CHRISTMAN
SINCE 1894

Addendum No.[2]

Project Name: Forest View - HVAC
Project No.: 221125-260
Architect: Kingscott
Date: 12/11/2025

Bid Package No.: 1
Bid Due Date: 12/18/2025 @ 2:00PM

This Addendum is issued to inform the bidders of modifications in the scope of work being bid for this project.

A. Documents included in this Addendum:

i. Project Manual
   1. WC 20 – Various changes to scope, including the full requirement for all roofing, including flagging and flagging maintenance.
   2. WC 20 – Clarification on allowances, all ceiling tile removal and reinstallation to be funded via WC Allowance, funded on a Time & Material basis, provide labor rates on bid form.
   3. WC 20 – Clarification on allowances, all painting to be funded via WC Allowance, funded on a Time & Material basis, provide labor rates on bid form.
   4. WC27 – Removal of all roofing scope notes.
   5. WC28 – Removal of all roofing scope notes.
   6. Sort Set revised to reflect changes to WC20.

ii. RFI's – All pre-bid RFI's received included.
iii. Kingscott Addendum 2 Narrative
iv. Kingscott Specifications
v. Kingscott Drawings

B. Other modifications:

- None

C. Bids are due 12/18/2025 @ 2:00PM.

- **Include in your bid the increase or decrease for all materials, labor, supervision, overhead and profit required to properly and completely execute the work described in this Addendum.**
- **Acknowledge receipt of this Addendum on the Bid Proposal Form.**

The applicable provisions of the Contract Documents shall govern all work included herein unless specifically noted otherwise.

END OF ADDENDUM NO. [#2]

Work Category No. 20 – General Trades

Work Included:

The subcontractor shall timely perform all work as detailed below, in accordance with the contract documents (including Bidding Requirements, Proposal Section, Contract Forms, General Conditions, Supplemental Conditions, General Requirements, Addenda, etc.), including, but not limited to, the following Specification Sections and Work Scope Items. Unless otherwise noted, this contractor is responsible for all items specified in the following specifications sections:

Reference WC Index

Work Category Notes:

1. Complete all exterior and interior Carpentry/Millwork (rough and finish) and various General Trades Work as noted within this Work Category, including all labor, materials and equipment required for a complete installation.
2. All exterior and interior rough and finish carpentry including counters, cabinets, trim, nailers, blocking and plywood sheathing.
3. If in-wall backing/blocking is required by a specific manufacturer for products included as part of this Work, though not specifically shown within the documents, i.e. architectural millwork.
4. Provide non-combustible wood blocking in walls for wall mounted accessories and equipment installed by Owner/others shown or specified.
5. All interior finish carpentry, architectural woodwork, stainless steel countertops, shelving and millwork. Provide all sealants to adjacent surfaces, including dissimilar materials. Coordinate counter top support spacing with WC 27 under lavatory guards and lavatory installation.
6. Furnish and install formed metal countertops and shelving.
7. Furnish and install all solid-surface materials and grommets as indicated.
8. All architectural hardware for cabinets supplied by this Work Category.
9. Install all custom casework fabricated and furnished by others including cabinets, p-lam coat shelves, p-lam and solid surface vanity tops, and solid surface windowsills.
10. All fabricated materials are to be shop assembled to the greatest extent possible before shipping to the job site.
11. All required temporary enclosures, materials, shoring, etc., to perform the demolition of the existing wall systems. Temporary enclosures must be weather tight.
12. Protect from damage existing finish work that is to remain.
13. Furnish and install sealants for all materials installed by this contractor such as cabinets, counters, sills, etc.
14. Furnish shop drawings, samples, product data, test reports, coordination drawings and other submittals as specified. Coordinate submittal schedule with the Construction Manager.

Specific Notes and Details:

The following details and notes are included in this Work Category; this list is to clarify the specific items noted

below and does not exclude other details or otherwise limit the scope of work for this Work Category.

1. Provide a 200 hour allowance for laborers to be used at the discretion of TCC. Daily time tickets will be required by TCC. All unused funds will be returned to the Owner.
2. Provide and install all metal stud, batt insulation, rigid insulation, and drywall, as well as drywall finishing and finish painting at all bulkheads/pipe housings as noted in the Sort Set included in this project manual.
3. Furnish and install all metal studs, gypsum board, plywood, blocking, etc as required unless noted otherwise.
4. This WC shall include cutting and patching in the existing roof for an installation of a new roof curb for WC27 mechanical piping, please refer to Sort Set details. Coordination with WC27 and 12 is absolutely necessary to ensure the installation of this curb is located correctly. Any repairs required in the existing roofing at the conclusion of this scope of work shall be installed by this WC. Include all flashing and roofing repair.
5. This WC shall temporarily protect roof after penetrations have been made to ensure a weather tight system is maintained.
6. Protect from damage existing finish work that is to remain. This WC to provide room protection for teacher/classroom belongings to cover, protect, and encase all belongings gathered in a central/localized area in plastic wrapping. This WC responsible to remove at the conclusion of the project.
7. Provide all patching and painting at plaster/drywall surfaces requiring repair where noted on project drawings.
8. Remove and salvage all ceiling tiles, acoustical ceiling tiles, metal ceiling tiles, ceiling grid etc. as required for roof penetrations and ceiling access as coordinated with electrical and mechanical contractor. This WC to provide replacement ceiling tiles and grid for any damages during the removal process. Include removal and adjustment of ceiling tiles to accommodate revised lighting plans. This WC to reinstall existing ceiling tiles, including any modifications required for mechanical and electrical equipment, at the end of the project.
9. This WC to demolish and removal base cabinets, countertops, shelving, anchors and supports at all casework locations. Where casework is required to be removed and reinstalled, coordinate with MEP contractors for extent of removal. Coordination with Mechanical contractor is necessary for layout of new units. This may require multiple site visits and coordination meetings to ensure field measuring is correct.
10. Install all new casework, blank offs, and louver covers where indicated at existing casework per project drawings.
11. This WC responsible for the infill, patch, and repair of existing walls, floors, ceilings, and surfaces to match existing where demolition occurs other than as described, including but not limited to and patching ductwork from mechanical demolition at all locations other than masonry openings.
    (a) Masonry openings are to be patched by others
    (b) Penetrations for sleeves/piping/conduits to be filled in by others, this WC required to repair flooring/drywall damaged/removed for installation of new work.
    (c) Refer to Sort Set for Roof Curb information & responsibilities for this WC.
12. At all locations where this WC creates a penetration through a presumed 1-hour fire rated wall, this WC is responsible to provide fire caulk and fireproofing required to meet local code and requirements to

WC is responsible to provide fire caulk and fireproofing required to meet local code and requirements to maintain the 1-hour rating.

13. Provide temporary fire extinguishers (during construction) as located by the Construction Manager. Removal following use included. Quantity for each area to match minimum required by MIOSHA.

14. Caulk all installed countertops, base, wood trim reinstalled by this WC, etc. as required to complete assemblies removed and reinstalled by this WC.

15. Final cleanup for this work shall include broom sweeping.

16. Provide and install all flooring to match existing conditions as similar as possible upon completion of the installation of new mechanical equipment. Should the new equipment expose any areas not covered by the original unit, this WC shall patch and infill. This flooring patch-and-infill shall be funded via WC allowance tracked by time and material daily with tickets turned over to the construction manager.

17. Provide all roofing work for the entire project, including any temporary roofing required for penetrations by others. Ensure penetrations are entirely sealed and flashed correctly for all scopes of work, including but not limited to structural steel, mechanical, and electrical penetrations. Include flagging for the entire project, including where other work is taking place by other contractors.

Related Work by Others:

1. Dumpsters
2. Temporary water and electrical
3. Benchmarks and column lines (one in each direction) by Construction Manager.
4. Independent testing and inspections by Owner.
5. Temporary heat by Construction Manager.
6. Slip sheets for electrical by WC28 on roof.
7. Slip sheets for mechanical/plumbing/gas by WC27 on roof.

Allowances:

This Contractor shall include in their Base Bid a Construction Manager's allowance of $35,000. Reference Section 01020 for specific instructions on allowances.

Intent for allowance is to fund any and all painting, ceiling removal and replacement. Base bid shall not account for any painting/ceiling work, and shall instead provide a time and material rate for both on bid proposal form.

Unit Prices:

Unit Prices are to be complete furnished in-place operations, and include all costs, incidental materials and work, insurance, fringes, bonds, engineering, overhead and profit. Reference the Trade Contract Proposal form for unit pricing required.

End of Work Category No. 20

Work Category No. 27 – HVAC Systems

Work Included:

The subcontractor shall timely perform all HVAC work, as detailed below, in accordance with the contract documents (including Bidding Requirements, Contract Forms and General Conditions, Supplemental Conditions, General Requirements, Addenda, etc.), including, but not limited to, the following Specification Sections and Work Scope Items. Unless otherwise noted, this contractor is responsible for all items specified in the following specifications sections:

See Work Category Index and Cross Reference

Work Category Notes:

1. Furnish all labor, materials, tools and equipment associated with HVAC/sheet metal, and air distribution equipment Work, including associated insulation, formal MEP space coordination process, commissioning and start-up/testing, for a complete installation, indicated by the contract documents (not just limited to the HVAC drawings) or as required for a complete installation, including labor, materials, dampers, duct detectors, louvers, accessories, and equipment for a complete installation.
2. Provide and install all mechanical equipment, piping, valves, etc., as required for a full and complete installation including but not limited to all energy recovery units, finned tube radiant units, hot water heaters, hot water cabinet unit heaters, roof top units, unit ventilators, mini split units, condensing units, boilers, pumps, fan coils, expansion tanks, grilles, registers, diffusers, etc.
    a. This WC responsible to locate, cut, and waterproof all roofing assemblies. This WC shall flash and roof all penetrations in roof membrane. Include installation of pre-fabricated roof curbs. Where pre-fabricated roof curbs are not required, coordinate with WC20 location, size, and provide time to have built-in-place curbs/access. This WC shall waterproof at the end of the day, and consider this a daily task.
3. Include all required air plenums, including but not limited to insulated panels, sheet metal closures, misc. iron galvanized support angles, joint sealants, isolation valves, pressure relief valves, reducers, strainers, manual air vent, condensate neutralizer, condensate pump, manual air vet, access doors (including frames if required and hardware), fiberglass insulation, etc. for a complete installation.
4. Investigate areas prior to demolition activities, reroute and relocate existing services required for occupied operation. Cut, cap, and make safe, all existing ductwork and HVAC systems in renovated areas prior to demolition. Properly identify and mark system and components to be removed.
    a. All mechanical systems including compressors, boilers, etc., as indicated to be demolished and removed to be by this WC.
5. All cutting, capping, coring, patching and firesafing of walls, floors, ceilings, etc., required for the installation of this work. Patch and repair work is to be done professionally by skilled craftsmen. All such openings require prior written approval from the Construction Manager, before work begins. Furnish and install all sleeves and or misc. steel in walls, floors, roofs and ceilings that may be required by this W.C.
6. All utility connection, disconnections, tie-ins, crossovers, shut downs and similar work must be performed and scheduled so they will not interfere with other work. It may be necessary to make these changes during "off" hours, or it may be necessary to make "hot tap" connections. The contractor should plan on premium time for this work. Coordinate with the Construction Manager prior to performing this work.
7. Furnish access panels where required for the wall and ceiling valves, dampers and controls that are not

shown on the Architectural/Mechanical plans but are necessary for the Mechanical Systems.

8. Furnish all hoisting, lifting, scaffolding and handling of all materials required to complete this work category.
9. The Electrical and Mechanical Contractors will be required to coordinate in a formal coordination process to accomplish the rough-in and final layout as required and specified in Section 1049. Any relocation required to coordinate work will be done at no additional cost to the Owner. All contractors are required to furnish layout and coordination prints for their work prior to these meetings allowing the team to be better prepared at each coordination meeting. Detailers will be provided by this contractor to accomplish this coordination. These meetings shall be coordinated with the construction manager and shall be held on-site.
10. Provide and install mechanical equipment tags, pipe identification and other required identification of signage related to his work.
11. Provide and install all necessary supports/anchoring/unistrut assemblies required for this scope of work to install all material and equipment.
12. Coordinate with WC20 locations of all mechanical openings, penetrations, etc., where WC20 must provide additional housings and assemblies.
13. All single pipe/multipipe roof penetrations outside housings constructed by WC20 housings to be flashed, and sealed by this WC.
14. A coordination meeting will be set up between the controls contractor, mechanical contractor, electrician, and construction manager prior to control work. This will include all required work for a complete system as indicated in the construction documents.

Specific Notes and Details:

The following details and notes are included in this Work Category; this list is to clarify the specific items noted below and does not exclude other details or otherwise limit the scope of work for this work category:

1. This work category shall assume base bid that 2nd shift (4:00PM – 12:00AM) from the months of February to June to get all overhead piping, inwall piping, rooftop routing, etc., completed to the fullest extent possible while the school is occupied.
2. Painting of all mechanical equipment to be done by this WC including but not limited to metal/plastic wall chases, filler panels, ductwork (interior and exterior) as noted and required in the drawings. Include caulking of these assemblies as required in base bid.
3. Paint all visible interior surfaces of ductwork flat black as required.
4. Install all louvers, metal fillers (Front, top and sides), sealants, etc. at interior and exterior penetrations. Include all painting required for mechanical equipment, covers, chases, etc.
5. Provide all roof curbs for mechanical equipment including but not limited to pipe curbs and equipment curbs.
6. Provide and install all slip-sheets required under mechanical units installed by this WC.
7. Provide and install metal/plastic wall chases, filler panels pre-finished & painted to match existing conditions. This WC to provide touch-up painting for surfaces scratched during installation and maneuvering of unit ventilators, chases, and filler panels.
8. This WC responsible for disconnecting supply piping at main and preparing for new connection.

9. At all locations where this WC creates a penetration through a presumed 1-hour fire rated wall, this WC is responsible to provide fire caulk and fireproofing required to meet local code and requirements to maintain the 1-hour rating.

10. Provide and install new 24V motorized damper duct up to relief hood.

11. Provide and install equipment stand as well as all roof slip-sheets for new condensing units as required.

12. Coordinate with WC 11 to field verify location of, dimension of, and extent of masonry removal to determine size required for new louvers.

13. Provide 16x12 transfer duct & grilles routed tight to underside of ceiling pre-finished to match existing adjacent wall color.

~~14. All metal deck cutting required to be performed by this WC. Roof structural steel support to be provided and installed by this WC in accordance with structural support details. Coordinate wood blocking/wood support with WC 20. All roofing repair to be done by this WC for all mechanical & plumbing penetrations required for new work to be installed.~~

~~15. Roofing and all roof associated assemblies required to be repaired in accordance with existing roof manufacturer requirements at all locations where this WC creates a penetration in the roof assembly.~~

~~*a.* Though this WC will not be the only contractor on the roof, this WC is responsible to provide all fall protection flagging and MIOSHA requirements to make the roof a safe working environment for all WC's required to be on the roof (WC01A, WC20, WC28). Include maintenance and removal when directed by General Contractor.~~

Addendum 2 removed notes 14 and 15. Added to WC20.

16. This WC to provide and install all condensate, refrigerant, and steam lines, including supports, anchors, and hangers as required to be furnished and installed.

17. This WC responsible to provide all controls for all mechanical equipment, including but not limited to furnishing and installing control valves, Split AC Monitoring, DDC system architecture, Equipment Start-up Intervals, Split system AC monitoring, Vertical Unit DX and HHW controls, relief hood controls, and Heating Hot Water System controls. Carry SC Tech as the controls subcontractor. If a substitute controls contractor is requested, a substitution request for a voluntary alternative is required. Include final commissioning and balancing of control systems as required.

18. This WC to provide all cleaning of existing diffusers & grilles to remain.

19. This WC responsible for all mechanical demolition including but not limited to removal of unit ventilators, unit ventilator controls, louvers, baseboard radiant heaters, steam traps, piping, and air conditioning units, finned tube & associated assemblies, existing ductwork, thermostats, and hydronic piping.

    a. This WC responsible to coordinate with WC 11 on all removal of exterior louvers, ensure that masonry can keep up with production of removal and can provide temporary protection and demolition for masonry assemblies as required. This WC responsible for removal of louvers.

20. Provide and install differential pressure device, verify install with TAB contractor also supplied by this WC.

21. This WC responsible for all TAB related requirements, including but not limited to balancing of existing FTR, CUH, UH, Convector, sequences of operations of controls, DDC system architecture & tie in.

22. This WC responsible for a pre-construction TAB report for all existing mechanical equipment to remain,

including but not limited to CUH/UH/Convector, FTR, and heating coil.

23. This WC responsible for a post-construction rebalancing of all existing equipment, including but not limited to FTR, CUH, UH, Convectors.

24. This WC responsible for all tie-ins to existing mechanical equipment including but not limited to existing OA duct to back of unit ventilator.

25. This WC responsible to remove all mechanical equipment required to be demolished including but not limited to mechanical pumps. For all items required to be turned over to owner, furnish material to owner warehouse located at *1717 Sams Way, Lansing, MI 48912.*

26. Mini-Split Indoor & Outdoor Units and all related accessories (thermostat, controls, etc.) to be provided by this WC. Coordinate electrical requirements with WC28.

27. This WC responsible for all sleeves and in-fill in penetrations where necessary, including concrete encasing, or mortar in-fill for penetrations made by this WC operations. Final architectural patching (drywall or VCT) by others. Final architectural painting by others.

28. Include safety plans, and adhere to local requirements for confined work space in tunnels as required for Mechanical equipment installation.

29. To the greatest extent possible, all metal enclosures, shrouds, unit ventilators, and accessories/components shall be pre-painted, if components do not come pre-painted by manufacturer, this WC shall have components powder coated to match adjacent surfaces prior to arriving on site.

Related Work by Others:

1. Power supply to mechanical equipment by W.C. 28.
2. Counter tops removal and reinstallation by WC 20.
3. Painting of all architectural assemblies to be done by WC 20.
4. Electrical disconnect of Unit Ventilators (Vertical and Horizontal) to be done by WC 28.
5. Flooring & wall base WC 20.
6. Roofing by WC20.

Allowances:

This Contractor shall include in their Base Bid a Construction Manager's allowance of $20,000. Reference Section 01020 for specific instructions on allowances.

Unit Prices:

Unit Prices are to be complete furnished in-place operations, and include all costs, incidental materials and work, insurance, fringes, bonds, engineering, overhead and profit. Reference the Trade Contract Proposal form for unit pricing required.

End of Work Category No. 27

Work Category No. 28 – Electrical Systems

Work Included:

The subcontractor shall timely perform all Electrical work, as detailed below, in accordance with the contract documents (including Bidding Requirements, Contract Forms and General Conditions, Supplemental Conditions, General Requirements, Addenda, etc.), including, but not limited to, the following Specification Sections and Work Scope Items. Unless otherwise noted, this contractor is responsible for all items specified in the following specifications sections:

See Work Category Index and Cross Reference

Work Category Notes:

1. Furnish and install all electrical systems, including power, fire alarm, system commissioning, etc., indicated by the contract documents (not just limited to the electrical drawings) or as required for a complete installation, including labor, materials, equipment, adhesives, fasteners, supports, hangers, grounds, blocking, shims and all necessary anchoring devices and accessories.
2. Investigate areas prior to demolition activities, reroute and relocate existing services required for occupied operation. Cut, cap, and make safe, all existing electrical systems in renovated areas prior to demolition. Properly identify and mark system and components to be removed by others.
3. All cutting, capping, coring, patching and firesafing of walls, floors, ceilings, etc., required for the installation of this work. Patch and repair work is to be done professionally by skilled craftsmen. All such openings require prior written approval from the Construction Manager, before work begins. Furnish and install all sleeves and or misc. steel in walls, floors, roofs and ceilings that may be required by this W.C.
4. All utility connection, disconnections, tie-ins, crossovers, shut downs and similar work must be performed and scheduled so they will not interfere with other work. It may be necessary to make these changes during "off" hours, or it may be necessary to make "hot tap" connections. The contractor should plan on premium time for this work. Coordinate with the Construction Manager prior to performing this work.
5. Furnish access panels where required for the wall and ceiling valves, dampers and controls that are not shown on the Architectural/Electrical plans but are necessary for the Electrical Systems.
6. Extreme care is to be taken when installing hangers and equipment in the area that has "spray on fireproofing", so as not to damage it. This contractor will be responsible for patching fireproofing incase of damage by this trade. This work is to be performed by a qualified contractor so that the warranty will not be affected.
7. Furnish all hoisting, lifting, scaffolding and handling of all materials required to complete this work category, all locating and installing of electrical equipment in place shall be reviewed prior to bidding, and bids shall include all means of installation necessary for equipment, including any door removal necessary for equipment sizes to fit in spaces.
8. The Electrical and Mechanical Contractors will be required to coordinate in a formal coordination process to accomplish the rough-in and final layout as required and specified in Section 1049. Any relocation required to coordinate work will be done at no additional cost to the Owner. All contractors are required to furnish layout and coordination prints for their work prior to these meetings allowing the team to be better prepared at each coordination meeting. Detailers will be provided by this contractor to accomplish this coordination. These meetings shall be coordinated with the construction manager and shall be held on-site.

9. Provide and install panel labeling, identification and other required identification of signage related to his work.

10. The electrical contractor will provide concrete equipment pads for required panelboards. Accommodate floor finishes when calculating elevations.

11. A coordination meeting will be set up between the controls contractor, mechanical contractor, electrical contractor, and construction manager prior to control work. This will include all required work for a complete system as indicated in the construction documents.

12. Electrical connections to equipment and devices provided by others, including by not limited to duct detectors, fire dampers, flow and tamper switches, variable frequency drives, power assist door motors, food service equipment, etc. Verify construction documents have been coordinated with power requirements of equipment prior to installation of devices.

13. Install electrical disconnects for all mechanical equipment provided by W.C. 27.

Specific Notes and Details:

The following details and notes are included in this Work Category; this list is to clarify the specific items noted below and does not exclude other details or otherwise limit the scope of work for this work category:

1. This work category shall assume base bid that 2nd shift (4:00PM – 12:00AM) from the months of February to June to get all overhead conduit, wire pulls, inwall piping, rooftop routing, etc., completed to the fullest extent possible while the school is occupied to ensure work can be completed by August

2. At all locations where this WC creates a penetration through a presumed 1 hour fire rated wall, this WC is responsible to provide fire caulk and fireproofing required to meet local code and requirements to maintain the 1 hour rating.

3. ~~Roofing and all roof associated assemblies required to be repaired in accordance with existing roof manufacturer requirements at all locations where this WC creates a penetration in the roof assembly.~~ Addendum 2 - Refer to WC20 for roofing

4. This WC responsible for all demolition associated with electrical assemblies, including but not limited to assemblies shown on the Electrical Riser Diagrams.

5. This WC responsible to relocate downstream electrical equipment to new panel affected by electrical demolition activities, including all work associated with re-feeding existing panels from new main distribution panel.

6. This WC responsible to provide and install all electrical equipment including but not limited to new lighting control equipment, new luminaire equipment, MDP, electrical panels, breakers, and inverters.

   a. Coordinate with LBWL for utility supplied/installed equipment.

7. This WC responsible for all removal, storage, and relocation of all electrical equipment including but not limited to lighting, surface mounted conduit, wall mounted equipment, wall switches, etc. as it interferes with the installation of new work.

8. Temporary power to be provided by this WC during all power shutdowns required to be performed for the safe demolition of all electrical devices & equipment. This WC to include lighting and power stations for the use of electrical tools and equipment of 120v.

9. Disconnect and make safe all unit ventilators, outdoor air units, radiant ceiling panels, pumps, etc. for equipment removal by WC 27, include receptacles as noted in drawings.

10. This WC responsible for all removal and replacement of asphalt/concrete surfaces, and turf grass surfaces

associated with the installation of new electrical service. All excavation and backfill related to Work including suitable backfill, compaction, & restoration and removal (from site) of all unsatisfactory fill in accordance with the documents.

11. New utility pad mounted transformer to be provided by LBWL.
12. This WC to take precautions when installing underground conduit so as to not damage existing underground utilities including but not limited to existing storm and sanitary lines crossing in the path of the new proposed electrical conduit.
13. This WC to provide updated typed-in directories for all panels affected by this scope of work.
14. Disconnect and remove all electrical equipment required to be demolished/removed including but not limited to existing VFDs and provide new as required for a full and complete installation, including all bracing/supports/anchoring required.
15. This WC to provide all protection measures as required to perform this scope of work.

Related Work by Others:

1. Installation of access panels/doors by W.C. 20
2. Low voltage wiring not identified on the drawings by the trade providing equipment.
3. Site utilities to transformers/cabinets by Utility Company.
4. Temperature Control wiring and conduit associated with the mechanical systems by W.C. 27.

Allowances:

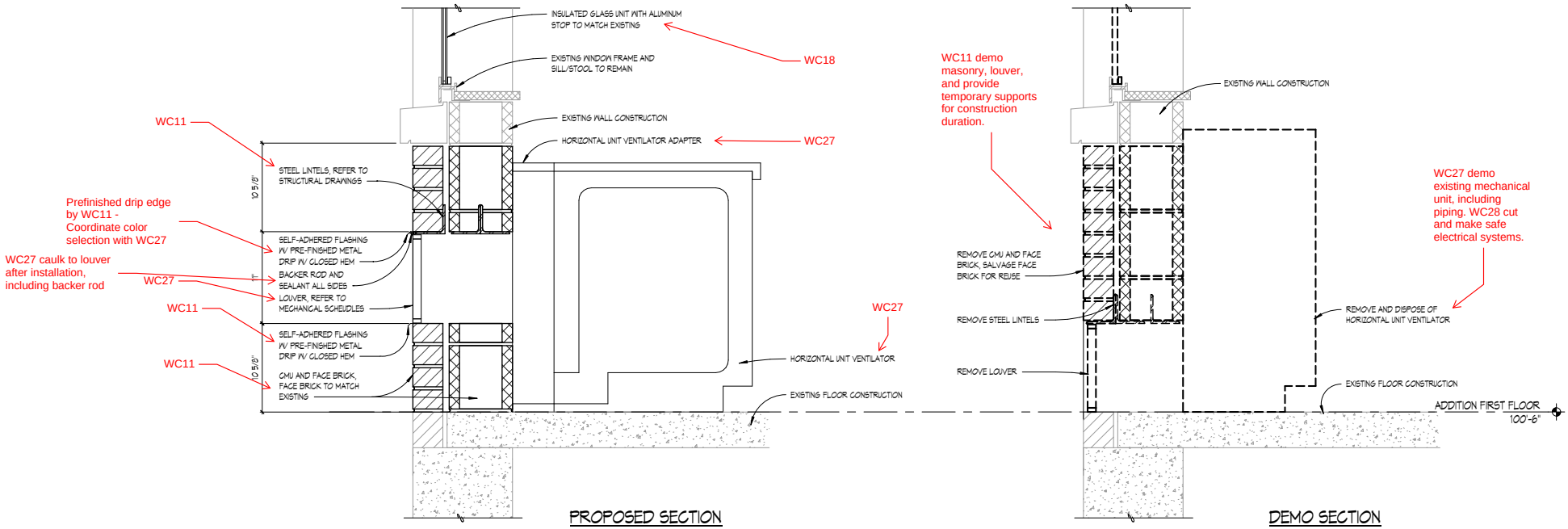
This Contractor shall include in their Base Bid a Construction Manager's allowance of $20,000. Reference Section 01020 for specific instructions on allowances.

Unit Prices:

Unit Prices are to be complete furnished in-place operations, and include all costs, incidental materials and work, insurance, fringes, bonds, engineering, overhead and profit. Reference the Trade Contract Proposal form for unit pricing required.

End of Work Category No. 28

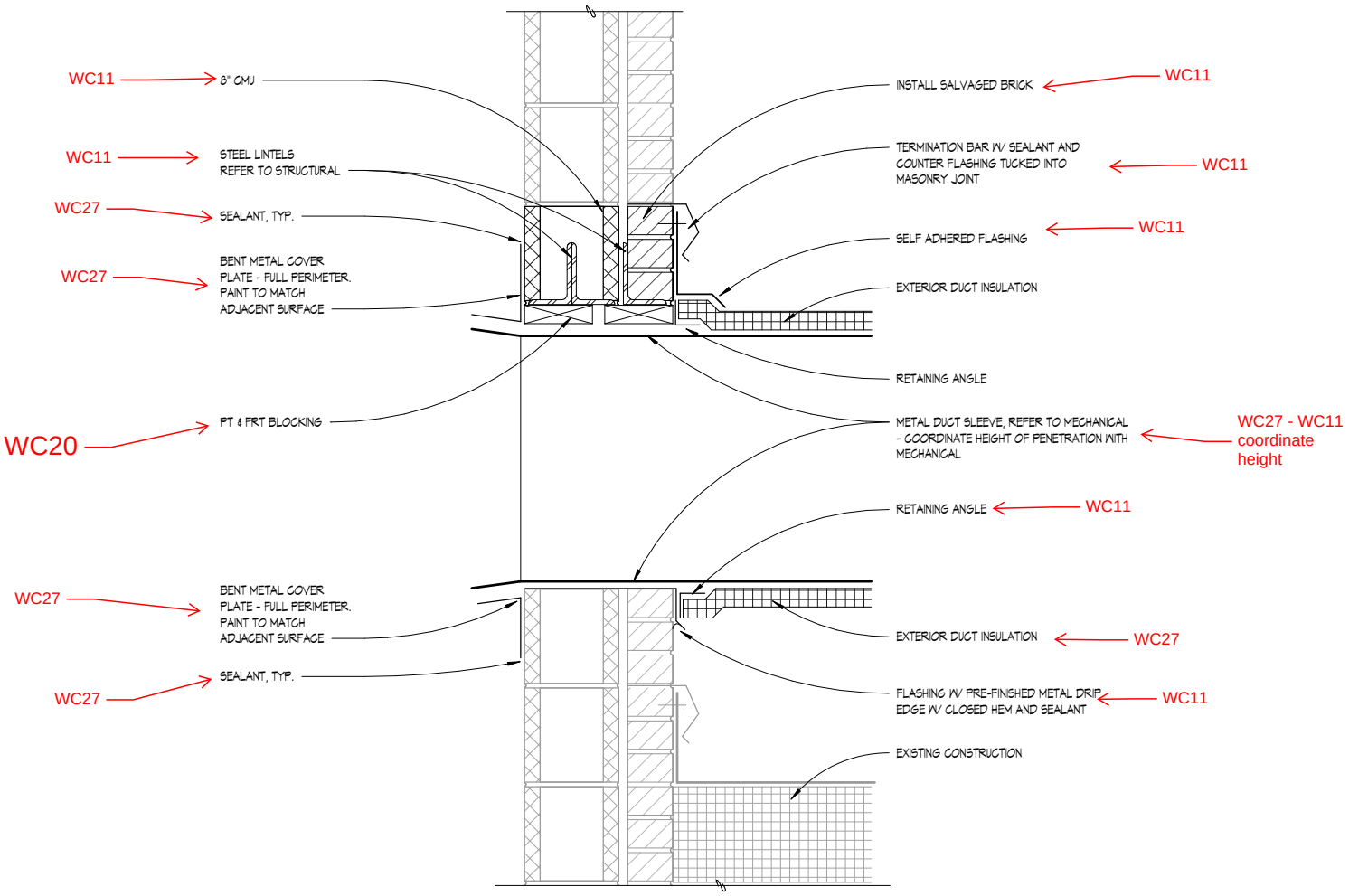
SORT SET - WC RESPONSIBILITIES - NEW LOUVER & UNIT INSTALLATION
DRAWING A4.1 DETAIL 2



*LOUVER WIDTHS VARY, REFER TO MECHANICAL DRAWINGS
*ALIGN LOUVERS WITH MASONRY COURSING
*TOOTH IN OPENING WHEN REDUCING WIDTH
*PROVIDE LOUVER SLEEVE AS REQUIRED

2 TYPICAL LOUVER DETAIL 1975
1 1/2" = 1'-0"

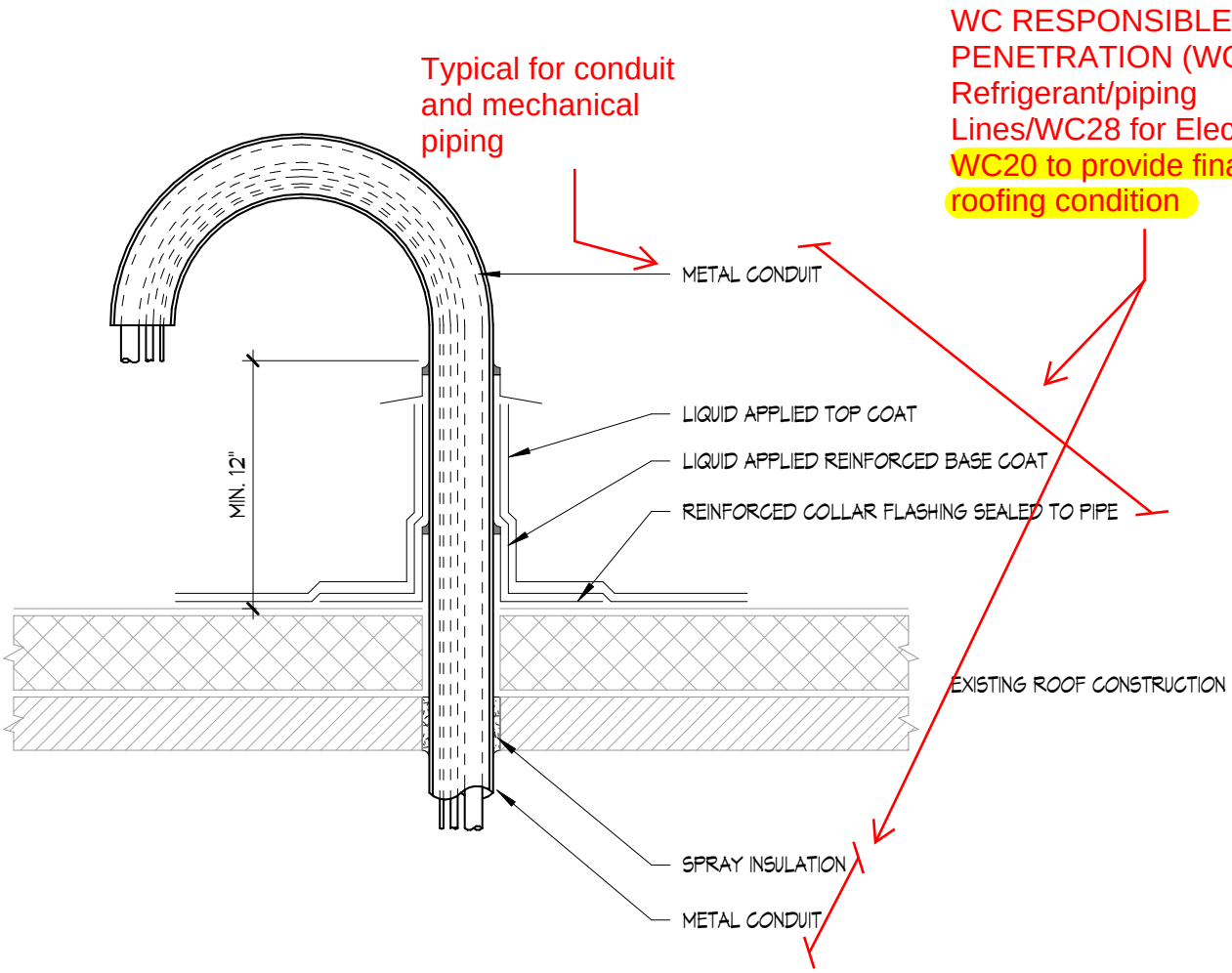
SORT SET - WC RESPONSIBILITIES - THROUGHWALL DUCT PENETRATION
DRAWING A4.1 DETAIL 3



3 DUCT PENETRATION THROUGH EXISTING WALL
1 1/2" = 1'-0"

SORT SET - WC RESPONSIBILITIES - TYPICAL PIPE PENETRATION AT ROOFING

DRAWING A5.1 DETAIL 3



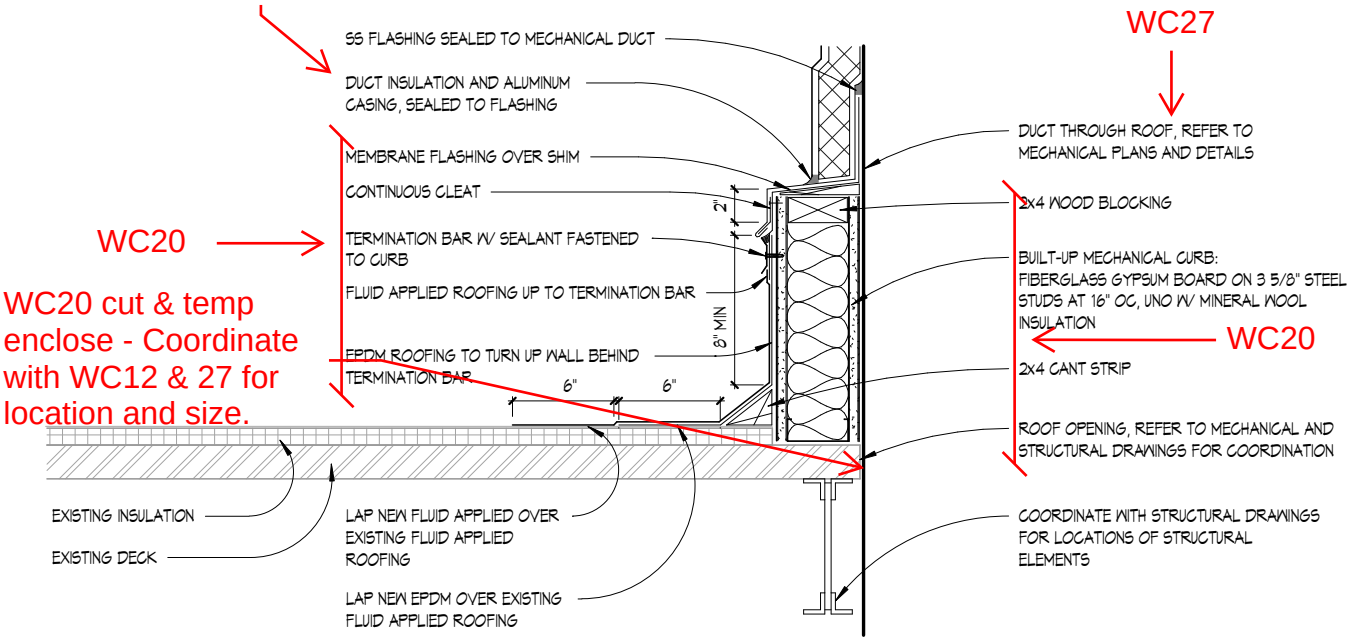
NOTES:
1. COORDINATE WITH MECHANICAL DETAILS.
2. COORDINATE WITH ROOFING MANUFACTURER TO MAINTAIN ROOF WARRANTY.
3. INSTALL ALL COMPONENTS SECURELY, CONTINUOUS, AND WEATHER TIGHT.

