



# Addendum 01

**Date:** July 7, 2023

**Project #:** 1347-23

**Owner:**

Muskegon Area Intermediate School District  
684 Harvey Street  
Muskegon, MI 49442

**Project Name:**

Mechanical Upgrades  
Heat Pumps & Boilers

**Purpose: Addendum 01**

This document shall form part of the bidding documents. Changes, additions, clarifications or deletions herein supersede the drawings and specifications. Bidders shall include on the proposal form, the acknowledgement of this Addendum.

**Attachments: Sign-in sheet**

**Existing Drawings: CTC original and CTC addition - Duct work**  
**Revised Specification Section 23 81 46 – Water Source Heat Pumps**

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**Item #1 Pre-Bid Meeting Attendees:**

See attached sign-in sheet for list of attendees.

**Item #2 Additional Information (CTC Heat Pumps):**

See attached for additional drawings of the existing Career Tech Center original construction and addition.

**Item #3 Pre-Bid Meeting Notes:**

1. Removal and reinstallation of lay-in ceilings, as necessary to perform the Heat Pump Replacements, is the responsibility of this contractor.
2. Existing JACE-8000 to remain.
3. Mechanical Contractor to provide, through Control's Contractor, any necessary software or additional 'parts' to make new boilers talk to existing controls systems. See Boiler Spec.
4. Boiler Specifications – Vissmann is the preferred Boiler manufacturer. Aerco is not an approved supplier.

**Item #4 Circuit Setters and Strainers (CTC Heat Pumps):**

Provide in your base bid, a price to replace the Circuit setters and Y-Strainers at all new heat pumps. See revised Specification Section 23 81 46 'Water Source Heat Pumps', attached.

**Item #5 Alternate Products (CTC Heat Pumps):**

'WaterFurnace' is approved as an equal heat pump manufacturer.  
'ClimateMaster' is approved as an equal heat pump manufacturer.

**Career Tech Center Mechanical Upgrades  
July 6, 2023 2:30 p.m. Pre-Bid Meeting (Optional)**

	Company	Name	Contact Phone
1	Hurst	Adam Schulte	231-286-3110
2	NORTHSIDE	JEFF PETROSKI	(231) 740-3705
3	Plouffe Service	GENE MAGOON	616-260-9489
4	<del>Andy Molitor</del> Grand Valley Automation	Andy Molitor	231-349-5115
5	Control Resource	Andy DeLange	616-202-8738
6	CONCEPT DESIGN Studio	Alan Majeski	231-740-4908
7	MATSD	STEVE FILLMORE	231 767-3695
8			
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10			
11			
12			

SECTION 23 8146 - WATER-SOURCE HEAT PUMPS, 5 TONS AND SMALLER, 6-25T

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water-Source Heat Pumps.
- B. Controls.
- C. Accessories.

1.02 REFERENCES

- A. ANSI/AHRI/ASHRAE/ISO13256-1 Performance for Water-Source Heat Pump Equipment.
- B. CSA C22.2 No. 186.1 Central Forced Air Unitary Heat Pumps with or without Electric Resistance Heat.
- C. AHRI 260 - Sound rating of ducted air moving and conditioning equipment.
- D. Attached Heat Pump Schedule.

1.03 Scope of Work

- A. Demolish and remove existing heat pump as scheduled to be replaced including associated condensate P-trap, demolish existing disconnect.
- B. Install new heat pump in existing heat pump location. Provide new supports and piping as required for new connections. **Replace existing Y-strainers and circuit setters.**

1.04 SUBMITTALS

- A. Submit unit performance data including: capacity, nominal and operating performance.
  - 1. Include rated capacities, furnished specialties, and accessories for each model.
- B. Submit Mechanical Specifications for unit and accessories describing construction, components and options.
- C. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 1. Include diagrams for power, signal, and control wiring.
- D. Manufacturer shall provide a paragraph by paragraph specification review with the product submission detailing compliance with or deviation from the specifications. Submittals without specification review will be returned un-reviewed.

- E. Submit operation and maintenance data including manufacturer's descriptive literature, operating instructions, installation instructions, and maintenance and repair data to include parts list and wiring diagrams.

#### 1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect, and handle products per manufacturer's recommendations.
- B. Comply with manufacturers installation instructions for rigging, unloading and transporting units.
- C. Unit shall be protected from physical damage and in compliance with LTL Rule 180
- D. Leave factory shipping covers in place until installation.

- 1.06 Provide Whole Units Parts Warranty for the duration of one year from start-up or 18 months from shipment, whichever is less. Units shall come with a 5-year compressor part warranty. Warrant that all products are free from defects in material and workmanship and have the capacities and ratings set forth in manufacturer's catalogs and bulletins.

#### 1.07 MAINTENANCE AGREEMENT

- A. Furnish complete service and maintenance of units for one year from Date of Substantial Completion.
- B. Provide maintenance service as outlined in manufacturer's operating and maintenance data. Provide 24 hour emergency service on breakdowns and malfunctions.
- C. Submit copy of service call work order or report and include description of work performed.

#### 1.08 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with documented experience.

### PART 2 PRODUCTS

- A. Standard eff WATER-SOURCE HEAT PUMPS, 0.5 to 25T
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Trane
  - 2. Daiken
  - 3. Other manufacturers as pre-approved by design engineer
- C. Description: Packaged water-source heat pump with temperature controls; factory assembled, tested, and rated according to ASHRAE/AHRI/ISO-13256-1.

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
2. Products shall be designed, rated, and certified in accordance with ISO-AHRI 13256-1. Units shall meet the efficiency standards of the ASHRAE 90.1.
3. Products shall be designed, rated and certified in accordance with ETL, CETL and ISO-AHRI 13256-1. Units shall meet the efficiency standards of the ASHRAE 90.1.

#### D. GENERAL UNIT DESCRIPTION

1. The unit frame shall be constructed of zinc coated, heavy-gauge, galvanized steel. The panels are acoustically insulated with ½ inch matte faced glass fiber insulation [option: foil faced insulation with no exposed edges to prevent glass fiber in the airstream]. The insulation shall be UL listed and meets NFPA-90A and UL 181 standards.
2. The manufacturer's maintenance instructions shall describe the proper cleaning procedure for the unit. Access for inspection and cleaning of the unit drain pan, coils and fan section shall be provided. The unit shall be installed for proper access. Procedures for proper access, inspection and cleaning of the unit shall be included in the maintenance manual.
3. All units shall be factory test operated prior to shipping
4. Vertical units shall have either Top or Back supply-air with Left or Right return-air.
5. Units shall be provided with 1" Throwaway Filter or 2" MERV8. Contractor to field verify filter housing requirements in field.
  - a. A ducted filter rack shall be factory mounted for the use of 1 or 2 inch filters and shall provide easy access to the filters from the side of the filter rack through a door that does not require a tool. Duct collars will be built into the filter rack to provide an easy means to connect the duct work to the unit.
  - b. A ducted filter rack shall be factory mounted for the use of 1 or 2 inch filters and shall provide easy access to the filters from the top or bottom of the filter rack through a door that does not require a tool. Duct collars will be built into the filter rack to provide an easy means to connect the duct work to the unit.
  - c. A factory-mounted ducted filter rack shall be provided on all 6-25 Ton models.
6. Drain Pan
  - a. Drain pan shall be non-corrosive with condensate drain piping projecting through unit cabinet and complying with ASHRAE 62.1. Acceptable materials include polymer or 304 stainless steel. Coated or uncoated galvanized steel drain pans are not acceptable. In order to ensure complete drainage the bottom of the drain pan shall be sloped on two planes to pitch the condensate toward the drain connection to ensure complete condensate drainage.
  - b. The unit as standard will ship with a solid state electronic switch or manufacturer's standard condensate overflow switch complying with UL 508.

#### E. COMPRESSOR

1. The unit shall have a Single Stage high efficiency rotary or scroll type compressor. The compressor shall be dually isolated. External vibration isolation is provided by rubber mounting devices located underneath the mounting base of the compressor. A second isolation of the refrigerant assembly shall be provided under the compressor mounting base. Internal thermal overload protection shall be provided. Protection against excessive discharge pressure is provided by means of a high pressure switch.

- Protection against a loss of charge is provided by a low pressure safety.
2. All 6-25 Ton models are provided with two scroll compressors and two refrigerant circuits.

#### F. SUPPLY AIR FAN AND MOTOR ASSEMBLY

1. Fan shall be a forward-curved centrifugal wheel style constructed of corrosion resistant galvanized material. The fan is placed in a draw-thru configuration and is arranged for top, back or side supply air. This assembly shall attach the wheel and motor to the fan housing providing single side service access.
2. All fan motors for units 0.5-5 tons shall be ECM variable speed motors with thermal overload protection. The motor shall be programmed to provide soft starting and a constant torque over a range of static pressures and airflows.
3. Removal of the motor and fan wheel shall be made with the assistance of a factory provided orifice ring assembly. This assembly shall attach the wheel and motor to the fan housing providing single side service access.
4. The fan assembly on horizontal units shall be arranged for back, left, or right discharge. The discharge must also be capable of being changed in the field.

#### G. REFRIGERATION CIRCUIT

1. All units shall have a sealed refrigerant circuit that is charged with R-410A refrigerant. The unit will have a bi-directional thermostatic expansion valve that allows equipment operation between 25 and at least 110 F entering fluid temperature. This system shall be clean and free from contaminants and conditions such as drilling fragments, dirt and oil.
2. The water-to-refrigerant heat exchanger shall be of a high quality co-axial coil for maximum heat transfer. Brazed plate heat exchanger type shall not be acceptable. The copper coil shall be deeply fluted to enhance heat transfer and minimize fouling and scaling. The coil shall have a working pressure of 650 psig on the refrigerant side and 400 psig on the water side.
  - a. The water-to-refrigerant heat exchanger, water lines, and refrigerant suction lines shall be insulated to prevent condensation at low temperatures below 60F degrees.
  - b. The air-to-refrigerant coil shall contain copper tubes mechanically expanded into evenly spaced aluminum fins. All coils are to be leak tested. The proof must be performed at 650 psig operating pressure and the leak test at 450 psig operating pressure with helium. In addition, the tubes are to be completely evacuated of air prior to shipment. The refrigerant coil distributor assembly shall be of orifice style with round copper distributor tubes. The tubes shall be sized consistently with the capacity of the coil. Suction headers shall be fabricated from rounded copper pipe.
3. Access ports shall be factory supplied within the refrigerant circuit on the high and low pressure sides for easy refrigerant pressure or temperature testing. A filter drier shall be provided and factory installed within the refrigerant circuit. Protection against excessive discharge pressure and loss of charge shall be provided.
4. Units shall come standard with a reversing valve for heating and cooling operation. The reversing valve is a pilot operating sliding piston type with replaceable encapsulated magnetic coil. This valve shall be energized in cooling. Refrigerant Metering shall be accomplished with a Bi-directional thermal expansion valve (TXV) as standard. Capillary tubes are not acceptable.

5. All water lines that are located in the indoor air stream shall be insulated with 3/8 inch thick elastomeric insulation. The refrigerant lines that are located in the indoor air stream that are not directly over the drain pan area shall be insulated with 3/8 inch thick elastomeric insulation.

#### H. ELECTRICAL

1. The factory tested and installed control panel shall contain all necessary devices to allow heating and cooling operation of the equipment to occur from a remote wall thermostat or zone sensor. These devices shall be as follows:
  - a. 24 Vac energy limiting class II 50 VA (minimum) transformer applicable to 0.5 to 5 ton units.
  - b. 24 Vac blower motor relay
  - c. 24 Vac compressor contactor for compressor control
  - d. Field thermostat connections shall be provided for ease of hook-up to terminal locations located in the unit's control box.
  - e. Lockout function controls excessive cycling of the compressor shall be provided to protect the compressor during adverse operating conditions. The device may be reset by interrupting power to the 24 Vac control circuit. Reset may be done either at a remote thermostat or through a momentary main power interruption for units with thermostat controls. For units with DDC controls, the reset can be reset at the zone sensor (with an off switch) or a service tool.
  - f. A high pressure switch shall protect the compressor against operation at refrigerant system pressures exceeding 650 psig.
  - g. Factory installed wire harness shall be available for the Deluxe, ZN524 and UC400(B) control packages.
  - h. A Disconnect Switch shall be unit-mounted and easily accessed from the front of the unit. The disconnect switch can be locked in the off position with one padlock. The disconnect switch is UL508 listed.
2. A single point power connection shall be provided which will power the entire unit including the controls, compressor, blower motor and all installed options.

#### A. CONTROLS

Unit control box shall contain necessary devices to allow heating and cooling operation to occur from a remote mounted zone sensor. Devices shall be as follows:

1. Option 1: UC400(B): A microprocessor based terminal unit controller that provides accurate, pressure independent control through the use of a proportional integral control algorithm and direct digital control (DDC) technology. The controller shall be factory-wired, factory tested, and factory-commissioned. Each WSHP unit shall have control logic for standalone control or BAS integration via the BACnet™ MS/TP protocol. Control of the compressor and supply air fan motor shall be provided by the unit controller to optimize energy efficiency and comfort.
  - a. The controller shall have the ability to control to four set points:
    - (i) Occupied
    - (ii) Occupied standby
    - (iii) Occupied bypass
    - (iv) Unoccupied

- b. Controller shall also provide anti-short cycle compressor protection, random start delay, filter maintenance timer, timed override, isolation valve control (two position), condensate overflow protection, high and low pressure protection, low water temperature sensor, diagnostics, test mode for troubleshooting, and dehumidification mode (if specified or scheduled).
- c. At a minimum a 75 VA transformer will be provided with a fuse for component safety.
- d. Brownout protection will protect the unit from a low voltage condition. Once low voltage has occurred, the anti-short cycle timer will become energized. The voltage will continue to be monitored until it increases. The compressors will be enabled at this time if all start-up time delays have expired, and all safeties have been satisfied.

