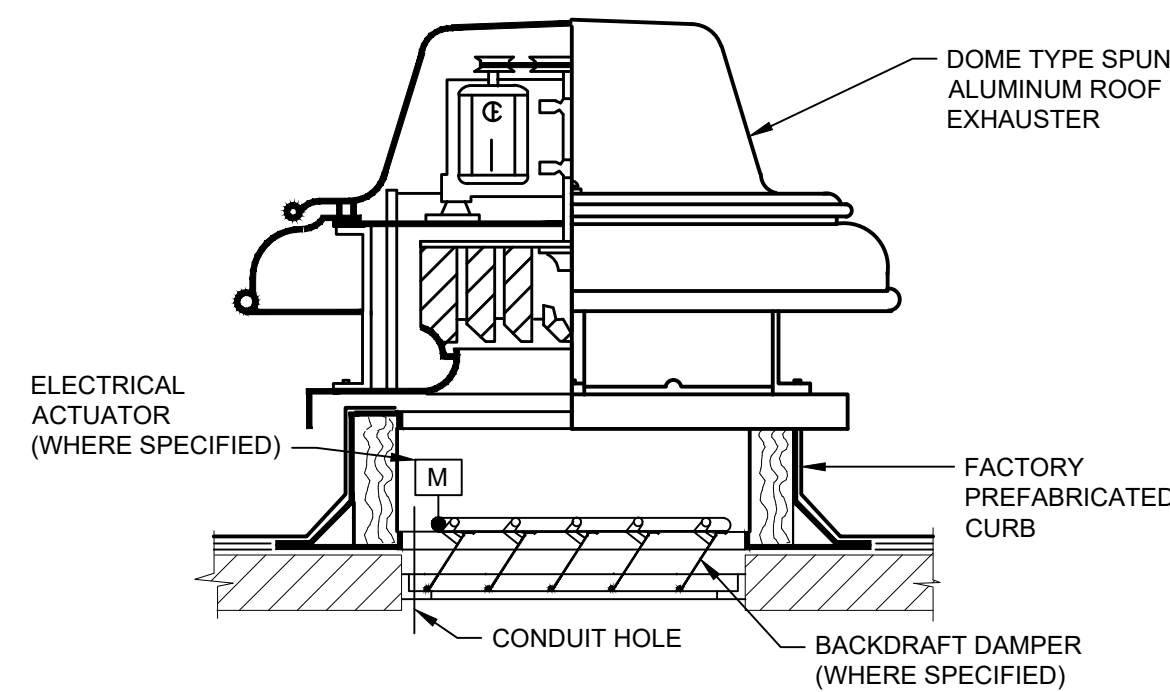
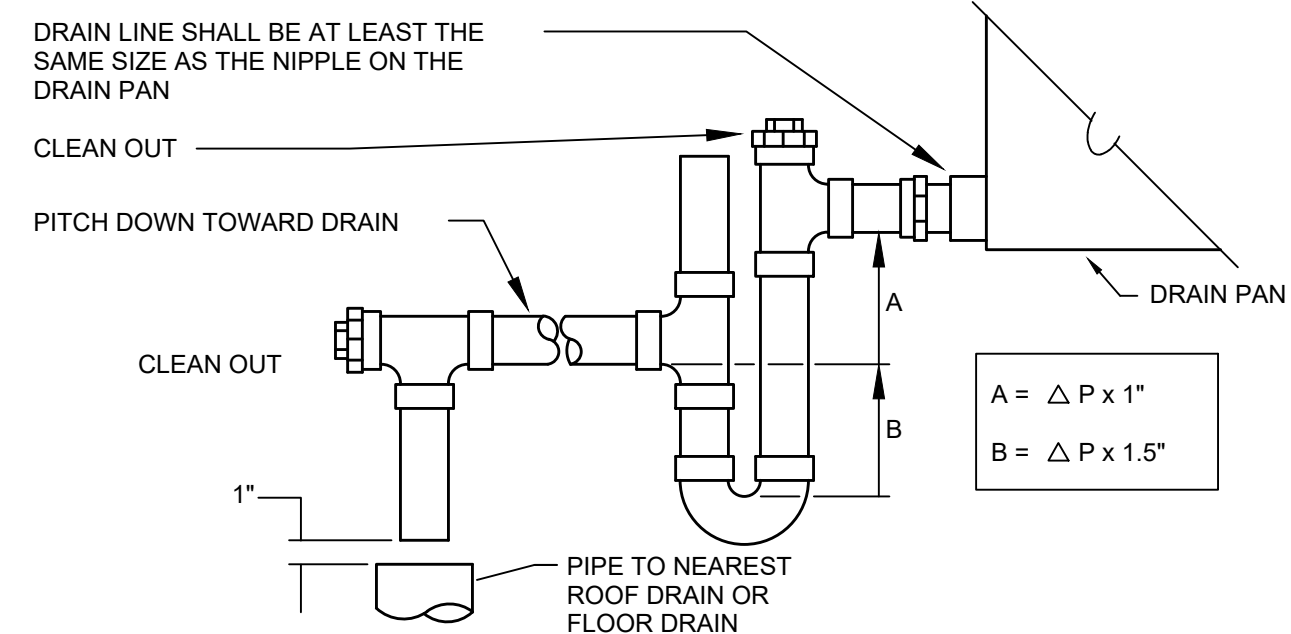


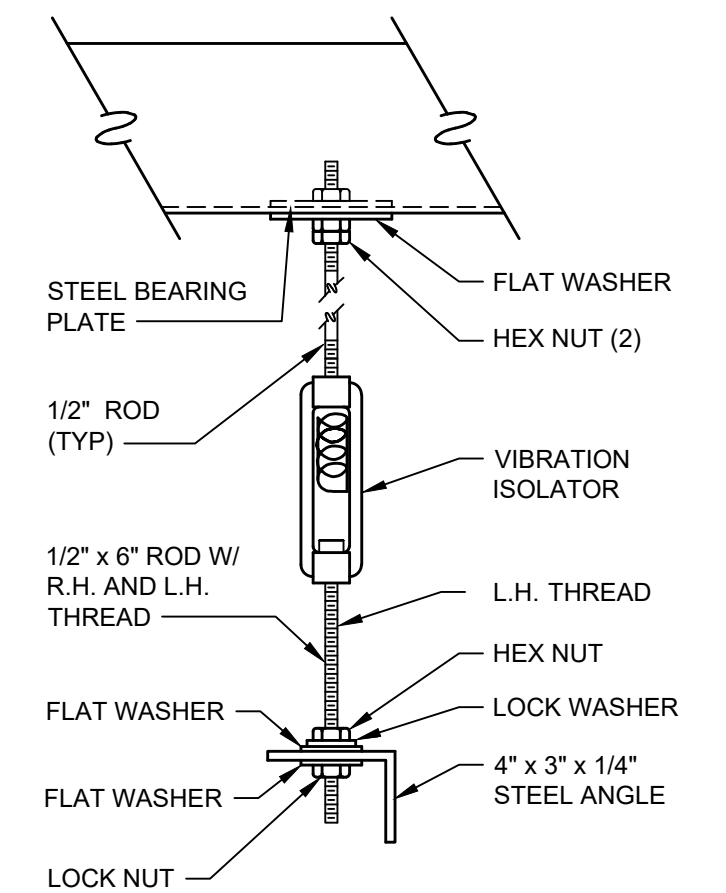
1 TYPICAL ROOFTOP UNIT DETAIL
NOT TO SCALE



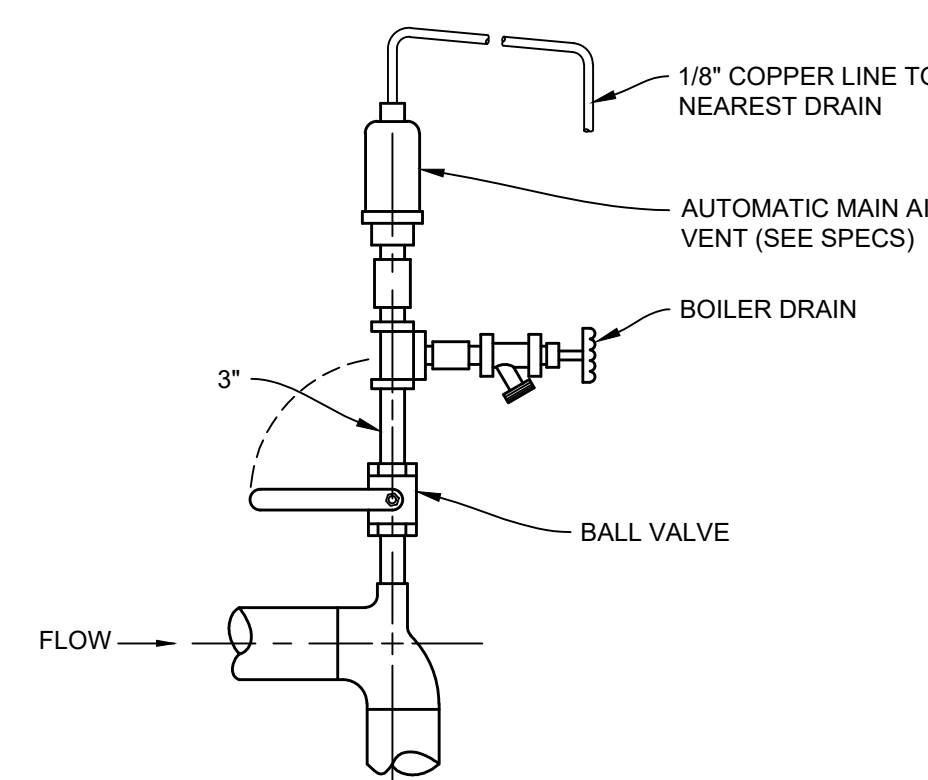
2 TYPICAL ROOF EXHAUST FAN DETAIL
NOT TO SCALE



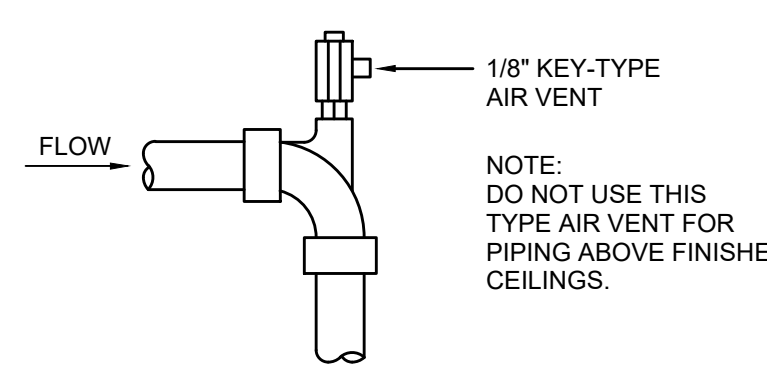
3 AIR HANDLING UNIT DRAIN TRAP
NOT TO SCALE



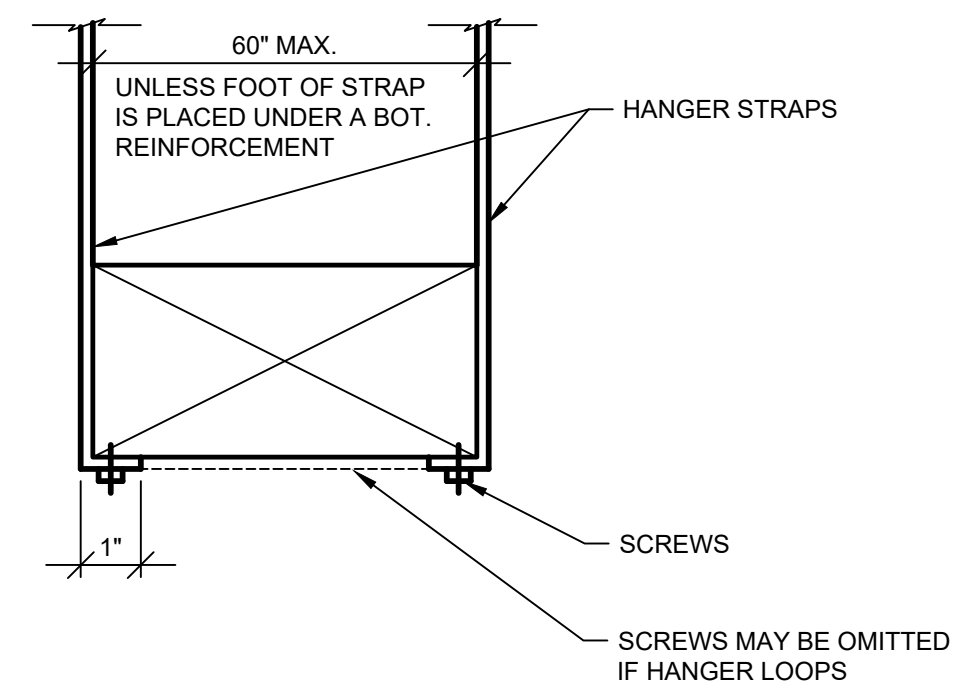
4 SUPPORT DETAIL TYPICAL LIGHT EQUIPMENT
NOT TO SCALE



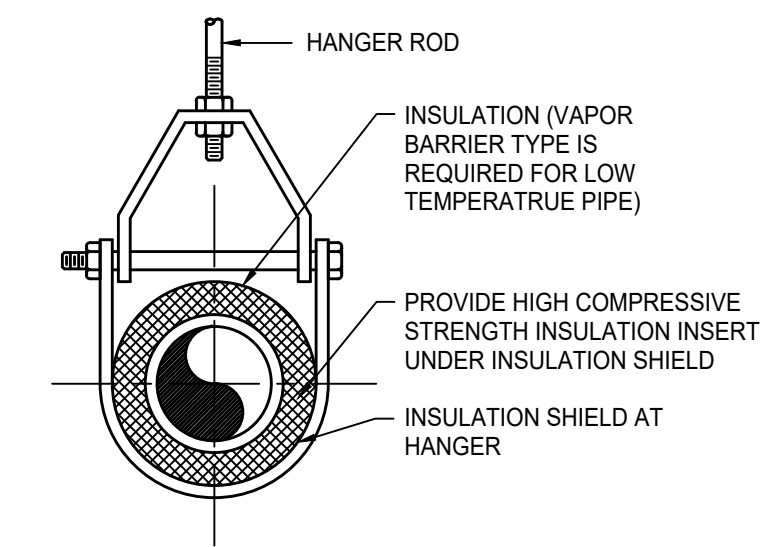
5 TYPICAL AUTOMATIC AIR VENT (AAV) END OF MAIN (RETURN RISERS) DETAIL
NOT TO SCALE