3

CONDENSING UNIT CONDUIT

NOT TO SCALE

WC27 including sealing



WC20

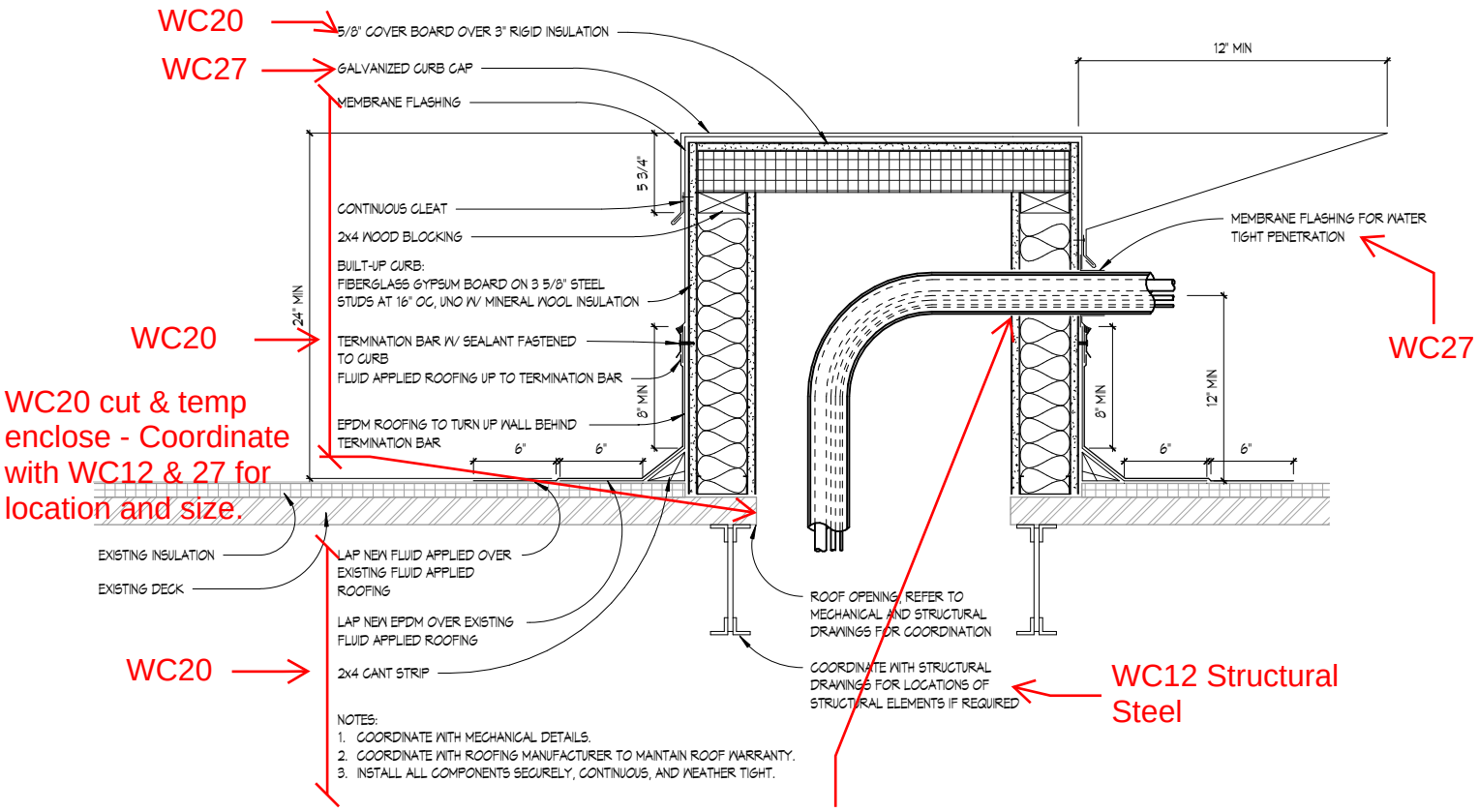
WC20 cut & temp enclose - Coordinate with WC12 & 27 for location and size.

NOTES:
1. COORDINATE WITH MECHANICAL DETAILS.
2. COORDINATE WITH ROOFING MANUFACTURER TO MAINTAIN ROOF WARRANTY.
3. INSTALL ALL COMPONENTS SECURELY, CONTINUOUS, AND WEATHER TIGHT.

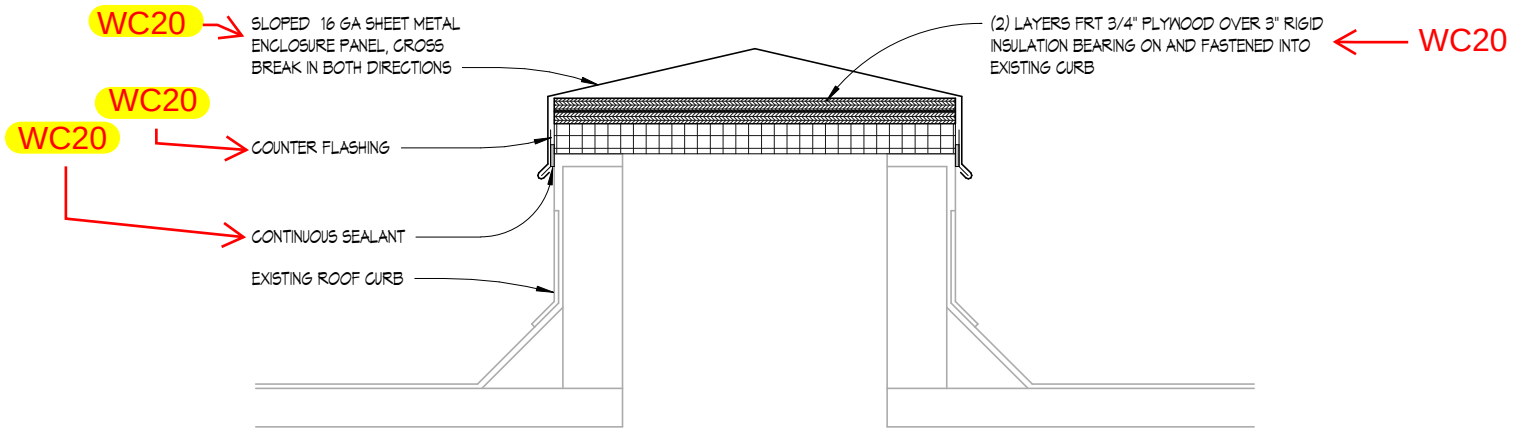
4

DUCT THROUGH ROOF DETAIL

NOT TO SCALE



5 GROUPED PIPE CURB DETAIL
NOT TO SCALE



1 CURB CAPPING DETAL
NOT TO SCALE

The Christman Company

RFI LOG

#	Subject	Status	Responsible Contractor	Received From	Date Initiated	RFI Manager	Assignee	Ball In Court	Due Date	Closed Date	Location	Schedule Impact	Cost Impact	Cost Code	Sub Job	RFI Stage	Distribution List	Private
15	SC Technologies for Controls	Closed		None	12/08/2025	Austin Brown	Brown, Austin (Th...		12/12/2025	12/11/25								No

Q: Austin Brown Sent Mon Dec 8, 2025 at 05:08 pm EST
VUV - Controls: Please confirm with LSD if they want factory controls or controls by SCT on the VUV's. In the past SCT provided the controls on VUV's

A: Austin Brown (The Christman Company (LAN)) Responded Thu Dec 11, 2025 at 10:41 am EST
Units to be shipped with controls included, SCTech to be utilized for tie into building BMS and all other controls wirings.

#	Subject	Status	Responsible Contractor	Received From	Date Initiated	RFI Manager	Assignee	Ball In Court	Due Date	Closed Date	Location	Schedule Impact	Cost Impact	Cost Code	Sub Job	RFI Stage	Distribution List	Private
14	WC20 Ceilings and WC27 Scope of Work	Closed		None	12/08/2025	Austin Brown	Brown, Austin (Th...		12/12/2025	12/11/25								No

Q: Austin Brown Sent Mon Dec 8, 2025 at 04:52 pm EST
It appears that the WC-20 General trades will be removing all ceilings for MEP trades. Does this include all ceilings where new piping and duct is being installed? Or are you requiring we install these systems through the grid?

A: Austin Brown (The Christman Company (LAN)) Responded Thu Dec 11, 2025 at 12:29 pm EST
WC20 will remove ceilings on a time and material basis funded via the work category allowance.

WC27 and 28 will need to account for ceiling tile removal and reinstallation of existing during the 2nd shift work, the expectation is that WC27 and WC28 will be running all overhead piping/supports during the 2nd shift, and will re-install on a daily basis to ensure teachers/students re-entering these spaces receive the space as they left it.

WC20 will not be on site daily to remove and reinstall just for WC27 and 28 2nd shift work. WC20 will remove bulk ceiling areas where required for significant work.

#	Subject	Status	Responsible Contractor	Received From	Date Initiated	RFI Manager	Assignee	Ball In Court	Due Date	Closed Date	Location	Schedule Impact	Cost Impact	Cost Code	Sub Job	RFI Stage	Distribution List	Private
13	Pro-press on 2" lines	Closed		None	12/08/2025	Austin Brown	Suardini, Lindsey...		12/12/2025	12/11/25								No

Q: Austin Brown Sent Mon Dec 8, 2025 at 04:49 pm EST
Section 23 2113 Hydronic Piping: This section calls for Copper pipe/ Sweat joints for 2” and under, can Copper Press seal joints be used on 2” and under as it has been on previous Lansing School Projects?

A: Lindsey Suardini (Kingscott) Responded Tue Dec 9, 2025 at 10:15 am EST
Copper piping and fittings under 2"can be pro-press, specification section will be updated accordingly for addendum 02 to reflect this change

#	Subject	Status	Responsible Contractor	Received From	Date Initiated	RFI Manager	Assignee	Ball In Court	Due Date	Closed Date	Location	Schedule Impact	Cost Impact	Cost Code	Sub Job	RFI Stage	Distribution List	Private
12	WC27 Providing Steel	Closed		None	12/08/2025	Austin Brown	Brown, Austin (Th...		12/12/2025	12/11/25								No

Q: Austin Brown Sent Mon Dec 8, 2025 at 04:47 pm EST
Note 14 on WC27 indicates mechanical shall provide and install all steel.

There is also a work scope for WC12 structural steel, please clarify if this is to be provided by WC27.

A: Austin Brown (The Christman Company (LAN)) Responded Thu Dec 11, 2025 at 12:29 pm EST
WC12 to provide all structural steel. Note 14 will be revised in an upcoming addendum to correct this condition.

#	Subject	Status	Responsible Contractor	Received From	Date Initiated	RFI Manager	Assignee	Ball In Court	Due Date	Closed Date	Location	Schedule Impact	Cost Impact	Cost Code	Sub Job	RFI Stage	Distribution List	Private
11	Roofing Scope WC 27 & WC 20	Closed		None	12/08/2025	Austin Brown	Brown, Austin (Th...		12/12/2025	12/11/25								No

Q: Austin Brown Sent Mon Dec 8, 2025 at 04:45 pm EST
All schools are requiring each work category to carry the necessary roof work for their respected trade. It is also in WC-27 to provide roof flagging. This could possibly create some confusion in the construction process with so many different trades carrying roof work scope. We suggest wrapping all of the roof work into one work category – preferably WC 20 as they would have the most roofing work in their package to build the group pipe curbs.

A: Austin Brown (The Christman Company (LAN)) Responded Thu Dec 11, 2025 at 10:48 am EST

The Christman Company

#	Subject	Status	Responsible Contractor	Received From	Date Initiated	RFI Manager	Assignee	Ball In Court	Due Date	Closed Date	Location	Schedule Impact	Cost Impact	Cost Code	Sub Job	RFI Stage	Distribution List	Private
	WC20 responsible for all roofing work. Coordination between trades on location, sizing and removal of all roofing must occur.																	
10	Substitution Request - Boiler Exhaust Fan	Closed		None	12/08/2025	Austin Brown	Suardini, Lindsey...		12/12/2025	12/11/25								No
	Q: Austin Brown Sent Mon Dec 8, 2025 at 04:07 pm EST I would like to request Van-Packer to be considered as an approved manufacturer for the boiler exhaust flue stack for specification section 235100-2.4-A Model-CS-CSplus-Spec-Sheet-VP0014-R01.pdf 2020-CS-Catalog.pdf																	
	A: Lindsey Suardini (Kingscott) Responded Tue Dec 9, 2025 at 10:11 am EST Manufacturer is not approved as an equal therefore it will not be added to the specification sections.																	
9	Break metal enclosure chase color selection	Closed		None	12/08/2025	Austin Brown	Brown, Austin (Th... Suardini, Lindsey...		12/12/2025	12/11/25								No
	Q: Austin Brown Sent Mon Dec 8, 2025 at 01:39 pm EST Per WC27 - "To the greatest extent possible all metal enclosures, shrouds, unit ventilators, and accessories/components shall be pre-painted, if components do not come pre-painted by the manufacturer, this WC shall have components powder coated to match adjacent surfaces prior to arriving on site." Please clarify. Do the unit ventilators need to be powder coated to match the shelving/casework in each classroom? During the walk thoughs it was observed that many of the classrooms had shelving/casework that had been hand painted in assorted colors. Will unit ventilators be one standard color per school. Does the powder coating apply to the pipe coving system or do they need to painted to match the walls in each classroom?																	
	A: Austin Brown (The Christman Company (LAN)) Responded Mon Dec 8, 2025 at 01:40 pm EST Break metal enclosures for piping shall be painted to match unit ventilators. Additional painting, should any be required by the owner, shall be completed by WC20 on a time-and-material basis funded from the WC Allowance.																	
8	Office lighting	Closed		None	12/08/2025	Austin Brown	Szeszulski, Sami ... Suardini, Lindsey...		12/12/2025	12/11/25								No
	Q: Austin Brown Sent Mon Dec 8, 2025 at 10:51 am EST Lighting in the office area are presumably going to need to be removed with the ceiling grid. There are no notes on the electrical demolition plans to remove, please verify if these are going to be removed, and reinstalled or replaced? Forestview ceiling and lighting.jpeg																	
	A: Lindsey Suardini (Kingscott) Responded Tue Dec 9, 2025 at 02:14 pm EST Addendum 2 will have updated drawings clarifying that lighting is to be removed and reinstalled.																	
7	ACP-1	Closed		None	12/08/2025	Austin Brown	Suardini, Lindsey... Szeszulski, Sami ...		12/12/2025	12/11/25								No
	Q: Austin Brown Sent Mon Dec 8, 2025 at 10:50 am EST ACP-1 indicated on architectural drawings, including A2.2. No tile specification and product selection is indicated on the drawings, please verify requirements for this project on what is required for ACP-1?																	
	A: Lindsey Suardini (Kingscott) Responded Tue Dec 9, 2025 at 01:46 pm EST All projects to reference the new spec that will be included in the addendum. 095113 ACOUSTICAL PANEL CEILINGS.pdf																	
6	Detail 4 S0.1 - Beam pocket not shown	Closed		None	12/08/2025	Austin Brown	Suardini, Lindsey...		12/12/2025	12/11/25								No

The Christman Company

#	Subject	Status	Responsible Contractor	Received From	Date Initiated	RFI Manager	Assignee	Ball In Court	Due Date	Closed Date	Location	Schedule Impact	Cost Impact	Cost Code	Sub Job	RFI Stage	Distribution List	Private
							Szeszulski, Sami ...											
	Q: Austin Brown Sent Mon Dec 8, 2025 at 10:48 am EST On S0.1 detail 4 there appears to be a support required for the added steel, but no beam pocket/grouted infill/plate is indicated. Please verify requirements for additional supports required on this added area. Forest view beam pocket.png																	
	A: Lindsey Suardini (Kingscott) Responded Wed Dec 10, 2025 at 02:18 pm EST See attached sketch. The north end of each W12x16 beam should bear within a new beam pocket onto a 7"x7"x1/2" plate. The existing CMU wall should be grouted 16" below the bearing plate (similar to 3/S0.1), and the beam pocket should be solid grouted after installation of the beams. RFI #006 Response - Detail 4 S0.1-Beam Pocket Not Shown.pdf																	
5	Masonry grouting	Closed		None	12/08/2025	Austin Brown	Brown, Austin (Th...		12/12/2025	12/08/25								No
	Q: Austin Brown Sent Mon Dec 8, 2025 at 10:42 am EST Who is responsible to infill masonry grout at structural walls/supports for steel?																	
	A: Austin Brown (The Christman Company (LAN)) Responded Mon Dec 8, 2025 at 10:43 am EST WC11 responsible to grout masonry where required for structural steel support																	
4	Mechanical Room - Boilers and LV Panels	Closed		None	12/08/2025	Austin Brown	Suardini, Lindsey... Szeszulski, Sami ...		12/12/2025	12/11/25								No
	Q: Austin Brown Sent Mon Dec 8, 2025 at 10:41 am EST New boilers are located in front of a low voltage disconnect/panel, please verify if there is any clashes with existing electrical equipment, and if this equipment must be relocated/removed? Forestview Electrical in Mechanical Room.jpeg																	
	A: Lindsey Suardini (Kingscott) Responded Tue Dec 9, 2025 at 10:20 am EST See revised plan. The pumps shifted slightly to allow for proper clearance from panels. _RFI #004 Response.pdf																	
	A: Lindsey Suardini (Kingscott) Responded Tue Dec 9, 2025 at 09:48 am EST All mechanical equipment was laid out to be a minimum of 3ft away from any electrical panels and equipment, per code, please confirm service clearance requirements of mechanical equipment once submittal of equipment is released. Then contractor to confirm if equipment needs to be replaced or relocated accordingly.																	
3	Mechanical piping in tunnels	Closed		None	12/08/2025	Austin Brown	Suardini, Lindsey... Szeszulski, Sami ...		12/12/2025	12/11/25								No
	Q: Austin Brown Sent Mon Dec 8, 2025 at 10:39 am EST Tunnels show all mechanical piping to be demolished and removed. If new piping is being ran overhead, can the existing be cut/capped and remain in place?																	
	A: Lindsey Suardini (Kingscott) Responded Tue Dec 9, 2025 at 09:50 am EST Existing piping to be cut and capped at the tunnels and abandoned in place. No work in the tunnels are to be conducted.																	
2	New unit ventilator sizing	Closed		None	12/08/2025	Austin Brown	Suardini, Lindsey... Szeszulski, Sami ...		12/12/2025	12/11/25								No

The Christman Company

#	Subject	Status	Responsible Contractor	Received From	Date Initiated	RFI Manager	Assignee	Ball In Court	Due Date	Closed Date	Location	Schedule Impact	Cost Impact	Cost Code	Sub Job	RFI Stage	Distribution List	Private
1	Radiant Heat at office room 2A	Closed		None	12/08/2025	Austin Brown	Suardini, Lindsey... Szeszulski, Sami ...		12/12/2025	12/11/25								No

Q: Austin Brown Sent Mon Dec 8, 2025 at 10:35 am EST
Radiant heat in room 2A wraps around the exterior glazing, drawings indicate it's only on one side. Please verify the intent is to demolish and remove all radiant heat and piping in this room.
Forest View Radiant Heat Not Shown.jpeg

A: Lindsey Suardini (Kingscott) Responded Tue Dec 9, 2025 at 10:04 am EST
Existing radiant heaters and all associated piping, valves and accessories to be demolished within Office 2A and Office 2B. See PDF for new layout of finned tube radiators and piping. Vertical and horizontal piping covers to be provided by manufacturer as needed to conceal piping.
_RFI #001 Response.pdf

Q: Austin Brown Sent Mon Dec 8, 2025 at 10:38 am EST
Please verify if new unit ventilators will be either more narrow, or wider than existing to assist in the estimating in the amount of casework/cabinetry to be modified/remain. There are 2 types, and one is wider than the other.
Forest View UV type 2.jpeg
Forestview UV1.jpeg

A: Lindsey Suardini (Kingscott) Responded Tue Dec 9, 2025 at 01:27 pm EST
In general, all unit ventilators fit in between the existing casework but they are deeper than the existing casework, except for UV-022, UV-101, UV-108, UV-109, these units are conflicting with the existing casework and casework needs to be reworked accordingly for these scenarios. Coordinate with architect for details regarding existing casework. Mechanical contractor to field verify and confirm with architect if additional casework rework needs to be performed once final mechanical submittals of unit ventilators are submitted and approved.

The Christman Company
208 N Capitol Ave
Lansing, Michigan 48933-1357
P: (517) 482-1488

Project: 221125-260 LSD Forest View HVAC Remodel
Lansing, Michigan 48910

RFI #6: Detail 4 S0.1 - Beam pocket not shown

Revision	0	**Status**	Open
To	Lindsey Suardini (Kingscott) Sami Szeszulski (Kingscott)	**From**	Austin Brown (The Christman Company (LAN)) 208 N. Capitol Ave Lansing, Michigan 48933-1357
Date Initiated	Dec 8, 2025	**Due Date**	Dec 12, 2025
Location		**Project Stage**	
Cost Impact		**Schedule Impact**	
Spec Section		**Cost Code**	
Drawing Number		**Reference**	
Linked Drawings			
Received From			
Copies To			

Activity

Question

Question from Austin Brown The Christman Company (LAN) *on Monday, Dec 8, 2025 at 10:48 AM EST*

On S0.1 detail 4 there appears to be a support required for the added steel, but no beam pocket/grouted infill/plate is indicated. Please verify requirements for additional supports required on this added area.

Attachments
Forest view beam pocket.png

Awaiting an Official Response

The Christman Company
208 N Capitol Ave
Lansing, Michigan 48933-1357
P: (517) 482-1488

Project: 221125-260 LSD Forest View HVAC Remodel
Lansing, Michigan 48910

RFI #6: Detail 4 S0.1 - Beam pocket not shown

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Cost Impact		**Schedule Impact**	
Spec Section		**Cost Code**	
Drawing Number		**Reference**	
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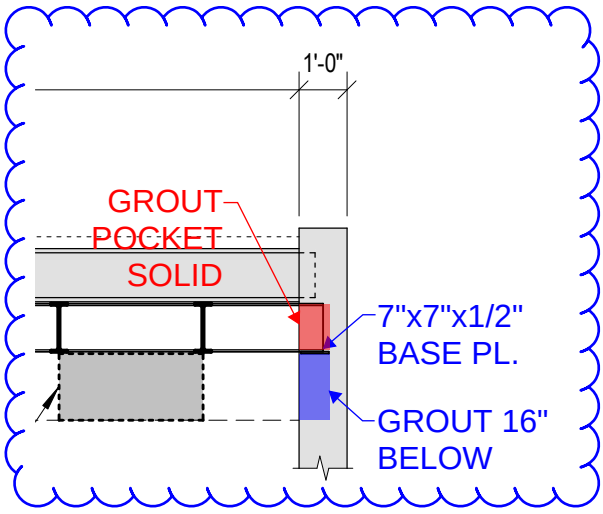
Attachments
Forest view beam pocket.png

Awaiting an Official Response

Thanks for passing this along. The north end of each W12x16 beam should bear within a new beam pocket onto a 7"x7"x1/2" plate. The existing CMU wall should be grouted 16" below the bearing plate (similar to 3/S0.1), and the beam pocket should be solid grouted after installation of the beams.

Brad Cutter
Robert Darvas Associates
December 9, 2025



KINGSCOTT
ARCHITECTURE | ENGINEERING | DESIGN

Date: 12/11/2025

Project: Forest View HVAC Improvements

Owner: Lansing School District

Location: Lansing, MI

A/E #: 2616.18

ADDENDUM NO. 02

SPECIAL NOTE:
The Notice to Bidders, Instructions to Bidders, General Conditions of the Contract for Construction, Supplementary Conditions of the Contract for Construction, and all modifications and previously issued Contract Documentation are a part of this Addendum.

SCOPE OF WORK:
The following items are changes, additions, deletions, clarifications and/or errors and omissions in plans & specifications and shall be considered by each Bidder in making up and submitting their proposal. All items shall be considered a part of the Contract Documents.

NOTICE TO ALL BIDDERS:
All Bidders shall take note of all items covered by this Addendum. Each Bidder shall review the total scope of his responsibilities with respect to his contract work and his interface with the work of others, as well as his required interface with their work.

SPECIFICATIONS:
Section 000110 – Table of Contents (Re-issued):

- Section 095113 – Acoustical Panel Ceiling added.

Section 095113 – Acoustical Panel Ceiling (Added):

- Added to the project.

Section 232113 – Hydronic Piping (Re-issued):

- RFI #13 Revised fittings and unions for copper piping for 2” and under to be press seal.

Section 235216 – Condensing Boilers (Re-issued):

- Added Camus Hydronics to alternate boiler manufacturer.

DRAWINGS:
MD1.1: Mechanical Demolition Plan – Unit 100 (Re-issued)

- Revised demolition keynote language.

MD1.2: Mechanical Demolition Plan – Unit 200 (Re-issued)
- Revised demolition keynote language.
- RFI #1: Clarified fin tube radiator demolition scope.

MD1.3: Mechanical Demolition Plan – Unit 300 (Re-issued)
- Revised demolition keynote language.

MH1.1: First Floor Mechanical HVAC Plan – Unit 100 (Re-issued)
- Revised N.I.C. scope area to indicate correct scope of work.

MH1.2: First Floor Mechanical HVAC Plan – Unit 200 (Re-issued)
- Revised N.I.C. scope area to indicate correct scope of work.
- RFI #1: Added new fin tube radiators and respective piping, fittings and valves in Office 2A and Office 2B.

MH1.3: First Floor Mechanical HVAC Plan – Unit 300 (Re-issued)
- Revised N.I.C. scope area to indicate correct scope of work.

MP1.1: First Floor Mechanical Piping Plan – Unit 100 (Re-issued)
- Revised N.I.C. scope area to indicate correct scope of work.

MP1.2: First Floor Mechanical Piping Plan – Unit 200 (Re-issued)
- Revised N.I.C. scope area to indicate correct scope of work.
- RFI #1: Added new fin tube radiators and respective piping, fittings and valves in Office 2A and Office 2B.

MP1.3: First Floor Mechanical Piping Plan – Unit 300 (Re-issued)
- Revised N.I.C. scope area to indicate correct scope of work.

M4.0: Enlarged Mechanical Plans (Re-issued)
- Revised piping layout to show a primary/secondary system in lieu of a variable primary system.
- RFI #4 – Revised P-1, P-2 locations to avoid conflicts with clearances from existing panels.
- Revised demolition keynote language.
- Added mechanical demolition general notes to sheet.

M7.0: Mechanical Riser Diagrams (Re-issued)
- Revised piping diagram to show a primary/secondary system in lieu of a variable primary systems.
- Edited gas riser diagram to clarify existing vs new scope better.

M8.0: Control Diagrams (Re-issued)
- Revised unit ventilator control diagram to show occupancy sensor and revised SOO to include occupancy controls.

M8.1: Control Diagrams (Re-issued)

- Revised heating hot water system control diagram SOO to indicate the correct sequence for a redundant boiler operation. Cleaned up control diagram to show correct points and devices.
- Added flow meter for make-up water to air separator.
- Added chemical shot feeder.

ED1.1: First Floor Power Demolition Plan – Unit 100 (not-issued)
- Added keynote D3.

ED1.2: First Floor Power Demolition Plan – Unit 200 (Re-issued)
- Added keynote D3
- Added keynote D3 to office areas where indicated.

ED1.3: First Floor Power Demolition Plan – Unit 300 (Re-issued)
- Revised keynote D2 arrows in office area where indicated.
- Added keynote D3
- Added keynote D3 to office areas where indicated.

EP1.1: First Floor Power Plan – Unit 100 (not-issued)
- Added keynote R4.

EP1.2: First Floor Power Plan – Unit 200 (Re-issued)
- Added keynote R4.
- Added keynote R4 to office areas where indicated.
- Revised layout of mechanical and electrical devices indicated per mechanical revisions in Enlarged Boiler Room New Work Plan.

EP1.3: First Floor Power Plan – Unit 300 (Re-issued)
- Added keynote R4
- Added keynote R4 to office areas where indicated.

EP1.11: Roof Power Plan – Unit 100 (not-issued)
- Added keynote R4.

EP1.12: Roof Power Plan – Unit 200 (not-issued)
- Added keynote R4.

EP1.13: Roof Power Plan – Unit 300 (not-issued)
- Added keynote R4
- Added keynote R4 to Office Area.

END OF ADDENDUM

SECTION 000110 - TABLE OF CONTENTS

SECTION 095113
ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes acoustical panels, trims and exposed suspension systems for interior ceilings.

B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.
2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Class A according to ASTM E1264.
2. Smoke-Developed Index: 450 or less.

B. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL or from the listings of another qualified testing agency.

2.3 ACOUSTICAL PANELS **APC-1**

A. Basis-of-Design Product: Subject to compliance with requirements, provide:
1. USG Interiors, Inc.; Subsidiary of USG Corporation; **USG 86785** Acoustical Panels or comparable product by one of the following:
   a. CertainTeed Corp.
   b. Armstrong World Industries, Inc

B. Insert drawing designation for each product required. Use the same designation for the acoustical panels in this article and for the related suspension system in "Metal Suspension System" Article; together, they make up the ceiling assembly. Use these designations on Drawings to identify each ceiling assembly.

C. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

D. Classification: Provide panels as follows:

A. Material: 3354 – Fiberglass with DuraBrite® acoustically transparent membrane; CAC backing

B. Surface Material: DuraBrite scrim with factory-applied latex paint

C. Color: White.

D. Light Reflectance (LR): Not less than 0.88.

E. Ceiling Attenuation Class (CAC): Not less than CAC indicated in a schedule 35.

F. Noise Reduction Coefficient (NRC): Not less than 0.90.

G. Edge/Joint Detail: Square Tegular

H. Thickness: 1 inch.

I. Weight: 0.64 LBS/SF

J. Modular Size: 24 by 24 inches or 24 by 48 inches.

K. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273, ASTM D3274, or ASTM G21 and evaluated according to ASTM D3274 or ASTM G21.

2.4 METAL SUSPENSION SYSTEM

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Armstrong World Industries, Inc.
   2. Rockfon (Rockwool International)
   3. USG Corporation.

B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C635/C635M and designated by type, structural classification, and finish indicated.

   1. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C635/C635M.

C. Wide-Face, Aluminum-Capped, Double-Web, Hot-Dip Galvanized, G60, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; hot-dip galvanized, G60 coating designation; with prefinished, 15/16-inch-wide aluminum caps on flanges.

1. Structural Classification: Intermediate-duty system.
2. Face Design: Flat, flush.
3. Cap Finish: Painted white.

2.5 ACCESSORIES

A. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

B. Wire Hangers, Braces, and Ties: Provide wires as follows:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.135-inch-diameter wire.

C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

D. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch-thick, galvanized-steel sheet complying with ASTM A653/A653M, G90 coating designation; with bolted connections and 5/16-inch-diameter bolts.

E. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees. / At all vestibule locations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.

B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION

A. Install acoustical panel ceilings according to ASTM C636/C636M and manufacturer's written instructions.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
8. Do not attach hangers to steel deck tabs.
9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.

1. Arrange directionally patterned acoustical panels as follows:

a. As indicated on reflected ceiling plans.
b. Install panels with pattern running in one direction parallel to long axis of space.
c. Install panels in a basket-weave pattern.

2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
4. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

3.4 ERECTION TOLERANCES

A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet non-cumulative.

3.5 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

SECTION 23 2113
HYDRONIC PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Hydronic system requirements.

B. Heating water piping, above grade.

C. Equipment drains and overflows.

D. Pipe hangers and supports.

E. Unions, flanges, mechanical couplings, and dielectric connections.

1.2 RELATED REQUIREMENTS

A. Section 07 8400 - Firestopping.

B. Section 09 9123 - Interior Painting.

C. Section 23 0516 - Expansion Fittings and Loops for HVAC Piping.

D. Section 23 0523 - General-Duty Valves for HVAC Piping.

E. Section 23 0553 - Identification for HVAC Piping and Equipment.

F. Section 23 0719 - HVAC Piping Insulation.

G. Section 23 2500 - HVAC Water Treatment: Pipe cleaning.

H. Section 25 3516 - Integrated Automation Sensors and Transmitters: Pipe-mounted product furnishing.

I. Section 25 3519 - Integrated Automation Control Valves: Product furnishing.

J. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.3 REFERENCE STANDARDS

A. ANSI/FCI 70-2 - Control Valve Seat Leakage; 2021.

B. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2023.

C. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2021.

D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.

E. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.

F. ASME B31.9 - Building Services Piping; 2020.

G. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.

H. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2023a.

I. ASTM B32 - Standard Specification for Solder Metal; 2020.

J. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.

K. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.

L. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 2024.

M. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications; 2007 (Reapproved 2019).

N. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2019.

O. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

P. AWWA C606 - Grooved and Shouldered Joints; 2022.

Q. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data:

1. Include data on pipe materials, pipe fittings,and accessories.

2. Indicate valve data and ratings.

3. Show grooved joint couplings, fittings, and specialties on drawings and product submittals, specifically identified with the manufacturer's style or series designation.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.

B. Provide all grooved joint couplings, fittings, valves, specialties, and grooving tools from a single manufacturer.

C. Coupling Manufacturer:

1. Perform on-site training by factory-trained representative to the Contractor's field personnel in the proper use of grooving tools and installation of grooved joint products.

2. Periodic job site visits by factory-trained representative to ensure best practices in grooved joint installation.

D. Welder Qualifications: Certify in accordance with ASME BPVC-IX.

1.6 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing hydronic piping systems with the following minimum working-pressure ratings:

1. Hot-Water Piping: 150 psig at 200 deg. F

PART 2 PRODUCTS

2.1 HYDRONIC SYSTEM REQUIREMENTS

A. Comply with ASME B31.9 and applicable federal, state, and local regulations.

B. Piping: Provide piping, fittings, hangers, and supports as required, as indicated, and as follows:

1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.

2. Use non-conducting dielectric connections whenever jointing dissimilar metals.

3. Grooved mechanical joints may be used in accessible locations only.

a. Accessible locations include those exposed on interior of building, in pipe chases, and in mechanical rooms, aboveground outdoors, and as approved by Architect.

b. Use rigid joints unless otherwise indicated.

4. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.

C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions, or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.

D. Valves: Provide valves where indicated:

1. Provide drain valves where indicated, and if not indicated, provide at least at main shut-off, low points of piping, bases of vertical risers, and at equipment. Use 3/4 inch gate valves with cap; pipe to nearest floor drain.

2. Isolate equipment using butterfly valves with lug end flanges or grooved mechanical couplings.

3. For throttling, bypass, or manual flow control services, use butterfly valves.

4. In heating water systems, butterfly valves may be used interchangeably with gate and globe valves.

E. Welding Materials and Procedures: Comply with ASME BPVC-IX.

2.2 HEATING WATER PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black, using one of the following joint types:

1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1/D1.1M welded.

2. Threaded Joints: ASME B16.3, malleable iron fittings.

3. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.

B. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn, using one of the following joint types:

1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings.

a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.

b. Braze: AWS A5.8M/A5.8 BCuP copper/silver alloy.

2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.

3. Mechanical Press Sealed Fittings: Double pressed type complying with ASME B16.22, utilizing EPDM, nontoxic synthetic rubber sealing elements.

a. Manufacturers:

1) Apollo Valves: www.apollovalves.com/#sle.

2) SCI Copper Press by ASC Engineered Solutions www.asc-es.com.

3) Substitutions: See Section 01 6000 - Product Requirements.

2.3 EQUIPMENT DRAINS AND OVERFLOWS

A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn; using one of the following joint types:

1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings; ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.

2.4 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.

1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.

B. In grooved installations, use rigid couplings with offsetting angle-pattern bolt pads or with wedge-shaped grooves in header piping to permit support and hanging in accordance with ASME B31.9.

2.5 UNIONSWEATSTIONS

A. Unions for Pipe of 2 Inches and Less:

1. Ferrous Piping: 150 psi brass or malleable iron, threaded.

2. Copper Pipe: Press seal joints.

B. Flanges for Pipe 2 Inches and Greater:

1. Ferrous Piping: 150 psig forged steel, slip-on.

2. Copper Piping: Bronze.

3. Gaskets: 1/16 inch thick, preformed neoprene.

C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.

1. Dimensions and Testing: In accordance with AWWA C606.

2. Mechanical Couplings: Comply with ASTM F1476.

3. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.

4. When pipe is field grooved, provide coupling manufacturer's grooving tools.

5. Manufacturers:

a. Anvil International: www.anvilintl.com/#sle.

b. Gruvlok by ASC Engineered Solutions www.asc-es.com

c. Victaulic Company: www.victaulic.com/#sle.

d. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Prepare pipe for grooved mechanical joints as required by coupling manufacturer.

C. Remove scale and dirt on inside and outside before assembly.

D. Prepare piping connections to equipment using jointing system specified.

E. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

F. After completion, fill, clean, and treat systems. See Section 23 2500 for additional requirements.

3.2 PIPING APPLICATIONS

A. Heating water piping, above grade:

1. Pipe sizes 3/4" - 2": Copper, press seal joints.

2. Pipe sizes 2 1/2" and larger: Schedule 40 black steel, welded joints or grooved joints where allowed

3.3 INSTALLATION

A. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

B. Install in accordance with manufacturer's instructions.

C. Route piping in orderly manner, parallel to building structure, and maintain gradient.

D. Install piping to conserve building space and to avoid interference with use of space.

E. Group piping whenever practical at common elevations.

F. Sleeve pipe passing through partitions, walls, and floors.

G. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified.

H. Slope piping and arrange to drain at low points.

I. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

J. Grooved Joints:

1. Install in accordance with the manufacturer's latest published installation instructions.

2. Gaskets to be suitable for the intended service, molded, and produced by the coupling manufacturer.

K. Pipe Hangers and Supports:

1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.

2. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.

3. Place hangers within 12 inches of each horizontal elbow.

4. Use hangers with 1-1/2 inches minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.

5. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.

6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

7. Provide copper plated hangers and supports for copper piping.

L. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. See Section 23 0719.

M. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 08 3100 .

N. Use eccentric reducers to maintain top of pipe level.

O. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welds.

P. Install valves with stems upright or horizontal, not inverted.

3.4 FIELD QUALITY CONTROL

A. Prepare hydronic piping according to ASME B31.9 and as follows:

1. Leave joints, including welds, uninsulated and exposed for examination during test.

2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.

3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.

4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.

5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on hydronic piping:

1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.

2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.

3. Isolate expansion tanks and determine that hydronic system is full of water.

4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times the "SE" value in Appendix A in ASME B31.9, "Building Services Piping."

5. After hydrostatic test pressure has been applied for at least 4 hours, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.

6. Prepare written report of testing.

C. Perform the following before operating the system:

1. Open manual valves fully.

2. Inspect pumps for proper rotation. Set makeup pressure-reducing valves for required system pressure.

3. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).

4. Set temperature controls so all coils are calling for full flow.

5. Inspect and set operating temperatures of hydronic equipment, such as boilers, chillers, cooling towers, to specified values.

6. Verify lubrication of motors and bearings.

SECTION 23 5216
CONDENSING BOILERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Manufactured units.

B. Boiler construction.

C. Boiler trim.

D. Fuel burning system.

E. Factory installed controls.

1.2 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete.

B. Section 23 0913 - Instrumentation and Control Devices for HVAC.

C. Section 23 2114 - Hydronic Specialties.

D. Section 23 2123 - Hydronic Pumps.

E. Section 23 2500 - HVAC Water Treatment.

F. Section 23 5100 - Breechings, Chimneys, and Stacks.

G. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.3 REFERENCE STANDARDS

A. AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI); Current Edition.

B. ANSI Z21.13 - American National Standard for Gas-Fired Low-Pressure Steam and Hot Water Boilers; 2022.

C. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. ASHRAE Std 135 - A Data Communication Protocol for Building Automation and Control Networks; 2020, with Errata (2023).

E. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; 2023.

F. NBBI Manufacturer and Repair Directory - The National Board of Boiler and Pressure Vessel Inspectors (NBBI); Current Edition.

G. NFPA 54 - National Fuel Gas Code; 2021.

H. SCAQMD 1146.1 - Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters; 1990, with Amendment (2018).

1.4 SUBMITTALS

A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 - General Requirements for submittal procedures.

B. Product Data: Provide data indicating general assembly, components, controls, safety controls, and wiring diagrams with electrical characteristics and connection requirements, and service connections.

C. Manufacturer's Field Reports: Burner manifold gas pressure, percent carbon monoxide (CO), percent oxygen (O), percent excess air, flue gas temperature at outlet, ambient temperature, net stack temperature, percent stack loss, percent combustion efficiency, and heat output.

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

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect boilers from damage by leaving factory inspection openings and shipping packaging in place until final installation.

1.7 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Provide a five year warranty to include coverage for heat exchanger.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Natural Gas, Propane, or Combination Natural Gas/Propane for Indoor Applications:

1. Aerco International, Inc : www.aerco.com

2. Cleaver-Brooks, Inc. : www.cleaverbrooks.com

3. Lochinvar LLC: www.lochinvar.com.

4. The Fulton Companies: www.fulton.com.

5. Camus: https://www.camus-hydronics.com/

6. Substitutions: See Section 01 6000 - Product Requirements.

2.2 MANUFACTURED UNITS

A. Factory assembled, factory fire-tested, self-contained, readily transported unit ready for automatic operation except for connection of water, fuel, electrical, and vent services.

B. Unit: Metal membrane wall, water or fire tube, condensing boiler on integral structural steel frame base with integral fuel burning system, firing controls, boiler trim, insulation, and removable jacket, suitable for indoor application.

2.3 BOILER CONSTRUCTION

A. Comply with the minimum requirements of ASME BPVC-IV and ANSI Z21.13 for construction of boilers.

B. Assembly to bear the ASME "H" stamp and comply with the efficiency requirements of the latest edition of ASHRAE Std 90.1 I-P.

C. Required Directory Listings:

1. AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI); current edition at www.ahrinet.org.

2. NBBI Manufacturer and Repair Directory - The National Board of Boiler and Pressure Vessel Inspectors (NBBI); current edition at www.nationalboard.org.

D. Heat Exchanger: Construct with materials that are impervious to corrosion where subject to contact with corrosive condensables.

E. Provide adequate tappings, observation ports, removable panels, and access doors for entry, cleaning, and inspection.

F. Insulate casing with insulation material, protected and covered by heavy-gauge metal jacket.

G. Factory apply boiler base and other components, that are subject to corrosion, with durable, acrylic, powder coated, painted, or weather-proofed finish.

2.4 BOILER TRIM

A. ASME rated pressure relief valve.

B. Flow switch.

C. Electronic Low Water Cut-off: Complete with test light and manual reset button to automatically prevent firing operation whenever boiler water falls below safe level.

D. Temperature and pressure gauge.

E. Pressure Switches:

1. High gas pressure.

2. Low gas pressure.

3. Air pressure.

F. Manual reset high limit.

G. Condensate neutralizer.

H. Boiler Pump (where required by boiler design):

1. Primary pump, factory supplied and sized for field installation to ensure minimum, continuous circulation through boiler.

2. Where pump is not provided by boiler manufacturer, provide pump in accordance with boiler manufacturer's recommendations.

3. Pump time delay.

2.5 FUEL BURNING SYSTEM

A. Provide forced draft automatic burner, integral to boiler, designed to burn natural gas, and maintain fuel-air ratios automatically.

1. Blower Design: Statically and dynamically balanced to supply combustion air; direct connected to motor.

2. Forced Draft Design: Mixes combustion air and gas to achieve 90 percent combustion efficiency.

3. Combustion Air Filter: Protects fuel burning system from debris.

B. Gas Train: Plug valve, safety gas valve, gas-air ratio control valve, and pressure regulator controls air and gas mixture.

C. Emission of Oxides of Nitrogen Requirements: Comply with SCAQMD 1146.1 for natural gas fired system, as applicable.

D. Intakes: Combustion air intake capable of accepting free mechanical room air or direct outside air through a sealed intake pipe.

2.6 FACTORY INSTALLED CONTROLS

A. Option for internal or external (0-10) VDC control.

B. Temperature Controls:

1. Automatic reset type to control fuel burning system on-off and firing rate to maintain temperature.

2. Manual reset type to control fuel burning system to prevent boiler water temperature from exceeding safe system water temperature.

3. Low-fire start time delay relay.

C. Electronic PI setpoint/modulation control system.

D. Microprocessor-based, fuel/air mixing controls.

E. BAS, SCADA, or other Integrated Automation Link: ASHRAE Std 135 BACnet MS/TP.

1. External Point Mapping: Provide mapping table for each parameter included in the local visual interface with software-toggle flag to allow reduced mapping of available points.

PART 3 EXECUTION

3.1 FACTORY AUTHORIZED START-UP

A. Engage a factory-authorized service representative to inspect component assemblies and equipment installations, including connections, and to conduct start-up as recommended by the manufacturer to secure and maintain all warranties.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install boiler and provide connection of natural gas service in accordance with requirements of NFPA 54 and applicable codes.

C. Install boiler on 4" concrete housekeeping base, sized minimum of 4 inches larger than boiler base in accordance with Section 03 3000.

D. Coordinate provisions for water treatment in accordance with Section 23 2500.

E. Pipe relief valves to nearest floor drain.

F. Pipe cooled condensate produced by the combustion process from the boiler condensate connection and/or flue stack with suitable piping material to neutralizer prior to discharging into nearest floor drain.

3.3 CLOSEOUT ACTIVITIES

A. Demonstrate proper operation of equipment to Owner's designated representative.

B. Training: Train Owner's personnel on operation and maintenance of system.

1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.

2. Provide minimum of two hours of training.

3. Instructor: Manufacturer's training personnel.

4. Location: At project site.

MECHANICAL DEMOLITION NOTES

1. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF WORK TO BE PERFORMED. THE EXACT EXTENT OF DEMOLITION SHALL BE AS REQUIRED BY THE NEW WORK.
2. PRIOR TO COMMENCEMENT OF WORK, CONTRACTOR SHALL VISIT THE SITE AND BECOME FAMILIAR WITH EXISTING SITE CONDITIONS, SYSTEMS, AND UTILITIES. NOTIFY ARCHITECT OF ANY INTERFERENCES OR DISCREPANCIES.
3. VERIFY DEPTH, SIZE, LOCATIONS AND CONDITION OF EXISTING UTILITIES IN THE FIELD, INCLUDING POINTS OF CONNECTION PRIOR TO STARTING ANY WORK.
4. ANY INTERRUPTIONS OF EXISTING SERVICES AND/OR EQUIPMENT SHALL BE PERFORMED AT A TIME APPROVED IN ADVANCE BY THE OWNER'S REPRESENTATIVE SO AS NOT TO INTERFERE WITH THE PRESENT BUILDING'S OPERATION.
5. ALL ITEMS ON DEMOLITION PLANS SHALL BE CONSIDERED EXISTING UNLESS OTHERWISE NOTED. ALL WORK INDICATED ON PLANS HAS BEEN LOCATED PER EXISTING DRAWINGS AND/OR FIELD OBSERVATION AND REQUIRES FIELD VERIFICATION.
6. ALL ITEMS INDICATED WITH BROKEN LINES SHALL BE REMOVED COMPLETE, WITH ALL RELATED ITEMS INCLUDING HANGERS, SUPPORTS, INSULATION, CONTROLS, ETC. CAP ALL OPEN ENDED PIPES AND DUCTS.
7. ALL EXISTING WORK TO REMAIN SHALL BE PROTECTED FROM DAMAGE. WHERE DUCT OR PIPE INSULATION HAS BEEN DAMAGED DURING DEMOLITION, THE CONTRACTOR SHALL REPAIR INSULATION AS REQUIRED TO MATCH EXISTING.
8. THE OWNER SHALL HAVE FIRST RIGHT OF REFUSAL ON ALL EQUIPMENT BEING REMOVED. ALL ITEMS REMOVED SHALL BE LEGALLY DISPOSED OF. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXISTING RELOCATED AND OWNER PROVIDED EQUIPMENT.

MECHANICAL DEMOLITION KEYNOTES

- Z1 REMOVE HORIZONTAL UNIT VENTILATOR, ASSOCIATED LOUVER AND ALL ASSOCIATED PIPING, FITTINGS, VALVES AND ACCESSORIES BACK TO PIPE MAINS. REMOVE ALL ASSOCIATED CONTROLS INCLUDING ALL ASSOCIATED THERMOSTATS.
- Z2 REMOVE STEAM BOILER, CONDENSATE RETURN UNITS, PUMPS, BOILER FEED WATER UNIT, FLASH TANK, STEAM TRAPS WITHIN BOILER ROOM. DEMOLISH AND REMOVE ALL ASSOCIATED PIPING, FITTINGS, VALVES AND ACCESSORIES ASSOCIATED WITH THIS EQUIPMENT UNLESS OTHERWISE NOTED. STEAM AND CONDENSATE PIPING IN TUNNELS TO BE CAPPED AT TUNNEL ENTRANCE AND ABANDONED IN PLACE. REMOVE ALL ASSOCIATED CONTROLS INCLUDING ALL ASSOCIATED THERMOSTATS.
- Z3 REMOVE HYDRONIC PIPING TO AND FROM CONDENSING BOILER AND ALL ASSOCIATED VALVES, FITTINGS AND ACCESSORIES. GAS CONNECTION, VENT CONNECTION, DRAIN CONNECTION, FLUE AND COMBUSTION AIR INTAKE TO REMAIN IN PLACE.
- Z4 REMOVE CEILING MOUNTED UNIT VENTILATOR AND ALL ASSOCIATED PIPING, VALVES, FITTINGS & ACCESSORIES, EXTERIOR LOUVER AND ASSOCIATED DUCTWORK AND DIFFUSERS. REMOVE ALL ASSOCIATED CONTROLS INCLUDING ALL ASSOCIATED THERMOSTATS.
- Z5 REMOVE FINNED TUBE RADIATOR AND ALL ASSOCIATED PIPING, FITTINGS AND VALVES UNLESS OTHERWISE NOTED. REMOVE ALL ASSOCIATED CONTROLS INCLUDING ALL ASSOCIATED THERMOSTATS.
- Z6 REMOVE STEAM CONVECTOR AND ALL ASSOCIATED PIPING, FITTINGS, VALVES AND ACCESSORIES BACK TO STEAM MAIN. DEMOLISH ALL ASSOCIATED EXTERIOR LOUVERS, IF APPLICABLE. COORDINATE WITH ARCHITECTURAL TO PATCH AND PAINT WALL AS NEEDED AND TO BLANK OFF ANY EXTERIOR OPENINGS.. REMOVE ALL ASSOCIATED CONTROLS INCLUDING ALL ASSOCIATED THERMOSTATS.
- Z7 REMOVE FLOOR-MOUNTED STEAM HEATER AND ALL ASSOCIATED PIPING, FITTINGS, VALVES AND ACCESSORIES BACK TO STEAM MAIN. COORDINATE WITH ARCHITECTURAL TO PATCH FLOORS AS NEEDED. REMOVE ALL ASSOCIATED CONTROLS INCLUDING ALL ASSOCIATED THERMOSTATS.
- Z8 REMOVE WALL-MOUNTED STEAM RADIATORS AND ALL ASSOCIATED PIPING, FITTINGS, VALVES, AND ACCESSORIES BACK TO STEAM MAIN. COORDINATE WITH ARCHITECTURAL TO PATCH WALLS AS NEEDED. REMOVE ALL ASSOCIATED CONTROLS INCLUDING ALL ASSOCIATED THERMOSTATS.
- Z9 REMOVE AIR COMPRESSOR AND ALL ASSOCIATED PNEUMATIC CONTROLS INCLUDING BUT NOT LIMITED TO CONTROL PANELS, GAUGES, PIPING, ETC.
- Z10 REMOVE STEAM TO HOT WATER PLANT. INCLUDING BUT NOT LIMITED TO PUMPS, HEAT EXCHANGER, EXPANSION TANK, PIPING, FITTINGS, VALVES & ACCESSORIES. REMOVE ALL ASSOCIATED CONTROLS.
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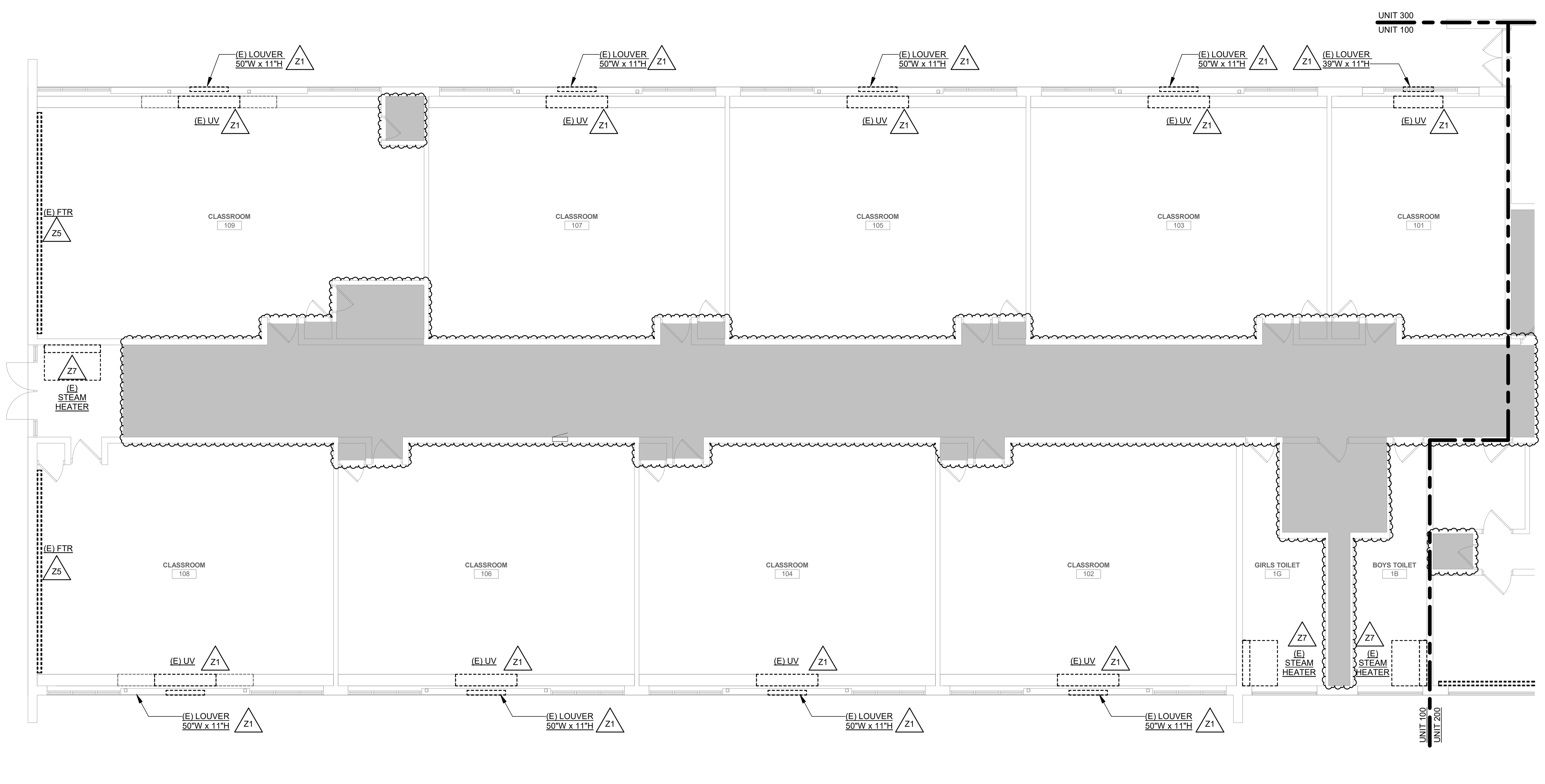
- Z12 CAP ROOF RELIEF OPENING SERVING THE MULTI-PURPOSE ROOM AT THE ROOF LEVEL. COORDINATE WITH ARCHITECTURE AND STRUCTURAL FOR ROOF PATCHING DETAILS.
- Z13 REMOVE 8"Ø FLUE SERVING DOMESTIC WATER HEATER AS NECESSARY TO REROUTE UP THROUGH THE ROOF IN THE NEW WORK SCOPE.



FIRST FLOOR MECHANICAL DEMOLITION PLAN - UNIT 100
SCALE: 1/8" = 1'-0"

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FOREST VIEW HVAC IMPROVEMENTS

LANSING SCHOOL DISTRICT
3119 Stoneleigh
Lansing, MI 48910

Lansing School District

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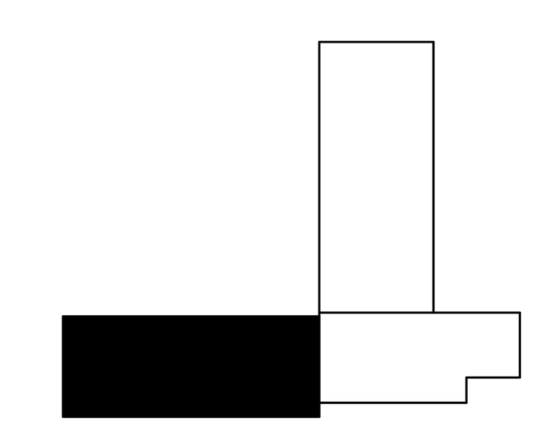

KEY PLAN

N

JOB NO. 2616.07

SHEET TITLE
FIRST FLOOR MECHANICAL DEMOLITION PLAN - UNIT 100

SHEET NO.
MD1.1

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4000 W. Eleven Mile Road Berkley, MI 48072
Phone 248.399.1900 Fax 248.399.1901
www.sesnet.com

SES Project # 25 0588 25

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MECHANICAL DEMOLITION NOTES

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3. VERIFY DEPTH, SIZE, LOCATIONS AND CONDITION OF EXISTING UTILITIES IN THE FIELD, INCLUDING POINTS OF CONNECTION PRIOR TO STARTING ANY WORK.
4. ANY INTERRUPTIONS OF EXISTING SERVICES AND/OR EQUIPMENT SHALL BE PERFORMED AT A TIME APPROVED IN ADVANCE BY THE OWNER'S REPRESENTATIVE SO AS NOT TO INTERFERE WITH THE PRESENT BUILDING'S OPERATION.
5. ALL ITEMS ON DEMOLITION PLANS SHALL BE CONSIDERED EXISTING UNLESS OTHERWISE NOTED. ALL WORK INDICATED ON PLANS HAS BEEN LOCATED PER EXISTING DRAWINGS AND/OR FIELD OBSERVATION AND REQUIRES FIELD VERIFICATION.
6. ALL ITEMS INDICATED WITH BROKEN LINES SHALL BE REMOVED COMPLETE, WITH ALL RELATED ITEMS INCLUDING HANGERS, SUPPORTS, INSULATION, CONTROLS, ETC. CAP ALL OPEN ENDED PIPES AND DUCTS.
7. ALL EXISTING WORK TO REMAIN SHALL BE PROTECTED FROM DAMAGE. WHERE DUCT OR PIPE INSULATION HAS BEEN DAMAGED DURING DEMOLITION, THE CONTRACTOR SHALL REPAIR INSULATION AS REQUIRED TO MATCH EXISTING.
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MECHANICAL DEMOLITION KEYNOTES

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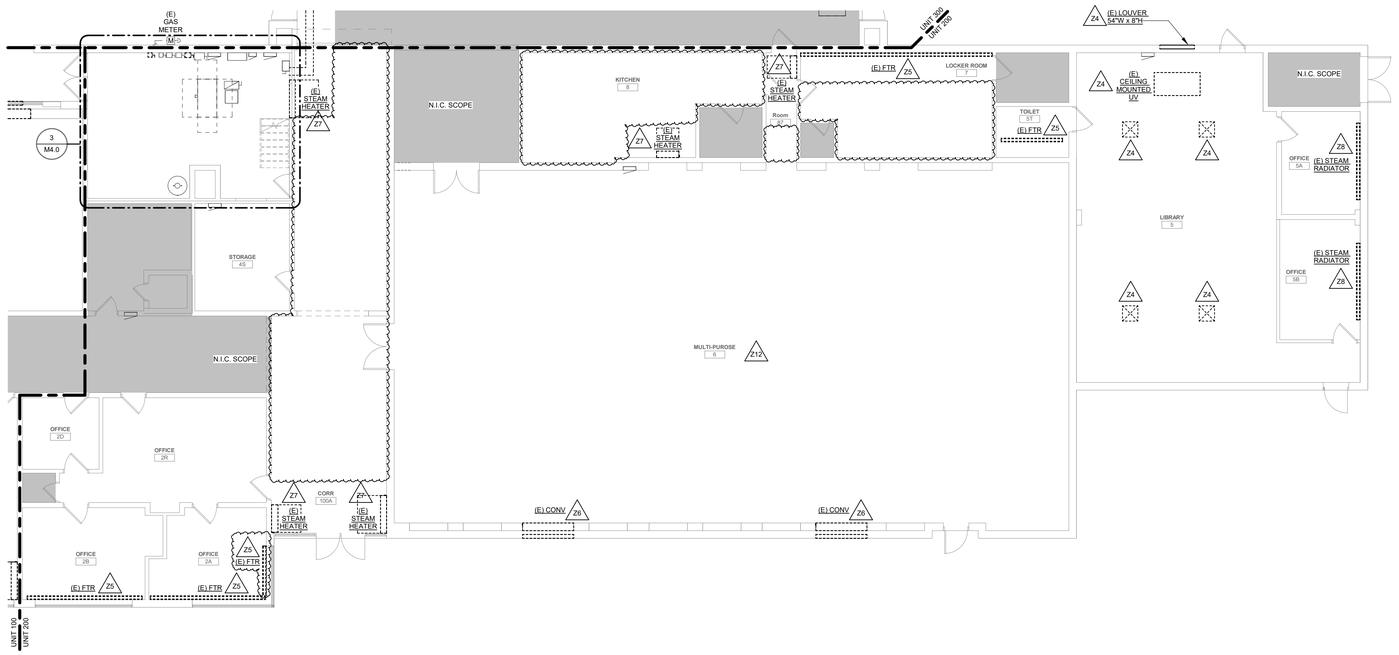

FIRST FLOOR MECHANICAL DEMOLITION PLAN - UNIT 200
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FOREST VIEW HVAC IMPROVEMENTS

LANSING SCHOOL DISTRICT
3119 Stoneleigh
Lansing, MI 48910

Lansing School District

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CONSTRUCTION DOCUMENTS	11.14.2025
ADDENDUM 02	12.11.2025

KEY PLAN

N

JOB NO. 2616.07

SHEET TITLE
FIRST FLOOR MECHANICAL DEMOLITION PLAN - UNIT 200

SHEET NO.
MD1.2

 PORTAGE, MICHIGAN

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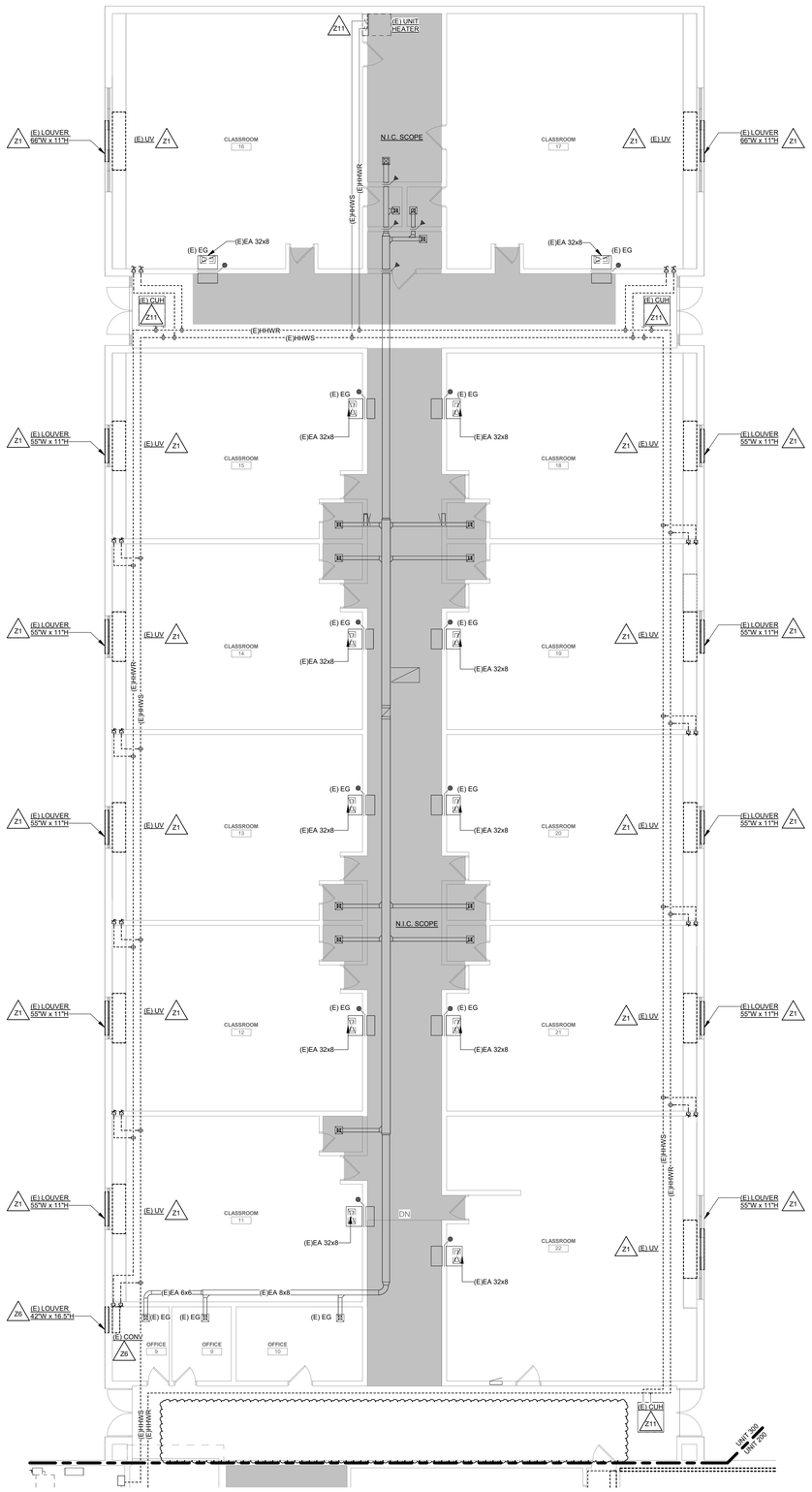

FIRST FLOOR MECHANICAL DEMOLITION PLAN - UNIT 300
SCALE: 1/8" = 1'-0"

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FOREST VIEW HVAC IMPROVEMENTS

LANSING SCHOOL DISTRICT

3119 Stoneleigh
Lansing, MI 48910

Lansing School District

ISSUANCES	DATE
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CONSTRUCTION DOCUMENTS	11.14.2025
ADDENDUM 02	12.11.2025

KEY PLAN

JOB NO. 2616.07

N

SHEET TITLE

FIRST FLOOR MECHANICAL DEMOLITION PLAN - UNIT 300

SHEET NO.

