

## CONSTRUCTION DOCUMENTS



### ADD ALTERNATE SCOPE OF WORK

**BASE BID**

1. INSTALL NEW CABINET HEATER IN MAIN ENTRY 127.
2. REPLACE UNIT VENTILATOR IN HEALTH ROOM 95.

**ALTERNATE 1**

1. REPLACE UNIT VENTILATOR IN CLASSROOM 92.

**ALTERNATE 2**

1. REPLACE CABINET HEATERS IN WOMENS LOCKER ROOMS AND ADJACENT COACHES OFFICES, ROOMS 93, 94, 99A, AND 99B.
2. INSTALL VENTILATION FAN FOR COACHES OFFICES 93 AND 94.

**ALTERNATE 3**

1. REPLACE DIGITAL CONTROLLERS AND CONTROL VALVES FOR VAV BOXES AND FAN TERMINAL UNITS IN THE ADMINISTRATIVE AREA.
2. TEST, ADJUST, AND BALANCE ALL VAV BOXES, FAN TERMINAL UNITS, DIFFUSERS, GRILLES, AIR HANDLING UNIT AHU-C3 AND ASSOCIATED COMPONENTS.

North Avenue West

Big Day High School

13th Avenue

17th Avenue

South Avenue West

Water

As Shown

MISSOURI COUNTY PUBLIC SCHOOLS  
BIG SKY HIGH SCHOOL  
2025 HVAC IMPROVEMENT PROJECT

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4.25.2025  
ROJ# | MCPS25\_BSHS  
DESIGNED BY | JACOBSEN  
DRAWN BY | JACOBSEN  
VIEWED BY | RATZ  
REVISIONS

**MECHANICAL**  
NATHAN H RATZ  
04.25.2025

COVER SHEET,  
GENERAL  
INFORMATION

G001

| PIPING AND INSULATION SPECIFICATION |                          |                       |   |                |                     |                |
|-------------------------------------|--------------------------|-----------------------|---|----------------|---------------------|----------------|
| SYSTEM                              | DESCRIPTION              | PIPE SIZE (IN)        | MATERIALS   | PIPE SIZE (IN) | INSULATION MATERIAL | THICKNESS (IN) |
| HWS,HWR                             | HEATING HOT WATER SYSTEM | NPS 2" AND SMALLER    | TYPE L DRAWN COPPER TUBING, WROUGHT-COPPER FITTINGS; AND SOLDERED OR PRESSURE SEALED JOINTS   | UP TO 1-1/4"   | GLASS FIBER         | 1-1/2"         |
|                                     |                          | NPS 2-1/2" AND LARGER | SCHEDULE 40 STEEL PIPE; CLASS 150 WROUGHT STEEL FITTINGS; AND WROUGHT-CAST OR FORGED STEEL FLANGES AND FLANGE FITTINGS; AND WELDED AND FLANGED JOINTS; OR | 1-1/2" AND UP  | GLASS FIBER         | 2"             |
|                                     |                          |                       | TYPE L DRAWING COPPER TUBING, WROUGHT-COPPER FITTINGS; AND SOLDERED OR PRESSURE SEALED JOINTS   |                |                     |                |

| MECHANICAL SPECIFICATIONS |   |
|---------------------------|---|
| GENERAL                   |   |
| 1.1                       | All work includes, but is not necessarily limited to the furnishing of all labor, materials, equipment, and services necessary for, and reasonably incidental to providing and installing complete heating, ventilating, and air conditioning systems, piping systems, and other mechanical work as shown or indicated in the construction documents.             |
| 1.2                       | Before submitting a bid for the mechanical work, the contractor shall visit the site and become familiar with all the work on other related drawings and specifications, and plan the work to provide the best possible assemble of combined work of all trades.  |
| 1.3                       | Although the intent of the work is shown on the drawings, not every fitting or elbow is shown. It is the contractor's responsibility to provide all work necessary to comply with the intent of the drawings and install complete and functional systems.   |
| 1.4                       | All work shall comply with 2021 International Mechanical Code as amended by the State of Montana and any other applicable codes of the local jurisdiction.  |
| 1.5                       | The contractor shall obtain and pay for all necessary permits and fees.   |
| 1.6                       | Install all equipment per manufacturer's written instructions. Install equipment level and plumb, firmly anchored. Install equipment to maintain manufacturer's recommended clearances.   |
| 1.7                       | The scheduled equipment is basis of design. Other manufacturers with equal products may be used pending Engineer's approval.  |
| 1.8                       | Provide shop drawings for all equipment prior to ordering. M.C. shall be responsible for scheduling work such that a 2 week shop drawing review by engineer can occur before ordering.  |
| 1.9                       | Mechanical contractor shall guarantee that all material furnished be acceptable in every respect and, if not found acceptable, shall replace the same immediately. All work and material shall be guaranteed for one (1) year from date of substantial completion.  |
| 1.10                      | Contractor shall maintain a set of red-lined as-built drawings during construction and submit to owner at project completion.   |
| 1.11                      | Contractor shall provide two copies of operation and maintenance manuals to owner at completion of project. O&M manuals shall contain all equipment submittal sheets, wiring diagrams, factory published installation, operation, and maintenance instructions, and parts list.   |
| 1.12                      | At project completion, the contractor shall provide training to the owner that describes the correct operation and maintenance of all equipment.  |
| 1.13                      | Contractor shall test, balance, and adjust the air and water systems and submit a type written report for approval by mechanical engineer and the owner. TABB work can be performed by contractor or third party.   |
| 1.14                      | Provide engraved, color coded, laminated plastic equipment markers. Include contact type, permanent adhesive. Markers shall be a minimum of 2-1/2" x 4", and include plan number.   |
| HYDRONIC SYSTEMS          |   |
| 2.1                       | Install piping at right angles or parallel to building walls. Diagonal runs are not allowed unless specifically indicated otherwise.  |
| 2.2                       | Install groups of pipes parallel to each other, spaced to permit servicing of valves.   |
| 2.3                       | Select system components with pressure rating equal or greater than system operating pressure.  |
| 2.4                       | Use dielectric joints at connections between dissimilar metals.   |
| 2.5                       | Install pipe escutcheons for exposed pipe penetrations of wall board partitions and ceilings.   |
| 2.6                       | Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPE 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.  |
| 2.7                       | Perform hydrostatic pressure test of hydronic system. Hydrostatic test pressure shall be 1.5 times the system working pressure, however, test pressure shall not exceed the maximum pressure for any component in the system, such as pumps, valves, etc. Ensure all air is removed from system, and isolate expansion tank. Run test a minimum of 15 minutes.    |
| AIR SYSTEMS               |   |
| 3.1                       | Unless noticed otherwise, ductwork shall be constructed according to SMACNA's "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE". All ductwork shall be a minimum of 26 gauge galvanized metal, crossbroke or beaded.  |
| 3.2                       | Construct ductwork to the following pressure classification: Supply Ducts: 2 in. w.c.; Return Ducts: 2 in. w.c.; Exhaust Ducts 1" w.c.  |
| 3.3                       | Seal all ductwork to SMACNA seal class "A". Utilize sealant material specifically made for ductwork. Pressure sensitive "duct" tape is not acceptable. Install sealant per manufacturer's recommendations.  |
| 3.4                       | Duct take-off fittings shall be high efficiency style with integral damper.   |
| 3.5                       | All supply and outside air ductwork shall be wrapped with fiberglass insulation with vapor barrier. Insulation shall have a compressed or installed R-value of 6.   |
| 3.6                       | All duct fabrication shall occur after field verification of site conditions to confirm routing and duct size.  |
| 3.7                       | Inaccessible volume dampers shall be provided with remote damper operators.   |
| 3.8                       | Install flexible connectors between ductwork and vibrating equipment such as fans and air handling units. Vibrating equipment with internal isolation do not require flexible connectors. The connectors shall be factory fabricated with a strip of fabric 3-1/2 inches wide attached to two strips of 2-3/4 inch wide, 0.028 inch thick galvanized sheet steel. |
| 3.9                       | Install single blade turning vanes in all elbows, unless indicated otherwise.   |
| 3.10                      | Where indicated to be used, duct wrap insulation shall be a glass fiber, blanket insulation, ASTM C533, Type I, Class B-2, jacketed flexible blankets with 0.75 lb/cu ft density. Thermal conductivity shall not exceed 0.27 at compressed thickness at 70 deg F.   |
| 3.11                      | All equipment and duct openings to be temporarily capped during construction to prevent dirt, debris, etc. from entering ductwork.  |

| HVA Abbreviations |                                       |        |                          |
|-------------------|---------------------------------------|--------|--------------------------|
| %                 | PERCENT                               | MAX    | MAXIMUM                  |
| ACFM              | ACTUAL CFM                            | MBH    | BTU PER HOUR (THOUSAND)  |
| AFF               | ABOVE FINISHED FLOOR                  | MC     | MECHANICAL CONTRACTOR    |
| AHU               | AIR HANDLING UNIT                     | MIN    | MINIMUM                  |
| AMP               | AMPERE (AMP, AMPS)                    | N/A    | NOT APPLICABLE           |
| ANSI              | AMERICAN NATIONAL STANDARDS INSTITUTE | NC     | NORMALLY CLOSED          |
| APD               | AIR PRESSURE DROP                     | NIC    | NOT IN CONTRACT          |
| APPROX            | APPROXIMATE                           | NO     | NORMALLY OPEN            |
| BHP               | BRAKE HORSEPOWER, BOILER HORSEPOWER   | NO     | NUMBER                   |
| BOD               | BOTTOM OF DUCT                        | NTS    | NOT TO SCALE             |
| BTU               | BRITISH THERMAL UNIT                  | OA     | OUTSIDE AIR              |
| C                 | COMMON                                | OBD    | OPPOSED BLADE DAMPER     |
| CFM               | CUBIC FEET PER MINUTE                 | OD     | OUTSIDE DIAMETER         |
| COO               | CENTER OF DUCT                        | PD     | PRESSURE DROP            |
| CU FT             | CUBIC FEET                            | PH     | PHASE (ELECTRICAL)       |
| DB                | DECIBEL                               | PSI    | POUNDS PER SQUARE INCH   |
| DBT               | DRY-BULB TEMPERATURE                  | PSIA   | PSI ABSOLUTE             |
| DIA               | DIAMETER                              | PSIG   | PSI GAUGE                |
| EAT               | ENTERING AIR TEMPERATURE              | R/O    | RUN OUT                  |
| EC                | ELECTRICAL CONTRACTOR                 | RA     | RETURN AIR               |
| EWT               | ENTERING WATER TEMPERATURE            | RH     | RELATIVE HUMIDITY        |
| EXP               | EXPANSION                             | RPM    | REVOLUTIONS PER MINUTE   |
| F                 | FAHRENHEIT                            | SA     | SUPPLY AIR               |
| FPM               | FEET PER MINUTE                       | SCFM   | CFM, STANDARD CONDITIONS |
| FPS               | FEET PER SECOND                       | SP     | STATIC PRESSURE          |
| FT                | FOOT OR FEET                          | SPEC   | SPECIFICATION            |
| GA                | GAGE OR GUAGE                         | STD    | STANDARD                 |
| GAL               | GALLONS                               | SUCT   | SUCTION                  |
| GC                | GENERAL CONTRACTOR                    | T STAT | THERMOSTAT               |
| GPM               | GALLONS PER MINUTE                    | TC     | TEMPERATURE CONTROL      |
| HD                | HEAD                                  | TEMP   | TEMPERATURE              |
| HGT               | HEIGHT                                | TOD    | TOP OF DUCT              |
| HP                | HORSEPOWER                            | TONS   | TONS OF REFRIGERATION    |
| HZ                | FREQUENCY                             | V      | VOLT                     |
| ID                | INSIDE DIAMETER                       | VAV    | VARIABLE AIR VOLUME      |
| KW                | KILOWATT                              | VEL    | VELOCITY                 |
| LAT               | LEAVING AIR TEMPERATURE               | VOL    | VOLUME                   |
| LBS               | POUNDS                                | W      | WITH                     |
| LF                | LINEAR FEET                           | WPD    | WATER PRESSURE DROP      |
| LWT               | LEAVING WATER TEMPERATURE             |        |                          |

