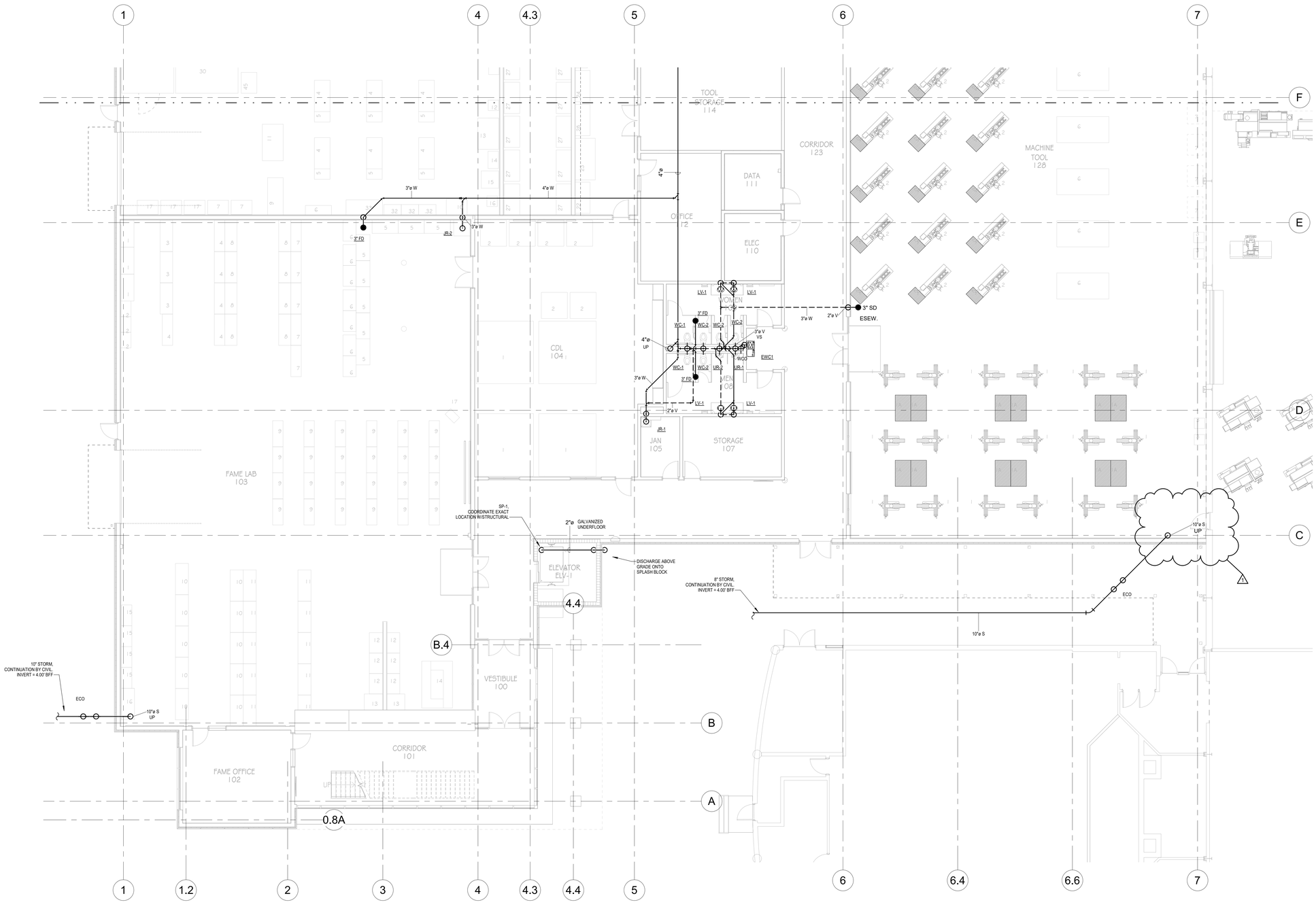

1 LEVEL 1 - AREA A NON-PRESSURE PLAN

SCALE: 1/8" = 1'-0"

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LEVEL 1 - AREA A - NON-PRESSURE PLAN

P1.01

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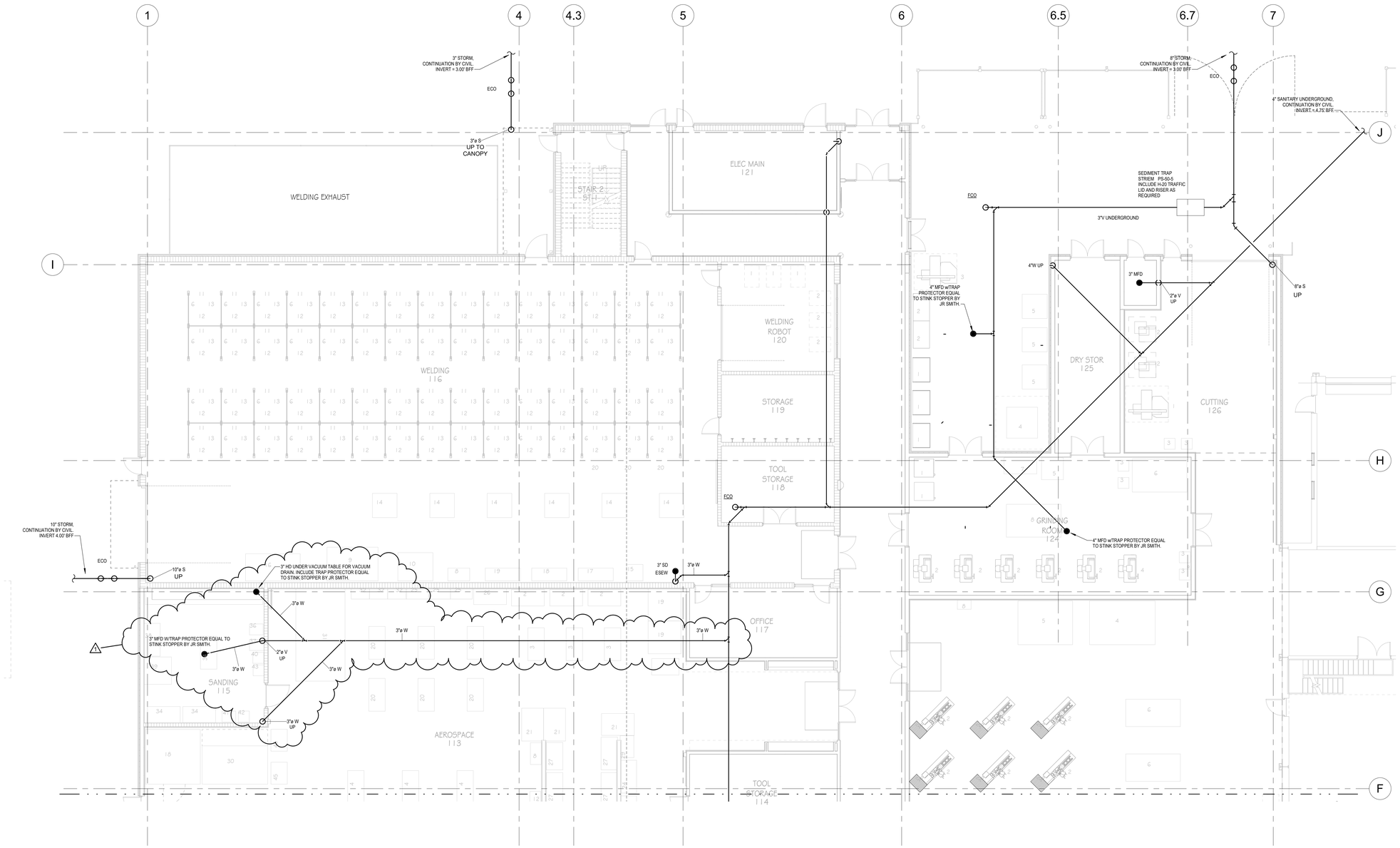