F. Hose Kits

1. Standard Hose Kit Flow Balancing Systems

- a. Provide two ball valves per unit. One for the supply line and one for the return line. Valve assembly shall be constructed of a brass ball and cast bronze body. Ball valve shall be seated in a teflon seal.
- b. Provide two hoses per unit in 3 foot lengths. Hoses shall be made of galvanized or stainless steel outer braid and a thermoplastic rubber inner lining. Hoses shall have a NPT fitting at the ends.

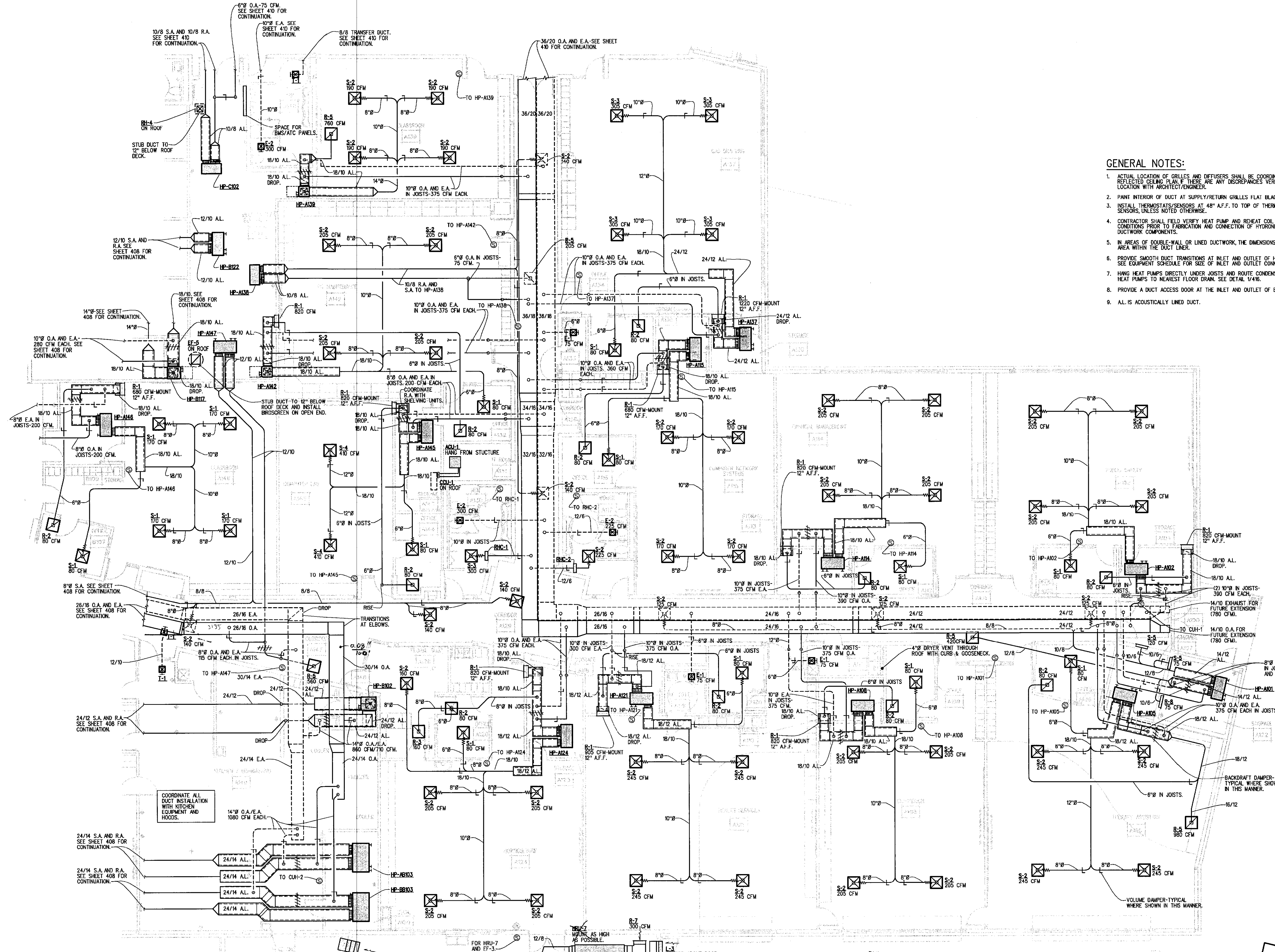
PART 3 EXECUTION

1.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Locate new units in existing units locations, level and shim units, and anchor to structure.
- C. Protect units with protective covers during balance of construction.

END OF SECTION

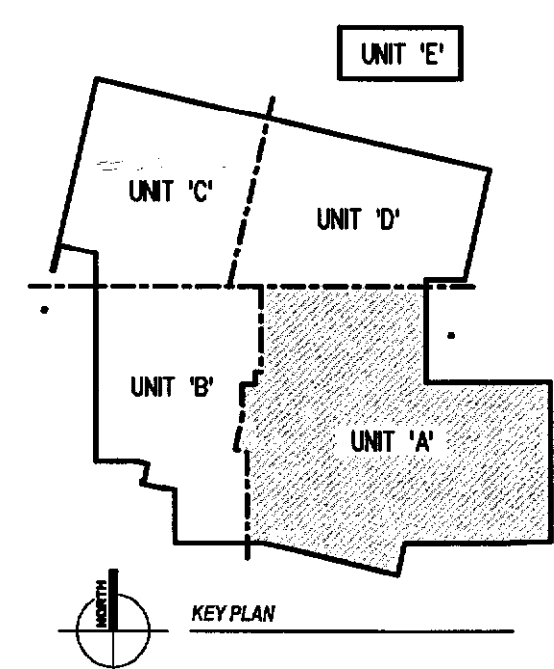




**GENERAL NOTES:**

1. ACTUAL LOCATION OF GRILLES AND DIFFUSERS SHALL BE COORDINATED WITH REFLECTED CEILING PLAN. IF THERE ARE ANY DISCREPANCIES VERIFY FINAL LOCATION WITH ARCHITECT/ENGINEER.
2. PAINT INTERIOR OF DUCT AT SUPPLY/RETURN GRILLES FLAT BLACK.
3. INSTALL THERMOSTATS/SENSORS AT 48" A.F.F. TO TOP OF THERMOSTATS/SENSORS, UNLESS NOTED OTHERWISE.
4. CONTRACTOR SHALL FIELD VERIFY HEAT PUMP AND REHEAT COIL CONDITIONS PRIOR TO FABRICATION AND CONNECTION OF HYDRONIC AND DUCTWORK COMPONENTS.
5. IN AREAS OF DOUBLE-WALL OR LINED DUCTWORK, THE DIMENSIONS LISTED ARE THE FREE AREA WITHIN THE DUCT LINER.
6. PROVIDE SMOOTH DUCT TRANSITIONS AT INLET AND OUTLET OF HEAT PUMPS AND REHEAT COILS. SEE EQUIPMENT SCHEDULE FOR SIZE OF INLET AND OUTLET CONNECTIONS.
7. HANG HEAT PUMPS DIRECTLY UNDER JOISTS AND ROUTE CONDENSATE PIPING FROM HEAT PUMPS TO NEAREST FLOOR DRAIN. SEE DETAIL 1416.
8. PROVIDE A DUCT ACCESS DOOR AT THE INLET AND OUTLET OF EACH REHEAT COIL.
9. A.L. IS ACOUSTICALLY LINED DUCT.

**NOTE:**  
 MAINTAIN 3'-6" FOR ELECTRICAL WORKING SPACE AT HIGH VOLTAGE ELECTRICAL CONNECTIONS TO HEAT PUMPS PER NATIONAL ELECTRICAL CODE. AVOID RUNNING DUCTWORK AND HYDRONIC PIPING WITHIN THIS SPACE.



**PARTIAL MECHANICAL FLOOR PLAN UNIT 'A'**  
 SCALE: 1/8" = 1'-0"

- ADD #3**  
 ELIMINATE HRU-7  
 Add unit HRU
- A. Eliminate HRU-7 from the Greenhouse, including louvers L-3 and L-4 and all ductwork associated with the heat recovery unit.
  - B. Furnish and install unit heater equal to Trane model 42-S, 591 cfm, 15.0 MBH @ 1.5 gpm (20F WTD), 1550 rpm, 1/20 hp, 120V/1/60. Install in the same general location where HRU-7 is shown on the plans.
  - C. Furnish and install a new exhaust fan in the Greenhouse, next to fan EF-3. New fan shall be Greenheck model SP-5 or equivalent, nominally 50 cfm, 120V/1/60, 46 watts, with wall discharge cap. Operate directly from a room humidifier to remove humid air (makeup air is intended to be provided by leakage). No CO2 monitoring or control function required.

PROJECT NO.	9760
ISSUANCES	
BIDDING & CONSTRUCTION	11/14/03
REVISIONS	
APPROVED BY	RAB
REVIEWED BY	TDK
DRAWN BY	TDK

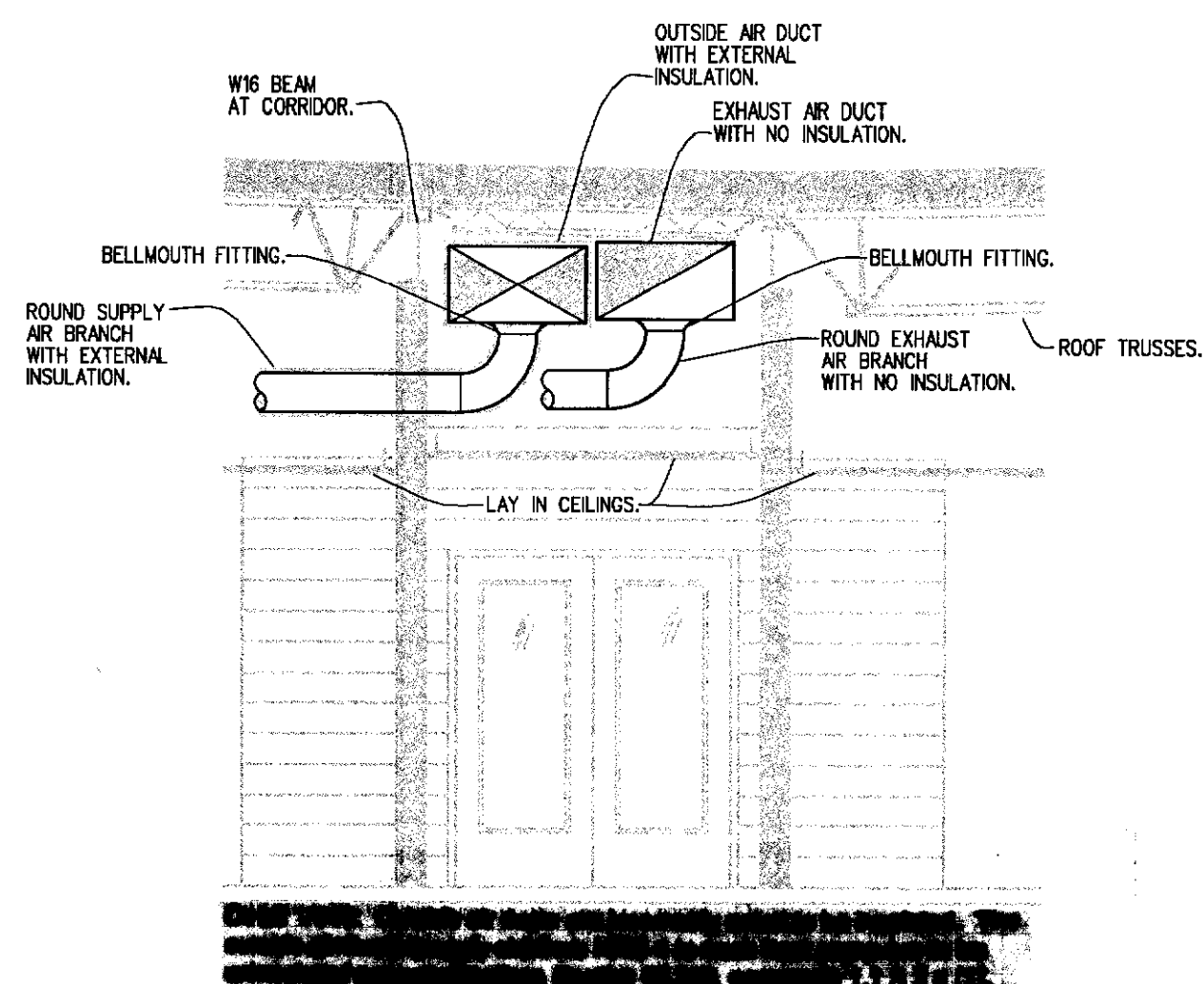
**PARTIAL MECHANICAL FLOOR PLAN UNIT A**