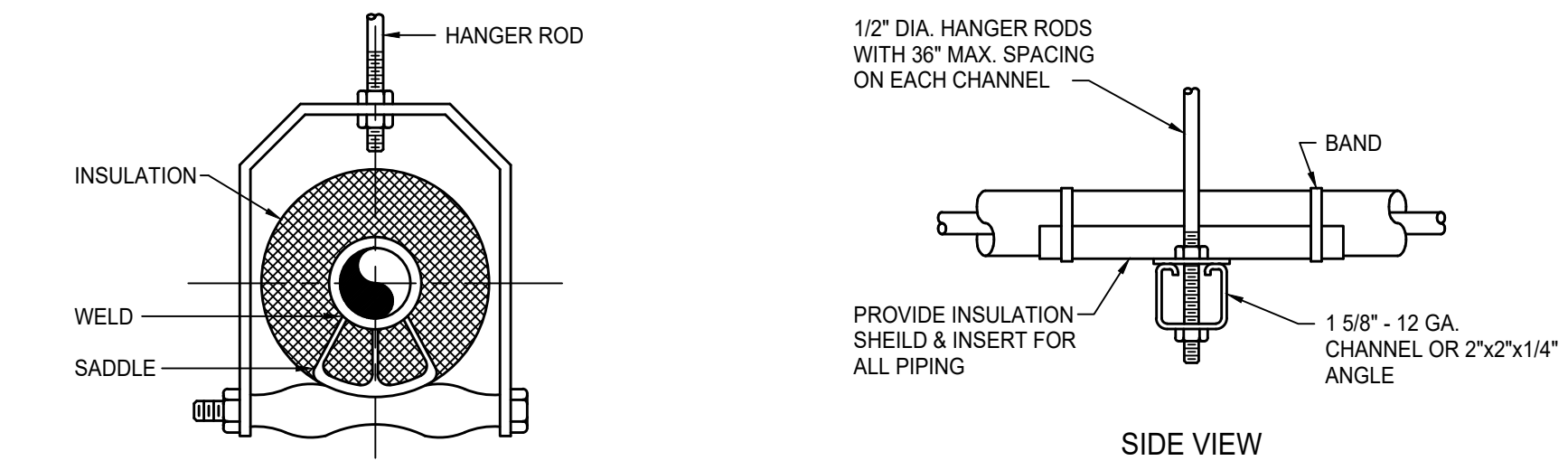
6 TYPICAL MANUAL AIR VENT (MAV)
NOT TO SCALE



7 TYPICAL DUCT HANGER
NOT TO SCALE



ADJUSTABLE CLEVIS HANGER TYPE 1 IN SPECIFICATIONS



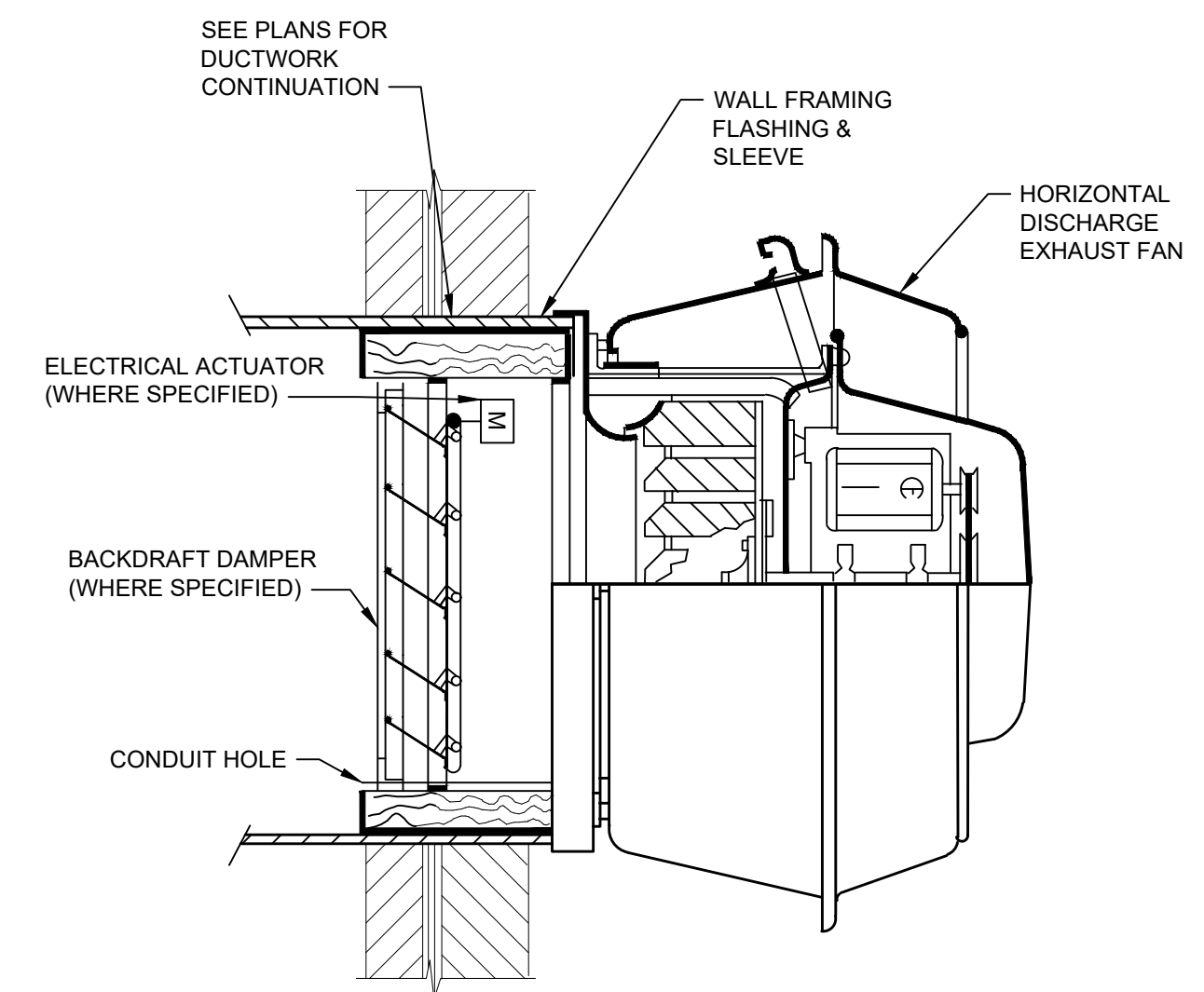
ADJUSTABLE ROLLER HANGER TYPE 43 IN SPECIFICATIONS

TRAPEZE HANGER FOR UP TO 1000 LB. UNIFORM LOAD

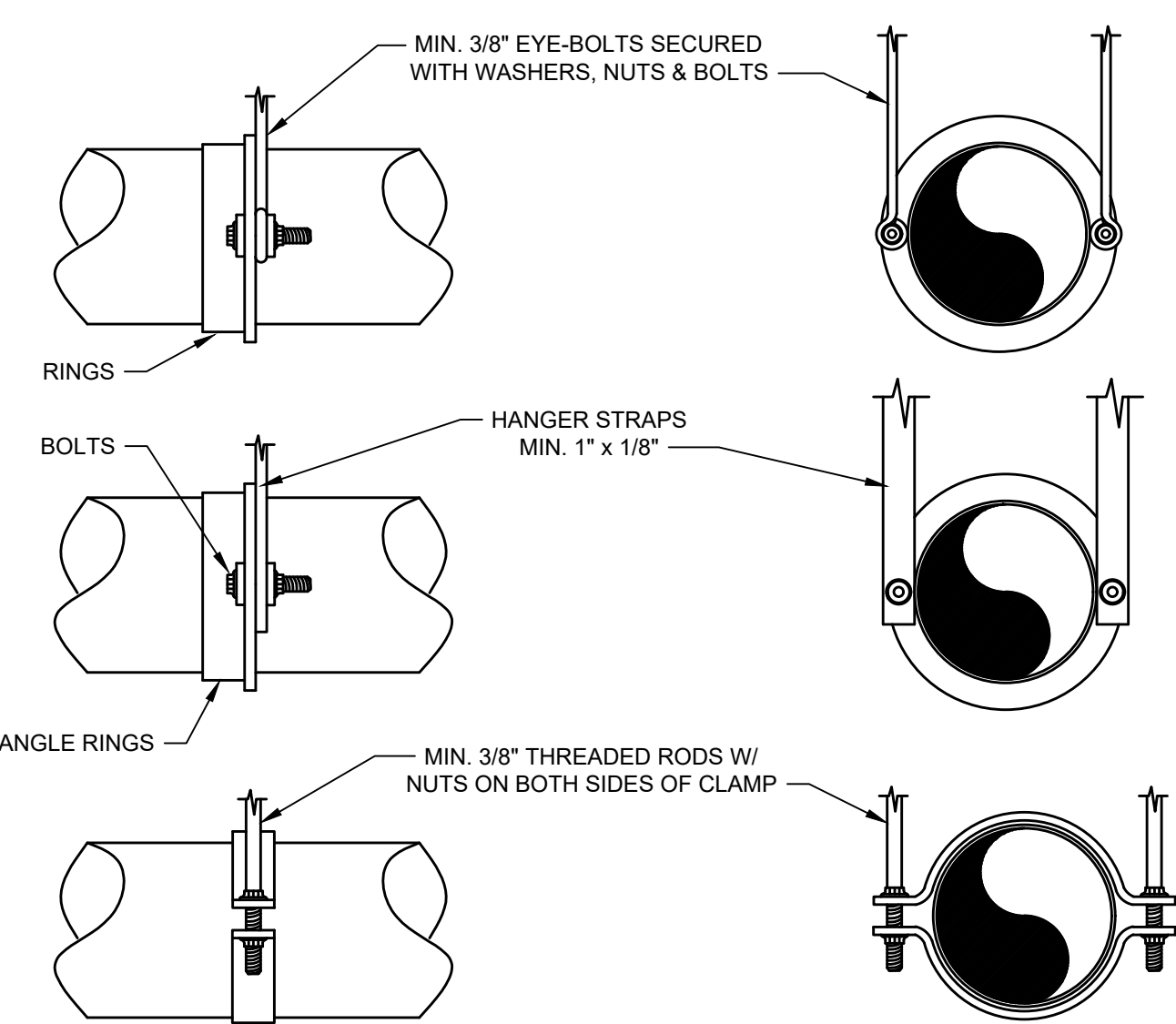
MAXIMUM PIPE/TUBING SUPPORT SPACING, FEET																	
NOM. SIZE	THRU 3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"	14"	18"	20"	24"
PIPE	7	7	9	10	11	12	14	16	17	19	22	23	25	27	28	30	32
TUBING	5	6	7	8	8	9	10	12	13	14	16	-	-	-	-	-	-

NOTE: FOR TRAPEZE HANGER TAKE SPACING OF SMALLEST SIZE ON TRAPEZE.

8 TYPICAL METAL PIPING HANGERS
NOT TO SCALE



9 TYPICAL WALL MOUNTED OUTBLAST EXHAUST FAN DETAIL
NOT TO SCALE



10 ROUND DUCT HANGERS
NOT TO SCALE

CONSTRUCTION DOCUMENTS

ENGINEERING - ARCHITECTURE - GEOSPATIAL
 www.girinc.com

HVAC DETAILS
 KENTON COUNTY SCHOOL DISTRICT SUPPORT OPERATIONS CENTER
 11800 TAYLOR MILL ROAD, INDEPENDENCE, KY. 41051

REVISIONS	DATE	BY	APPROVED

DATE: MARCH 30, 2023
 SCALE: NO SCALE
 SHEET NO: M-502

EXHAUST FAN SCHEDULE

MARK	MANUFACTURER	MODEL	AREA SERVED	CFM	ESP (IN H2O)	SONES	DRIVE TYPE	RPM	ELECTRICAL			REMARKS
									V/Ø/Hz	HP	FLA	
EF-01	GREENHECK	CUE-100-A	1ST FLOOR BATHROOMS AREA B, BUG ROOMS, 2ND FLOOR KITCHEN AREA B	1,080	0.750	10.6	DIRECT	1,725	115/60/1	1/3	7.2	ALL
EF-02	GREENHECK	G-090-G	1ST FLOOR MALE/FEMALE LOCKER ROOMS AREA A	440	0.250	5.5	DIRECT	1,300	115/60/1	1/25	-	ALL
EF-03	GREENHECK	G-070-VG	2ND FLOOR BATHROOMS AREA A	170	0.250	2.9	DIRECT	1,313	115/60/1	1/15	1.3	ALL
EF-04	GREENHECK	CUE-070-G	1ST FLOOR BATHROOMS AREA A	100	0.250	2.2	DIRECT	1,300	115/60/1	1/60	-	ALL
EF-05	GREENHECK	CUE-090-E	1ST FLOOR ELEVATOR MECH ROOM, STAIR B	240	0.250	4.4	DIRECT	1,050	115/60/1	1/40	-	ALL
EF-06	GREENHECK	G-095-VG	PARTS STORAGE, PARTS/INVENTORY	940	0.250	9.7	DIRECT	1,648	115/60/1	1/6	2.8	ALL
EF-07	GREENHECK	GB-220	TIRE STORAGE	2,390	0.250	7.1	BELT	436	115/60/1	1/4	5.8	ALL
EF-08	GREENHECK	GB-180	1ST FLOOR AREA D STORAGE ROOMS	2,060	0.500	7.4	BELT	765	115/60/1	1/3	7.2	ALL
EF-09	GREENHECK	SBE-1L24	MAINTENANCE/INSPECTION BAYS	4,400	0.125	10.8	BELT	589	115/60/1	1/3	7.2	1.2
EF-10	GREENHECK	SBE-1L24	MAINTENANCE/INSPECTION BAYS	4,400	0.125	10.8	BELT	589	115/60/1	1/3	7.2	1.2
EF-11	GREENHECK	SBE-1L24	MAINTENANCE/INSPECTION BAYS	4,400	0.125	10.8	BELT	589	115/60/1	1/3	7.2	1.2
EF-12	GREENHECK	SBE-1L24	MAINTENANCE/INSPECTION BAYS	4,400	0.125	10.8	BELT	589	115/60/1	1/3	7.2	1.2
EF-13	GREENHECK	SE1-14-432-VG	WORKSPACES	1,510	0.125	6.1	DIRECT	1,242	115/60/1	1/4	3.8	1.2
EF-14	GREENHECK	SE1-14-432-VG	WORKSPACES	1,510	0.125	6.1	DIRECT	1,242	115/60/1	1/4	3.8	1.2
EF-15	GREENHECK	SE1-12-432-E	WAREHOUSE	550	0.125	4.2	DIRECT	1,050	115/60/1	1/20	-	1.2