1 LEVEL 1 - AREA B - NON-PRESSURE PLAN

SCALE: 1/8" = 1'-0"

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LEVEL 1 - AREA B - NON-PRESSURE PLAN

P1.02

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P1.03

OVERALL LEVEL 2 - NON-PRESSURE PLAN

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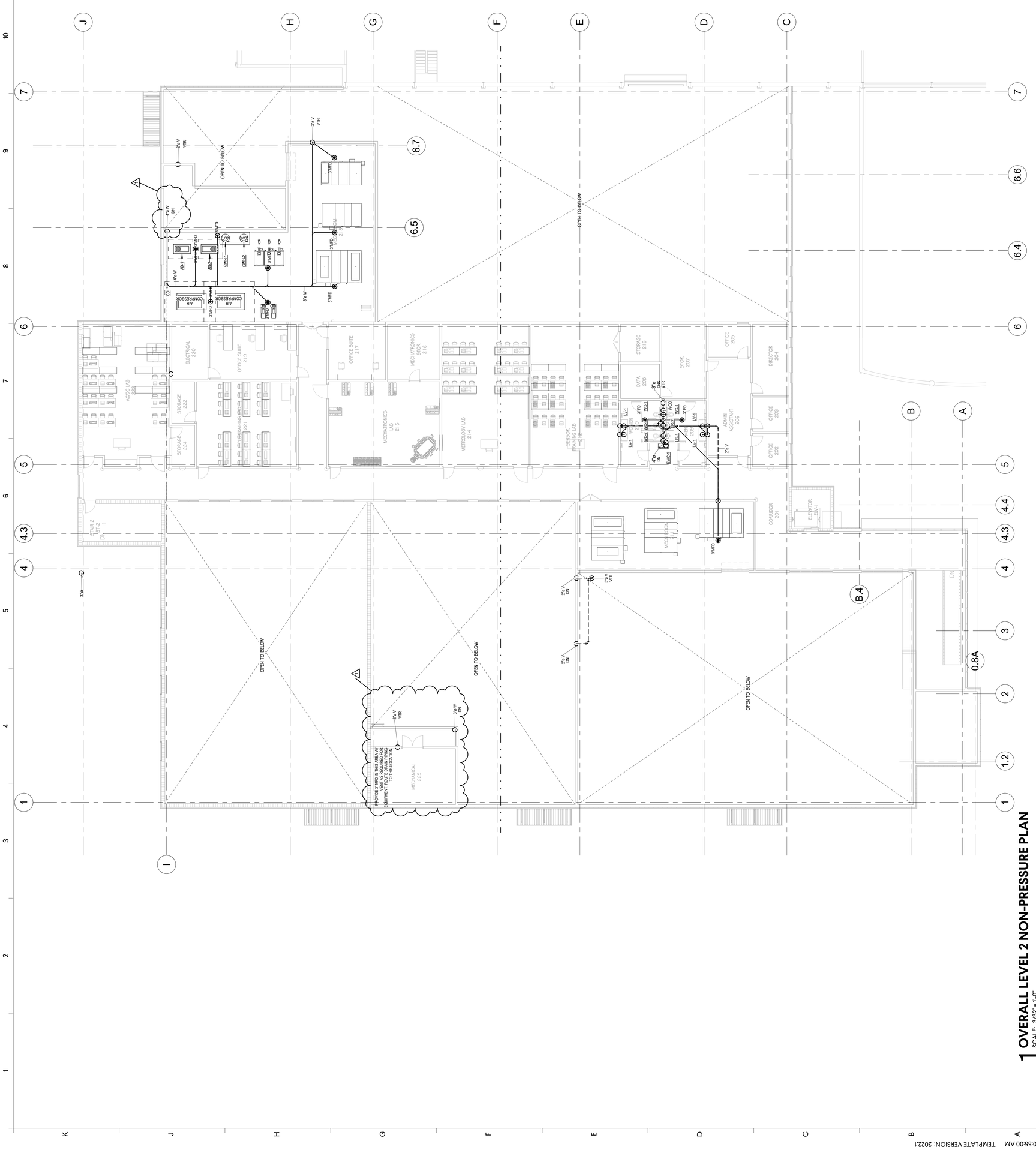

1 OVERALL LEVEL 2 NON-PRESSURE PLAN
SCALE: 3/32" = 1'-0"

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LEVEL 2 - AREA B - NON-PRESSURE PLAN

