

G100



KEY PLAN

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2.402 DEMOLISH PORTION OF EXISTING STEEL—STUD—FRAMED DRYWALL. CAREFULLY REMOVE ELEMENTS TO PERMIT SALVAGING OF EXISTING DOOR, FRAME AND HARDWARE; DEMOLISH WALL BASE.

2.410 SALVAGE EXISTING DOOR, FRAME AND HARDWARE.

2.413 CREATE OPENING IN EXISTING STEEL—STUD—FRAMED FIRE-RATED GYPSUM DRYWALL CONSTRUCTION FOR FOR NEW MECHANICAL DUCT TO TIGHTLY FIT SIZE OF DUCT. REFER TO NEW WORK PLAN.

7.840 FIRESTOPPING: FIRESTOP NEW PENETRATION(S) THROUGH EXISTING FIRE-RATED GYPSUM DRYWALL ASSEMBLY; REFER TO SPECIFICATIONS.

8.100 REINSTALL SALVAGED EXISTING DOOR, FRAME AND HARDWARE.

9.212 GYPSUM BOARD ASSEMBLY: RECONSTRUCT DEMOLISHED PORTION OF STEEL—STUD—FRAMED GYPSUM DRYWALL, USING LIKE MATERIALS, TO PERMIT REINSTALLATION OF SALVAGED DOOR, FRAME AND HARDWARE; PROVIDE NEW WALL BASE TO MATCH EXISTING.

9.922 RE—PAINT ENTIRE WALL SURFACE, TOP TO BOTTOM, COLUMN TO COLUMN; BLEND PATCHED AREA AROUND DOOR FRAME INTO EXISTING WALL SURFACE.

9.923 RE—PAINT ALL SURFACES OF EXISTING DOOR AND FRAME.

23.100 REMOVE AIR HANDLING UNIT AND ASSOCIATED DUCTWORK AS SHOWN.

23.101 DEMOLISH SECTION OF DUCTWORK AS REQUIRED FOR INSTALLATION OF NEW RETRO—FIT VAV BOX AND HEATING COIL; SALVAGE EXISTING ACOUSTICAL CEILING PANELS AND GRID MEMBERS TO PERMIT DEMOLITION AND NEW COILS TO BE SAVED TO PROTECT SALVAGED CEILING COMPONENTS FOR REINSTALLATION.

23.102 REMOVE PNEUMATIC CONTROL PANEL, AND ALL ASSOCIATED END DEVICES. VERIFY ONLY POINTS IN PANEL ARE ASSOCIATED WITH AHU—20. IF OTHER CONTROLS ARE IN PANEL AFFECTING OTHER EQUIPMENT NOTIFY OWNER. COORDINATE WITH OWNER FOR REMOVAL OF ANY GRAPHICS IN JOI SYSTEM.

23.109 EXISTING PIPING INTO MECHANICAL ROOM DOES NOT HAVE ISOLATION VALVES. CHILLED WATER PIPING CONTAINS SORE GYLOX.

23.110 COORDINATE WITH OWNER FOR DRAINING PIPES. OWNER TO DRAIN AND FILL CHILLED WATER AND HEATING WATER PIPING.

23.114 REMOVE CHS/R AND CHS/R PIPING AND COIL. SPECIALTIES BACK TO WALL AS SHOWN. PROVIDE TEMPORARY CAP FOR NEW CONNECTION.

23.200 EXISTING IR RACK, PROTECT BACK AND ALL ASSOCIATED WIRING THROUGHOUT ALL PHASES OF CONSTRUCTION.

23.201 PROVIDE NEW CONNECTION BETWEEN OUTSIDE AIR DUCTWORK AND AIR HANDLING UNIT. PROVIDE ALL REQUIRED TRANSITIONS AND FITTINGS TO MAKE THE CONNECTION.

23.202 PROVIDE NEW HW5/R AND CHS/R PIPING AND COIL SPECIALTIES TO AHU.

23.203 PROVIDE 7"—6" X 3"—6" PLENUM BOX FOR AIR HANDLING UNIT. PROVIDE ALL CONNECTIONS TO VAV BOXES AS SHOWN. PLENUM BOX TO BE INSTALLED UP TO CEILING

23.204 PROVIDE NEW VAV BOX. MOUNT VAV BOX LOWER THAN VAV—200 TO ALLOW FOR SERVICING OF UNIT.

23.205 PROVIDE NEW DDC CONTROLLER FOR AHU. PROVIDE GRAPHICS AND INTERFACE INTO CAMPUS BUILDING AUTOMATION SYSTEM.

23.206 PROVIDE VARIABLE FREQUENCY DRIVE FOR NEW AHU IN PLACE OF LOCAL DISCONNECT.

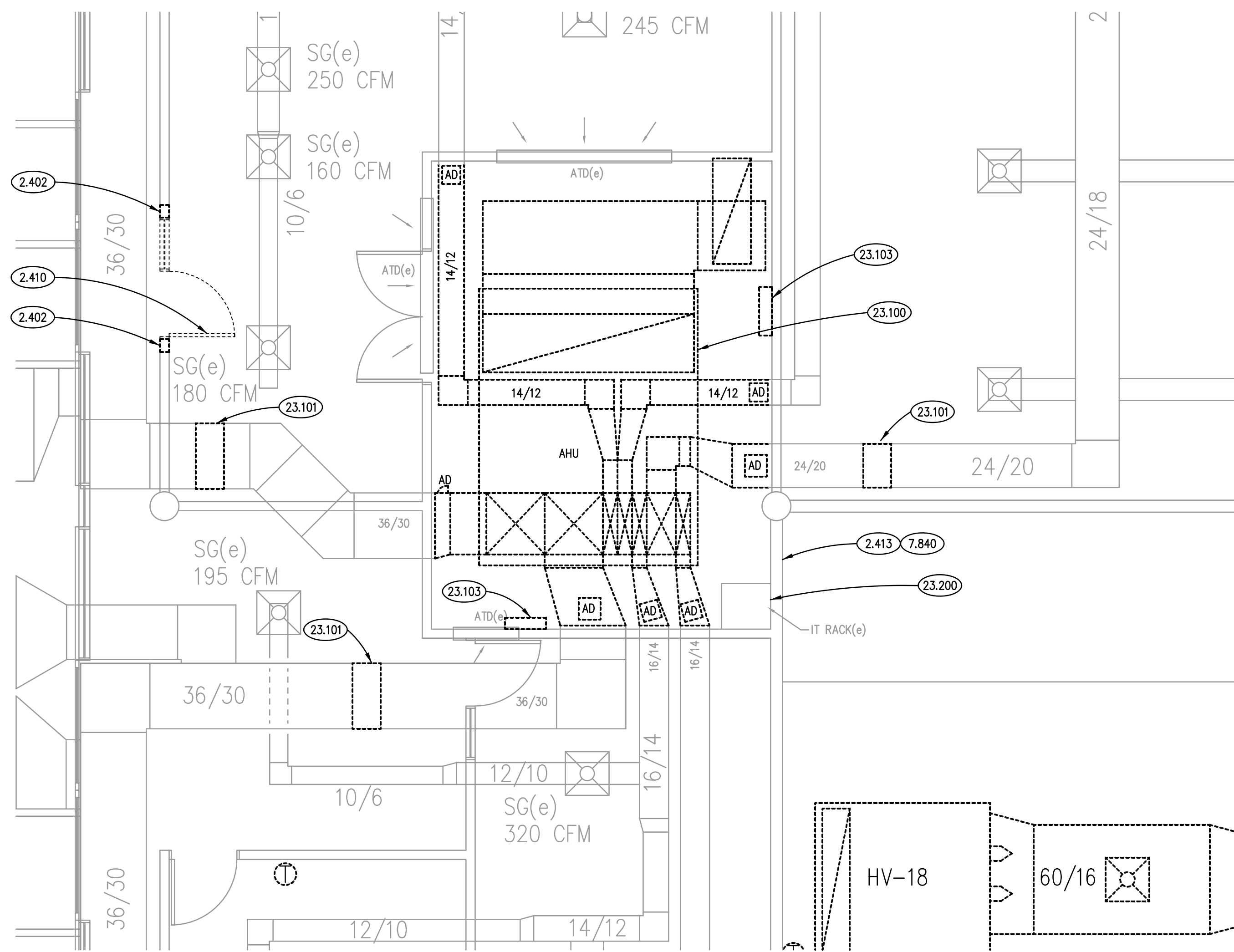
23.207 PROPOSED ROUTE OF CONDENSATE PIPING. DISCHARGE IN NEAREST FLOOR DRAIN.

23.208 PROVIDE NEW VAV BOXES. PROVIDE ALL REQUIRED TRANSITIONS AND FITTINGS. MAINTAIN CLEARANCE AROUND BOXES FOR SERVICING.

23.209 PROVIDE NEW HW5/R PIPING AND ASSOCIATED SPECIALTIES FOR VAV BOXES.

23.211 PROVIDE NEW RETROFIT VAV BOX FOR THIS ZONE. FLEET VERIFY EXACT DUCT DIMENSIONS PRIOR TO CONSTRUCTION; REINSTALL SALVAGED ACOUSTICAL CEILING PANELS AND GRID MEMBERS.

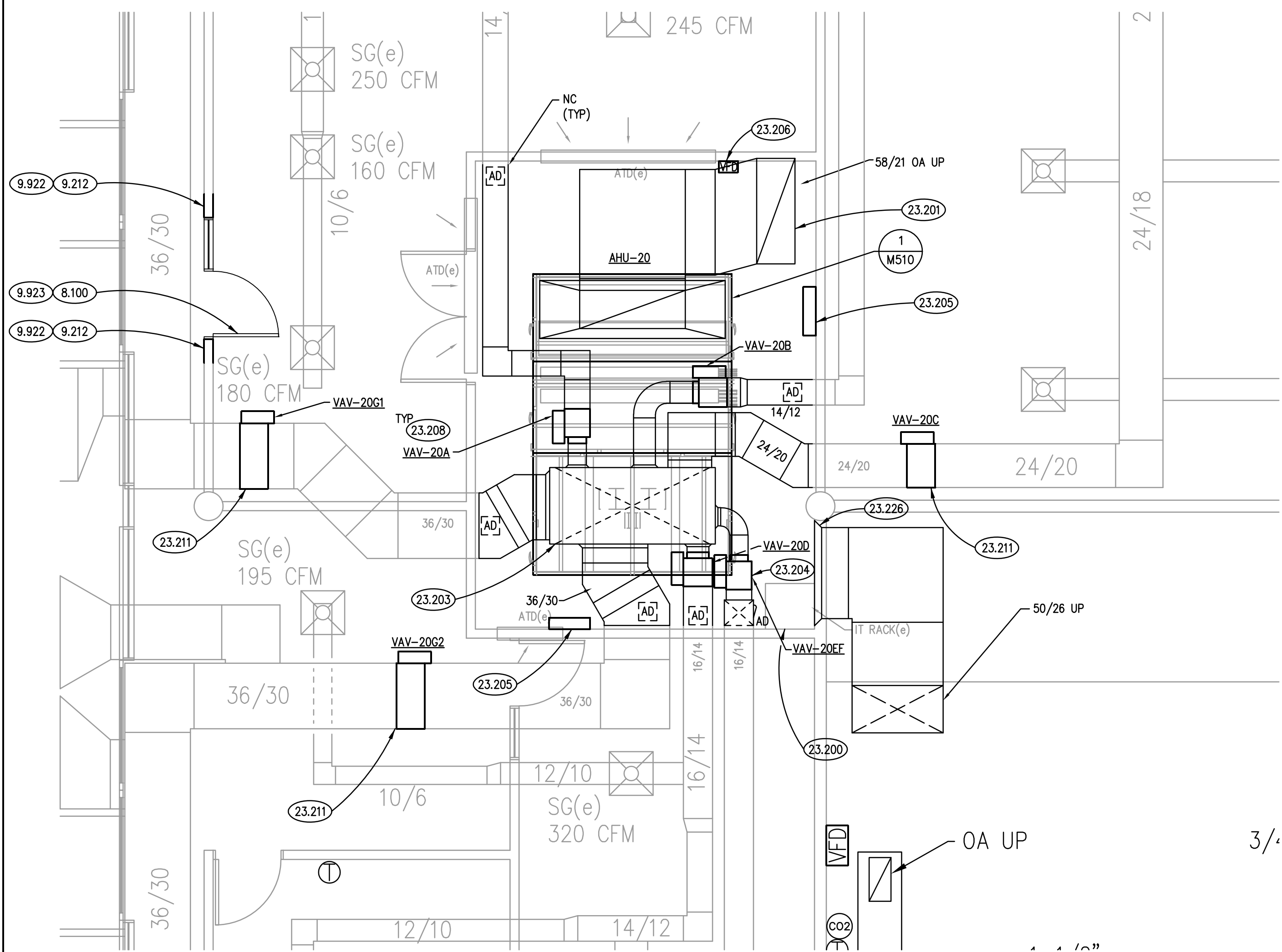
23.226 PROVIDE FLARED AND SCREENED OPENING ON EXHAUST OPENING TO ROOM.



S1020 VENTILATION DEMOLITION PLAN

SCALE: 1/4" = 1'-0"

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S1020 VENTILATION PLAN

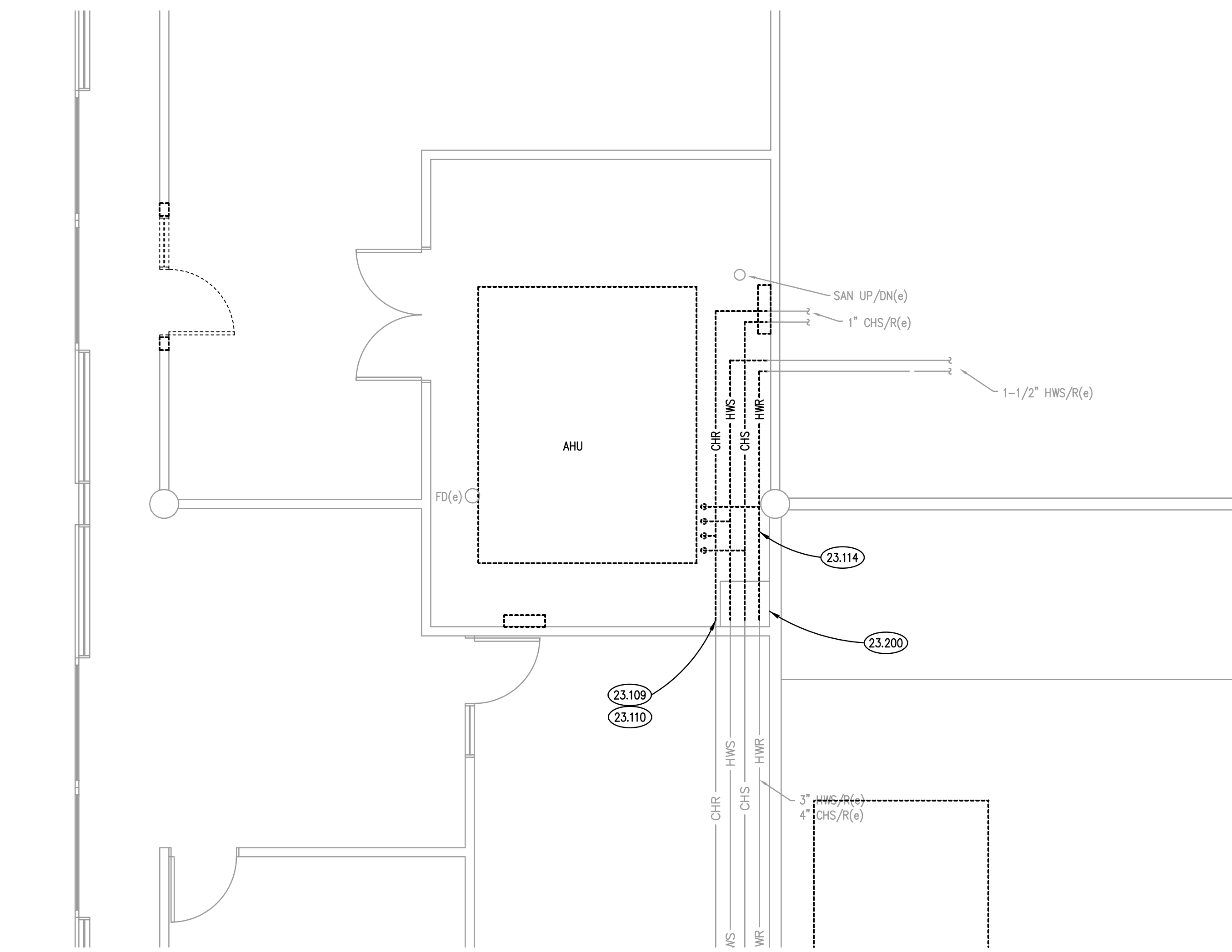
SCALE: 1/4" = 1'-0"

