GENERAL MECHANICAL NOTES

- 1. ALL WORK SHALL BE IN COMPLIANCE WITH STATE AND LOCAL CODES.
- 2. THE CONTRACTOR SHALL APPLY FOR ALL PERMITS NECESSARY FOR PROPER COMPLETION OF THE WORK. THE CITY SHALL PAY THE ASSOCIATED FEES FOR ALL
- 3. INSTALL ALL EQUIPMENT IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
- 4. VERIFY ALL EXISTING CONDITIONS. NOTIFY ENGINEER OF ANY CONFLICTS BETWEEN CONTRACT DRAWINGS AND ACTUAL CONDITIONS.
- 5. THESE DRAWINGS ARE DIAGRAMMATIC AND SHALL NOT BE SCALED. ADDITIONAL DATA SHALL BE FROM THE ENGINEER THROUGH WRITTEN CLARIFICATION ONLY. VERIFY ALL EXISTING CONDITIONS, ELEVATIONS, AND DIMENSIONS BEFORE PROCEEDING WITH ANY PORTION OF ANY WORK. THE CONTRACTOR SHALL PROVIDE ALL OFFSETS AND TRANSITIONS REQUIRED TO MEET EXISTING CONDITIONS.
- 6. THE CONTRACTOR SHALL PERFORM WORK IN A SKILLED AND PROFESSIONAL MANNER. 7. ALL CONTRACTORS ARE RESPONSIBLE TO FIELD COORDINATE WORK SCHEDULE WITH OWNER REPRESENTATIVE.
- 8. THE CONTRACTOR SHALL WORK AND COORDINATE WITH THE OTHER TRADES.
- 9. ALL EQUIPMENT SHALL BE NEW AND IN UNDAMAGED CONDITION. ANY EQUIPMENT FOUND DEFECTIVE SHALL BE IMMEDIATELY REMOVED FROM THE PROJECT.
- 10. DUCT MATERIAL SHALL BE GALVANIZED OR ALUMINUM CONSTRUCTED IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARD 2005 AND SMACNA HVAC AIR DUCT LEAKAGE MANUAL 2012 FOR THE PRESSURE AND SEAL CLASS LISTED IN THE PROJECT DUCTWORK/INSULATION SCHEDULE.
- 11. DUCT SIZES LISTED ON PLANS ARE THE REQUIRED CLEAR INTERIOR DIMENSIONS.

- 12. SUPPLY AND RETURN BRANCH DUCTS MAY BE INSULATED FLEX DUCT IF THE RUN IS LESS THAN 3 FEET IN LENGTH. ANY LENGTHS OVER 3 FEET SHALL BE RIGID DUCTWORK, DUCT SHALL BE THE SAME SIZE AS THE LISTED DIFFUSER THROAT UNLESS NOTED OTHERWISE.
- PROVIDE VOLUME CONTROL DAMPERS WHERE INDICATED AND AT ALL TAKEOFFS, BOTH SUPPLY AND RETURN SYSTEMS, AND MAJOR DUCT RUNS. DAMPERS SHALL BE FACTORY-FABRICATED WITH ZINC-PLATED, DIE-CAST CONTROL HARDWARE. CONTROL HARDWARE SHALL INCLUDE HEAVY GAUGE DIAL AND HANDLE WITH ELEVATED PLATFORM FOR INSULATED DUCT MOUNTING.
- PROVIDE TURNING VANES IN ALL RECTANGULAR ELBOWS CONFORMING TO SMACNA HVAC DUCT CONSTRUCTION STANDARD 2005 FIG. 4-2 TYPE RE-3 WITH STANDARD RADIUS. WHERE SPACE PERMITS, PROVIDE RADIUSED ELBOWS IN ACCORDANCE WITH FIGURES 4-2, TYPE RE-1.
- 15. ALL RECTANGULAR MAIN TO RECTANGULAR BRANCH CONNECTIONS, BOTH CONVERGING AND DIVERGING CONFIGURATIONS, SHALL HAVE A 45 DEG. ENTRY TAP CONSTRUCTED IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARD 2005 FIG. 4-6.
- 16. MECHANICAL CONTRACTOR TO REPAIR ANY DAMAGE DONE TO THE FIRE PROOFING WHILE INSTALLING THE MECHANICAL TRADES. SEAL ALL PENETRATIONS THROUGH RATED STRUCTURES WITH UL LISTED FIRE SEAL DESIGNED FOR THE SPECIFIED APPLICATION.
- THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES TO PROTECT THE
- PUBLIC AND ADJACENT PROPERTIES FROM DAMAGE THROUGHOUT CONSTRUCTION. 18. UPON PROJECT COMPLETION, RECORD (AS-BUILT) DRAWINGS SHALL BE PROVIDED BY THE CONTRACTOR TO THE OWNER AND ENGINEER. ALL CHANGES IN PIPING AND

DUCTWORK ARRANGEMENTS SHALL BE NOTED ON THE RECORD DRAWINGS.