MD1.3

Strategic Energy Solutions®
4000 W. Eleven Mile Road Berkley, MI 48072
Phone 248.399.1900 Fax 248.399.1901
www.sesnet.com

SES Project # 25 0588 25

HVAC GENERAL NOTES

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2. CONTRACTOR SHALL COORDINATE THEIR WORK WITH THE WORK OF ALL OTHER TRADES. ALL DUCTWORK IS TO BE ROUTED AS HIGH AS POSSIBLE. PROVIDE ACCESS AROUND ALL NEW EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS. VERIFY ALL CLEARANCES PRIOR TO THE FABRICATION OF ANY WORK.
3. DUCTWORK/PIPING SHALL BE ROUTED AS HIGH AS POSSIBLE AND SHALL NOT BE LOCATED OVER ELECTRICAL EQUIPMENT/PANELS. PROVIDE REQUIRED CLEARANCE IN FRONT OF ELECTRICAL EQUIPMENT. DUCTWORK/PIPING SHALL NOT INTERFERE WITH ELECTRICAL EQUIPMENT CLEARANCE.
4. DUCTWORK/PIPING SHALL NOT BE INSTALLED IN A LOCATION THAT RESTRICTS THE ACCESS TO MECHANICAL DEVICES REQUIRING ACCESS.
5. THE CONTRACTOR SHALL PROVIDE ALL MISCELLANEOUS SUPPORTING STEEL, ETC. FOR THE PROPER INSTALLATION OF ALL MECHANICAL SYSTEMS.
6. COORDINATE FLOOR, WALL, ROOF PENETRATIONS, LOUVER SIZES, PAD LOCATIONS ETC. WITH ARCHITECTURAL TRADES. SEAL ALL PIPING AND DUCT PENETRATIONS.
7. THE CONTRACTOR SHALL REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATION OF GRILLES, REGISTERS, AND DIFFUSERS.
8. COORDINATE AND PROVIDE ACCESS DOORS IN HARD CEILING AREAS FOR ACCESS TO BALANCING DAMPERS, ETC. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES.
9. BRANCH DUCTWORK TO GRILLES, REGISTERS AND DIFFUSERS SHALL BE THE SAME SIZE AS THE GRILLE, REGISTER OR DIFFUSER NECK SIZE WHERE NO DUCT SIZE IS INDICATED ON PLAN.
10. MAXIMUM LENGTH OF FLEXIBLE DUCT SHALL BE 5'-0".
11. FOR EQUIPMENT VALVING, COMPONENT, AND PIPING ARRANGEMENT, REFER TO PIPING DIAGRAMS AND DETAILS.
12. PAINT ALL VISIBLE INTERIOR SURFACES OF EXHAUST/RETURN GRILLES, REGISTERS AND VISIBLE ASSOCIATED DUCTWORK FLAT BLACK.
13. THE CEILING SPACE IS USED AS A RETURN AIR PLENUM. NO PLASTIC MATERIALS INCLUDING PVC PIPING, CONDUIT, WIRING, ETC. SHALL BE USED. ALL MATERIAL IN THE CEILING SPACE IS TO BE PLENUM RATED.
14. PROVIDE CODE REQUIRED CLEARANCE/ACCESS DOORS FOR DAMPERS, VALVES, AND CLEANOUTS LOCATED IN WALLS OR ABOVE HARD CEILINGS. COORDINATE LOCATIONS WITH ARCHITECT. REFER TO ARCHITECTURAL PLANS FOR CEILING TYPES.
15. DUCTWORK TO AND FROM VAV BOXES/TERMINAL UNITS SHALL BE EQUAL TO THE BOX CONNECTIONS SIZES UNLESS INDICATED OTHERWISE.
16. CONNECTION TO EQUIPMENT SHALL BE VERIFIED WITH MANUFACTURER'S CERTIFIED DRAWINGS. TRANSITIONS TO ALL EQUIPMENT SHALL BE VERIFIED AND PROVIDED FOR EQUIPMENT FURNISHED.
17. ALL BRANCH PIPING TO TERMINAL UNITS TO BE 3/4" UNLESS OTHERWISE NOTED.
18. ROOF MOUNTED EQUIPMENT REQUIRING SERVICE SHALL BE LOCATED A MINIMUM OF 10 FEET FROM ROOF EDGES. WHERE EQUIPMENT CAN'T BE LOCATED AWAY FROM ROOF EDGE AND GUARD RAILS ARE NOT PROVIDED, PROVIDE PERMANENT FALL ARREST ANCHORAGE CONNECTION DEVICE THAT COMPLIES WITH ANSI/ASSE Z 359.1.

MECHANICAL KEYNOTES

H1 NEW DECORATIVE, CLEAR ANODIZED, DRAINABLE BLADE LOUVER PROVIDED BY MANUFACTURER; PROVIDE WITH WALL SLEEVE. COORDINATE WITH ARCHITECT AND STRUCTURAL FOR DETAILS AND SUPPORT REQUIRED FOR INSTALLATION OF LOUVER.

H2 ROUTE O/A DUCT FROM CEILING CASSETTE UP THROUGH ROOF AND TERMINATE 1'6" ABOVE ROOF WITH GOOSENECK AND BIRD SCREEN.

H3 MOUNT NEW MULTI-SPLIT CONDENSING UNIT ON STEEL RAILS. ROUTE REFRIGERANT PIPING FROM CONDENSING UNIT TO CASSETTE(S) THROUGH A COVERED PIPE CURB.

H4 MOUNT NEW CONDENSING UNIT ON 6" REMOVABLE PAD. ROUTE ASSOCIATED REFRIGERANT PIPING THROUGH COVERED PIPE CURB.

H5 MOUNT NEW SPLIT SYSTEM CONDENSING UNIT ON STEEL RAILS. ROUTE REFRIGERANT PIPING FROM CONDENSING UNIT TO INDOOR WALL-MOUNTED UNIT THROUGH A COVERED PIPE CURB.

H6 CONNECT NEW HHWS & HHWR PIPING TO NEW UNIT VENTILATOR. REFER TO MANUFACTURER'S GUIDE FOR INSTALLATION OF PIPING TO NEW UNIT. COORDINATE WITH ARCHITECTURAL TO PROVIDE PIPE COVERS FOR HYDRONIC PIPING FROM CEILING TO UNIT, AS NEEDED.

H7 PROVIDE THERMOSTAT WITH LOCKING COVER IN MULTI-PURPOSE ROOM

H8 ROUTE 8"Ø BOILER FLUE/INTAKE UP THROUGH ROOF AND TERMINATE A MINIMUM OF 3 FT ABOVE ROOF AND 10 FT MIN FROM ANY INTAKE. TRANSITION AS REQUIRED TO AVOID STRUCTURES, CONDUIT, PIPING, ETC. TERMINATE INTAKE WITH A GOOSENECK. BOILER VENTS TO BE CONSTRUCTED OF STAINLESS STEEL ONLY (PVC WILL NOT BE ACCEPTED) AND COMPLIANT WITH MFR RECOMMENDATIONS AND MMC 2021.

H9 MOUNT NEW ROOFTOP UNIT ON NEW STRUCTURAL STEEL PLATFORM. SEE STRUCTURAL DRAWINGS FOR MORE DETAILS. ROUTE CONDENSATE FROM COOLING COIL TO NEAREST ROOF DRAIN. SEE DETAIL ON SHEET M5.1 FOR MORE DETAILS.

H10 ROUTE REFRIGERANT PIPING TO AND FROM RESPECTIVE MULTI-SPLIT CONDENSING UNIT ON ROOF TO CEILING CASSETTE THROUGH COVERED PIPE CURB. INSULATE AND ROUTE 3/4" PVC CONDENSATE DRAIN PIPE FROM CEILING CASSETTE TO NEAREST UTILITY SINK OR MECHANICAL ROOM FLOOR DRAIN.

H11 PIPE CURB SIZES AND LOCATION SHOWN AS REFERENCE ONLY.

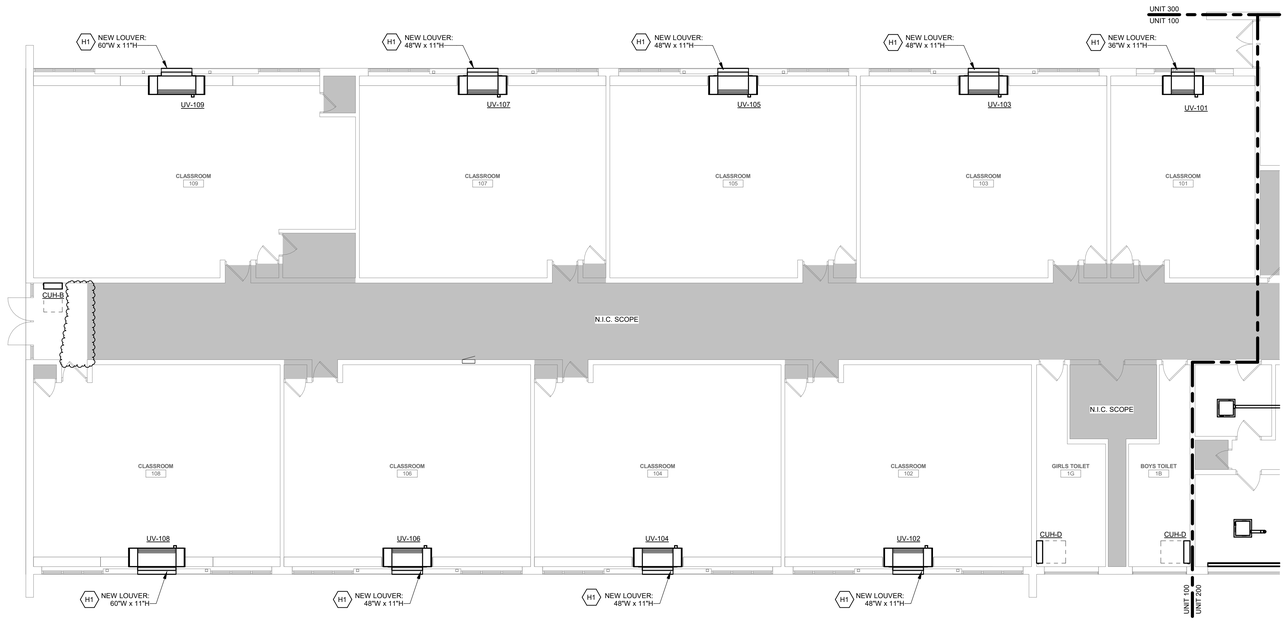
H12 RECONNECT EXISTING HHWS & HHWR PIPING TO EXISTING HEATING EQUIPMENT TO NEW HYDRONIC MAINS.

H13 CONNECT NEW 8"Ø FLUE TO EXISTING 8"Ø FLUE SERVING THE (E) DOMESTIC WATER HEATER. ROUTE NEW 8"Ø UP THROUGH ROOF AND TERMINATE A MINIMUM OF 3 FT. ABOVE ROOF AND 10 FT. MIN FROM ANY INTAKE. TRANSITION AS REQUIRED TO AVOID STRUCTURES, CONDUIT, PIPING, ETC. FLUE TO BE CONSTRUCTED OF STAINLESS STEEL ONLY (PVC WILL NOT BE ACCEPTED) AND COMPLIANT WITH MFR RECOMMENDATIONS AND MMC 2021.

H14 ROUTE NEW HHWS & HHWR PIPING DOWN TO NEW UNIT HEATER. COORDINATE WITH ARCHITECTURAL TO PROVIDE PIPE COVERS AS NEEDED TO CONCEAL EXPOSED PIPING FROM CEILING TO PIPING CONNECTIONS ON UNIT HEATER.

H15 ROUTE NEW HHWS & HHWR PIPING DOWN TO NEW FINNED TUBE RADIATOR. PROVIDE MANUFACTURER SPECIFIC PIPE COVERS AS NEEDED AS NEEDED TO CONCEAL EXPOSED PIPING FROM CEILING TO PIPING CONNECTIONS ON FINNED TUBE RADIATOR.

H16 DUCTSOX FABRIC DUCT WITH INTERNAL HOOP SUPPORT SYSTEM MOUNTED AT ~15' 8" AFF. COORDINATE LOCATION WITH EXISTING LIGHTS AND BASKETBALL HOOPS. COORDINATE DISCHARGE/NOZZLE DIRECTION, SPACING, AND THROW WITH LIGHT FIXTURES. FABRIC DUCT MFR TO PROVIDE FINAL LAYOUT AND ENGINEERING INCLUDING, BUT NOT LIMITED TO, THROWS, VELOCITIES, MATERIALS, SPACING, ETC.



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3. DUCTWORK/PIPING SHALL BE ROUTED AS HIGH AS POSSIBLE AND SHALL NOT BE LOCATED OVER ELECTRICAL EQUIPMENT/PANELS. PROVIDE REQUIRED CLEARANCE IN FRONT OF ELECTRICAL EQUIPMENT. DUCTWORK/PIPING SHALL NOT INTERFERE WITH ELECTRICAL EQUIPMENT CLEARANCE.
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7. THE CONTRACTOR SHALL REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATION OF GRILLES, REGISTERS, AND DIFFUSERS.
8. COORDINATE AND PROVIDE ACCESS DOORS IN HARD CEILING AREAS FOR ACCESS TO BALANCING DAMPERS, ETC. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES.
9. BRANCH DUCTWORK TO GRILLES, REGISTERS AND DIFFUSERS SHALL BE THE SAME SIZE AS THE GRILLE, REGISTER OR DIFFUSER NECK SIZE WHERE NO DUCT SIZE IS INDICATED ON PLAN.
10. MAXIMUM LENGTH OF FLEXIBLE DUCT SHALL BE 5'-0".
11. FOR EQUIPMENT VALVING, COMPONENT, AND PIPING ARRANGEMENT, REFER TO PIPING DIAGRAMS AND DETAILS.
12. PAINT ALL VISIBLE INTERIOR SURFACES OF EXHAUST/RETURN GRILLES, REGISTERS AND VISIBLE ASSOCIATED DUCTWORK FLAT BLACK.
13. THE CEILING SPACE IS USED AS A RETURN AIR PLENUM. NO PLASTIC MATERIALS INCLUDING PVC PIPING, CONDUIT, WIRING, ETC. SHALL BE USED. ALL MATERIAL IN THE CEILING SPACE IS TO BE PLENUM RATED.
14. PROVIDE CODE REQUIRED CLEARANCE/ACCESS DOORS FOR DAMPERS, VALVES, AND CLEANOUTS LOCATED IN WALLS OR ABOVE HARD CEILINGS. COORDINATE LOCATIONS WITH ARCHITECT. REFER TO ARCHITECTURAL PLANS FOR CEILING TYPES.
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18. ROOF MOUNTED EQUIPMENT REQUIRING SERVICE SHALL BE LOCATED A MINIMUM OF 10 FEET FROM ROOF EDGES. WHERE EQUIPMENT CAN'T BE LOCATED AWAY FROM ROOF EDGE AND GUARD RAILS ARE NOT PROVIDED, PROVIDE PERMANENT FALL ARREST ANCHORAGE CONNECTION DEVICE THAT COMPLIES WITH ANSI/ASSE Z 359.1.

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H6 CONNECT NEW HHWS & HHWR PIPING TO NEW UNIT VENTILATOR. REFER TO MANUFACTURER'S GUIDE FOR INSTALLATION OF PIPING TO NEW UNIT. COORDINATE WITH ARCHITECTURAL TO PROVIDE PIPE COVERS FOR HYDRONIC PIPING FROM CEILING TO UNIT, AS NEEDED.

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H8 ROUTE 8"Ø BOILER FLUE/INTAKE UP THROUGH ROOF AND TERMINATE A MINIMUM OF 3 FT ABOVE ROOF AND 10 FT MIN FROM ANY INTAKE. TRANSITION AS REQUIRED TO AVOID STRUCTURES, CONDUIT, PIPING, ETC. TERMINATE INTAKE WITH A GOOSENECK. BOILER VENTS TO BE CONSTRUCTED OF STAINLESS STEEL ONLY (PVC WILL NOT BE ACCEPTED) AND COMPLIANT WITH MFR RECOMMENDATIONS AND MMC 2021.

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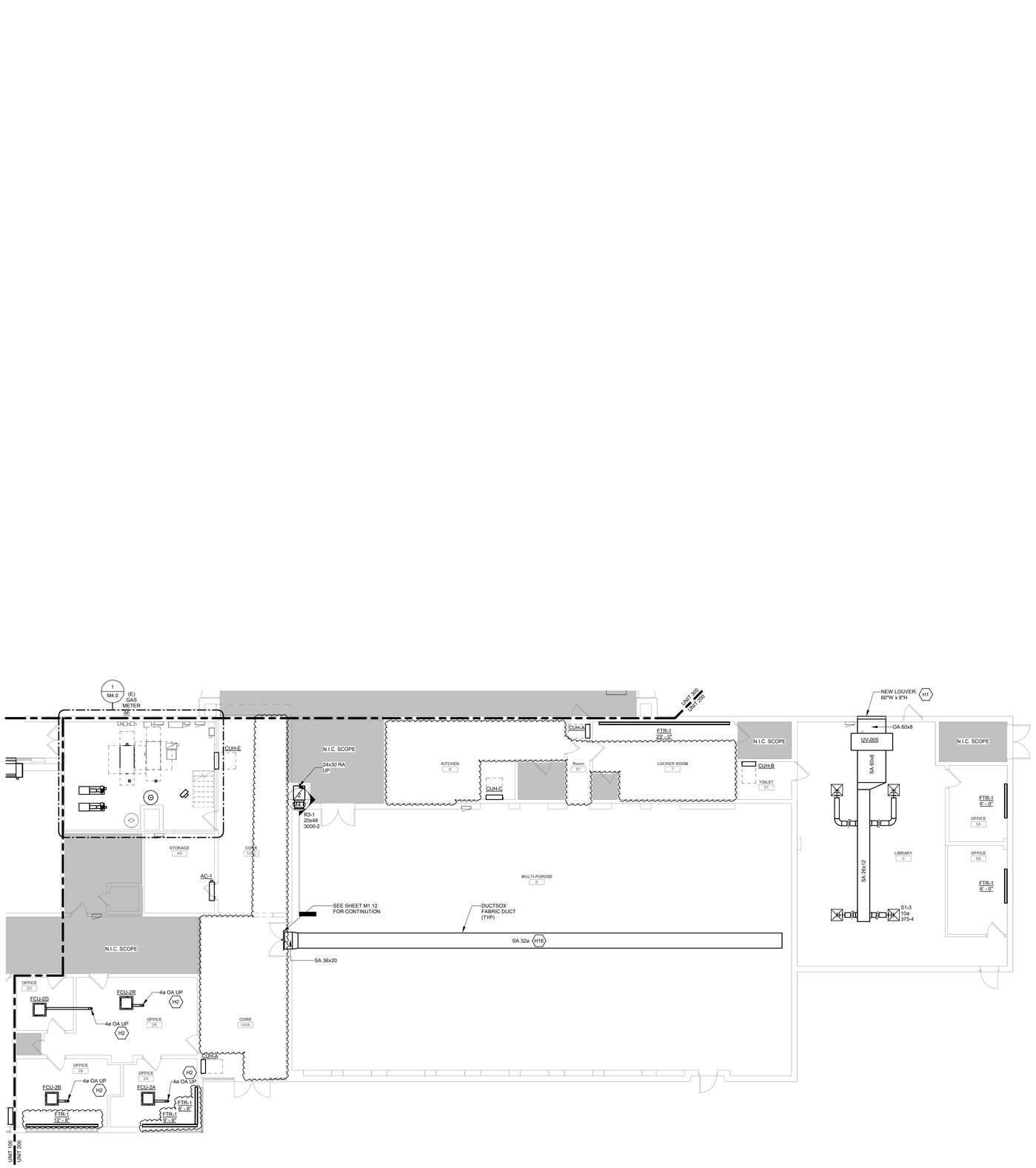

FIRST FLOOR MECHANICAL HVAC PLAN - UNIT 200
SCALE: 1/8" = 1'-0"

FOREST VIEW HVAC IMPROVEMENTS

LANSING SCHOOL DISTRICT

3119 Stoneleigh
Lansing, MI 48910

KINGSCOTT
PORTAGE | CHELSEA | GRAND RAPIDS | ROYAL OAK

Lansing School District

ISSUANCES	DATE
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CONSTRUCTION DOCUMENTS	11.14.2025
ADDENDUM 02	12.11.2025

KEY PLAN

N

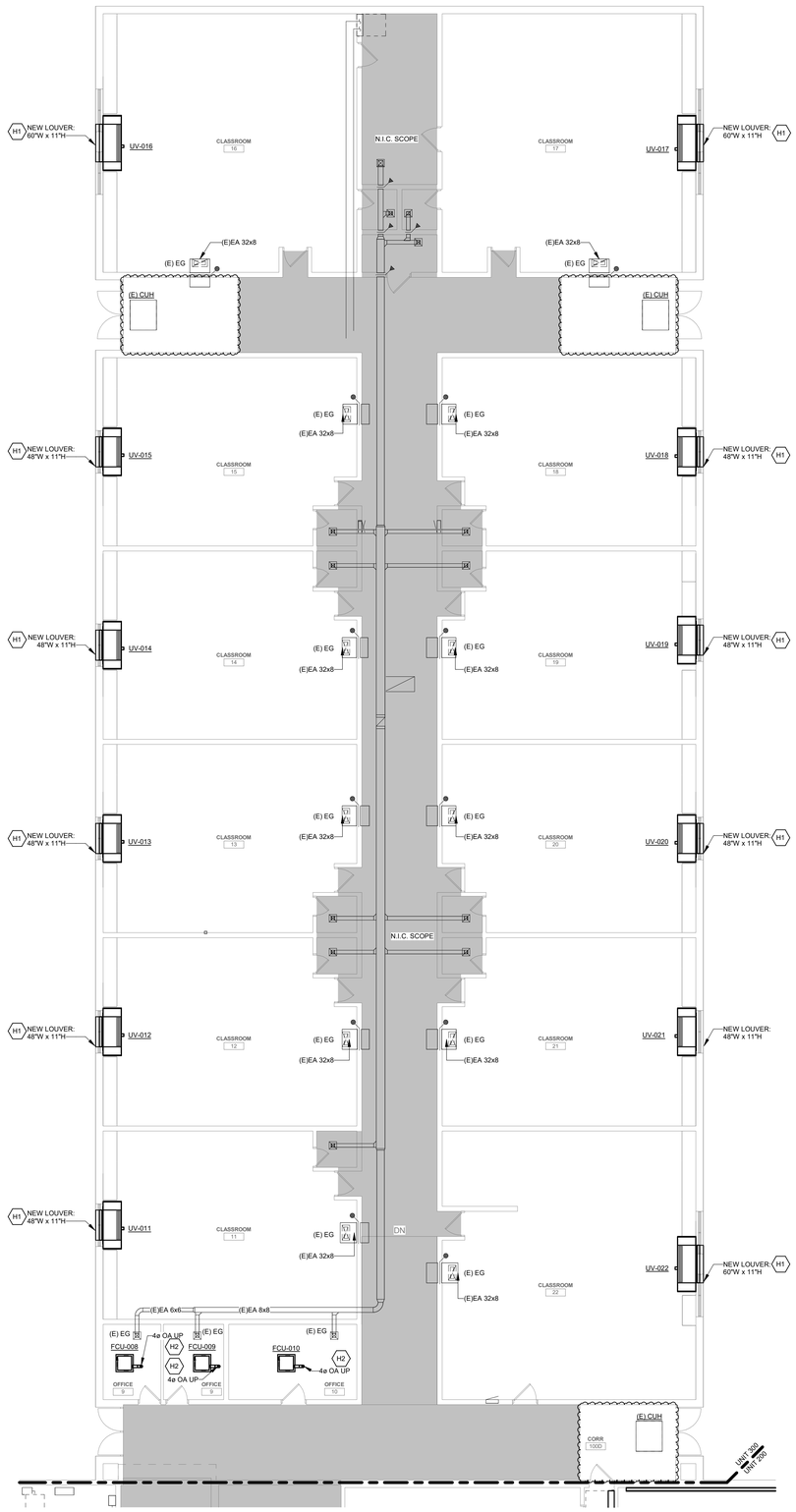
JOB NO. 2616.07

SHEET TITLE
FIRST FLOOR MECHANICAL HVAC PLAN - UNIT 200

SHEET NO.
MH1.2

SES
Strategic Energy Solutions®
4000 W. Eleven Mile Road Berkley, MI 48072
Phone 248.399.1900 Fax 248.399.1901
www.sesnet.com

SES Project # 25 0588 25



FIRST FLOOR MECHANICAL HVAC PLAN - UNIT 300
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PORTAGE | CHELSEA | GRAND RAPIDS | ROYAL OAK

FOREST VIEW HVAC IMPROVEMENTS

LANSING SCHOOL DISTRICT

3119 Stoneleigh
Lansing, MI 48910

Lansing School District

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ADDENDUM 02	12.11.2025

KEY PLAN

JOB NO. 2616.07

N

SHEET TITLE

FIRST FLOOR MECHANICAL HVAC PLAN - UNIT 300

SHEET NO.

MH1.3

Strategic Energy Solutions®
4000 W. Eleven Mile Road Berkley, MI 48072
Phone 248.399.1900 Fax 248.399.1901
www.sesnet.com

SES Project # 25 0588 25

LAST PRINTED: 12/12/2025 9:00:01 AM
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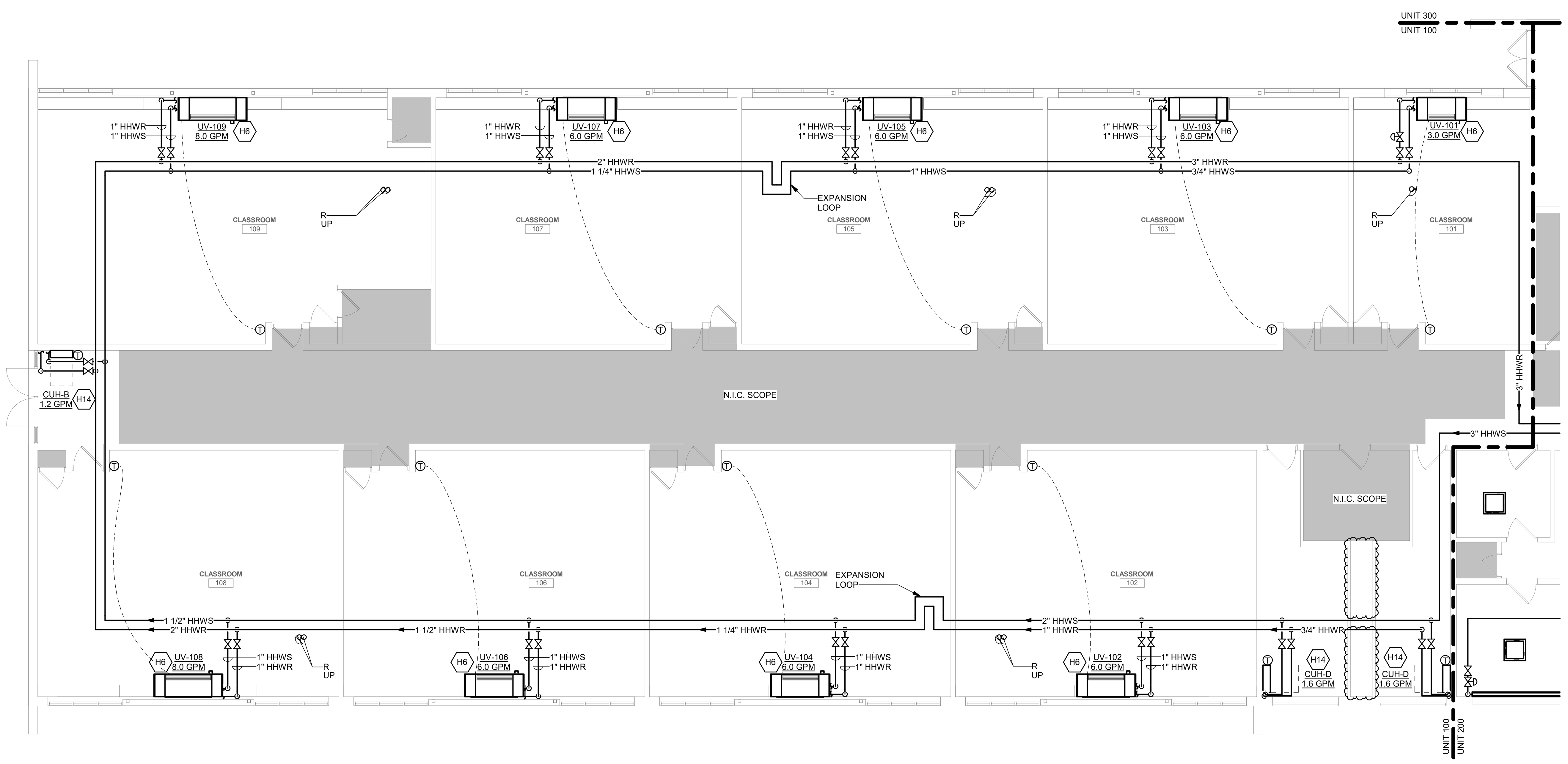

FIRST FLOOR MECHANICAL PIPING PLAN - UNIT 100
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LANSING SCHOOL DISTRICT

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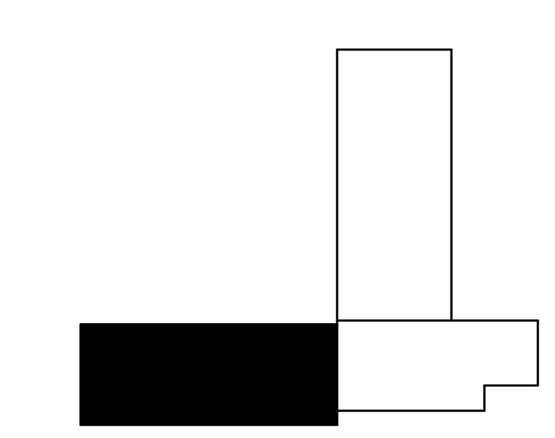
ADDENDUM 02	12.11.2025



KEY PLAN

N

JOB NO. 2616.07

SHEET TITLE
FIRST FLOOR MECHANICAL PIPING PLAN - UNIT 100

SHEET NO.
MP1.1

Strategic Energy Solutions®
4000 W. Eleven Mile Road Berkley, MI 48072
Phone 248.399.1900 Fax 248.399.1901
www.sesnet.com

SES Project # 25 0588 25

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HVAC GENERAL NOTES

1. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF THE WORK. PROVIDE HVAC SYSTEMS COMPLETE PER SPECIFICATION, SMACNA STANDARDS, AND PER APPLICABLE CODES INCLUDING ALL NECESSARY OFFSETS, FITTINGS, SPECIAL RADIUS OR MITERED ELBOWS WHICH ARE REQUIRED DUE TO SPACE CONSTRAINTS OR STRUCTURAL CONDITIONS OR OTHER CONDITIONS.
2. CONTRACTOR SHALL COORDINATE THEIR WORK WITH THE WORK OF ALL OTHER TRADES. ALL DUCTWORK IS TO BE ROUTED AS HIGH AS POSSIBLE. PROVIDE ACCESS AROUND ALL NEW EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS. VERIFY ALL CLEARANCES PRIOR TO THE FABRICATION OF ANY WORK.
3. DUCTWORK/PIPING SHALL BE ROUTED AS HIGH AS POSSIBLE AND SHALL NOT BE LOCATED OVER ELECTRICAL EQUIPMENT/PANELS. PROVIDE REQUIRED CLEARANCE IN FRONT OF ELECTRICAL EQUIPMENT. DUCTWORK/PIPING SHALL NOT INTERFERE WITH ELECTRICAL EQUIPMENT CLEARANCE.
4. DUCTWORK/PIPING SHALL NOT BE INSTALLED IN A LOCATION THAT RESTRICTS THE ACCESS TO MECHANICAL DEVICES REQUIRING ACCESS.
5. THE CONTRACTOR SHALL PROVIDE ALL MISCELLANEOUS SUPPORTING STEEL, ETC. FOR THE PROPER INSTALLATION OF ALL MECHANICAL SYSTEMS.
6. COORDINATE FLOOR, WALL, ROOF PENETRATIONS, LOUVER SIZES, PAD LOCATIONS ETC. WITH ARCHITECTURAL TRADES. SEAL ALL PIPING AND DUCT PENETRATIONS.
7. THE CONTRACTOR SHALL REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATION OF GRILLES, REGISTERS, AND DIFFUSERS.
8. COORDINATE AND PROVIDE ACCESS DOORS IN HARD CEILING AREAS FOR ACCESS TO BALANCING DAMPERS, ETC. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES.
9. BRANCH DUCTWORK TO GRILLES, REGISTERS AND DIFFUSERS SHALL BE THE SAME SIZE AS THE GRILLE, REGISTER OR DIFFUSER NECK SIZE WHERE NO DUCT SIZE IS INDICATED ON PLAN.
10. MAXIMUM LENGTH OF FLEXIBLE DUCT SHALL BE 5'-0".
11. FOR EQUIPMENT VALVING, COMPONENT, AND PIPING ARRANGEMENT, REFER TO PIPING DIAGRAMS AND DETAILS.
12. PAINT ALL VISIBLE INTERIOR SURFACES OF EXHAUST/RETURN GRILLES, REGISTERS AND VISIBLE ASSOCIATED DUCTWORK FLAT BLACK.
13. THE CEILING SPACE IS USED AS A RETURN AIR PLENUM. NO PLASTIC MATERIALS INCLUDING PVC PIPING, CONDUIT, WIRING, ETC. SHALL BE USED. ALL MATERIAL IN THE CEILING SPACE IS TO BE PLENUM RATED.
14. PROVIDE CODE REQUIRED CLEARANCE/ACCESS DOORS FOR DAMPERS, VALVES, AND CLEANOUTS LOCATED IN WALLS OR ABOVE HARD CEILINGS. COORDINATE LOCATIONS WITH ARCHITECT. REFER TO ARCHITECTURAL PLANS FOR CEILING TYPES.
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17. ALL BRANCH PIPING TO TERMINAL UNITS TO BE 3/4" UNLESS OTHERWISE NOTED.
18. ROOF MOUNTED EQUIPMENT REQUIRING SERVICE SHALL BE LOCATED A MINIMUM OF 10 FEET FROM ROOF EDGES. WHERE EQUIPMENT CAN'T BE LOCATED AWAY FROM ROOF EDGE AND GUARD RAILS ARE NOT PROVIDED, PROVIDE PERMANENT FALL ARREST ANCHORAGE CONNECTION DEVICE THAT COMPLIES WITH ANSI/ASSE Z 359.1.

MECHANICAL KEYNOTES

H1 NEW DECORATIVE, CLEAR ANODIZED, DRAINABLE BLADE LOUVER PROVIDED BY MANUFACTURER. PROVIDE WITH WALL SLEEVE. COORDINATE WITH ARCHITECT AND STRUCTURAL FOR DETAILS AND SUPPORT REQUIRED FOR INSTALLATION OF LOUVER.

H2 ROUTE O/A DUCT FROM CEILING CASSETTE UP THROUGH ROOF AND TERMINATE 1'6" ABOVE ROOF WITH GOOSENECK AND BIRD SCREEN.

H3 MOUNT NEW MULTI-SPLIT CONDENSING UNIT ON STEEL RAILS. ROUTE REFRIGERANT PIPING FROM CONDENSING UNIT TO CASSETTE(S) THROUGH A COVERED PIPE CURB.

H4 MOUNT NEW CONDENSING UNIT ON 6" REMOVABLE PAD. ROUTE ASSOCIATED REFRIGERANT PIPING THROUGH COVERED PIPE CURB .

H5 MOUNT NEW SPLIT SYSTEM CONDENSING UNIT ON STEEL RAILS. ROUTE REFRIGERANT PIPING FROM CONDENSING UNIT TO INDOOR WALL-MOUNTED UNIT THROUGH A COVERED PIPE CURB.

H6 CONNECT NEW HHWS & HHWR PIPING TO NEW UNIT VENTILATOR. REFER TO MANUFACTURER'S GUIDE FOR INSTALLATION OF PIPING TO NEW UNIT. COORDINATE WITH ARCHITECTURAL TO PROVIDE PIPE COVERS FOR HYDRONIC PIPING FROM CEILING TO UNIT, AS NEEDED.