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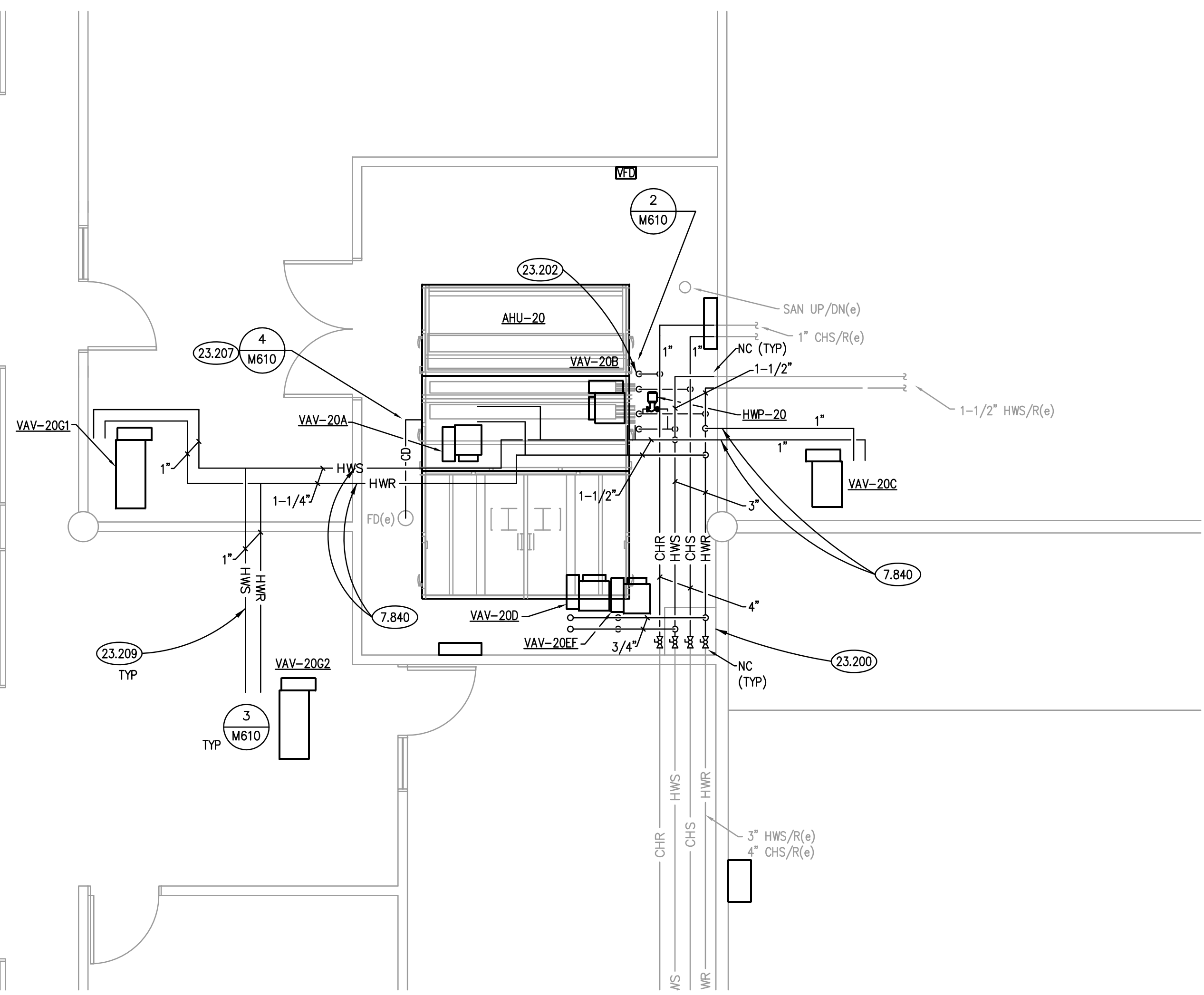
2. REFER TO DRAWING G10 FOR PROJECT GENERAL NOTES.
3. ALL PIPING AND DUCTWORK IS SHOWN DIAGRAMMATICALLY AND DOES NOT SHOW ALL REQUIRED FITTINGS, OFFSETS, DROPS AND RISES. THE CONTRACTOR IS RESPONSIBLE TO PROVIDE ALL MATERIAL AND LABOR FOR A COMPLETE AND WORKING SYSTEM. COORDINATE WITH OTHER TRADES FOR SPACE AVAILABLE AND RELATIVE LOCATIONS OF EQUIPMENT, PIPING, DUCTWORK, ETC.
4. ALL TAPES AND MASTICS USED TO SEAL DUCTWORK LISTED AND LABELED IN ACCORDANCE WITH UL 181A SHALL BE MARKED ACCORDINGLY. ALL TAPES AND MASTICS USED TO SEAL FLEXIBLE DUCTS AND AIR CONNECTORS SHALL COMPLY WITH UL 181B AND MARKED ACCORDINGLY.
5. THERMOSTATIC CONTROLS OF EQUIPMENT SHALL HAVE A 5 °F DEADBAND.
6. GENERALLY, SMALL DIAMETER PIPE RUNS FROM DRIPS, CONDENSATE PANS AND OTHER SERVICES ARE NOT SHOWN BUT MUST BE PROVIDED.
7. SPACE ALLOCATION, COORDINATION WITH ELECTRICAL, ARCHITECTURAL & OTHER MECHANICAL COMPONENTS HAVE BEEN MADE WITH RESPECT TO ALL EQUIPMENT SCHEDULED ON THESE DRAWINGS AND IN THE SPECIFICATIONS OF ALL OTHER MANUFACTURERS ONLY. OTHER MANUFACTURERS ARE ACCEPTABLE PROVIDED THEY MEET PERFORMANCE REQUIREMENTS AND AFOREMENTIONED COORDINATION.
8. DO NOT CUT THROUGH THE MASONRY BOND BEAMS OR OTHER STRUCTURAL ELEMENT WHEN INSTALLING OPENINGS REQUIRED FOR ALL DUCTWORK, PIPING, CONDUITS OR OTHER WORK. CONTRACTOR CUTTING THROUGH OR OTHERWISE DAMAGING THESE ELEMENTS WILL BE RESPONSIBLE FOR ALL ASSOCIATED ENGINEERING FEES AND SUBSEQUENT RETRO-FIT/REINFORCING DEEMED NECESSARY TO REINSTATE THE CONTINUITY OF THE DISRUPTED ELEMENTS.
9. HEATING AND COOLING DESIGN LOADS FOR THE BUILDING HAVE BEEN CALCULATED WITH ELITE SOFTWARE. COMEAL HVAC LOADS PROGRAM, VERSION 8.0.2.14A, IN ACCORDANCE WITH ASHRAE STANDARDS. INTERIOR DESIGN TEMPERATURES ARE MAXIMUM 72 DEGREES F FOR HEATING AND A MINIMUM OF 75 DEGREES F FOR COOLING.
10. OBTAIN PAY ALL COSTS FOR PERMITS, LICENSES, CERTIFICATE FILING AND ALL INSPECTIONS BY AUTHORITIES HAVING JURISDICTION.

S 1020

NOR



S1020 PIPING DEMOLITION PLAN **4**
SCALE: 1/4" = 1'-0"



S1020 PIPING PLAN 2
SCALE: 1/4" = 1'-0"

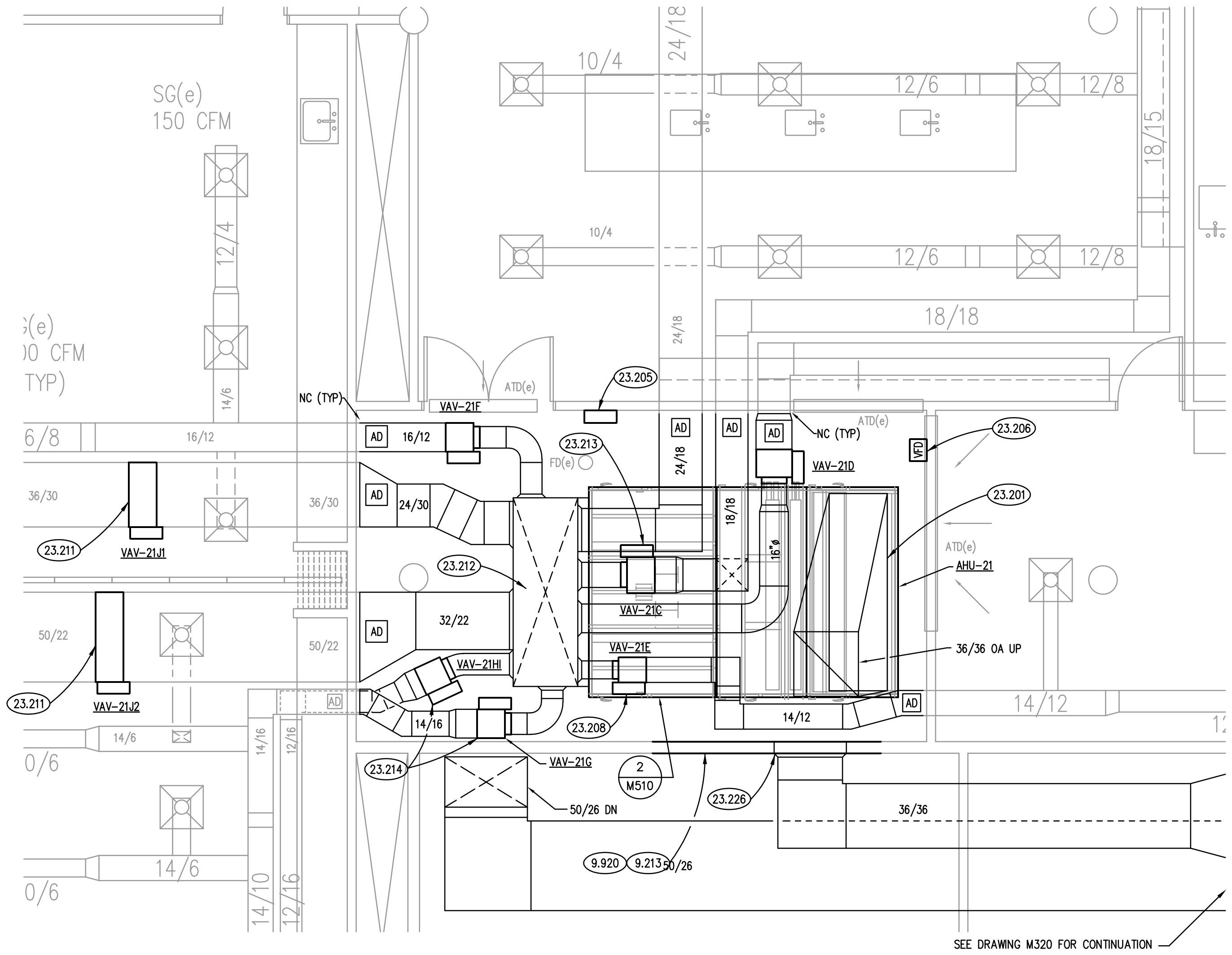
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KEYNOTES

KEYNOTES ARE TYPICALLY NOT DUPLICATED WITHIN A GIVEN DETAIL. AN UN-KEYNOTED ITEM IN A DETAIL IS THE SAME AS A KEYNOTED ITEM HAVING THE SAME APPEARANCE WITHIN THE SAME DETAIL.

- 2.403 CREATE OPENING(S) IN STEEL-STUD-FRAMED DRYWALL CONSTRUCTION FOR NEW MECHANICAL DUCT(S)/PIPE(S) TO TIGHTLY FIT TO SIZE(S) OF DUCT(S)/PIPES(S) TO BE PROVIDED; REFER TO NEW WORK PLAN.
- 2.412 CREATE OPENING IN EXISTING STEEL-STUD-FRAMED FIRE-RATED GYPSUM DRYWALL CONSTRUCTION TO PERMIT REMOVAL OF EXISTING MECHANICAL AHU AND INSTALLATION OF NEW MECHANICAL AHU; LOCATE AND SIZE OPENING SO AS TO ENCOMPASS EXISTING HOLE IN WALL.
- 9.213 GYPSUM BOARD ASSEMBLY: RECONSTRUCT DEMOLISHED PORTION OF STEEL-STUD-FRAMED FIRE-RATED GYPSUM DRYWALL, USING LIKE MATERIALS, INCLUDING ACOUSTIC INSULATION BATTS, AND ACOUSTICAL FIBERBOARD AND RESILIENT CHANNELS ON AHU SIDE OF WALL.
- 9.920 PAINT PATCHED AREA AND BLEND INTO EXISTING WALL SURFACE.
- 23.100 REMOVE AIR HANDLING UNIT AND ASSOCIATED DUCTWORK AS SHOWN.
- 23.101 DEMOLISH SECTION OF DUCTWORK AS REQUIRED FOR INSTALLATION OF NEW RETRO-FIT VAV BOX AND HEATING COIL; SALVAGE EXISTING ACOUSTICAL CEILING PANELS AND GRID MEMBERS TO PERMIT DEMOLITION AND NEW CONSTRUCTION; SAVE AND PROTECT SALVAGED CEILING COMPONENTS FOR REINSTALLATION.
- 23.102 REMOVE OUTSIDE AIR DUCTWORK AS SHOWN. REMOVE DUCTWORK BACK TO CEILING AND PROVIDE TEMPORARY CAP FOR NEW CONNECTION.
- 23.104 REMOVE PNEUMATIC CONTROL PANEL AND ALL ASSOCIATED END DEVICES. VERIFY ONLY POINTS IN PANEL ARE ASSOCIATED WITH AHU-21. IF OTHER CONTROLS ARE IN PANEL AFFECTING OTHER EQUIPMENT NOTIFY OWNER. COORDINATE WITH OWNER FOR REMOVAL OF ANY GRAPHICS IN JCI SYSTEM.
- 23.109 EXISTING PIPING INTO MECHANICAL ROOM DOES NOT HAVE ISOLATION VALVES. CHILLED WATER PIPING CONTAINS 30% GLYCOL.
- 23.114 REMOVE HWS/R AND CHS/R PIPING AND COIL SPECIALTIES BACK TO WALL AS SHOWN. PROVIDE TEMPORARY CAP FOR NEW CONNECTION.
- 23.201 PROVIDE NEW CONNECTION BETWEEN OUTSIDE AIR DUCTWORK AND AIR HANDLING UNIT. PROVIDE ALL REQUIRED TRANSITIONS AND FITTINGS TO MAKE THE CONNECTION.
- 23.202 PROVIDE NEW HWS/R AND CHS/R PIPING AND COIL SPECIALTIES TO AHU.
- 23.205 PROVIDE NEW ODC CONTROLLER FOR AHU. PROVIDE GRAPHICS AND INTERFACE INTO CAMPUS BUILDING AUTOMATION SYSTEM.
- 23.206 PROVIDE VARIABLE FREQUENCY DRIVE FOR NEW AHU IN PLACE OF LOCAL DISCONNECT.
- 23.207 PROPOSED ROUTE OF CONDENSATE PIPING. DISCHARGE IN NEAREST FLOOR DRAIN.
- 23.208 PROVIDE NEW VAV BOXES. PROVIDE ALL REQUIRED TRANSITIONS AND FITTINGS. MAINTAIN CLEARANCE AROUND BOXES FOR SERVING.
- 23.209 PROVIDE NEW HWS/R PIPING AND ASSOCIATED SPECIALTIES FOR VAV BOXES.
- 23.211 PROVIDE NEW RETROFIT VAV BOX FOR THIS ZONE; FIELD VERIFY EXACT DUCT DIMENSIONS PRIOR TO CONSTRUCTION; REINSTALL SALVAGED ACOUSTICAL CEILING PANELS AND GRID MEMBERS.
- 23.212 PROVIDE 8'-9" X 3'-0" PLENUM BOX FOR AIR HANDLING UNIT. PROVIDE ALL CONNECTIONS TO VAV BOXES AS SHOWN. PLENUM BOX TO BE INSTALLED UP TO CEILING.
- 23.213 ROUTE DUCTWORK AND MOUNT VAV BOX LOW IN ORDER TO MAINTAIN SERVICE ACCESS AROUND VAV BOX.
- 23.214 DUCTWORK FOR VAV-21HI SHALL BE MOUNTED LOWER THAN DUCTWORK FOR VAV-21G FOR IN ORDER TO MAINTAIN SERVICE ACCESS AROUND BOTH VAV-BOXES.
- 23.226 PROVIDE SCREENED OPENING ON EXHAUST OPENING TO ROOM.



SUBSTATION A PIPING SCHEMATIC

SEQUENCE OF OPERATIONS (e)

BOILER (B-A1, B-A2, B-A3):

THE BOILER CONTROLLER SHALL CONTROL THE OPERATION OF THE THREE BOILERS. THE LEAD BOILER SHALL BE ENABLED WHEN THE OUTSIDE AIR TEMPERATURE FALLS BELOW 60 DEGREES F (ADJ). THE BOILER CONTROL PANEL SHALL EQUALIZE THE RUN TIME OF THE THREE BOILERS AUTOMATICALLY AT SET INTERVALS.

THE BOILER CONTROL PANEL SHALL ENERGIZE THE BOILERS IN A ENERGY OPTIMIZATION SEQUENCE. ON A CALL FOR HEAT THE FIRST BOILER CONTROL VALVE BV-X SHALL OPEN. THE FIRST BOILER SHALL MODULATE ITS FIRING RATE TO MAINTAIN THE HEATING WATER TEMPERATURE SETPOINT. ONCE THE FIRST BOILER REACHES 50% OF ITS FIRING RATE THE SECOND BOILER CONTROL VALVE BV-X SHALL OPEN. THE BOILER CONTROLLER SHALL CALCULATE THE RATE AT WHICH THE FIRST AND SECOND BOILER SHOULD FIRE TO MEET THE BUILDING LOAD. THE BOILERS SHALL THEN MODULATE THEIR FIRING RATE TOGETHER TO MAINTAIN THE HEATING WATER TEMPERATURE SETPOINT. ONCE THE FIRST AND SECOND BOILER FIRING RATE SHALL THEN MODULATE TO MEET THE HEATING LOAD. WHEN THE FIRST AND SECOND BOILER REACH A MINIMUM OF 10% OF THEIR FIRING RATE, THE SECOND BOILER SHALL BE DE-ENERGIZED AND THE ASSOCIATED BOILER CONTROL VALVE BV-X SHALL CLOSE. THE FIRST BOILER FIRING RATE SHALL THEN MODULATE TO MEET THE HEATING LOAD.

AS THE HEATING DEMAND DECREASES, THE BOILERS FIRING RATE SHALL MODULATE DOWN TOGETHER UNTIL THEY REACH A MINIMUM OF 10% OF THEIR FIRING RATE AT WHICH TIME THE THIRD BOILER SHALL BE DE-ENERGIZED AND THE ASSOCIATED BOILER CONTROL VALVE BV-X SHALL CLOSE. THE FIRST AND SECOND BOILER FIRING RATE SHALL THEN MODULATE TO MEET THE HEATING LOAD. WHEN THE FIRST AND SECOND BOILER REACH A MINIMUM OF 10% OF THEIR FIRING RATE, THE SECOND BOILER SHALL BE DE-ENERGIZED AND THE ASSOCIATED BOILER CONTROL VALVE BV-X SHALL CLOSE. THE FIRST BOILER FIRING RATE SHALL THEN MODULATE TO MEET THE HEATING LOAD.

THE HEATING WATER TEMPERATURE SHALL BE RESET BASED ON OUTDOOR AIR TEMPERATURE. THE WATER TEMPERATURE SHALL BE 180 DEGREES F WHEN THE OUTDOOR AIR TEMPERATURE IS 0 DEGREES F. THE WATER TEMPERATURE SHALL BE 100 DEGREES F WHEN THE OUTDOOR AIR TEMPERATURE IS 60 DEGREES F. TEMPERATURE RESET CURVES AND SETPOINTS SHALL BE ADJUSTABLE.

AN ALARM SHALL BE GENERATED IF THERE IS A BOILER ALARM OR A LOW WATER LEVEL ALARM.

IF THE BOILER EMERGENCY SHUTDOWN SWITCH IS ACTIVATED. ALL OF THE BOILERS SHALL BE IMMEDIATELY DE-ENERGIZED AND AN ALARM SHALL BE GENERATED.

PUMP (HWP-A1, HWP-A2)

THE HEATING WATER PUMPS SHALL OPERATE IN A LEAD/LAG SEQUENCE. IF THE LEAD PUMP FAILS, THE LAG PUMP SHALL BE ENERGIZED. THE PUMPS SHALL BE ALTERNATED AS LEAD AT SET INTERVALS.

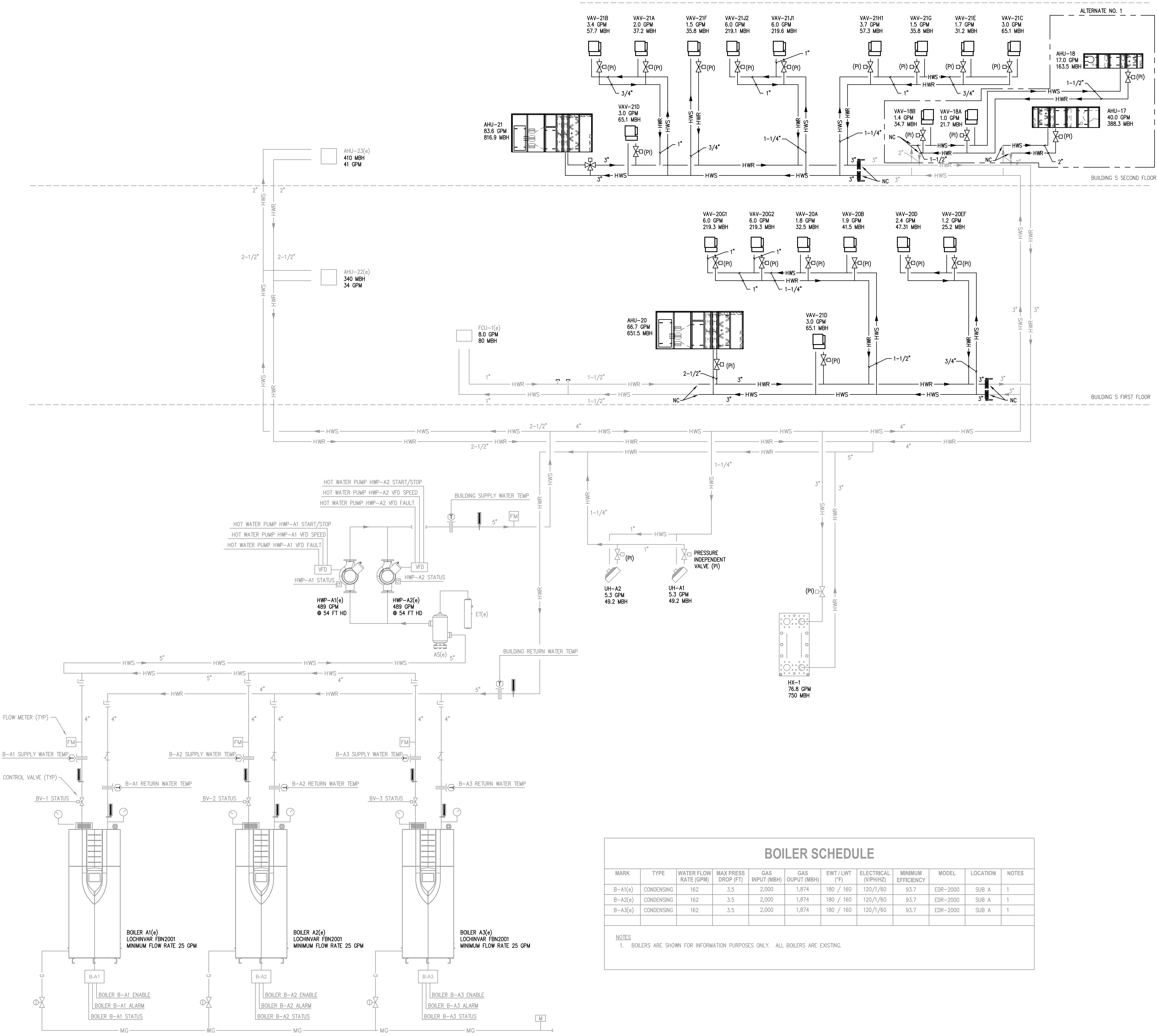
UPON A CALL FOR HEAT THE LEAD PUMP SHALL BE ENERGIZED. THE PUMP SPEED SHALL MODULATE TO MEET SYSTEM DEMAND BASED ON SENSORLESS SYSTEM PRESSURE CONTROL.