	EXHAUST AIR DUCT (DOWN)	ACC	AIR COOLED CHILLER
	EXHAUST AIR DUCT (UP)	AD AF	ACCESS DOOR AIR FILTER
	RETURN AIR DUCT (DOWN)	AHU B	AIR HANDLING UNIT BOILER
	RETURN AIR DUCT (UP)	BDD CD	BACK DRAFT DAMPER CEILING DIFFUSER
	OUTSIDE OR SUPPLY AIR DUCT (UP)	CR	CEILING REGISTER CHILLED WATER BUFFER TANK EXHAUST FAN
]><[]	OUTSIDE OR SUPPLY AIR DUCT (DOWN)	EG ERV	EXHAUST GRILLE ENERGY RECOVERY VENTILATO
24x12	DUCT SIZE	ET FD	EXPANSION TANK FIRE DAMPER
\	NEW DUCTWORK	H HX L	HUMIDIFIER HEAT EXCHANGER LOUVER
+++++++++	FLEX DUCT	MD NC	MOTOR OPERATED DAMPER NORMALLY CLOSED
>	EXISTING DUCTWORK	NO OA	NORMALLY OPEN OUTSIDE AIR
<u></u>	DEMOLITION LINETYPE	OED RA	OPEN END DUCT RETURN AIR
	SUPPLY AIR CEILING DIFFUSER	RF RG RH	RETURN FAN RETURN AIR GRILLE HOT WATER RE-HEAT
	CEILING DIFFUSER W/BLANKOFF	RTU SA SAT	ROOFTOP UNIT SUPPLY AIR SOUND ATTENUATORS
	RETURN AIR GRILLE	SF SG SR	SUPPLY FAN SUPPLY GRILLE SUPPLY REGISTER
	EXHAUST AIR GRILLE	TG UH	TRANSFER GRILLE UNIT HEATER
DIFFUSER, (GRILLE, AND REGISTER CALL-OUTS		
7	CALL-OUT/SIZE CFM		
-	MANUAL BALANCING DAMPER		
→ P	PIPE PENETRATION THROUGH FIRE RATED WALL		
X	FIRE DAMPER (X=F) SMOKE DAMPER (X=S) FIRE/SMOKE DAMPER (X=C)		
M	MOTORIZED DAMPER		
-	SCHEDULED EQUIPMENT TAG		
T	THERMOSTAT		
\bigcirc H	HUMIDISTAT		
(C)	CO2 SENSOR		
0	OCCUPANCY SENSOR		
<u>(S)</u>	REMOTE SENSOR		
<u>\$</u>	DUCT SMOKE DETECTOR		
Θ	NEW TO EXISTING		
	EXTENT OF DEMO		

MECHANIC	CAL F	PIPINO	G LEGEND
DOUBLE ELBOW DOWN	+G+	Ė+	DOUBLE ELBOW DOWN (AT CORNER)
ELBOW DOWN	C+	0+	ELBOW UP
TEE	++	 +2+-	TEE DOWN
ELBOW	t ₊	+0+	TEE UP
ELBOW DOWN TO TEE		E	END CAP
TYPICAL TEE CONNECTION (PLANS ONLY)	+		REDUCER
AUTOMATIC AIR VENT		 	NEW TO EXISTING PIPE CONNECTION
WATER FLOW MEASURING DEVICE		─	FLOW DIRECTION ARROW
PIPE ANCHOR			MANUAL AIR VENT (MAV)
PIPE GUIDE / SLEEVE			PRESSURE GAUGE
BALANCING VALVE			UNION
CIRCUIT SETTER			PRESSURE RELIEF VALVE
PRESSURE REDUCING VALVE		PT	PRESSURE/TEMPERATURE PORT
BALL VALVE/SHUT-OFF VALVE			AIR SEPARATOR
SILENT CHECK VALVE			
			PUMP OR
GLOBE VALVE			PUMP
TWO-WAY VALVE			FLEX CONNECTION
THREE-WAY VALVE			THERMOMETER
SHUT-OFF COCK	<u> </u>		COIL
STRAINER	—	•	PIPE VIEW
STRAINER WITH BLOWDOWN	+		
SUCTION DIFFUSER W/ STRAINER	-SD-		
AND BLOWDOWN			
DRAIN VALVE	*		
VACUUM BREAKER			
FLOW CONTROL VALVE W/ PRESSURE DIFFERENTIAL SENSOR	DP		
DIFFERENTIAL PRESSURE SENSOR	<u>OP</u>		
		•	