NOTE:  
ALL SCHEDULED EQUIPMENT AND ACCESSORIES ARE BASIS OF DESIGN. EQUIPMENT FROM OTHER MANUFACTURERS MAY BE ALLOWED PENDING ENGINEER'S APPROVAL.

| MECHANICAL LEGEND |  |
|-------------------|--|
| SYMBOL            | DESCRIPTION                                  |
| -----HWS-----     | HEATING WATER SUPPLY                         |
| -----HWR-----     | HEATING WATER RETURN                         |
| -----CD-----      | CONDENSATE DRAIN                             |
|                   | GATE VALVE                                   |
|                   | BALL VALVE                                   |
|                   | BUTTERFLY VALVE                              |
|                   | SWING CHECK VALVE                            |
|                   | STRAINER                                     |
|                   | FLEX CONNECTOR                               |
|                   | HOSE END DRAIN VALVE                         |
|                   | UNION  |
|                   | MOTORIZED TC VALVE / 2-WAY                   |
|                   | MOTORIZED TC VALVE / 3-WAY                   |
|                   | TEE UP                                       |
|                   | TEE DOWN                                     |
|                   | ELBOW UP                                     |
|                   | ELBOW DOWN                                   |
|                   | PIPE SIZE CHANGE                             |
|                   | DIRECTION OF FLOW                            |
|                   | MANUAL FLOW BALANCING VALVE (CIRCUIT SETTER) |
|                   | AUTOMATIC FLOW BALANCING VALVE               |
|                   | PIPE GUIDE                                   |
|                   | PIPE ANCHOR                                  |
|                   | PRESSURE / TEMP. TEST PLUG                   |
|                   | DIAL THERMOMETER                             |
|                   | PRESSURE GAUGE W/ SNUBBER                    |
| SYMBOL            | DESCRIPTION                                  |
|                   | ACOUSTICALLY LINED SHEET METAL DUCT          |
|                   | MANUAL BALANCING DAMPER                      |
|                   | FLEX CONNECTOR                               |
|                   | MOTORIZED DAMPERS                            |
|                   | TURNING VANE ELBOW                           |
|                   | CONNECT NEW WORK TO EXISTING                 |
|                   | POINT OF DISCONNECT                          |
| (E)               | EXISTING                                     |
| (R)               | VALVE IN RISER                               |
|                   | THERMOSTAT/TEMPERATURE SENSOR W/ GUARD       |
|                   | REVERSE ACTING THERMOSTAT                    |
|                   | THERMOSTAT/TEMPERATURE SENSOR                |
|                   | CARBON DIOXIDE SENSOR                        |

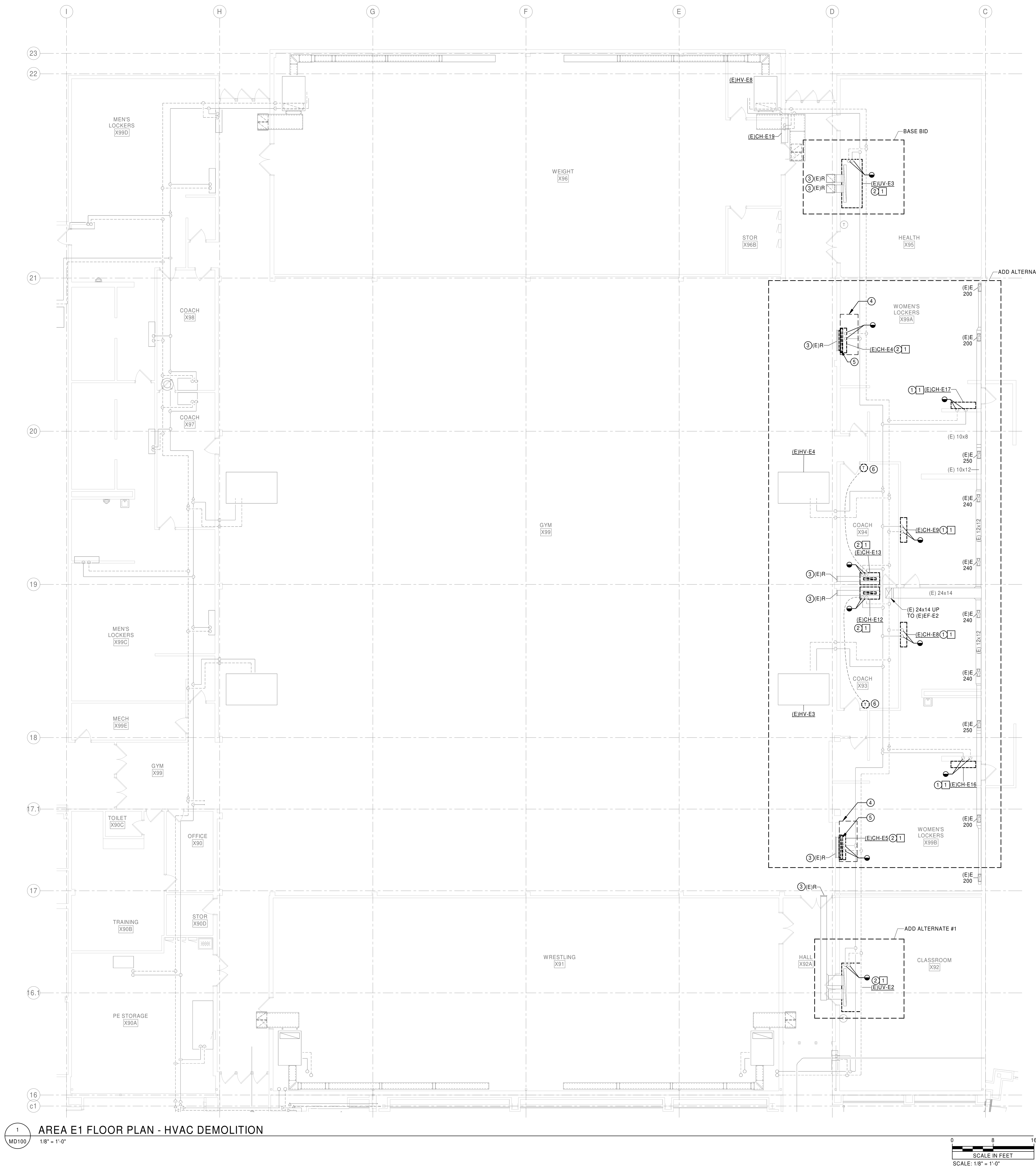
| GRILLES, REGISTERS AND DIFFUSERS SCHEDULE |       |       |           |       |   |           |       |   |         |                     |                        |         |          |        |             |
|---|-------|-------|-----------|-------|---|-----------|-------|---|---------|---------------------|------------------------|---------|----------|--------|-------------|
| PLAN CODE                                 | MFGR  | MODEL | FACE SIZE |       |   | NECK SIZE |       |   | MAX CFM | NOISE CRITERIA (NC) | TOTAL PRESSURE (IN WC) | STYLE   | MATERIAL | FINISH | REMARKS     |
|   |       |       | HEIGHT    | WIDTH | Ø | HEIGHT    | WIDTH | Ø |         |                     |                        |         |          |        |             |
| SUPPLY                                    |       |       |           |       |   |           |       |   |         |                     |                        |         |          |        |             |
| S-1                                       | PRICE | 520   | 8         | 8     |   | 6         | 6     |   | 100     | 20                  | 0.08                   | SURFACE | STEEL    | WHITE  | ADD ALT. #2 |
| TRANSFER                                  |       |       |           |       |   |           |       |   |         |                     |                        |         |          |        |             |
| T-1                                       | PRICE | 510   | 20        | 32    |   | 18        | 30    |   | 1400    | -                   | 0.06                   | SURFACE | STEEL    | WHITE  | ADD ALT. #2 |