H7 PROVIDE THERMOSTAT WITH LOCKING COVER IN MULTI-PURPOSE ROOM

H8 ROUTE 8"Ø BOILER FLUE/INTAKE UP THROUGH ROOF AND TERMINATE A MINIMUM OF 3 FT ABOVE ROOF AND 10 FT MIN FROM ANY INTAKE. TRANSITION AS REQUIRED TO AVOID STRUCTURES, CONDUIT, PIPING, ETC. TERMINATE INTAKE WITH A GOOSENECK. BOILER VENTS TO BE CONSTRUCTED OF STAINLESS STEEL ONLY (PVC WILL NOT BE ACCEPTED) AND COMPLIANT WITH MFR RECOMMENDATIONS AND MMC 2021.

H9 MOUNT NEW ROOFTOP UNIT ON NEW STRUCTURAL STEEL PLATFORM. SEE STRUCTURAL DRAWINGS FOR MORE DETAILS. ROUTE CONDENSATE FROM COOLING COIL TO NEAREST ROOF DRAIN, SEE DETAIL ON SHEET M5.1 FOR MORE DETAILS.

H10 ROUTE REFRIGERANT PIPING TO AND FROM RESPECTIVE MULTI-SPLIT CONDENSING UNIT ON ROOF TO CEILING CASSETTE THROUGH COVERED PIPE CURB. INSULATE AND ROUTE 3/4" PVC CONDENSATE DRAIN PIPE FROM CEILING CASSETTE TO NEAREST UTILITY SINK OR MECHANICAL ROOM FLOOR DRAIN.

H11 PIPE CURB SIZES AND LOCATION SHOWN AS REFERENCE ONLY.

H12 RECONNECT EXISTING HHWS & HHWR PIPING TO EXISTING HEATING EQUIPMENT TO NEW HYDRONIC MAINS.

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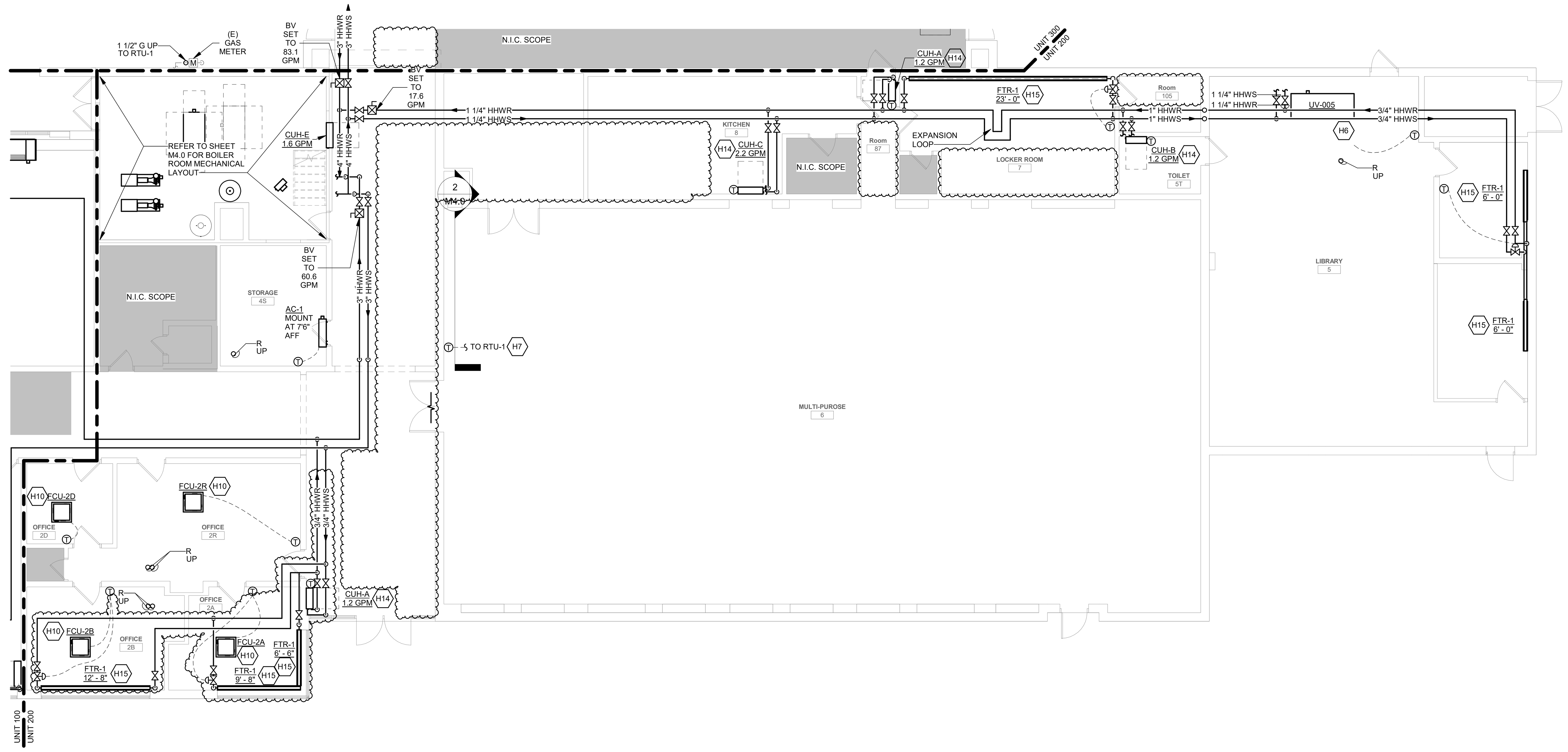
H16 DUCTSOX FABRIC DUCT WITH INTERNAL HOOP SUPPORT SYSTEM MOUNTED AT ~15' 8" AFF. COORDINATE LOCATION WITH EXISTING LIGHTS AND BASKETBALL HOOPS. COORDINATE DISCHARGE/NOZZLE DIRECTION, SPACING, AND THROW WITH LIGHT FIXTURES. FABRIC DUCT MFR TO PROVIDE FINAL LAYOUT AND ENGINEERING INCLUDING, BUT NOT LIMITED TO, THROWS, VELOCITIES, MATERIALS, SPACING, ETC.



FIRST FLOOR MECHANICAL PIPING PLAN - UNIT 200
SCALE: 1/8" = 1'-0"

KINGSCOTT
PORTAGE | CHELSEA | GRAND RAPIDS | ROYAL OAK

FOREST VIEW HVAC IMPROVEMENTS

LANSING SCHOOL DISTRICT
3119 Stoneleigh
Lansing, MI 48910

Lansing School District

ISSUANCES	DATE
DESIGN DEVELOPMENT	09.26.2025
CONSTRUCTION DOCUMENTS	11.14.2025
ADDENDUM 02	12.11.2025

KEY PLAN

N

JOB NO. 2616.07

SHEET TITLE
FIRST FLOOR MECHANICAL PIPING PLAN - UNIT 200

SHEET NO.
MP1.2

SES
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4000 W. Eleven Mile Road Berkley, MI 48072
Phone 248.399.1900 Fax 248.399.1901
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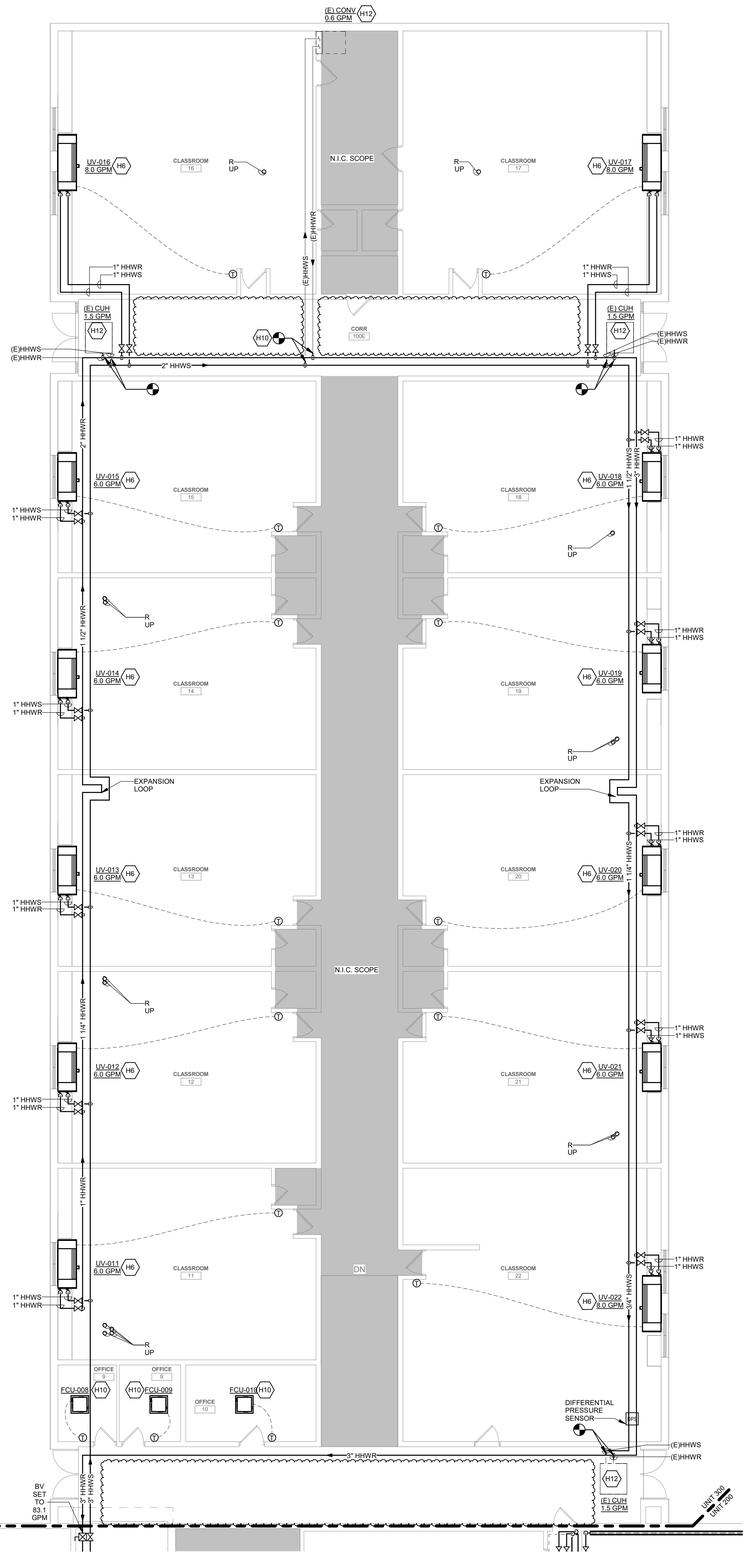
SES Project # 25 0588 25



FIRST FLOOR MECHANICAL PIPING PLAN - UNIT 300
SCALE: 1/8" = 1'-0"

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PORTAGE | CHELSEA | GRAND RAPIDS | ROYAL OAK

FOREST VIEW HVAC IMPROVEMENTS

LANSING SCHOOL DISTRICT

3119 Stoneleigh
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Lansing School District

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KEY PLAN

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JOB NO. 2616.07

SHEET TITLE
FIRST FLOOR MECHANICAL PIPING PLAN - UNIT 300

SHEET NO.
MP1.3

SES
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4000 W. Eleven Mile Road Berkley, MI 48072
Phone 248.399.1900 Fax 248.399.1901
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SES Project # 25 0588 25

MECHANICAL DEMOLITION NOTES

1. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF WORK TO BE PERFORMED. THE EXACT EXTENT OF DEMOLITION SHALL BE AS REQUIRED BY THE NEW WORK.
2. PRIOR TO COMMENCEMENT OF WORK, CONTRACTOR SHALL VISIT THE SITE AND BECOME FAMILIAR WITH EXISTING SITE CONDITIONS, SYSTEMS, AND UTILITIES. NOTIFY ARCHITECT OF ANY INTERFERENCES OR DISCREPANCIES.
3. VERIFY DEPTH, SIZE, LOCATIONS AND CONDITION OF EXISTING UTILITIES IN THE FIELD, INCLUDING POINTS OF CONNECTION PRIOR TO STARTING ANY WORK.
4. ANY INTERRUPTIONS OF EXISTING SERVICES AND/OR EQUIPMENT SHALL BE PERFORMED AT A TIME APPROVED IN ADVANCE BY THE OWNER'S REPRESENTATIVE SO AS NOT TO INTERFERE WITH THE PRESENT BUILDING'S OPERATION.
5. ALL ITEMS ON DEMOLITION PLANS SHALL BE CONSIDERED EXISTING UNLESS OTHERWISE NOTED. ALL WORK INDICATED ON PLANS HAS BEEN LOCATED PER EXISTING DRAWINGS AND/OR FIELD OBSERVATION AND REQUIRES FIELD VERIFICATION.
6. ALL ITEMS INDICATED WITH BROKEN LINES SHALL BE REMOVED COMPLETE, WITH ALL RELATED ITEMS INCLUDING HANGERS, SUPPORTS, INSULATION, CONTROLS, ETC. CAP ALL OPEN ENDED PIPES AND DUCTS.
7. ALL EXISTING WORK TO REMAIN SHALL BE PROTECTED FROM DAMAGE. WHERE DUCT OR PIPE INSULATION HAS BEEN DAMAGED DURING DEMOLITION, THE CONTRACTOR SHALL REPAIR INSULATION AS REQUIRED TO MATCH EXISTING.
8. THE OWNER SHALL HAVE FIRST RIGHT OF REFUSAL ON ALL EQUIPMENT BEING REMOVED. ALL ITEMS REMOVED SHALL BE LEGALLY DISPOSED OF. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXISTING RELOCATED AND OWNER PROVIDED EQUIPMENT.

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MECHANICAL ENLARGED KEYNOTES

M1 ROUTE 8"Ø BOILER FLUE/INTAKE UP THROUGH ROOF AND TERMINATE A MINIMUM OF 3 FT ABOVE ROOF AND 10 FT MIN FROM ANY INTAKE. TRANSITION AS REQUIRED TO AVOID STRUCTURES, CONDUIT, PIPING, ETC. TERMINATE INTAKE WITH A GOOSENECK. BOILER VENTS TO BE CONSTRUCTED OF STAINLESS STEEL ONLY (PVC WILL NOT BE ACCEPTED) AND COMPLIANT WITH MFR RECOMMENDATIONS AND MMC 2021.

M2 CONNECT NEW 4" HHWS & R TO (E) BOILER AND ROUTE TO NEW HEATING HOT WATER PIPE HEADERS TO CONNECT TO NEW HEATING HOT WATER PLANT.

M3 CONNECT NEW 8"Ø FLUE TO (E) 8"Ø FLUE SERVING (E) DWH-1. ROUTE UP THROUGH THE ROOF AND TERMINATE A MINIMUM OF 3FT ABOVE ROOF AND 10FT. FROM ANY INTAKE WITH A WEATHER CAP. TRANSITION AS REQUIRED TO AVOID STRUCTURES, CONDUIT, PIPING, ETC. VENTS TO BE CONSTRUCTED OF STAINLESS STEEL ONLY (PVC WILL NOT BE ACCEPTED) AND COMPLIANT WITH MFR RECOMMENDATIONS AND MMC 2021.

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MECHANICAL DEMOLITION KEYNOTES

Z1 REMOVE HORIZONTAL UNIT VENTILATOR, ASSOCIATED LOUVER AND ALL ASSOCIATED PIPING, FITTINGS, VALVES AND ACCESSORIES BACK TO PIPE MAINS. REMOVE ALL ASSOCIATED CONTROLS INCLUDING ALL ASSOCIATED THERMOSTATS.

Z2 REMOVE STEAM BOILER, CONDENSATE RETURN UNITS, PUMPS, BOILER FEED WATER UNIT, FLASH TANK, STEAM TRAPS WITHIN BOILER ROOM. DEMOLISH AND REMOVE ALL ASSOCIATED PIPING, FITTINGS, VALVES AND ACCESSORIES ASSOCIATED WITH THIS EQUIPMENT UNLESS OTHERWISE NOTED. STEAM AND CONDENSATE PIPING IN TUNNELS TO BE CAPPED AT TUNNEL ENTRANCE AND ABANDONED IN PLACE. REMOVE ALL ASSOCIATED CONTROLS INCLUDING ALL ASSOCIATED THERMOSTATS.

Z3 REMOVE HYDRONIC PIPING TO AND FROM CONDENSING BOILER AND ALL ASSOCIATED VALVES, FITTINGS AND ACCESSORIES. GAS CONNECTION, VENT CONNECTION, DRAIN CONNECTION, FLUE AND COMBUSTION AIR INTAKE TO REMAIN IN PLACE.

Z4 REMOVE CEILING MOUNTED UNIT VENTILATOR AND ALL ASSOCIATED PIPING, VALVES, FITTINGS & ACCESSORIES, EXTERIOR LOUVER AND ASSOCIATED DUCTWORK AND DIFFUSERS. REMOVE ALL ASSOCIATED CONTROLS INCLUDING ALL ASSOCIATED THERMOSTATS.

Z5 REMOVE FINNED TUBE RADIATOR AND ALL ASSOCIATED PIPING, FITTINGS AND VALVES UNLESS OTHERWISE NOTED. REMOVE ALL ASSOCIATED CONTROLS INCLUDING ALL ASSOCIATED THERMOSTATS.

Z6 REMOVE STEAM CONVECTOR AND ALL ASSOCIATED PIPING, FITTINGS, VALVES AND ACCESSORIES BACK TO STEAM MAIN. DEMOLISH ALL ASSOCIATED EXTERIOR LOUVERS, IF APPLICABLE. COORDINATE WITH ARCHITECTURAL TO PATCH AND PAINT WALL AS NEEDED AND TO BLANK OFF ANY EXTERIOR OPENINGS.. REMOVE ALL ASSOCIATED CONTROLS INCLUDING ALL ASSOCIATED THERMOSTATS.

Z7 REMOVE FLOOR-MOUNTED STEAM HEATER AND ALL ASSOCIATED PIPING, FITTINGS, VALVES AND ACCESSORIES BACK TO STEAM MAIN. COORDINATE WITH ARCHITECTURAL TO PATCH FLOORS AS NEEDED. REMOVE ALL ASSOCIATED CONTROLS INCLUDING ALL ASSOCIATED THERMOSTATS.

Z8 REMOVE WALL-MOUNTED STEAM RADIATORS AND ALL ASSOCIATED PIPING, FITTINGS, VALVES, AND ACCESSORIES BACK TO STEAM MAIN. COORDINATE WITH ARCHITECTURAL TO PATCH WALLS AS NEEDED. REMOVE ALL ASSOCIATED CONTROLS INCLUDING ALL ASSOCIATED THERMOSTATS.

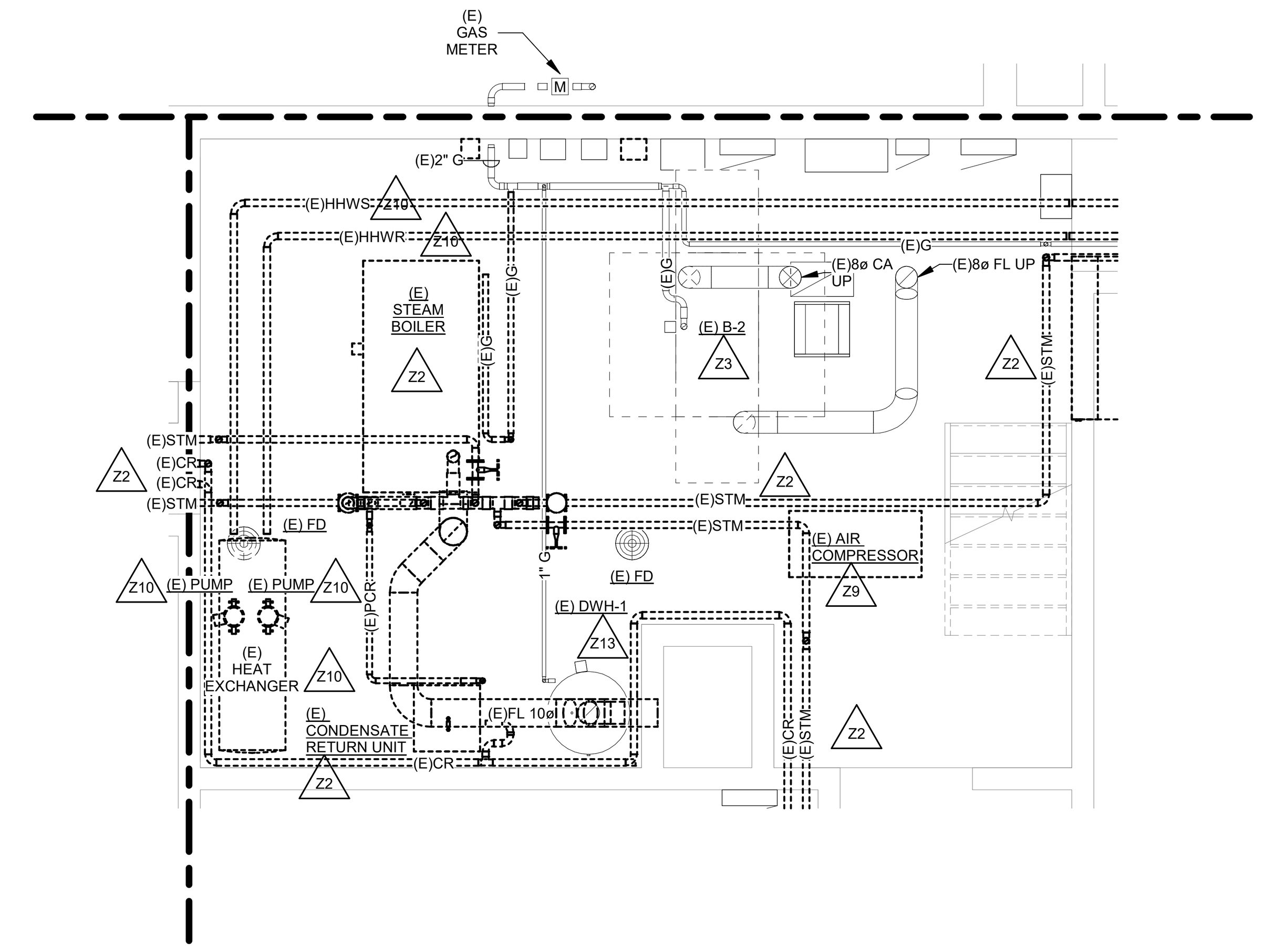
Z9 REMOVE AIR COMPRESSOR AND ALL ASSOCIATED PNEUMATIC CONTROLS INCLUDING BUT NOT LIMITED TO CONTROL PANELS, GAUGES, PIPING, ETC.

Z10 REMOVE STEAM TO HOT WATER PLANT. INCLUDING BUT NOT LIMITED TO PUMPS, HEAT EXCHANGER, EXPANSION TANK, PIPING, FITTINGS, VALVES & ACCESSORIES. REMOVE ALL ASSOCIATED CONTROLS.

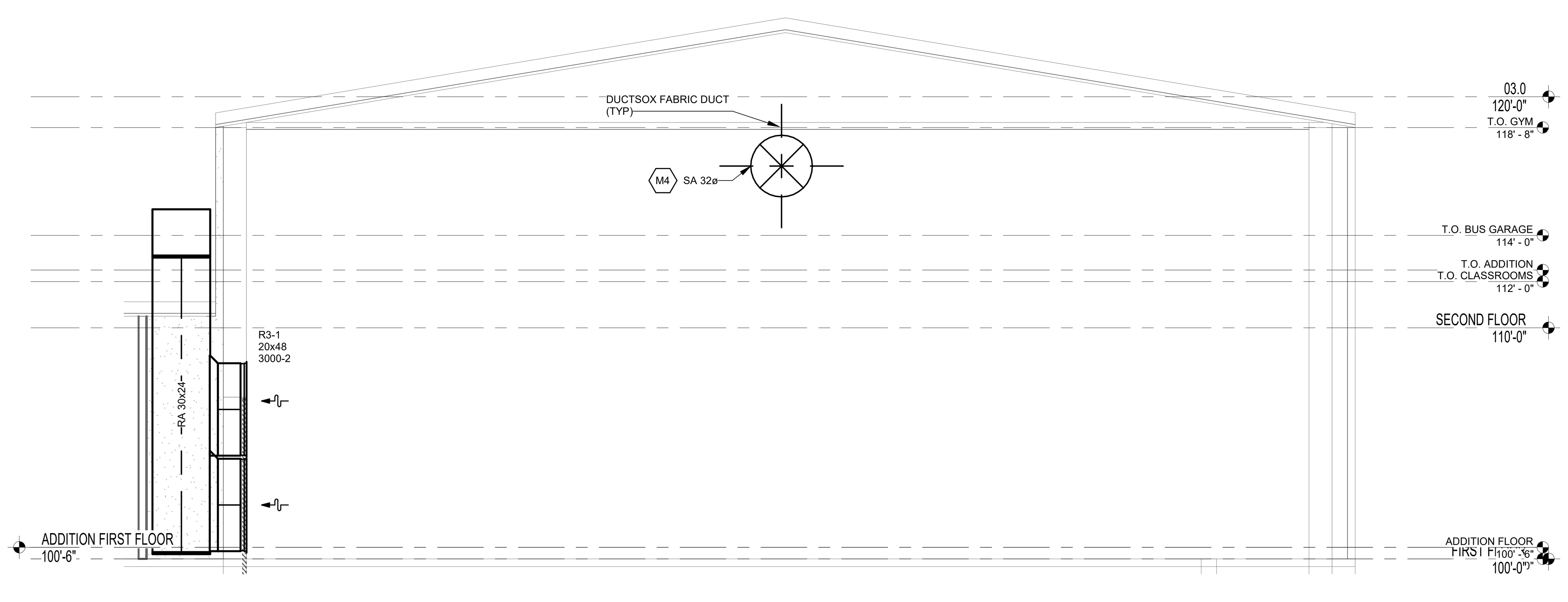
Z11 REMOVE HYDRONIC PIPING FROM HEATING EQUIPMENT. HYDRONIC PIPING TO BE RECONNECTED TO NEW HYDRONIC PIPING MAINS AS PART OF THE NEW WORK SCOPE.

Z12 CAP ROOF RELIEF OPENING SERVING THE MULTI-PURPOSE ROOM AT THE ROOF LEVEL. COORDINATE WITH ARCHITECTURE AND STRUCTURAL FOR ROOF PATCHING DETAILS.

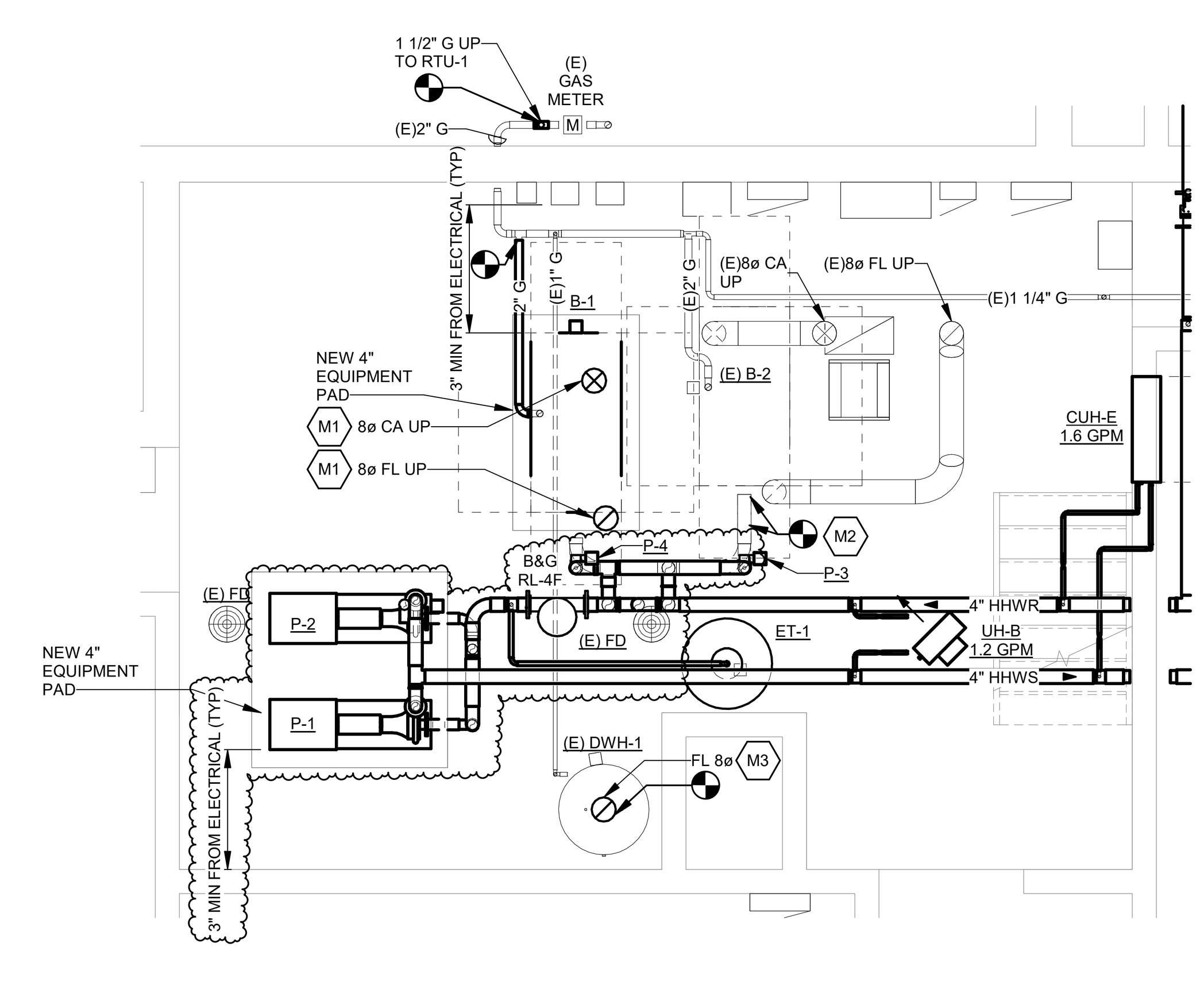
Z13 REMOVE 8"Ø FLUE SERVING DOMESTIC WATER HEATER AS NECESSARY TO REROUTE UP THROUGH THE ROOF IN THE NEW WORK SCOPE.



ENLARGED MECHANICAL ROOM DEMOLITION PLAN
SCALE: 1/4" = 1'-0"



2
M1.12
GYM N-S SECTION
SCALE: 1/4" = 1'-0"



ENLARGED BOILER ROOM PLAN
SCALE: 1/4" = 1'-0"

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LANSING SCHOOL DISTRICT

3119 Stoneleigh
Lansing, MI 48910

Lansing School District

ISSUANCES	DATE
DESIGN DEVELOPMENT	09.26.2025
CONSTRUCTION DOCUMENTS	11.14.2025
ADDENDUM 02	12.11.2025

Strategic Energy Solutions®
4000 W. Eleven Mile Road Berkley, MI 48072
Phone 248.399.1900 Fax 248.399.1901
www.sesnet.com

SES Project # 25 0588 25

JOB NO. 2616.07

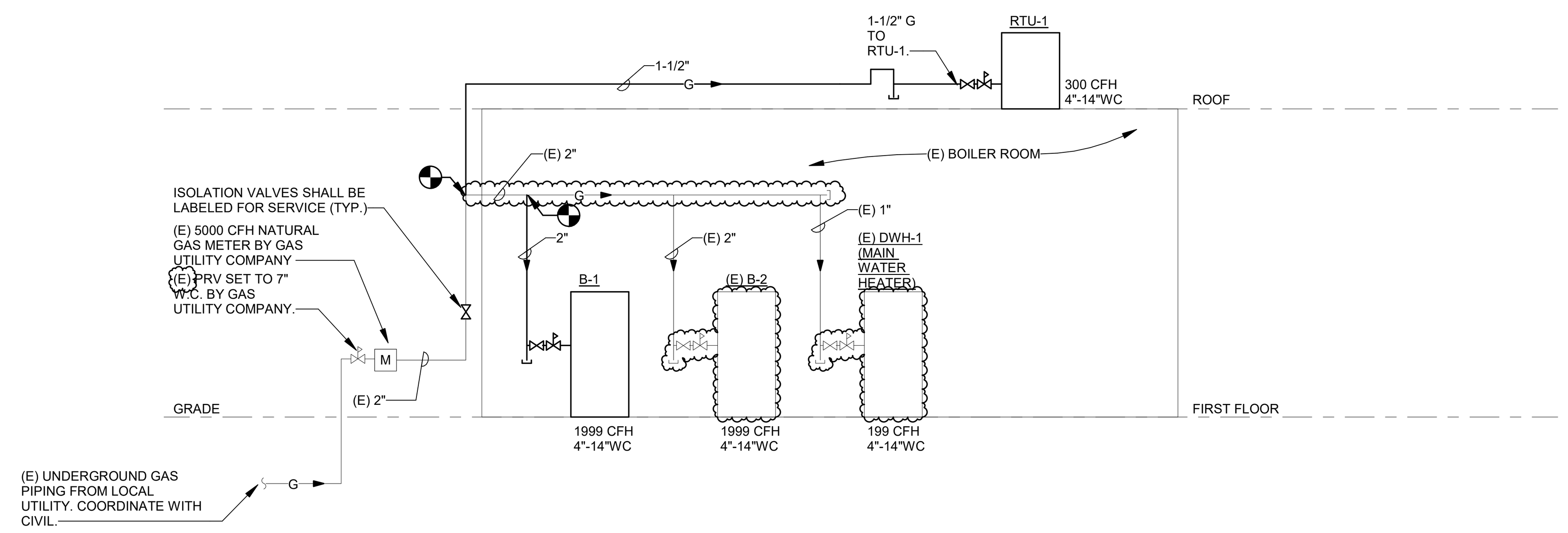
SHEET TITLE
ENLARGED MECHANICAL PLANS

SHEET NO.
M4.0

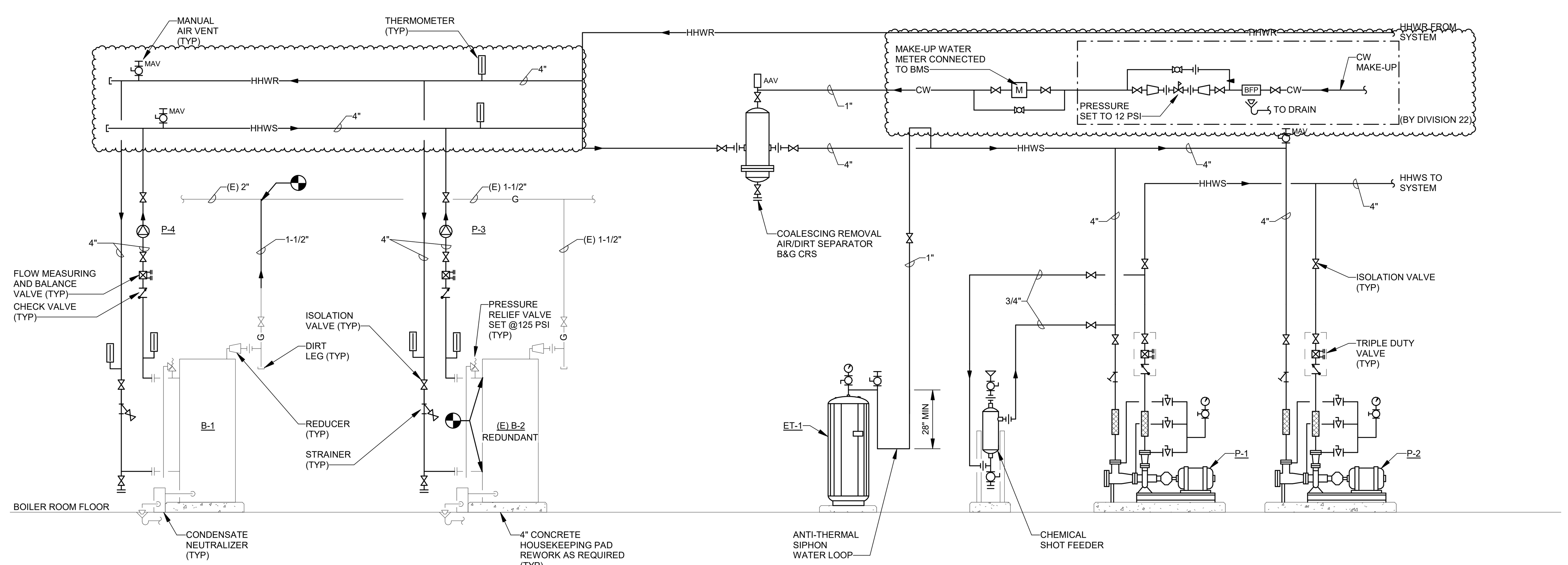
GAS LOAD SUMMARY

EQUIPMENT ID	CFH
(E) B-2	1999
(E) DWH-1	199
B-1	1999
RTU-1	300
TOTAL	4497

NOTES:
1. CONTRACTOR TO COORDINATE GAS LOAD AND PRESSURE REQUIREMENTS WITH LOCAL UTILITY COMPANY.
2. CONTRACTOR SHALL VERIFY ALL EQUIPMENT CONNECTION REQUIREMENTS (SIZES, LOCATION, TYPES, ETC.) PRIOR TO COMMENCEMENT OF WORK.
3. 7" W.C. DELIVERY PRESSURE. DISTRIBUTION OF GAS PIPING IS SIZED BASED ON A TOTAL DEVELOPMENT LENGTH OF 60 LINEAR FEET SCHEDULE 40 METALLIC PIPE TO FURTHEST EQUIPMENT.
4. CONTRACTOR TO VERIFY EQUIPMENT MINIMUM PRESSURE REQUIREMENTS FROM SUBMITTALS AND REQUEST ELEVATED PRESSURE FROM UTILITY COMPANY AS REQUIRED.