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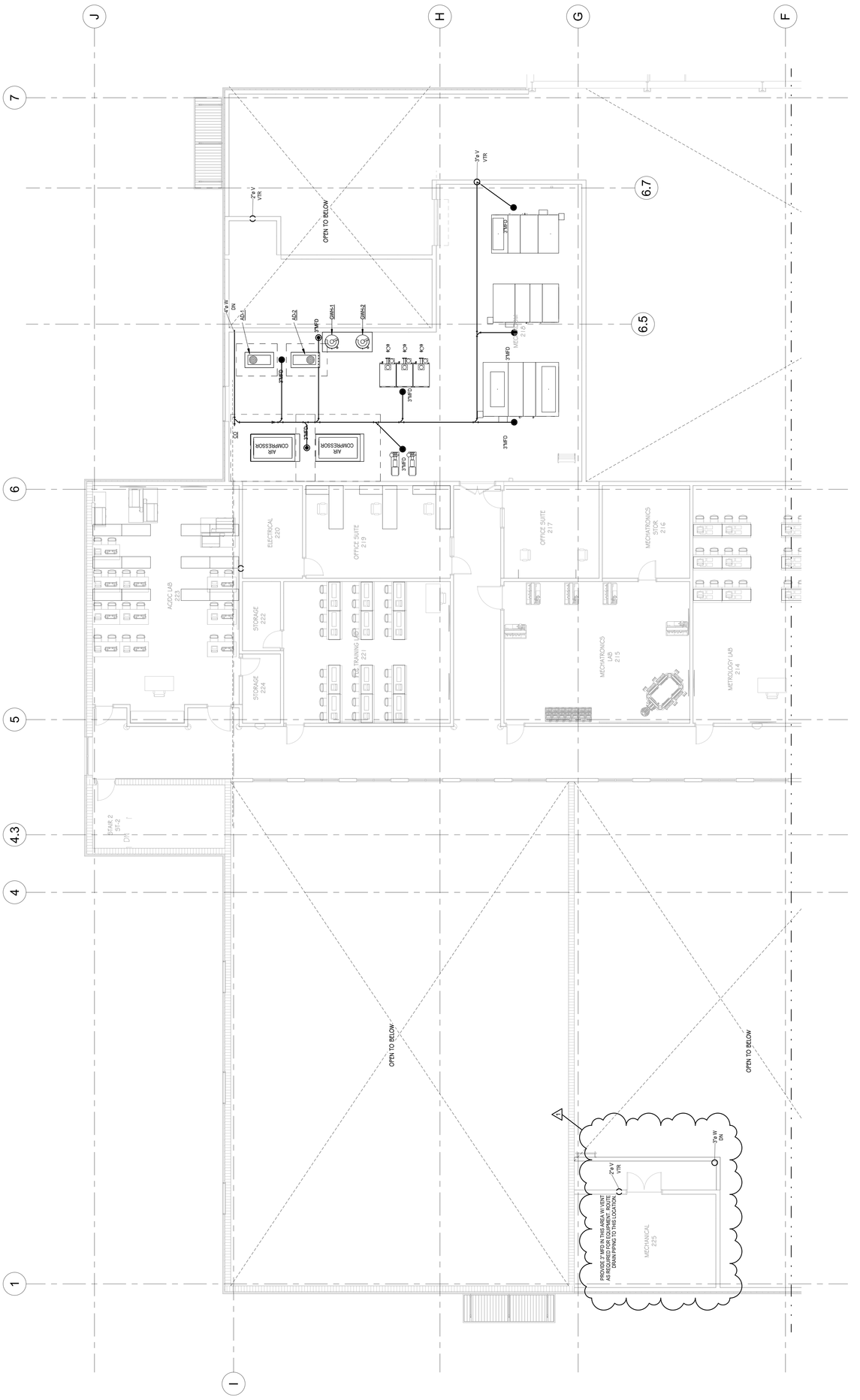
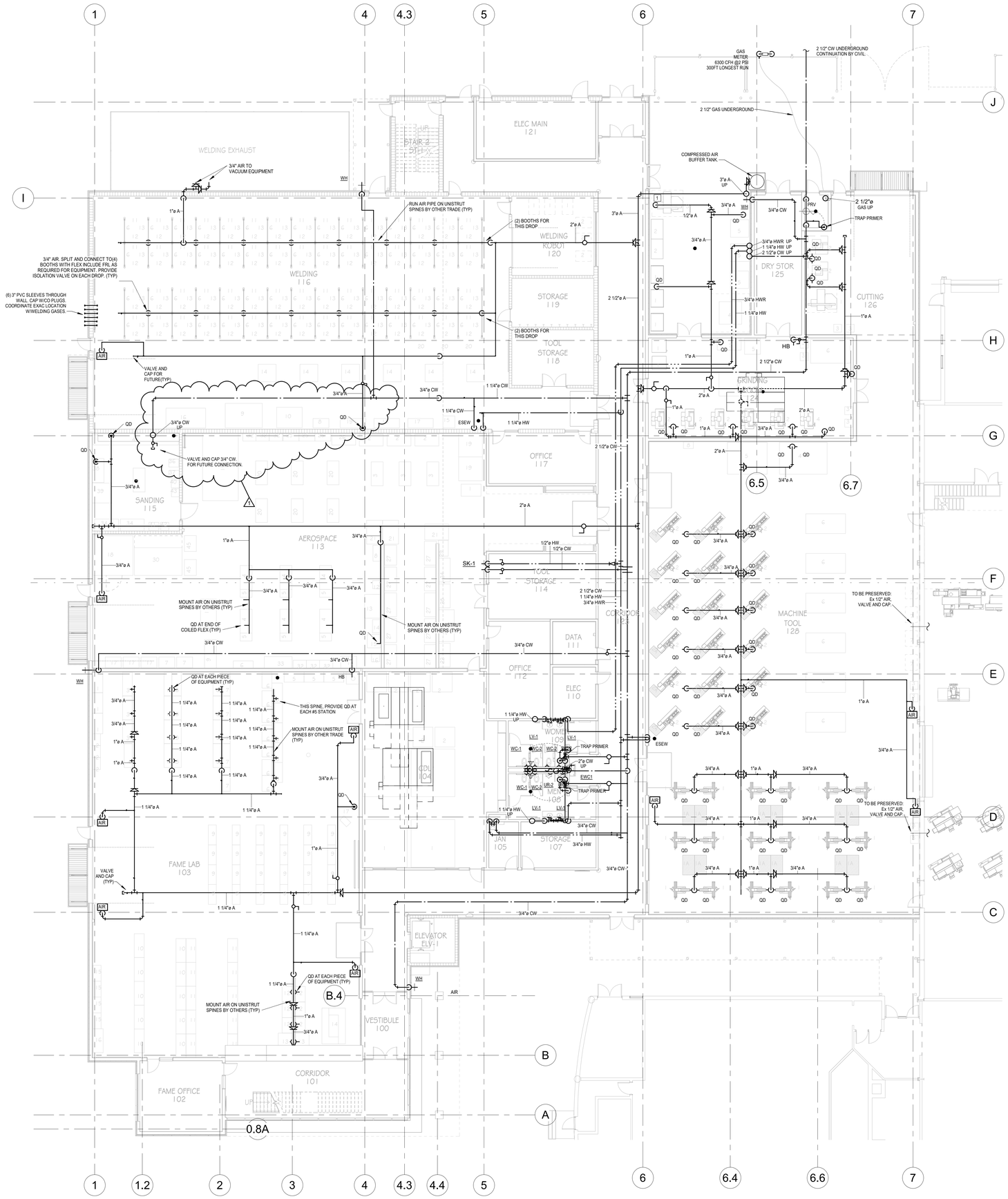

OPEN TO BELOW
OPEN TO BELOW
OPEN TO BELOW
ELECTRICAL 220
OFFICE SUITE 219
OFFICE SUITE 217
MECHATRONICS STOR 216
ACIDIC LAB 223
STORAGE 222
TRAINING LAB 221
MECHATRONICS LAB 215
METROLOGY LAB 214
STAIR 2 ST-2
DN
MECHANICAL Z25
AIR COMPRESSOR
AIR COMPRESSOR
PROVIDE 4" DRIP IN PIPING AS REQUIRED FOR EQUIPMENT. ROUTE DRAIN PIPING TO THIS LOCATION
2"ø V
VTR
3"ø V
VTR
3"ø W
DN
W 4"ø
DN
CWAC
CWAC
CWAC



1 OVERALL LEVEL 1 PRESSURE PLAN

SCALE: 3/32" = 1'-0"

GENERAL NOTES - PRESSURED

1. UNLESS OTHERWISE NOTED, QD LINES ARE 3/4" INCLUDE FRL AS REQUIRED FOR EQUIPMENT.
2. UNLESS OTHERWISE NOTED, AIR LINES ARE 3/4".