REMARKS:
 1. PROVIDE WITH UNIT MOUNTED DISCONNECT
 2. PROVIDE WITH MOTORIZED DAMPER. CONTROLS CONTRACTOR SHALL PROVIDE REQUIRED POWER TO ACTUATOR.
 3. PROVIDE WITH APPROPRIATE ROOF CURB (MIN. 12"). ROOF SLOPE SHALL BE CONFIRMED PRIOR TO ORDERING ROOF CURB
 OTHER ACCEPTABLE MANUFACTURERS INCLUDE: CARNES, COOK. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

HVLS SCHEDULE

MARK	MANUFACTURER	MODEL	MAX CFM	MAX RPM	WEIGHT (LB)	ELECTRICAL				REMARKS
						V/Ø/Hz	FLA	MCA	MOCP	
HVLS-01	GREENHECK	DS-3-8	23,500	145	137.0	208/3/60	7	8.75	15.75	ALL
HVLS-02	GREENHECK	DS-3-8	23,500	145	137.0	208/3/60	7	8.75	15.75	ALL
HVLS-03	GREENHECK	DS-3-8	23,500	145	137.0	208/3/60	7	8.75	15.75	ALL
HVLS-04	GREENHECK	DS-3-8	23,500	145	137.0	208/3/60	7	8.75	15.75	ALL
HVLS-05	GREENHECK	DS-3-8	23,500	145	137.0	208/3/60	7	8.75	15.75	ALL
HVLS-06	GREENHECK	DS-3-8	23,500	145	137.0	208/3/60	7	8.75	15.75	ALL
HVLS-07	GREENHECK	DS-3-8	23,500	145	137.0	208/3/60	7	8.75	15.75	ALL
HVLS-08	GREENHECK	DS-3-8	23,500	145	137.0	208/3/60	7	8.75	15.75	ALL
HVLS-09	GREENHECK	DS-3-8	23,500	145	137.0	208/3/60	7	8.75	15.75	ALL
HVLS-10	GREENHECK	DS-3-8	23,500	145	137.0	208/3/60	7	8.75	15.75	ALL

REMARKS:
 1. MOUNT AS HIGH AS POSSIBLE IN SPACE PER MANUFACTURER'S INSTRUCTIONS
 2. MAINTAIN 3'-0" CLEARANCE FROM POSSIBLE OBSTRUCTIONS
 3. PROVIDE WITH CENTRALIZED (WIRED) WALL-MOUNTED CONTROLLER TO CONTROL FANS WITH BAS CONNECTION. SEE DRAWINGS FOR LOCATIONS.
 4. COLOR BY ARCHITECT
 5. SUPPORT FROM THE STRUCTURE
 6. PROVIDE WITH FIRE ALARM WIRING PIGTAIL.
 OTHER ACCEPTABLE MANUFACTURERS INCLUDE: BAF. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

ELECTRIC HEATER SCHEDULE

MARK	MANUFACTURER	MODEL	TYPE	CFM	BTUH	ELECTRICAL				REMARKS
						V/Ø/Hz	KW	MCA	MOCP	
EUH-1	MARKEL	AWH3150F	WALL HEATER	100	5,118	115/1/60	1.5	12.5	15	1-3
EUH-2	MARKEL	AWH3150F	WALL HEATER	100	5,118	115/1/60	1.5	12.5	15	1-3
EUH-3	MARKEL	AWH3150F	WALL HEATER	100	5,118	115/1/60	1.5	12.5	15	1-3
EUH-4	RUFFNECK	CR1-480360-075	CORROSIVE WASHDOWN	700	25,600	480/3/60	7.5	13.13	30	1, 4
EUH-5	RUFFNECK	CR1-480360-075	CORROSIVE WASHDOWN	700	25,600	480/3/60	7.5	13.13	30	1, 4

REMARKS:
 1. INTEGRAL THERMOSTAT AND DISCONNECT
 2. PROVIDE REQUIRED MOUNTING BRACKET FOR SURFACE MOUNTING.
 3. COLOR TO BE SELECTED BY ARCHITECT
 4. PROVIDE REQUIRED MOUNTING HARDWARE FOR WALL MOUNTING.
 OTHER ACCEPTABLE MANUFACTURERS INCLUDE: TRANE, REDDI. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

GAS FIRED RADIANT TUBE HEATER SCHEDULE

MARK	MANUFACTURER	MODEL	LENGTH	GAS INFORMATION INPUT (MBH)	FUEL			FLUE SIZE	ELECTRICAL			REMARKS
					TYPE	PRES IN W/G	IGNITION		V/Ø/Hz	MCA	MOCP	
RH-1	ROBERTS GORDON	CTH2V-150	40'	150	NG	4.6-14	HOT SURFACE	4	115/1/60	5	15	ALL
RH-2	ROBERTS GORDON	CTH2V-150	40'	150	NG	4.6-14	HOT SURFACE	4	115/1/60	5	15	ALL
RH-3	ROBERTS GORDON	CTH2V-150	40'	150	NG	4.6-14	HOT SURFACE	4	115/1/60	5	15	ALL
RH-4	ROBERTS GORDON	CTH2V-175	50'	175	NG	5.0-14	HOT SURFACE	4	115/1/60	5	15	ALL
RH-5	ROBERTS GORDON	CTH2V-175	50'	175	NG	5.0-14	HOT SURFACE	4	115/1/60	5	15	ALL
RH-6	ROBERTS GORDON	CTH2V-175	50'	175	NG	5.0-14	HOT SURFACE	4	115/1/60	5	15	ALL
RH-7	ROBERTS GORDON	CTH2V-175	50'	175	NG	5.0-14	HOT SURFACE	4	115/1/60	5	15	ALL
RH-8	ROBERTS GORDON	CTH2V-175	50'	175	NG	5.0-14	HOT SURFACE	4	115/1/60	5	15	ALL
RH-9	ROBERTS GORDON	CTH2V-175	50'	175	NG	5.0-14	HOT SURFACE	4	115/1/60	5	15	ALL

REMARKS:
 1. INSTALL AS HIGH AS POSSIBLE TO AVOID WORKING AREA BELOW
 2. COORDINATE FLUE PENETRATIONS WITH ROOFING CONTRACTOR
 3. PROVIDE WALL MOUNTED THERMOSTAT
 OTHER ACCEPTABLE MANUFACTURERS INCLUDE: REZTOR, MODINE, SPACE RAY. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

GAS FIRED UNIT HEATER SCHEDULE

MARK	MANUFACTURER	MODEL	CFM	GAS INFORMATION		FAN MOTOR ELECTRICAL		FLUE SIZE	ELECTRICAL			REMARKS
				INPUT (MBH)	OUTPUT (MBH)	HP	AMPS		V/Ø/Hz	MCA	MOCP	
GUH-1	REZTOR	UBX	1793	105	87.2	3/4	13	4	115/1/60	19.5	30	ALL
GUH-2	REZTOR	UBX	506	30	24.6	1/6	3.7	4	115/1/60	5.6	15	ALL
GUH-3	REZTOR	UBX	759	45	36.9	1/6	3.7	4	115/1/60	5.6	15	ALL
GUH-4	REZTOR	UBX	759	45	36.9	1/6	3.7	4	115/1/60	5.6	15	ALL
GUH-5	REZTOR	UBX	506	30	24.6	1/6	3.7	4	115/1/60	5.6	15	ALL
GUH-6	REZTOR	UBX	506	30	24.6	1/6	3.7	4	115/1/60	5.6	15	ALL

REMARKS:
 1. HORIZONTAL GAS FIRED UNIT HEATER
 2. PROVIDE FLUE AS REQUIRED BY MANUFACTURER AND ROUTE PER PLANS
 3. PROVIDE WALL MOUNTED THERMOSTAT
 4. INSTALL AS HIGH AS POSSIBLE
 5. PROVIDE WITH DISCONNECT.
 OTHER ACCEPTABLE MANUFACTURERS INCLUDE: TRANE, MODINE. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

SEQUENCE OF OPERATION - RTU-01

ROOF TOP UNIT RTU-01

FANS
SUPPLY FAN SHALL RUN CONTINUOUSLY UNDER VFD CONTROL. SUPPLY FAN VFD SHALL MODULATE TO MAINTAIN THE DUCT STATIC PRESSURE SETPOINT. SUPPLY FAN STATIC PRESSURE SETPOINT SHALL BE RESET BASED ON THE ZONE REQUIRING THE MOST PRESSURE. RELIEF FAN SHALL RUN CONTINUOUSLY UNDER VFD CONTROL. RELIEF FAN VFD SHALL MODULATE TO MAINTAIN BUILDING PRESSURIZATION SETPOINT. SUM UP VAV BOX VOLUMES FOR SUPPLY AIR TOTAL BUILDING STATIC PRESSURE SETPOINT SHALL BE MONITORED BY PRESSURE SENSOR AND SEND AN ALARM IF BUILDING GOES NEGATIVE.

DAMPER CONTROL
OUTSIDE AIR DAMPER SHALL MODULATE BETWEEN MINIMUM AND MAXIMUM OUTSIDE AIR VOLUME TO MAINTAIN CO2 LEVEL DIFFERENTIAL SETPOINT DURING OCCUPIED MODE. OUTSIDE AIR DAMPER SHALL CLOSE IF SUPPLY FAN IS OFF OR IF NIGHT SETBACK OR SET UP IS IN OPERATION.

COOLING COIL CONTROL
IN COOLING MODE DX COIL SHALL MAINTAIN COOLING COIL DISCHARGE TEMPERATURE SETPOINT. IN HEATING MODE DX COIL SHALL BE DISABLED.

ECONOMIZER
ENABLE ECONOMIZER COOLING WHEN OUTSIDE AIR TEMPERATURE IS EQUAL TO OR LESS THAN THE ECONOMIZER COOLING SWITCHOVER SETPOINT. DX COOLING COIL SHALL SEQUENCE OFF EXHAUST (RELIEF) AIR DAMPER SHALL OPEN AND OUTSIDE AIR AND RETURN AIR DAMPERS SHALL MODULATE TO MAINTAIN MIXED AIR TEMPERATURE SETPOINT. IF RETURN AIR RELATIVE HUMIDITY SETPOINT IS EXCEEDED THE DX COOLING COIL SHALL BE SEQUENCED ON UNTIL RETURN AIR RELATIVE HUMIDITY SETPOINT IS MET. WHEN THE OUTSIDE AIR TEMPERATURE IS GREATER THAN THE SWITCHOVER SETPOINT ECONOMIZER COOLING IS DISABLED.

UNOCCUPIED MODE (TIMEFRAME USER DEFINED)
DURING UNOCCUPIED MODE CONTROL SYSTEM SHALL MODULATE HEATING OR COOLING COILS TO MAINTAIN SPACE SET UP / BACK TEMPERATURE AS SCHEDULED. OUTSIDE AIR AND RELIEF / EXHAUST DAMPERS SHALL CLOSE AND RETURN DAMPER SHALL OPEN. ASSOCIATED EXHAUST FANS SHALL DE-ENERGIZE. UNOCCUPIED MODE CONTINUES UNTIL OPTIMAL START ROUTINE IS INITIATED AND CONTROL SYSTEM RETURNS TO OCCUPIED MODE OF OPERATION.

MORNING WARM-UP / COOL-DOWN
DEPENDING ON THE SEASON DDC SHALL CALCULATE OPTIMAL START TIME FOR OBTAINING OCCUPIED SPACE TEMPERATURE SETPOINT AS SCHEDULED. ALL VAV BOXES SHALL OPEN 100% OUTSIDE AIR AND RELIEF / EXHAUST DAMPERS SHALL REMAIN CLOSED AND RETURN DAMPER SHALL REMAIN OPEN. SUPPLY FAN SHALL OPERATE AT 100% CAPACITY. HEATING OR COOLING CONTROL SHALL OPERATE AT 100% CAPACITY. WHEN THE COOLEST OR WARMEST SPACE TEMPERATURE (DEPENDING ON THE SEASON) RISES / DROPS 0.5 F ABOVE / BELOW OCCUPIED SPACE TEMPERATURE SETPOINT THE DDC SHALL BE PLACED IN OCCUPIED MODE OF OPERATION.

SMOKE / FIRE ALARMS
ACTIVATION OF ROOFTOP UNIT DUCT SMOKE DETECTOR SHALL DE-ENERGIZE ASSOCIATED ROOFTOP UNIT AND SEND AN ALARM SIGNAL TO THE FIRE ALARM SYSTEM. FIRE ALARM SYSTEM SHALL SEND A SUPERVISORY SIGNAL TO THE ROOFTOP UNIT CONTROL SYSTEM.

EMERGENCY SHUTDOWN
UPON ACTIVATION OF THE HVAC EMERGENCY SHUTDOWN BUTTON THE SUPPLY AND RETURN / RELIEF / EXHAUST FANS SHALL STOP AND OUTSIDE AIR, RETURN AIR AND / OR RELIEF / EXHAUST DAMPERS SHALL CLOSE. UPON RESET THE SYSTEM SHALL RETURN TO LAST OPERATING STATE.