							AHU-1											
							ASHRAE STAND	ARD 62.1-2007					SBS TABLE 364.0403 (WI. CODE)					
ROOM OR SPACE DESIGNATION OCCUPANCY CLASSIFICATION		FLOOR AREA (square feet)	PEOPLE/ 1000 SQ.FT.	# OF OCCUPANTS	EXHAUST RATE(CFM/SQFT)	TOTAL EXHAUST	PEOPLE OUTDOOR AIR RATE (CFM/PERSON)	TOTAL PEOPLE OUTDOOR AIR (CFM)	AREA OUTDOOR AIR RATE (CFM/SQ.FT.)	TOTAL AREA OUTDOOR AIR (CFM)	TOTAL OUTDOOR AIR REQ'D FOR SPACE (CFM)	PEOPLE/ 1000 SQ.FT.	# OF OCCUPANTS	PEOPLE OUTDOOR AIR RATE (CFM/PERSON)	TOTAL OUTDOOR AIR (CFM)			
Classroom 1 #121	Classroom	900	10	30	NR	0	10	300	0.12	108	410	50	30	7.5	225			
Classroom 2 #122	Classroom	900	10	30	NR	0	10	300	0.12	108	408	50	30	7.5	225			
Classroom 3 #123	Classroom	900	10	30	NR	0	10	300	0.12	108	408	50	30	7.5	225			
Circulation #110	Corridors	1590	0	0	NR	0	0	0	0.06	95	95	0	0	7.5	0			
Office Space #210	Office Space	1268	5	6	NR	0	5	30	0.06	76	106	7	6	7.5	45			
Director Office #213	Office Space	115	5	3	NR	0	5	15	0.06	7	22	7	3	7.5	23			
Storage #211	Storage	260	0	0	NR	0	0	0	0.12	31	31	0	0	7.5	0			
Lobby #201	Corridors	450	30	4	NR	0	5	20	0.06	27	47	60	0	7.5	0			
JC #101**	Janitor Closet	45	NR	NR	2	90	0	0	0	0	0	0	NA	7.5	0			
Toilet #104**	Restroom	60	NR	1 Fixture	75/ Fixture	75	0	0	0	0	0	0	NA	7.5	0			
Toilet #105**	Restroom	60	NR	1 Fixture	75/ Fixture	75	0	0	0	0	0	0	NA	7.5	0			
Toilet #202**	Restroom	60	NR	1 Fixture	75/ Fixture	75	0	0	0	0	0	0	NA	7.5	0			

TOTAL EXHAUST AIR (CFM)	315		
TOTAL OUTSIDE AIR (CFM)		1528	743

	MECHANICAL SHEET INDEX
	WEST WITHOUT ESTILET HISEX
M001	MECHANICAL TITLE SHEET
MD111	GREENHOUSE MECHANICAL PIPING DEMOLITION PLAN
MD131	COMMONS AREA MECHANICAL DEMOLITION PLAN
M101	LEARNING CENTER MECHANICAL DUCTWORK PLAN
M102	LEARNING CENTER MECHANICAL PIPING PLAN
M103	LEARNING CENTER RADIANT HEAT AND COOL
M111	GREENHOUSE MECHANICAL PIPING PLAN
M112	ENLARGED PLANS AND SECTIONS
M113	ENLARGED PLANS AND SECTIONS
M131	COMMONS AREA MECHANICAL PIPING PLAN
M201	MECHANICAL DETAILS
M202	MECHANICAL DETAILS
M301	MECHANICAL CONTROLS SCHEMATICS
M302	MECHANICAL CONTROLS SCHEMATICS
M303	MECHANICAL CONTROLS SCHEMATICS
M304	MECHANICAL CONTROLS SCHEMATICS
M401	MECHANICAL SCHEDULES
M402	MECHANICAL SCHEDULES