NATURAL GAS PIPING DIAGRAM
NO SCALE



HEATING HOT WATER SYSTEM PIPING DIAGRAM
NO SCALE

LAST PRINTED: 12/11/2025 9:00:16 AM

Autodesk Docs://LSD - Forest View HVAC Improvements/25 0588 25_LSD Forest View AC Upgrade_MEP_2025.rvt

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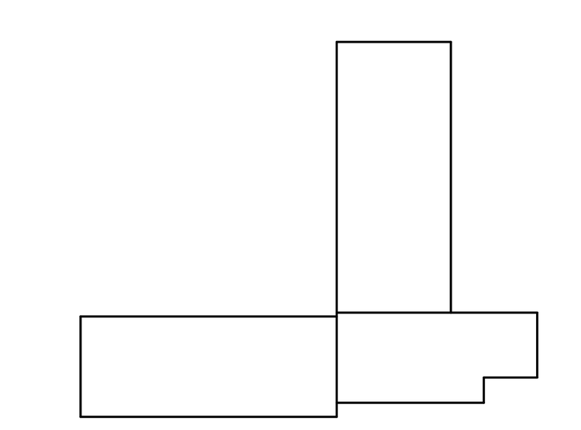

KEY PLAN

N

JOB NO. 2616.07

SHEET TITLE

MECHANICAL RISER DIAGRAMS

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Phone 248.399.1900 Fax 248.399.1901
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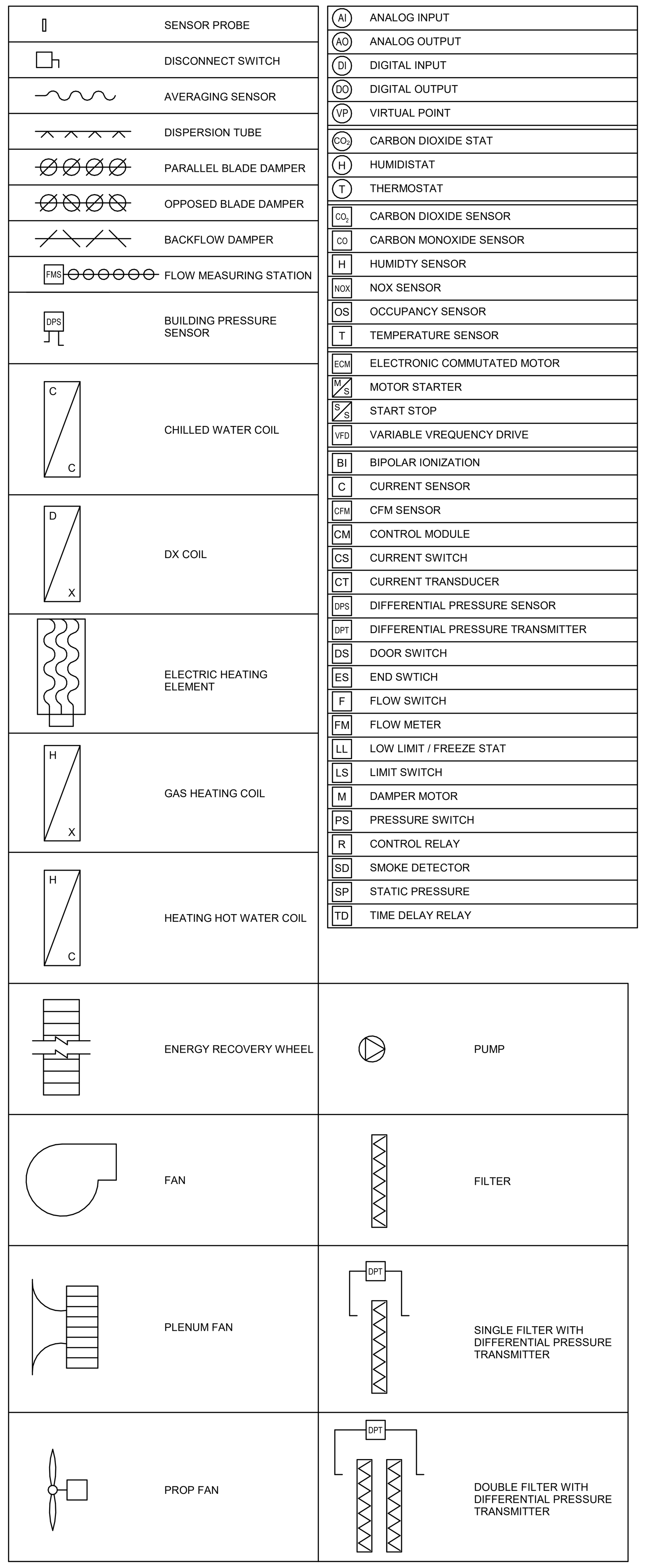
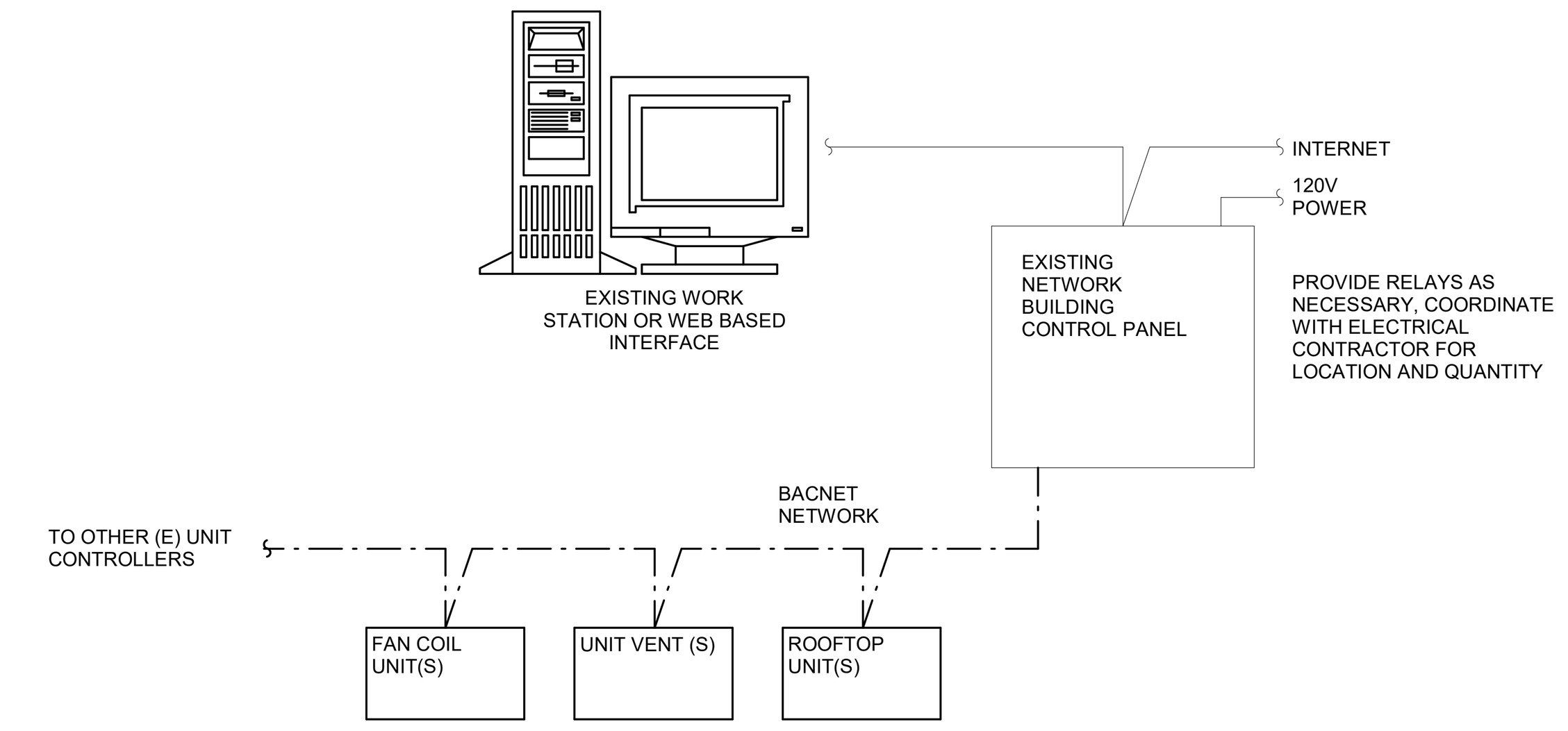
SHEET NO.

M7.0


SENSOR PROBE
DISCONNECT SWITCH
AVERAGING SENSOR
DISPERSION TUBE
PARALLEL BLADE DAMPER
OPPOSED BLADE DAMPER
BACKFLOW DAMPER
FLOW MEASURING STATION
BUILDING PRESSURE SENSOR
CHILLED WATER COIL
DX COIL
ELECTRIC HEATING ELEMENT
GAS HEATING COIL
HEATING HOT WATER COIL
ENERGY RECOVERY WHEEL
FAN
PLENUM FAN
PROP FAN
AI ANALOG INPUT
AO ANALOG OUTPUT
DI DIGITAL INPUT
DO DIGITAL OUTPUT
VP VIRTUAL POINT
CO2 CARBON DIOXIDE STAT
H HUMIDISTAT
T THERMOSTAT
CO2 CARBON DIOXIDE SENSOR
CO CARBON MONOXIDE SENSOR
H HUMIDTY SENSOR
NOX NOX SENSOR
OS OCCUPANCY SENSOR
T TEMPERATURE SENSOR
ECM ELECTRONIC COMMUTATED MOTOR
MOTOR STARTER
START STOP
VFD VARIABLE VREQUENCY DRIVE
BI BIPOLAR IONIZATION
C CURRENT SENSOR
CFM CFM SENSOR
CM CONTROL MODULE
CS CURRENT SWITCH
CT CURRENT TRANSDUCER
DPS DIFFERENTIAL PRESSURE SENSOR
DPT DIFFERENTIAL PRESSURE TRANSMITTER
DS DOOR SWITCH
ES END SWITCH
F FLOW SWITCH
FM FLOW METER
LL LOW LIMIT / FREEZE STAT
LS LIMIT SWITCH
M DAMPER MOTOR
PS PRESSURE SWITCH
R CONTROL RELAY
SD SMOKE DETECTOR
SP STATIC PRESSURE
TD TIME DELAY RELAY
PUMP
FILTER
SINGLE FILTER WITH DIFFERENTIAL PRESSURE TRANSMITTER
DOUBLE FILTER WITH DIFFERENTIAL PRESSURE TRANSMITTER

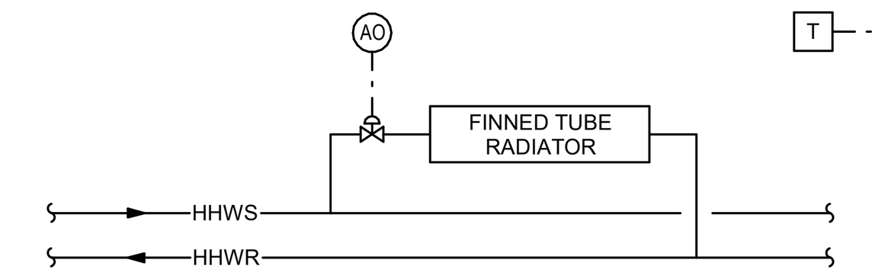

EXISTING WORK STATION OR WEB BASED INTERFACE
INTERNET
120V POWER
EXISTING NETWORK BUILDING CONTROL PANEL
PROVIDE RELAYS AS NECESSARY, COORDINATE WITH ELECTRICAL CONTRACTOR FOR LOCATION AND QUANTITY
BACNET NETWORK
TO OTHER (E) UNIT CONTROLLERS
FAN COIL UNIT(S)
UNIT VENT (S)
ROOFTOP UNIT(S)

GENERAL CONTROLS INTENT:

GENERAL INTENT:
1. INTEGRATE ALL NEW COMPONENTS INTO EXISTING BMS. UPDATE GRAPHICS AND SEQUENCES ACCORDINGLY TO REFLECT NEW EQUPIMENT.

BUILDING AUTOMATION SYSTEM NOTES:
1. CONFIGURATION AND ORDER OF CONTROLLER CONNECTION IS FOR REPRESENTATION PURPOSES ONLY. TTC CONTROL SYSTEM DRAWINGS SHALL REFLECT ACTUAL AS-BUILT CONDITIONS, INCLUDING ORDER IN WHICH CONTROLLERS ARE CONNECTED WITHIN THE NETWORK. DDC PANELS SHALL BE LOCATED IN MECHANICL, STORAGE, OR CUSTODIAL SPACES WITH 120V CONTROL POWER AT EACH. WHERE DDC PANELS AND/OR POWER SUPPLIES ARE REQUIRED, IT IS THE TCC RESPONSIBILITY TO PROVIDE POWER TO THOSE PANELS AND COORDINATE WITH THE ELECTRICAL ENGINEER/CONTRACTOR. IT SHOULD BE NOTED THAT ADDITIONAL ELEMENTS SUCH AS GENERAL VALVES, OTHER NON-ACTIVELY CONTROLLED DEVICES, AND/OR OTHER NETWORK COMMUNICATION DEVICES (SUCH AS SWITCHES,GATEWAYS, ROUTERS, SERVERS, ETC.) MAY NOT BE SHOWN ON CONTROLS DRAWINGS. REFER TO THE DETAILS, PROJECT PLANS, AND SPECIFICATIONS FOR ADDITIONAL DEVICES AND INSTRUCTIONS THAT ARE REQUIRED IN THE CONSTRUCTION OF THESE SYSTEMS.
2. ALL CONTROL POINTS SHALL BE TRENDABLE. AFTER THE SYSTEM IS BALANCED, COMMISSIONED, AND OPERATIONAL, TRENDING WILL BE REQUIRED TO VERIFY THE ACCURACY AND ACCEPTABILITY OF THE CONTROL SEQUENCES. PROVIDE ADDITIONAL ADJUSTMENTS AND/OR CHANGES IN STRATEGY IN ORDER TO HONE BUILDING OPERATION AND OPTIMIZE ENERGY USAGE. ALL SET POINTS SHALL BE OPERATOR ADJUSTABLE THROUGH THE BMS AT THE OPERATOR'S WORKSTATION (OWS).
3. PROVIDE PROGRAMMING FOR ADDITIONAL ALARMS AS REQUESTED BY THE OWNER AND/OR ENGINEER.
4. SEE FLOOR PLANS, SPECIFICATIONS, AND SHOP DRAWINGS FOR MINIMUM CLEARANCE OF ALL MECHANICAL EQUIPMENT AND CONTROL DEVICES. MAINTAIN ACCEPTABLE CLEARANCE IN ALL AREAS REQUIRED FOR SERVICE AND ACCESS OF MECHANICAL EQUIPMENT AS PER ANY APPLICABLE CODES AND/OR MANUFACTURER RECOMMENDATIONS. MAINTAIN CODE-REQUIRED MINIMUM CLEARANCES ABOVE AND IN FRONT OF ALL ELECTRICAL PANELS, INCLUDING THOSE INCLUDED AS A PART OF MECHANICAL EQUIPMENT.
5. ALL POINTS SHALL BE INCLUDED ON GRAPHICS THROUGH BMS AT OWS.
6. FOR EQUIPMENT PROVIDED WITH BACNET OR MODBUS CONTROLLERS/COMMUNICATION INTERFACES, PROVIDE SUB-GRAPHICS THROUGH THE BMS AT THE OWS. THE GRAPHIC SHALL DISPLAY ALL POINTS LISTED IN INDIVIDUAL CONTROL DIAGRAMS. PROVIDE ADDITIONAL READ/WRITE POINTS UPON REQUEST BY THE OWNER FOR SUCH EQUIPMENT.
7. PROVIDE ALL DEVICES SHOWN IN THE DIAGRAMS NOT PROVIDED BY THE UNIT MANUFACTURER AS REQUIRED TO PROVIDE THE DESIRED SEQUENCE OF OPERATION. REFER TO INDIVIDUAL CONTROL DIAGRAMS.
8. UNLESS OTHERWISE NOTED, ROOM THERMOSTATS, CO2 SENSORS AND/OR HUMIDISTATS SHALL HAVE SET-POINT ADJUSTMENT CAPABILITY AND TEMPERATURE/HUMIDITY DISPLAY.

BMS SYSTEM ARCHITECTURE
NO SCALE

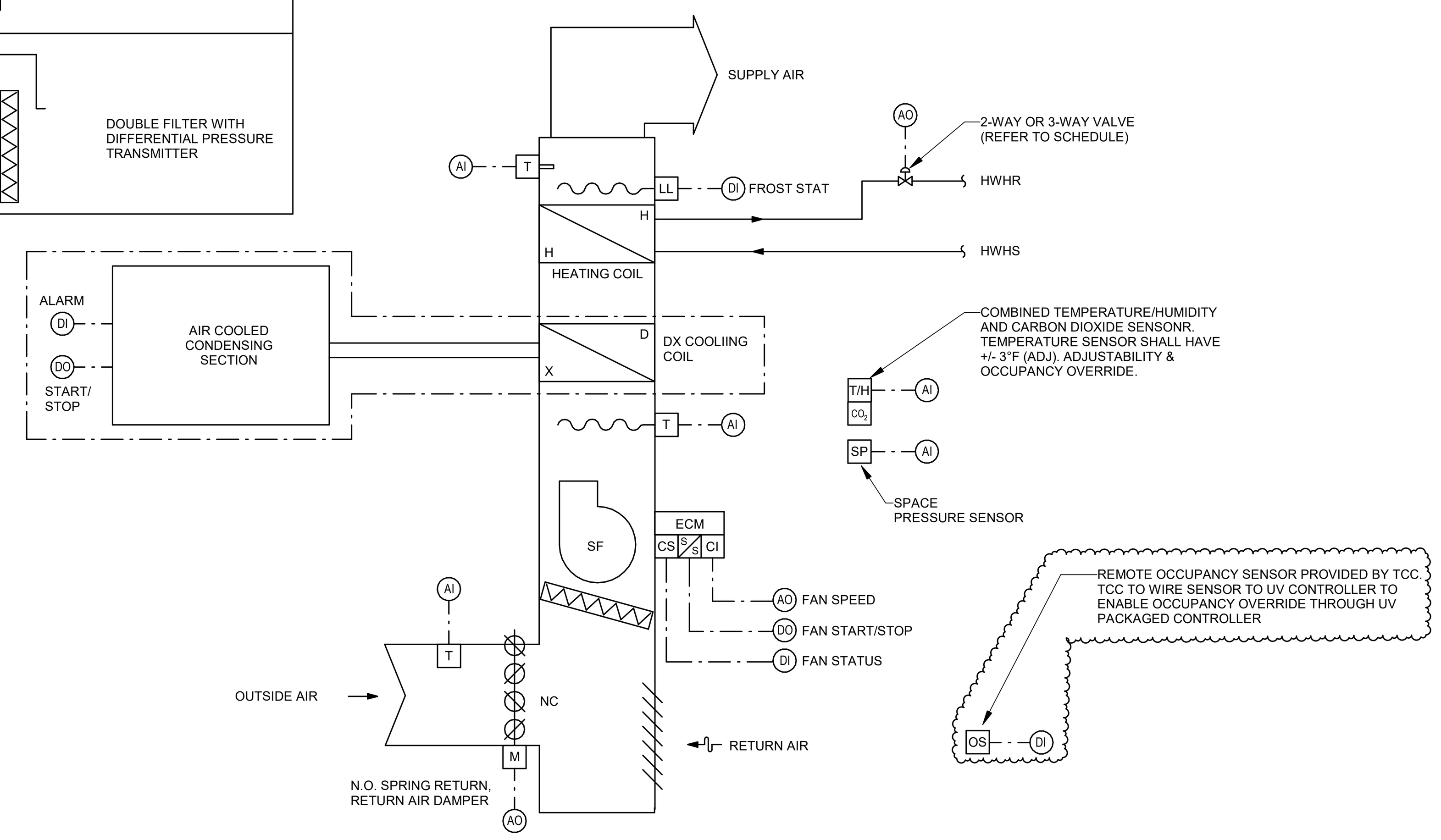


TYPICAL FINNED TUBE RADIATOR OR RADIANT CEILING PANEL SEQUENCE OF OPERATIONS:

1. THE HEATING CONTROL VALVE ASSOCIATED WITH EACH FTR SHALL BE MODULATED BY THE BUILDING DDC SYSTEM TO MAINTAIN THE SPACE TEMPERATURE SETPOINT.

2. IF THE SPACE TEMPERATURE IS OUT OF RANGE, AN ALARM SHALL BE GENERATED AT THE FRONT END.

TYPICAL FINNED TUBE RADIATOR AND RADIANT CEILING PANEL CONTROL DIAGRAM
NO SCALE


SUPPLY AIR
2-WAY OR 3-WAY VALVE (REFER TO SCHEDULE)
HWHR
HWHS
FROST STAT
HEATING COIL
DX COOLING COIL
ALARM
AIR COOLED CONDENSING SECTION
START/ STOP
COMBINED TEMPERATURE/HUMIDITY AND CARBON DIOXIDE SENSONR. TEMPERATURE SENSOR SHALL HAVE +/- 3°F (ADJ). ADJUSTABILITY & OCCUPANCY OVERRIDE.
SPACE PRESSURE SENSOR
ECM
SF
FAN SPEED
FAN START/STOP
FAN STATUS
OUTSIDE AIR
NC
RETURN AIR
N.O. SPRING RETURN, RETURN AIR DAMPER
REMOTE OCCUPANCY SENSOR PROVIDED BY TCC. TCC TO WIRE SENSOR TO UV CONTROLLER TO ENABLE OCCUPANCY OVERRIDE THROUGH UV PACKAGED CONTROLLER

NOTE:

ALL SETPOINTS DESCRIBED IN A SEQUENCE SHALL BE ADJUSTABLE BY SYSTEM OPERATORS (CREATE REQUIRED VIRTUAL POINTS). APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS.

CYCLING SITUATIONS:

TEMPERATURE CONTROLS SHALL BE FACTORY MOUNTED AND PROVIDED BY THE MANUFACTURER. ALL UNIT VENTS SHALL BE MONITORED/SHOWN BY THE BMS. AT MINIMUM, PROVIDE GRAPHICAL REPRESENTATION OF THE DIAGRAM AND ASSOCIATED POINTS INDICADED ABOVE.

SEQUENCE OF OPERATION:

OCCUPANCY CONTROL:
SUPPLY FAN SHALL BE STARTED/STOPPED BY THE BMS DIRECT DIGITAL CONTROLLER (DDC) ACCORDING TO THE MENU DRIVEN, ADJUSTIBLE WEEKLY SCHEDULING PROGRAM (COMPENSATED BY OPTIMUM START PROGRAM) AND BY OCCUPANCY OVERRIDE SWITCH ON SPACE TEMPERATURE SENSOR (SET FOR 2 HOURS, ADJUSTIBLE).

OCCUPANCY CONTROL SOURCE OPTIONS SHALL BE:
1. BUILDING MANAGEMENT SYSTEM (BMS)
2. OCCUPANCY OVERRIDE OPTION SHALL BE:
   A. HORIZONTAL PAD STAT (PUSH BUTTON)
   B. INPUT FROM OCCUPANCY SENSOR (BY EC)

UPON A CALL FOR OPERATION, THE OUTSIDE AIR DAMPER SHALL MODULATE TO 100% RE-CIRCULATION (CLOSED POSITION).

UPON PROOF OF SUCCESSFUL START AND OPERATION OF SUPPLY FAN, THE OUTSIDE AIR DAMPER SHALL MODULATE TO PROVIDE MINIMUM OUTSIDE AIR AS SCHEDULED ON MECHANICAL DRAWINGS AND ESTABLISHED BY TEST AND BALANCE CONTRACTOR.

DEFAULT CONTROL TEMPERATURE SETPOINTS SHALL BE:

- OCCUPIED 72.0°F COOLING, 70.0°F HEATING (ADJ)
- UNOCCUPIED 85.0°F COOLING, 62.0°F HEATING (ADJ)

SUPPLY FAN

THE SUPPLY FAN WILL RUN CONTINUOUSLY DURING OCCUPIED AND STANDBY MODES. IN UNOCCUPIED MODE THE SUPPLY FAN WILL ONLY RUN ON A CALL FOR COOLING, HEATING OR DEHUMIDIFICATION.

WHEN ACTIVE, THE SUPPLY FAN HAS 2 SPEED SETTINGS, LOW AND HIGH. THE FAN WILL RUN AT LOW SPEED DURING VENTILATION, ECONOMIZER COOLING, STAGE 1 COOLING/HEATING AND DEHUMIDIFICATION.

THE FAN WILL RUN AT HIGH SPEED DURING STAGE 2 COOLING/HEATING, STAGE 3 COOLING/HEATING AND STAGE 4 HEATING (IF APPLICABLE). AT HIGH SPEED THE FAN WILL GO TO 100% OF THE STANDARD CONDITION.

CO2 OPTION
WHEN THE SPACE CO2 DECREASES BELOW 1000 PPM (ADJ) THE RETURN AIR/OUTDOOR AIR DAMPER SHALL MODULATE THE OUTDOOR AIR BELOW THE MINIMUM POSITION TO MAINTAIN THE RETURN AIR CO2 AT 1000 PPM.

TEMPERATURE & HUMIDITY CONTROL

ECONOMIZER:
WHEN OUTDOOR AIR CONDITIONS ARE APPROPRIATE FOR FREE COOLING, THE OUTDOOR AIR/RETURN AIR DAMPERS SHALL MODULATE TO PROVIDE ADDITIONAL OUTDOOR AIR (ABOVE THE MINIMUM REQUIRED) TO ALLOW FOR FREE COOLING. THE CONTROLLER SHALL MEASURE THE MIXED AIR TEMPERATURE AND MODULATE THE ECONOMIZER DAMPERS IN SEQUENCE TO MAINTAIN A SETPOINT 2°F LESS THAN THE COOLING SUPPLY AIR TEMPERATURE SETPOINT. THE ECONOMIZER SHALL BE ENABLED WHENEVER:
1. OUTSIDE AIR TEMPERATURE IS LESS THAN 60°F (ADJ.).
2. AND THE OUTSIDE AIR TEMPERATURE IS LESS THAN THE RETURN AIR TEMPERATURE.
3. AND THE OUTSIDE AIR ENTHALPY IS LESS THAN THE RETURN AIR ENTHALPY.
4. AND THE SUPPLY FAN STATUS IS ON.

COOLING (SUMMER-OCCUPIED)
IF THE CONTROL TEMPERATURE IS HIGHER THAN THE COOLING SET POINT AND IF THE OUTDOOR AIR TEMPERATURE IS TOO HIGH TO ALLOW FREE COOLING, THE UNIT CONTROLLER WILL CALL FOR MECHANICAL DX COOLING. THE UNIT CONTROLLER WILL DETERMINE WHICH STAGE OF DX COOLING IS MOST EFFICIENT TO HANDLE THE COOLING LOAD BASED ON THE SPACE, RETURN, SUPPLY AND OUTDOOR AIR TEMPERATURES. USING A PRE-ENGINEERED CONTROL STRATEGY THE CONTROLLER WILL THEN PLACE THE UNIT IN THE APPROPRIATE STAGE OF DX COOLING.

REMOTE CONDENSING UNIT
THE COMPRESSOR SHALL BE ENABLED BY THE CONTROLLER BASED UPON ON A DEMAND FOR DX COOLING. THE COMPRESSOR SHALL HAVE A MINIMUM ON TIME OF 60 SECONDS AND A MINIMUM OFF TIME COMPRESSOR OFF TIME OF 60 SECONDS. THE COMPRESSOR WILL SHUT DOWN IF ANY OF THE FOLLOWING OCCUR:

- LOW PRESSURE SWITCH / HIGH PRESSURE SWITCH OPEN.
- SUPPLY FAN STATUS ALARM.
- CONDENSER FAN STATUS ALARM.
- CONDENSATE FLOAT SWITCH OPEN.
- FREEZE STAT CLOSES.
- INDOOR COIL FREEZE PROTECTION TEMPERATURE SENSOR FALLS BELOW SETPOINT.
- OUTDOOR AIR TEMPERATURE FALLS BELOW COMPRESSOR LOCKOUT SETPOINT.

WHEN THE SPACE HUMIDITY SENSOR REACHES 60%RH (ADJ) SETPOINT, THE UNIT DX COIL SHALL MODULATE TO LOWER THE COIL DISCHARGE TEMPERATURE AND SHALL MODULATE OPEN THE HEATING HOT WATER CONTROL VALVE TO MAINTAIN A DISCHARGE AIR TEMPERATURE NOT LESS THAN 55 DEGREES.

HEATING
IF THE CONTROL TEMPERATURE IS LOWER THAN THE HEATING SETPOINT THE HOT WATER VALVE WILL OPEN PROPORTIONALLY BASED ON THE DEMAND GENERATED VIA THE OUTPUT OF AN ADJUSTABLE PI LOOP.

IN OCCUPIED MODE, IF THE OUTDOOR AIR TEMPERATURE FALLS BELOW 45.0˚F (ADJ) THEN THE SUPPLY AIR IS MAINTAINED AT A MINIMUM OF 50.0˚F (ADJ) VIA A SUPPLY AIR LOW LIMIT.

IF THE SUPPLY FAN IS OFF (TYPICALLY ONLY OCCURS IN UNOCCUPIED MODE WHEN THERE IS NO COOLING, HEATING OR DEHUM. DEMAND) AND IF THE OUTDOOR AIR TEMPERATURE FALLS BELOW 45.0˚F, THE HOT
WATER VALVE WILL OPEN 30% TO A "BLEED" POSITION.

IF THERE IS A HOT WATER COIL FREEZE STAT TRIP, THE VALVE SHALL SPRING OPEN.

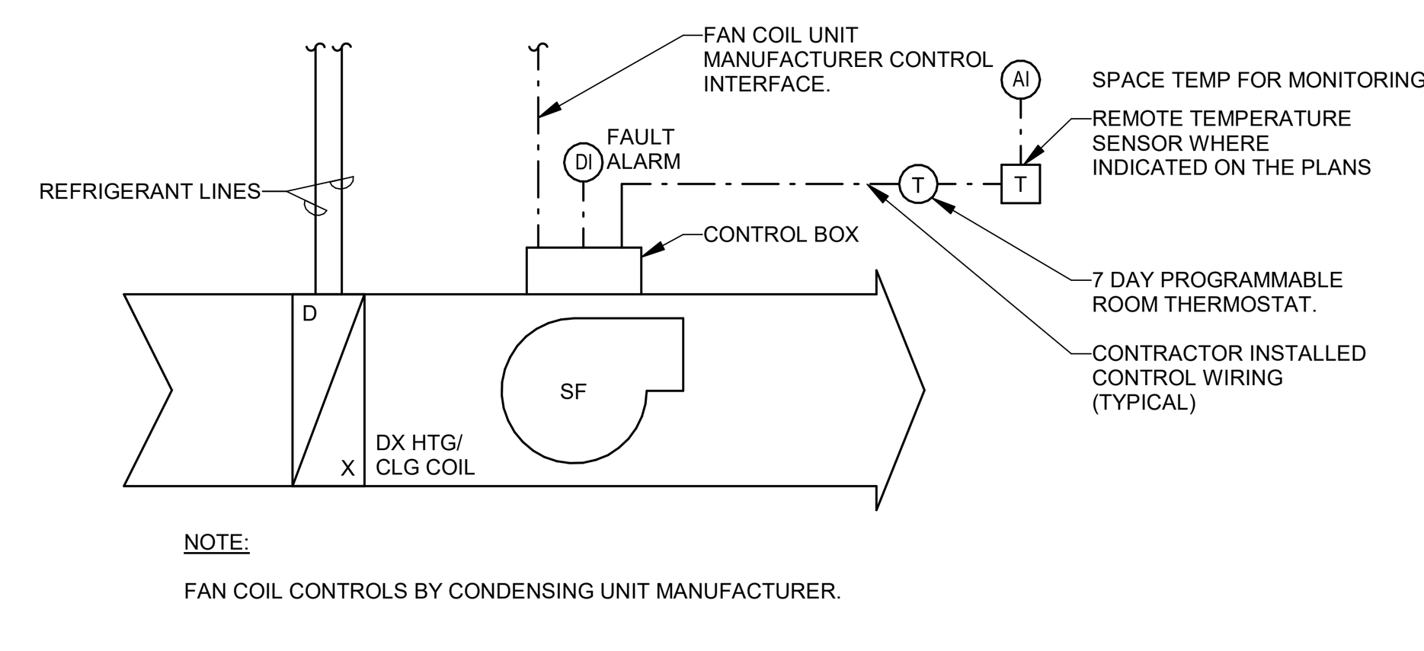
FREEZE PROTECTION (ALL MODES)

WHEN SPACE TEMPERATURE IS 35°F OR BELOW THE DIGITAL INPUT WILL BE NORMALLY OPEN. IF THE CONTACT GOES CLOSED, THE UNIT WILL CONTINUE TO RUN BUT COOLING WILL BE DISABLED AND THE HOT WATER VALVE WILL BE PARTIALLY OPENED.