KEYED NOTES - PRESSURE

1 AIR DROP TO EQUIP, SIZE SHOWN INCLUDE FRL AS REQUIRED.

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ALABAMA No. 14178 PROFESSIONAL ENGINEER JAMES S. DAVIS, JR.
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OVERALL LEVEL 1 - PRESSURE PLAN

P1.06

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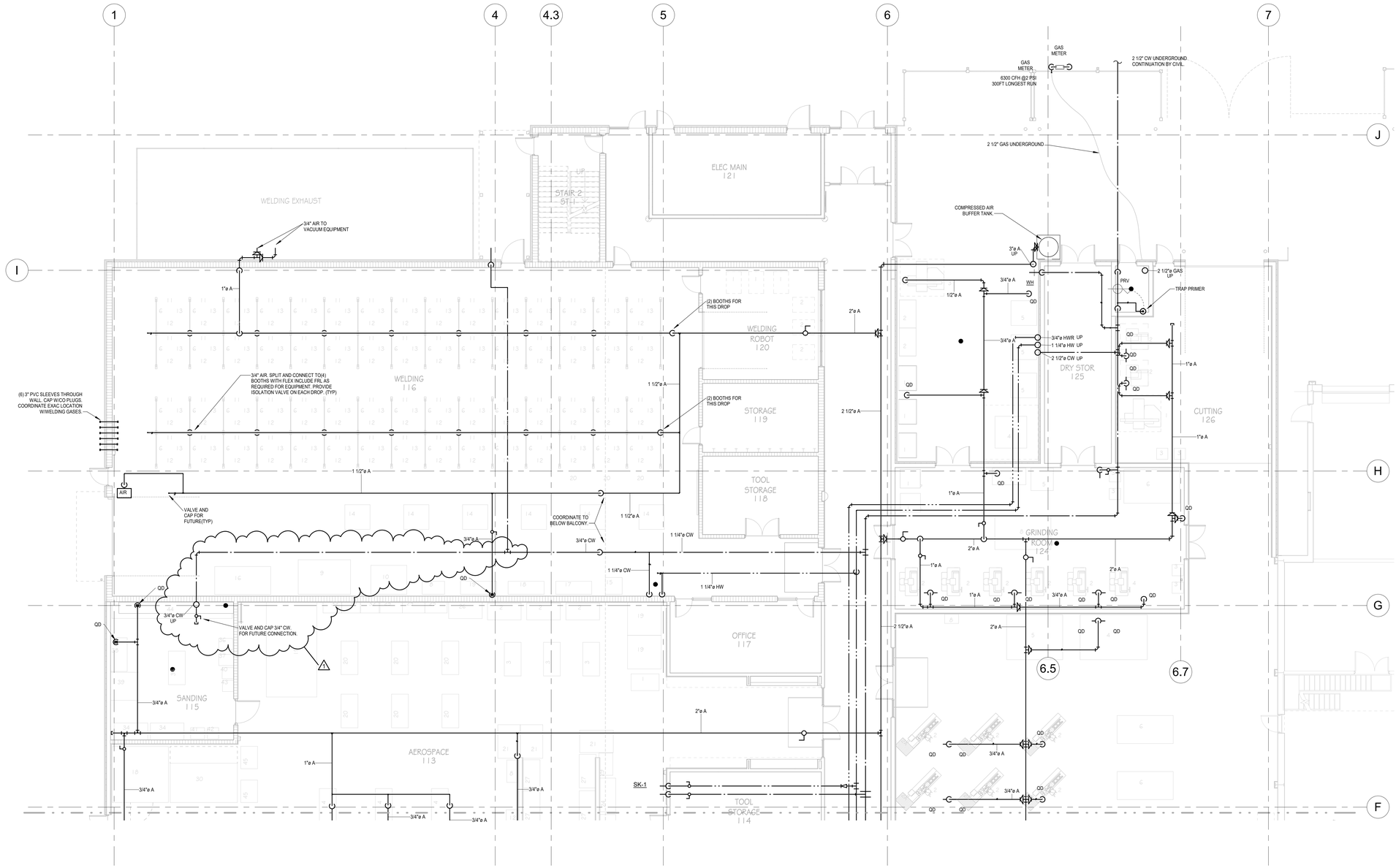

1 LEVEL 1 - AREA B - PRESSURE PLAN
SCALE: 1/8" = 1'-0"

GENERAL NOTES - PRESSURED

1. UNLESS OTHERWISE NOTED, QD LINES ARE 3/4" INCLUDE FRL AS REQUIRED FOR EQUIPMENT.
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LEVEL 1 - AREA B - PRESSURE PLAN

P1.08

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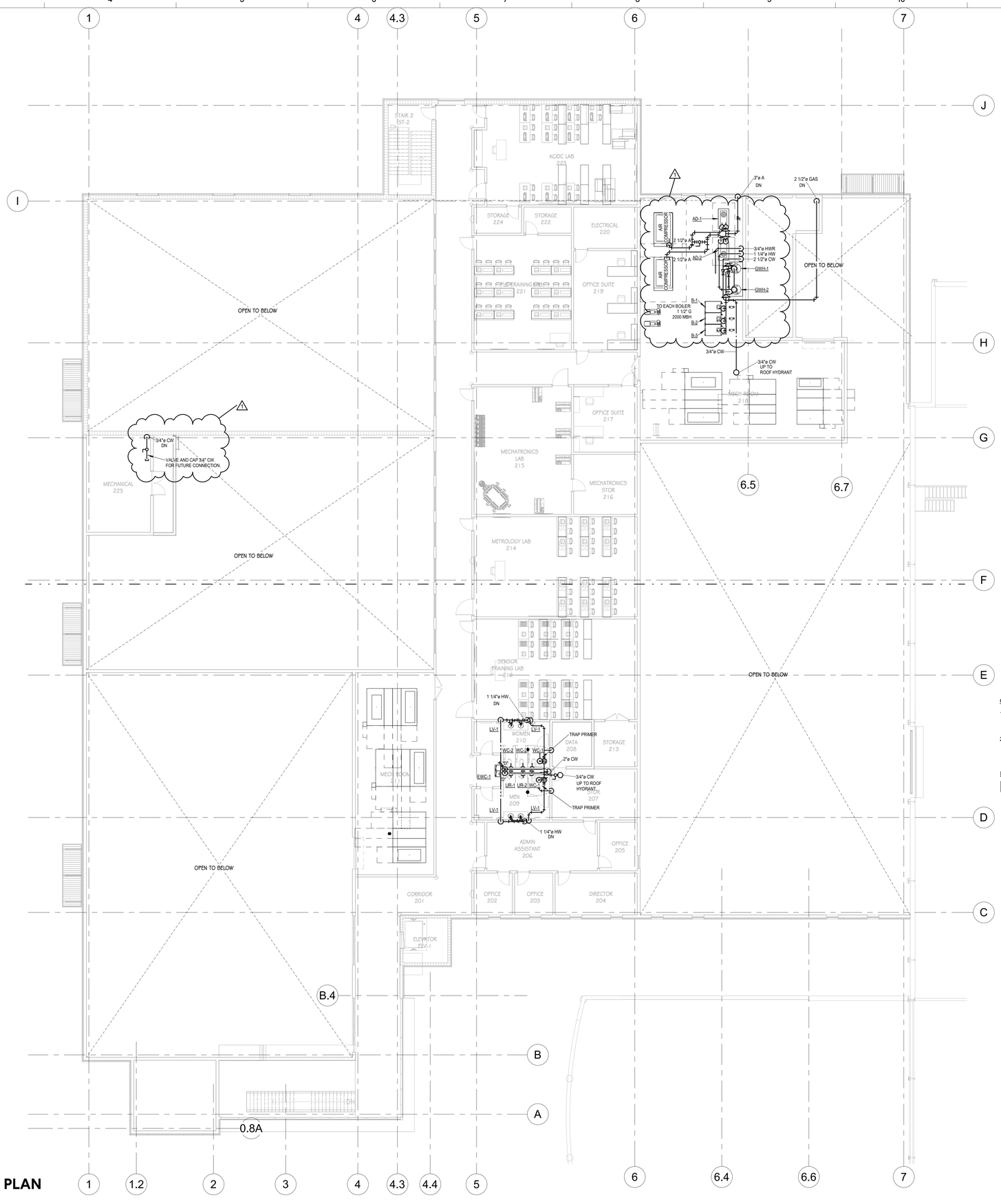