AN ALARM SHALL BE GENERATED UPON A PUMP OR A VFD FAULT STATUS.

NOTE: UNTIL THE SYSTEM IS CHANGED OVER TO VARIABLE FLOW, ALL BOILER VALVES (BV-1, BV-2, BV-3) SHALL REMAIN OPEN.

POINTS LIST(e)

BOILER (B-A1, B-A2, B-A3)	HARDWARE				SOFTWARE			
	AI	AO	DI	DO	SCHED	TREND	ALARM	GRAPHIC
BOILER ENABLE (B-A1, B-A2, B-A3)				X	X			X
BOILER STATUS (B-A1, B-A2, B-A3)			X				X	X
BOILER ALARM (B-A1, B-A2, B-A3)			X				X	X
BUILDING HOT WATER FLOW RATE (FM)						X		X
HOT WATER PUMP START/STOP (HWP-A1, HWP-A2)	X						X	X
HOT WATER PUMP STATUS (HWP-A1, HWP-A2)			X				X	X
HOT WATER PUMP VFD SPEED (HWP-A1, HWP-A2)						X		X
HOT WATER PUMP VFD FAULT (HWP-A1, HWP-A2)			X				X	X
BUILDING SUPPLY WATER TEMPERATURE	X					X		X
BUILDING RETURN WATER TEMPERATURE	X					X		X
BUILDING HOT WATER SETPOINT		X					X	X
BOILER SUPPLY WATER TEMPERATURE (B-A1, B-A2, B-A3)						X		X
BOILER RETURN WATER TEMPERATURE (B-A1, B-A2, B-A3)						X		X
OUTSIDE AIR TEMPERATURE	X						X	X
GAS FLOW MEASUREMENT	X						X	X
BOILER KILL SWITCH STATUS			X				X	X
BOILER CONTROL VALVE (BV-1, BV-2, BV-3)			X				X	X
BOILER FLOW RATE FM (B-A1, B-A2, B-A3)	X					X		X



BUILDING S HVAC UNIT REPLACEMENT

JOLIET JUNIOR COLLEGE
1215 HOBBS ROAD
JOLIET, ILLINOIS 60431

ISSUED
12/03/2018 BID DOCUMENTS

JOB NO. 18-292-1195
DRAWN BWG
CHECKED DDW
APPROVED DDW

SHEET TITLE

PIPING SCHEMATIC

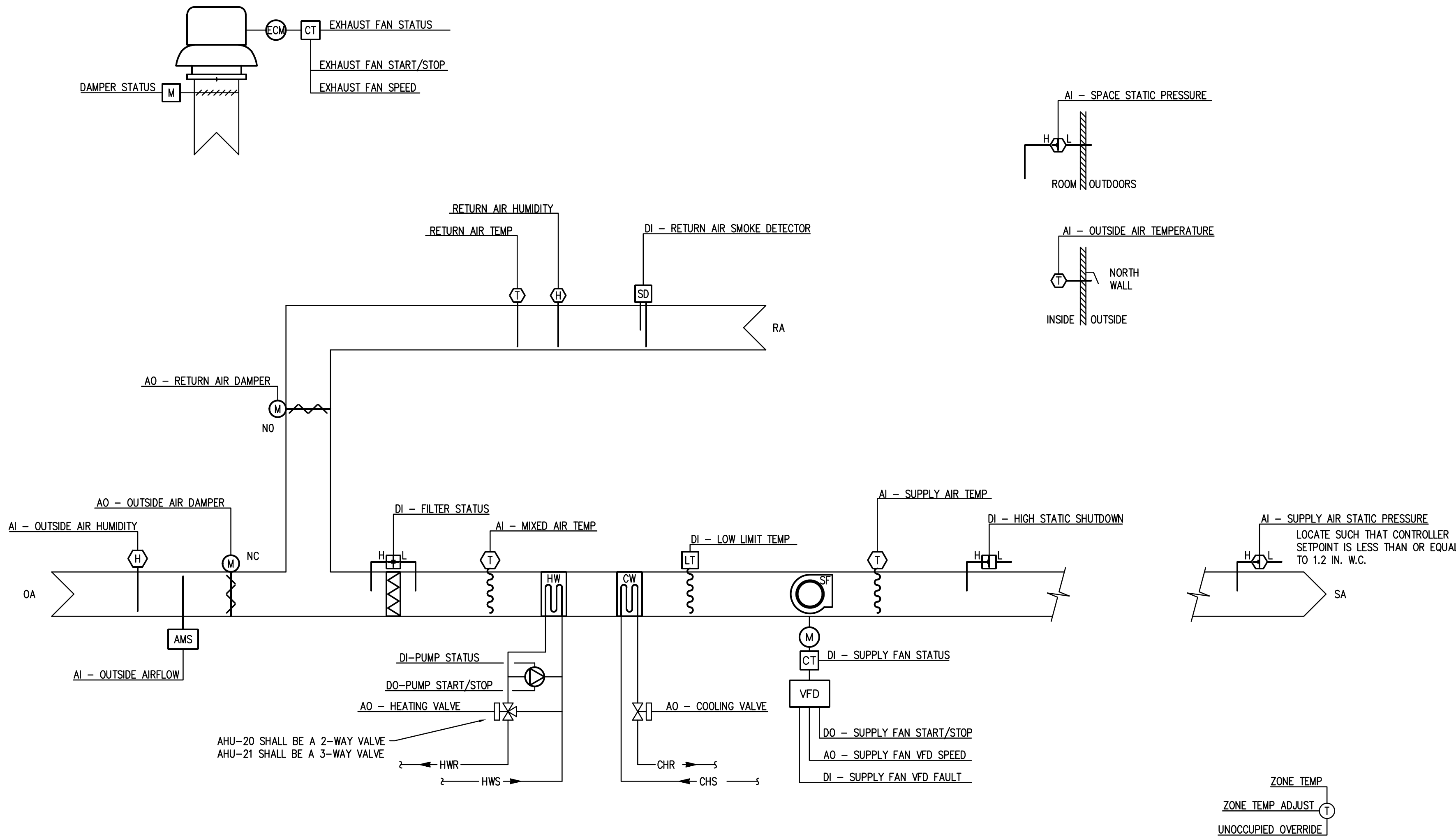
SHEET NUMBER

M410

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AHU-20, AHU-21 TEMPERATURE CONTROL SCHEMATIC



NOTES:

- COMPONENTS AND INTERCONNECTIONS SHOWN ARE SCHEMATIC ONLY.
- CONTRACTOR IS RESPONSIBLE FOR PROVIDING COMPONENTS, SENSORS, RELAYS, ETC, TO ENSURE A COMPLETE OPERATING SYSTEM.
- SMOKE DETECTORS EXISTING TO BE REUSED.

POINTS LIST

AIR HANDLING UNIT (AHU-20, AHU-21)	HARDWARE				SOFTWARE			
	AI	AO	DI	DO	SCHED	TREND	ALARM	GRAPHIC
OCCUPIED/UNOCCUPIED MODE			X		X			X
SUPPLY FAN START/STOP				X	X			
SUPPLY FAN STATUS			X				X	X
SUPPLY FAN VFD SPEED			X			X	X	
SUPPLY FAN VFD FAULT			X				X	
OUTSIDE AIR TEMPERATURE	X					X	X	
SUPPLY AIR TEMPERATURE	X					X	X	
RETURN AIR TEMPERATURE	X					X	X	
MIXED AIR TEMPERATURE	X					X	X	
OUTSIDE AIR HUMIDITY	X					X	X	
RETURN AIR HUMIDITY	X					X	X	
LOW LIMIT TEMPERATURE			X				X	X
OUTSIDE AIR DAMPER		X				X	X	X
OUTSIDE AIR CFM	X					X	X	X
RETURN AIR DAMPER		X				X	X	X
HOT WATER COIL CONTROL VALVE		X				X	X	X
CHILLED WATER COIL CONTROL VALVE		X				X	X	X
FILTER STATUS			X				X	X
RETURN AIR SMOKE DETECTOR STATUS			X				X	X
PUMP STATUS				X			X	X
PUMP START/STOP				X			X	X
ECONOMIZER STATUS			X				X	X
DUCT STATIC PRESSURE	X					X	X	X
DUCT STATIC PRESSURE SETPOINT	X					X	X	X
HIGH STATIC PRESSURE SHUTDOWN			X				X	X
EXHAUST FAN STATUS (EF-20, EF-21)			X				X	X
EXHAUST FAN START/STOP (EF-20, EF-21)				X				
EXHAUST FAN SPEED (EF-20, EF-21)			X				X	X
SPACE CO2 DETECTOR LEVEL	X					X	X	X
SPACE CO2 LEVEL SETPOINT HIGH / LOW			X			X	X	X
OUTSIDE AIR DAMPER POSITION SETPOINT HIGH / LOW		X				X	X	X

NOTES:

- HEATING CONTROL VALVE SHALL HAVE SPRING RETURN ACTUATORS TO FAIL OPEN DURING LOSS OF POWER.
- OUTSIDE AIR DAMPERS SHALL HAVE SPRING RETURN ACTUATORS TO FAIL IN CLOSE POSITION DURING LOSS OF POWER.

SEQUENCE OF OPERATIONS

AIR HANDLING UNIT (AHU-20, AHU-21):

THE OCCUPIED/UNOCCUPIED MODE SCHEDULING SHALL BE MADE AT THE BUILDING AUTOMATION SYSTEM. PROVISIONS SHALL BE MADE FOR MANUAL SHUTDOWN OF EQUIPMENT. ALL SETPOINTS SHALL BE ADJUSTABLE. UNOCCUPIED SPACE TEMPERATURE SETPOINTS SHALL BE 80 DEGREES F COOLING AND 65 DEGREES F HEATING.

SUPPLY FAN - THE SUPPLY FAN SHALL RUN CONTINUOUSLY DURING OCCUPIED MODE AND INTERMITTENTLY DURING UNOCCUPIED MODE. THE SUPPLY FAN VARIABLE FREQUENCY DRIVE SHALL MODULATE THE SPEED OF THE FAN TO MAINTAIN THE DUCT STATIC PRESSURE SETPOINT. IF AIRFLOW IS NOT DETECTED WITHIN TWO MINUTES AFTER A START COMMAND THE FAN MOTOR SHALL BE DE-ENERGIZED AND AN AUDIBLE ALARM SHALL BE ACTIVATED. IF A HIGH STATIC PRESSURE IS SENSED IN THE SUPPLY AIR THE SUPPLY FAN SHALL BE DE-ENERGIZED AND SIGNAL AN ALARM CONDITION.

STATIC PRESSURE/SUPPLY AIR TEMPERATURE RESET - THE SUPPLY FAN VFDs SHALL MODULATE THE FANS TO MAINTAIN A DUCT STATIC PRESSURE SETPOINT. THE BAS SHALL CONTROL SUPPLY FAN SPEED TO MAINTAIN A CRITICAL STATIC PRESSURE SETPOINT. UPON FAILURE OF COMMUNICATION THE AHU SHALL OPERATE ON THEIR OWN STATIC PRESSURE CONTROL IN STAND ALONE MODE. THE SETPOINT SHALL RESET TO OPTIMIZE FAN SPEED AS FOLLOWS:

- THE BUILDING AUTOMATION SYSTEM SHALL MONITOR THE DAMPER POSITION OF ALL VAV TERMINAL UNITS AND DETERMINE THE CRITICAL ZONE (CZ), WHICH IS THE VAV TERMINAL UNIT THAT IS MOST OPEN.
- WHEN THE CZ IS MORE THAN 95% OPEN, THE SUPPLY FAN DISCHARGE STATIC PRESSURE SETPOINT SHALL BE RESET DOWNWARD 10% OF THE PREVIOUS SETPOINT A FREQUENCY OF 10 MINUTES UNTIL THE CZ IS MORE THAN 97% OPEN OR THE STATIC PRESSURE SETPOINT HAS RESET DOWNWARD TO THE SYSTEM MINIMUM SETTING.
- WHEN THE CZ IS LESS THAN 95% OPEN AND THE STATIC PRESSURE SETPOINT IS AT THE MINIMUM SETTING, THE DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE RESET UPWARD IN INCREMENTS OF 0.5° F AT A FREQUENCY OF 10 MINUTES AND THE STATIC PRESSURE SETPOINT HELD CONSTANT UNTIL THE CZ IS MORE THAN 97% OPEN OR THE DISCHARGE AIR TEMPERATURE IS RESET TO ITS MAXIMUM SETTING OF 10° F (ADJ) ABOVE THE DISCHARGE AIR TEMPERATURE SETPOINT.
- THE REVERSE CONTROL SEQUENCE SHALL OCCUR WHEN THE CZ IS 98% OPEN UNTIL THE DISCHARGE AIR TEMPERATURE AND STATIC TEMPERATURE SETPOINTS ARE A THEIR DESIGN SETPOINT.

SMOKE DETECTORS - UPON DETECTION OF SMOKE THE FANS SHALL BE DE-ENERGIZED, CLOSE OUTSIDE AIR DAMPER, AND SIGNAL ALARM LOCALLY AND AT FIRE ALARM PANEL.

OA/RA DAMPERS - AN AIRFLOW MEASURING STATION/DAMPER SENSOR SHALL MODULATE THE OUTSIDE AIR DAMPERS TO MAINTAIN THE MINIMUM OUTSIDE AIR CFM SETPOINT. AN ECONOMIZER SHALL MODULATE THE DAMPERS BASED ON DIFFERENTIAL ENTHALPY OF THE RETURN AIR AND OUTSIDE AIR TO MAINTAIN A SUPPLY AIR TEMPERATURE OF 55 DEGREES F. THE ECONOMIZER SHALL HAVE A MAXIMUM OUTSIDE AIR INTAKE OF 5,000 CFM. IN UNOCCUPIED MODE THE OUTSIDE AIR DAMPER SHALL BE FULLY CLOSED. THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED AND RETURN AIR DAMPER OPEN DURING OPTIMIZED START.

DEMAND CONTROLLED VENTILATION - THE AIR HANDLING UNIT SHALL UTILIZE A CO2 BASED DEMAND CONTROLLED VENTILATION WITH VENTILATION RESET. THE B.A.S. SHALL CALCULATE THE AMOUNT OF VENTILATION (V₀₁) REQUIRED TO SATISFY THE CRITICAL ZONE BASED ON ASHRAE STANDARD 62.1 CALCULATIONS. THE BUILDING AUTOMATION SYSTEM SHALL MONITOR THE PRIMARY AIRFLOW FOR EACH VAV BOX AND TOTAL THE PRIMARY AIRFLOW (V_{p2}) AND REQUIRED OUTDOOR AIRFLOW (V_{o2}) TO DETERMINE THE HIGHEST OUTDOOR AIR FRACTION (Z_{o2}) REQUIRED. THE B.A.S. SHALL THEN CALCULATE THE SYSTEM VENTILATION EFFICIENCY (E_{v2}) AND THE REQUIRED CORRECTED OUTDOOR AIR INTAKE FLOW (V_{o1}). FOR ZONES WITH CO2 SENSORS, THE ZONE CO2 CONCENTRATION SHALL DETERMINE THE REQUIRED AMOUNT OF OUTDOOR AIR REQUIRED FOR THAT ZONE BASED ON A CO2 SETPOINT. AS ZONE CO2 CONCENTRATION CHANGES, OR AS ZONE VENTILATION EFFICIENCY CHANGES, THE CORRECTED OUTDOOR AIR AMOUNT SHALL BE RESET TO MEET THE REQUIRED VENTILATION FOR THE CRITICAL ZONE. WHEN THE UNIT IS IN ECONOMIZER MODE, DEMAND CONTROL VENTILATION SHALL BE DISABLED.

ECONOMIZER - AN ECONOMIZER SHALL MODULATE THE DAMPERS BASED ON DIFFERENTIAL ENTHALPY OF THE RETURN AIR AND THE OUTSIDE AIR TO MAINTAIN A SUPPLY AIR TEMPERATURE 55 DEGREES F. THE ECONOMIZER SHALL HAVE FAULT AND DETECTION DIAGNOSTICS (FDD). THE FDD SHALL ALARM IF IS AIR TEMPERATURE SENSOR FAILURE, NO ECONOMIZER WHEN ENABLED, ECONOMIZING WHEN DISABLED, DAMPERS NOT MODULATING AND EXCESS OUTDOOR AIR. THE FDD SHALL ALARM WITH ANY OF THE FOLLOWING FAULTS:

- AIR TEMPERATURE SENSOR FAILURE/FAULT
- NOT ECONOMIZING WHEN THE UNIT SHOULD BE ECONOMIZING
- ECONOMIZING WHEN THE UNIT SHOULD NOT BE ECONOMIZING
- DAMPER NOT MODULATING
- EXCESS OUTDOOR AIR

COOLING MODE - THE COOLING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN A SUPPLY AIR TEMPERATURE OF 55 DEGREES F WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 60 DEGREES F. THE AHU SHALL BEGIN A MORNING COOL-DOWN AT LEAST ONE HOUR BEFORE OCCUPIED MODE.