03/30/02 AM

11/14/03

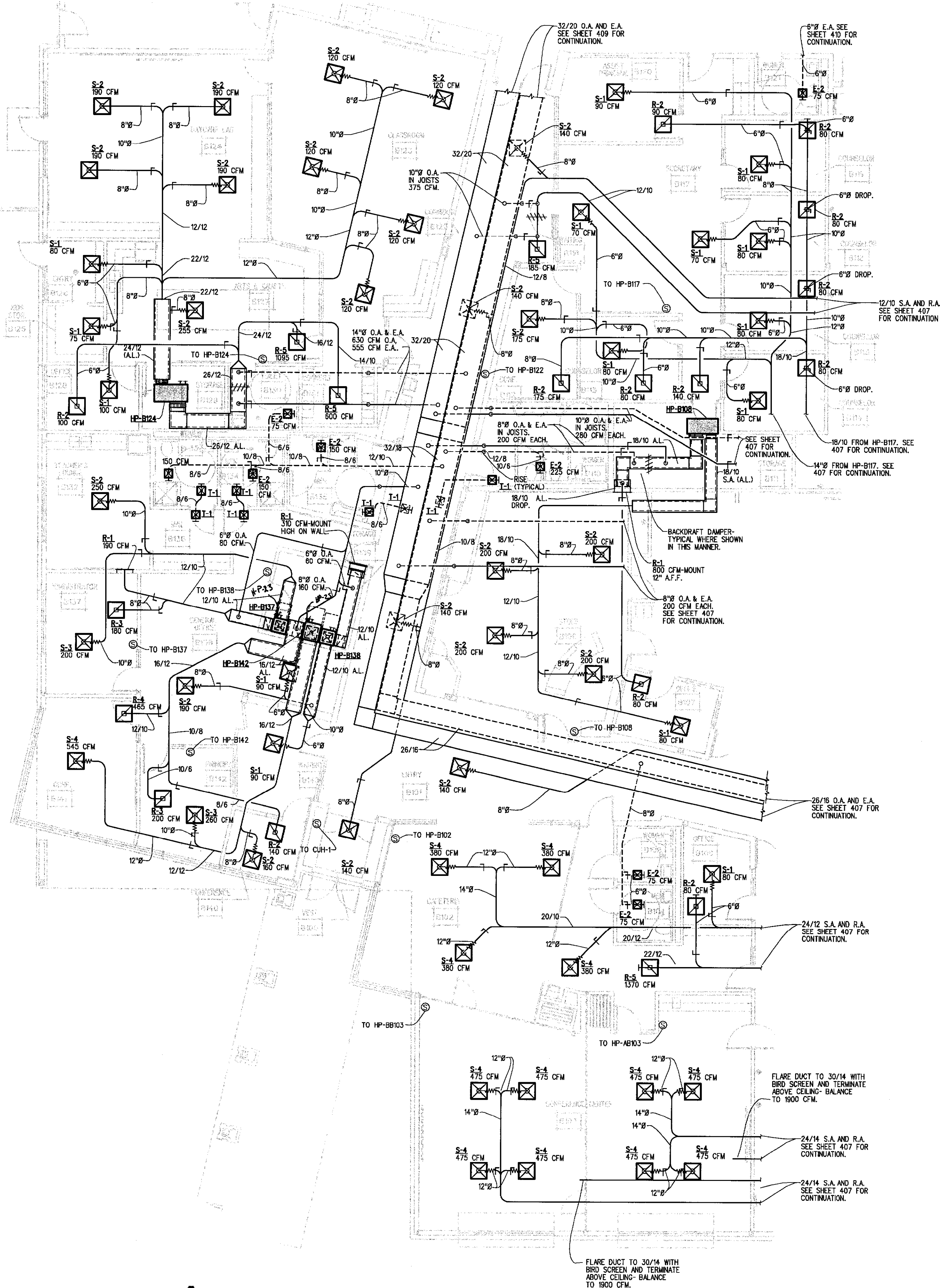
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1  
408  
TYPICAL CORRIDOR MECHANICAL SECTION  
SCALE: 1/4" = 1'-0"

ADD 1

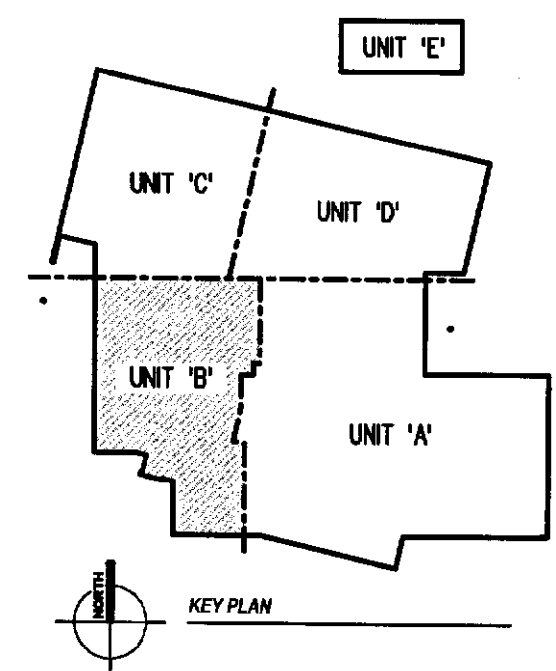


**GENERAL NOTES:**

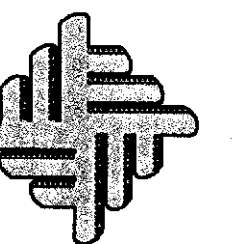
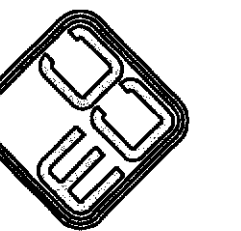
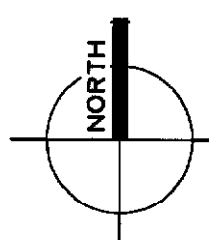
- ACTUAL LOCATION OF GRILLES AND DIFFUSERS SHALL BE COORDINATED WITH REFLECTED CEILING PLAN. IF THERE ARE ANY DISCREPANCIES VERIFY FINAL LOCATION WITH ARCHITECT/ENGINEER.
- PAIN INTERIOR OF DUCT AT SUPPLY/RETURN GRILLES FLAT BLACK.
- INSTALL THERMOSTATS/SENSORS AT 48" A.F.F. TO TOP OF THERMOSTATS/SENSORS, UNLESS NOTED OTHERWISE.
- CONTRACTOR SHALL FIELD VERIFY HEAT PUMP AND REHEAT COIL CONDITIONS PRIOR TO FABRICATION AND CONNECTION OF HYDRONIC AND DUCTWORK COMPONENTS.
- IN AREAS OF DOUBLE-WALL OR LINED DUCTWORK, THE DIMENSIONS LISTED ARE THE FREE AREA WITHIN THE DUCT LINER.
- PROVIDE SMOOTH DUCT TRANSITIONS AT INLET AND OUTLET OF HEAT PUMPS AND REHEAT COILS. SEE EQUIPMENT SCHEDULE FOR SIZE OF INLET AND OUTLET CONNECTIONS.
- HANG HEAT PUMPS DIRECTLY UNDER JOISTS AND ROUTE CONDENSATE PIPING FROM HEAT PUMPS TO NEAREST FLOOR DRAIN. SEE DETAIL 1/4-16.
- PROVIDE A DUCT ACCESS DOOR AT THE INLET AND OUTLET OF EACH REHEAT COIL.
- A.L. IS ACOUSTICALLY LINED DUCT.

**NOTE:**

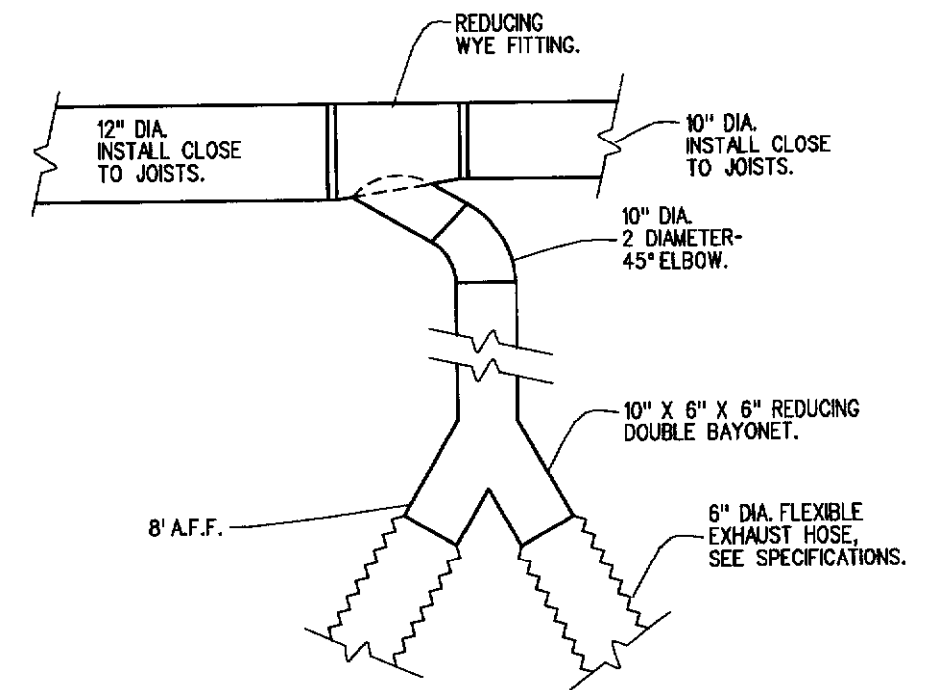
MAINTAIN 3'-6" FOR ELECTRICAL WORKING SPACE AT HIGH VOLTAGE ELECTRICAL CONNECTIONS TO HEAT PUMPS PER NATIONAL ELECTRICAL CODE. AVOID RUNNING DUCTWORK AND HYDRONIC PIPING WITHIN THIS SPACE.



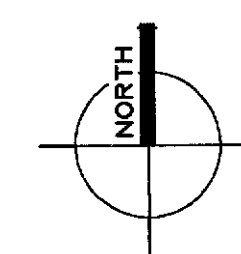
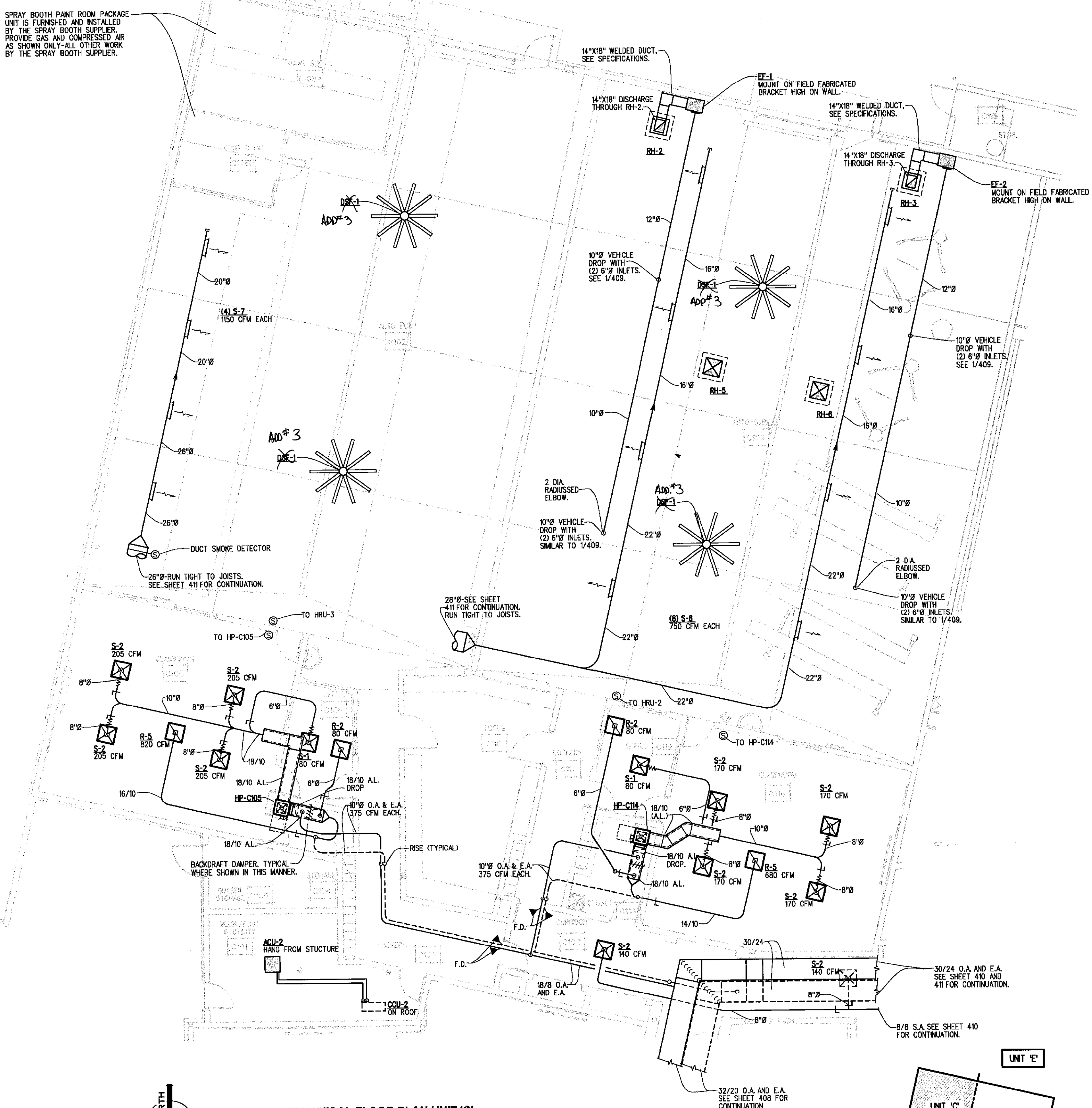
PARTIAL MECHANICAL FLOOR PLAN UNIT 'B'  
SCALE: 1/8" = 1'-0"



SPRAY BOOTH PAINT ROOM PACKAGE UNIT IS FURNISHED AND INSTALLED BY THE SPRAY BOOTH SUPPLIER. PROVIDE GAS AND COMPRESSED AIR AS SHOWN ONLY-ALL OTHER WORK BY THE SPRAY BOOTH SUPPLIER.