| HYDRONIC CABINET HEATER / UNIT VENTILATOR SCHEDULE  |          |                    |         |                       |           |     |          |                      |                |                |                     |      |             |          |          |               |                            |  |
|---|----------|--------------------|---------|-----------------------|-----------|-----|----------|----------------------|----------------|----------------|---------------------|------|-------------|----------|----------|---------------|----------------------------|--|
| PLAN CODE   | MFR      | MODEL              | STYLE   | HEATING COIL (NOTE 8) |           |     |          |                      |                |                | FAN                 |      | ELECTRICAL  |          |          |               | REMARKS                    |  |
|   |          |                    |         | MBH                   | COIL ROWS | GPM | WPD (FT) | PIPING R/O SIZE (IN) | EWT / LWT (°F) | EAT / LAT (°F) | VENTILATION AIR CFM | CFM  | ESP (IN WC) | MOTOR HP | UNIT MCA | (V / PH / HZ) |                            |  |
| CH-A6   | AIREDALE | FC 01408ABBL421K10 | FLOOR   | 142                   | 3         | 10  | 4.4      | 1.25                 | 170 / 140      | 60 / 150       | -                   | 1500 | -           | 1/4 (x2) | 7.4      | 115 / 1 / 60  | NOTES 1,2,3,4 BASE BID     |  |
| UV-E2   | DAIKIN   | U-AHV-9-H10        | CEILING | 45.6                  | 2         | 2   | 1.0      | 0.75                 | 170 / 128      | 65 / 107       | 1000                | 1000 | 0.3         | 1/3      | 6.25     | 115 / 1 / 60  | NOTES 1,2,5,7, ADD ALT. #1 |  |
| UV-E3   | DAIKIN   | U-AHV-9-H10        | CEILING | 45.6                  | 2         | 2   | 1.0      | 0.75                 | 170 / 128      | 65 / 107       | 1000                | 1000 | 0.3         | 1/3      | 6.25     | 115 / 1 / 60  | NOTES 1,2,5,7, BASE BID    |  |
| CH-E4   | MODINE   | CW 010             | WALL    | 35.9                  | 1         | 3   | 0.1      | 0.75                 | 170 / 145      | 65 / 100       | -                   | 1000 | -           | 1/4 (x2) | 7.4      | 115 / 1 / 60  | NOTES 1,2,4, ADD ALT. #2   |  |
| CH-E5   | MODINE   | CW 010             | WALL    | 35.9                  | 1         | 3   | 0.1      | 0.75                 | 170 / 145      | 65 / 100       | -                   | 1000 | -           | 1/4 (x2) | 7.4      | 115 / 1 / 60  | NOTES 1,2,4, ADD ALT. #2   |  |
| CH-E8   | MODINE   | CW 004             | WALL    | 14.4                  | 1         | 1   | 0.1      | 0.75                 | 170 / 130      | 70 / 102       | -                   | 450  | -           | 1/4      | 3.7      | 115 / 1 / 60  | NOTES 1,2,4, ADD ALT. #2   |  |
| CH-E9   | MODINE   | CW 004             | WALL    | 14.4                  | 1         | 1   | 0.1      | 0.75                 | 170 / 130      | 70 / 102       | -                   | 450  | -           | 1/4      | 3.7      | 115 / 1 / 60  | NOTES 1,2,4, ADD ALT. #2   |  |
| CH-E12  | MODINE   | CW 003             | CEILING | 12.7                  | 1         | 1   | 0.1      | 0.75                 | 170 / 130      | 70 / 110       | -                   | 330  | -           | 1/4      | 3.7      | 115 / 1 / 60  | NOTES 1,2,6, ADD ALT. #2   |  |
| CH-E13  | MODINE   | CW 003             | CEILING | 12.7                  | 1         | 1   | 0.1      | 0.75                 | 170 / 130      | 70 / 110       | -                   | 330  | -           | 1/4      | 3.7      | 115 / 1 / 60  | NOTES 1,2,6, ADD ALT. #2   |  |
| CH-E16  | MODINE   | CW 003             | WALL    | 12.7                  | 1         | 1   | 0.1      | 0.75                 | 170 / 130      | 70 / 110       | -                   | 330  | -           | 1/4      | 3.7      | 115 / 1 / 60  | NOTES 1,2,4, ADD ALT. #2   |  |
| CH-E17  | MODINE   | CW 003             | WALL    | 12.7                  | 1         | 1   | 0.1      | 0.75                 | 170 / 130      | 70 / 110       | -                   | 330  | -           | 1/4      | 3.7      | 115 / 1 / 60  | NOTES 1,2,4, ADD ALT. #2   |  |
| NOTES:<br>1 - FACTORY DISCONNECT SWITCH.<br>2 - EC MOTOR(S).<br>3 - MAXIMUM HEIGHT OF UNIT SHALL BE 35".<br>4 - AIRFLOW DIRECTION: FRONT IN AND OUT.<br>5 - AIRFLOW DIRECTION: BOTTOM RETURN IN, TOP OA IN, FRONT SUPPLY OUT.<br>6 - AIRFLOW DIRECTION: BOTTOM IN, FRONT OUT<br>7 - RETURN AIR AND OUTSIDE AIR DAMPERS.<br>8 - HEATING COIL CALCULATIONS ARE BASED ON 100% WATER. |          |                    |         |                       |           |     |          |                      |                |                |                     |      |             |          |          |               |                            |  |

| VENTILATION FAN SCHEDULE   |      |          |        |     |     |             |            |                 |                       |
|--|------|----------|--------|-----|-----|-------------|------------|-----------------|-----------------------|
| PLAN CODE  | MFGR | MODEL    | DRIVE  | CFM | RPM | ESP (IN WC) | MOTOR AMPS | POWER (W/PH/Hz) | REMARKS               |
| VF-1   | COOK | GNVF-100 | DIRECT | 70  | 748 | 0.2         | 0.26       | 115/1/60        | NOTES 1,2 ADD ALT. #2 |
| VF-2   | COOK | GNVF-100 | DIRECT | 70  | 748 | 0.2         | 0.26       | 115/1/60        | NOTES 1,2 ADD ALT. #2 |
| NOTES:<br>1 - PLUG DISCONNECT.<br>2 - EC MOTOR WITH FAN MOUNTED SPEED CONTROL. |      |          |        |     |     |             |            |                 |                       |

| MECHANICAL SHEET INDEX |  |
|------------------------|--|
| M001                   | MECHANICAL SCHEDULES, LEGENDS & SPECIFICATIONS |
| MD100                  | AREA E1 FLOOR PLAN - HVAC DEMOLITION           |
| MD101                  | PARTIAL A2 & C2 FLOOR PLANS - HVAC DEMOLITION  |
| M100                   | AREA E1 FLOOR PLAN - HVAC NEW WORK             |
| M101                   | PARTIAL A2 & C2 FLOOR PLANS - HVAC NEW WORK    |
| M200                   | MECHANICAL DETAILS & TEMPERATURE CONTROLS      |





1  
MD100  
AREA E1 FLOOR PLAN - HVAC DEMOLITION  
1/8" = 1'-0"

## GENERAL MECHANICAL DEMOLITION NOTES

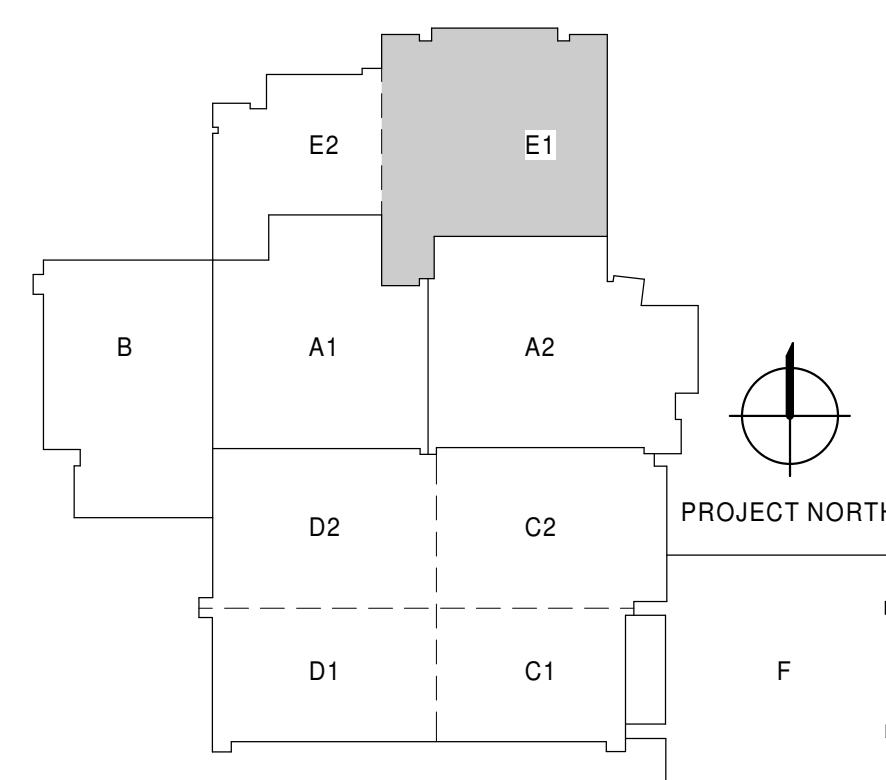
- THE CONTRACTOR SHALL BE AWARE THAT THIS IS A REMODELING PROJECT AND AS SUCH, CERTAIN ITEMS AND SIZES CANNOT BE FULLY ILLUSTRATED NOR EXPLAINED WITHOUT FIELD OBSERVATION. ALL EXISTING DUCT SIZES ARE ASSUMED. THEREFORE, THIS CONTRACTOR IS ADVISED TO VISIT AND EXAMINE THE JOB SITE AND BUILDING IN EVERY DETAIL AS PERTAINS TO THIS PROJECT AND MAKE ALLOWANCES IN THEIR PROPOSAL FOR ALL CONDITIONS THAT WILL AFFECT THE WORK INDICATED IN THE PROJECT SPECIFICATIONS AND CONTRACT DRAWINGS.
- ALL REMOVED ITEMS, EXCEPT THOSE NOTED TO BE REUSED OR TO REMAIN THE PROPERTY OF THE OWNER, SHALL BECOME PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE JOB SITE. THE OWNER RESERVES THE RIGHT TO KEEP ANY REMOVED ITEMS EVEN THOUGH NOT NOTED ON DRAWINGS.
- WHERE EXISTING DUCTS, PIPES, ETC. ARE TO BE REMOVED, SUCH REMOVAL SHALL INCLUDE ALL ANCHORS, BASES, HANGERS, ETC.
- THE CONTRACTOR SHALL MEET WITH THE OWNER OR HIS REPRESENTATIVE AND DISCUSS THE PROPOSED WORK SCHEDULE FOR REMOVAL AND REMODEL WORK WITHIN CONTRACT DRAWINGS PRIOR TO PERFORMING ANY WORK. THE CONTRACTOR SHALL INFORM THE OWNER OR THEIR REPRESENTATIVE OF THE INTENT TO DO SO AT LEAST 48 HOURS BEFORE SUCH WORK BEGINS.
- THE CONTRACTOR SHALL PERFORM ALL CUTTING AND PATCHING REQUIRED.
- AS REQUIRED TO MAINTAIN FACILITY OPERATION AND FUNCTIONS, DEMOLITION AND REMODEL WORK SHALL BE PERFORMED AS REQUIRED OUTSIDE NORMAL BUSINESS HOURS. COORDINATE WORK ACTIVITIES WITH THE OWNER.
- ITEMS SHOWN DASHED AND HEAVY ARE EXISTING ITEMS TO BE REMOVED. -----
- ITEMS SHOWN LIGHT AND SOLID ARE EXISTING ITEMS TO REMAIN. \_\_\_\_\_

## MECHANICAL KEYNOTES

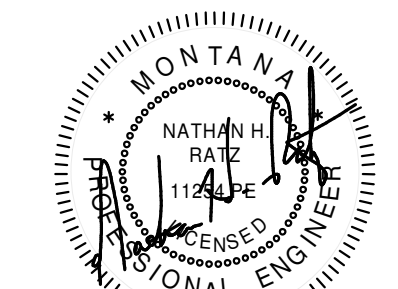
- DISCONNECT EXISTING HEATING WATER PIPING FROM EXISTING CABINET HEATER AND REMOVE EXISTING CABINET HEATER. DEMOLISH ALL PIPING AND COMPONENTS DOWNSTREAM OF SHUT-OFF VALVES. PREPARE FOR INSTALLATION OF NEW UNIT IN SIMILAR LOCATION. SEE NEW WORK PLAN.
- DISCONNECT EXISTING HEATING WATER PIPING AND DUCTWORK FROM EXISTING CABINET HEATER / UNIT VENTILATOR AND REMOVE EXISTING CABINET HEATER / UNIT VENTILATOR. DEMOLISH ALL PIPING AND COMPONENTS DOWNSTREAM OF SHUT-OFF VALVES. DEMOLISH OUTSIDE AIR DUCT BACK TO DUCT MAIN AND CAP. PREPARE FOR INSTALLATION OF NEW UNIT IN SIMILAR LOCATION. SEE NEW WORK PLAN.
- REMOVE, CLEAN AND REINSTALL EXISTING RETURN GRILLE.
- DEMOLISH PORTION OF GYP CEILING AS REQUIRED FOR INSTALLATION OF NEW DUCTWORK AND TRANSFER GRILLE. SEE NEW WORK PLAN FOR NEW DUCT INSTALLATION.
- DEMOLISH DUCT FROM EXISTING CABINET HEATER AS REQUIRED FOR NEW CONNECTION. SEE NEW WORK PLAN FOR NEW CONNECTION.
- DEMOLISH EXISTING THERMOSTAT. PREPARE FOR INSTALLATION OF NEW DDC TEMPERATURE SENSOR IN SAME LOCATION.