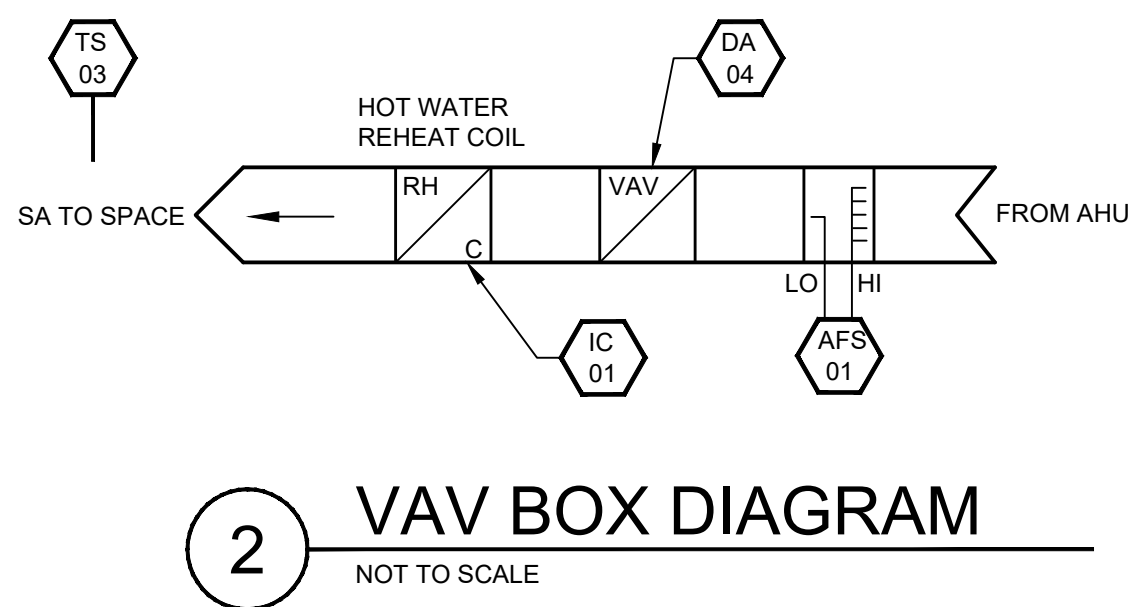
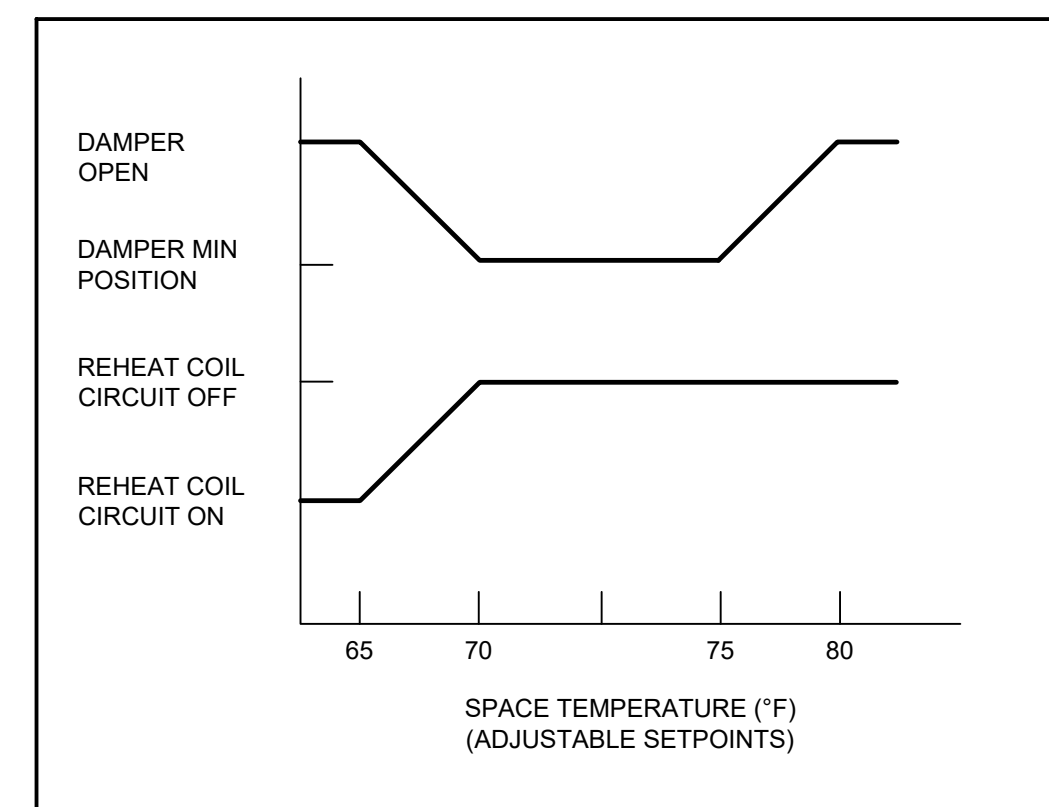
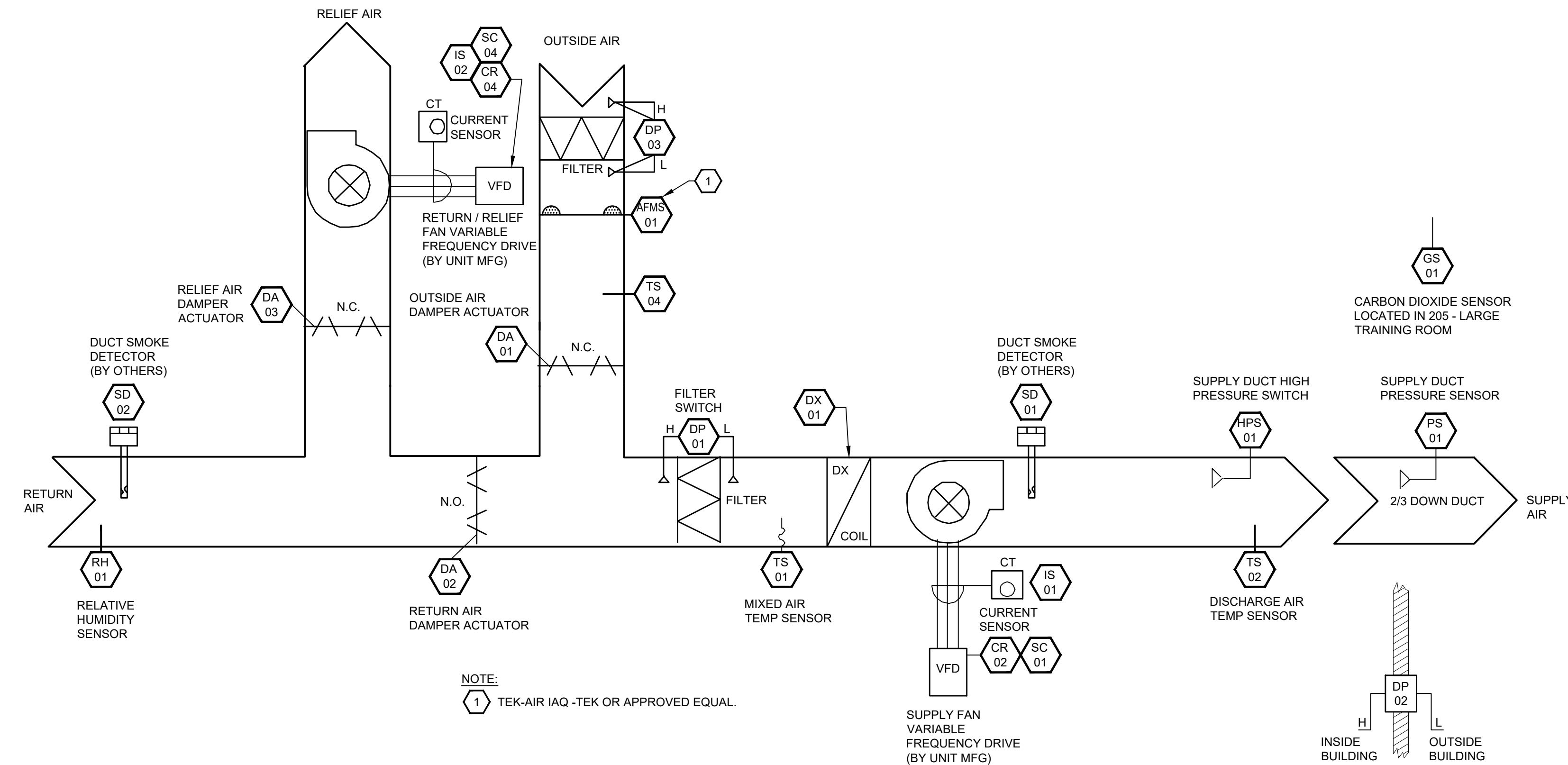
OVER PRESSURIZATION CONTROL
IF THE STATIC PRESSURE IN THE SUPPLY DUCT EXCEEDS HIGH STATIC PRESSURE ALARM, THE FAN SHALL BE DEACTIVATED. UPON CORRECTION OF THE PROBLEM, THE SYSTEM SHALL BE RESET AND UNIT SHALL RETURN TO NORMAL OPERATION.

OPERATING PARAMETERS

FUNCTION	SET POINT (ADJUSTABLE)	REMARKS
COOLING COIL DISCHARGE AIR TEMPERATURE	55 F	
SPACE TEMPERATURE SETPOINT - COOLING	75 F	DEAD BAND +/- 2 F
SPACE TEMPERATURE SETPOINT - HEATING	70 F	DEAD BAND +/- 2 F
SPACE RELATIVE HUMIDITY SETPOINT - COOLING	50% RH	DEAD BAND +/- 5% RH
SPACE RELATIVE HUMIDITY SETPOINT - HEATING	50% RH	DEAD BAND +/- 10% RH
ECONOMIZER COOLING SWITCHOVER TEMP	55 F	OAT = or < SETPOINT
MIXED AIR TEMPERATURE	55 F	
NIGHT SET BACK TEMP SETPOINT - COOLING	80 F	DEAD BAND +/- 2 F
NIGHT SET BACK TEMP SETPOINT - HEATING	65 F	DEAD BAND +/- 2 F
DUCT STATIC PRESSURE	1.5" WG	
HIGH STATIC PRESSURE ALARM	2.5" WG	
BUILDING PRESSURIZATION	0.02" WG	
FILTER ALARM	0.75" WG	
MAXIMUM CO ₂ DIFFERENTIAL	700 PPM	MAXIMUM DIFFERENCE BETWEEN AMBIENT OUTSIDE AIR CO ₂ LEVELS AND SPACE CO ₂ LEVELS.

TAG	POINT DESCRIPTION	UNITS	HARDWARE																		
			OUTPUT				INPUT														
			DIGITAL	ANALOG	DIGITAL	ANALOG	DIGITAL	ANALOG	DIGITAL	ANALOG											
			START/STOP	ENABLE/DISABLE	YES/NO	CONTROL POINT ADDRESS	0-10 VDC SPEED	4-20 MA STATUS	ALARM CONTACTS	CURRENT SENSOR	PRESS SWITCH	REL. HUMIDITY	AIR TEMP	WATER TEMP	FLOWRATE	CO2 PPM	POSITION	SPEED	4-20 MA	PRESSURE	
TS-01	MIXED AIR TEMPERATURE	DEG F (DEG C)											X								
TS-02	SUPPLY AIR TEMPERATURE	DEG F (DEG C)											X								
TS-04	OUTSIDE AIR TEMPERATURE	DEG F (DEG C)											X								
DP-01	FILTER STATUS	IN WG (PA)																			X
DP-03	FILTER STATUS - OUTSIDE AIR	IN WG (PA)																			X
RH-01	RETURN AIR RELATIVE HUMIDITY	%RH										X									
PS-01	STATIC PRESSURE SENSOR (Approx 2/3 Dist Downstream of AHU)	IN WG (PA)																			X
DP-02	BUILDING STATIC PRESSURE	IN WG (PA)																			X
GS-01	CO2 SENSOR	PPM														X					
SD-01	SUPPLY SMOKE DETECTOR	ON/OFF								X											
SD-02	RETURN SMOKE DETECTOR	ON/OFF								X											
IS-01	SUPPLY FAN STATUS	ON/OFF									X										
HPS-01	HIGH LIMIT STATIC PRESSURE SWITCH	IN WG (PA)									X										
CR-02	SUPPLY FAN VFD ALARM	ON/OFF									X										
DX-01	DX COIL CONTROL	PER (%)									X										
SC-01	SUPPLY FAN VFD COMMAND	PER (%)									X										
DA-02	RETURN DAMPER	PER (%)									X										
SC-04	EXH RELIEF FAN VFD COMMAND	PER (%)									X										
DA-01	OUTSIDE AIR DAMPER	PER (%)									X										
DA-03	RELIEF / EXHAUST AIR DAMPER	PER (%)									X										
CR-04	EXH RELIEF FAN VFD ALARM	ON/OFF									X										
IS-02	EXH RELIEF FAN STATUS	ON/OFF										X									
AFMS-01	AIRFLOW MEASURING STATION	CFM													X						
TS-03	SPACE TEMPERATURE	DEG F (DEG C)												X							
IC-01	HOT WATER REHEAT CONTROL	PER (%)											X								
AFS-01	AIR FLOW SWITCH	ON/OFF													X						
DA-04	VAV DAMPER ACTUATOR	PER (%)														X					

Note 1: Outside air temperature, and humidity readings can be a global point.



SEQUENCE OF OPERATION - VAV

VARIABLE AIR VOLUME TERMINAL (VAV) CONTROL

WHEN IN COOLING MODE, THE BAS WILL MODULATE VOLUME DAMPER TO MAXIMUM CFM SET POINT TO MAINTAIN THE DESIRED SPACE TEMPERATURE.

WHEN IN HEATING MODE, THE BAS WILL MODULATE VOLUME DAMPER TO HEATING CFM SET POINT AND MODULATE HOT WATER REHEAT COIL TO MAINTAIN THE DESIRED SPACE TEMPERATURE PER THE VAV CONTROL CHART ABOVE.