FIRE ALARM MODE CONTROL:

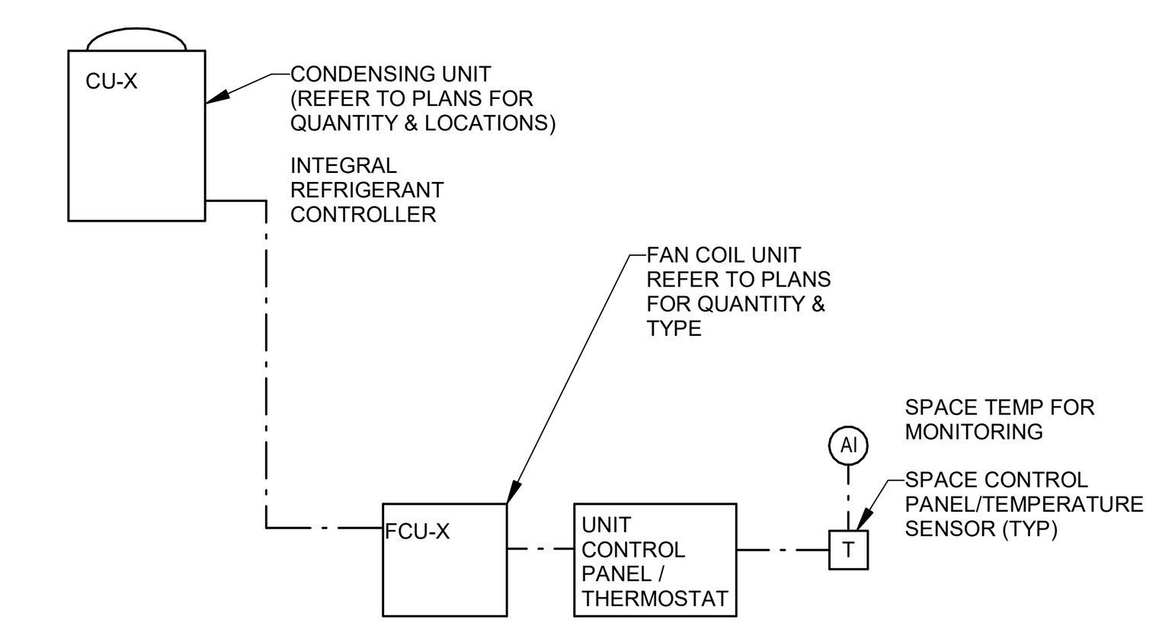
THE SUPPLY FAN SHALL SHUT DOWN AND OUTDOOR AIR DAMPERS SHALL CLOSE WHEN ANY AUTOMATIC OR MANUAL FIRE ALARM DEVICE IS PLACED INTO ALARM BY THE BUILDING FIRE ALARM CONTROL PANEL. SYSTEM SHALL MANUALLY RESET FOLLOWING AN ALARM EVENT.

UNIT VENTILATOR W/REMOTE DX AND HHW CONTROL DIAGRAM
NO SCALE

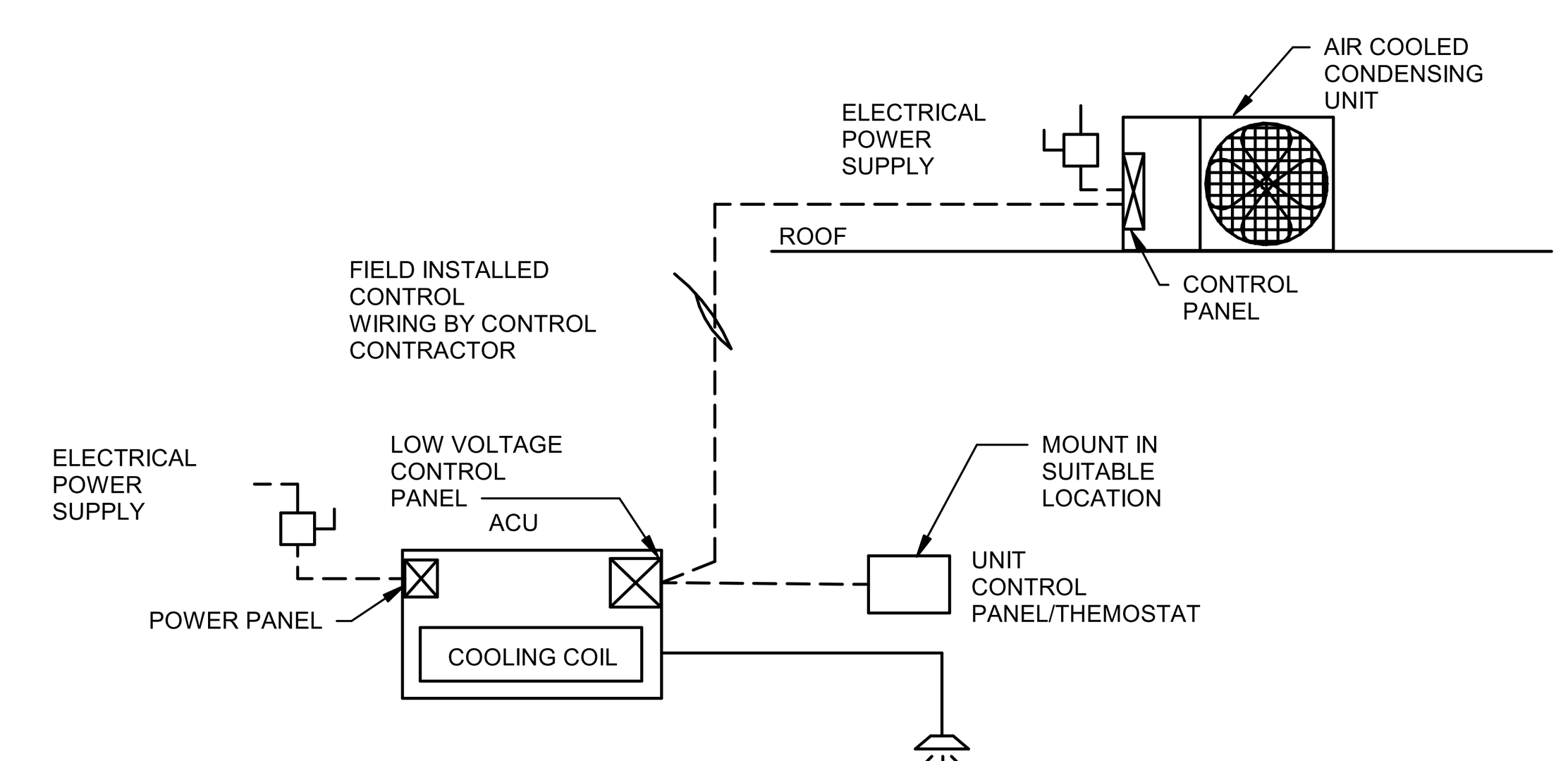

FAN COIL UNIT MANUFACTURER CONTROL INTERFACE.
SPACE TEMP FOR MONITORING
REMOTE TEMPERATURE SENSOR WHERE INDICATED ON THE PLANS
FAULT ALARM
REFRIGERANT LINES
CONTROL BOX
7 DAY PROGRAMMABLE ROOM THERMOSTAT.
CONTRACTOR INSTALLED CONTROL WIRING (TYPICAL)
SF
DX HTG/ CLG COIL

NOTE:
FAN COIL CONTROLS BY CONDENSING UNIT MANUFACTURER.

FAN COIL UNIT CONTROL DIAGRAM
NO SCALE


CU-X
CONDENSING UNIT (REFER TO PLANS FOR QUANTITY & LOCATIONS)
INTEGRAL REFRIGERANT CONTROLLER
FAN COIL UNIT REFER TO PLANS FOR QUANTITY & TYPE
SPACE TEMP FOR MONITORING
SPACE CONTROL PANEL/TEMPERATURE SENSOR (TYP)
FCU-X
UNIT CONTROL PANEL / THERMOSTAT

MULTI-SPLIT CONDENSING UNIT CONTROL DIAGRAM
NO SCALE


ELECTRICAL POWER SUPPLY
AIR COOLED CONDENSING UNIT
ROOF
CONTROL PANEL
FIELD INSTALLED CONTROL WIRING BY CONTROL CONTRACTOR
ELECTRICAL POWER SUPPLY
LOW VOLTAGE CONTROL PANEL
ACU
MOUNT IN SUITABLE LOCATION
UNIT CONTROL PANEL/THEMOSTAT
POWER PANEL
COOLING COIL

SEQUENCE OF OPERATION

THE ACU IS EQUIPPED WITH A DIRECT EXPANSION COOLING COIL. THE ACU & ITS ASSOCIATED CONDENSING UNIT ARE OPERATED BY ITS OWN INTEGRAL CONTROLS TO MAINTAIN SPACE TEMPERATURE SETPOINT.

DX MODE: WHEN THE ACU CALLS FOR COOLING THE CONDENSER FAN IS ENABLED & STAGED THROUGH ITS PACKAGED CONTROLS TO MAINTAIN TEMPERATURE SETPOINT.

THE ROOM AIR CONDITIONING UNIT AND ASSOCIATED OUTDOOR CONDENSING UNIT SHALL OPERATE THROUGH ITS INTERNAL CONTROLS (COOLING, HUMIDIFICATION) TO MAINTAIN TEMPERATURE AND HUMIDITY SETPOINTS (72 DEG. F/30 % RH, ADJUSTABLE).

THESE SETPOINTS SHALL BE USER ADJUSTABLE THROUGH THE BMS.

ACU CONTROL DIAGRAM
NO SCALE

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FOREST VIEW HVAC IMPROVEMENTS
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4000 W. Eleven Mile Road Berkley, MI 48072
Phone 248.399.1900 Fax 248.399.1901
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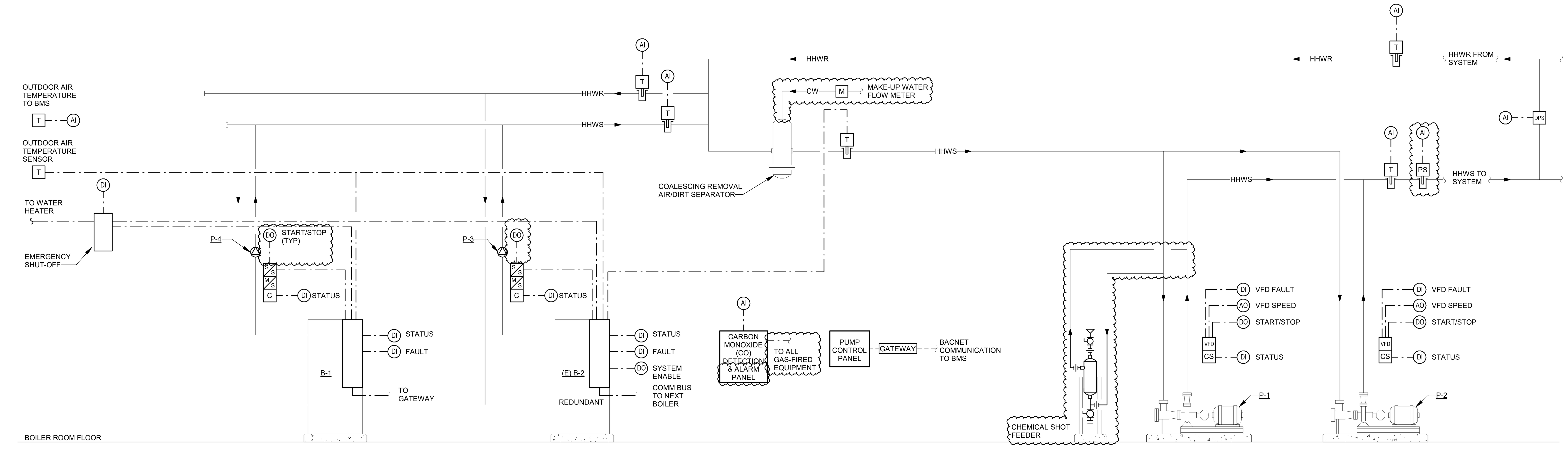
SHEET TITLE
CONTROL DIAGRAMS
SHEET NO.
M8.0



HEATING HOT WATER SUPPLY (HHWS) RESET SCHEDULE	
OUTSIDE AIR TEMPERATURE	HHWS TEMPERATURE
< 60°F	120°F
45°F - 60°F	130°F
30°F - 45°F	140°F
15°F - 30°F	150°F
< 15°F	160°F

HEATING HOT WATER SYSTEM - PRIMARY/SECONDARY SEQUENCE OF OPERATIONS:
NOTE: ALL SETPOINTS AND TIME INTERVALS SHALL BE ADJUSTABLE BY THE SYSTEM OPERATOR.

HEATING HOT WATER PLANT MANAGER

1. THE BUILDING MANAGEMENT SYSTEM (BMS) SHALL INCLUDE A HEATING HOT WATER PLANT MANAGER TO CONTROL THE SECONDARY HEATING HOT WATER PUMPS AND TO MONITOR HEATING GOT WATER SYSTEM SENSORS AND ACCESSORIES.
2. TO PREVENT SHORT CYCLING, THE HEATING HOT WATER SYSTEM SHALL RUN FOR AND BE OFF FOR A MINIMUM ADJUSTABLE TIME (BOTH TIMES USER ADJUSTABLE).
3. HEATING HOT WATER PLANT SHALL BE ENABLED BY THE BMS BASED WHEN OUTSIDE AIR TEMPERATURE IS BELOW 60°F (ADJ) AND ANY DOWNSTREAM EQUIPMENT SERVED CALLS FOR HEATING.

SECONDARY PUMP CONTROL

1. WHEN THE HEATING HOT WATER SYSTEM IS ENABLED, THE LEAD HEATING HOT WATER SECONDARY PUMP SHALL BE ENABLED. EACH PUMP WILL PROVE OPERATION TO THE BMS WITH ITS CURRENT SWITCH.
2. IF A PUMP FAILS, AN ALARM WILL BE SENT TO THE BMS AND THE STANDBY PUMP WILL BE ACTIVATED.
3. THE PLANT MANAGER SHALL ALTERNATE LEAD PUMP OPERATION BASED ON RUN TIME HOURS OR AT THE BEGINNING OF EACH WEEK.
4. THE CONTROLLER SHALL MODULATE PUMP SPEED TO MAINTAIN HEATING HOT WATER DIFFERENTIAL PRESSURE AS SET BY THE TEST & BALANCE CONTRACTOR. THE VFDS MINIMUM SPEED SHALL NOT DROP BELOW 20% (ADJ).
5. THE SYSTEM SHALL RESET THE DIFFERENTIAL PRESSURE SETPOINT BASED ON VALVE POSITIONS IN THE SYSTEM UTILIZING CRITICAL ZONE RESET STRATEGY. THE CRITICAL ZONE SHALL BE THE VALVE IN THE SYSTEM THAT NEEDS TO BE 100% OPEN TO SATISFY THE CURRENT LOAD. CRITICAL ZONE RESET SHALL BE DISABLED WHEN SYSTEM IS NOT IN OCCUPIED MODE.

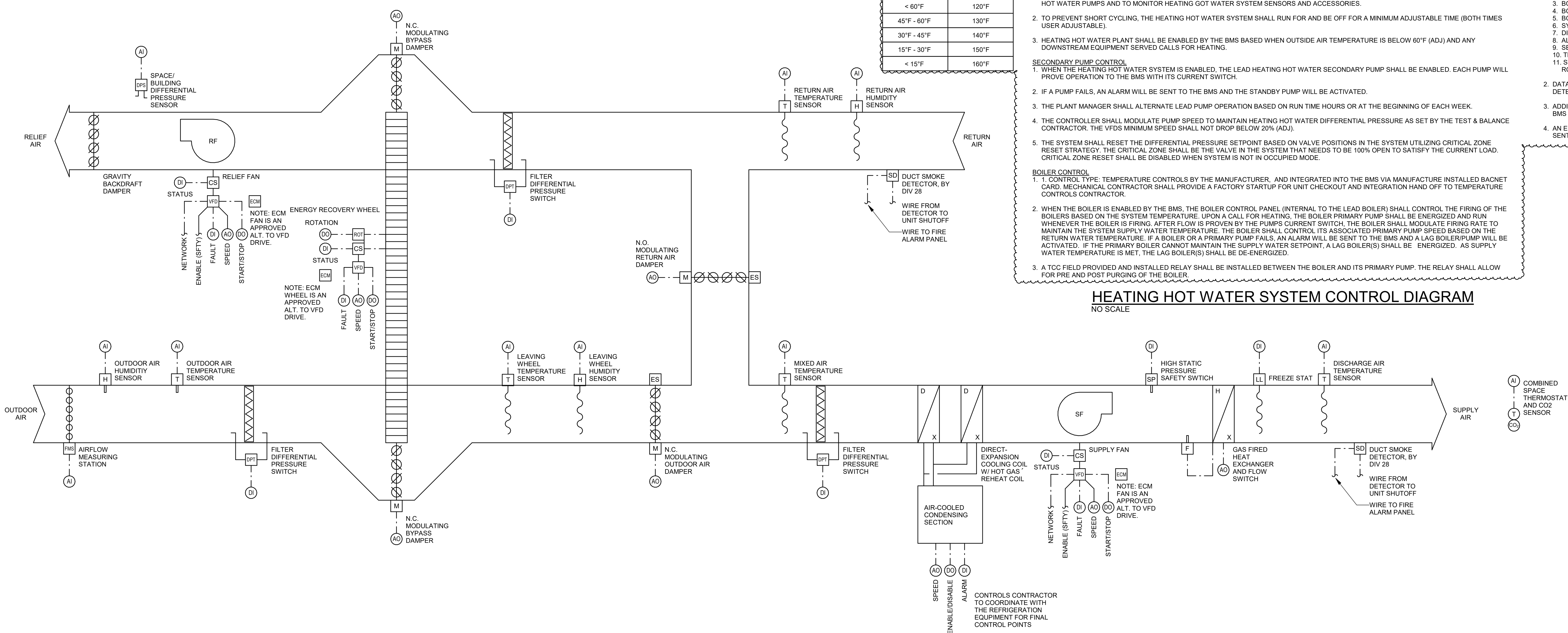
BOILER CONTROL

1. 1. CONTROL TYPE: TEMPERATURE CONTROLS BY THE MANUFACTURER, AND INTEGRATED INTO THE BMS VIA MANUFACTURE INSTALLED BACNET CARD. MECHANICAL CONTRACTOR SHALL PROVIDE A FACTORY STARTUP FOR UNIT CHECKOUT AND INTEGRATION HAND OFF TO TEMPERATURE CONTROLS CONTRACTOR.
2. WHEN THE BOILER IS ENABLED BY THE BMS, THE BOILER CONTROL PANEL (INTERNAL TO THE LEAD BOILER) SHALL CONTROL THE FIRING OF THE BOILERS BASED ON THE SYSTEM TEMPERATURE. UPON A CALL FOR HEATING, THE BOILER PRIMARY PUMP SHALL BE ENERGIZED AND RUN WHENEVER THE BOILER IS FIRING. AFTER FLOW IS PROVEN BY THE PUMPS CURRENT SWITCH, THE BOILER SHALL MODULATE FIRING RATE TO MAINTAIN THE SYSTEM SUPPLY WATER TEMPERATURE. THE BOILER SHALL CONTROL ITS ASSOCIATED PRIMARY PUMP SPEED BASED ON THE RETURN WATER TEMPERATURE. IF A BOILER OR A PRIMARY PUMP FAILS, AN ALARM WILL BE SENT TO THE BMS AND A LAG BOILER/PUMP WILL BE ACTIVATED. IF THE PRIMARY BOILER CANNOT MAINTAIN THE SUPPLY WATER SETPOINT, A LAG BOILER(S) SHALL BE ENERGIZED. AS SUPPLY WATER TEMPERATURE IS MET, THE LAG BOILER(S) SHALL BE DE-ENERGIZED.
3. A TCC FIELD PROVIDED AND INSTALLED RELAY SHALL BE INSTALLED BETWEEN THE BOILER AND ITS PRIMARY PUMP. THE RELAY SHALL ALLOW FOR PRE AND POST PURGING OF THE BOILER.

MONITOR AND ALARM

1. THE BMS SHALL MONITOR AND GRAPHICALLY SHOW, AT A MINIMUM, THE FOLLOWING POINTS. ALL POINTS SHALL BE ALARMED WHEN OUT OF RANGE:
   1. BOILER STATUS AND STAGING
   2. PRIMARY PUMP SPEED, STATUS AND ALARMS
   3. BOILER RUN TIMES AND START/STOPS
   4. BOILER ALARM
   5. BOILER ENTERING AND LEAVING WATER TEMPERATURES (HIGH AND LOW ALARMS)
   6. SYSTEM SUPPLY AND RETURN WATER TEMPERATURES
   7. DIFFERENTIAL PRESSURE
   8. ALL TEMPERATURE POINTS INDICATED
   9. SECONDARY PUMPS SPEED, STATUS AND ALARMS
   10. THE BAS SHALL MONITOR THE BOILER MAKE-UP WATER FLOW METER.
   11. STANDALONE GAS DETECTION SYSTEM (CO SENSOR, STROBE, AND HORN) SHALL MONITOR CO LEVELS IN THE BOILER ROOM. UPON TRIGGER, THE GAS DETECTION SYSTEM SHALL ALERT THE BAS IF SYSTEM IS IN ALARM
2. DATA TRENDS SHALL BE ESTABLISHED TO RECORD AND TREND ALL POINTS INDICATED ABOVE AT INTERVALS DETERMINED BY THE OWNER.
3. ADDITIONAL BOILER INFORMATION AVAILABLE THROUGH THE BMS INTEGRATION SHALL BE ACCESSIBLE THROUGH THE BMS FRONT END SYSTEM, BUT DOES NOT NEED TO BE CONTINUOUSLY PRESENTED ON THE GRAPHIC DISPLAY.
4. AN EMERGENCY STOP BUTTON LOCATED IN THE BOILER ROOM DISABLES THE BOILERS CONTROLS. A SIGNAL IS ALSO SENT TO THE BMS, WHICH DISABLES THE PRIMARY PUMP OPERATION THROUGH AN INTERLOCK.

HEATING HOT WATER SYSTEM CONTROL DIAGRAM
NO SCALE



SEQUENCE OF OPERATIONS:

GENERAL

THE SINGLE-ZONE VAV AIR-HANDLING UNIT SEQUENCES HEREIN DEPICT GENERAL INTENT OF OPERATION AND ARE TO BE PERFORMANCE BASED. FOR COMPLETE PROCEDURAL FUNCTIONALITY, THE UNITS SHALL FOLLOW THE GUIDELINES IN ASHRAE 90.1-2013 CHAPTER 6, AHRAE 62.1-2016, AND ASHRAE GUIDELINE 36 CHAPTERS 5.1-5.4, 5.15, AND 5.18 WITHOUT EXPLICIT STATEMENT. IMPLEMENTATIONS THAT PROVIDE THE SAME FUNCTIONAL RESULTS USING DIFFERENT UNDERLYING DETAILED LOGIC WILL BE ACCEPTABLE.

CONTROLS TO BE MANUFACTURER PACKAGED CONTROLS AND FACTORY INSTALLED.

AT MINIMUM, PROVIDE A GRAPHICAL REPRESENTATION OF THE DIAGRAM AND ASSOCIATED POINTS INDICATED ABOVE. ALL ADDITIONAL POINTS NOT STRICTLY REQUIRING GRAPHICAL REPRESENTATION, SHALL STILL BE READ/WRITE ACCESSIBLE AT THE OWS/BAS. ALL SETPOINTS, TIMERS, DEADBANDS, SCHEDULES, ETC. LISTED HEREIN THE SEQUENCE SHALL BE ADJUSTABLE BY THE SYSTEM OPERATOR. VALUES FOR ALL POINTS, INCLUDING HARDWARE POINTS, SHALL BE OVERRIDABLE. EXCEPTIONS CAN BE MADE REGARDING MACHINE OR LIFE SAFETY.

EQUIPMENT MOTORS INTENDED TO BE MODULATED CAN BE PROVIDED WITH EITHER VARIABLE FREQUENCY DRIVES OR ELECTRONIC COMMUTATED MOTOR; SEQUENCE MAY USED INTERCHANGEABLE.

THE ROOFTOP UNIT SHALL BE CAPABLE OF OPERATING IN THE FOLLOWING MODES AS DETERMINED BY THE ZONE GROUPS ASSOCIATED WITH THE UNIT: (1) OCCUPIED, (2) COOLDOWN, (3) UNOCCUPIED COOLING, (4) WARMUP, (5) UNOCCUPIED HEATING, AND (6) UNOCCUPIED MODE.

MINIMUM DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE 55ºF. **MAXIMUM DISCHARGE AIR TEMPERATURE** SHALL BE 95ºF.

UNOCCUPIED CONTROL:

DURING UNOCCUPIED MODE, THE OUTDOOR AIR DAMPER SHALL BE FULLY CLOSED. THE RETURN AIR DAMPER SHALL BE FULLY OPEN. THE SUPPLY FAN SHALL BE OFF. THE TEMPERATURE CONTROL LOOP SHALL BE SET TO DEADBAND.

DURING UNOCCUPIED MODE, THE AHU CONTROLLER OR BAS SHALL CONTINUOUSLY POLL THE ZONE TEMPERATURE SENSOR. IF THE ZONE TEMPERATURE SENSOR FALLS OUTSIDE OF THE UNOCCUPIED SETPOINT RANGES, THE UNIT SHALL BE ENABLED AND RUN IN UNOCCUPIED HEATING OR UNOCCUPIED COOLING MODES UNTILL THE UNOCCUPIED SETPOINTS ARE 1ºF ABOVE OR BELOW UNOCCUPIED SETPOINT RESPECTIVELY.

WHEN UNOCCUPIED COOLING MODE IS INITIATED BY THE AHU CONTROLLER OR BAS, THE SUPPLY AIR TEMPERATURE CONTROL LOOP SHALL BE ENABLED AND OPERATE TO MAINTAIN **MINIMUM DISCHARGE AIR TEMPERATURE** AS MEASURED AT THE DISCHARGE AIR TEMPERATURE SENSOR.

WHEN UNOCCUPIED HEATING MODE IS INITIATED BY THE AHU CONTROLLER OR BAS, THE SUPPLY AIR TEMPERATURE CONTROL LOOP SHALL BE ENABLED AND OPERATE UP TO A **MAXIMUM DISCHARGE AIR TEMPERATURE** AS MEASURED AT THE DISCHARGE AIR TEMPERATURE SENSOR. THE OUTDOOR AIR DAMPER SHALL BE FULLY CLOSED. THE RETURN AIR DAMPER SHALL BE FULLY OPEN.

FACILITY COOLDOWN / WARMUP CONTROL:

THE FACILITY COOLDOWN / WARMUP SEQUENCES SHALL USE A CALCULATED OPTIMIZED START ROUTINE PRIOR TO SCHEDULED OCCUPIED MODE. THE MORNING WARM-UP / COOL-DOWN ROUTINE SHALL BE INITIATED BY THE BAS. DEFAULT FACILITY COOLDOWN / WARMUP START TIME SHALL BE SIXTY MINUTES.

DURING FACILITY COOLDOWN / WARMUP MODE, THE OUTDOOR AIR DAMPER SHALL BE FULLY CLOSED. THE RETURN AIR DAMPER SHALL BE FULLY OPEN. EXCEPTION: IF ECONOMIZER MODE WOULD RESULT IN AN OVERALL MECHANICAL ENERGY SAVINGS, THEN OUTDOOR AIR DAMPER SHALL BE OPENED.

WHEN FACILITY COOLDOWN MODE IS INITIATED BY THE AHU CONTROLLER OR BAS, THE SUPPLY AIR TEMPERATURE CONTROL LOOP SHALL BE ENABLED AND OPERATE TO MAINTAIN **MINIMUM DISCHARGE AIR TEMPERATURE** AS MEASURED AT THE DISCHARGE AIR TEMPERATURE SENSOR.

WHEN FACILITY WARMUP MODE IS INITIATED BY THE AHU CONTROLLER OR BAS, THE SUPPLY AIR TEMPERATURE CONTROL LOOP SHALL BE ENABLED AND OPERATE UP TO THE **MAXIMUM DISCHARGE AIR TEMPERATURE** AS MEASURED AT THE DISCHARGE AIR TEMPERATURE SENSOR. NOTE: ZONE REHEAT SHALL BE THE SECOND STAGE OF HEATING (AS REQUIRED).

FACILITY COOLDOWN/ WARMUP MODES SHALL SWTICH TO OCCUPIED MODE OPPERATION ONCE THE SPACE TEMPERATURE REACHES THE OCCUPIED SETPOINT OR OCCUPIED TIME.

OUTDOOR AIR CONTROL:

WHEN IN OCCUPIED MODE, THE AHU CONTROLLER OR BAS SHALL INCLUDE MEANS TO AUTOMATICALLY REDUCE OUTDOOR AIR INTAKE AIRFLOW BELOW DESIGN RATES IN RESPONSE TO CHANGES IN SPACE CO2 CONCENTRATION LEVELS.

UPON RISING CO2 CONCENTRATION LEVELS, THE OUTDOOR AIR DAMPER ACTUATOR SHALL MODULATE OPEN. THE AHU OUTDOOR DAMPER ACTUATOR SHALL NOT MODULATE BEYOND ITS SCHEDULED MAXIMUM VENTILATION SETPOINT (SEE VENTILATION SCHEDULE) UNLESS IN ECONOMIZER MODE.

INVERSELY, UPON FALLING CO2 CONCENTRATION LEVELS, THE OUTDOOR AIR DAMPER ACTUATOR SHALL MODULATE CLOSED. DAMPER POSITION LIMITED TO NO LESS THAN THE BUILDING COMPONENT OUTDOOR AIRFLOW.

OUTDOOR AIRFLOW RATE SHALL BE MEASURED BY AIRFLOW MEASURING DEVICE.

ECONOMIZER (DRY-BULB):

DURING UNOCCUPIED MODE, THE BYPASS DAMPER(S) SHALL BE CLOSED.

WHILE IN OCCUPIED MODE, IF THE OUTDOOR AIR TEMPERATURE IS LESS THAN THE RETURN AIR TEMPERATURE, THE UNIT SHALL MODULATE THE BYPASS DAMPER TO MAINTAIN THE DISCHARGE AIR TEMPERATURE AND MINIMIZE THE TOTAL MECHANICAL COOLING. THE ECONOMIZER IS THE FIRST STAGE OF COOLING. THE WHEEL SHALL STOP.

IF THE OUTDOOR AIR TEMPERATURE EXCEEDS RETURN AIR TEMPERATURE OR IF THE OUTDOOR AIR TEMPERATURE EXCEEDS 75°F, THE BYPASS DAMPER SHALL CLOSE.

IF THE OUTDOOR AIR TEMPERATURE IS LOWER THAN 45°F, THE BYPASS DAMPER(S) SHALL CLOSE.

ENTHALPY WHEEL CONTROL:

DURING UNOCCUPIED MODE, THE ENTHALPY WHEEL SHALL BE STOPPED.

IN OCCUPIED MODE, IF THE OUTDOOR AIR ENTHALPY (CALCULATED) IS GREATER THAN THE RETURN AIR ENTHALPY (CALCULATED) OR IF THE OUTDOOR AIR TEMPERATURE EXCEEDS 75°F, THE UNIT SHALL MODULATE THE ENTHALPY WHEEL TO MAX SPEED. AT CONDITION, THE ENTHALPY WHEEL SHALL BE THE FIRST STAGE OF COOLING.

IN OCCUPIED MODE, WHENEVER THE OUTDOOR AIR TEMPERATURE IS LESS THAN THE DISCHARGE AIR TEMPERATURE, THE ENTHALPY WHEEL SHALL MODULATE SPEED TO MAINTAIN REQUIRED DISCHARGE TEMPERATURE. THE ENTHALPY WHEEL SHALL BE THE FIRST STAGE OF HEATING.

IF UNIT HAS PACKAGED CONTROLS, MANUFACTURER SEQUENCES SHALL GOVERN.

ENTHALPY WHEEL DEFROST CONTROL:

THE UNITS CONTROLLER SHALL PROVIDE MEANS TO PROTECT WHEEL FROM FROSTING. CONSULT MANUFACTURER LITERATURE.

A FROST/CONDENSATE PREVENTION CRAWL MODE SHALL BE USED TO PREVENT BUILD UP OF ICE. WHEN THE CRAWL MODE IS ENABLED THE BYPASS DAMPERS WILL RAMP TO 100% BYPASS, AND THE ENERGY WHEEL'S VARIABLE FREQUENCY DRIVE WILL BE COMMANDED TO MINIMUM.

FIRE ALARM MODE CONTROL:

THE SUPPLY FAN SHALL SHUT DOWN WHEN ANY AUTOMATIC OR MANUAL FIRE ALARM DEVICE IS PLACED INTO ALARM BY THE BUILDING FIRE ALARM CONTROL PANEL VIA THE FIRE ALARM CONTROL MODULE. NEXT, THE OUTDOOR AIR DAMPER SHALL CLOSE AND THE UNIT SHALL BE DISABLED.

SYSTEM SHALL MANUALLY RESET FOLLOWING AN ALARM EVENT.

RELIEF FAN CONTROL:

PROVIDE OFFSET TO MAINTAIN BUILDING POSITIVE BUILDING PRESSURE (0.03 - 0.05 IN W.C.).

ENABLE, DISABLE, AND MODULATE EXHAUST FAN BASED ON BUILDING PRESSURE CONTROL. REFER TO ASHRAE G36 5.16.9.

SETPOINTS:

UNOCCUPIED SPACE COOLING SETPOINT SHALL BE 85ºF (ADJ.)
UNOCCUPIED SPACE HEATING SETPOINT SHALL BE 65ºF (ADJ.)
OCCUPIED SPACE COOLING SETPOINT SHALL BE 75ºF (ADJ.) 60% RH* (ADJ.)
OCCUPIED SPACE HEATING SETPOINT SHALL BE 70ºF (ADJ.)

*RELATIVE HUMIDITY WILL NOT BE DIRECTLY CONTROLLED. THIS IS A CONDITION THAT CAN BE EXPECTED UNDER NORMAL OPERATING CONDITIONS.

SUPPLY FAN AND SUPPLY AIR TEMPERATURE CONTROL:

SUPPLY FAN SPEED AND TEMPERATURE SEQUENCE SHALL IMPLEMENT ASHRAE G36 SECTION 5.18.4 AND GENERALLY FOLLOW THE LOGIC BELOW:

THE SUPPLY FAN SHALL RUN WHEN THE SYSTEM IS OPERATING IN ALL MODES EXCEPT UNOCCUPIED MODE.

THE SUPPLY FAN SHALL BE AUTOMATICALLY STARTED AND STOPPED BY THE AHU CONTROLLER OR BAS.

UPON PROOF OF SUCCESSFUL START AND OPERATION OF THE SUPPLY FAN, THE OUTDOOR AIR DAMPER SHALL OPEN TO ITS MINIMUM POSITION INITIALLY.

PROVIDE A RAMP FUNCTION TO PREVENT CHANGES IN FAN SPEED OF MORE THAN 10% PER MIN.

AS SPACE TEMPERATURE INCREASES, THE UNIT SHALL MODULATE ECONOMIZER DAMPERS (WHEN ECONOMIZER MODE IS ENABLED) AND/OR SHALL MODULATE THE DX COOLING SYSTEM TO MAINTAIN SPACE TEMPERATURE SETPOINT. THE COOLING SYSTEM WILL CONTINUE TO MODULATE UP UNTIL THE DISCHARGE AIR TEMPERATURE REACHES THE **MINIMUM DISCHARGE AIR TEMPERATURE**. AT WHICH POINT, BOTH THE MECHANICAL COOLING SYSTEM AND THE SUPPLY FAN WILL MODULATE UP TOGETHER TO MAINTAIN SPACE AIR TEMPERATURE SETPOINT AND **MINIMUM DISCHARGE AIR TEMPERATURE**.