## ELECTRICAL KEYNOTES

- DISCONNECT POWER FROM EXISTING UNIT AND PREPARE TO RE-USE AND CONNECT TO NEW UNIT.



KEY PLAN

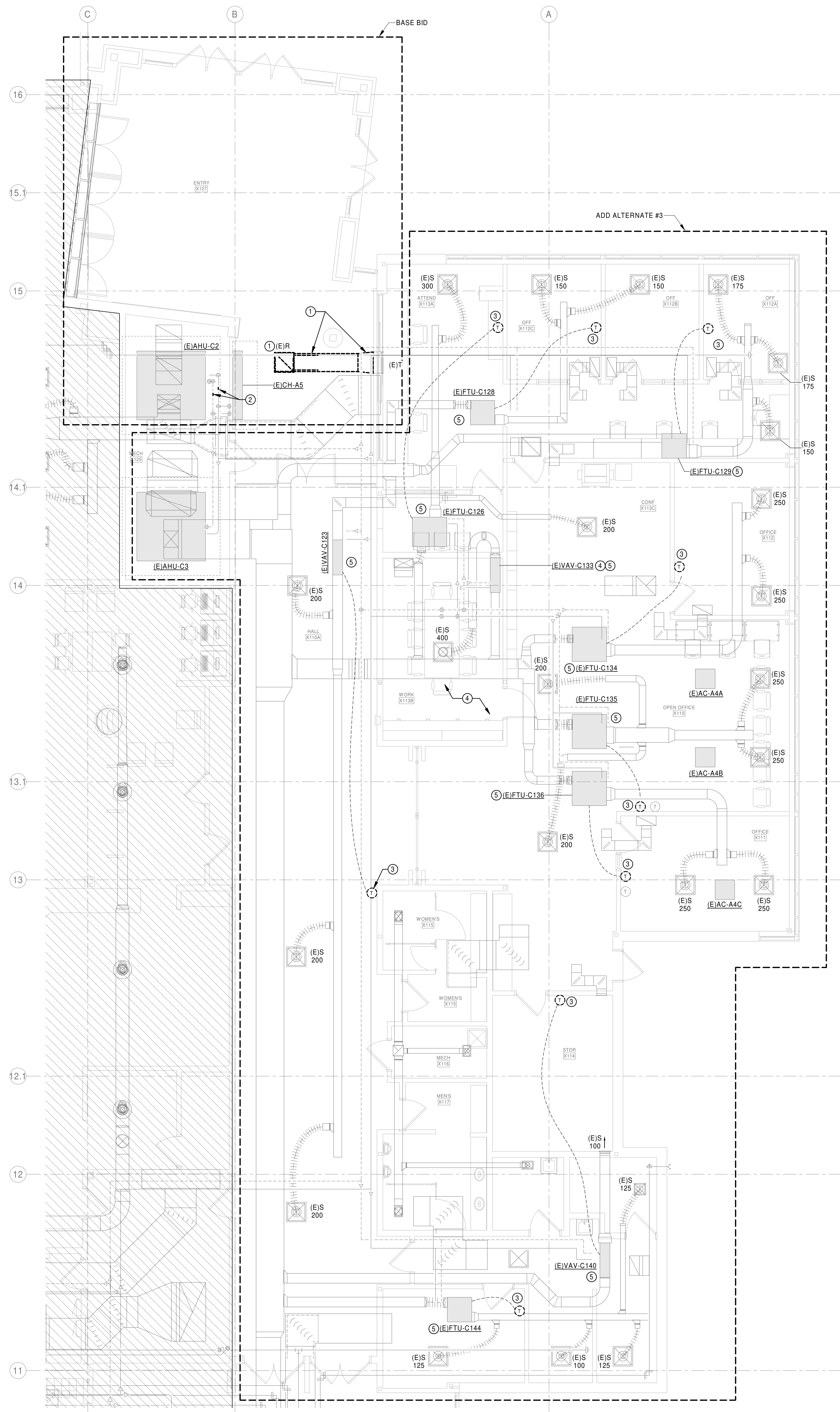


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- AS REQUIRED TO MAINTAIN FACILITY OPERATION AND FUNCTIONS, DEMOLITION AND REMODEL WORK SHALL BE PERFORMED AS REQUIRED OUTSIDE NORMAL BUSINESS HOURS. COORDINATE WORK ACTIVITIES WITH THE OWNER.
- ITEMS SHOWN DASHED AND HEAVY ARE EXISTING ITEMS TO BE REMOVED. \_\_\_\_\_
- ITEMS SHOWN LIGHT AND SOLID ARE EXISTING ITEMS TO REMAIN. \_\_\_\_\_

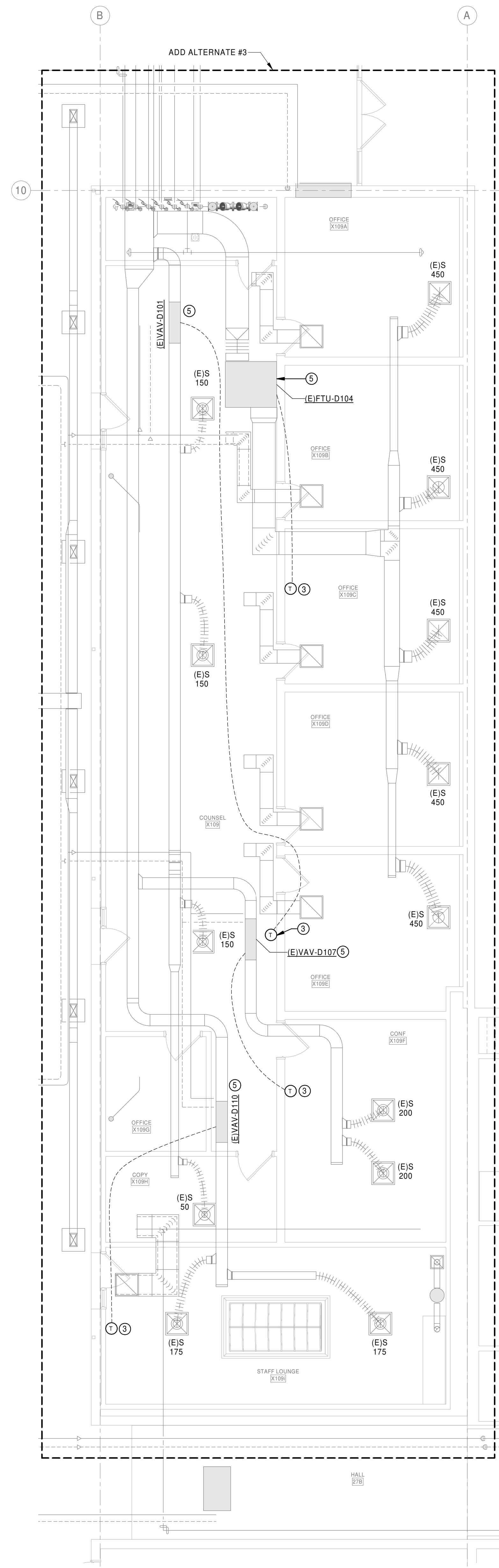
## KEYNOTES

- REMOVE EXISTING RETURN GRILL FROM LAY IN CEILING OVER ENTRY CORRIDOR AND DEMOLISH ASSOCIATED DUCT BACK TO TRANSFER GRILL IN "ATTEND 113A". TRANSFER GRILLE IN "ATTEND 113A" SHALL REMAIN. CAP BACK OF TRANSFER GRILLE. SEE NEW WORK PLAN.
- DEMOLISH PORTION OF HEATING WATER PIPING FOR NEW CONNECTION. SEE NEW WORK PLAN FOR NEW CONNECTION.
- REMOVE EXISTING TEMPERATURE SENSOR AND PREPARE FOR INSTALLATION OF NEW TEMPERATURE SENSOR IN SAME LOCATION. SEE NEW WORK PLAN.
- FIELD VERIFY LOCATION OF EXISTING TEMPERATURE SENSOR ASSOCIATED WITH (EIVAV-C133) AND REMOVE. INSTALL COVER PLATE OVER JUNCTION BOX OR PATCH HOLE AND PREPARE FOR INSTALLATION OF NEW TEMPERATURE SENSOR IN NEW LOCATION. SEE NEW WORK PLAN FOR NEW LOCATION.
- REMOVE AND REPLACE EXISTING DIGITAL CONTROLLER, CONTROL VALVE AND DISCHARGE AIR SENSOR IN EXISTING VAV/FAN TERMINAL UNIT. SEE NEW WORK PLAN AND TEMPERATURE CONTROLS DIAGRAM AND COIL CONTROL VALVE REPLACEMENT DETAILS ON M200 FOR MORE INFORMATION. SEE 3/M200 FOR CONTROL VALVE DEMOLITION DETAIL.



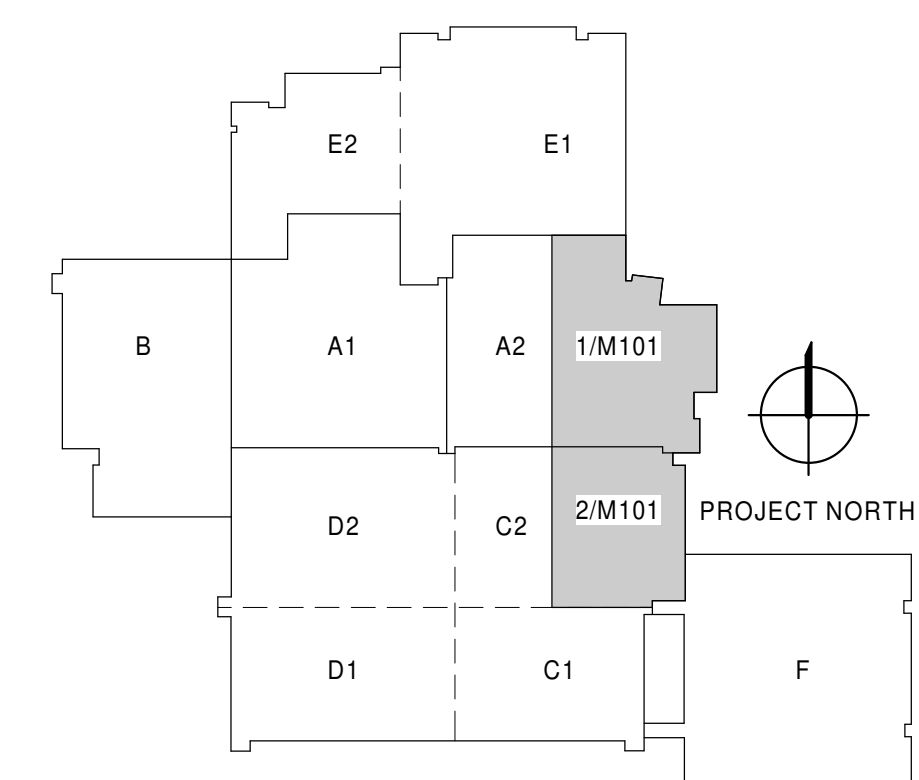
1 PARTIAL AREA A2 FIRST FLOOR PLAN - HVAC DEMOLITION  
3/16" = 1'-0"