1 OVERALL LEVEL 2 PRESSURE PLAN

SCALE: 3/32" = 1'-0"

GENERAL NOTES - PRESSURED

1. UNLESS OTHERWISE NOTED, QD LINES ARE 3/4" INCLUDE FRL AS REQUIRED FOR EQUIPMENT.
2. UNLESS OTHERWISE NOTED, AIR LINES ARE 3/4".

KEYED NOTES - PRESSURE

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OVERALL LEVEL 2 - PRESSURE PLAN

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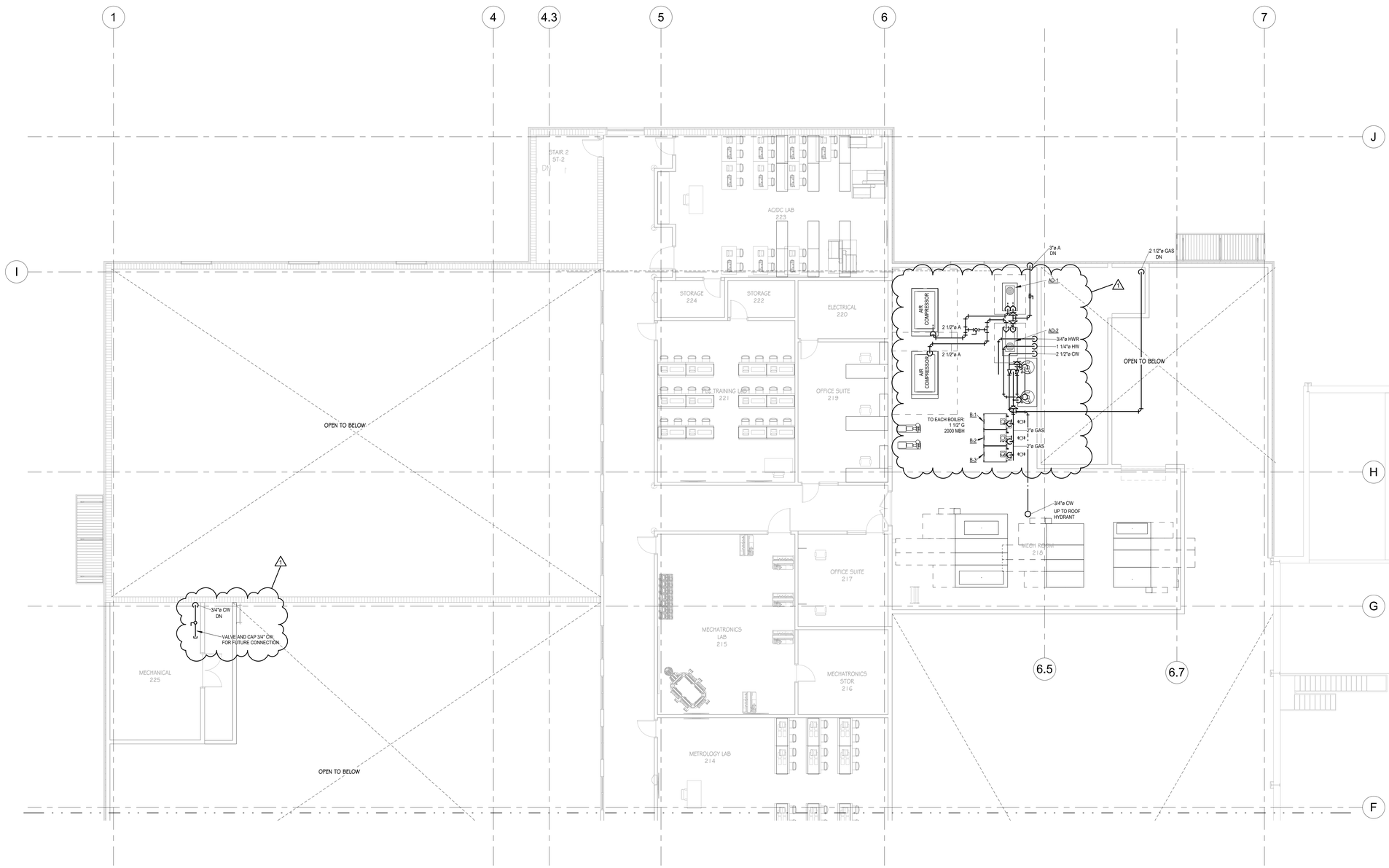

1 LEVEL 2 - AREA B - PRESSURE PLAN
SCALE: 1/8" = 1'-0"

GENERAL NOTES - PRESSURED

1. UNLESS OTHERWISE NOTED, QD LINES ARE 3/4" INCLUDE FRL AS REQUIRED FOR EQUIPMENT.
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LEVEL 2 - AREA B - PRESSURE PLAN