WHEN ROOMS THAT ARE SERVED BY A VAV BOX ARE UNOCCUPIED, THE BAS WILL MODULATE VOLUME DAMPER TO MINIMUM CFM SET POINT AND THERMOSTAT FOR VAV BOX SHALL BE SET TO SET UP / BACK TEMPERATURE. OCCUPANCY STATUS SHALL BE SET BY LIGHTING OCCUPANCY SENSORS PROVIDED BY DIVISION 26.

SEQUENCE OF OPERATION: PARKING LOT LIGHTS

LIGHTING CONTROL SHALL BE DETERMINED BY PHOTOCCELL STATUS AND DDC SCHEDULE.
 PROVIDE LIGHTING STATUS TO DDC MONITORING SYSTEM.
 SEE SHEET E-608 FOR MORE INFORMATION.

SEQUENCE OF OPERATION: INFRARED HEATER

INFRARED HEATER CONTROL:

THERMOSTAT WILL CYCLE THE INFRARED HEATER SYSTEM TO MAINTAIN THE DESIRED SETPOINT (ADJUSTABLE).
 CURRENT SENSOR DRY CONTACTS FOR INFRARED HEATER STATUS (ON/OFF) AND TEMPERATURE OF SPACE TO DDC MONITORING SYSTEM.

SEQUENCE OF OPERATION: HVLS FANS

FANS SHALL BE ENABLED CONTINUOUSLY UNDER HAND-OFF-AUTOMATIC (H-O-A) CONTROL. DURING AUTOMATIC (A) FANS CONTROLLED BY BMS SCHEDULE.

PROVIDE FAN STATUS AND ALARM STATUS TO DDC MONITORING SYSTEM.

SEQUENCE OF OPERATION: CO/NO_x DETECTOR

CO AND NO_x SENSOR SHALL CONTINUOUSLY MONITOR PPM OF GAS IN BUS MAINTENANCE BAYS. SEE SHEET MH403 & MH404 FOR LOCATIONS.

ONCE SETPOINT IS REACHED SENSOR SHOULD TRIGGER AUDIBLE AND VISUAL ALARM.

SENSOR SHALL ALSO REPORT ALARM STATUS TO DDC MONITORING SYSTEM.

SEQUENCE OF OPERATION: CRAC UNITS

UNITS SHALL OPERATE ON LEAD/LAG SYSTEM WHERE EACH UNIT SHALL OPERATE FOR 7 DAYS (ADJUSTABLE) BEFORE SWAPPING WITH THE OTHER UNIT AND GOING IDLE. THE CONTROL DAMPERS FOR THE ACTIVE UNIT SHALL OPEN AND THE CONTROLS DAMPERS FOR THE IDLE UNIT SHALL BE CLOSED.

UPON ACTIVATION OF FIRE SUPPRESSION SYSTEM, ALL CONTROL DAMPERS SHALL CLOSE AND UNITS SHALL SHUT DOWN. FIRE DAMPERS SHALL BE INSTALLED AT THE PENETRATIONS FROM THE SECOND FLOOR TO THE NETWORK OPERATIONS CENTER.

OPERATING PARAMETERS: MS-1, 2, 3 / OU-1, 2, 3

FUNCTION	SET POINT ADJUSTABLE	REMARKS
HIGH TEMPERATURE ALARM	90 F (38 C)	SEND ALARM TO DDC SYSTEM IF SPACE TEMPERATURE GOES ABOVE HIGH TEMP ALARM OR BELOW LOW TEMP ALARM (ADJUSTABLE).
LOW TEMPERATURE ALARM	50 F (10 C)	
SYSTEM STATUS		-ON/OFF STATUS TO DDC MONITORING SYSTEM (ALL). -HEAT/COOL STATUS TO DDC MONITORING SYSTEM (MS-1/OU-1 ONLY). -SPACE TEMPERATURE TO DDC MONITORING SYSTEM (ALL).

OPERATING PARAMETERS: FREEZER STORAGE

FUNCTION	SET POINT ADJUSTABLE	REMARKS
HIGH TEMPERATURE ALARM	32 F (0 C)	SEND ALARM TO DDC SYSTEM IF SPACE TEMPERATURE GOES ABOVE HIGH TEMP ALARM (ADJUSTABLE).
SYSTEM STATUS		-SPACE TEMPERATURE TO DDC MONITORING SYSTEM.

OPERATING PARAMETERS: CRAC UNITS

FUNCTION	SET POINT ADJUSTABLE	REMARKS
HIGH TEMPERATURE ALARM	80 F (27 C)	SEND ALARM TO DDC SYSTEM IF SPACE TEMPERATURE GOES ABOVE HIGH TEMP ALARM (ADJUSTABLE).
SYSTEM STATUS		-SPACE TEMPERATURE TO DDC MONITORING SYSTEM. -EQUIPMENT STATUS TO DDC MONITORING SYSTEM.



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HVAC CONTROLS
KENTON COUNTY SCHOOL DISTRICT SUPPORT OPERATIONS CENTER
 11800 TAYLOR MILL ROAD, INDEPENDENCE, KY, 41051

DESIGNED	STAFF
DRAWN	STAFF
REVIEWED	CVS
APPROVED	CVS

NO.	DATE	BY	REVISION DESCRIPTION

DATE: MARCH 30, 2023
 SCALE: NO SCALE
 SHEET NO: M-704

GENERAL NOTES:

- SEE SHEET M001 FOR MECHANICAL LEGEND AND GENERAL NOTES.
- COORDINATE WITH OTHER DISCIPLINES PRIOR TO INSTALLATION OF MECHANICAL COMPONENTS.

STATE OF KENTUCKY
 CORY V. SKERRARD
 REGISTERED PROFESSIONAL ENGINEER
 LICENSE NO. 15433

GRW PROJECT NO. 0506-01
 CLIENT PROJECT NO. BG 23-173

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SHEET KEYNOTES

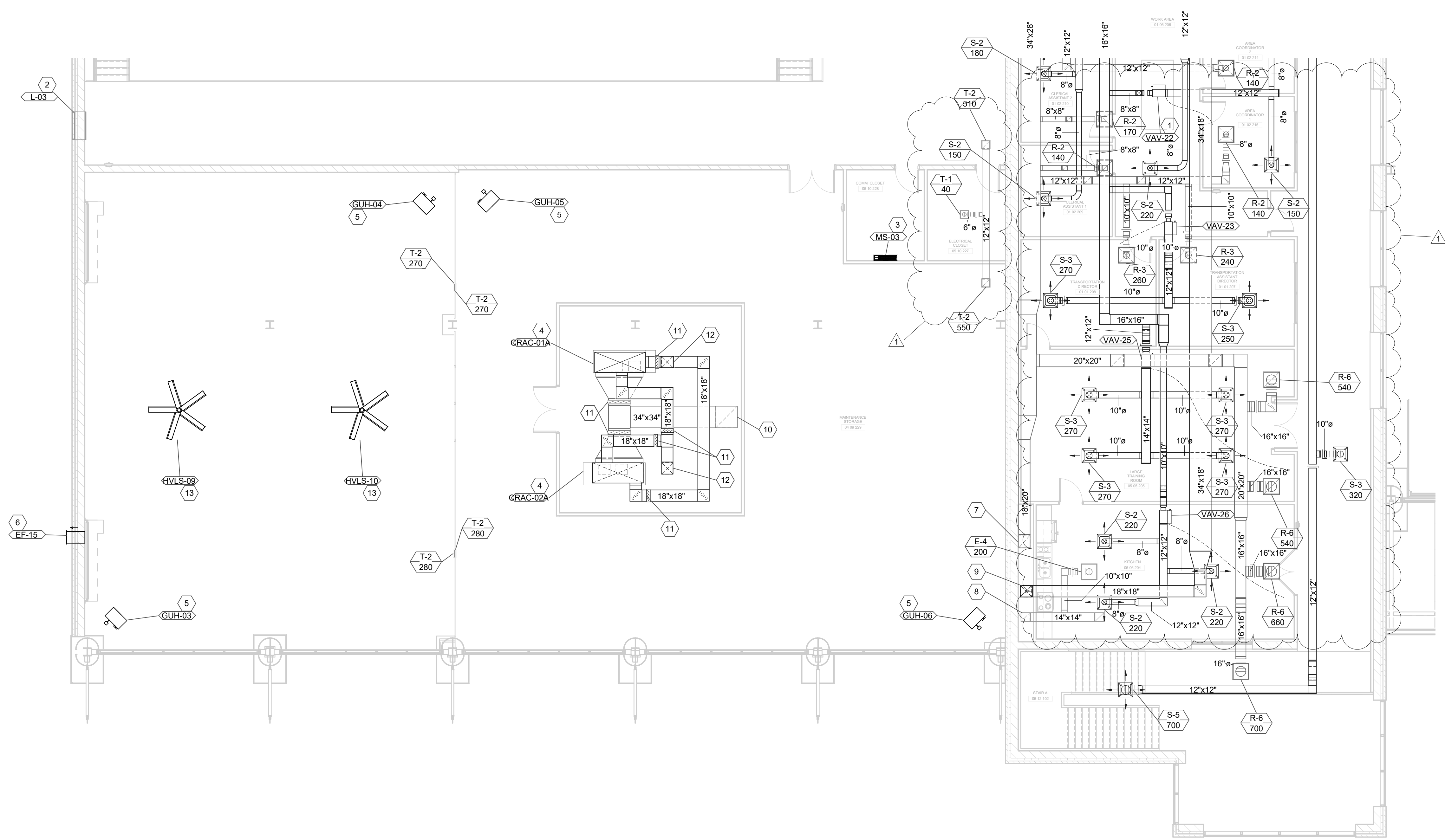
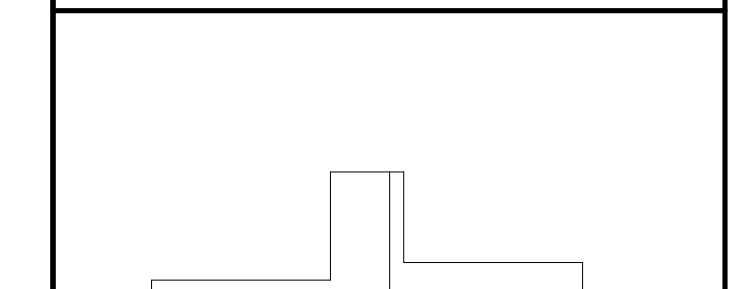
- FURNISH AND INSTALL VAV TERMINAL UNIT. MAINTAIN ALL MANUFACTURER'S REQUIRED CLEARANCES. SEE SCHEDULES AND DETAILS FOR MORE INFORMATION.
- FURNISH AND INSTALL OPERABLE LOUVER. BASE OF LOUVER SHALL APPROXIMATELY BE 22" AFF. SEE SCHEDULES AND DETAILS FOR MORE INFORMATION.
- FURNISH AND INSTALL INDOOR WALL MOUNTED MINI SPLIT UNIT. BASE OF UNIT SHALL BE 7" AFF. SEE SCHEDULES AND DETAILS FOR MORE INFORMATION.
- FURNISH AND INSTALL INDOOR COMPUTER ROOM AIR CONDITIONER UNIT. SEE SCHEDULES AND DETAILS FOR MORE INFORMATION.
- FURNISH AND INSTALL GAS FIRED UNIT HEATER. MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCES. SEE SCHEDULES AND DETAILS FOR MORE INFORMATION.
- FURNISH AND INSTALL WALL-MOUNTED EXHAUST FAN. BASE OF FAN SHALL APPROXIMATELY BE 20" AFF. SEE SCHEDULES AND DETAILS FOR MORE INFORMATION.
- RETURN DUCTWORK UP FROM FIRST LEVEL. SEE SHEET MH402 FOR CONTINUATION.
- EXHAUST DUCTWORK UP FROM FIRST LEVEL. SEE SHEET MH402 FOR CONTINUATION.
- SUPPLY DUCTWORK DOWN TO FIRST LEVEL. SEE SHEET MH402 FOR CONTINUATION.
- RETURN DUCTWORK UP FROM NETWORK OPERATIONS CENTER. SEE SHEET MH402 FOR CONTINUATION. PROVIDE AND INSTALL FIRE DAMPER IN DUCTWORK AT FLOOR PENETRATION. SEE MECHANICAL CONTROL SHEETS FOR MORE INFORMATION.
- PROVIDE AND INSTALL CONTROL DAMPERS FOR COMPUTER ROOM AIR CONDITIONER DUCTWORK. SEE MECHANICAL CONTROL SHEETS FOR MORE INFORMATION.
- SUPPLY DUCTWORK DOWN TO NETWORK OPERATIONS CENTER. SEE SHEET MH402 FOR CONTINUATION. PROVIDE AND INSTALL FIRE DAMPER IN DUCTWORK AT FLOOR PENETRATION. SEE MECHANICAL CONTROL SHEETS FOR MORE INFORMATION.
- FURNISH AND INSTALL HIGH VELOCITY, LOW SPEED FAN. MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCES FROM STRUCTURE AND LIGHTING. SEE SCHEDULES AND DETAILS FOR MORE INFORMATION.

SECOND LEVEL - AREA B - HVAC PLAN
 KENTON COUNTY SCHOOL DISTRICT SUPPORT OPERATIONS CENTER
 11800 TAYLOR MILL ROAD, INDEPENDENCE, KY 41051

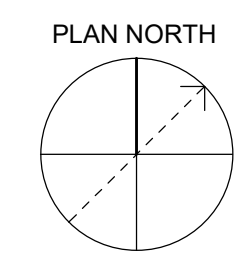
DESIGNED:	JJS
DRAWN:	JJS
REVIEWED:	CVS
APPROVED:	CVS

NO.	DATE	REVISION/DESCRIPTION

AREA KEY PLAN

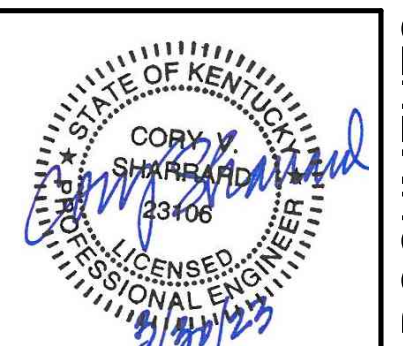


1 SECOND LEVEL - AREA B - HVAC PLAN
 SCALE: 1/8" = 1'-0"



DATE:	MARCH 30, 2023
SCALE:	1/8" = 1'-0"
SHEET NO.:	MH406 X1

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GENERAL NOTES:

- SEE SHEET M001 FOR MECHANICAL LEGEND AND GENERAL NOTES.
- COORDINATE WITH OTHER DISCIPLINES PRIOR TO INSTALLATION OF MECHANICAL COMPONENTS.