0 6 12  
SCALE IN FEET  
SCALE: 3/16" = 1'-0"

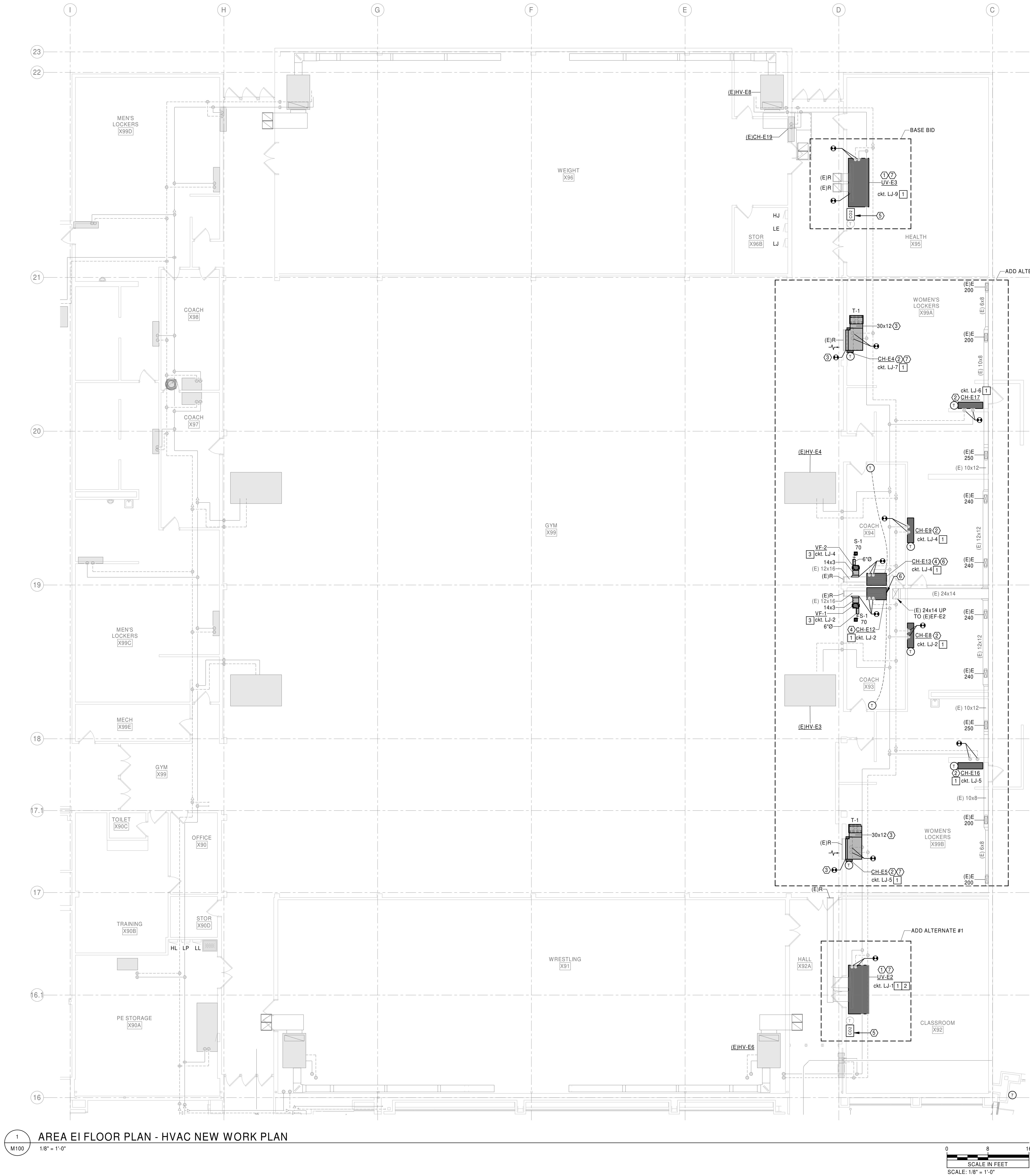


2 PARTIAL AREA C2 FIRST FLOOR PLAN - HVAC DEMOLITION  
3/16" = 1'-0"

0 6 12  
SCALE IN FEET  
SCALE: 3/16" = 1'-0"



KEY PLAN



GENERAL MECHANICAL NOTES

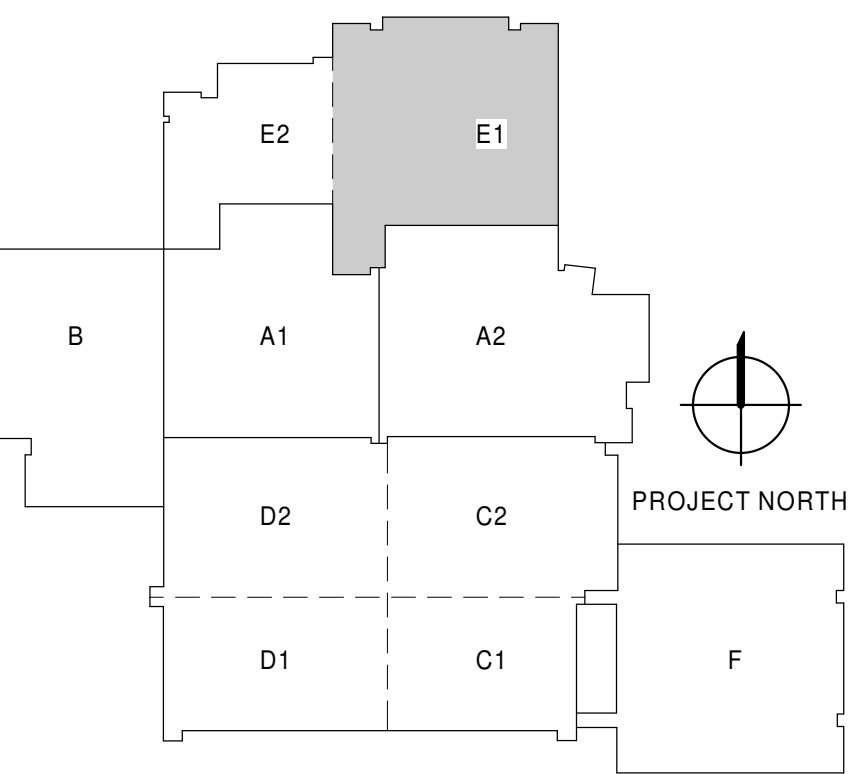
- A. DO NOT RUN ANY DUCTWORK OR PIPING OVER ELECTRICAL PANELS FROM PANEL TO STRUCTURE ABOVE AND FROM ACCESS SPACE TO 80" ABOVE FLOOR.
- B. CEILING SPACE IN SOME AREAS OF THIS BUILDING IS VERY CONGESTED. COORDINATE ROUTING OF PIPING AND DUCTWORK WITH ALL TRADES PRIOR TO INSTALLATION.
- C. NO DUCTWORK SHALL BE FABRICATED PRIOR TO FIELD VERIFICATION OF DUCT SIZES AND ROUTING BY MECHANICAL CONTRACTOR.

KEYNOTES

1. INSTALL NEW UNIT VENTILATOR TIGHT TO BOTTOM OF CEILING. RECONNECT EXISTING VENTILATION AIR DUCT TO NEW UNIT VENTILATOR. RECONNECT EXISTING HEATING WATER PIPING TO NEW UNIT VENTILATOR AND INSTALL NEW BALANCE VALVE, CONTROL VALVE, AND STRAINER. SEE 2/M200 FOR UNIT VENTILATOR DETAIL.
2. INSTALL NEW CABINET HEATER ON WALL IN PLACE OF DEMOLISHED CABINET HEATER. RECONNECT EXISTING HEATING WATER PIPING TO NEW CABINET HEATER. PROVIDE AND INSTALL NEW BALANCE VALVE, CONTROL VALVE, AND STRAINER. SEE 1/M200 FOR CABINET HEATER DETAIL. INSTALL NEW DDC TEMPERATURE SENSOR ON UNIT.
3. CONNECT NEW DUCT TO EXISTING VENTILATION AIR DUCT AND ROUTE TO NEW TRANSFER GRILLE AS SHOWN. INSTALL 1" ACOUSTICAL LINER ON TRANSFER DUCT.
4. INSTALL NEW CABINET HEATER TIGHT TO BOTTOM OF CEILING IN PLACE OF DEMOLISHED CABINET HEATER. RECONNECT EXISTING HEATING WATER PIPING TO NEW CABINET HEATER. PROVIDE AND INSTALL NEW BALANCE VALVE, CONTROL VALVE, AND STRAINER. SEE 1/M200 FOR CABINET HEATER DETAIL. REPLACE EXISTING THERMOSTAT WITH NEW DDC TEMPERATURE SENSOR.
5. INSTALL CO2 SENSOR NEXT TO TEMPERATURE SENSOR.
6. CAP DUCT OPENING TO OLD CABINET HEATER.
7. REPAIR DRYWALL WHERE REMOVED TO FACILITATE UNIT INSTALLATION. PAINT TO MATCH EXISTING CEILING/WALL.

ELECTRICAL KEYNOTES

1. MECHANICAL CONTRACTOR TO ENGAGE ELECTRICAL CONTRACTOR TO DISCONNECT EXISTING EQUIPMENT AND RECONNECT NEW EQUIPMENT. REUTILIZE EXISTING CIRCUIT, UNLESS OTHERWISE NOTED.
2. ELECTRICAL CONTRACTOR TO REPLACE EXISTING 1P 20A BREAKER WITH NEW 1P 15A G.E. TOB BREAKER TO MATCH EXISTING PANEL.
3. ELECTRICAL CONTRACTOR TO EXTEND ELECTRICAL CIRCUIT FROM ADJACENT CABINET HEATER IN SAME ROOM AND CONNECT TO EXHAUST FAN.





A. DO NOT RUN ANY DUCTWORK OR PIPING OVER ELECTRICAL PANELS FROM PANEL TO STRUCTURE ABOVE AND FROM ACCESS SPACE TO 80" ABOVE FLOOR.

B. CEILING SPACE IN SOME AREAS OF THIS BUILDING IS VERY CONGESTED. COORDINATE ROUTING OF PIPING AND DUCTWORK WITH ALL TRADES PRIOR TO INSTALLATION.