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ROOF PLUMBING PLAN

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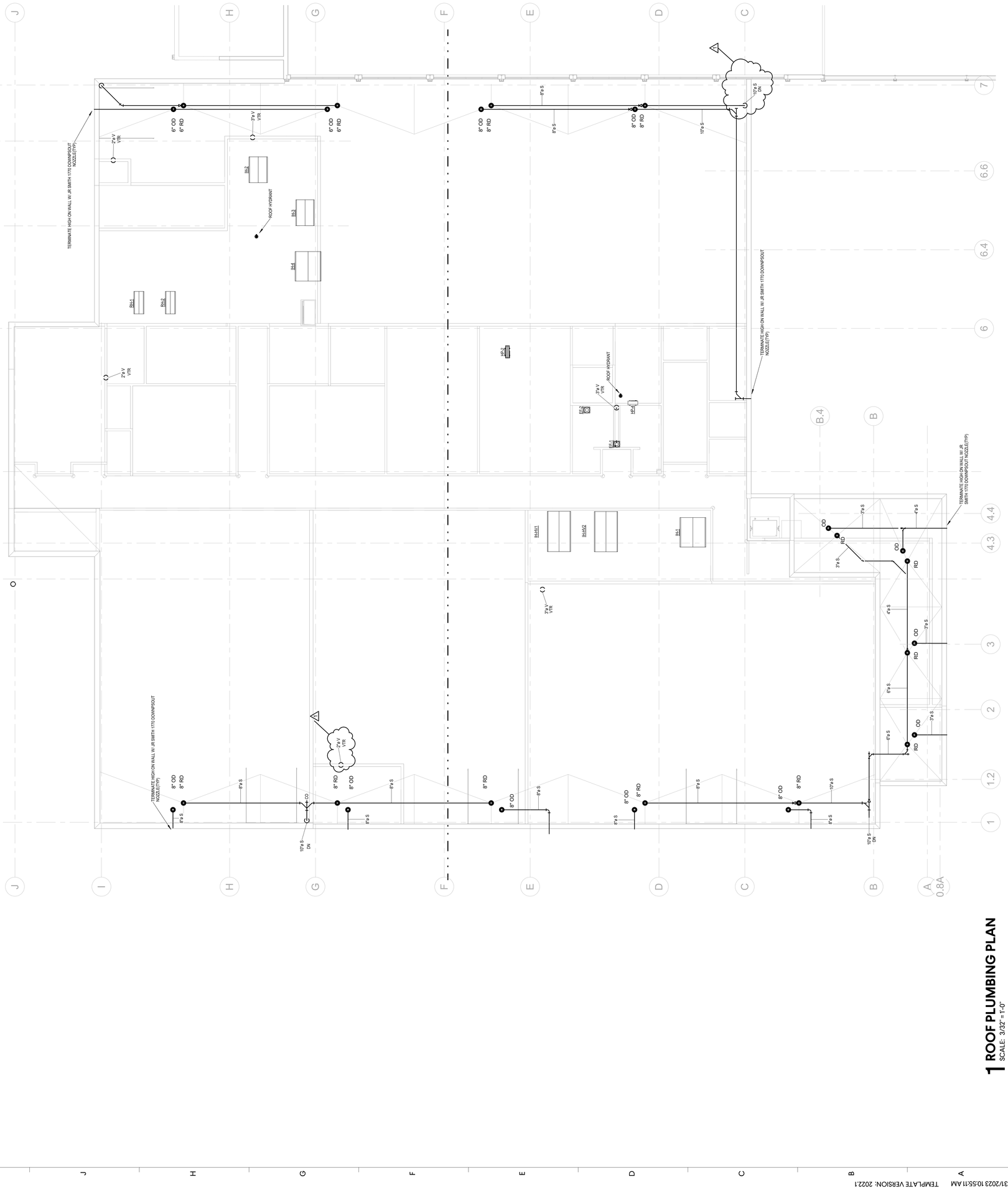

1 ROOF PLUMBING PLAN

SCALE: 3/32" = 1'-0"

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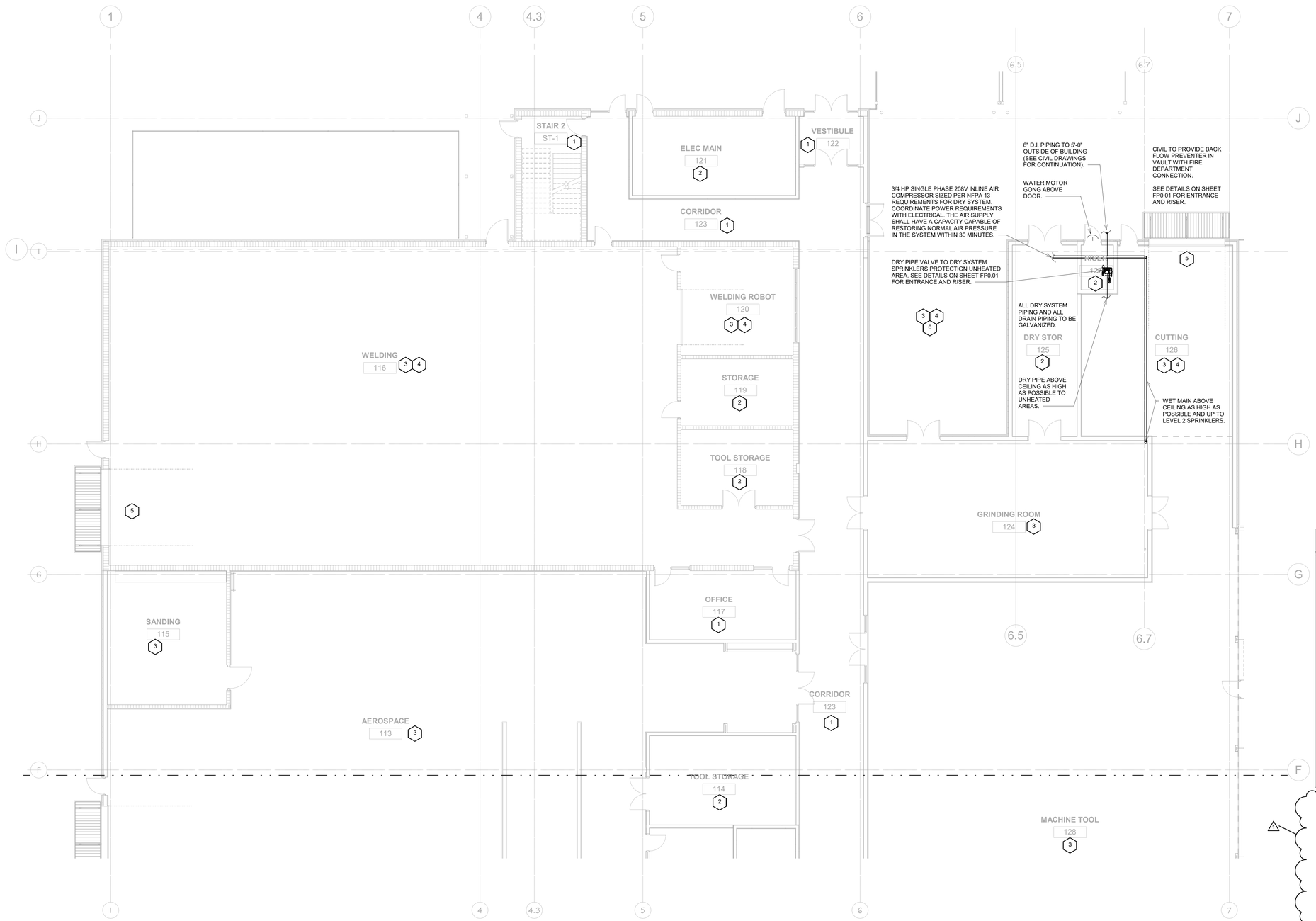

KEYED NOTES

1. LIGHT HAZARD OCCUPANCY PROVIDE 0.10 DENSITY.
2. ORDINARY HAZARD GROUP 1 OCCUPANCY PROVIDE 0.15 DENSITY.
3. ORDINARY HAZARD GROUP 2 OCCUPANCY PROVIDE 0.20 DENSITY.
4. PROVIDE HIGH TEMPERATURE RATED SPRINKLERS IN THIS ROOM OR AREA.
5. PROVIDE SIDEWALL SPRINKLERS UNDER OVERHEAD GARAGE DOORS FOR PROPER COVERAGE WHEN DOORS ARE IN THE OPEN POSITION.
6. PROVIDE DRY PIPE SPRINKLER SYSTEM COVERAGE FOR THIS ROOM OR AREA.