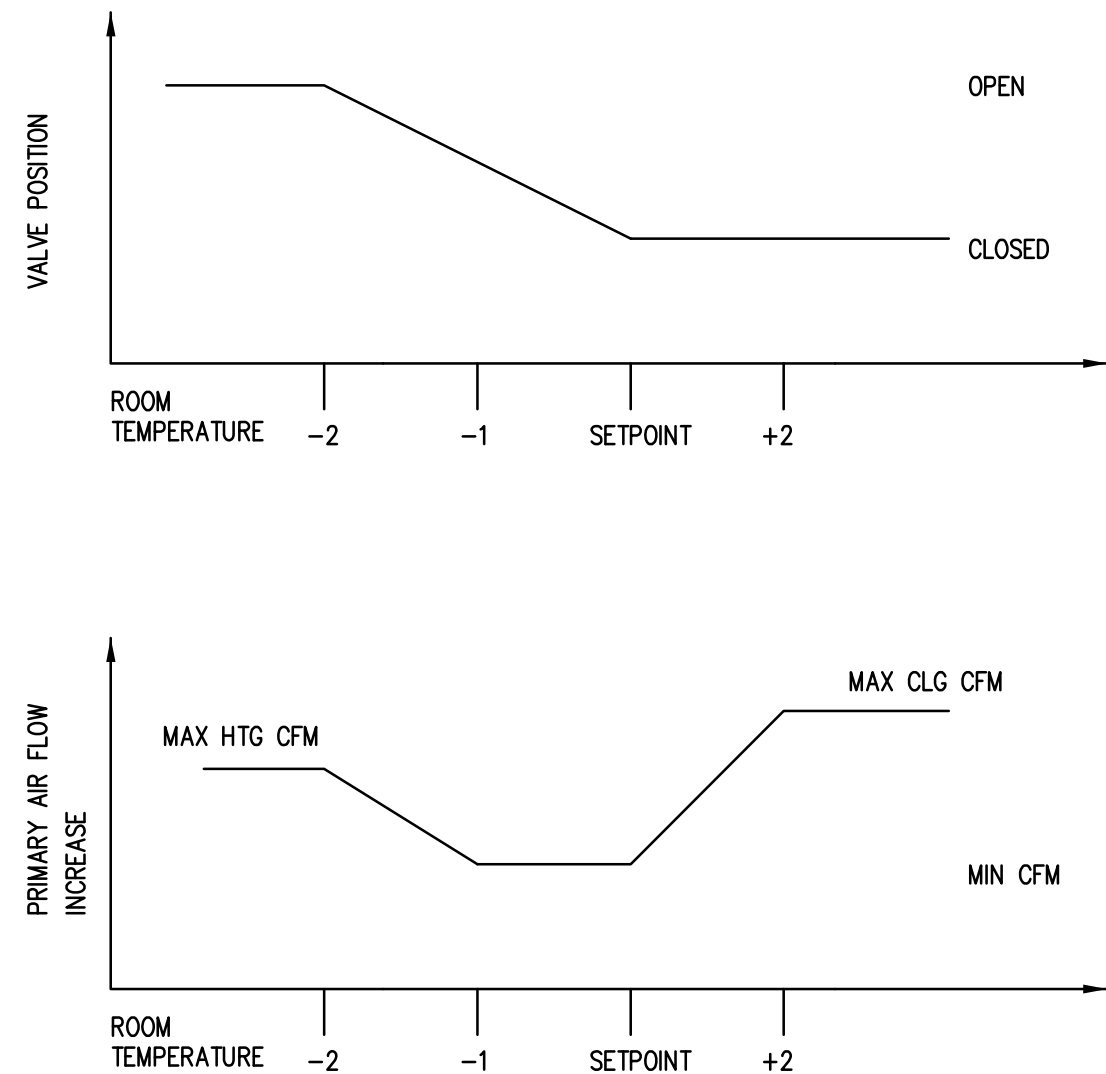
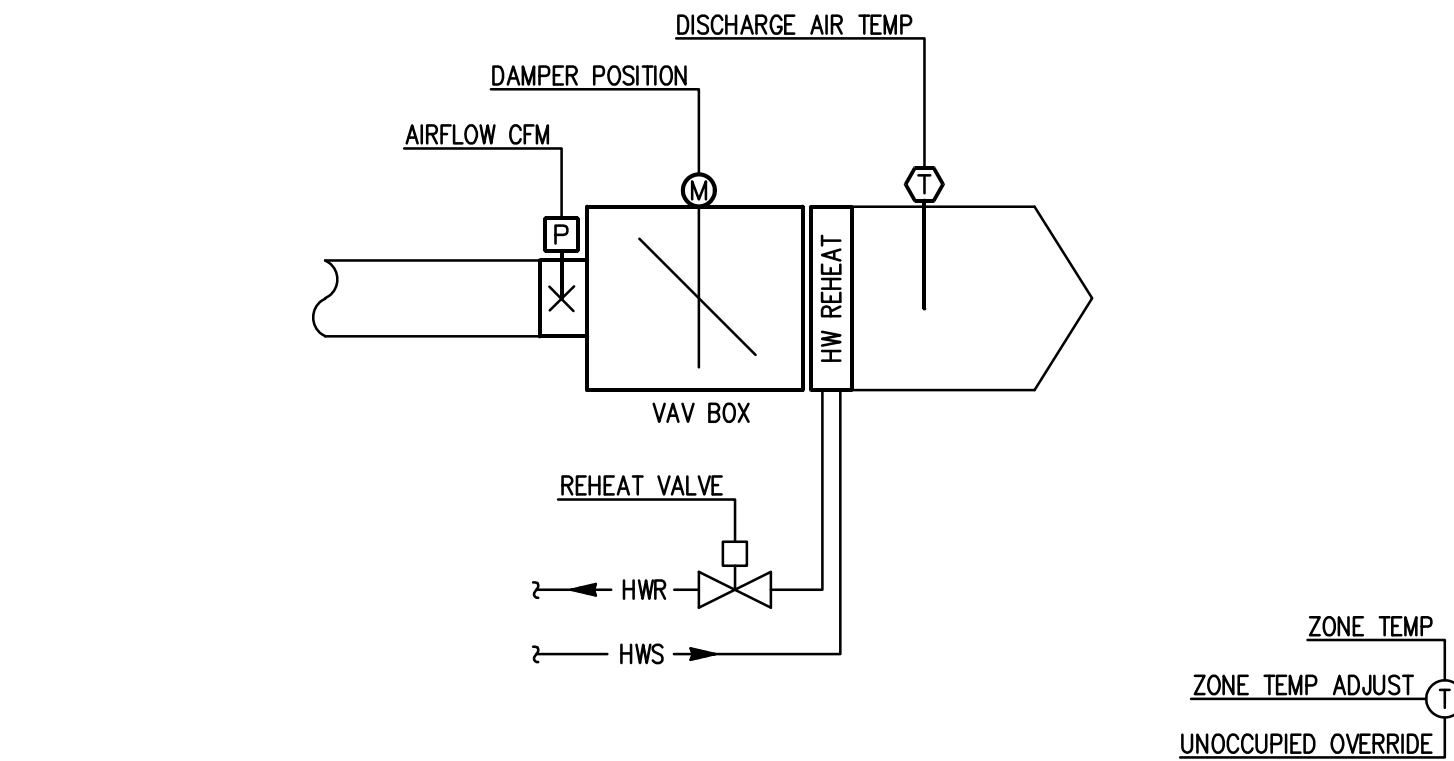
HEATING MODE - THE HOT WATER COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE TEMPERATURE SETPOINT OF 65 DEGREES F WHEN IN THE OCCUPIED MODE. THE AHU SHALL BEGIN A MORNING WARM-UP AT LEAST ONE HOUR BEFORE OCCUPIED MODE. AFTER SPACE TEMPERATURE REACHES 70 DEGREES F IN ALL ZONES THE AHU SHALL OPERATE IN OCCUPIED MODE.

HWP-1, PUMP CONTROL - THE PUMP SHALL RUN CONTINUOUSLY WHEN THE OUTSIDE AIR IS BELOW 40 DEG F. ABOVE 40 DEG F OUTSIDE AIR TO THE PUMP SHALL BE OFF.

OPTIMIZED START - THE AHU SHALL BEGIN A MORNING WARM-UP/COOL DOWN BEFORE OCCUPIED MODE AS CALCULATED BY THE BAS FOR THE SPACE TO BE AT OCCUPIED TEMPERATURE SETPOINT AT THE START OF THE OCCUPIED MODE. AFTER SPACE TEMPERATURE REACHES THE OCCUPIED SETPOINT THE AHU SHALL OPERATE IN OCCUPIED MODE.

THE EXHAUST AIR DAMPER SHALL OPEN AND THE EXHAUST FAN SHALL BE ENERGIZED WHEN THE AIR HANDLING UNIT IS IN ECONOMIZER MODE. THE EXHAUST FAN ECM MOTOR SHALL MODULATE TO MAINTAIN A CORRIDOR POSITIVE PRESSURE OF 0.05 IN WG (ADJ) IN THE CORRIDOR IN RELATION TO OUTDOORS.

VARIABLE AIR VOLUME BOX CONTROL SCHEMATIC



MODULATE PRIMARY VALVE FULLY OPEN WHEN ROOM AIR TEMPERATURE IS 2 DEGREES ABOVE SETPOINT.
MODULATE PRIMARY AIR VALVE AND HEATING VALVE AS REQUIRED TO MAINTAIN 95 DEGREES F DISCHARGE AIR TEMPERATURE.

SEQUENCE OF OPERATIONS

PRESSURE INDEPENDENT AIR TERMINAL SHALL MAINTAIN ZONE TEMPERATURE HEAT/COOL SETPOINTS OF 72/75 DEGREES F (ADJ) AND UNOCCUPIED COOL/HEAT SETPOINTS OF 80/65 DEGREES F. ALL SETPOINTS SHALL BE ADJUSTABLE.

OCCUPIED MODE:
COOLING - THE TERMINAL UNIT DAMPER SHALL MODULATE TO MAINTAIN THE ZONE COOLING TEMPERATURE SETPOINT BY MODULATING SUPPLY AIR FLOW. WHEN THE ZONE TEMPERATURE IS ABOVE SETPOINT THE DAMPER SHALL MODULATE TO THE MAXIMUM COOLING CFM POSITION. WHEN THE ZONE TEMPERATURE IS BELOW SETPOINT THE DAMPER SHALL MODULATE TO THE MINIMUM CFM POSITION.

HEATING - WHEN THE TERMINAL UNIT DAMPER HAS REACHED THE MINIMUM CFM POSITION AND THE ZONE TEMPERATURE IS BELOW SETPOINT THE VALVE SHALL MODULATE OPEN TO PROVIDE A DISCHARGE AIR TEMPERATURE OF 95 DEGREES F. IF THE ZONE CONTINUES TO REMAIN BELOW SETPOINT THE TERMINAL UNIT DAMPER SHALL MODULATE OPEN TO THE HEATING CFM MAXIMUM CFM. THE VALVE SHALL MODULATE IN UNISON WITH THE DAMPER TO MAINTAIN A 95° F DISCHARGE AIR TEMPERATURE. AS THE ZONE TEMPERATURE INCREASES THE DAMPER AND VALVE SHALL REACT IN A REVERSE MANNER.

UNOCCUPIED MODE:
THE TERMINAL UNIT DAMPER AND REHEAT SHALL OPERATE AS DESCRIBED ABOVE WHEN THE ASSOCIATED AIR HANDLING UNIT IS ENERGIZED. THE UNIT SHALL OPERATE TO MAINTAIN THE UNOCCUPIED HEATING/COOLING SETPOINTS.

ZONE THERMOSTAT SHALL HAVE PLUS/MINUS 2° F TEMPERATURE SETPOINT ADJUSTMENT OF THE SETPOINT SET AT THE BAS AND TIMED UNOCCUPIED OVERRIDE BUTTON.

POINTS LIST

VARIABLE AIR VOLUME BOX	HARDWARE				SOFTWARE			
	AI	AO	BI	BO	SCHED	TREND	ALARM	GRAPHIC
DISCHARGE AIR TEMPERATURE	X					X		
ZONE AIR TEMPERATURE		X				X		
ZONE TEMPERATURE ADJUSTMENT	X					X		
HEATING SETPOINT		X						
COOLING SETPOINT		X						
DAMPER POSITION		X						
AIRFLOW CFM	X					X		
MINIMUM AIRFLOW SETPOINT		X						
MAXIMUM COOLING AIRFLOW SETPOINT		X						
MAXIMUM HEATING AIRFLOW SETPOINT		X						
ZONE HIGH TEMPERATURE ALARM			X				X	
ZONE LOW TEMPERATURE ALARM			X				X	
REHEAT COIL 2-WAY VALVE		X				X		
UNOCCUPIED MODE OVERRIDE			X					

BUILDING S HVAC UNIT REPLACEMENT

JOLIET JUNIOR COLLEGE
1215 HOUBOLT ROAD
JOLIET, ILLINOIS 60431

ISSUED

JOB NO. 18-292-1195
DRAWN BWG
CHECKED DDW
APPROVED DDW

SHEET TITLE

TEMPERATURE CONTROLS

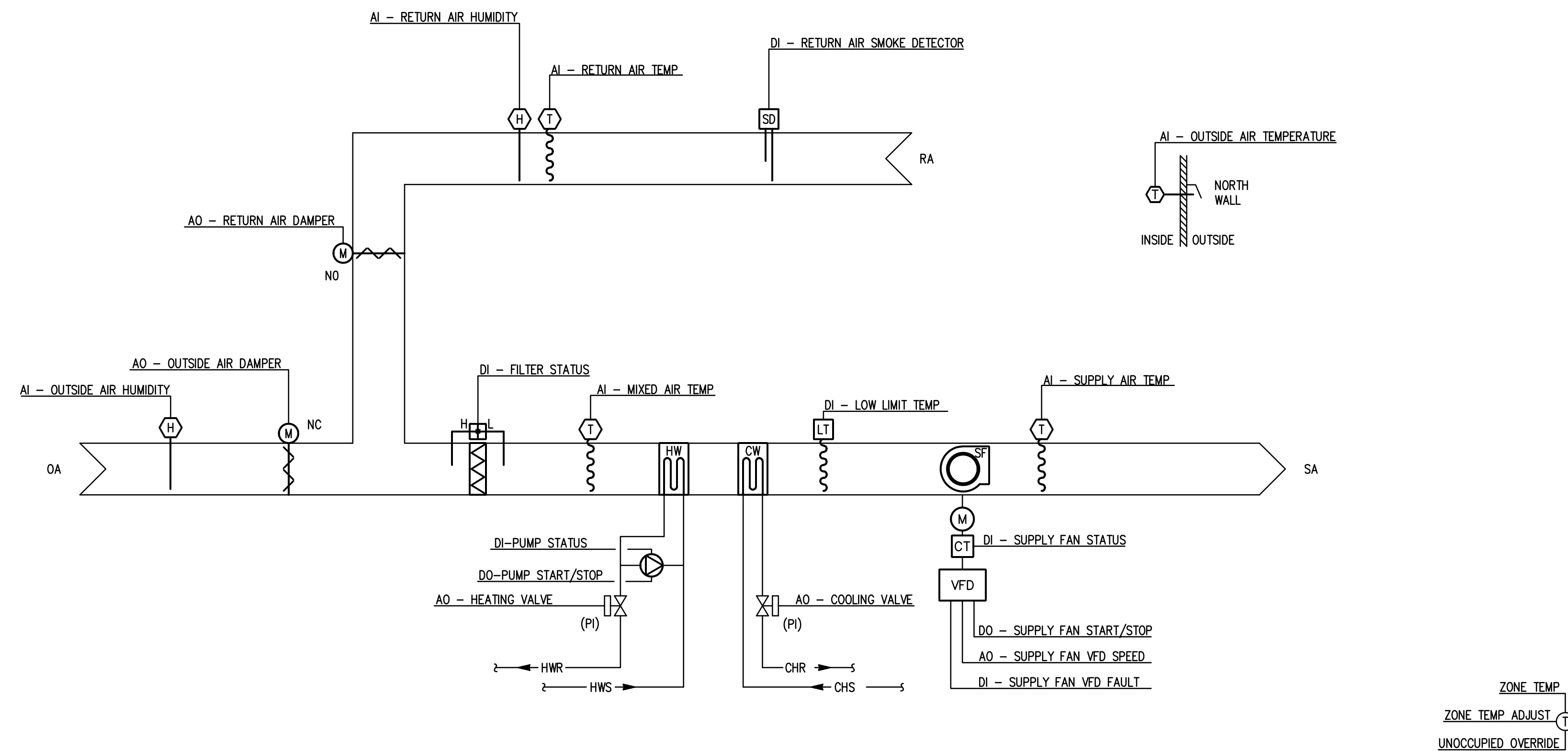
SHEET NUMBER

M411

Kluber, Inc.
Barrington, Illinois 60015
Tel. 847.406.2113
Gurnee, Illinois 60031
Tel. 847.236.3428
www.kluberinc.com

Kluber
Architects + Engineers

ALTERNATE NO. 1: AHU-17 TEMPERATURE CONTROL SCHEMATIC



NOTES:

- COMPONENTS AND INTERCONNECTIONS SHOWN ARE SCHEMATIC ONLY.
- CONTRACTOR IS RESPONSIBLE FOR PROVIDING COMPONENTS, SENSORS, RELAYS, ETC, TO ENSURE A COMPLETE OPERATING SYSTEM.
- SMOKE DETECTORS ARE TO BE SUPPLIED AND INSTALLED BY THE ELECTRICAL CONTRACTOR.

POINTS LIST

AIR HANDLING UNIT (AHU-17)	HARDWARE				SOFTWARE		
	AI	AO	DI	DO	SCHED	TREND	ALARM
OCCUPIED/UNOCCUPIED MODE			X		X		X
SUPPLY FAN START/STOP				X	X		
SUPPLY FAN STATUS			X				X
SUPPLY FAN VFD SPEED		X				X	X
SUPPLY FAN VFD FAULT			X				X
OUTSIDE AIR TEMPERATURE	X					X	X
SUPPLY AIR TEMPERATURE	X					X	X
RETURN AIR TEMPERATURE	X					X	X
MIXED AIR TEMPERATURE	X					X	X
OUTSIDE AIR HUMIDITY	X					X	X
RETURN AIR HUMIDITY	X					X	X
ZONE TEMPERATURE	X					X	X
ZONE TEMPERATURE SETPOINT	X					X	X
LOW LIMIT TEMPERATURE			X				X
OUTSIDE AIR DAMPER		X				X	X
RETURN AIR DAMPER		X				X	X
EXHAUST AIR DAMPER		X				X	X
HOT WATER COIL CONTROL VALVE		X				X	X
CHILLED WATER COIL CONTROL VALVE		X				X	X
FILTER STATUS			X				X
RETURN AIR SMOKE DETECTOR STATUS			X				X
PUMP STATUS			X				X
PUMP START/STOP				X			X
ECONOMIZER STATUS			X				X

NOTES:

- HEATING CONTROL VALVE SHALL HAVE SPRING RETURN ACTUATORS TO FAIL OPEN DURING LOSS OF POWER.
- OUTSIDE AIR DAMPERS SHALL HAVE SPRING RETURN ACTUATORS TO FAIL IN CLOSE POSITION DURING LOSS OF POWER.

SEQUENCE OF OPERATIONS

AIR HANDLING UNIT (AHU-17):

THE OCCUPIED/UNOCCUPIED MODE SCHEDULING SHALL BE MADE AT THE BUILDING AUTOMATION SYSTEM. PROVISIONS SHALL BE MADE FOR MANUAL SHUTDOWN OF EQUIPMENT. ALL SETPOINTS SHALL BE ADJUSTABLE. UNOCCUPIED SPACE TEMPERATURE SETPOINTS SHALL BE 80 DEGREES F COOLING AND 65 DEGREES F HEATING.

SUPPLY FAN – DURING THE OCCUPIED MODE THE SUPPLY FAN SHALL RUN CONTINUOUSLY. THE OUTSIDE AIR DAMPERS SHALL MODULATE TO A MINIMUM OUTSIDE AIR SETPOINT. DURING THE UNOCCUPIED MODE, THE SUPPLY FAN WILL CYCLE INTERMITTENTLY TO MAINTAIN A NIGHT SETPOINT. THE OUTSIDE AIR DAMPERS SHALL REMAIN CLOSED. IN HEATING MODE THE VALVE SHALL BE FULLY OPEN.

OA/RA DAMPERS – THE OUTSIDE AIR DAMPERS SHALL OPEN TO A MINIMUM POSITION WHEN THE UNIT IS IN OCCUPIED MODE. AN ECONOMIZER SHALL MODULATE THE DAMPERS BASED ON DIFFERENTIAL ENTHALPY OF THE RETURN AIR AND OUTSIDE AIR TO MAINTAIN A SUPPLY AIR TEMPERATURE OF 55 DEGREES F WHEN IN COOLING MODE. IN UNOCCUPIED MODE THE OUTSIDE AIR DAMPER SHALL BE FULLY CLOSED. THE ECONOMIZER SHALL HAVE FAULT AND DETECTION DIAGNOSTICS (FDD). THE FDD SHALL ALARM IF THERE IS AIR TEMPERATURE SENSOR FAILURE, NO ECONOMIZING WHEN ENABLED, ECONOMIZING WHEN DISABLED, DAMPERS NOT MODULATING AND EXCESS OUTDOOR AIR.

THE AIR HANDLING UNIT SHALL HAVE OPERATE AS SINGLE ZONE VARIABLE AIR UNIT.