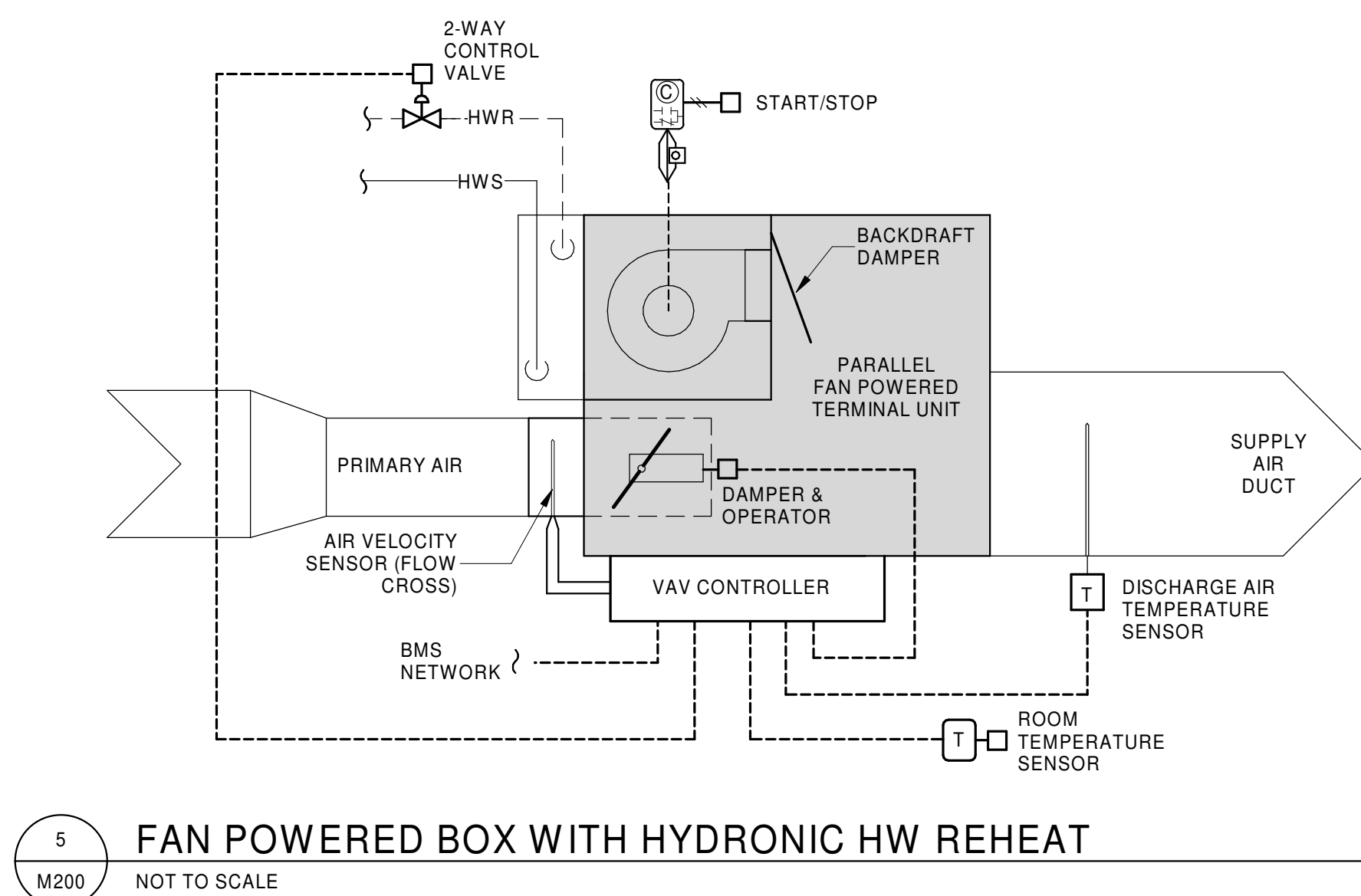
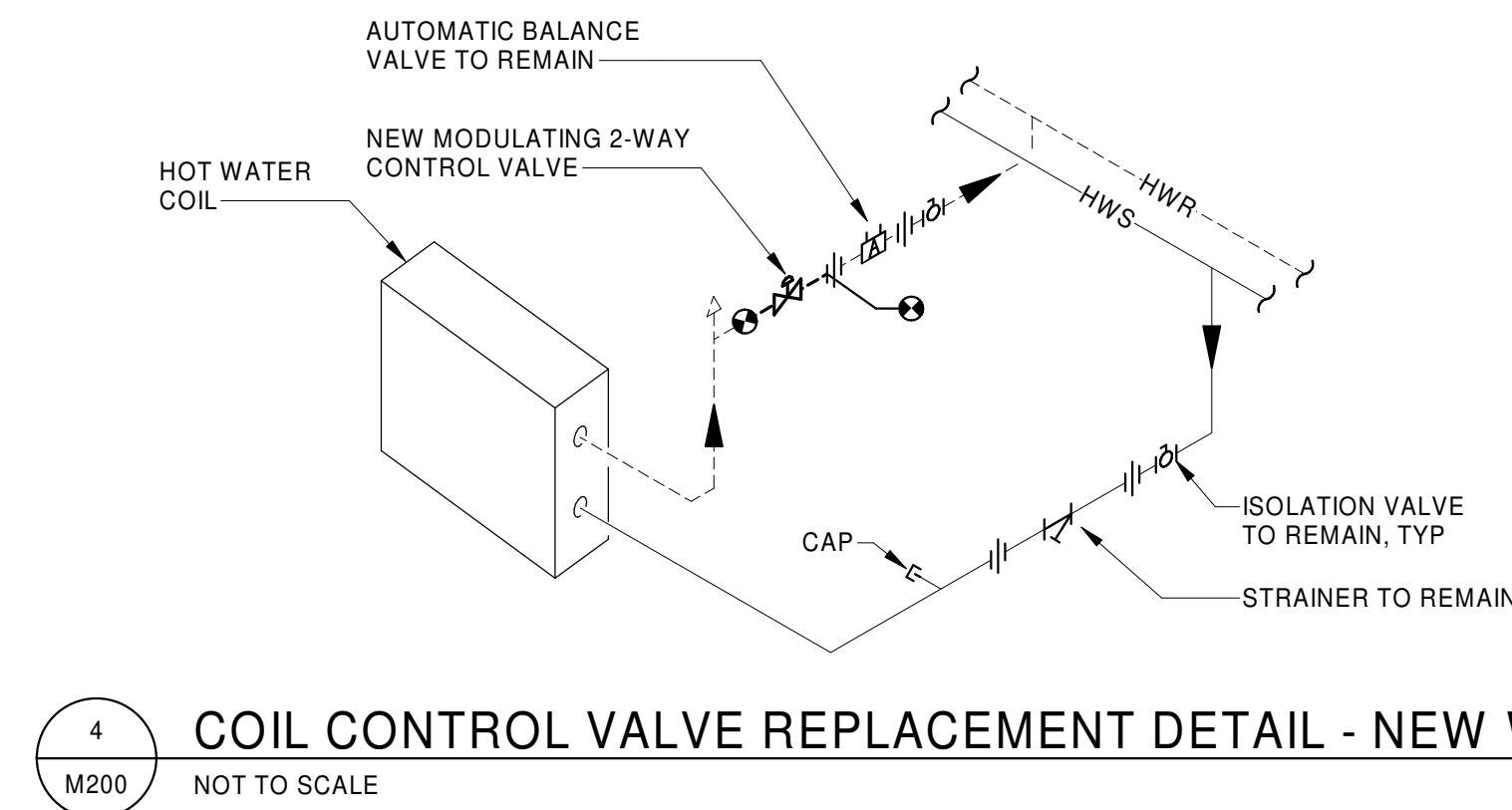
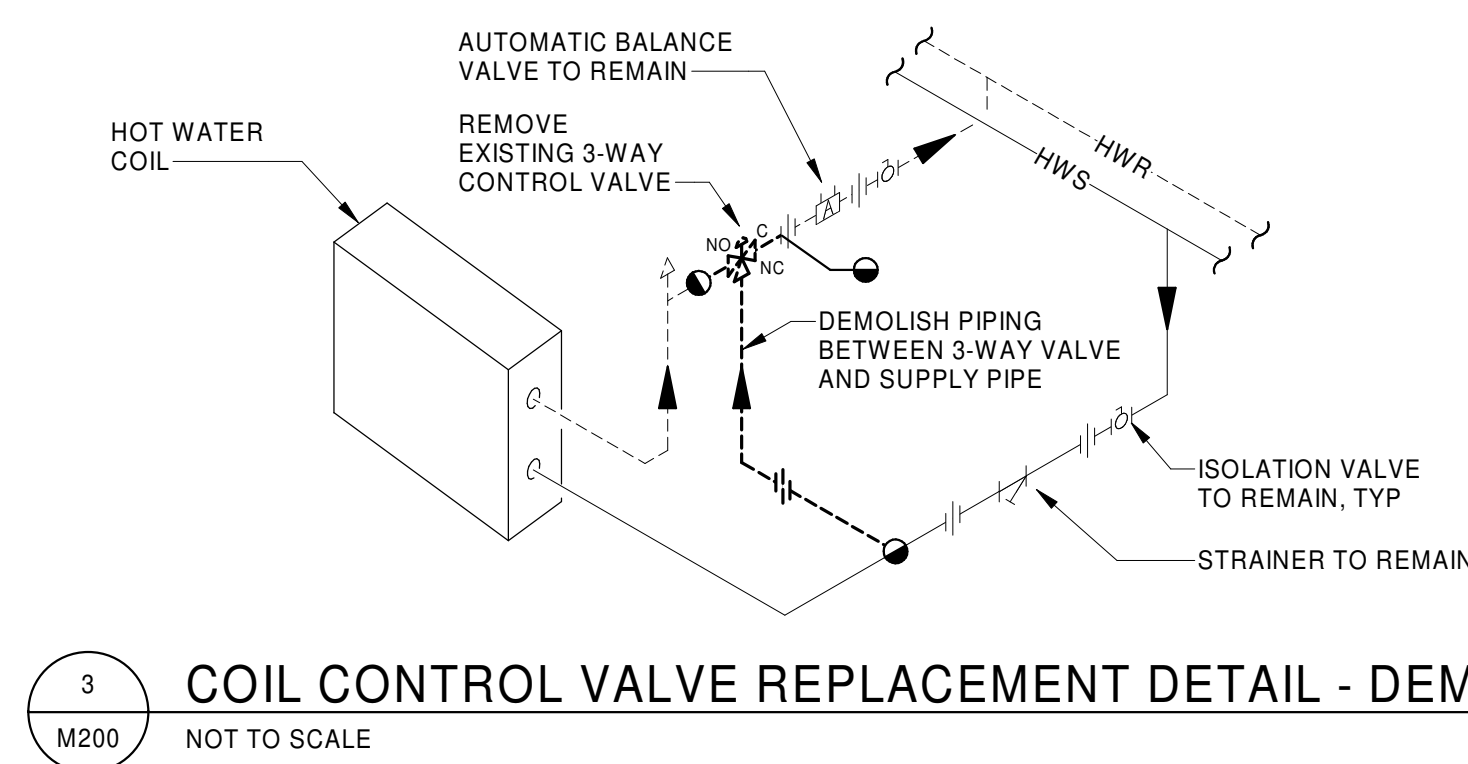
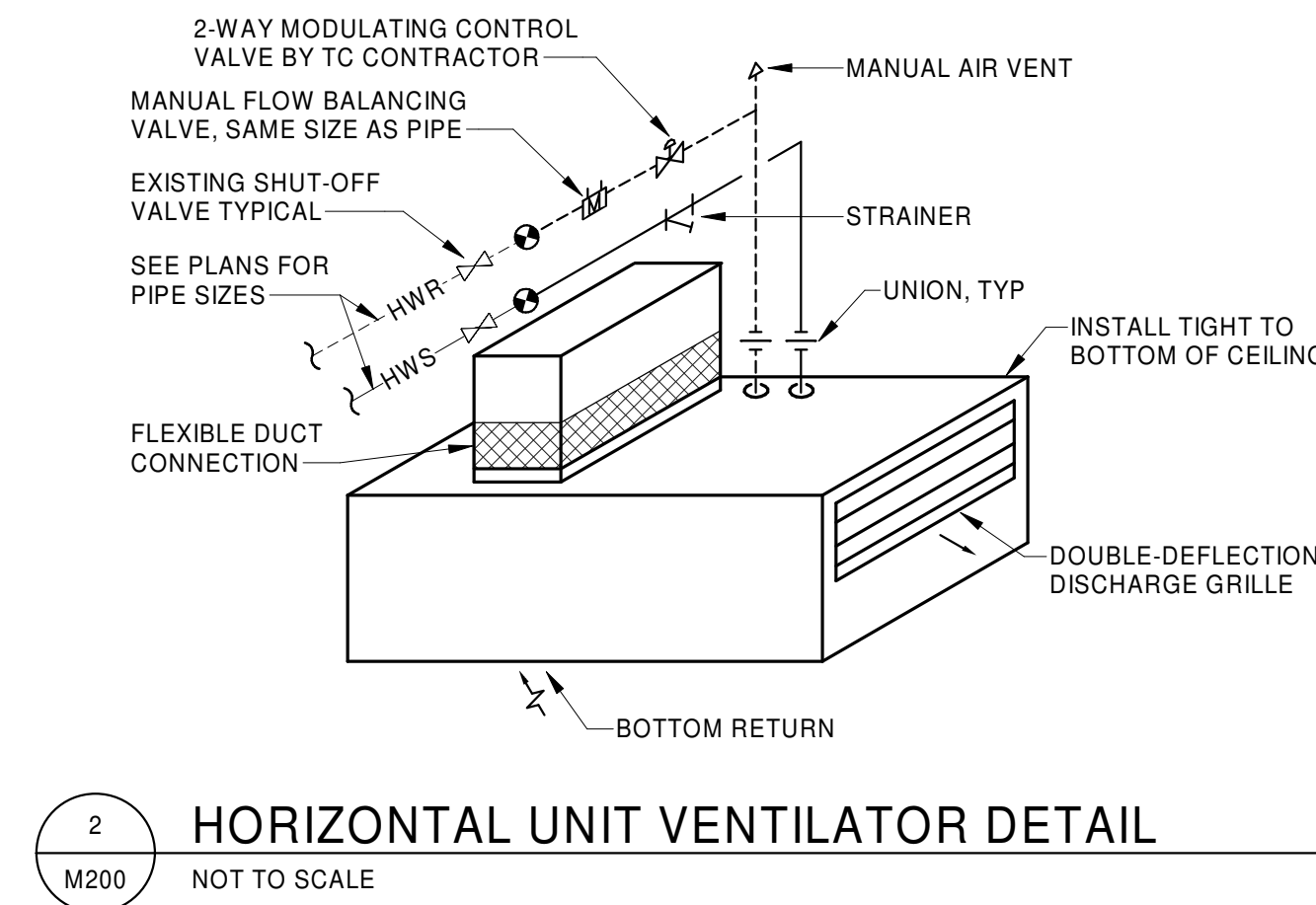
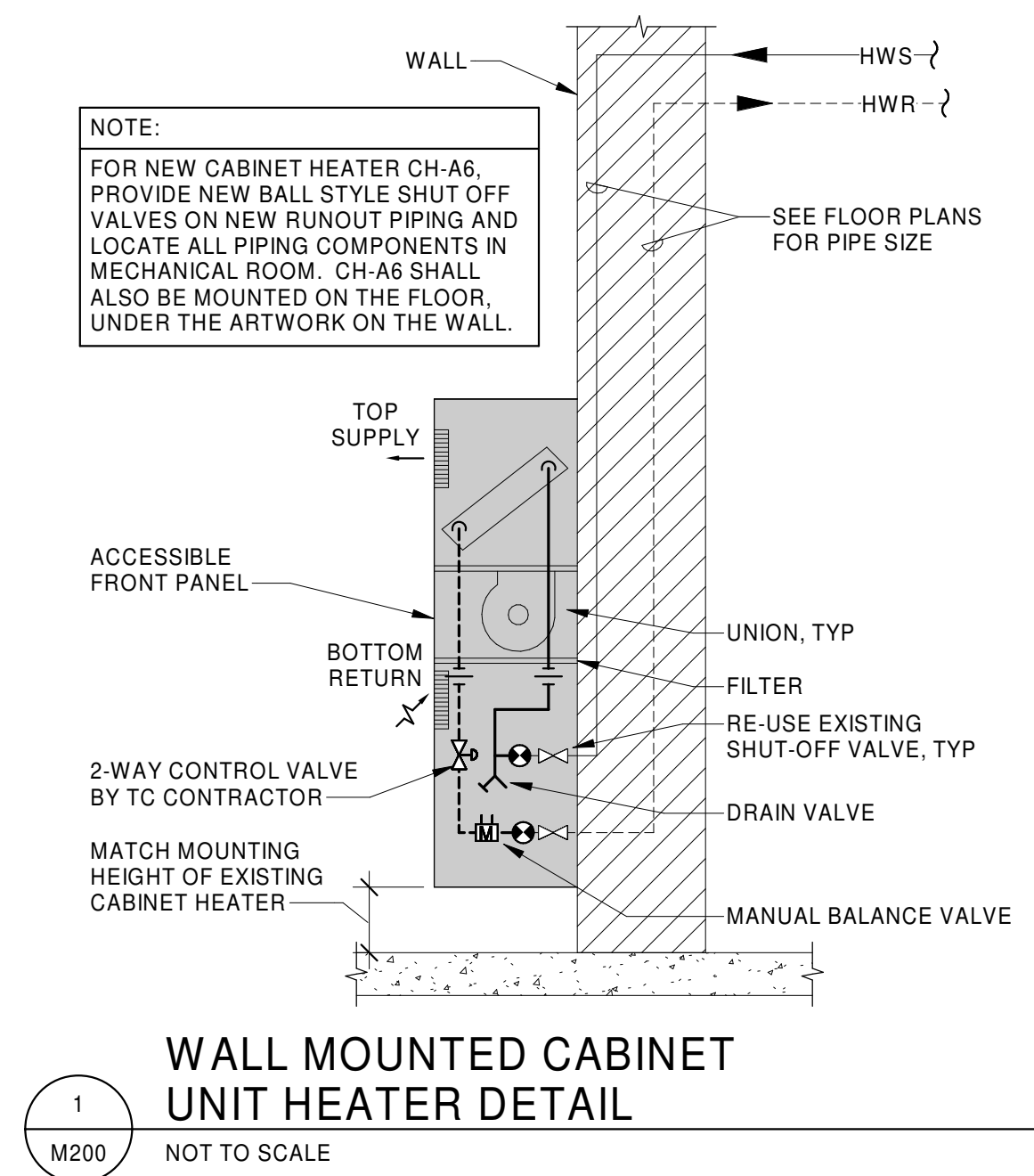
C. NO DUCTWORK SHALL BE FABRICATED PRIOR TO FIELD VERIFICATION OF DUCT SIZES AND ROUTING BY MECHANICAL CONTRACTOR.