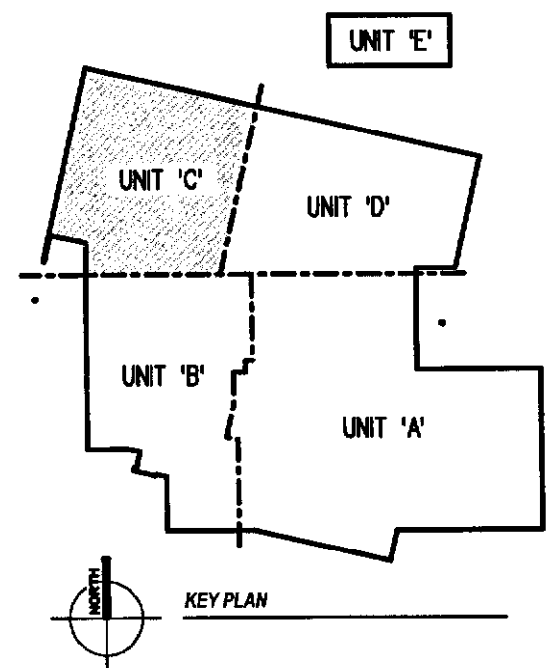
**1 TYPICAL VEHICLE EXHAUST DROP DETAIL**  
409 NO SCALE



**PARTIAL MECHANICAL FLOOR PLAN UNIT 'C'**  
SCALE: 1/8" = 1'-0"

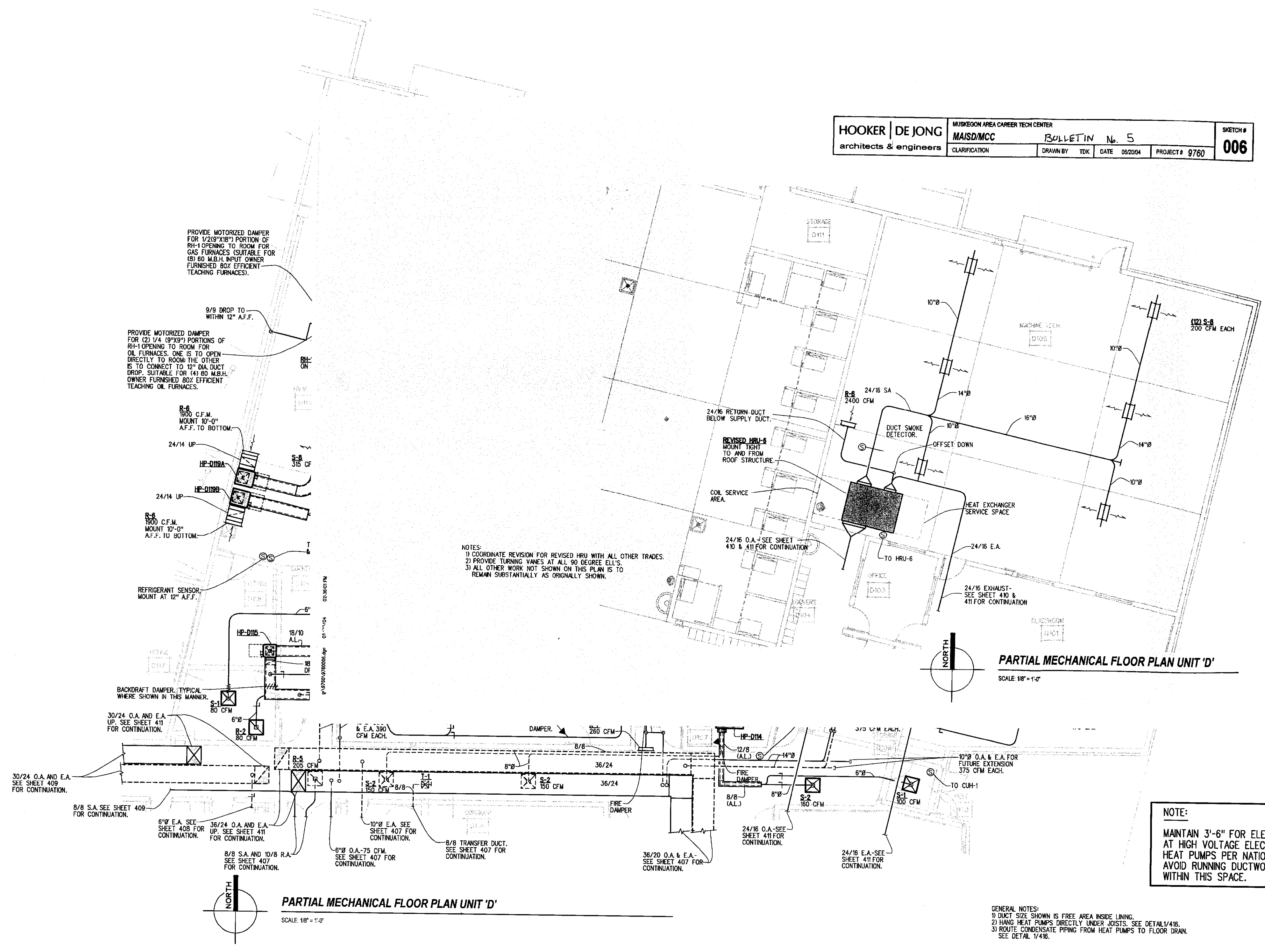
- GENERAL NOTES:**
- ACTUAL LOCATION OF GRILLES AND DIFFUSERS SHALL BE COORDINATED WITH REFLECTED CEILING PLAN. IF THERE ARE ANY DISCREPANCIES VERIFY FINAL LOCATION WITH ARCHITECT/PENNEL.
  - PAINT INTERIOR OF DUCT AT SUPPLY/RETURN GRILLES FLAT BLACK.
  - INSTALL THERMOSTATS/SENSORS AT 48" A.F.F. TO TOP OF THERMOSTATS/SENSORS, UNLESS NOTED OTHERWISE.
  - CONTRACTOR SHALL FIELD VERIFY HEAT PUMP AND REHEAT COIL CONDITIONS PRIOR TO FABRICATION AND CONNECTION OF HYDRONIC AND DUCTWORK COMPONENTS.
  - IN AREAS OF DOUBLE-WALL OR LINED DUCTWORK, THE DIMENSIONS LISTED ARE THE FREE AREA WITHIN THE DUCT LINER.
  - PROVIDE SMOOTH DUCT TRANSITIONS AT INLET AND OUTLET OF HEAT PUMPS AND REHEAT COILS. SEE EQUIPMENT SCHEDULE FOR SIZE OF INLET AND OUTLET CONNECTIONS.
  - HANG HEAT PUMPS DIRECTLY UNDER JOISTS AND ROUTE CONDENSATE PIPING FROM HEAT PUMPS TO NEAREST FLOOR DRAIN. SEE DETAIL 1/416.
  - PROVIDE A DUCT ACCESS DOOR AT THE INLET AND OUTLET OF EACH REHEAT COIL.
  - A.L. IS ACOUSTICALLY LINED DUCT.

**NOTE:**  
MAINTAIN 3'-6" FOR ELECTRICAL WORKING SPACE AT HIGH VOLTAGE ELECTRICAL CONNECTIONS TO HEAT PUMPS PER NATIONAL ELECTRICAL CODE. AVOID RUNNING DUCTWORK AND HYDRONIC PIPING WITHIN THIS SPACE.

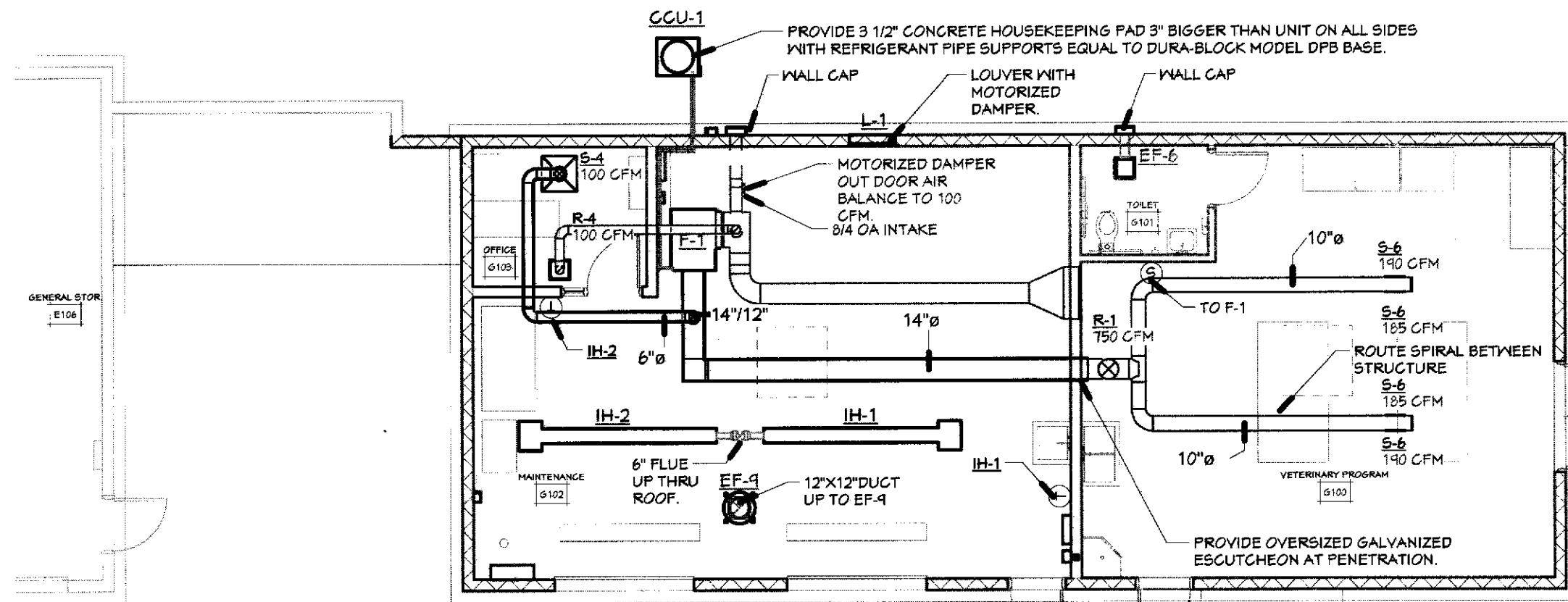




HOOKEER   DE JONG architects & engineers	MUSKEGON AREA CAREER TECH CENTER	SKETCH #
	MAISD/MCC	006
CLARIFICATION	BULLETIN No. 5	DRAWN BY TDK
DATE 05/20/04	PROJECT # 9760	