NOTE:
1. SPRINKLER PIPING AND EQUIPMENT SHOWN ARE FOR REPRESENTATIONAL PURPOSES AND EXACT LOCATION AND QUANTITY MAY CHANGE DUE TO ACTUAL CONDITIONS. SPRINKLERS ARE TO BE PROVIDED AND LOCATED IN ACCORDANCE WITH NFPA 13. COORDINATE SPRINKLER LOCATIONS WITH ARCHITECT, LIGHTING AND HVAC.
2. ALL PRODUCTS USED SHALL BE MANUFACTURED IN THE U.S.A., INCLUDING BUT NOT LIMITED TO SPRINKLERS, SPRINKLER PIPING, FITTINGS, VALVES, SWITCHES AND ALL OTHER ITEMS USED IN THE FIRE PROTECTION SYSTEM.
3. SMALL ROOM RULE DOES NOT APPLY TO ORDINARY HAZARD OCCUPANCIES.
4. COORDINATE LOCATION AND ARRANGEMENT OF SPRINKLERS WITH THE ARCHITECT.

1 LEVEL 1 FIRE PROTECTION PLAN - PART A
SCALE: 1/8" = 1'-0"

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FIRE PROTECTION LEVEL 1 PLAN PART A

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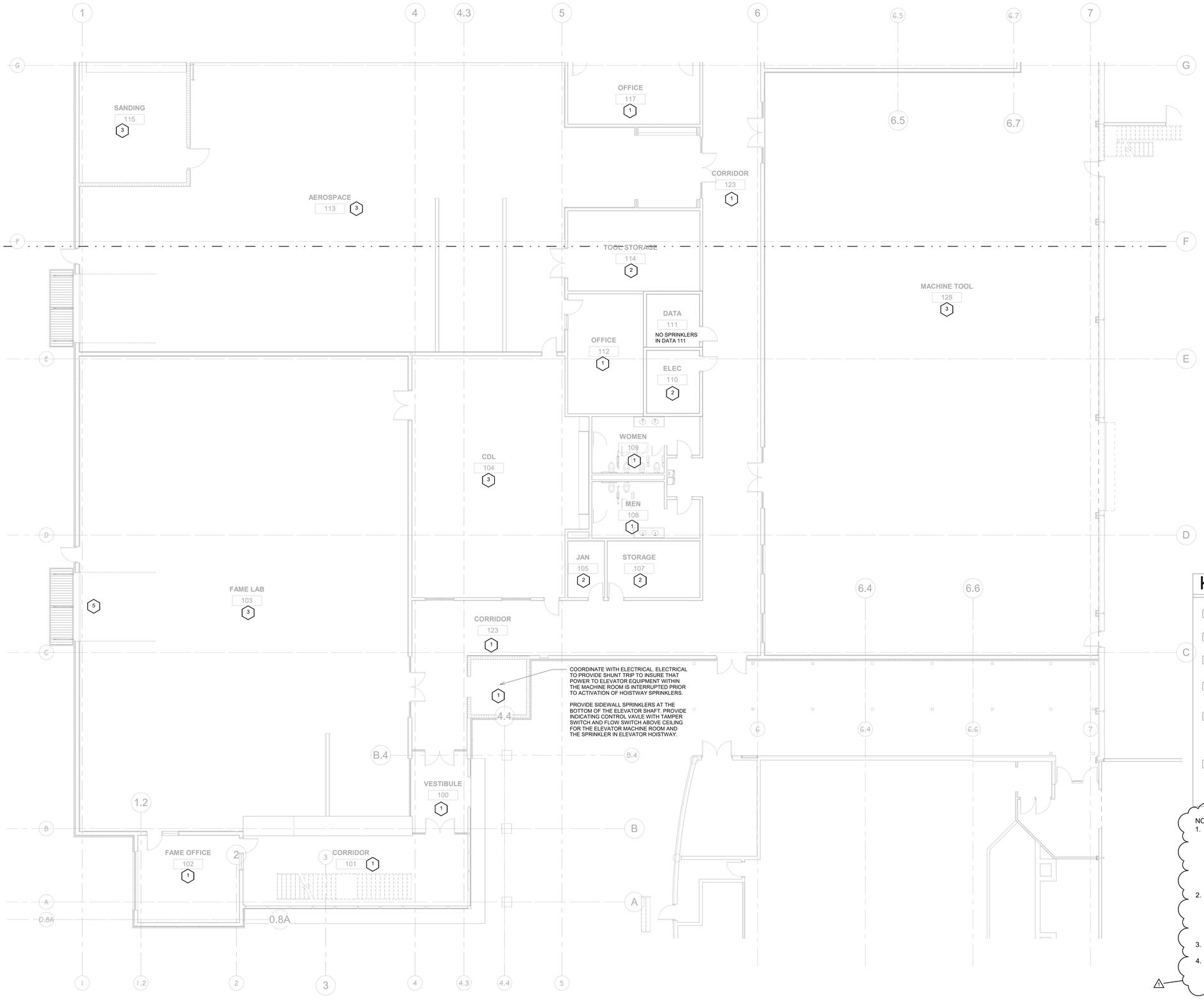

1 LEVEL 1 FIRE PROTECTION PLAN - PART B

SCALE: 1/8" = 1'-0"

KEYED NOTES

1. LIGHT HAZARD OCCUPANCY PROVIDE 0.10 DENSITY.
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FIRE PROTECTION LEVEL 1 PART B