|     |   |
|-----|---|
| 1.  | INSTALL NEW CABINET HEATER ON FLOOR TIGHT WITH FLOOR. ENSURE CABINET HEATER FITS BELOW EXISTING AIRWORK ON WALL. CONNECT NEW RUN OUT PIPING TO HEATING MAINS IN MECHANICAL ROOM AND EXTEND TO CABINET HEATER. PROVIDE AND INSTALL BALL STYLE SHUT OFF VALVES AND ALL COMPONENTS SHOWN IN 11001. |
| 2.  | INSTALL CONTROL VALVE AND PIPING COMPONENTS ACCESSIBLE IN MECHANICAL ROOM.  |
| 3.  | CORE DRILL THROUGH CUM WALL FOR PIPING. COORDINATE FINAL LOCATION WITH OWNER. PROVIDE 1/2" MIN. WALL THICKNESS.   |
| 4.  | REUSE EXISTING J BOX AND LOCATION FOR NEW TEMPERATURE SENSOR FOR CAHAB.   |
| 5.  | COORDINATE WITH SCHOOL DISTRICT TO GET EXTRA CEILING TILE TO INSTALL IN PLACE OF DEMOLISHED TRANSFER GRILLE   |
| 6.  | EXISTING MINI SPLIT CEILING MOUNTED FAN COIL TO REMAIN AS IS. NO WORK IN THIS CABINET.  |
| 7.  | INSTALL NEW TEMPERATURE SENSOR IN 113B NEAR DOOR. COORDINATE FINAL LOCATION WITH OWNER. MOUNT 48" AFF.  |
| 8.  | THIS TEMPERATURE SENSOR SHALL BE SENSING ONLY, WITH VANDAL RESISTANT STAINLESS STEEL PLATE.   |
| 9.  | PROVIDE AND INSTALL NEW TEMPERATURE CONTROLS FOR EXISTING TERMINAL UNIT. REPLACE CONTROL VALVE AND DISCHARGE AIR SENSOR. SEE TEMPERATURE CONTROLS SCHEDULE FOR SENSING AND DISCHARGE AIR SENSING. SEE TAILS ON M200 FOR MORE INFORMATION. FLUSH AND CLEAN EXISTING STRAINER.                    |
| 10. | REPLACE EXISTING TEMPERATURE SENSOR WITH NEW TEMPERATURE SENSOR.  |
| 11. | EXISTING MINI SPLIT TEMPERATURE SENSOR SHALL REMAIN AS IS. NO WORK IN THIS CABINET.   |

1. MECHANICAL CONTRACTOR TO ENGAGE ELECTRICAL CONTRACTOR TO PROVIDE POWER TO NEW HEATER. HEATER CAN BE ADDED TO THE SAME CIRCUIT AS (E)CH-A5. BELIEVED TO BE FED FROM PANEL LL. ELECTRICAL CONTRACTOR TO CONFIRM A 20AMP CIRCUIT IS UTILIZED FOR EXISTING FEED. UPDATE PANEL SCHEDULE ACCORDINGLY

AFTER THE TEMPERATURE CONTROL WORK IS COMPLETE, TEST, ADJUST, AND BALANCE ALL OF THE AHU-C3 SYSTEM, INCLUDING GRILLES, REGISTERS, DIFFUSERS, FAN TERMINAL UNITS, VAV BOXES, AND AHU-C3.