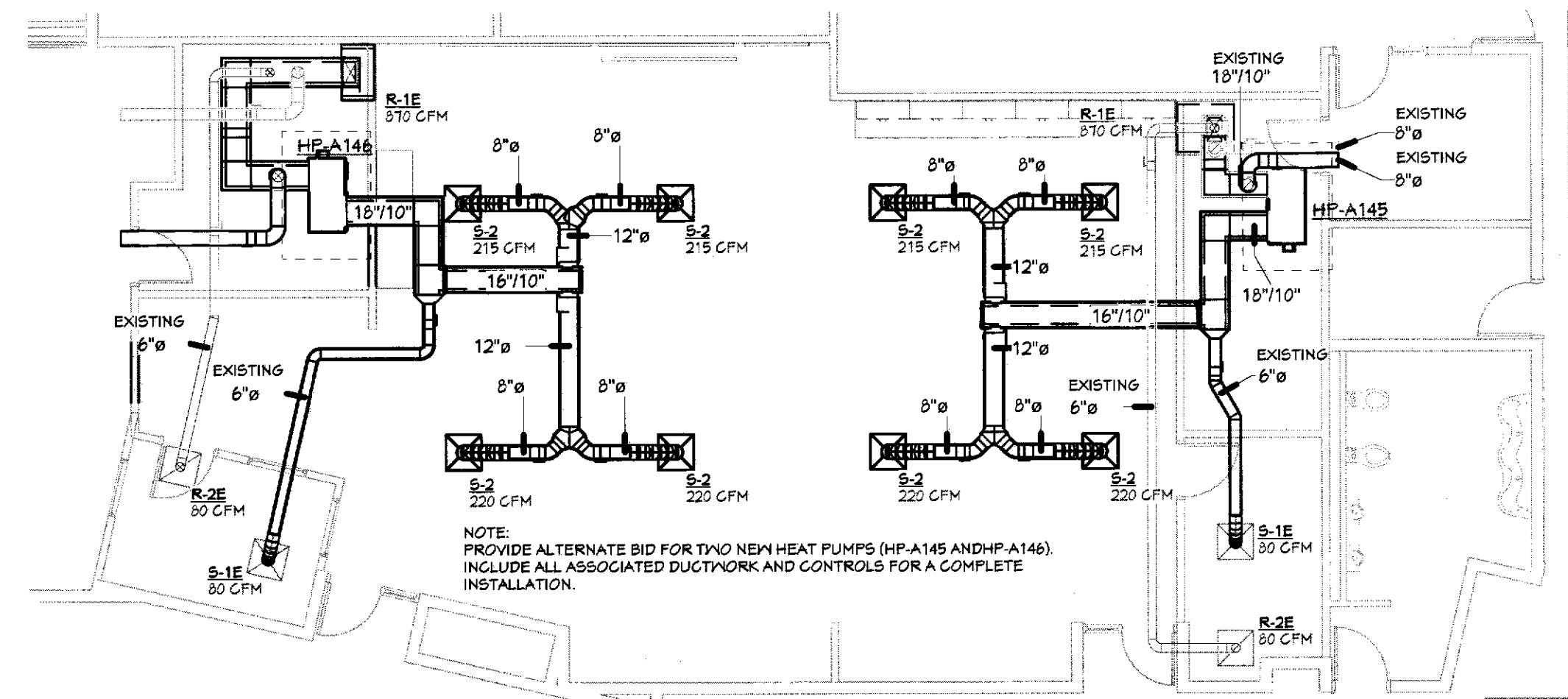


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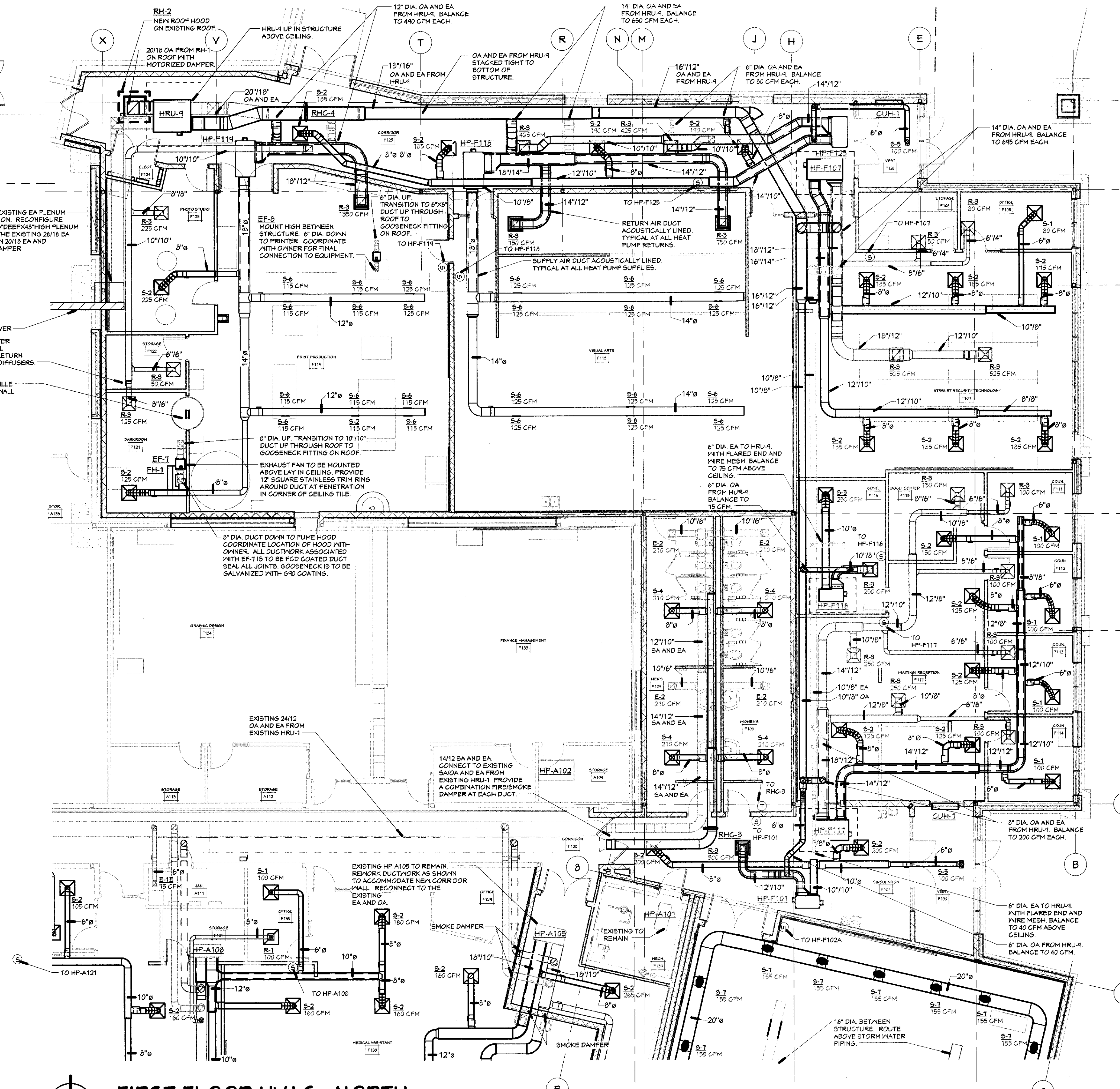
**1 ENLARGED HVAC PLAN - MAINTENANCE / VETERINARY**

MH1.1 1/8" = 1'-0"

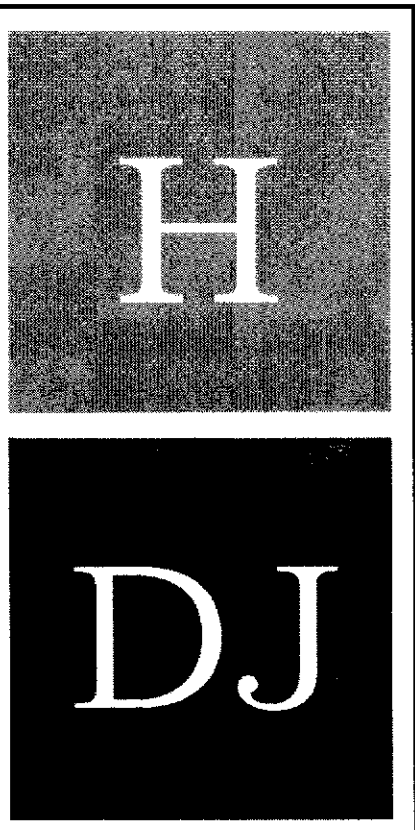


**2 ENLARGED HVAC PLAN - CRIMINAL JUSTICE**

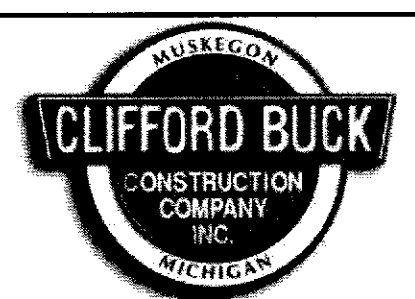
MH1.1 1/8" = 1'-0"



**FIRST FLOOR HVAC - NORTH**  
1/8" = 1'-0"



HOOKER | DE JONG  
Architects & Engineers  
318 Morris Avenue  
Studio Suite 410  
Muskegon, MI 49440  
P:231.723.3407  
F:231.723.2589



**MUSKEGON AREA CAREER TECH CENTER**  
BUILDING ADDITION AND RENOVATION  
200 Harvey Street  
Muskegon, Michigan  
MAISD / MCC

Project Number **4-0563**

ISSUANCES  
2013.02.11 • FOR BIDS AND CONSTRUCTION

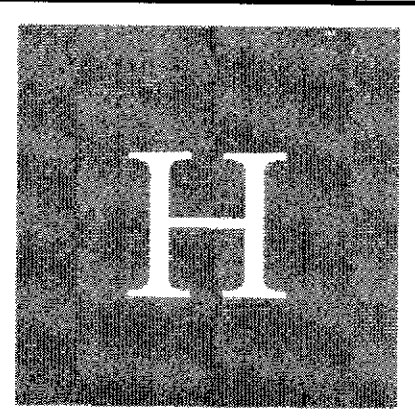
REVISIONS	No.	Date	Description
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REVISIONS	No.	Date	Description
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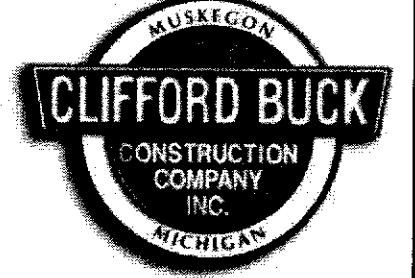
**FIRST FLOOR HVAC-NORTH & MISC.**

**MH1.1**





HOOKER | DE JONG  
Architects & Engineers  
318 Morris Avenue  
Stoughton, MA 01940  
P 231 722 1347  
F 231 722 1258



**BUILDING ADDITION AND RENOVATION**  
**MUSKOGON AREA CAREER TECH CENTER**  
200 Haven Street  
Muskegon, Michigan  
MAIS / MCC

Project Number **4-0563**

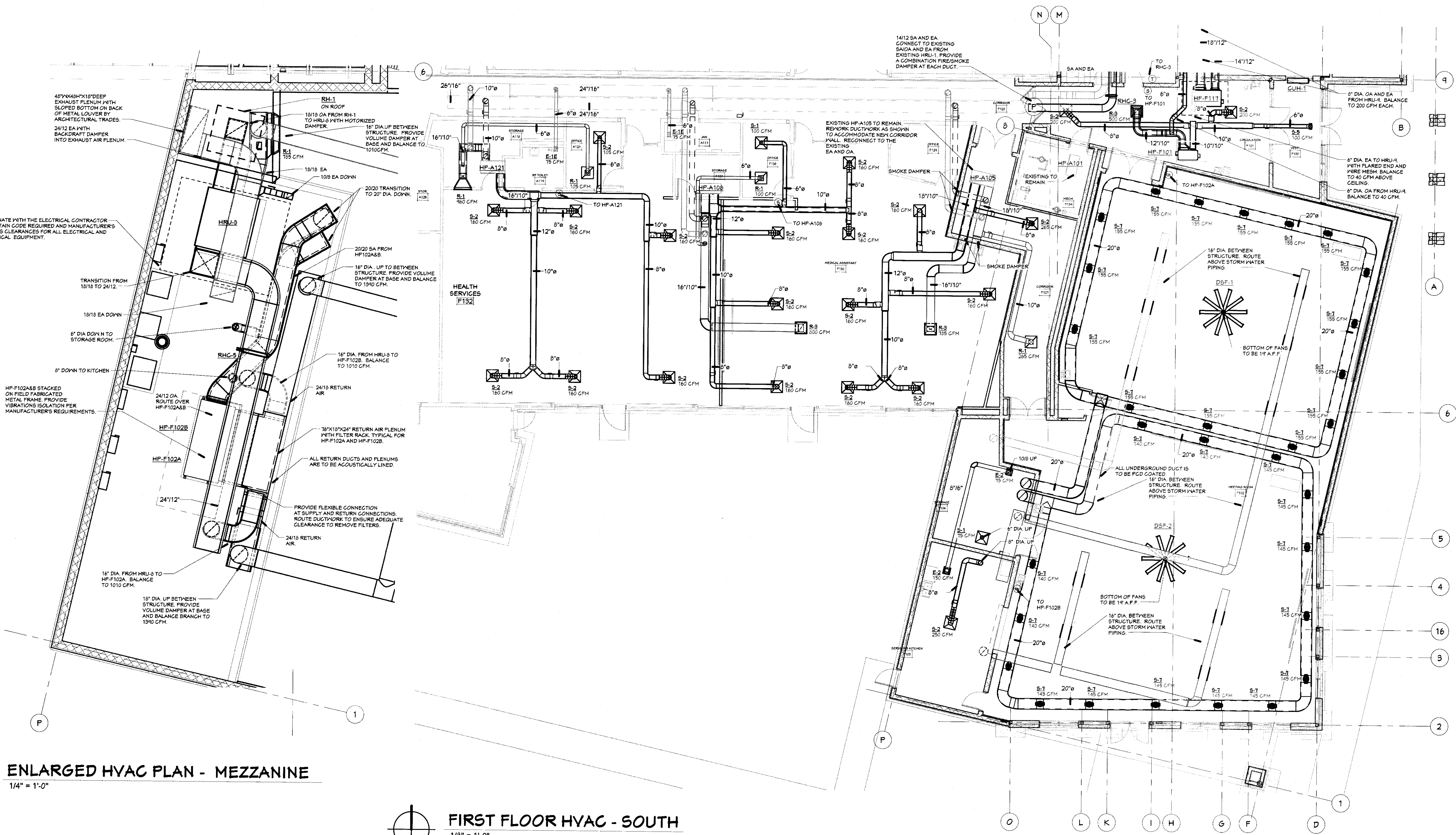
ISSUANCES  
2013.02.11 • FOR BIDS AND CONS.

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REVISIONS  
No. Date Description

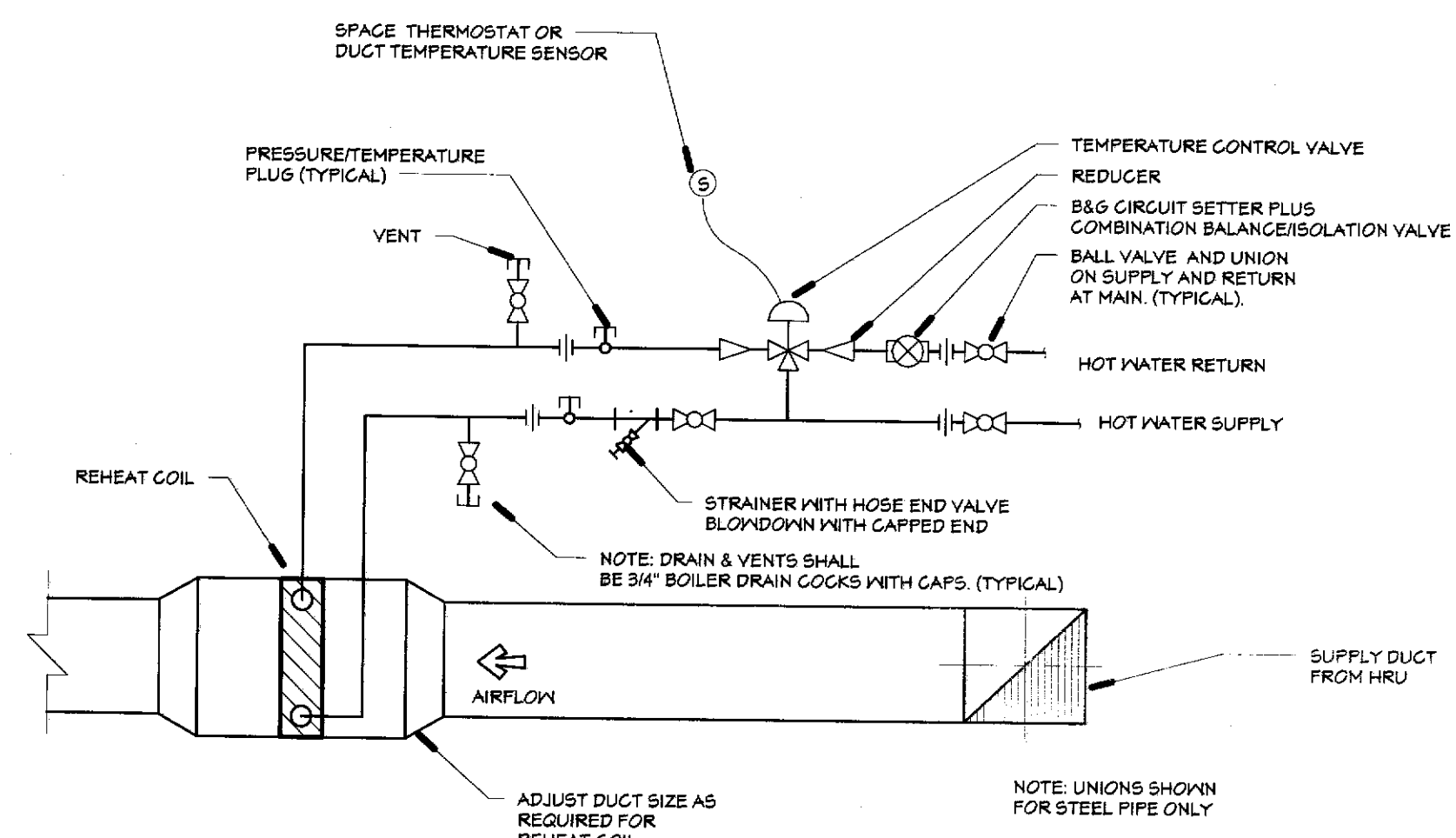
FIRST FLOOR HVAC  
- SOUTH & MISC.