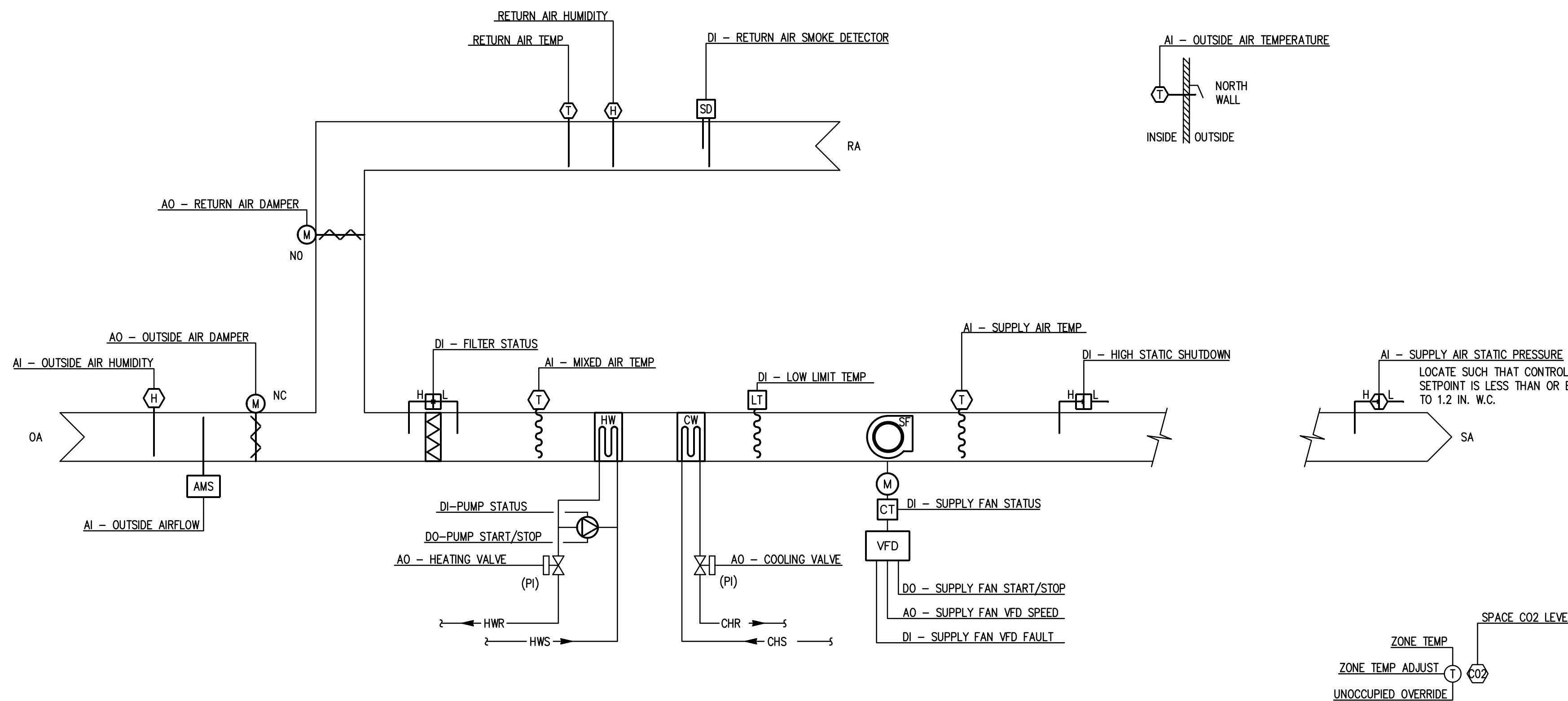
SINGLE ZONE VARIABLE AIR:

- COOLING MODE – DURING THE COOLING MODE OF OPERATION THE SUPPLY FAN SPEED SHALL VARY BETWEEN MINIMUM SPEED AND 100% SPEED AS NEEDED TO MAINTAIN THE SPACE TEMPERATURE. THE COOLING VALVE SHALL MODULATE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT OF 55 DEGREES.
- HEATING MODE – DURING THE HEATING MODE OF OPERATION THE SUPPLY FAN SHALL MODULATE BETWEEN 50% AND 100% AS REQUIRED TO MAINTAIN THE SPACE TEMPERATURE. THE HEATING VALVE SHALL MODULATE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT OF 90 DEGREES.

HWP-1, PUMP CONTROL – THE PUMP SHALL RUN CONTINUOUSLY WHEN THE OUTSIDE AIR IS BELOW 40 DEG F. ABOVE 40 DEG F OUTSIDE AIR THE PUMP SHALL BE OFF.

OPTIMIZED START – THE AHU SHALL BEGIN A MORNING WARM-UP/COOL DOWN BEFORE OCCUPIED MODE AS CALCULATED BY THE BAS. AFTER SPACE TEMPERATURE REACHES THE OCCUPIED SETPOINT THE AHU SHALL OPERATE IN OCCUPIED MODE.

ALTERNATE NO. 1: AHU-18 TEMPERATURE CONTROL SCHEMATIC



NOTES:

- COMPONENTS AND INTERCONNECTIONS SHOWN ARE SCHEMATIC ONLY.
- CONTRACTOR IS RESPONSIBLE FOR PROVIDING COMPONENTS, SENSORS, RELAYS, ETC, TO ENSURE A COMPLETE OPERATING SYSTEM.
- SMOKE DETECTORS ARE TO BE SUPPLIED AND INSTALLED BY THE ELECTRICAL CONTRACTOR.

POINTS LIST

AIR HANDLING UNIT (AHU-18)	HARDWARE				SOFTWARE		
	AI	AO	DI	DO	SCHED	TREND	ALARM
OCCUPIED/UNOCCUPIED MODE			X		X		X
SUPPLY FAN START/STOP				X	X		
SUPPLY FAN STATUS			X				X
SUPPLY FAN VFD SPEED		X				X	X
SUPPLY FAN VFD FAULT			X				X
OUTSIDE AIR TEMPERATURE	X					X	X
SUPPLY AIR TEMPERATURE	X					X	X
RETURN AIR TEMPERATURE	X					X	X
MIXED AIR TEMPERATURE	X					X	X
OUTSIDE AIR HUMIDITY	X					X	X
RETURN AIR HUMIDITY	X					X	X
LOW LIMIT TEMPERATURE			X				X
OUTSIDE AIR DAMPER		X				X	X
RETURN AIR DAMPER		X				X	X
OUTSIDE AIR CFM	X					X	X
RETURN AIR DAMPER	X					X	X
HOT WATER COIL CONTROL VALVE		X				X	X
CHILLED WATER COIL CONTROL VALVE		X				X	X
FILTER STATUS			X				X
RETURN AIR SMOKE DETECTOR STATUS			X				X
PUMP STATUS			X				X
PUMP START/STOP				X			X
ECONOMIZER STATUS			X				X
DUCT STATIC PRESSURE	X					X	X
DUCT STATIC PRESSURE SETPOINT	X					X	X
HIGH STATIC PRESSURE SHUTDOWN			X				X
SPACE CO2 DETECTOR LEVEL	X					X	X
SPACE CO2 LEVEL SETPOINT HIGH / LOW		X					X
OUTSIDE AIR DAMPER POSITION SETPOINT HIGH / LOW		X				X	X

NOTES:

- HEATING CONTROL VALVE SHALL HAVE SPRING RETURN ACTUATORS TO FAIL OPEN DURING LOSS OF POWER.
- OUTSIDE AIR DAMPERS SHALL HAVE SPRING RETURN ACTUATORS TO FAIL IN CLOSE POSITION DURING LOSS OF POWER.

SEQUENCE OF OPERATIONS

AIR HANDLING UNIT (AHU-18):

THE OCCUPIED/UNOCCUPIED MODE SCHEDULING SHALL BE MADE AT THE BUILDING AUTOMATION SYSTEM. PROVISIONS SHALL BE MADE FOR MANUAL SHUTDOWN OF EQUIPMENT. ALL SETPOINTS SHALL BE ADJUSTABLE. UNOCCUPIED SPACE TEMPERATURE SETPOINTS SHALL BE 80 DEGREES F COOLING AND 65 DEGREES F HEATING.

SUPPLY FAN – THE SUPPLY FAN SHALL RUN CONTINUOUSLY DURING OCCUPIED MODE AND INTERMITTENTLY DURING UNOCCUPIED MODE. THE SUPPLY FAN VARIABLE FREQUENCY DRIVE SHALL MODULATE THE SPEED OF THE FAN TO MAINTAIN THE DUCT STATIC PRESSURE SETPOINT. IF AIRFLOW IS NOT DETECTED WITHIN TWO MINUTES AFTER A START COMMAND THE FAN MOTOR SHALL BE DE-ENERGIZED AND AN AUDIBLE ALARM SHALL BE ACTIVATED. IF A HIGH STATIC PRESSURE IS SENSED IN THE SUPPLY AIR THE SUPPLY FAN SHALL BE DE-ENERGIZED AND SIGNAL AN ALARM CONDITION.

STATIC PRESSURE/SUPPLY AIR TEMPERATURE RESET – THE SUPPLY FAN VFDs SHALL MODULATE THE FANS TO MAINTAIN A DUCT STATIC PRESSURE SETPOINT. THE BAS SHALL CONTROL SUPPLY FAN SPEED TO MAINTAIN A CRITICAL STATIC PRESSURE SETPOINT. UPON FAILURE OF COMMUNICATION THE AHUs SHALL OPERATE ON THEIR OWN STATIC PRESSURE CONTROL IN STAND ALONE MODE. THE SETPOINT SHALL RESET TO OPTIMIZE FAN SPEED AS FOLLOWS:

- THE BUILDING AUTOMATION SYSTEM SHALL MONITOR THE DAMPER POSITION OF ALL VAV TERMINAL UNITS AND DETERMINE THE CRITICAL ZONE (CZ), WHICH IS THE VAV TERMINAL UNIT THAT IS WIDEST OPEN.
- WHEN THE CZ IS MORE THAN 95% OPEN, THE SUPPLY FAN DISCHARGE STATIC PRESSURE SETPOINT SHALL BE RESET DOWNWARD 10% OF THE PREVIOUS SETPOINT A FREQUENCY OF 10 MINUTES UNTIL THE CZ IS MORE THAN 97% OPEN OR THE STATIC PRESSURE SETPOINT HAS RESET DOWNWARD TO THE SYSTEM MINIMUM SETTING.
- WHEN THE CZ IS LESS THAN 95% OPEN AND THE STATIC PRESSURE SETPOINT IS AT THE MINIMUM SETTING, THE DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE RESET UPWARD IN INCREMENTS OF 0.5° F AT A FREQUENCY OF 10 MINUTES AND THE STATIC PRESSURE SETPOINT HELD CONSTANT UNTIL THE CZ IS MORE THAN 97% OPEN OR THE DISCHARGE AIR TEMPERATURE IS RESET TO ITS MAXIMUM SETTING OF 10° F (ADJ) ABOVE THE DISCHARGE AIR TEMPERATURE SETPOINT.
- THE REVERSE CONTROL SEQUENCE SHALL OCCUR WHEN THE CZ IS 98% OPEN UNTIL THE DISCHARGE AIR TEMPERATURE AND STATIC TEMPERATURE SETPOINTS ARE A THEIR DESIGN SETPOINT.

SMOKE DETECTORS – UPON DETECTION OF SMOKE THE FANS SHALL BE DE-ENERGIZED, CLOSE OUTSIDE AIR DAMPER, AND SIGNAL ALARM LOCALLY AND AT FIRE ALARM PANEL.

OA/RA DAMPERS – AN AIRFLOW MEASURING STATION/DAMPER SENSOR SHALL MODULATE THE OUTSIDE AIR DAMPERS TO MAINTAIN THE MINIMUM OUTSIDE AIR CFM SETPOINT. AN ECONOMIZER SHALL MODULATE THE DAMPERS BASED ON DIFFERENTIAL ENTHALPY OF THE RETURN AIR AND OUTSIDE AIR TO MAINTAIN A SUPPLY AIR TEMPERATURE OF 55 DEGREES F. THE ECONOMIZER SHALL HAVE A MAXIMUM OUTSIDE AIR INTAKE OF 5,000 CFM. IN UNOCCUPIED MODE THE OUTSIDE AIR DAMPER SHALL BE FULLY CLOSED. THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED AND RETURN AIR DAMPER OPEN DURING OPTIMIZED START.

DEMAND CONTROLLED VENTILATION – THE OUTSIDE AIR DAMPER POSITION IS VARIED BETWEEN THE MINIMUM VENTILATION LEVEL BASED ON THE AREA OUTDOOR AIRFLOW RATE, AND THE MAXIMUM DESIGN VENTILATION LEVEL BASED ON THE AREA AND PEOPLE OUTDOOR AIRFLOW RATE. THE ZONE CO2 CONCENTRATION SHALL BE MONITORED BY CO2 SENSORS LOCATED IN THE SPACE. IN OCCUPIED MODE IF ALL OF THE SPACE CO2 SENSORS READ A CO2 CONCENTRATION LEVEL BELOW THE SPACE CO2 MINIMUM SETPOINT OF 800 PPM (ADJ), THEN THE OUTSIDE AIR DAMPER SHALL OPEN TO THE MINIMUM OA DAMPER POSITION SETPOINT. THE MINIMUM DAMPER POSITION SHALL BE MAINTAINED AS LONG AS THE SPACE CO2 LEVELS REMAIN BELOW THE SETPOINT. IF ANY OF THE SPACE CO2 SENSORS READ A CO2 CONCENTRATION ABOVE THE MINIMUM SPACE CO2 SETPOINT, THE OUTSIDE AIR DAMPERS SHALL MODULATE TO ALLOW MORE VENTILATION AIR IN. AS THE SPACE CO2 LEVEL APPROACHES THE MAXIMUM SPACE CO2 SETPOINT OF 1000 PPM (ADJ), THE OUTSIDE AIR DAMPER POSITION WILL REACH THE MAXIMUM OA DAMPER POSITION SETPOINT. THE DAMPER POSITION SHALL BE MODULATED IN A DIRECTLY PROPORTIONAL RELATIONSHIP BETWEEN THE CO2 SETPOINT LIMITS AND THEIR CORRESPONDING DAMPER POSITION LIMITS. IN UNOCCUPIED MODE, THE OUTSIDE AIR DAMPERS SHALL BE FULLY CLOSED.

ECONOMIZER – AN ECONOMIZER SHALL MODULATE THE DAMPERS BASED ON DIFFERENTIAL ENTHALPY OF THE RETURN AIR AND OUTSIDE AIR TO MAINTAIN A SUPPLY AIR TEMPERATURE 55 DEGREES F. THE ECONOMIZER SHALL HAVE FAULT AND DETECTION DIAGNOSTICS (FDD). THE FDD SHALL ALARM IF IS AIR TEMPERATURE SENSOR FAILURE, NO ECONOMIZING WHEN ENABLED, ECONOMIZING WHEN DISABLED, DAMPERS NOT MODULATING AND EXCESS OUTDOOR AIR. THE FDD SHALL ALARM WITH ANY OF THE FOLLOWING FAULTS:

- AIR TEMPERATURE SENSOR FAILURE/FAULT
- NOT ECONOMIZING WHEN THE UNIT SHOULD BE ECONOMIZING
- ECONOMIZING WHEN THE UNIT SHOULD NOT BE ECONOMIZING
- DAMPER NOT MODULATING
- EXCESS OUTDOOR AIR

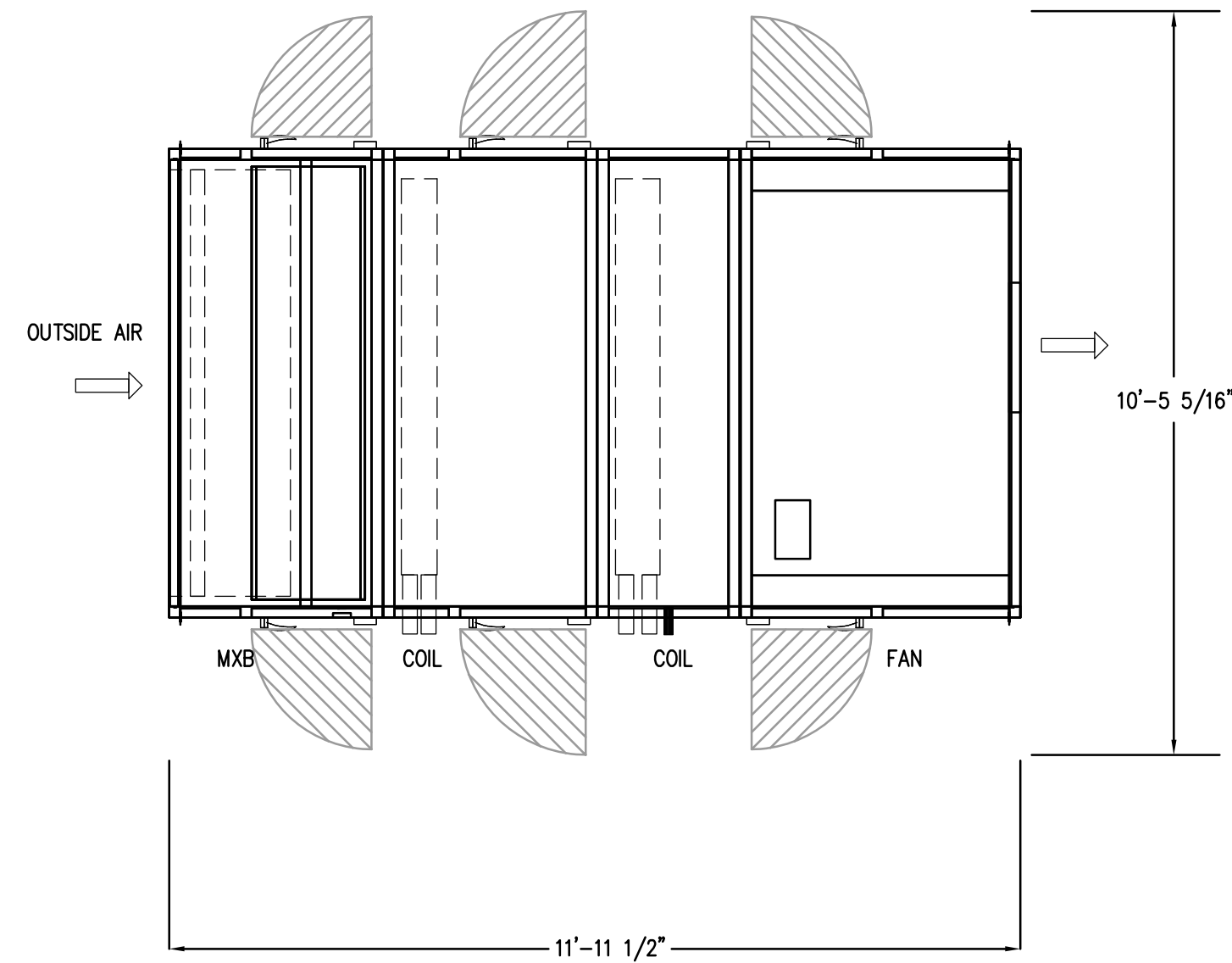
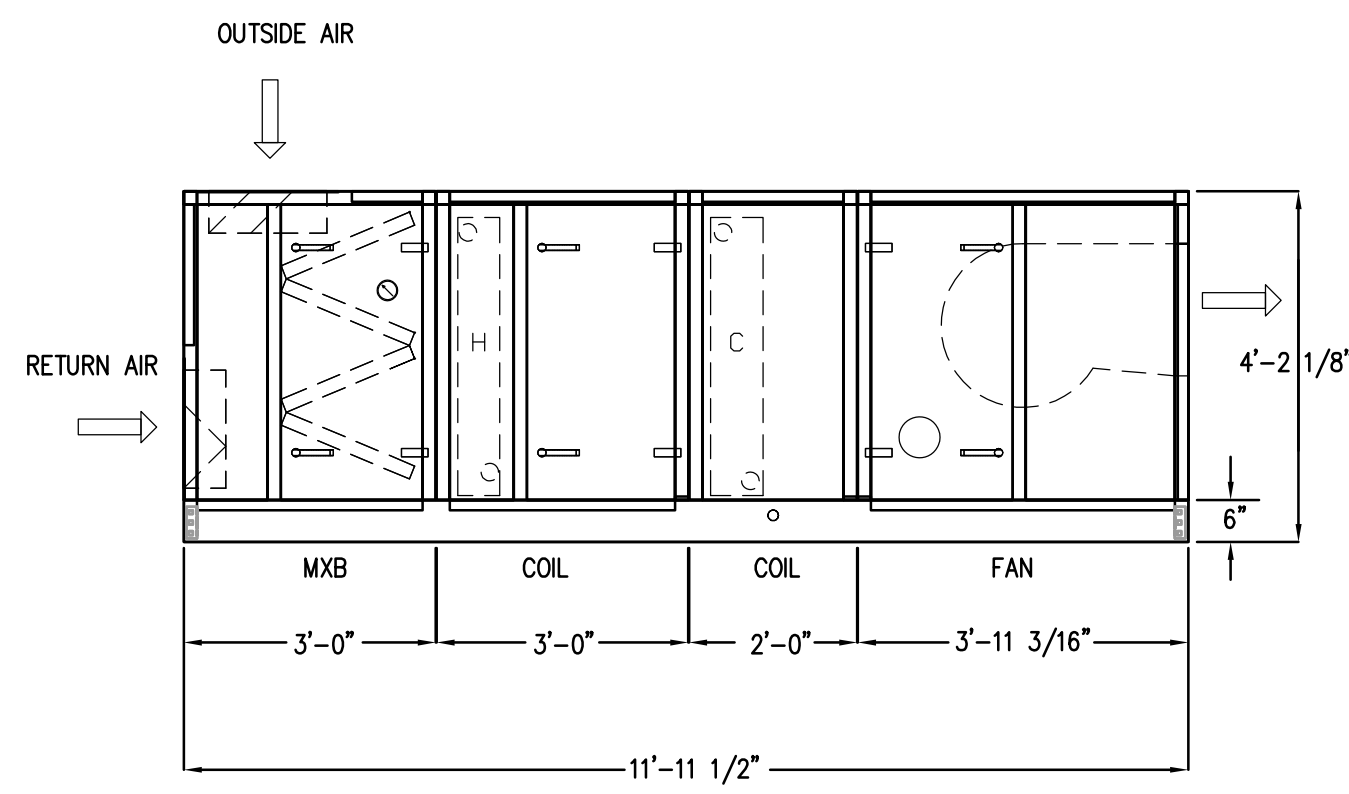
COOLING MODE – THE COOLING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN A SUPPLY AIR TEMPERATURE OF 55 DEGREES F. WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 60 DEGREES F, THE AHU SHALL BEGIN A MORNING COOL-DOWN AT LEAST ONE HOUR BEFORE OCCUPIED MODE.