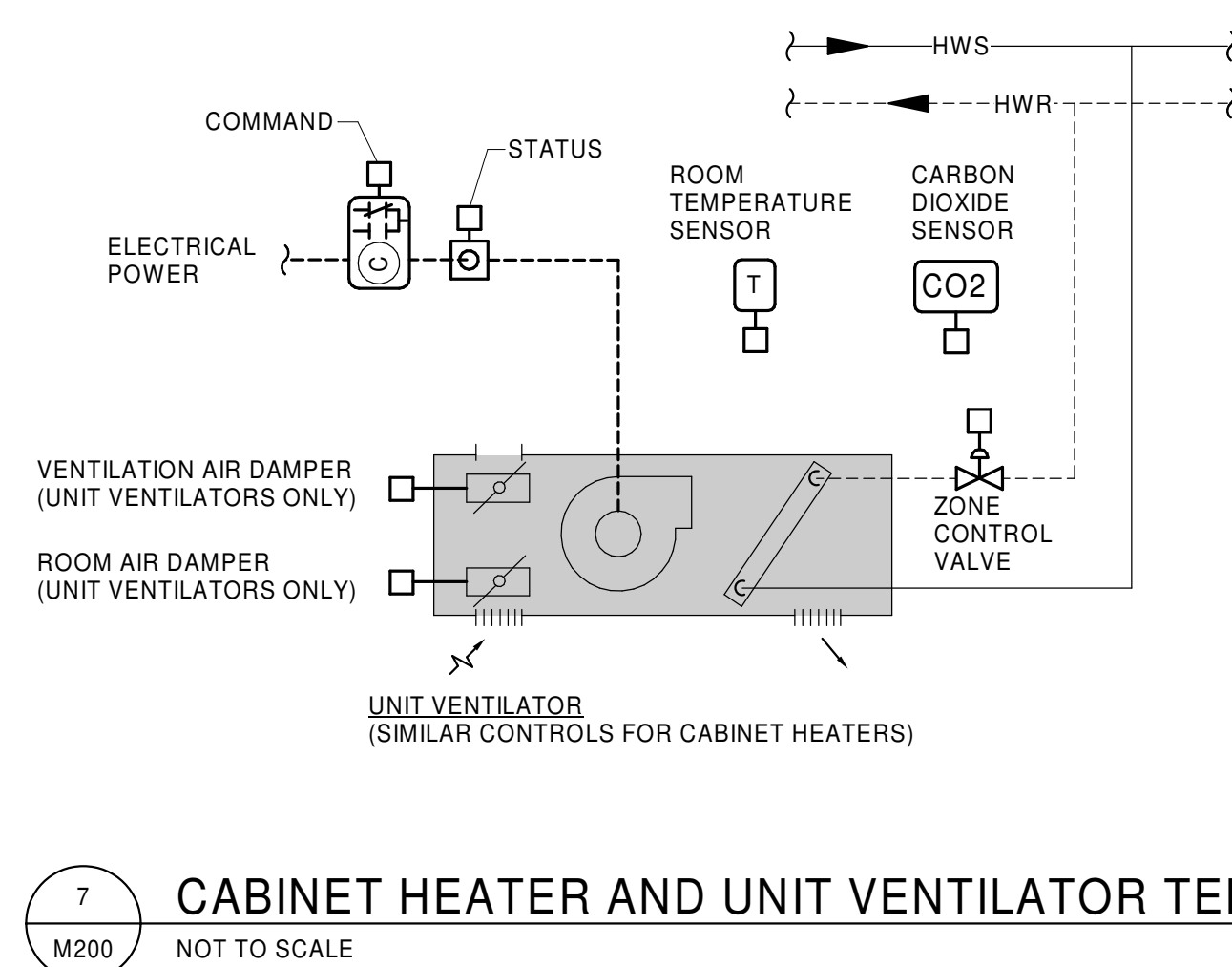
Parallel Fan Powered Terminal Temperature Control

Occupied mode:

- A. Room temperature sensors shall control fan powered VAV boxes to maintain a 75 F cooling set point. As the space cooling load decreases, the thermostat shall modulate the primary air damper from full open to its minimum position.
- B. When the room temp is within the 2 °F comfort dead band between the occupied heating setpoint 72 °F and occupied cooling setpoint 75 °F, maintain the cooling min CFM.
- C. As the room temp falls below the heating setpoint, maintain the cooling min CFM and modulate the reheat valve to maintain the room heating setpoint. A PID loop modulates the reheat valve up to the supply temp limit of 95 °F.
- D. On a further call for heating, the fan shall be enabled and the heating control valve shall modulate open to maintain set point. As the room temp rises, modulate in reverse sequence.
- E. Thermostat set points and box minimum and maximum air flow rates for each box shall be capable of being adjusted.
- F. A thermostat override feature shall be provided for each box which will allow the box fan to be started before the box reaches its minimum position.

Unoccupied Mode:

- A. Heating: Primary air damper remains closed. Cycle on fan and modulate reheat valve to maintain setback temperature.

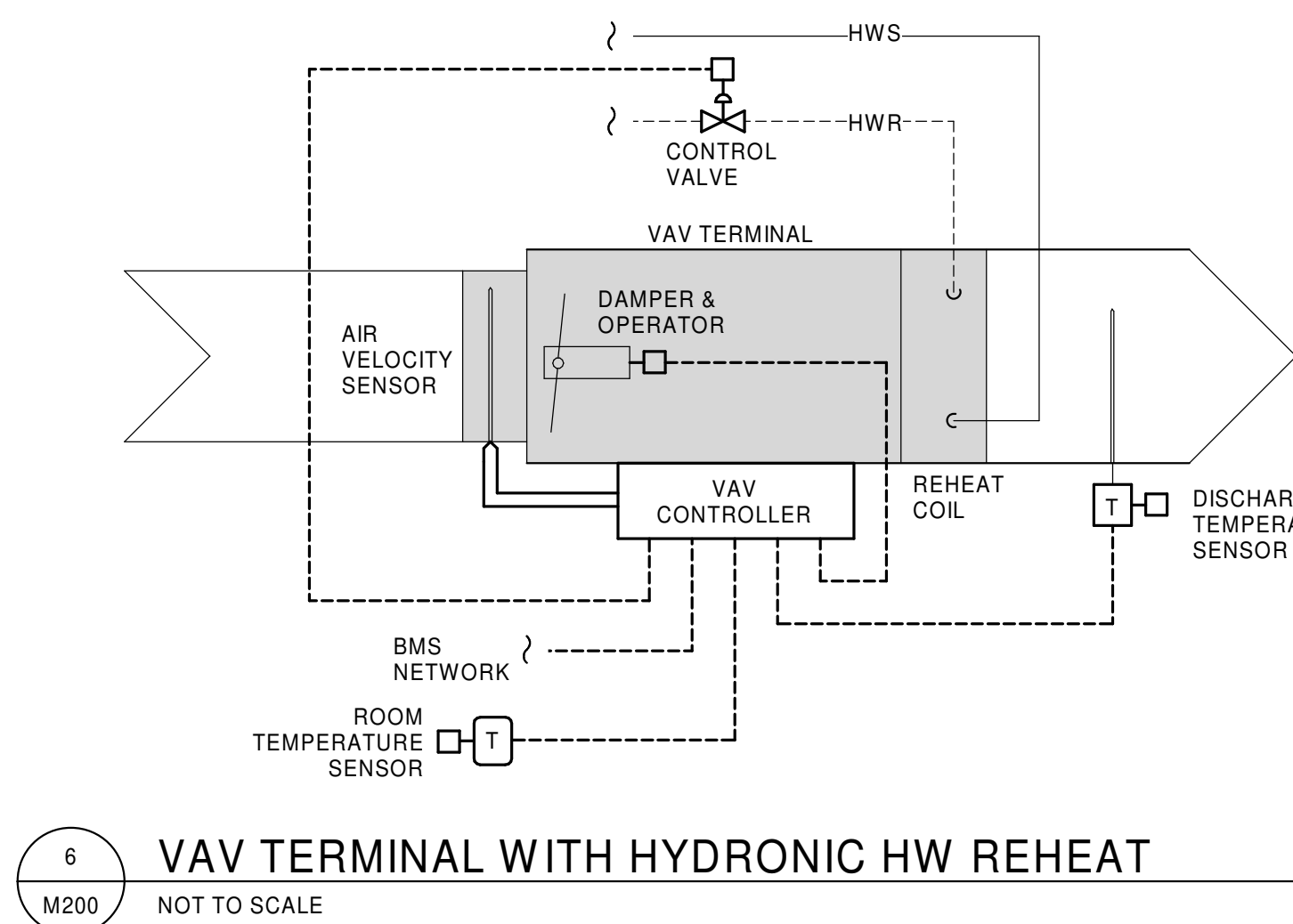


Cabinet Heater Temperature Control

- A. Room temperature sensors shall control cabinet heaters to maintain 70 °F heating set point.
- B. When the space temperature drops below 72 F set point, the fan shall be enabled and the heating control valve opened to maintain heating set point.
- C. Thermostat set points shall be capable of being adjusted.

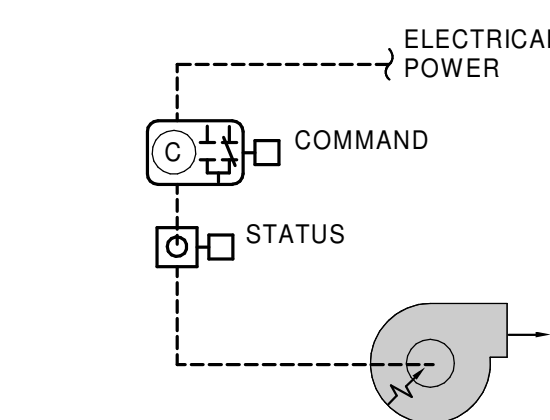
Unit Ventilator Temperature Control

- A. All setpoints adjustable.
- B. Schedule: Schedule modes are Occupied and Unoccupied.
- C. Room temperature control:
- Occupied mode: The fan shall run continuously and the ventilation air damper shall open fully and the room air damper shall close fully. When the temperature drops below 70°F (adj.) the control valve shall open until set point is reached. Monitor room for CO2. Generate alarm if CO2 levels exceed 1000 ppm.
  - Unoccupied mode: The ventilation air damper shall close fully and the room air damper shall open fully. When the temperature drops below 60°F (adj.) the fan shall turn on and the control valve shall open until the set point is reached.



VAV Terminal Temperature Control

- A. Provide a room temp sensor with local display and setpoint adjustment with limits adjustable by the Operator.
- B. When the room temp is within the 2 °F comfort dead band between the occupied heating setpoint 72 °F and occupied cooling setpoint 75 °F, maintain the cooling min CFM.
- C. As the room temp falls below the heating setpoint, maintain the cooling min CFM and modulate the reheat valve to maintain the room heating setpoint. A PID loop modulates the reheat valve up to the supply temp limit of 95 °F.
- D. On a further call for heating, modulate the VAV airflow up to the reheat max CFM. As the room temp rises, modulate in reverse sequence.
- E. As the room temp rises above the room cooling setpoint, a PID loop modulates the VAV airflow from cooling min CFM up to the cooling max CFM. As the room temp drops, modulate in reverse sequence.



Sequence of Operation:

- A. Provide the following equipment, valves, sensors, etc.
- Current sensor for fan status with adjustable trip point
  - Control relay
- B. Provide user-defined occupied and unoccupied schedule. Fan shall run continuously during occupied periods. Fan shall remain off during unoccupied periods.
- C. Alarms and faults: generate an alarm at the BAS front end and elsewhere (text message, e-mail, etc.) as per owner's request for the following conditions:
- Fan status does not match command.

| DDC LEGEND |                               |
|------------|-------------------------------|
| SYMBOL     | DESCRIPTION                   |
|            | CONTROL RELAY                 |
|            | CURRENT-SENSING STATUS SWITCH |
|            | 2-WAY CONTROL VALVE           |
|            | ROOM TEMPERATURE SENSOR       |
|            | CARBON DIOXIDE SENSOR         |
|            | EMCS POINT                    |