**MH1.2**

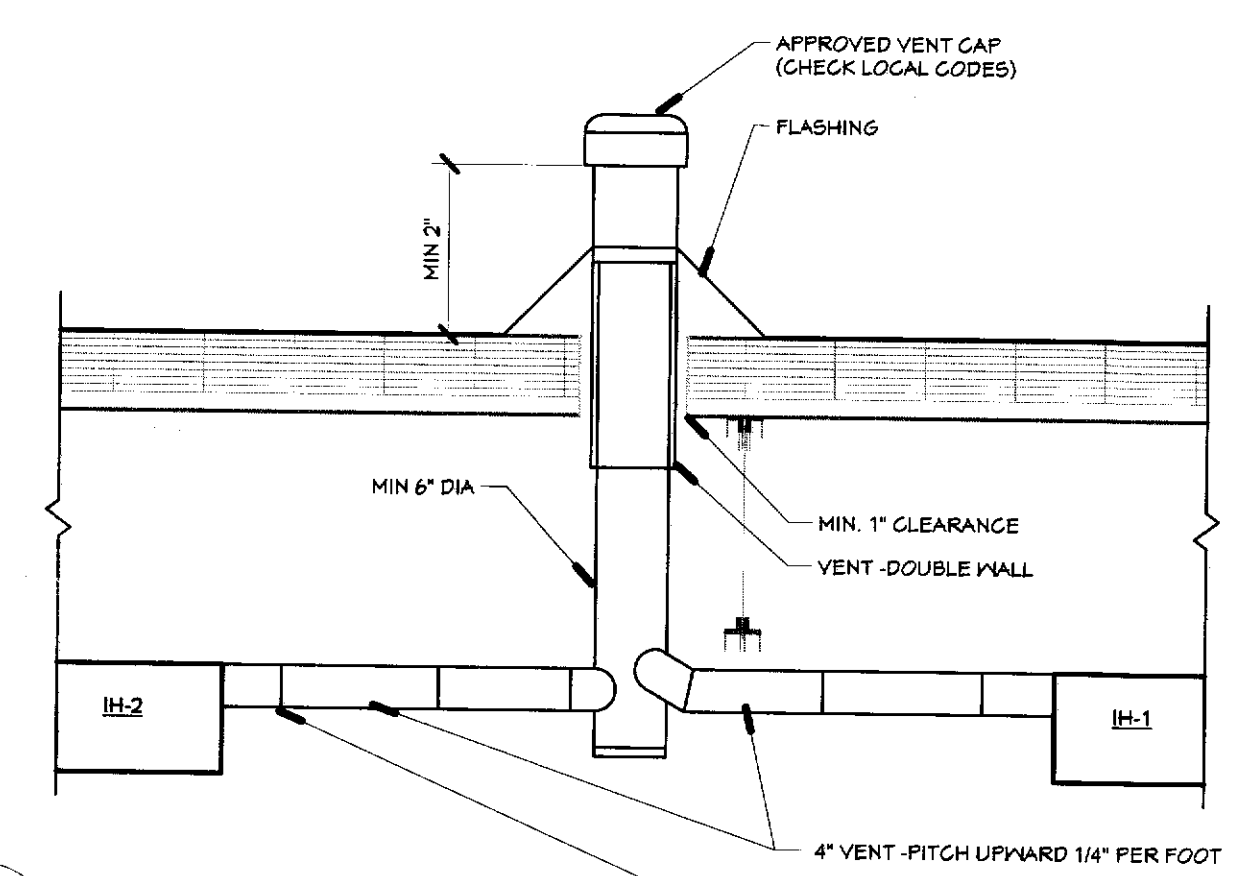


**ENLARGED HVAC PLAN - MEZZANINE**  
1/4" = 1'-0"

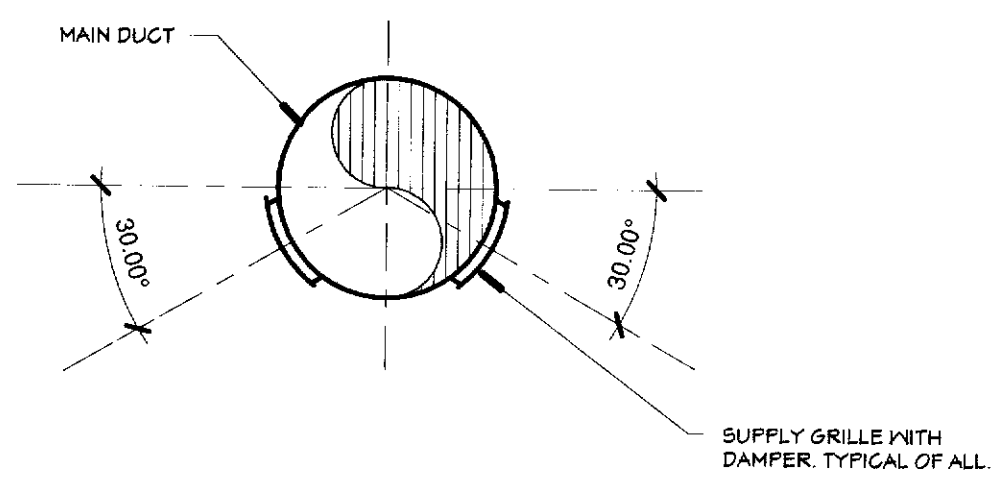
**FIRST FLOOR HVAC - SOUTH**  
1/8" = 1'-0"



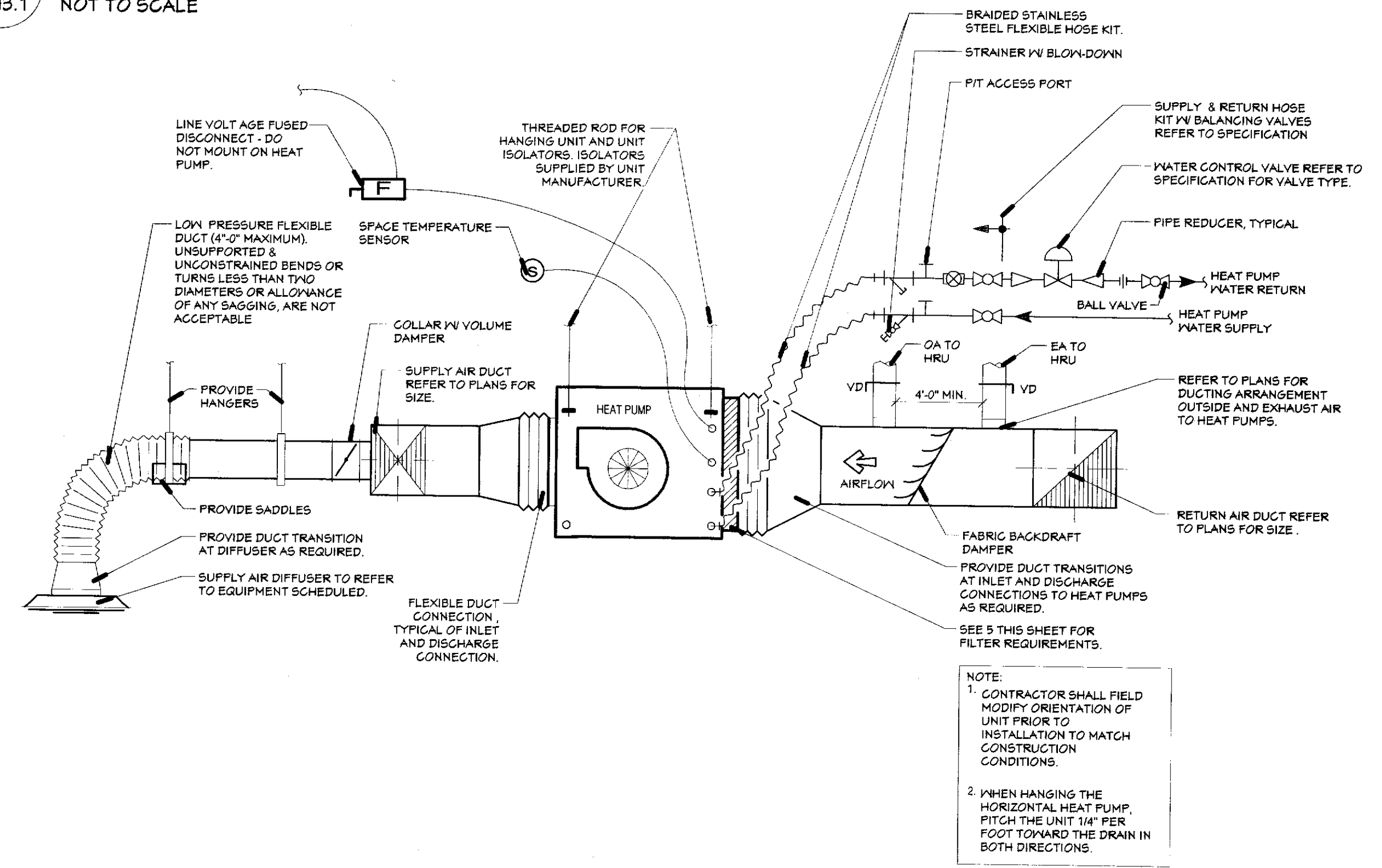
12 2 WAY REHEAT COIL PIPING DETAIL  
MH3.1 NOT TO SCALE



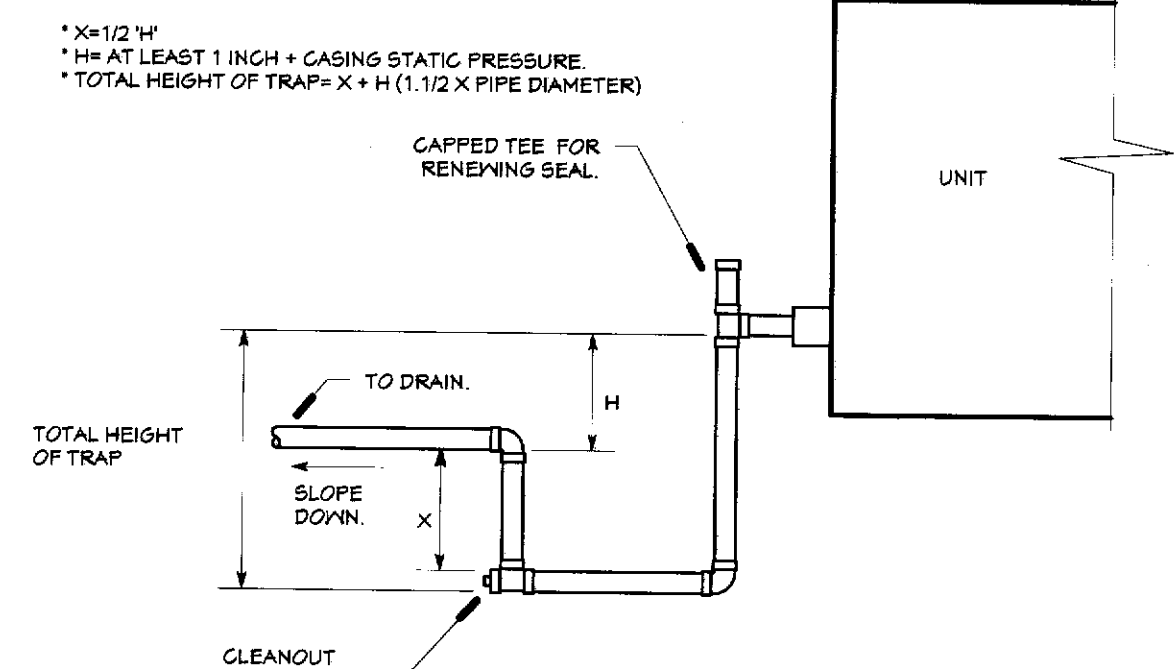
11 FLUE VENTING  
MH3.1 NOT TO SCALE



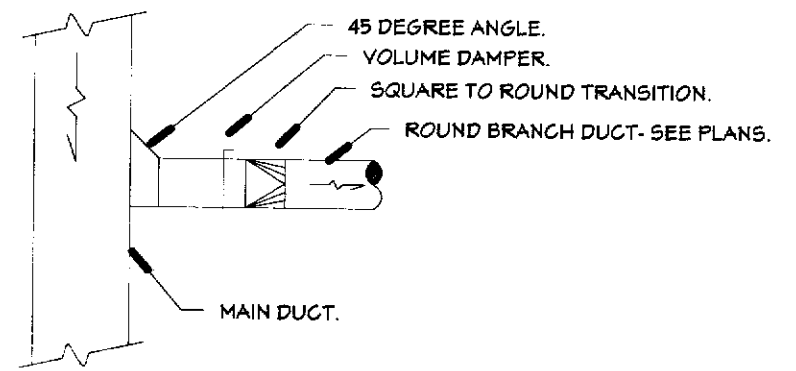
13 SUPPLY AIR TAKE OFF  
MH3.1 NOT TO SCALE