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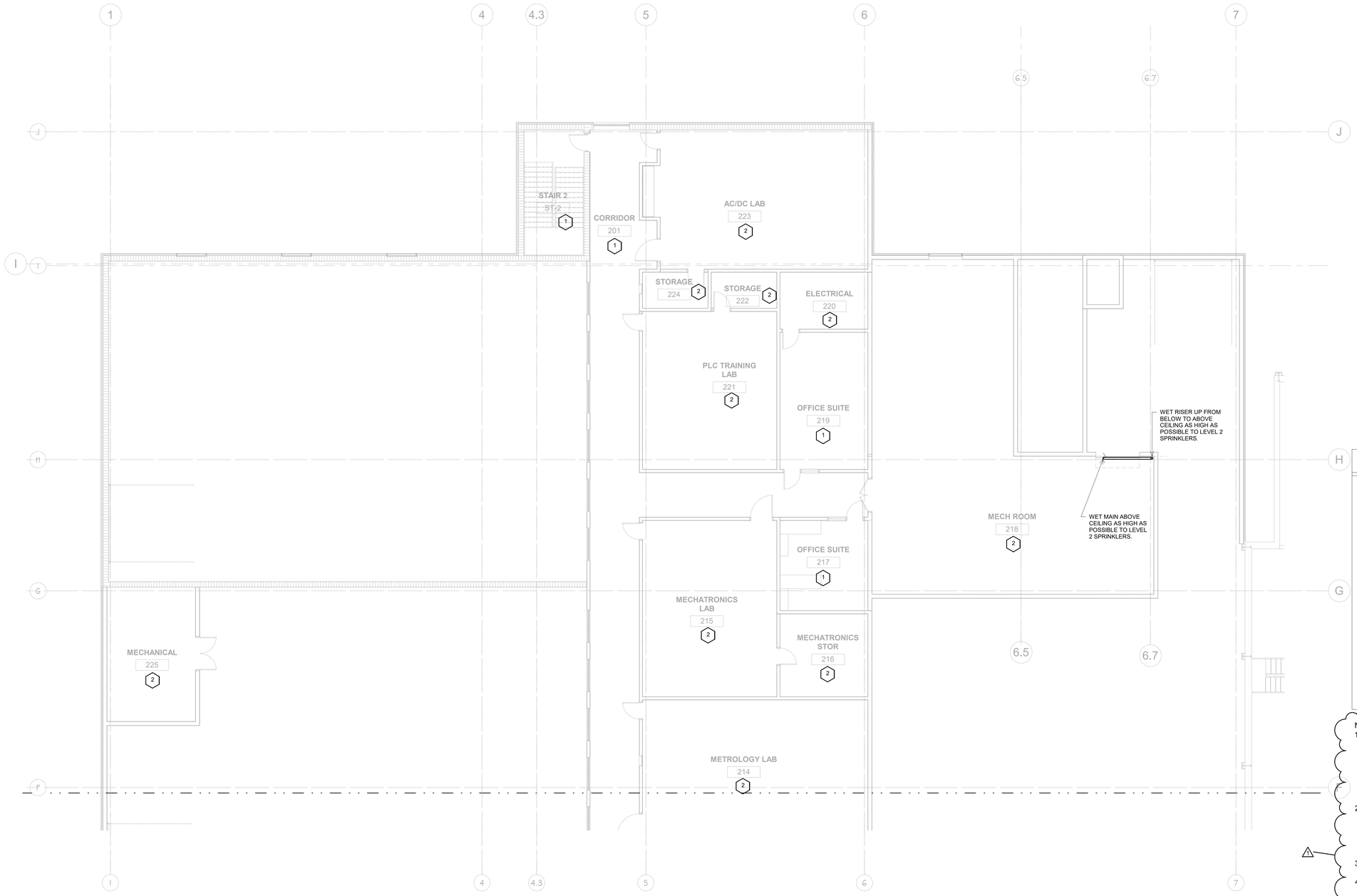

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1 LEVEL 2 FIRE PROTECTION PLAN - PART A

SCALE: 1/8" = 1'-0"

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FIRE PROTECTION LEVEL 2 PART A

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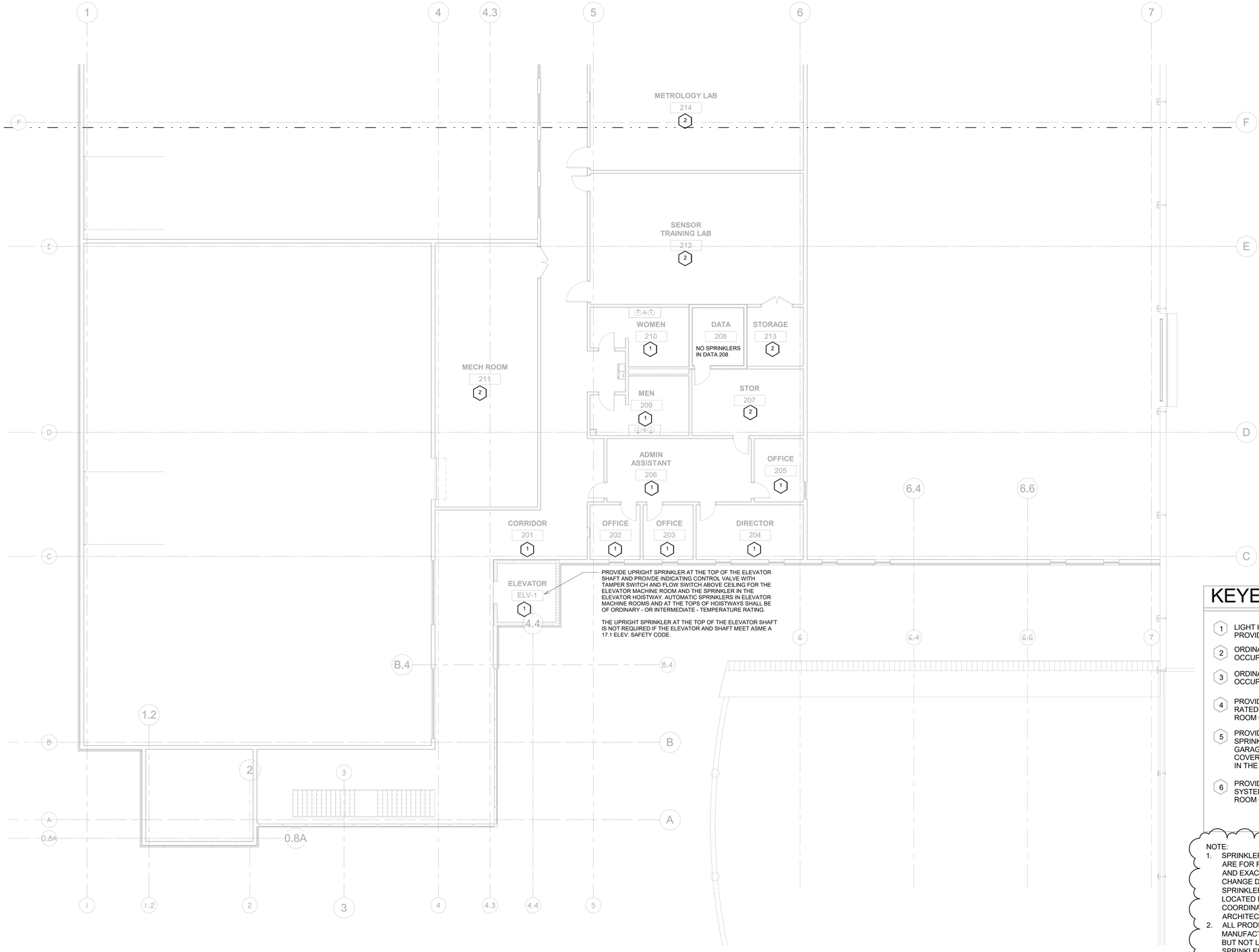

1 LEVEL 2 FIRE PROTECTION PLAN - PART B

SCALE: 1/8" = 1'-0"

KEYED NOTES

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FIRE PROTECTION LEVEL 2 PART B

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