SHEET KEYNOTES

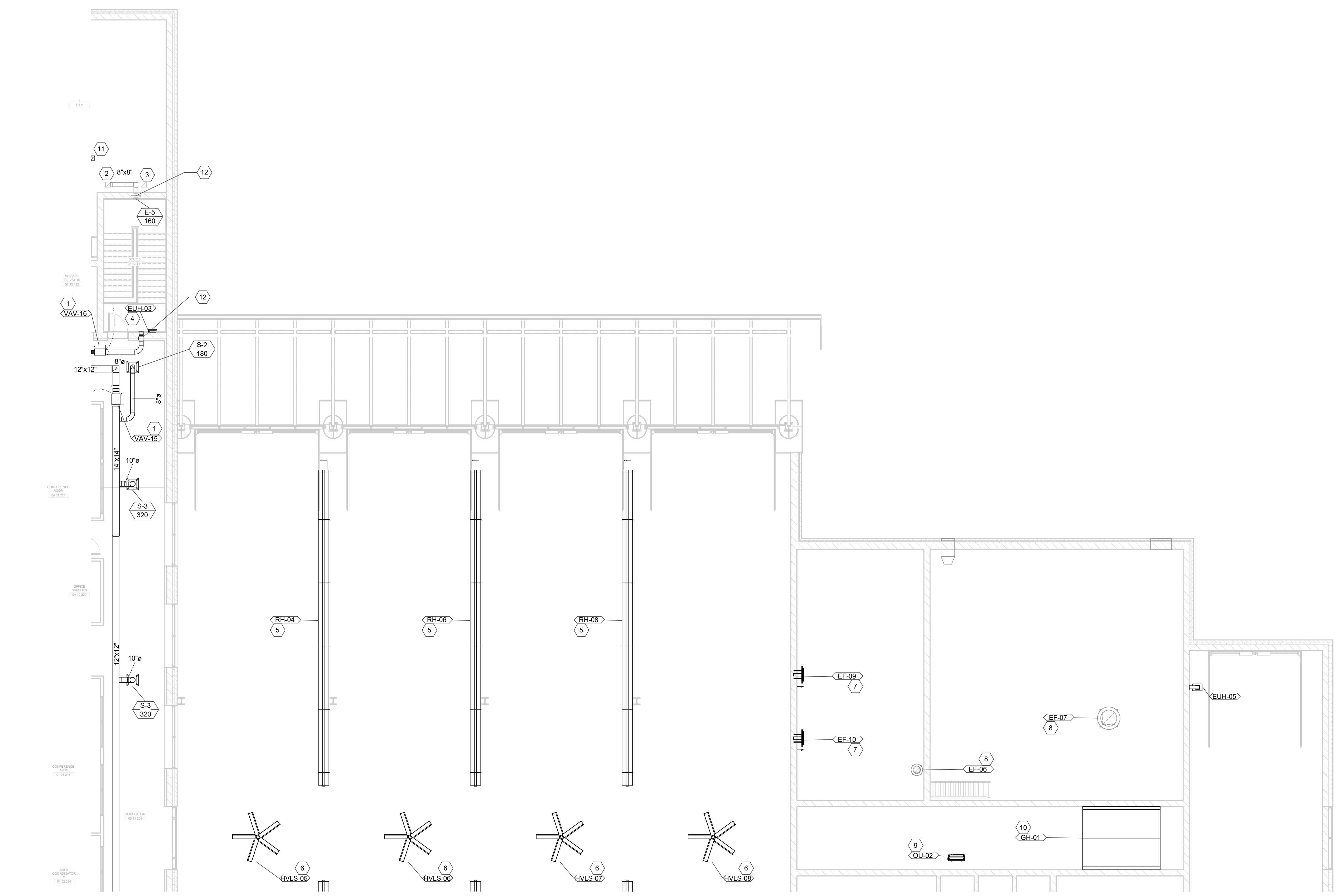
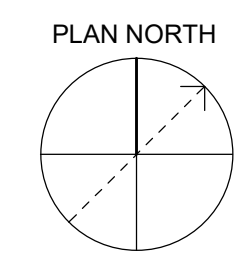
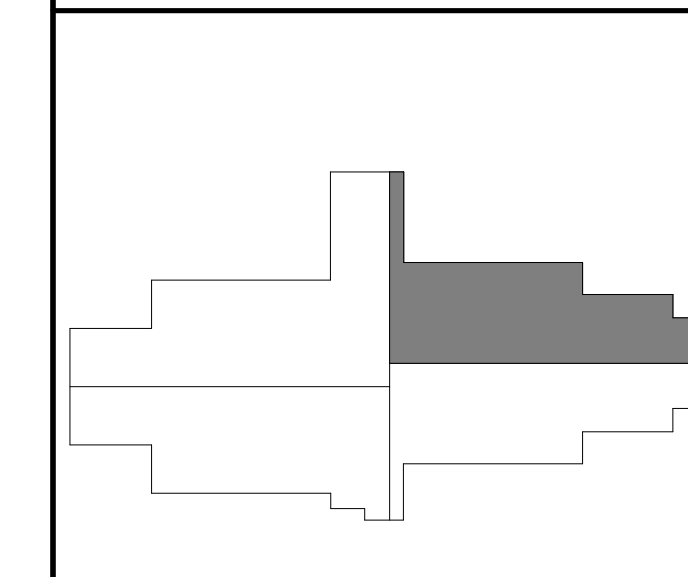
- FURNISH AND INSTALL VAV TERMINAL UNIT. MAINTAIN ALL MANUFACTURER'S REQUIRED CLEARANCES. SEE SCHEDULES AND DETAILS FOR MORE INFORMATION.
- PROVIDE DUCTWORK UP TO EF-05, SEE SHEET MH101 FOR CONTINUATION.
- PROVIDE DUCTWORK UP TO EF-04, SEE SHEET MH101 FOR CONTINUATION.
- FURNISH AND INSTALL WALL-MOUNTED ELECTRIC UNIT HEATER. BASE OF UNIT SHALL BE 3'-0" AFF. SEE SCHEDULES AND DETAILS FOR MORE INFORMATION.
- FURNISH AND INSTALL GAS FIRED RADIANT HEATER. MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCES. SEE SCHEDULES AND DETAILS FOR MORE INFORMATION.
- FURNISH AND INSTALL HIGH VELOCITY, LOW SPEED FAN. MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCES FROM STRUCTURE AND LIGHTING. SEE SCHEDULES AND DETAILS FOR MORE INFORMATION.
- FURNISH AND INSTALL WALL-MOUNTED EXHAUST FAN. BASE OF FAN SHALL APPROXIMATELY BE 22'-0" AFF. SEE SCHEDULES AND DETAILS FOR MORE INFORMATION.
- FURNISH AND INSTALL NEW ROOF MOUNTED EXHAUST FAN. SEE SCHEDULES AND DETAILS FOR MORE INFORMATION. INSTALL PER MANUFACTURER'S RECOMMENDATION.
- FURNISH AND INSTALL NEW ROOF MOUNTED OUTDOOR MINI SPLIT UNIT. SEE SCHEDULES AND DETAILS FOR MORE INFORMATION. INSTALL PER MANUFACTURER'S RECOMMENDATION.
- FURNISH AND INSTALL NEW ROOF MOUNTED GRAVITY INTAKE HOOD. SEE SCHEDULES AND DETAILS FOR MORE INFORMATION. INSTALL PER MANUFACTURER'S RECOMMENDATION.
- SUPPLY DUCTWORK DOWN TO FIRST LEVEL. SEE SHEET MH001 FOR CONTINUATION.
- FURNISH AND INSTALL FIRE DAMPER WHERE DUCTWORK PENETRATES THE FIRE-RATED WALL.

SECOND LEVEL - AREA C - HVAC PLAN
 KENTON COUNTY SCHOOL DISTRICT SUPPORT OPERATIONS CENTER
 11800 TAYLOR MILL ROAD, INDEPENDENCE, KY 41051

DESIGNED:	JJS
DRAWN:	JJS
REVIEWED:	CVS
APPROVED:	CVS

REVISIONS	DATE	BY

AREA KEY PLAN



1 SECOND LEVEL - AREA C - HVAC PLAN
 SCALE: 1/8" = 1'-0"

DATE: MARCH 30, 2023
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 SHEET NO. MH407

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CONSTRUCTION DOCUMENTS

GENERAL NOTES:

- SEE SHEET M001 FOR MECHANICAL LEGEND AND GENERAL NOTES.
- COORDINATE WITH OTHER DISCIPLINES PRIOR TO INSTALLATION OF MECHANICAL COMPONENTS.

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SHEET KEYNOTES

- FURNISH AND INSTALL GAS FIRED UNIT HEATER. MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCES. SEE SCHEDULES AND DETAILS FOR MORE INFORMATION.
- FURNISH AND INSTALL WALL-MOUNTED EXHAUST FAN. BASE OF FAN SHALL APPROXIMATELY BE 10'-0" AFF. SEE SCHEDULES AND DETAILS FOR MORE INFORMATION.
- FURNISH AND INSTALL OPERABLE LOUVER. BASE OF LOUVER SHALL APPROXIMATELY BE 10'-0" AFF. SEE SCHEDULES AND DETAILS FOR MORE INFORMATION.

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WAREHOUSE ALTERNATE - MECHANICAL PLAN
KENTON COUNTY SCHOOL DISTRICT SUPPORT OPERATIONS CENTER
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DATE:	MARCH 30, 2023
SCALE:	1/8" = 1'-0"
SHEET NO.:	MK401

EXHAUST FAN SCHEDULE

MARK	MANUFACTURER	MODEL	CFM	ESP (IN H2O)	SONES	DRIVE TYPE	RPM	V/PHHZ	HP	FLA	REMARKS
EF-16	GREENHECK	CUE-090-VG	200	0.13 in-wg	1.4	Direct	738	115/1/60	0.10	2 A	ALL

- REMARKS:
- PROVIDE WITH UNIT MOUNTED DISCONNECT.
 - PROVIDE WITH MOTORIZED DAMPER.
 - OPERATION OF EXHAUST FAN SHALL BE INTERLOCKED WITH THE OPERATION OF THE LIGHTING FOR THE WAREHOUSE.
 - CONNECT EXHAUST FAN TO DDC MONITORING SYSTEM. PROVIDE FAN STATUS PARAMETER TO SYSTEM.
- OTHER ACCEPTABLE MANUFACTURERS INCLUDE: RUSKIN, UNITED ENTERTECH. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

LOUVER SCHEDULE

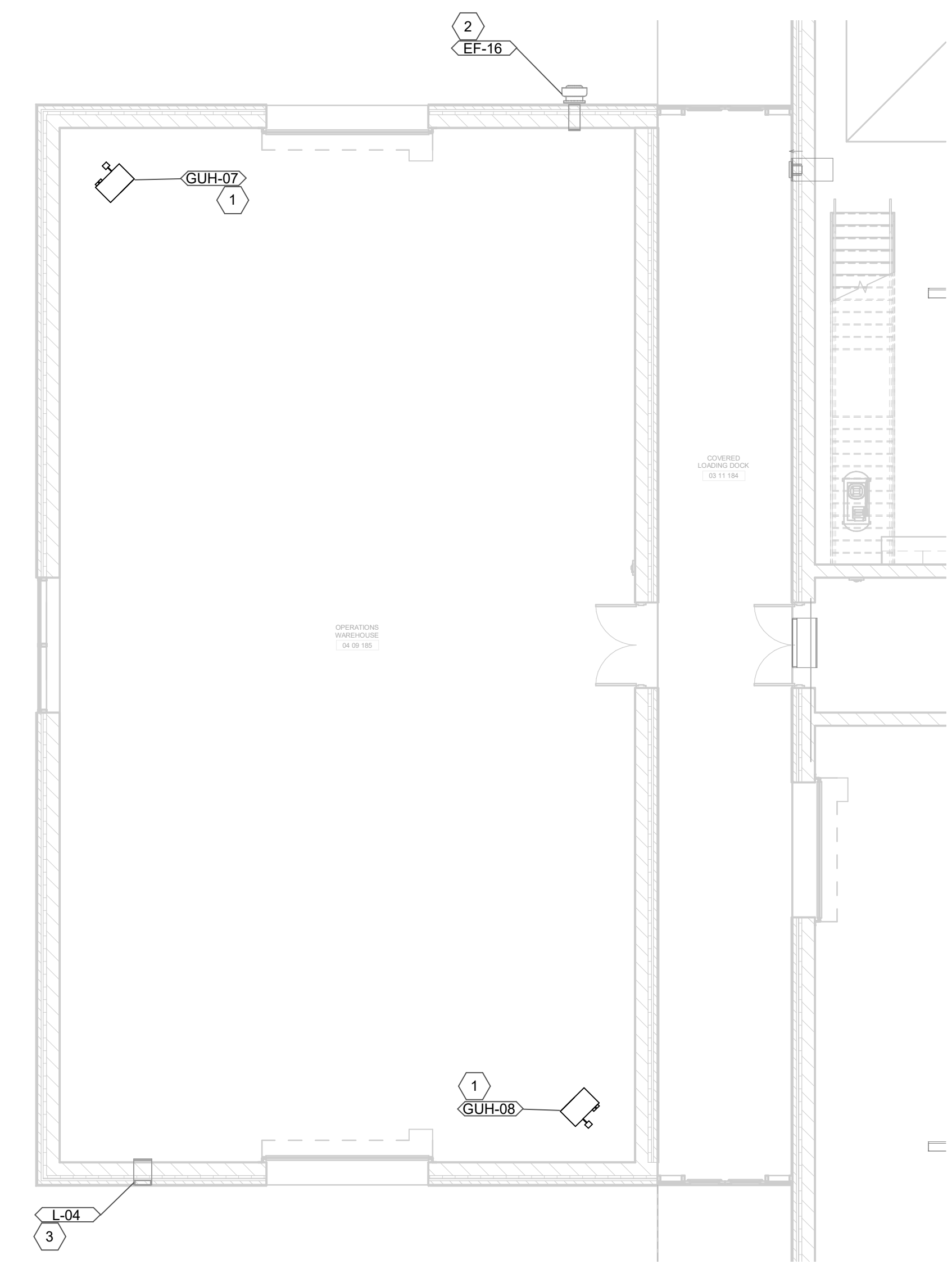
MARK	MANUFACTURER	MODEL	INTAKE/EXHAUST	WIDTH	HEIGHT	DEPTH	CFM	PRESSURE DROP (IN)	FREE AREA (SQ.FT.)	VELOCITY (FPM)	REMARKS
L-04	GREENHECK	ECD-401	Intake	1'-4"	1'-0"	0'-4"	200	0.038	0.4	473	ALL