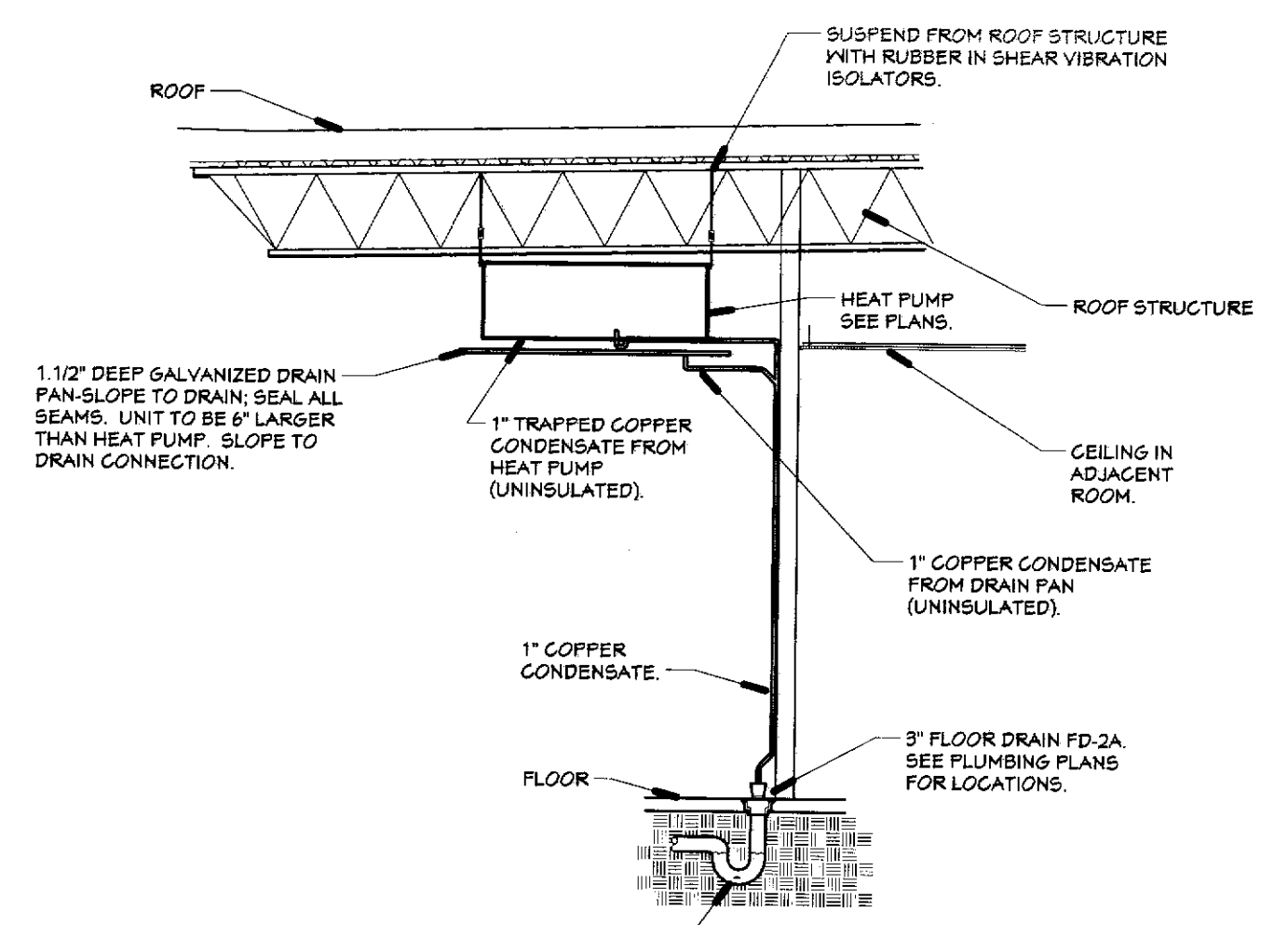
8 TYPICAL HORIZONTAL WATER SOURCE HEAT PUMP DETAIL  
MH3.1 NOT TO SCALE



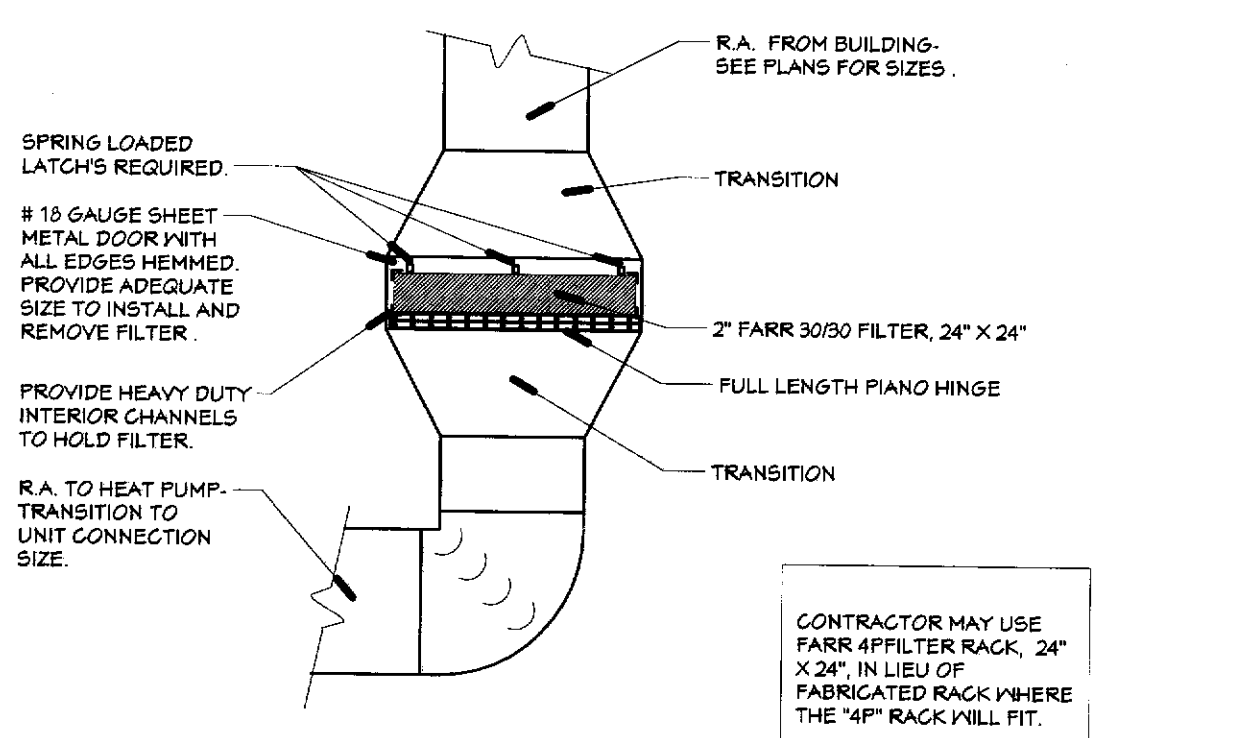
10 CONDENSATE PIPING DETAIL  
MH3.1 NOT TO SCALE



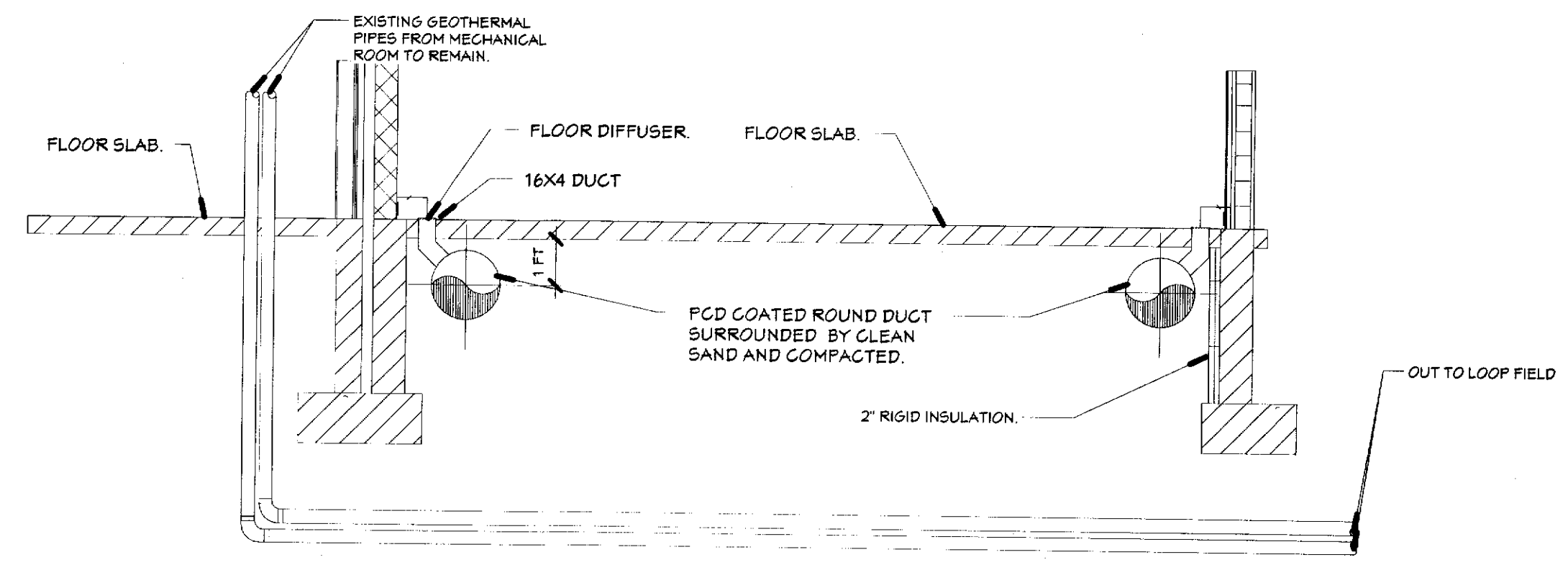
9 LOW VELOCITY BRANCH DUCT DETAIL  
MH3.1 NOT TO SCALE