HWP-1, PUMP CONTROL – THE PUMP SHALL RUN CONTINUOUSLY WHEN THE OUTSIDE AIR IS BELOW 40 DEG F. ABOVE 40 DEG F OUTSIDE AIR TO THE PUMP SHALL BE OFF.

OPTIMIZED START – THE AHU SHALL BEGIN A MORNING WARM-UP/COOL DOWN BEFORE OCCUPIED MODE AS CALCULATED BY THE BAS FOR THE SPACE TO BE AT OCCUPIED TEMPERATURE SETPOINT AT THE START OF THE OCCUPIED MODE. AFTER SPACE TEMPERATURE REACHES THE OCCUPIED SETPOINT THE AHU SHALL OPERATE IN OCCUPIED MODE.

SIDE VIEW

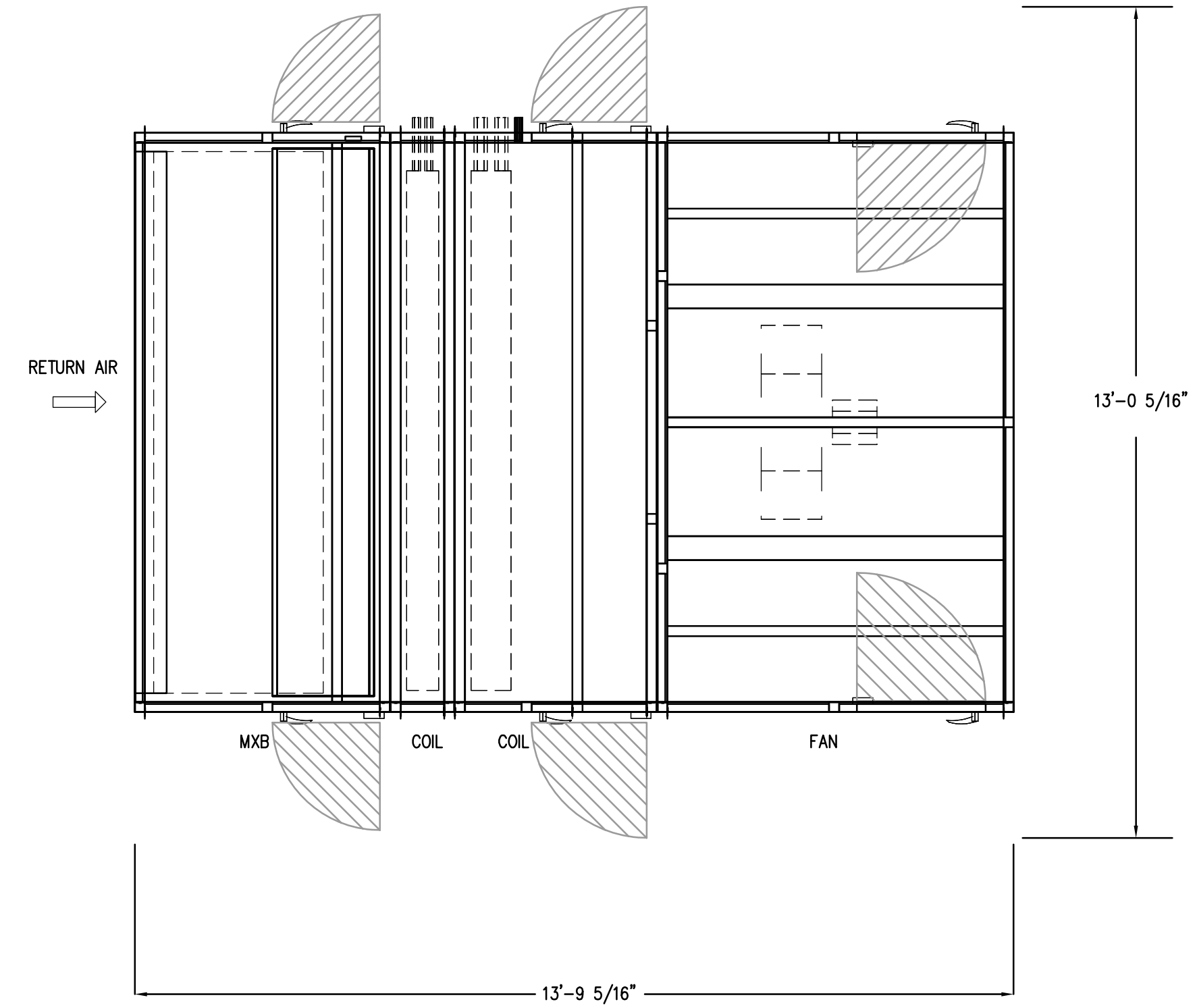
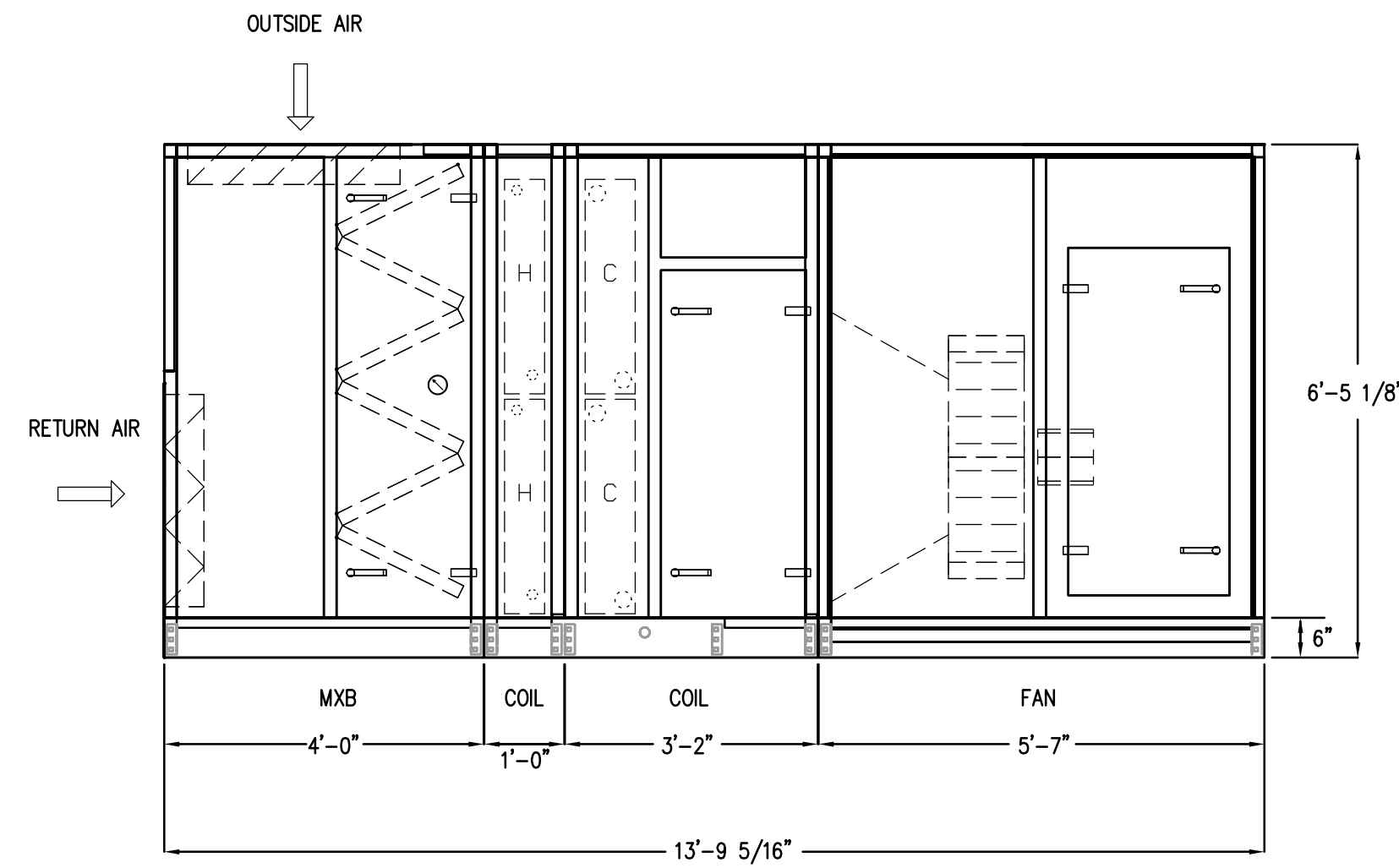
PLAN VIEW



ALTERNATE NO. 1: AIR HANDLING UNIT (AHU-17) DETAIL
SCALE: NTS **3**

SIDE VIEW

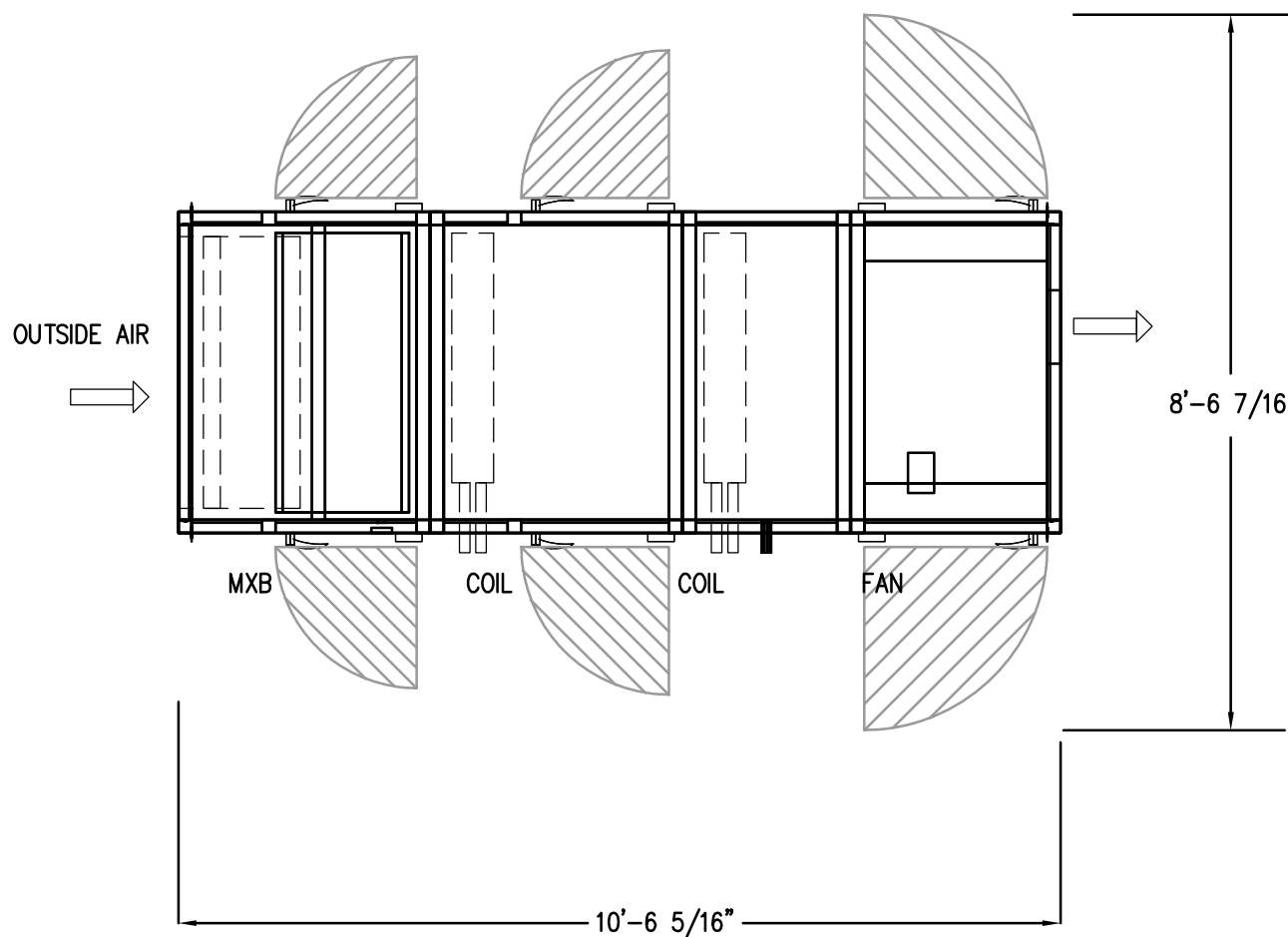
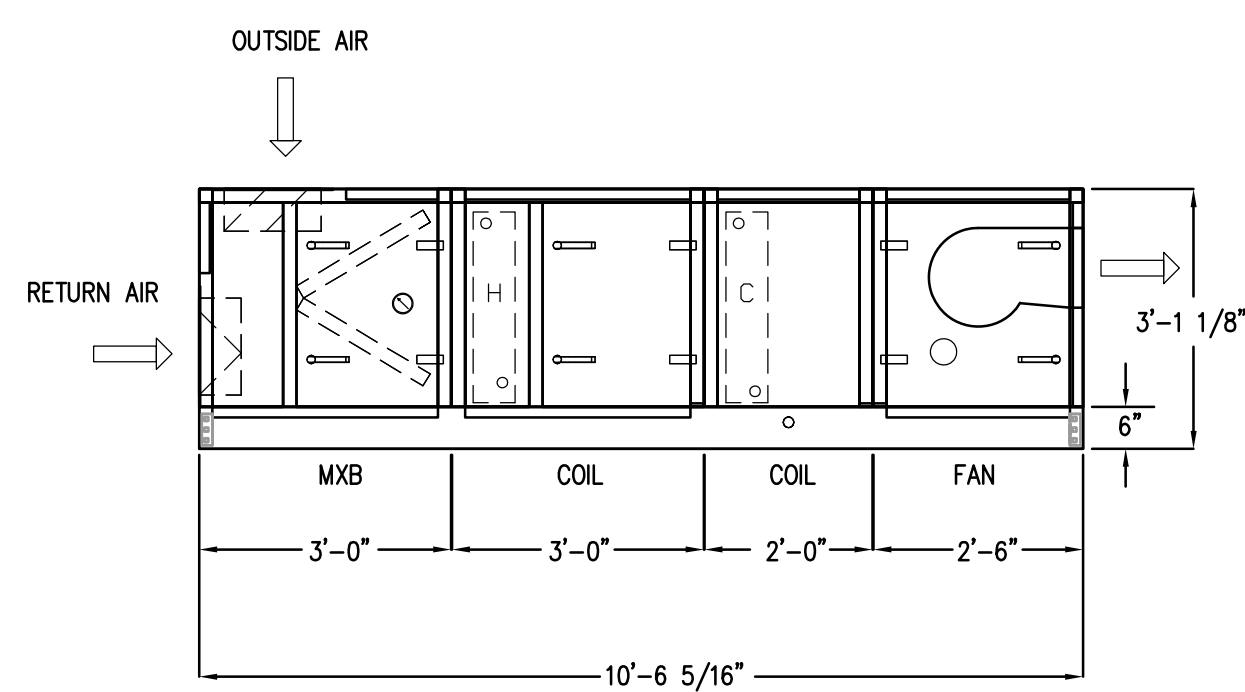
PLAN VIEW