- REMARKS:
- LOUVER COLOR SELECTED BY ARCHITECT.
 - COORDINATE ALL LOUVER LOCATIONS WITH ARCHITECT AND ENGINEER PRIOR TO INSTALLATION.
 - ALUMINUM CONSTRUCTION.
 - DRAINABLE BLADES.
 - PROVIDE INSECT SCREEN.
 - PROVIDE WITH FACTORY MOUNTED DAMPER ACTUATOR. CONTROLS CONTRACTOR SHALL PROVIDE REQUIRED POWER TO ACTUATOR.
 - INTERLOCK OPERATION OF DAMPER WITH EF-16.
- OTHER ACCEPTABLE MANUFACTURERS INCLUDE: CARNES, COOK. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

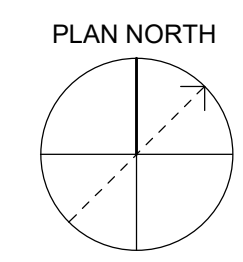
GAS FIRED UNIT HEATER

MARK	MANUFACTURER	MODEL	CFM	INPUT (MBH)	OUTPUT (MBH)	HP	AMPS	FLUE SIZE	V/PHHZ	MCA	MOCP	REMARKS
GUH-07	REZNOR	UBX	759	45	36.9	1/6	3.7	4	115/1/60	5.6	15	ALL
GUH-08	REZNOR	UBX	759	45	36.9	1/6	3.7	4	115/1/60	5.6	15	ALL

- REMARKS:
- HORIZONTAL GAS FIRED UNIT HEATER.
 - PROVIDE FLUE AS REQUIRED BY MANUFACTURER AND ROUTE PER PLANS.
 - PROVIDE WALL MOUNTED THERMOSTAT.
 - INSTALL AS HIGH AS POSSIBLE.
- OTHER ACCEPTABLE MANUFACTURERS INCLUDE: TRANE, MODINE. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

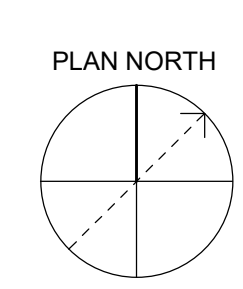
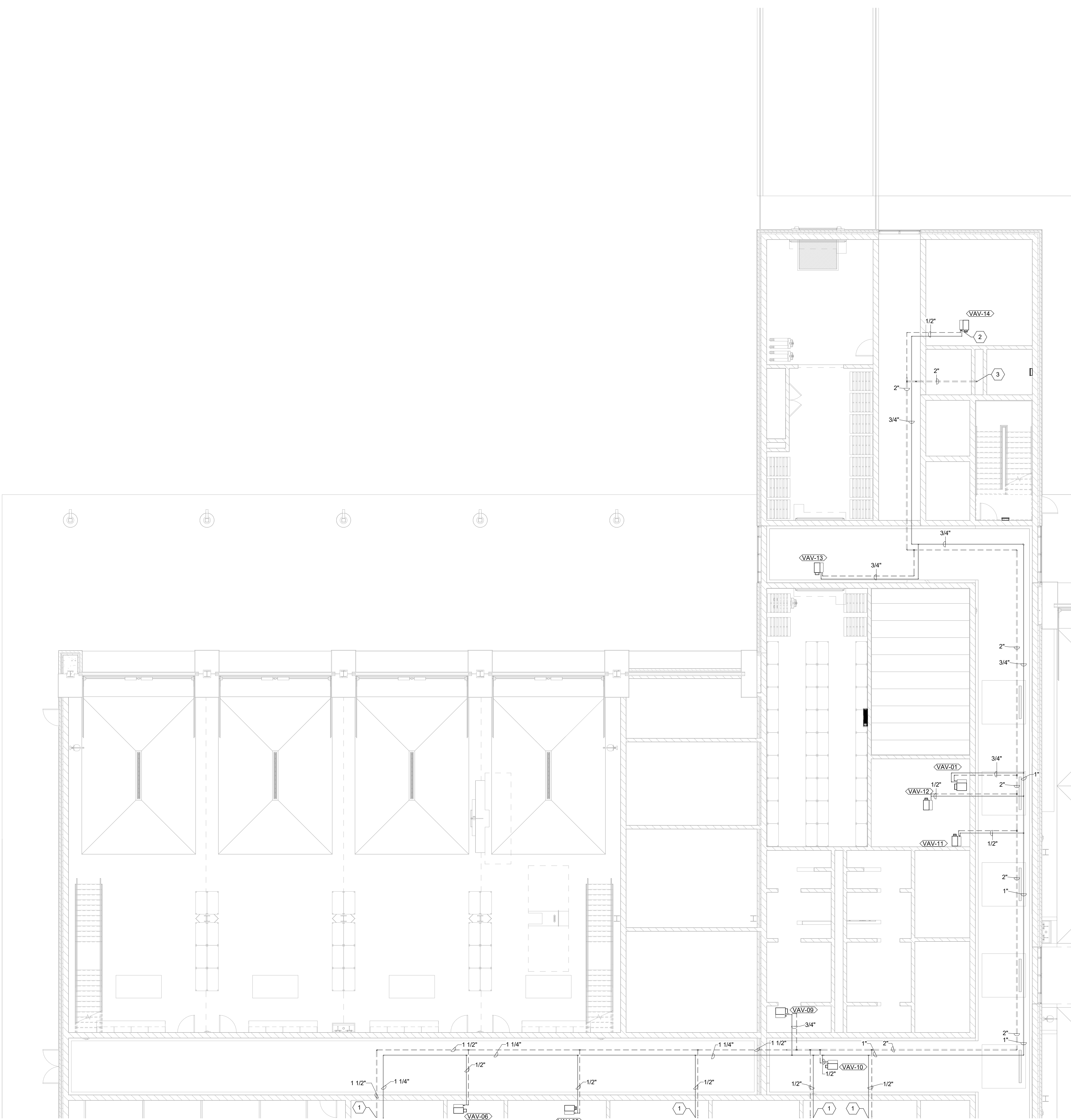


1 FIRST LEVEL - WAREHOUSE ALTERNATE - MECHANICAL PLAN
SCALE: 1/8" = 1'-0"

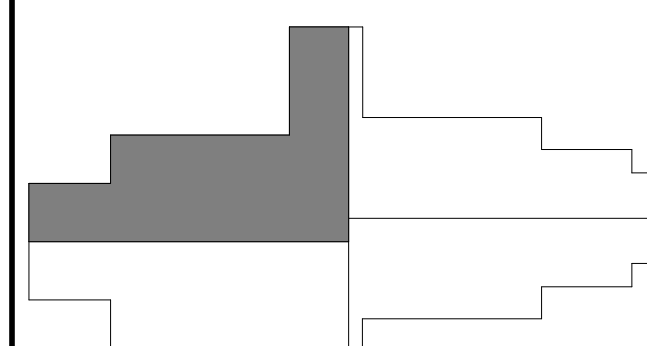


1 FIRST LEVEL - AREA A - MECHANICAL PIPING PLAN

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



AREA KEY PLAN



GENERAL NOTES:

- SEE SHEET M001 FOR MECHANICAL LEGENDS AND GENERAL NOTES.
- COORDINATE WITH OTHER DISCIPLINES PRIOR TO INSTALLATION OF MECHANICAL COMPONENTS.

SHEET KEYNOTES

- SEE SHEET MP402 FOR CONTINUATION.
- CONNECT HOT WATER SUPPLY AND RETURN PIPING TO NEW VAV BOX. SEE DETAIL FOR CONNECTION INFORMATION. TYPICAL.
- HYDRONIC PIPING UP TO SECOND FLOOR. SEE SHEET MP405 FOR CONTINUATION.

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 CLIENT PROJECT NO. BG 23-173
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FIRST LEVEL - AREA A - MECHANICAL PIPING PLAN
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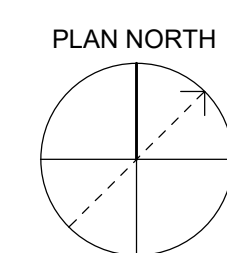
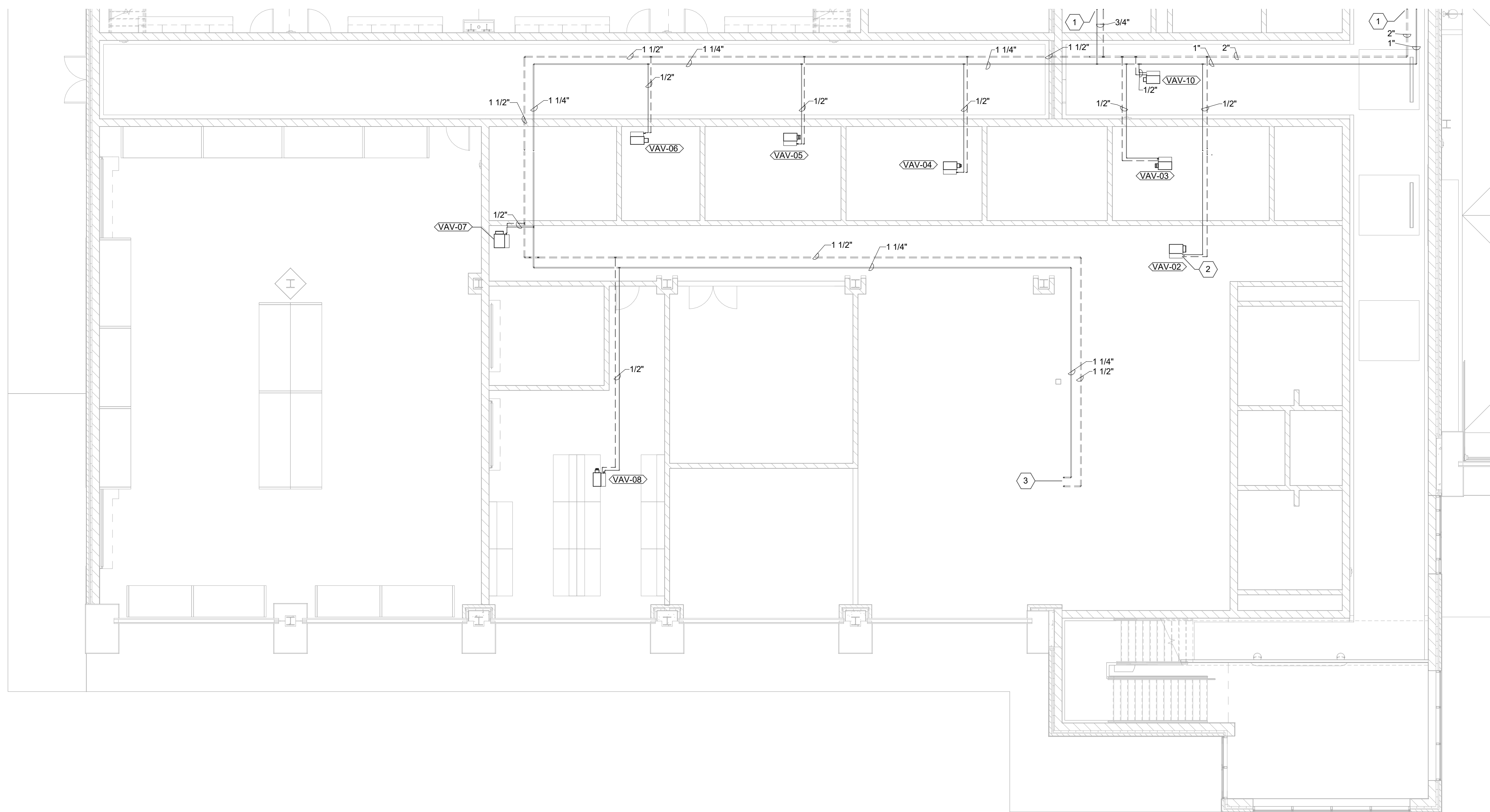
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DRAWN:	STAFF
REVIEWED:	CVS
APPROVED:	CVS

REVISIONS	DATE	BY

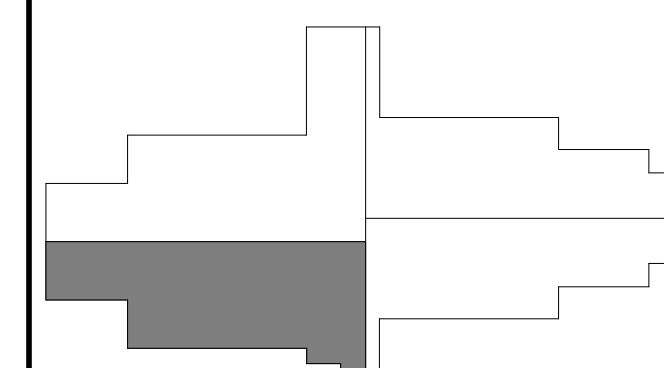
DATE:	MARCH 30, 2023
SCALE:	1/8" = 1'-0"
SHEET NO.:	MP401

1 FIRST LEVEL - AREA B - MECHANICAL PIPING PLAN

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



AREA KEY PLAN



GENERAL NOTES:

- SEE SHEET M001 FOR MECHANICAL LEGENDS AND GENERAL NOTES.
- COORDINATE WITH OTHER DISCIPLINES PRIOR TO INSTALLATION OF MECHANICAL COMPONENTS.