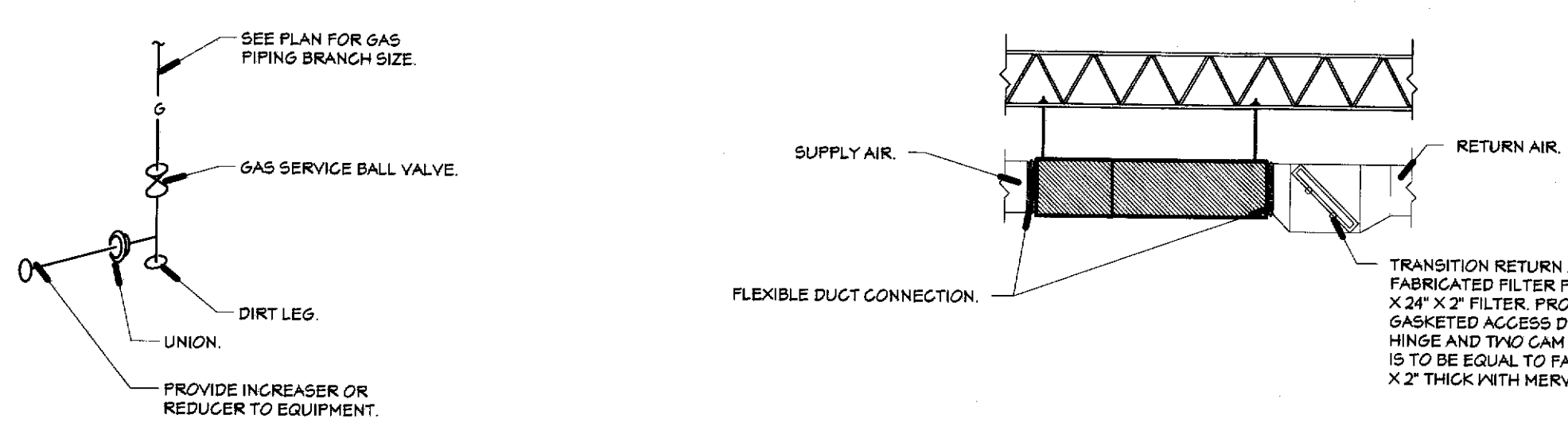
7 HEAT PUMP DETAIL  
MH3.1 NOT TO SCALE



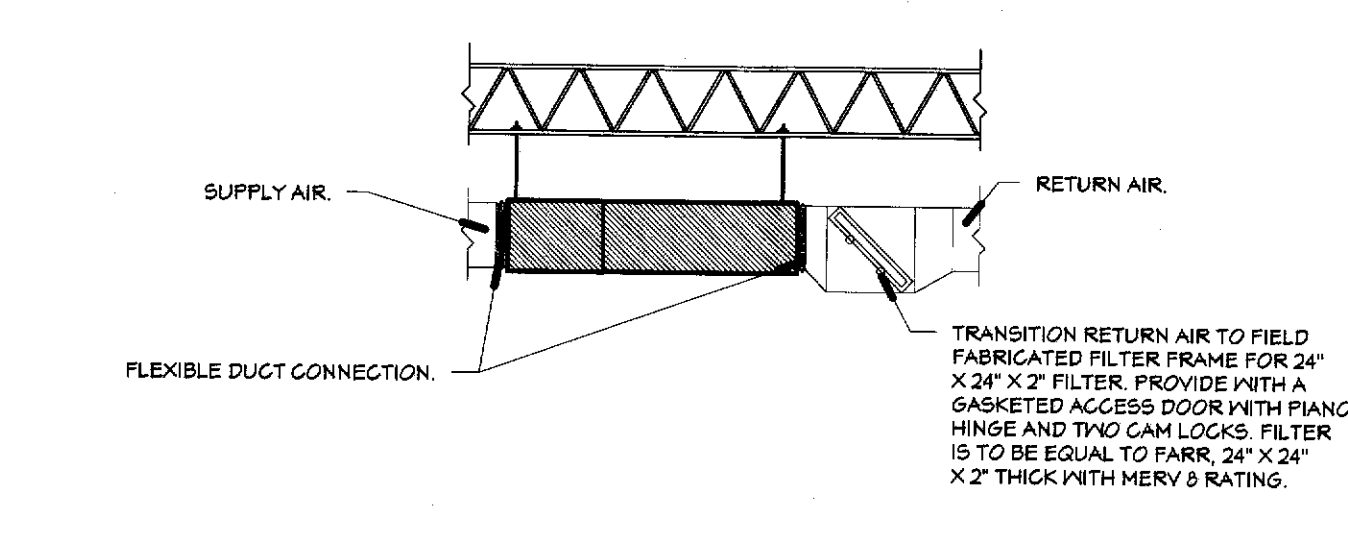
6 TYPICAL HEAT PUMP FILTER DETAIL  
MH3.1 NOT TO SCALE



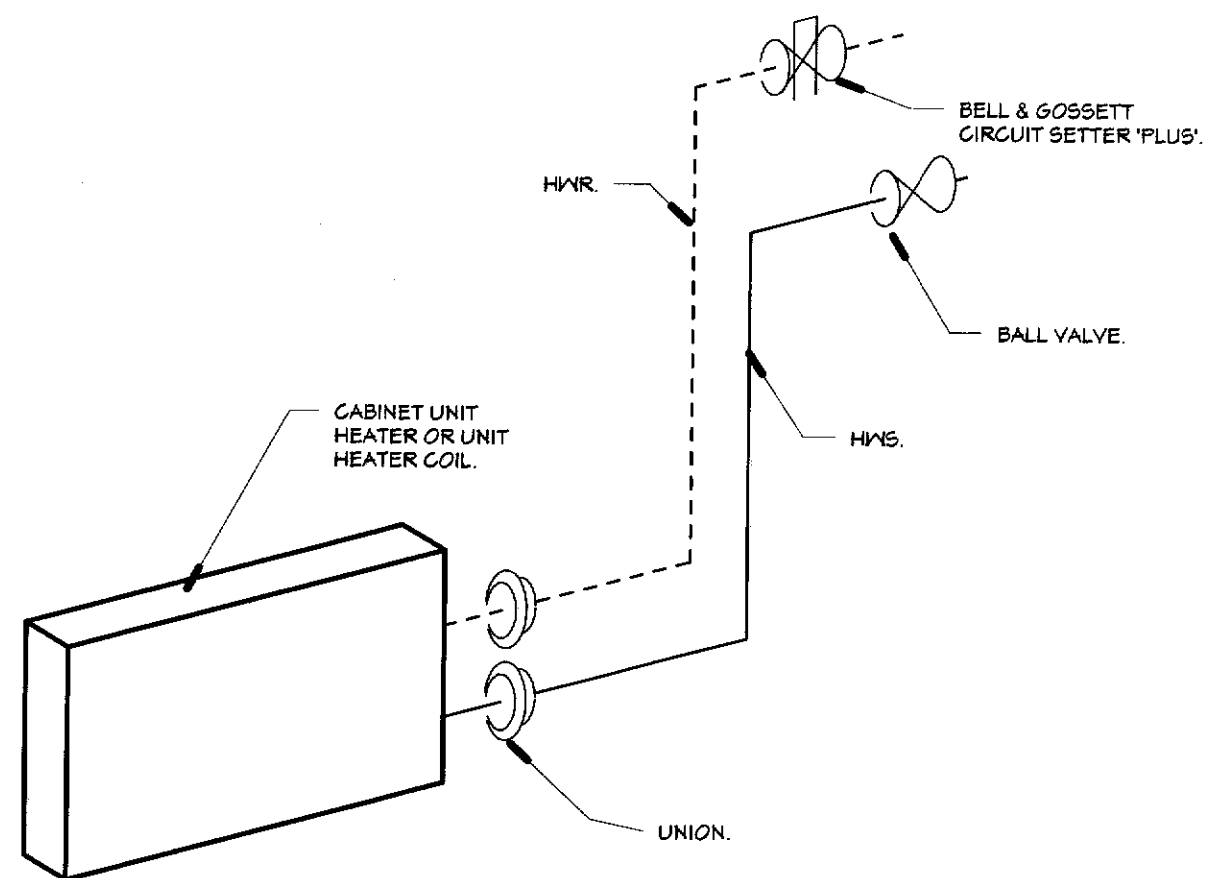
5 UNDERGROUND DUCT & GEOTHERMAL DETAIL  
MH3.1 NOT TO SCALE



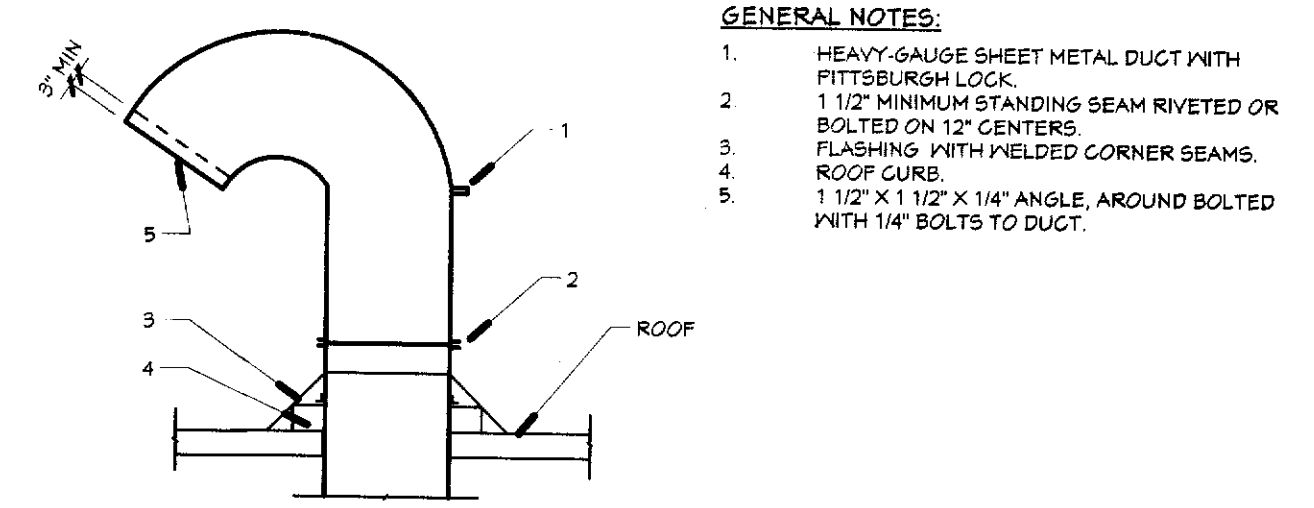
4 GAS PIPING DETAIL  
MH3.1 NOT TO SCALE



3 HORIZONTAL FURNACE DETAIL  
MH3.1 NOT TO SCALE

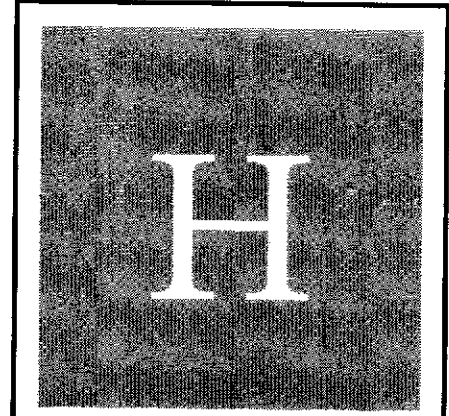


2 CABINET HEATER / UNIT HEATER PIPING DETAIL  
MH3.1 NOT TO SCALE

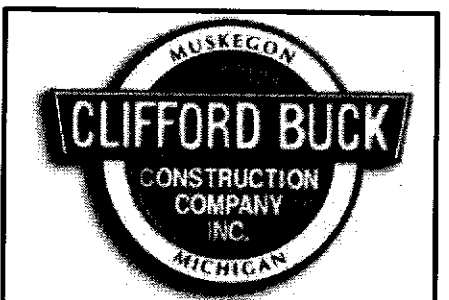


1 EXHAUST GOOSENECK ON FLAT ROOF DETAIL  
MH3.1 NOT TO SCALE

- GENERAL NOTES:**
- HEAVY-GAUGE SHEET METAL DUCT WITH PITTSBURGH LOCK.
  - 1 1/2" MINIMUM STANDING SEAM RIVETED OR BOLTED ON 12" CENTERS.
  - FLASHING WITH WELDED CORNER BEAMS, ROOF GIRDERS.
  - 1 1/2" X 1 1/2" X 1/4" ANGLE, AROUND BOLTED WITH 1/4" BOLTS TO DUCT.



HOOKER DE JONG  
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BUILDING ADDITION AND RENOVATION  
**MUSKEGON AREA CAREER TECH CENTER**  
200 Haven Street  
Muskegon, Michigan  
MAIS / MCC

Project Number 4-0563

ISSUANCES  
2013.02.11 • FOR BIDS AND CONS.

REVISIONS	No.	Date	Description
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DETAILS

**MH3.1**



LOUVER SCHEDULE table with columns: SYMBOL, CFM, SIZE, REMARKS

REHEAT COIL SCHEDULE table with columns: SYMBOL, CFM, A.P.D., MBH, GPM, AVT, REMARKS

GENERAL MECHANICAL NOTES: (THESE NOTES APPLY TO ALL MECHANICAL DRAWINGS)

- CONTRACTOR AND SUB-CONTRACTORS SHALL CAREFULLY REVIEW THE CONSTRUCTION DOCUMENTS... 1. CONTRACTOR AND SUB-CONTRACTORS SHALL CAREFULLY REVIEW THE CONSTRUCTION DOCUMENTS...

INFRARED TUBE HEATER SCHEDULE table with columns: SYMBOL, M.B.H, ROOF VENT CAP, TUBE LENGTH, REMARKS

FUME HOOD SCHEDULE table with columns: SYMBOL, REMARKS

ROOF HOOD SCHEDULE table with columns: SYMBOL, CFM, SIZE, THROAT VELOCITY, THROAT AREA, REMARKS

A.C. CONDENSING UNIT SCHEDULE table with columns: SYMBOL, M.B.H, VOLTS, PHASE, MCA, SEER, DISCONNECT, REMARKS

EXHAUST FAN SCHEDULE table with columns: SYMBOL, CFM, ESP, BDD, RPM, V, PHASE, DISCONNECT, REMARKS

AIR TERMINAL SCHEDULE table with columns: SYMBOL, REMARKS

DESTRATIFICATION FAN SCHEDULE table with columns: SYMBOL, C.F.M., DIAMETER, WATTS, RPM, VOLTS, PHASE, DISCONNECT, REMARKS

FURNACE SCHEDULE table with columns: SYMBOL, C.F.M., E.S.P., MBH IN, MBH OUT, A.F.U.E., H.P., V, PHASE, DISCONNECT, REMARKS

CABINET UNIT HEATER SCHEDULE table with columns: SYMBOL, C.F.M., H.M.B.H., H.G.P.M., HWRSR BRANCH SIZE, H.P., V, PHASE, DISCONNECT, REMARKS

HEAT RECOVERY UNIT SCHEDULE table with columns: SYMBOL, SA CFM, EA CFM, ESP, WINTER SA DB LAT, WINTER SA WB LAT, SUMMER SA DB LAT, SUMMER SA WB LAT, TOTAL ENTHALPY EFF., V, PHASE, MCA, DISCONNECT, REMARKS

HEAT PUMP SCHEDULE table with columns: SYMBOL, SUPPLY FAN (CFM, ESP, OUTSIDE AIR CFM), FLOW RATE (GPM), COOLING (TOTAL COOLING MBH, EWT, EER), HEATING (TOTAL MBH, EWT, COP, FAN HP, V), PHASE, MCA, DISCONNECT, REMARKS

MECHANICAL ABBREVIATIONS

Table of mechanical abbreviations: ACU AIR-CONDITIONING UNIT, AD ACCESS DOOR, AFF ABOVE FINISHED FLOOR, etc.

Logo for Hooker De Jong Architects & Engineers, featuring a large 'H' and 'DJ'.

Logo for Clifford Buck Construction Company, Inc.

Logo for Muskegon Area Career Tech Center, featuring a large 'H' and 'DJ'.

Project information and schedule sections: Project Number 4-0563, ISSUANCES, REVISIONS, and SCHEDULES MH4.1.

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