AS SPACE TEMPERATURE BEGINS TO DECREASES, THE PROCESS SHALL WORK IN REVERSE ORDER.

AS SPACE TEMPERATURE DECREASES, THE UNIT SHALL MODULATE THE INDIRECT GAS BURNER TO MAINTAIN SPACE TEMPERATURE SETPOINT. THE HEATING SYSTEM WILL CONTINUE TO MODULATE UP UNTIL THE DISCHARGE AIR TEMPERATURE REACHES THE **MAXIMUM DISCHARGE AIR TEMPERATURE**. AT WHICH POINT, BOTH THE MECHANICAL HEATING SYSTEM AND THE SUPPLY FAN WILL MODULATE UP TOGETHER TO MAINTAIN SPACE AIR TEMPERATURE SETPOINT AND **MAXIMUM DISCHARGE AIR TEMPERATURE**.

AS SPACE TEMPERATURE BEGINS TO INCREASE, THE PROCESS SHALL WORK IN REVERSE ORDER.

DEHUMIDIFICATION CONTROL:

DEHUMIDICATION MODE SHALL BE ENABLED DURING NORMAL AHU OPPERATION WHEN THE SUPPLY FAN IS PROVEN ON, THE RETURN AIR HUMIDITIY RAISES ABOVE 60% RH, AND THE OUTDOOR TEMPERATURE IS ABOVE 55°F.

WHEN ENABLED, THE AHU CONTROLLER SHALL DISABLE THE ECONOMIZER. NEXT, THE DX COOLING SYSTEM SHALL MODULATE THE MECHANICAL COOLING SYSTEM TO OVERCOOL THE AIR, LOWERING THE MOISTURE CONTENT. THE MODULATING HOT GAS REHEAT SYSTEM SHALL BE USED TO MAINTIAN THE DISCHRAGE AIR TEMPERATURE SETPOINT. ONCE THE RETURN AIR HUMIDITY LOWERS TO 55% RH DEHUMIDIFICATION MODE SHALL BE DISABLED.

ALARMS AND SAFETIES

PROVIDE ALL RELEVANT ALARMS TO NOTIFY SYSTEM OPERATORS OF MAINTENANCE, PERFORMANCE, EQUIPMENT, OR LIFE-SAFETY ERRORS AND FAULTS. REFER TO MANUFACTURER INFORMATION, CODE REQUIREMENTS, AND ASHRAE 36 RECOMMENDATIONS FOR ADDITIONAL SAFETIES AND ALARMS.

HIGH STATIC PRESSURE SAFETY SWTICH: WHEN THE SAFETY SWITCH IS TRIPPED, DISABLE SUPPLY FAN (HARDWIRED) AND GENERATE AN ALARM AT THE BAS. ALL OTHER COMPONENTS SHALL RETURN TO AN UNOCCUPIED/OFF CONTROL MODE. HIGH PRESSURE SHALL BE SET TO TRIP AT 4" W.G. AND SHALL BE RESET MANUALLY AT THE UNIT.

FREEZE STAT: WHEN A FREEZE CONDITION OCCURS, DISABLE SUPPLY FAN (HARDWIRED) AND GENERATE AN ALARM AT THE BAS. ALL OTHER COMPONENTS SHALL RETURN TO AN UNOCCUPIED/OFF CONTROL MODE. FREEZE STAT SHALL BE SET TO TRIP AT 40°F AND SHALL BE RESET MANUALLY AT THE UNIT.

DUCT SMOKE DETECTOR: WHEN SMOKE IS DETECTED, DISABLE SUPPLY FAN AND RELIEF FAN (HARDWIRED) AND GENERATE AN ALARM AT THE BAS. ALL OTHER COMPONENTS SHALL RETURN TO AN UNOCCUPIED/OFF CONTROL MODE.

FILTER DIFFERENTIAL SWTICH: WHEN DIFFERENTIAL PRESSURE ACCROSS THE FILTERS EXCEEDS ALLOWABLE LIMIT, GENERATE AN ALARM AT THE BAS.

FAN STATUS: THE BAS SHALL MONITOR FAN CURRENT SWITCHES. IF STATUS DOES NOT MATCH COMMAND OUTPUT, DISABLE FAN AND GENERATE AN ALARM AT THE BAS. ALL OTHER COMPONENTS SHALL RETURN TO AN UNOCCUPIED/OFF CONTROL MODE.

DAMPER POSITION: KNOWLEDGE OF DAMPER POSITION SHALL BE REQUIRED; A MODULATING (ANALOG) ACTUATOR OR FLOATING ACTUATOR CAN BE USED. IF DAMPER POSITION IS DETERMINED BY THE BAS TO BE INCORRECT, GENERATE AN ALARM AT THE BAS.

OUTDOOR AIR DAMPER POSITION: THE OUTDOOR AIR DAMPER SHALL FAIL CLOSED. IF THE OUTDOOR AIR DAMPER FAILS TO OPEN/MODULATE, AS INDICATED BY THE END SWITCH, GENERATE AN ALARM AT THE BAS.

RETURN AIR DAMPER POSITION: THE RETURN AIR DAMPER SHALL FAIL OPEN. IF THE RETURN AIR DAMPER FAILS TO CLOSE/MODULATE, AS INDICATED BY THE END SWITCH, GENERATE AN ALARM AT THE BAS.

DISCHARGE AIR TEMPERATURE: IF DISCHARGE AIR TEMPERATURE FALLS OUT OF THE ALLOWABLE RANGE OF 5°F FOR A TIME PERIOD 10 MINUTES, GENERATE AN ALARM AT THE BAS.

SINGLE-ZONE VAV AHU W/ DX W/ HGR, GAS, ERW CONTROLS DIAGRAM
NO SCALE

KINGSCOTT
PORTAGE | CHELSEA | GRAND RAPIDS | ROYAL OAK

FOREST VIEW HVAC IMPROVEMENTS
LANSING SCHOOL DISTRICT
3119 Stoneleigh
Lansing, MI 48910

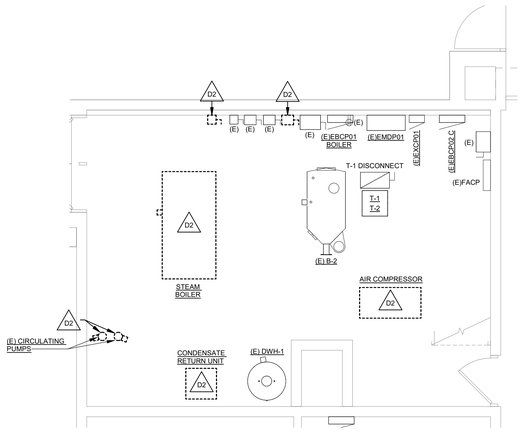
Lansing School District

ISSUANCES	DATE
CONSTRUCTION DOCUMENTS	11.14.2025
ADDENDUM 02	12.11.2025

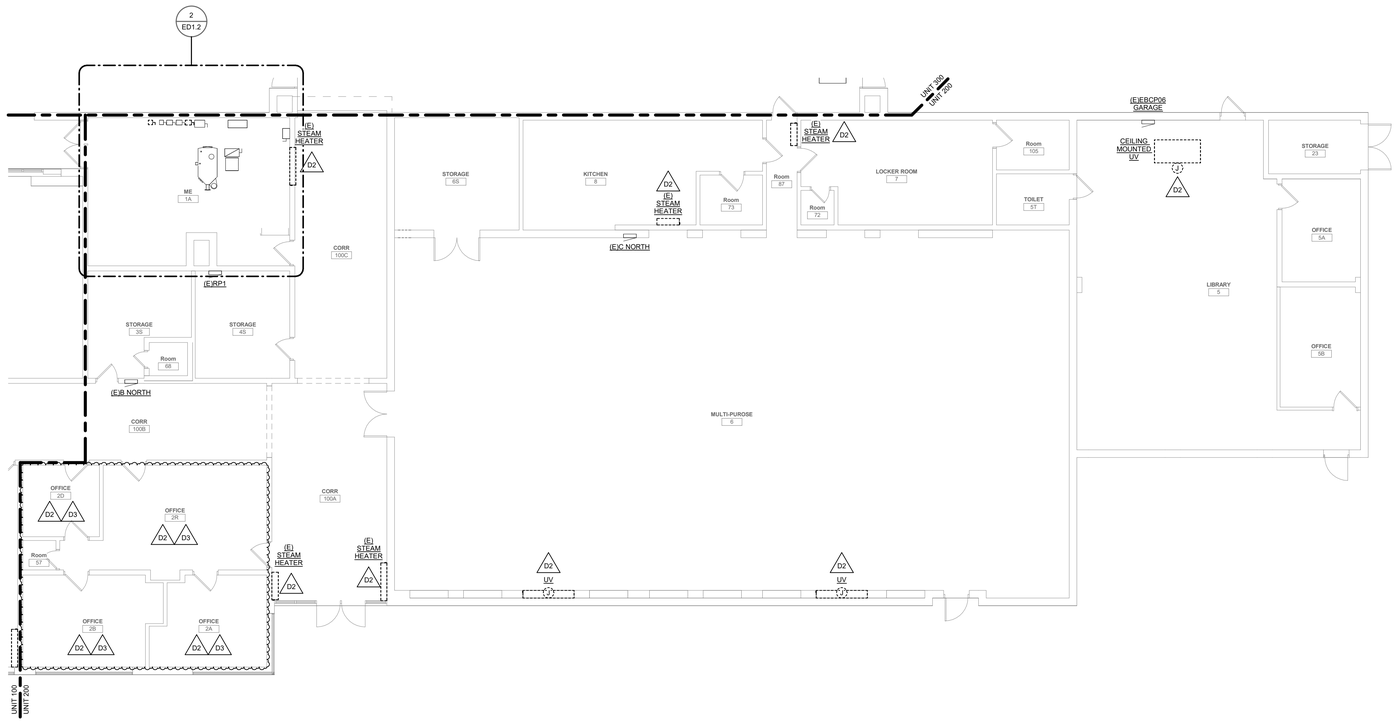
Strategic Energy Solutions®
4000 W. Eleven Mile Road Berkley, MI 48072
Phone 248.399.1900 Fax 248.399.1901
www.sesnet.com

SES Project # 25 0588 25

JOB NO. 2616.07
SHEET TITLE
CONTROL DIAGRAMS
SHEET NO.
M8.1



2 ED1.2 ENLARGED BOILER ROOM DEMOLITION PLAN
SCALE: 1/4" = 1'-0"



FIRST FLOOR POWER DEMOLITION PLAN - UNIT 200
SCALE: 1/8" = 1'-0"

ELECTRICAL DEMOLITION NOTES

1. VISIT THE SITE PRIOR TO SUBMISSION OF BID TO EXAMINE THE EXISTING CONDITIONS AND THE EXTENT OF DEMOLITION WORK.
2. EXAMINE THE DRAWINGS OF OTHER TRADES, BE FAMILIAR WITH THE DEMOLITION REQUIRED BY OTHER TRADES.
3. PERFORM ALL INCIDENTAL ELECTRICAL DEMOLITION AND/OR RELOCATION OF DEVICES AND EQUIPMENT REQUIRED TO FACILITATE THE DEMOLITION WORK OF OTHER TRADES.
4. COORDINATE WITH NEW WORK PLANS, ONE LINE, AND RISER DIAGRAMS FOR EXTENT OF DEMOLITION WORK.
5. COORDINATE ANY SHUTDOWN OF EXISTING SERVICES AND EQUIPMENT REMAINING IN USE WITH OWNERS' REPRESENTATIVE. WHERE EXISTING BUILDING SERVICE IS REQUIRED TO BE SHUT DOWN, INCLUDE ALL ASSOCIATED OVERTIME COST TO PERFORM THIS WORK DURING EVENING AND WEEKENDS. INCLUDE ALL COSTS FOR PROVIDING TEMPORARY POWER.
6. REMOVE ALL CONDUIT AND WIRE BACK TO NEAREST UPSTREAM DEVICE REMAINING IN SERVICE.
7. WHERE DEMOLITION WORK AFFECTS ELECTRICAL SERVICE TO DOWNSTREAM DEVICES TO REMAIN; EXTEND CONDUIT AND WIRE AS REQUIRED TO MAINTAIN ELECTRICAL SERVICE.
8. PROVIDE BLANK COVER PLATES WHERE SWITCHES AND DEVICES ARE REMOVED AND WALL REMAINS INTACT. MARK ALL UNUSED CIRCUIT BREAKERS AS "SPARE".
9. CONTRACTOR TO TAG ALL CIRCUITS AT BOTH ENDS AFFECTED BY THIS SCOPE OF WORK.
10. CONTRACTOR SHALL PROVIDE UPDATED, TYPED-IN DIRECTORIES FOR ALL PANELS AFFECTED BY THIS SCOPE OF WORK.
11. CONTRACTOR SHALL VERIFY ALL UNDERGROUND AND IN-SLAB UTILITIES LOCATIONS PRIOR TO SAW CUTTING OR PENETRATING ANY FLOOR SLABS. CONTRACTOR SHALL REPAIR ALL UTILITIES DAMAGED BY SAW CUTTING.

ELECTRICAL DEMOLITION KEYNOTES

D1 DISCONNECT AND DEMOLISH UNIT HEATER POWER CONNECTION. MAINTAIN EXISTING FEEDER FOR REUSE IN NEW WORK.

D2 DEMOLISH ELECTRICAL DISCONNECT AND ASSOCIATED POWER CONNECTION COMPLETE BACK TO SOURCE FOR DEMOLISHED MECHANICAL EQUIPMENT.

D3 COORDINATE TEMPORARY REMOVAL OF CEILING MOUNTED LIGHTING AND POWER DEVICES, AND FEEDS IN CEILING AS REQUIRED FOR NEW MECHANICAL WORK. SAVE LIGHTING AND POWER DEVICES FOR REINSTALLATION IN NEW WORK. COORDINATE WITH MECHANICAL TRADES FOR EXACT AREA OF SCOPE IN FIELD.

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FOREST VIEW HVAC IMPROVEMENTS

LANSING SCHOOL DISTRICT

3119 Stoneleigh
Lansing, MI 48910

Lansing School District

ISSUANCES	DATE
DESIGN DEVELOPMENT	09.26.2025
CONSTRUCTION DOCUMENTS	11.14.2025
ADDENDUM 02	12.11.2025

KEY PLAN

N

JOB NO. 2616.07

SHEET TITLE
FIRST FLOOR POWER DEMOLITION PLAN - UNIT 200

SHEET NO.
ED1.2

Strategic Energy Solutions®
4000 W. Eleven Mile Road Berkley, MI 48072
Phone 248.399.1900 Fax 248.399.1901
www.sesnet.com

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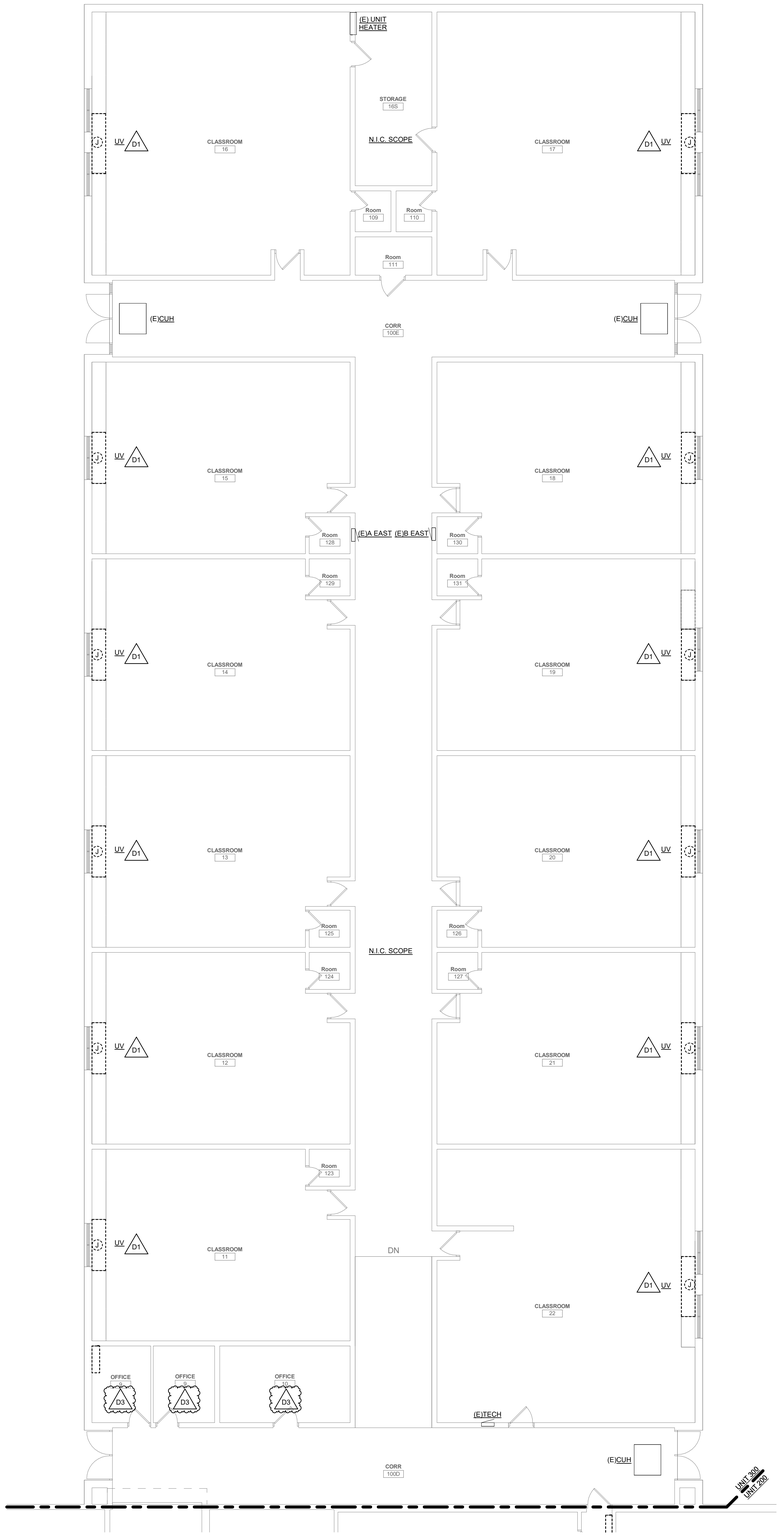

FIRST FLOOR POWER DEMOLITION PLAN - UNIT 300
SCALE: 1/8" = 1'-0"

ELECTRICAL DEMOLITION NOTES

1. VISIT THE SITE PRIOR TO SUBMISSION OF BID TO EXAMINE THE EXISTING CONDITIONS AND THE EXTENT OF DEMOLITION WORK.
2. EXAMINE THE DRAWINGS OF OTHER TRADES, BE FAMILIAR WITH THE DEMOLITION REQUIRED BY OTHER TRADES.
3. PERFORM ALL INCIDENTAL ELECTRICAL DEMOLITION AND/OR RELOCATION OF DEVICES AND EQUIPMENT REQUIRED TO FACILITATE THE DEMOLITION WORK OF OTHER TRADES.
4. COORDINATE WITH NEW WORK PLANS, ONE LINE, AND RISER DIAGRAMS FOR EXTENT OF DEMOLITION WORK.
5. COORDINATE ANY SHUTDOWN OF EXISTING SERVICES AND EQUIPMENT REMAINING IN USE WITH OWNERS' REPRESENTATIVE. WHERE EXISTING BUILDING SERVICE IS REQUIRED TO BE SHUT DOWN, INCLUDE ALL ASSOCIATED OVERTIME COST TO PERFORM THIS WORK DURING EVENING AND WEEKENDS. INCLUDE ALL COSTS FOR PROVIDING TEMPORARY POWER.
6. REMOVE ALL CONDUIT AND WIRE BACK TO NEAREST UPSTREAM DEVICE REMAINING IN SERVICE.
7. WHERE DEMOLITION WORK AFFECTS ELECTRICAL SERVICE TO DOWNSTREAM DEVICES TO REMAIN; EXTEND CONDUIT AND WIRE AS REQUIRED TO MAINTAIN ELECTRICAL SERVICE.
8. PROVIDE BLANK COVER PLATES WHERE SWITCHES AND DEVICES ARE REMOVED AND WALL REMAINS INTACT. MARK ALL UNUSED CIRCUIT BREAKERS AS "SPARE".
9. CONTRACTOR TO TAG ALL CIRCUITS AT BOTH ENDS AFFECTED BY THIS SCOPE OF WORK.
10. CONTRACTOR SHALL PROVIDE UPDATED, TYPED-IN DIRECTORIES FOR ALL PANELS AFFECTED BY THIS SCOPE OF WORK.
11. CONTRACTOR SHALL VERIFY ALL UNDERGROUND AND IN-SLAB UTILITIES LOCATIONS PRIOR TO SAW CUTTING OR PENETRATING ANY FLOOR SLABS. CONTRACTOR SHALL REPAIR ALL UTILITIES DAMAGED BY SAW CUTTING.

ELECTRICAL DEMOLITION KEYNOTES

D1 DISCONNECT AND DEMOLISH UNIT HEATER POWER CONNECTION. MAINTAIN EXISTING FEEDER FOR REUSE IN NEW WORK.

D2 DEMOLISH ELECTRICAL DISCONNECT AND ASSOCIATED POWER CONNECTION COMPLETE BACK TO SOURCE FOR DEMOLISHED MECHANICAL EQUIPMENT.

D3 COORDINATE TEMPORARY REMOVAL OF CEILING MOUNTED LIGHTING AND POWER DEVICES, AND FEEDS IN CEILING AS REQUIRED FOR NEW MECHANICAL WORK. SAVE LIGHTING AND POWER DEVICES FOR REINSTALLATION IN NEW WORK. COORDINATE WITH MECHANICAL TRADES FOR EXACT AREA OF SCOPE IN FIELD.

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FOREST VIEW HVAC IMPROVEMENTS

LANSING SCHOOL DISTRICT

3119 Stoneleigh
Lansing, MI 48910

Lansing School District

ISSUANCES	DATE
DESIGN DEVELOPMENT	09.26.2025
CONSTRUCTION DOCUMENTS	11.14.2025
ADDENDUM 02	12.11.2025

KEY PLAN

N

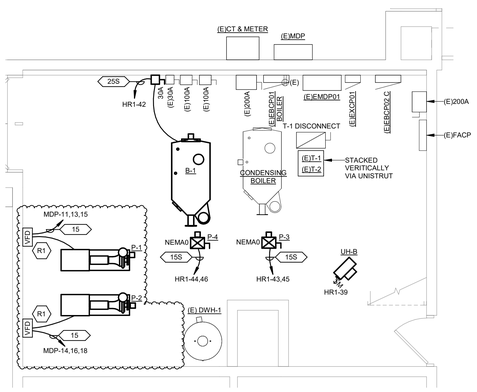
JOB NO. 2616.07

SHEET TITLE
FIRST FLOOR POWER DEMOLITION PLAN - UNIT 300

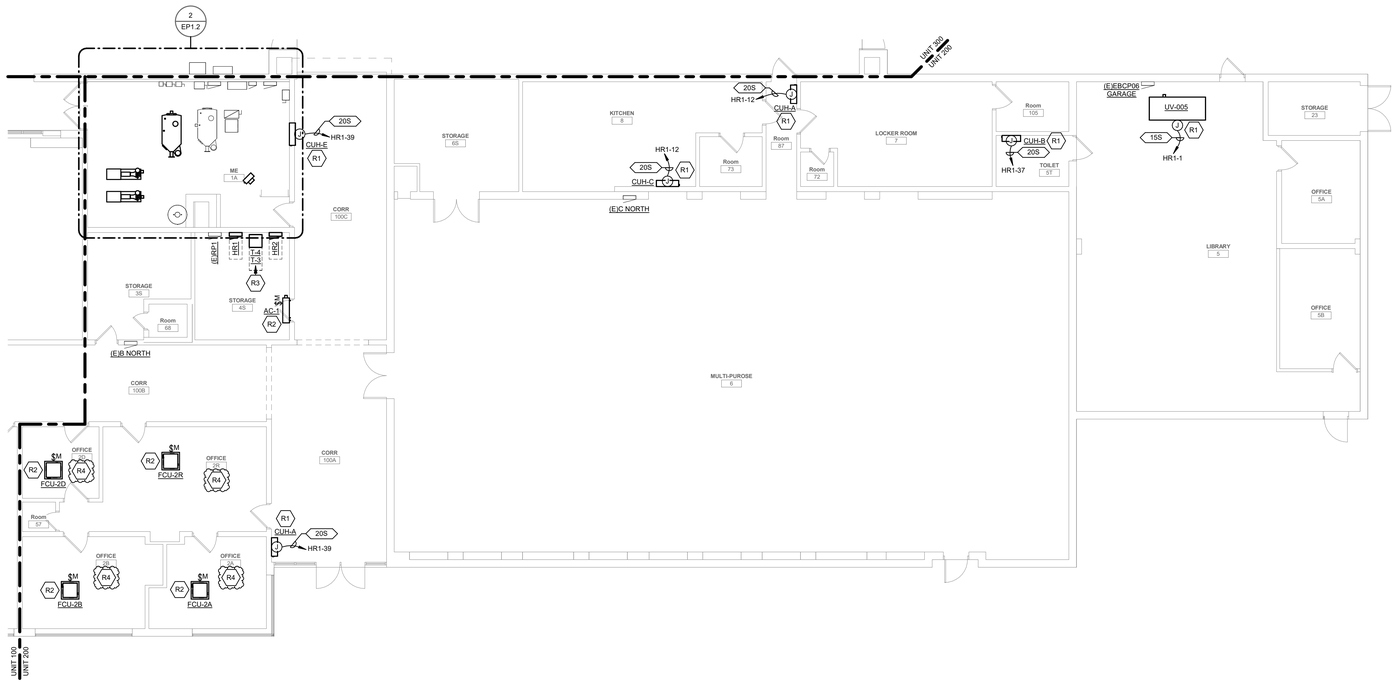
SHEET NO.
ED1.3

SES
Strategic Energy Solutions®
4000 W. Eleven Mile Road Berkley, MI 48072
Phone 248.399.1900 Fax 248.399.1901
www.sesnet.com

SES Project # 25 0588 25



2 EP1.2 ENLARGED BOILER ROOM NEW WORK PLAN
SCALE: 1/4" = 1'-0"



FIRST FLOOR POWER PLAN - UNIT 200
SCALE: 1/8" = 1'-0"

POWER GENERAL NOTES

1. ALL RECEPTACLES ON EXTERIOR, IN KITCHEN, IN CONCESSION, IN LABORATORY, AND WITHIN 6'-0" OF SINK OR OTHER WATER SUPPLY SHALL BE READILY ACCESSIBLE GFCI TYPE RECEPTACLE.
2. REFER TO ARCHITECTURAL FLOOR PLANS AND ELEVATIONS TO VERIFY LOCATION OF DEVICES.
3. ALL CONDUITS SERVING 120 VOLTS OR GREATER SHALL INCLUDE A GROUND WIRE.
4. ALL CONDUITS SHALL BE ROUTED CONCEALED UNLESS NOTED OTHERWISE.
5. ALL 120 VOLT CIRCUITS SHALL UTILIZE A SEPARATE NEUTRAL.
6. ALL BRANCH CIRCUITS THAT SUPPLY 125-V SINGLE PHASE, 15 AND 20 AMP OUTLETS TO BE INSTALLED IN DWELLING UNIT FAMILY ROOMS, DINING ROOMS, LIVING ROOMS, PARLORS, LIBRARIES, RECREATION ROOMS, CLOSETS, HALLWAYS OR SIMILAR ROOMS OR AREAS SHALL BE PROTECTED BY A LISTED ARC-FAULT CIRCUIT INTERRUPTER, COMBINATION-TYPE, INSTALLED TO PROVIDE PROTECTION OF THE BRANCH CIRCUIT.

POWER KEYNOTES

R1 EQUIPMENT DISCONNECT OR COMBINATION DISCONNECT/VFD TO PROVIDED BY MANUFACTURER. EC TO PROVIDE ALL POWER CONNECTIONS TO ENERGIZE EQUIPMENT AS INDICATED. COORDINATE INSTALLATION WITH MECHANICAL TRADES AND FINAL EQUIPMENT SUBMITTAL POWER REQUIREMENTS.

R2 INDOOR AC AND FCU MECHANICAL EQUIPMENT POWERED BY OUTDOOR CU OR HP. COORDINATE PLACEMENT OF INTERIOR DISCONNECT IN ACCESSIBLE LOCATION PRIOR TO ROUGH-IN.

R3 PROVIDE UNISTRUT MOUNTING TO VERTICALLY STACK T-1 AND T-2 TRANSFORMERS.

R4 COORDINATE REINSTALLATION OF CEILING MOUNTED LIGHTING AND POWER DEVICES. AND FEEDS MAINTAINED DURING DEMOLITION ONCE MECHANICAL SCOPE IS COMPLETED. COORDINATE WITH ARCHITECTURAL TRADES FOR EXACT AREA OF SCOPE IN FIELD.

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SHEET TITLE
FIRST FLOOR POWER PLAN - UNIT 200

SHEET NO.
EP1.2

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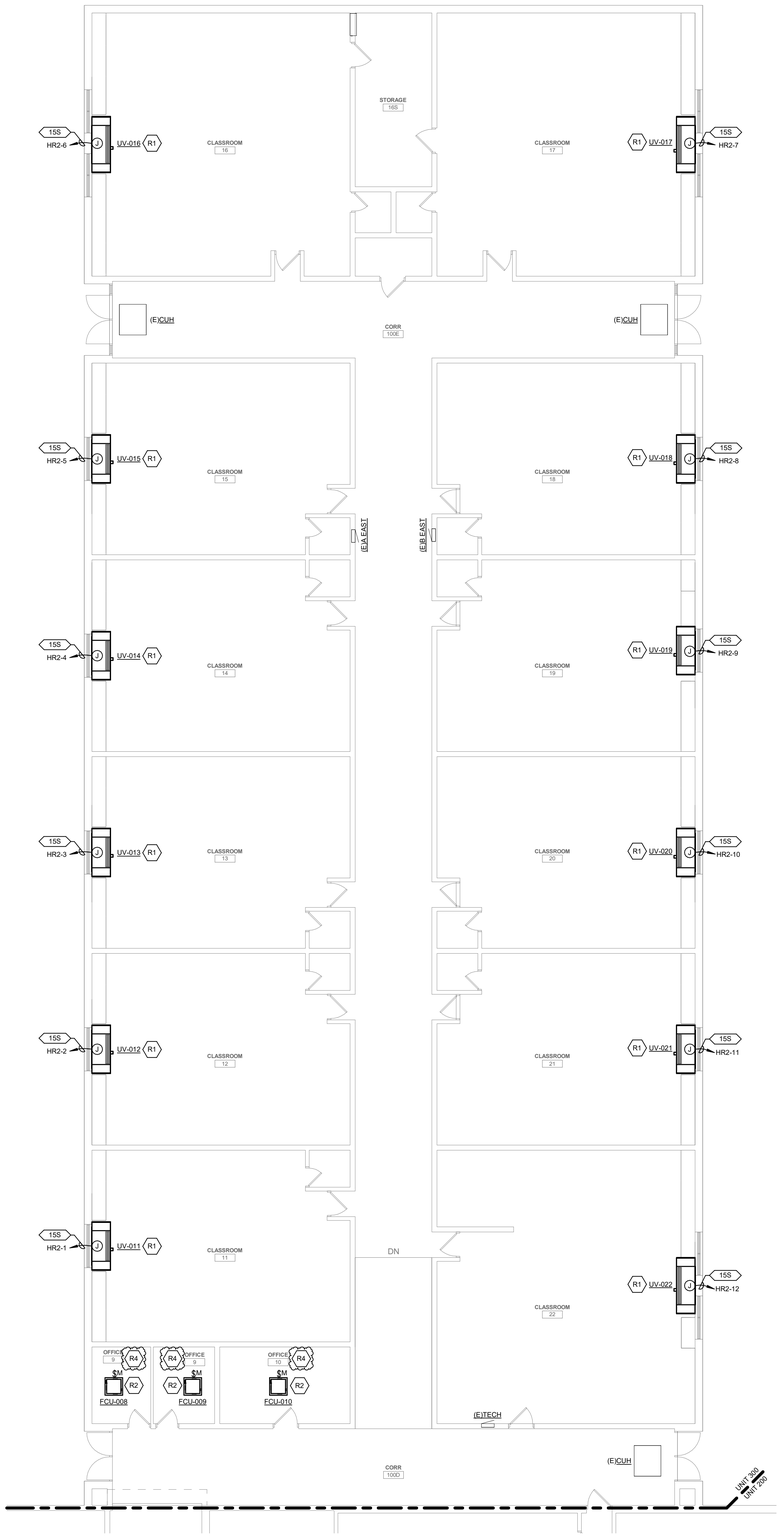
SES Project # 25 0588 25



FIRST FLOOR POWER PLAN - UNIT 300
SCALE: 1/8" = 1'-0"

POWER GENERAL NOTES

1. ALL RECEPTACLES ON EXTERIOR, IN KITCHEN, IN CONCESSION, IN LABORATORY, AND WITHIN 6'-0" OF SINK OR OTHER WATER SUPPLY SHALL BE READILY ACCESSIBLE GFCI TYPE RECEPTACLE.
2. REFER TO ARCHITECTURAL FLOOR PLANS AND ELEVATIONS TO VERIFY LOCATION OF DEVICES.
3. ALL CONDUITS SERVING 120 VOLTS OR GREATER SHALL INCLUDE A GROUND WIRE.
4. ALL CONDUITS SHALL BE ROUTED CONCEALED UNLESS NOTED OTHERWISE.
5. ALL 120 VOLT CIRCUITS SHALL UTILIZE A SEPARATE NEUTRAL.
6. ALL BRANCH CIRCUITS THAT SUPPLY 125-V SINGLE PHASE, 15 AND 20 AMP OUTLETS TO BE INSTALLED IN DWELLING UNIT FAMILY ROOMS, DINING ROOMS, LIVING ROOMS, PARLORS, LIBRARIES, RECREATION ROOMS, CLOSETS, HALLWAYS OR SIMILAR ROOMS OR AREAS SHALL BE PROTECTED BY A LISTED ARC-FAULT CIRCUIT INTERRUPTER, COMBINATION-TYPE, INSTALLED TO PROVIDE PROTECTION OF THE BRANCH CIRCUIT.

POWER KEYNOTES

R1 EQUIPMENT DISCONNECT OR COMBINATION DISCONNECT/VFD TO PROVIDED BY MANUFACTURER. EC TO PROVIDE ALL POWER CONNECTIONS TO ENERGIZE EQUIPMENT AS INDICATED. COORDINATE INSTALLATION WITH MECHANICAL TRADES AND FINAL EQUIPMENT SUBMITTAL POWER REQUIREMENTS.

R2 INDOOR AC AND FCU MECHANICAL EQUIPMENT POWERED BY OUTDOOR CU OR HP. COORDINATE PLACEMENT OF INTERIOR DISCONNECT IN ACCESSIBLE LOCATION PRIOR TO ROUGH-IN.

R3 PROVIDE UNISTRUT MOUNTING TO VERTICALLY STACK TWO 75KVA TRANSFORMERS.

R4 COORDINATE REINSTALLATION OF CEILING MOUNTED LIGHTING AND POWER DEVICES AND FEEDS MAINTAINED DURING DEMOLITION ONCE MECHANICAL SCOPE IS COMPLETED. COORDINATE WITH ARCHITECTURAL TRADES FOR EXACT AREA OF SCOPE IN FIELD.

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