SHEET KEYNOTES

- SEE SHEET MP401 FOR CONTINUATION.
- CONNECT HOT WATER SUPPLY AND RETURN PIPING TO NEW VAV BOX. SEE DETAIL FOR CONNECTION INFORMATION. TYPICAL.
- HYDRONIC PIPING UP TO SECOND FLOOR. SEE SHEET MP406 FOR CONTINUATION.

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FIRST LEVEL - AREA B - MECHANICAL PIPING PLAN
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DATE: MARCH 30, 2023
 SCALE: 1/8" = 1'-0"
 SHEET NO. MP402

GENERAL NOTES:

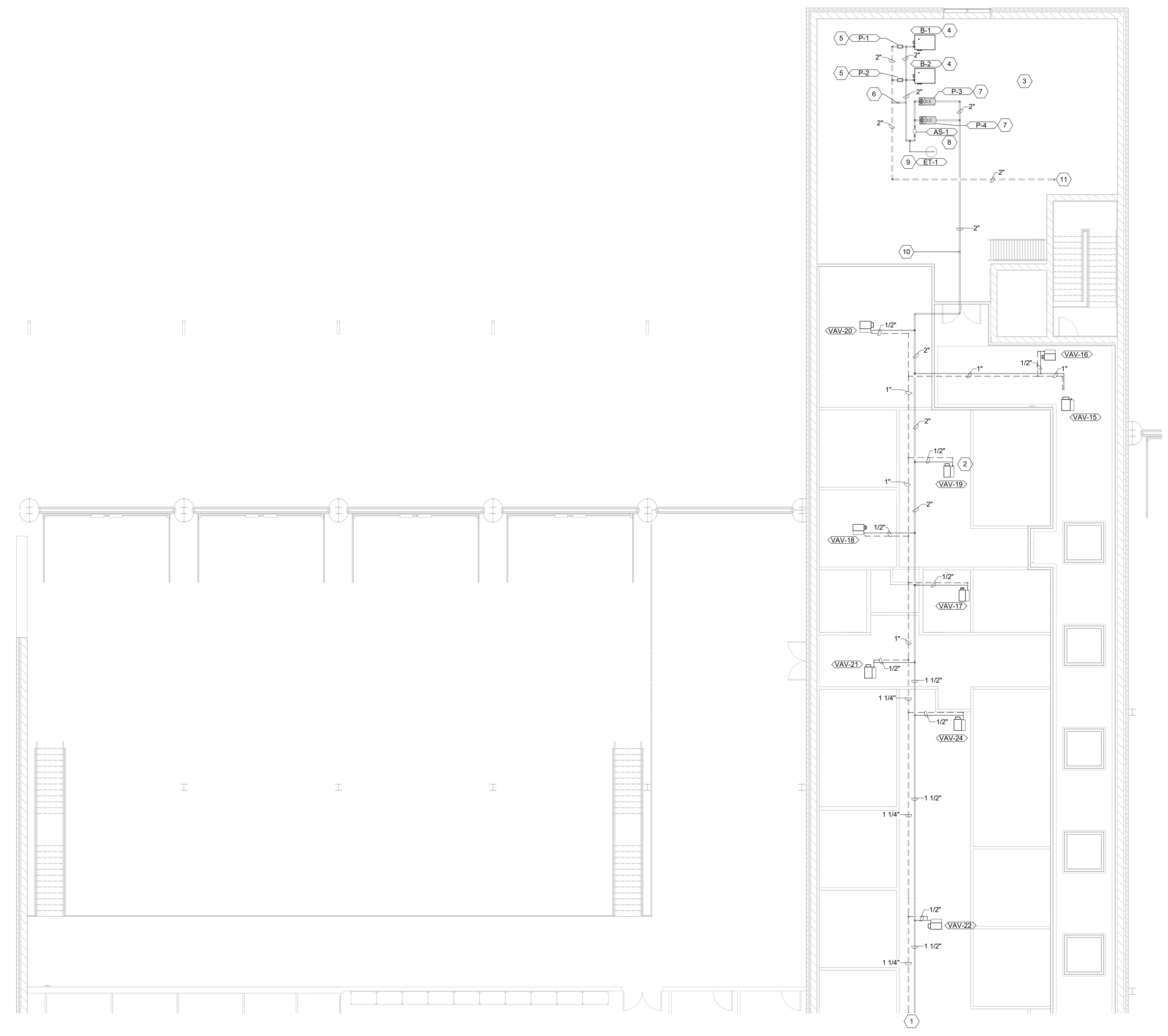
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SHEET KEYNOTES

- SEE SHEET MP406 FOR CONTINUATION.
- CONNECT HOT WATER SUPPLY AND RETURN PIPING TO NEW VAV BOX. SEE DETAIL FOR CONNECTION INFORMATION. TYPICAL.
- SEE SCHEMATIC MECHANICAL ROOM PIPING DIAGRAM DETAIL FOR MORE INFORMATION.
- FURNISH AND INSTALL NEW GAS-FIRED BOILER. INSTALL PER MANUFACTURER'S RECOMMENDATION. PROVIDE WITH 6" HOUSEKEEPING PAD. SEE DETAILS AND SCHEDULES FOR MORE INFORMATION.
- FURNISH AND INSTALL NEW INLINE BOILER CIRCULATING PUMP. INSTALL PER MANUFACTURER'S RECOMMENDATION. SEE DETAILS AND SCHEDULES FOR MORE INFORMATION.
- BYPASS PIPING WITH CHECK VALVE.
- FURNISH AND INSTALL NEW BASE MOUNTED ZONE PUMP. INSTALL PER MANUFACTURER'S RECOMMENDATION. PROVIDE WITH 6" HOUSEKEEPING PAD. SEE DETAILS AND SCHEDULES FOR MORE INFORMATION.
- FURNISH AND INSTALL NEW AIR SEPARATOR. INSTALL PER MANUFACTURER'S RECOMMENDATION. MOUNT AS HIGH AS POSSIBLE. SEE DETAILS AND SCHEDULES FOR MORE INFORMATION.
- FURNISH AND INSTALL NEW EXPANSION TANK. INSTALL PER MANUFACTURER'S RECOMMENDATION. PROVIDE WITH 6" HOUSEKEEPING PAD. SEE DETAILS AND SCHEDULES FOR MORE INFORMATION.
- PIPING TO MAKE-UP WATER STATION. SEE DETAIL FOR MORE INFORMATION.
- HYDRONIC PIPING DOWN TO FIRST FLOOR. SEE SHEET MP401 FOR CONTINUATION.

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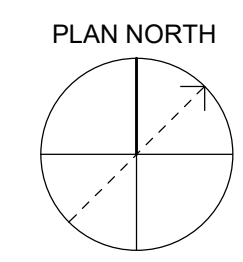
SECOND LEVEL - AREA A - MECHANICAL PIPING PLAN
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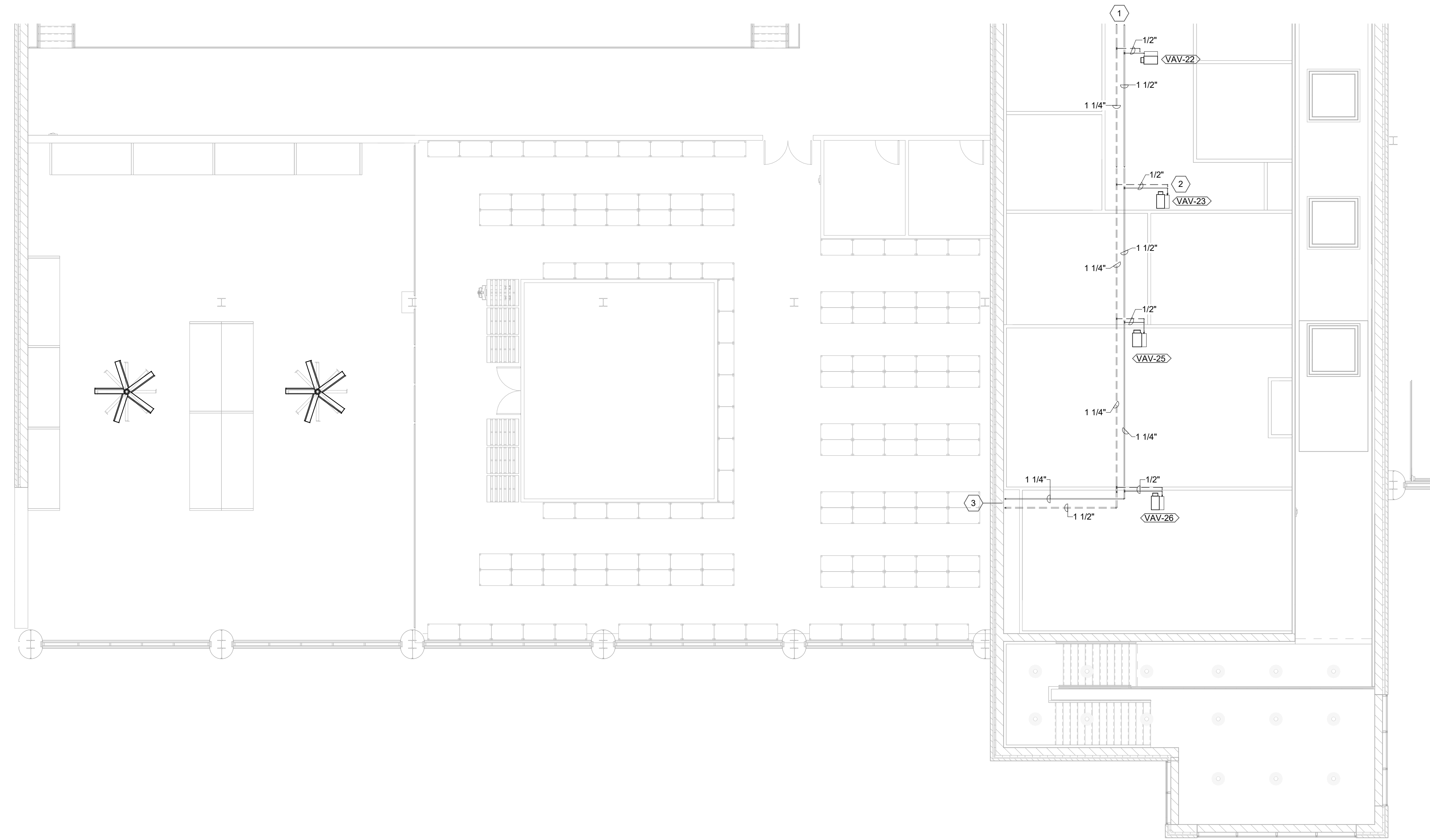
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DRAWN	STAFF
REVIEWED	CVS
APPROVED	CVS

AREA KEY PLAN

DATE: MARCH 30, 2023
 SCALE: 1/8" = 1'-0"
 SHEET NO. MP405

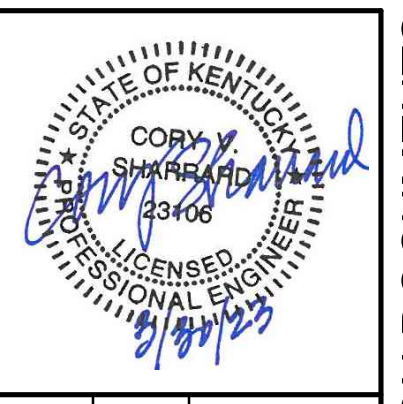
1 SECOND LEVEL - AREA A - MECHANICAL PIPING PLAN
 SCALE: 1/8" = 1'-0"





GENERAL NOTES:

- SEE SHEET M001 FOR MECHANICAL LEGEND AND GENERAL NOTES.
- COORDINATE WITH OTHER DISCIPLINES PRIOR TO INSTALLATION OF MECHANICAL COMPONENTS.


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 CLIENT PROJECT NO. BG 23-173
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SHEET KEYNOTES

- SEE SHEET MP405 FOR CONTINUATION.
- CONNECT HOT WATER SUPPLY AND RETURN PIPING TO NEW VAV BOX. SEE DETAIL FOR CONNECTION INFORMATION. TYPICAL.
- HYDRONIC PIPING DOWN TO FIRST FLOOR. SEE SHEET MP402 FOR CONTINUATION.

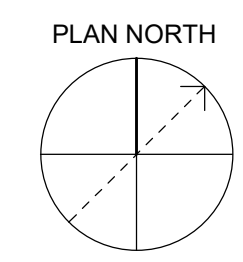
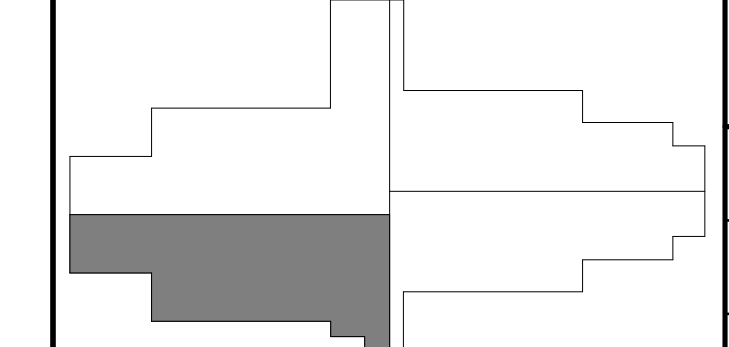

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SECOND LEVEL - AREA B - MECHANICAL PIPING PLAN
 KENTON COUNTY SCHOOL DISTRICT SUPPORT OPERATIONS CENTER
 11800 TAYLOR MILL ROAD, INDEPENDENCE, KY 41051

DESIGNED:	STAFF
DRAWN:	STAFF
REVIEWED:	CVS
APPROVED:	CVS

NO.	REVISIONS	DATE	BY

AREA KEY PLAN



DATE:	MARCH 30, 2023
SCALE:	1/8" = 1'-0"
SHEET NO.:	MP406

1 SECOND LEVEL - AREA B - MECHANICAL PIPING PLAN
 SCALE: 1/8" = 1'-0"

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