AIR HANDLING UNIT (AHU-20) DETAIL
SCALE: NTS **1**

SIDE VIEW

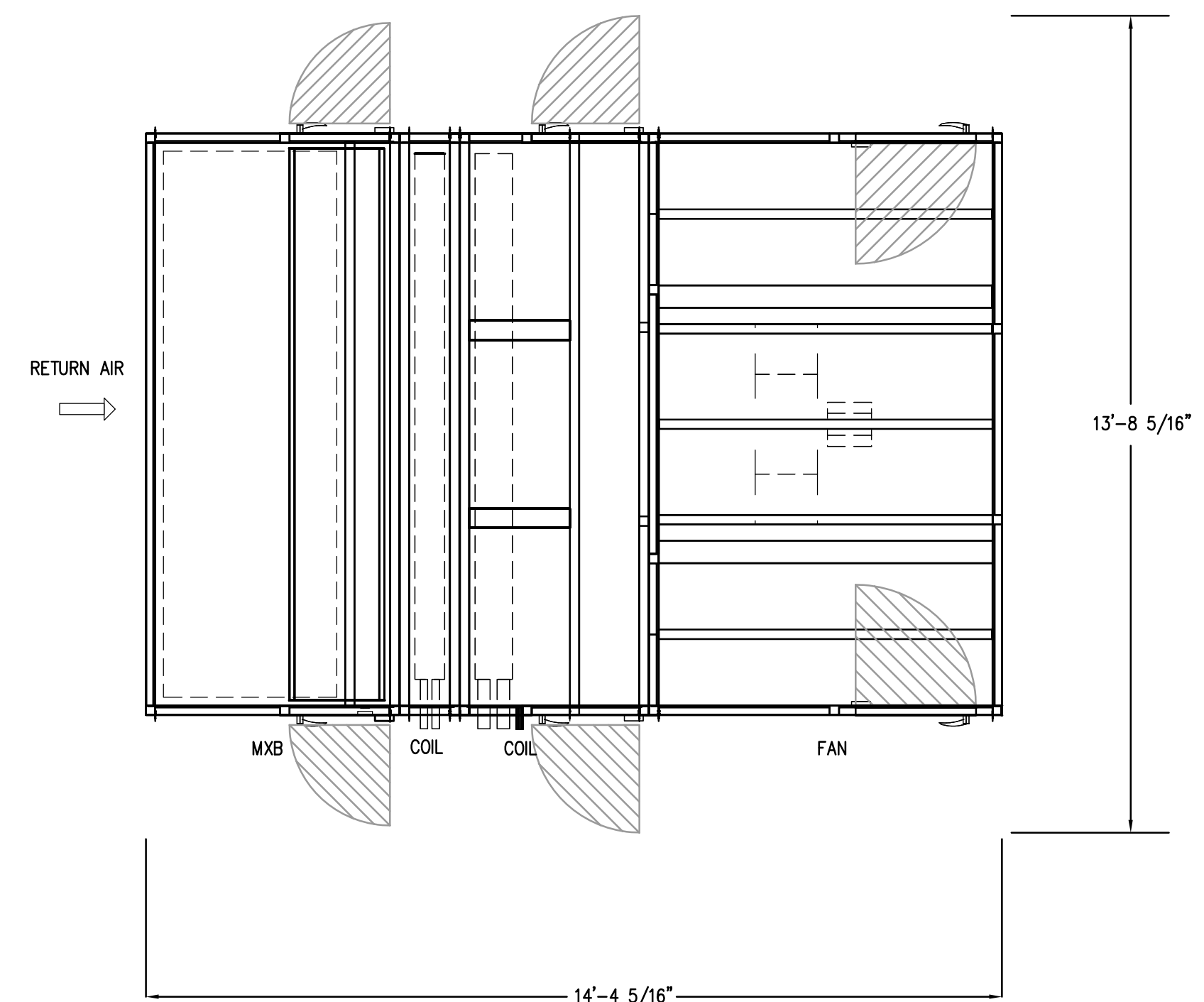
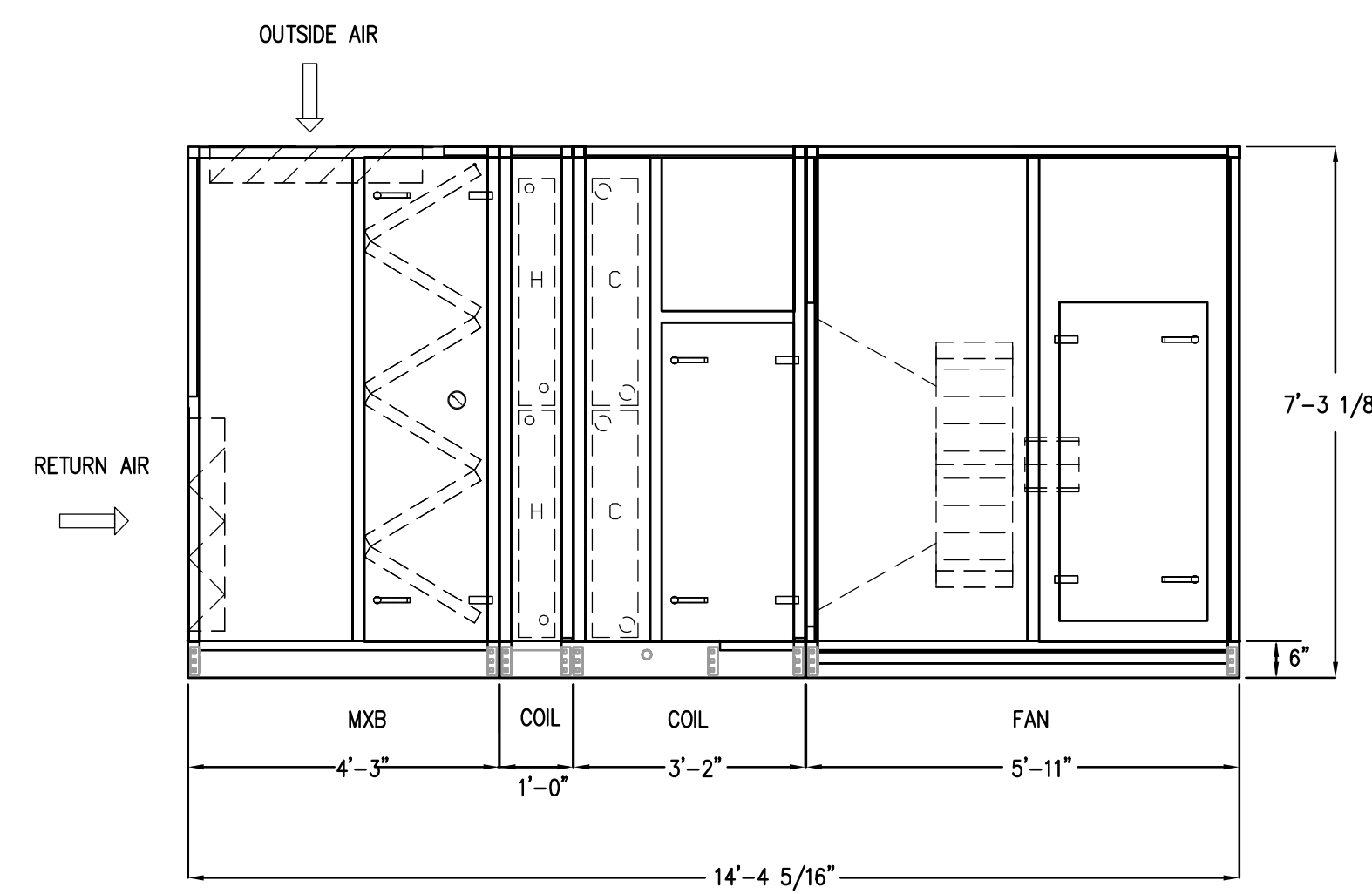
PLAN VIEW



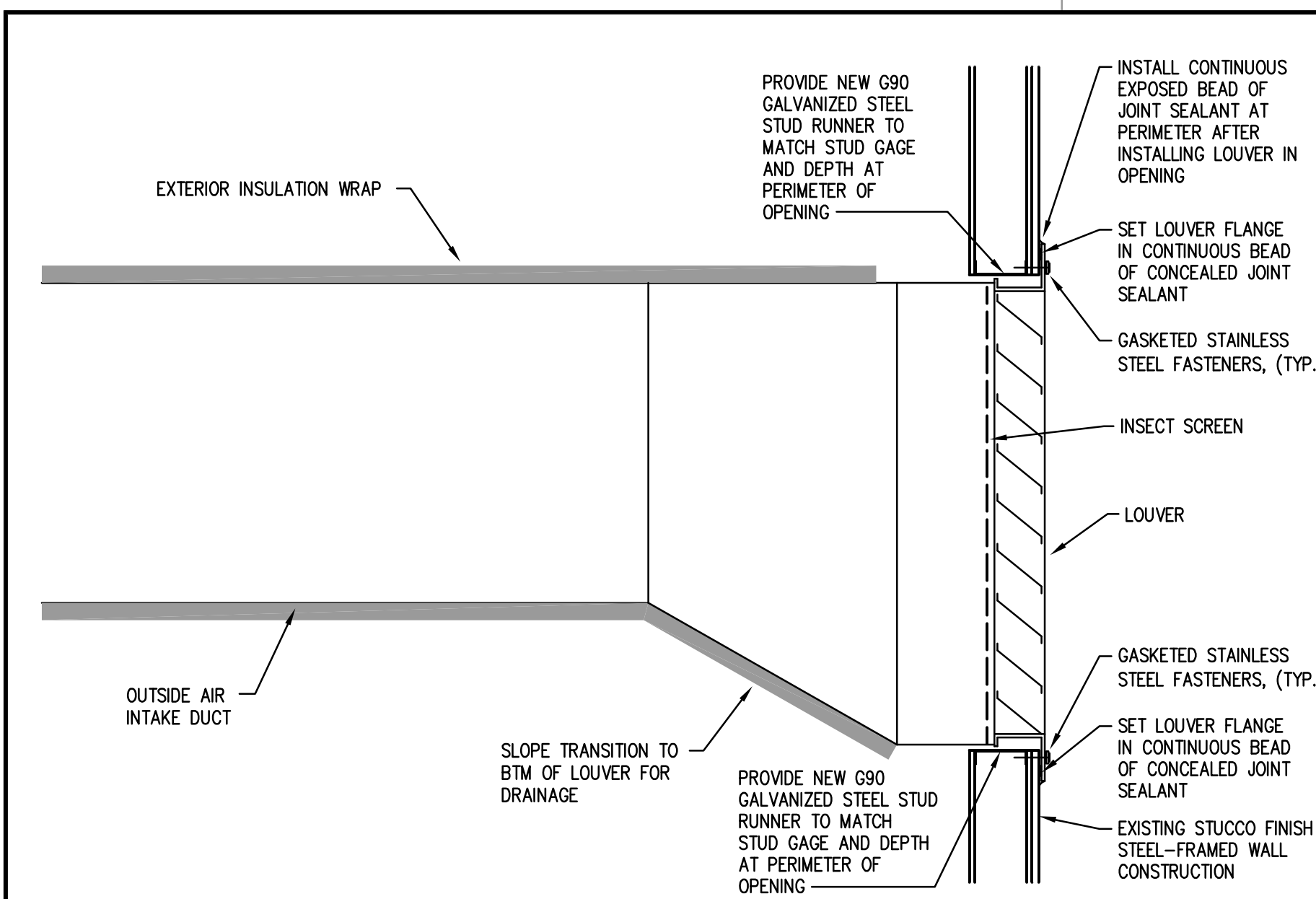
ALTERNATE NO. 1: AIR HANDLING UNIT (AHU-18) DETAIL
SCALE: NTS **4**

SIDE VIEW

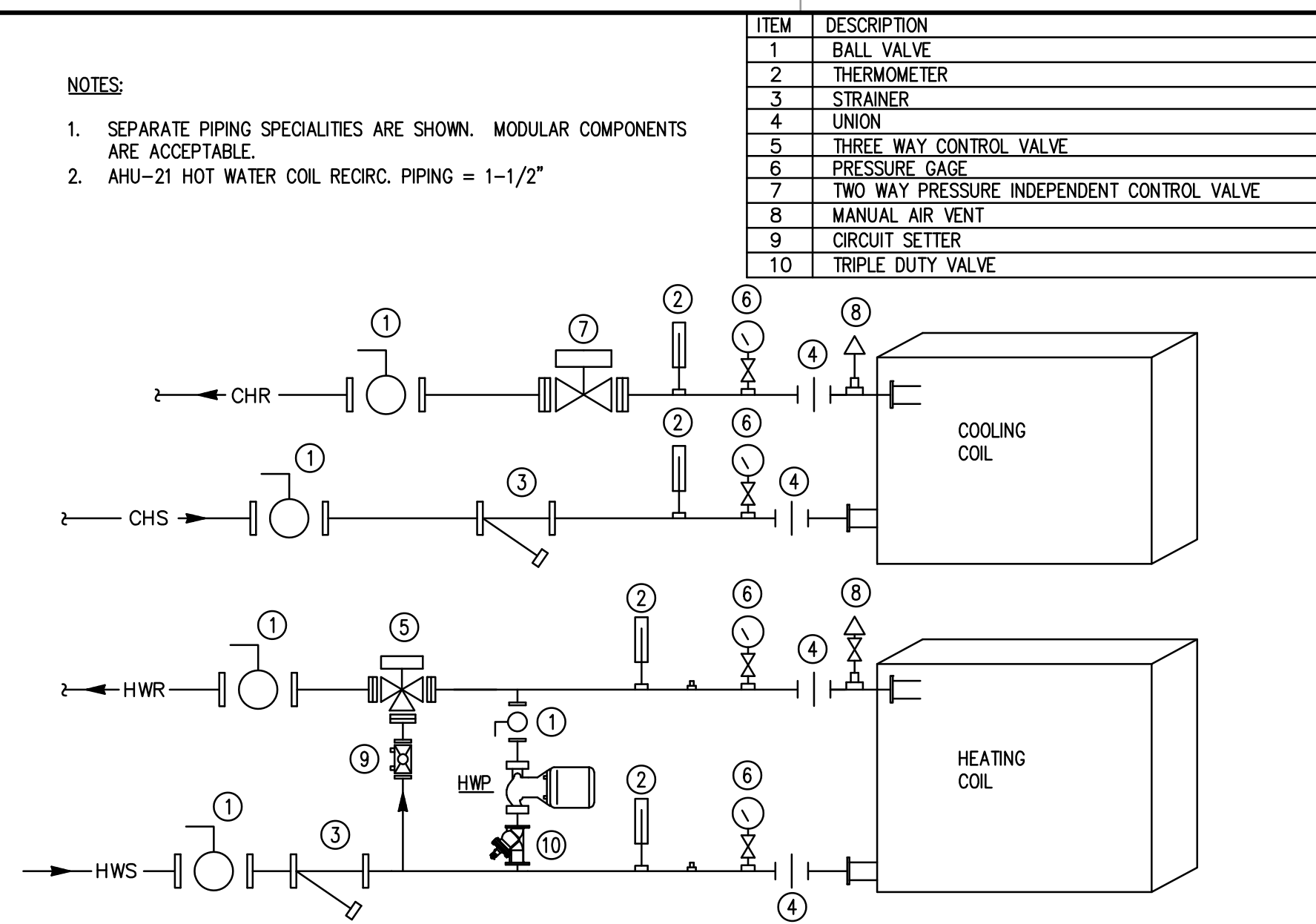
PLAN VIEW



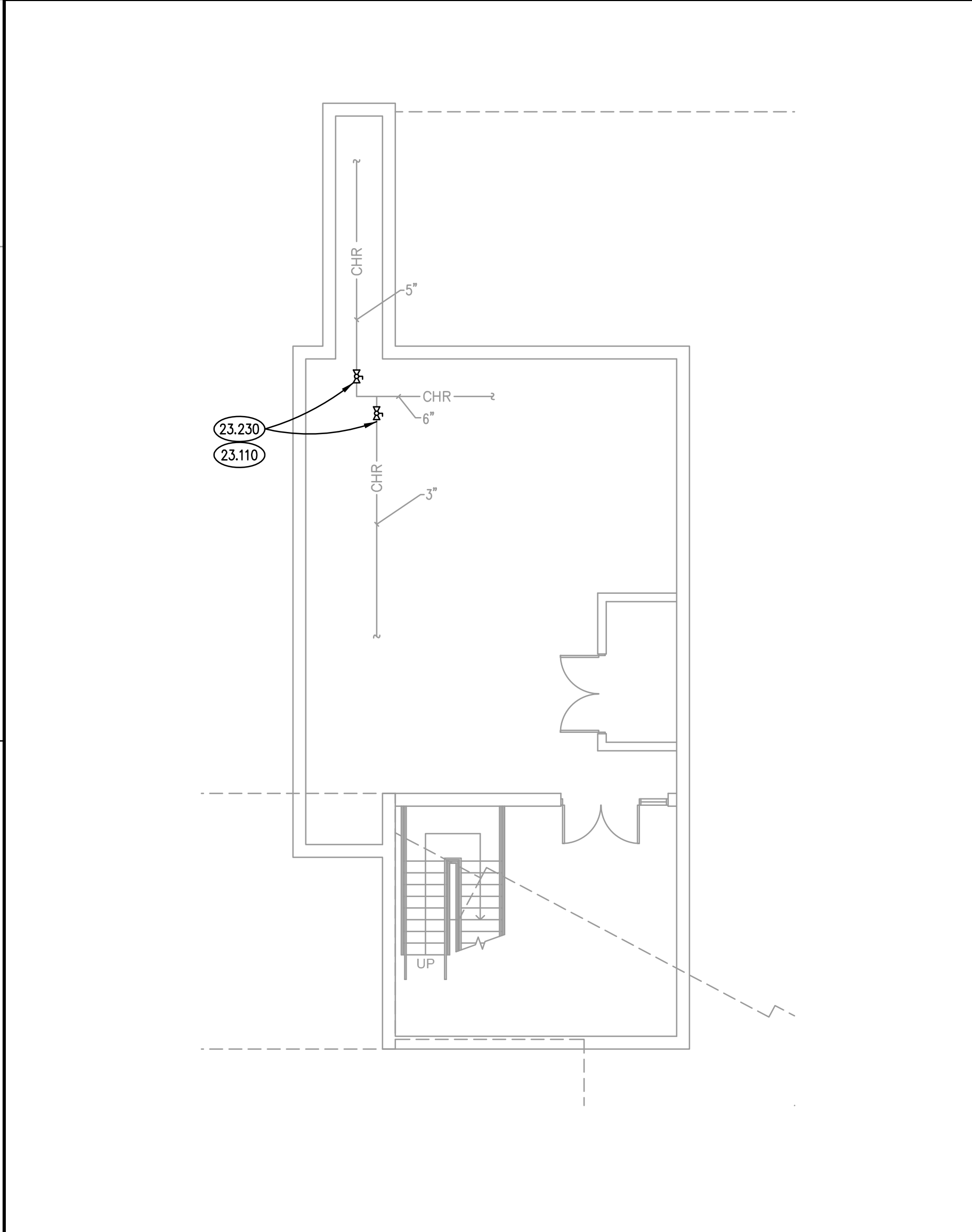
AIR HANDLING UNIT (AHU-21) DETAIL
SCALE: NTS **2**



WALL LOUVER IN STUD WALL DETAIL
SCALE: NTS



AHU-21 COIL PIPING DETAIL
SCALE: NTS

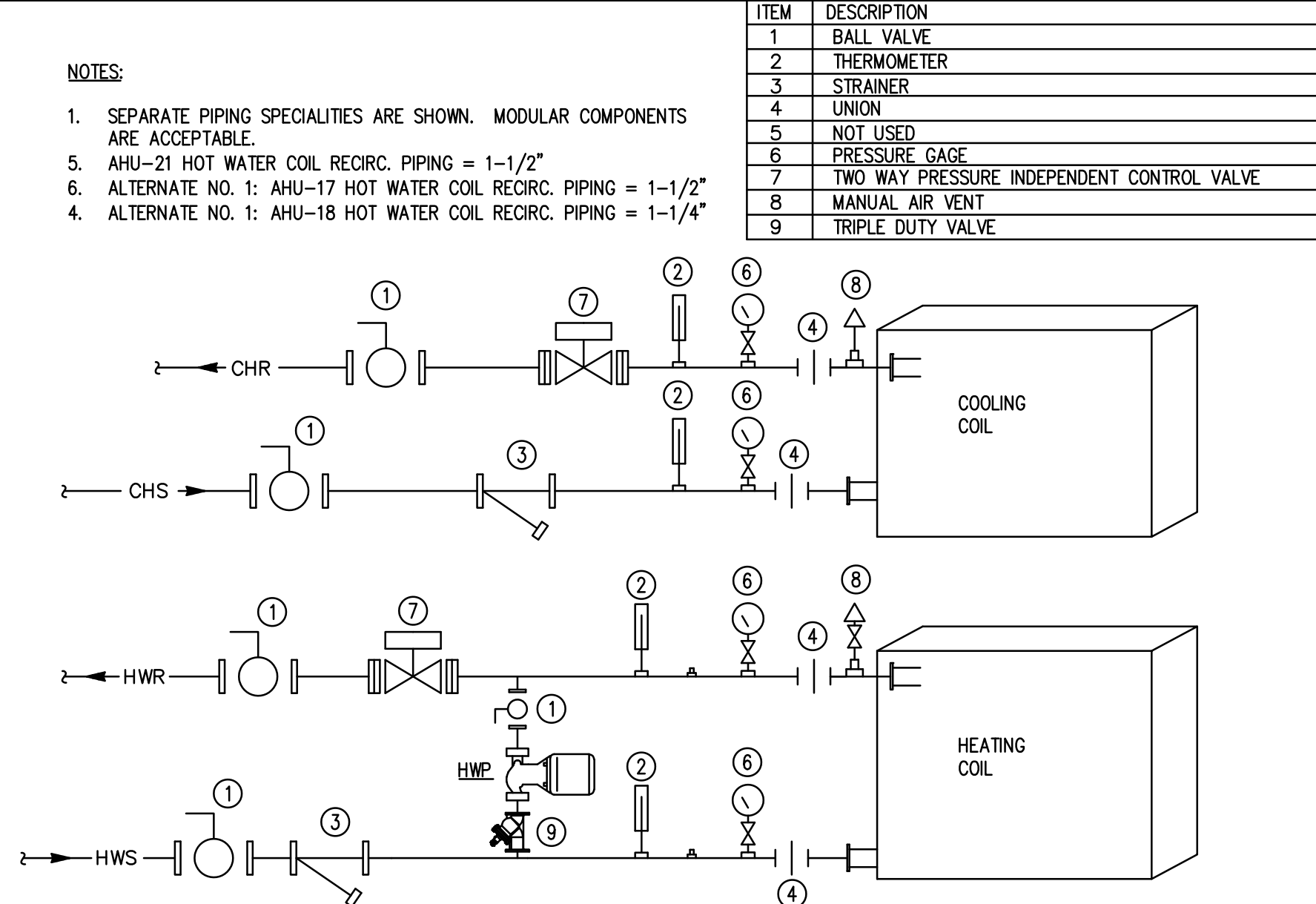


KEYNOTES:

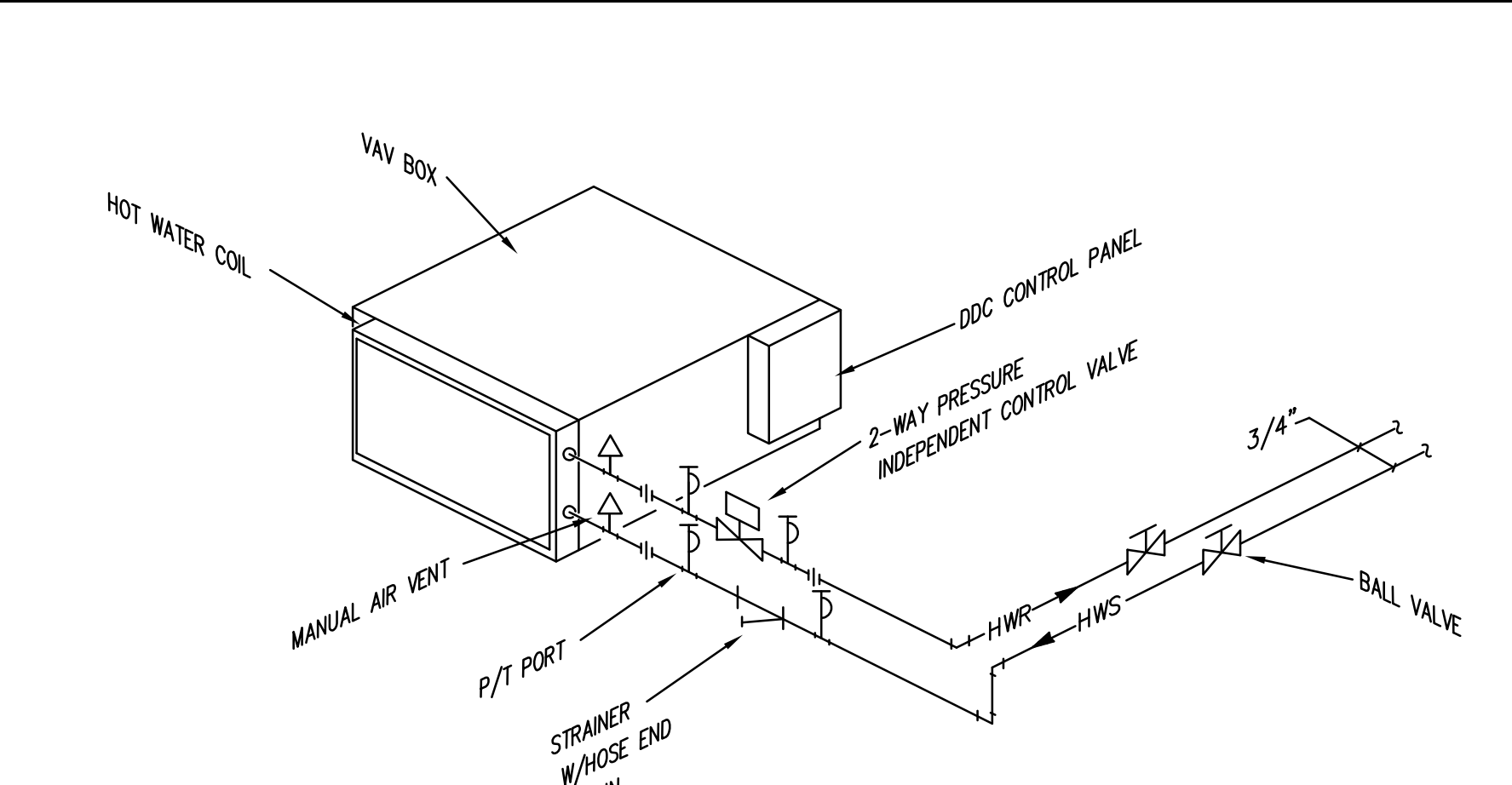
23.110 COORDINATE WITH OWNER FOR DRAINING PIPES. OWNER TO DRAIN AND FILL CHILLED WATER AND HEATING WATER PIPING

23.230 PROVIDE ALL MATERIALS AND LABOR TO INSTALL NEW ISOLATION VALVES ON EXISTING CHILLED WATER RETURN PIPING.

SUBSTATION A NEW WORK PLAN
SCALE: NTS

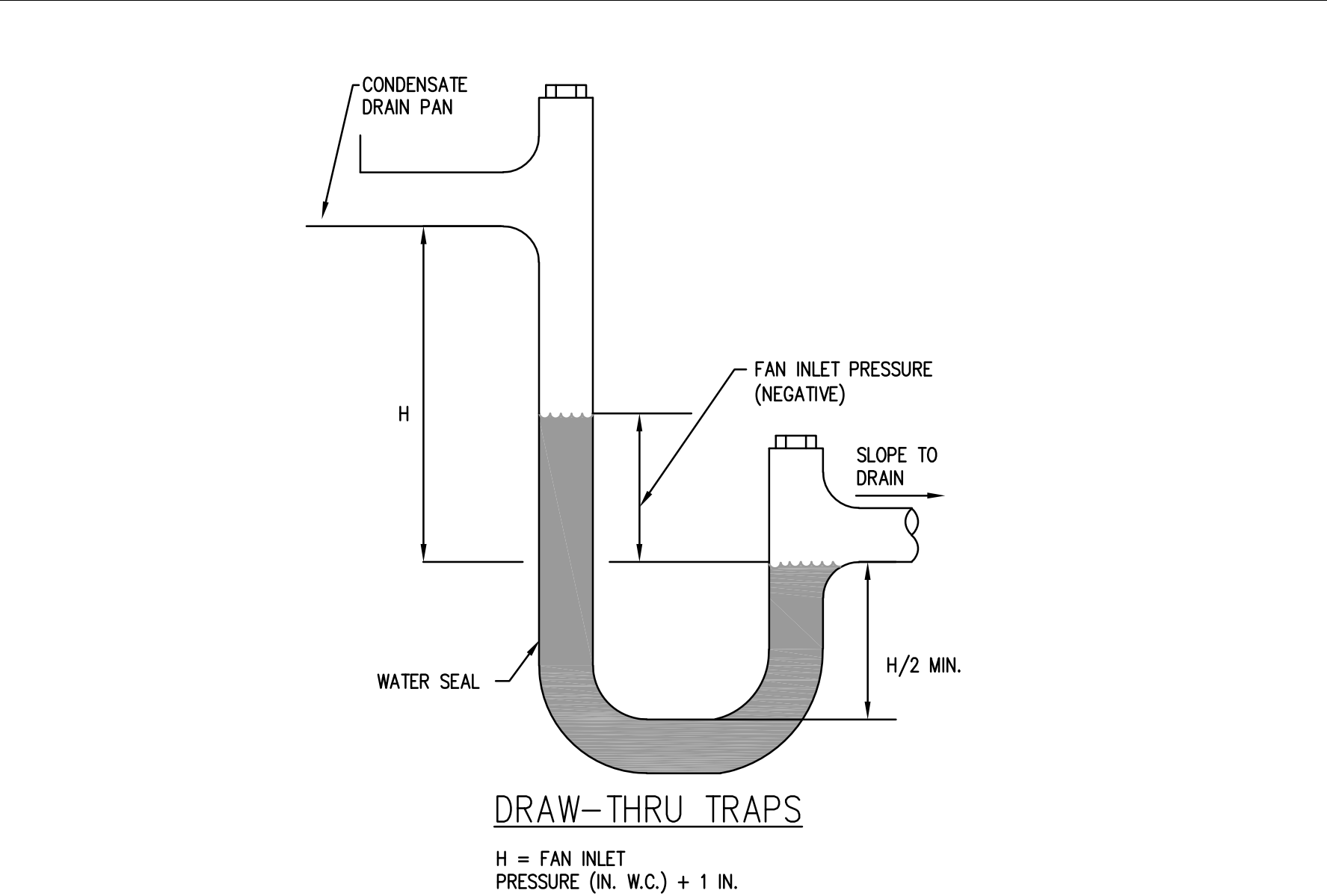


AHU-17, AHU-18 & AHU-20 COIL PIPING DETAIL
SCALE: NTS



NOTES:
1. PIPING TO ALL REHEAT COILS SHALL BE MINIMUM 3/4" UNLESS OTHERWISE NOTED.
2. SEPARATE PIPING SPECIALTIES ARE SHOWN. MODULAR COMPONENTS ARE ACCEPTABLE.

REHEAT COIL PIPING DETAIL
SCALE: NTS



COOLING COIL CONDENSATE TRAP DETAILS
SCALE: NTS

AIR HANDLING UNIT SCHEDULE

MARK	AIR FLOW (CFM)	MINIMUM OA (CFM)	ENT AIR TEMP (db / wb °F)	LVG AIR TEMP (db / wb °F)	EWI / LWT (°F)	SENS CAP (MBH)	TOTAL CAP (MBH)	WATER FLOW RATE (GPM)	WATER PRESS DROP (FT)	TOTAL CAP (MBH)	EWI / LWT (°F)	EAT / LAT (°F)	WATER FLOW RATE (GPM)	WATER PRESS DROP (FT)	SUPPLY FAN (HP)	EXTERNAL STATIC PRESS (IN WG)	ELECTRICAL VPHHZ	MCA	MODEL	NOTES
AHU-20	21,225	3,500	78.3 / 65.5	54.7 / 54.7	45.0 / 54.3	527.0	678.8	160.0	10.3	651.5	180 / 160	48 / 85	66.7	7.7	20	1.5	460/3/60	33.8	39MN-40W	1, 2, 3
AHU-21	24,970	5,100	79.1 / 66.2	54.2 / 54.2	45.0 / 54.4	651.2	875.4	204.0	12.9	816.9	180 / 160	45 / 83	63.6	9.3	25	1.5	460/3/60	42.5	39MN-50W	1, 2, 4
AHU-17	7,750	1,500	79.0 / 66.0	54.9 / 54.6	45.0 / 55.0	198.6	260.1	57.0	8.5	388.3	180 / 160	50 / 94.4	40	6.1	7.5	0.75	460/3/60	12.1	39MN-17W	1, 2, 5
AHU-18	2,070	1,000	81.4 / 68.5	54.6 / 54.5	45.0 / 55.0	58.7	87.1	19.0	9.3	163.5	180 / 160	0.0 / 63.6	17	2.5	2.0	1.5	460/3/60	3.6	39MN-06W	1, 2, 5

1. MODEL BASED ON CARRIER.
2. COOLING COIL BASED ON 30% EG.
3. HEATING CFM = 15,920.
4. HEATING CFM = 18,970.
5. ALTERNATE NO. 1.

VARIABLE AIR VOLUME BOX SCHEDULE

MARK	AIR FLOW (CFM)	MIN AIR FLOW (CFM)	INLET SIZE (IN)	AIR FLOW (CFM)	MAX APD (IN WG)	EAT / LAT (°F)	WATER (GPM)	EWI/LWT (°F)	MAX WPD (FT)	ROWS / FPI	CAPACITY (MBH)	MODEL	AREA SERVED	NOTES
VAV-20A	1000	750	10	750	0.28	55 / 95	1.8	180 / 143	0.22	2 / 10	32.5	DES	-	1
VAV-20B	1280	425	12	960	0.25	55 / 95	1.9	180 / 134	0.28	2 / 10	41.5	DES	-	1
VAV-20C	3205	1050	24/20	2400	0.48	55 / 94	4.5	180 / 134	2.6	2 / 8	100.9	DOCV	-	1
VAV-20D	1450	485	12	1090	0.31	55 / 95	2.4	180 / 139	0.45	2 / 10	47.3	DES	-	1
VAV-20EF	770	250	10	580	0.18	55 / 95	1.2	180 / 134	0.16	2 / 10	25.2	DES	-	1
VAV-20G1	6760	2250	36/30	5070	0.53	55 / 95	6.0	180 / 106	8.4	2 / 10	219.3	DOCV	-	1
VAV-20G2	6760	2250	36/30	5070	0.53	55 / 95	6.0	180 / 160	8.4	2 / 10	219.3	DOCV	-	1
VAV-21A	1140	380	20/10	855	0.34	55 / 95	2.0	180 / 142	0.4	2 / 8	37.2	DOCV	-	1
VAV-21B	1765	1325	18/15	1325	0.46	55 / 95	3.4	180 / 145	1.0	2 / 8	57.7	DOCV	-	1
VAV-21C	2000	675	14	1500	0.28	55 / 95	3.0	180 / 135	0.39	2 / 10	65.1	DES	-	1
VAV-21D	2000	675	14	1500	0.28	55 / 95	3.0	180 / 135	0.39	2 / 10	65.1	DES	-	1
VAV-21E	960	325	10	720	0.26	55 / 95	1.7	180 / 141	0.21	2 / 10	31.2	DES	-	1
VAV-21F	1100	370	12	825	0.19	55 / 95	1.5	180 / 131	0.24	2 / 10	35.8	DES	-	1
VAV-21G	1100	370	12	825	0.19	55 / 95	1.5	180 / 131	0.24	2 / 10	35.8	DES	-	1
VAV-21H1	1455	485	12	1320	0.31	55 / 95	3.7	180 / 148	1.0	2 / 10	57.3	DES	-	1
VAV-21J1	6810	2270	36/30	5100	0.54	55 / 95	6.0	180 / 106	8.0	2 / 10	219.6	DOCV	-	1
VAV-21J2	6640	2215	50/22	5000	0.51	55 / 95	6.0	180 / 106	7.3	2 / 10	219.1	DOCV	-	1
VAV-18A	990	330	10	500	0.27	55 / 95	1.0	180 / 136	0.12	2 / 10	21.7	DES	-	1, 2
VAV-18B	1080	360	12	800	0.12	55 / 95	1.4	180 / 129.9	0.22	2 / 10	34.7	DES	-	1, 2

NOTES:
1. MODEL BASED ON TITUS.
2. ALTERNATE NO. 1.

FAN SCHEDULE

MARK	AIR FLOW RATE (CFM)	EXTERNAL S.P. (IN WG)	TYPE	MOTOR (HP)	ELECTRICAL (V/PHHZ)	AREA SERVED	LOCATION	MODEL	NOTES
EF-20	15,000	0.75	CENTRIFUGAL	7.5	208/3/60	AHU-20	RW S1020	SQN-B	1, 2, 3
EF-21	17,000	0.75	CENTRIFUGAL	7.5	208/1/60	AHU-21	RW S2008	SQN-B	1, 2, 3

NOTES:
1. MODEL BASED ON COOK.
2. PROVIDE WITH SPACE STATIC PRESSURE SPEED CONTROL.

PUMP SCHEDULE

MARK	WATER FLOW RATE (GPM)	HEAD (FT)	TYPE	MOTOR POWER (HP)	ELECTRICAL (V/PHHZ)	MOTOR SPEED (RPM)	SERVICE	MODEL	NOTES
HWP-20	15	15	INLINE	1/8	115/1/60	2963	AHU-20	ECOCIRC-XL	1
HWP-21	20	15	INLINE	1/8	115/1/60	3086	AHU-21	ECOCIRC-XL	1
HWP-17	15	10	INLINE	1/8	115/1/60	2963	AHU-17	ECOCIRC-XL	1, 2
HWP-18	10	10	INLINE	1/8	115/1/60	2393	AHU-18	ECOCIRC-XL	1, 2

NOTES:
1. MODEL BASED ON BELL & GOSSETT.
2. ALTERNATE NO. 1.

WALL LOUVER SCHEDULE

MARK	AIR FLOW RATE (CFM)	SIZE H x L (IN x IN)	VELOCITY (FPM)	PRESSURE DROP (IN WG)	APPLICATION	SERVED BY	LOCATION	MODEL	NOTES
WL-1	41,000	127 X 84	912	0.1	EXHAUST	-	AG-SHOP	ELF6375DX	1, 2, 3, 4.

NOTES:
1. MODEL BASED ON RUSKIN.
2. PROVIDE INSECT SCREEN.
3. COLOR = WHITE.
4. SERVED BY EF-20, EF-21, AHU-18, AHU-17.

DIFFUSERS, REGISTERS AND GRILLES SCHEDULE

MARK	MODEL	SIZE	NECK	DAMPER	MATERIAL	REMARKS
S-1	300RL	12 / 8	-	OBD	ST	1, 2
S-2	300RL	12 / 10	-	OBD	ST	1, 2
S-3	300RL	18 / 10	-	OBD	ST	1, 2
S-4	300RL	24 / 16	-	OBD	ST	1, 2
R-1	350RL	20 / 20	-	-	ST	1, 2

1. MODEL BASED ON TITUS.
2. ALTERNATE NO. 1.

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BUILDING S HVAC UNIT REPLACEMENT

JOLIET JUNIOR COLLEGE
1215 HOBOLT ROAD
JOLIET, ILLINOIS 60431

ISSUED

12/05/2018 BID DOCUMENTS

JOB NO. 18-292-1195

DRAWN BWG

CHECKED DDW

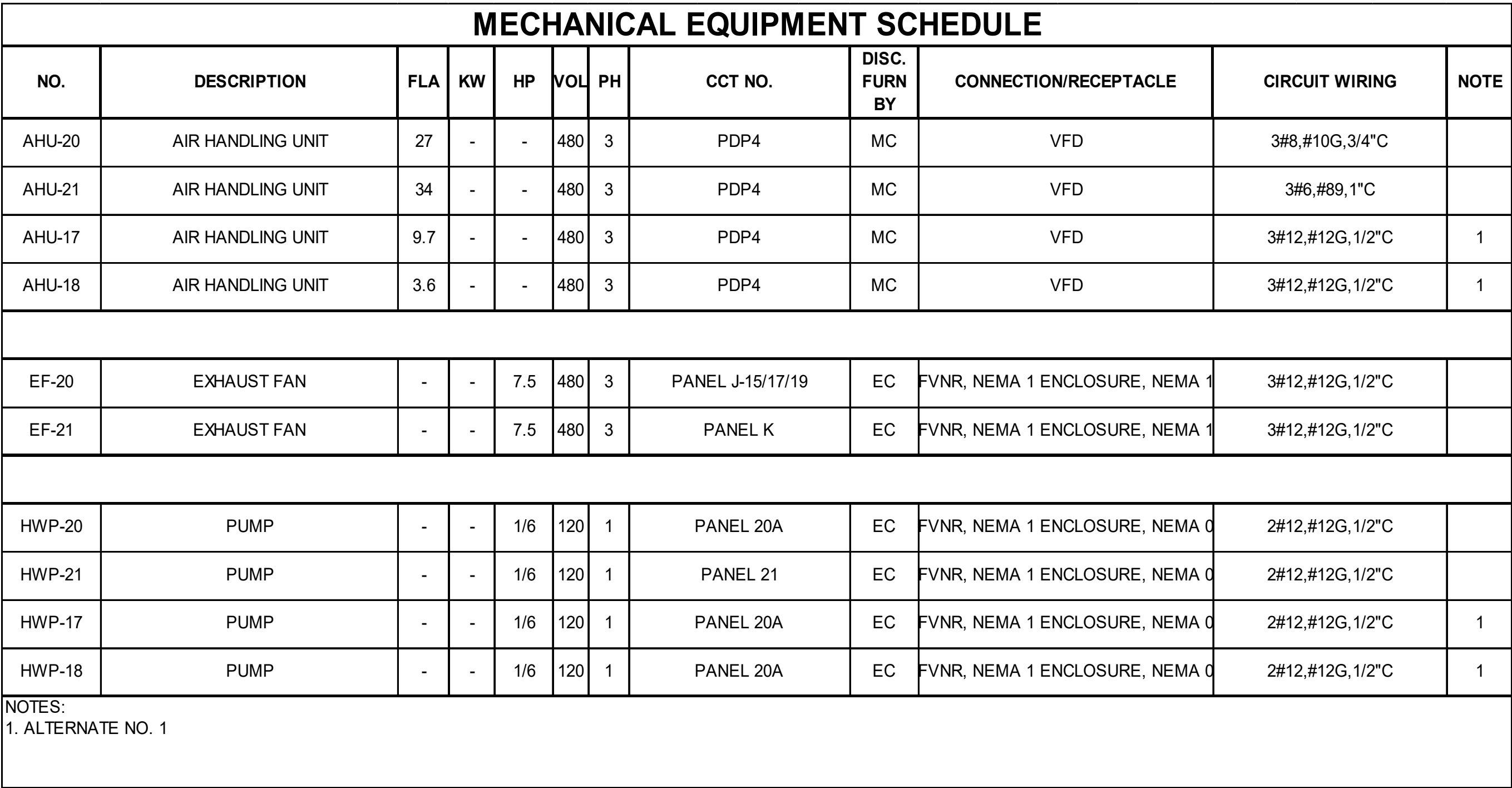
APPROVED DDW

SHEET TITLE

MECHANICAL SCHEDULES AND DETAILS

SHEET NUMBER

M610



MECHANICAL EQUIPMENT SCHEDULE 2
SCALE: NTS



KEY PLAN

-
- A site map showing the layout of various buildings. A specific building, labeled 'BLDG 'S'', is highlighted in gray. The map includes a north arrow pointing upwards.