ABBREV	'IATIONS
A AMP	IN INCH
ADD ADDENDUM ADDL ADDITIONAL	INSUL INSULATION
ADJ ADJUSTABLE	J-BOX JUNCTION BOX
AFF ABOVE FINISH FLOOR AFG ABOVE FINISH GRADE	LAT LEAVING AIR TEMPERATURE
AHU AIR HANDLER UNIT AI ANALOG INPUT	LB POUND LLT LEAVING LIQUID TEMPERATURE
ALT ALTERNATE	LOC LOCATION
ANNC ANNUNCIATOR AO ANALOG OUTPUT	LPR LOW PRESSURE RETURN LPS LOW PRESSURE STEAM
APPRX APPROXIMATE ARCH ARCHITECT, ARCHITECTURAL	LV LOW VOLTAGE LWT LEAVING WATER TEMPERATURE
BDD BACK DRAFT DAMPER BLDG BUILDING	MA MAKE-UP AIR OR MIXED AIR MAX MAXIMUM
BI BLACK IRON BOD BOTTOM OF DUCTWORK	MBH 1000 BTU PER HOUR MC MECHANICAL CONTRACTOR
BOP BOTTOM OF PIPE	MCA MINIMUM CIRCUIT AMPS
BOT BOTTOM BSMT BASEMENT	MECH MECHANICAL MIN MINIMUM
BTUH BRITISH THERMAL UNIT PER HOUR BTWN BETWEEN	MFR MANUFACTURER
	NFC NOT FOR CONSTRUCTION
C CENTER CC COOLING COIL	NIC NOT IN CONTRACT NTS NOT TO SCALE
CD CEILING DIFFUSER CFM CUBIC FEET PER MINUTE	OA OUTSIDE AIR
CHAR CHARACTERISTICS	OC ON CENTER
CI CAST IRON CL CENTERLINE	OED OPEN END DUCT OPNG OPENING
CLR CLEAR CO CLEAN OUT	OPP OPPOSITE
COL COLUMN	P PUMP
COMP COMPRESSOR CONC CONCRETE	PC PLUMBING CONTRACTOR PERP PERPENDICULAR
COND CONDENSATE CONT CONTINUOUS	PLBG PLUMBING PNL PANEL
COP COEFFICIENT OF PERFORMANCE	PPH POUNDS PER HOUR
CR CEILING REGISTER CW COLD WATER	PRES PRESSURE PSF POUNDS PER SQUARE FOOT
CHWR CHILLED WATER RETURN CHWS CHILLED WATER SUPPLY	PSI POUNDS PER SQUARE INCH PSIG POUNDS PER SQUARE INCH GAUGE
DB DRY BULB	PWR POWER
DEG DEGREE	QTY QUANTITY
DEPT DEPARTMENT DET DETAIL	R RADIUS
DF DRINKING FOUNTAIN DG DOOR GRILLE	RA RETURN AIR RD ROOF DRAIN
DI DIGITAL INPUT	REL RELIEF
DIA OR DIAMETER DIM DIMENSION	REQD REQUIRED REV REVERSE OR REVISION
DN DOWN DO DIGITAL OUTPUT	RG RETURN AIR GRILLE RPM REVOLUTIONS PER MINUTE
DW DEIONIZED WATER DWG DRAWING	RTU ROOF TOP UNIT
	SA SUPPLY AIR
EA EXHAUST AIR EAT ENTERING AIR TEMPERATURE	SAN SANITARY SCH SCHEDULE
EC ELECTRICAL CONTRACTOR ECM ELECTRONIC CONTROL MODULE	SECT SECTION SEP SEPARATOR
EER ENERGY EFFICIENCY RATIO	SF SQUARE FEET
EF EXHAUST FAN EG EXHAUST GRILLE	SG SUPPLY GRILLE SHT SHEET
EL ELEVATION ELEC ELECTRICAL	SHWR SHOWER SIM SIMILAR
ELEV ELEVATOR ELT ENTERING LIQUID TEMPERATURE	SP STATIC PRESSURE SPEC SPECIFICATIONS
EQ EQUAL	SQ SQUARE
EQUIP EQUIPMENT ERU ENERGY RECOVERY UNIT	SS STAINLESS STEEL
ESP EXTERNAL STATIC PRESSURE EST ESTIMATE OR ESTIMATED	T&B TEST AND BALANCE OR TOP AND BOTTOM
ET DIAPHRAGM EXPANSION TANK	T&P TEMPERATURE AND PRESSURE
ETR EXISTING TO REMAIN EWT ENTERING WATER TEMPERATURE	RELIEF VALVE TEMP TEMPERATURE OR TEMPORARY
EXIST EXISTING	TG TRANSFER GRILLE TYP TYPICAL
F&T FLOAT AND THERMOSTATIC FA FRESH AIR	
FCO FLOOR CLEANOUT	UNO UNLESS NOTED OTHERWISE
FD FLOOR DRAIN FLR FLOOR	V VOLT VAR VARIABLE OR VARIES
FPM FEET PER MINUTE FT FOOT (FEET)	VEL VELOCITY VERT VERTICAL
,	VFD VARIABLE FREQUENCY DRIVE
GA GAUGE/GAGE GAL GALLON	VOL VOLUME VS VENT STACK
GALV GALVANIZED GC GENERAL CONTRACTOR	VTR VENT THRU ROOF
GPM GALLONS PER MINUTE	W/ WITH
GYP GYPSUM	W/IN WITHIN W/O WITH OUT
HB HOSE BIB HORIZ HORIZONTAL	WB WET BULB WC WATER COLUMN (INCHES OF)
HP HORSEPOWER	WCO WALL CLEANOUT
HT HEIGHT HW HOT WATER	WG WATER GAUGE WP WEATHER PROOF
HWR HOT WATER RETURN HWS HOT WATER SUPPLY	WP WORKING PRESSURE WT WEIGHT

I/O INPUT/OUTPUT IA INSTRUMENT AIR IE INVERT ELEVATION

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ch

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Engineer under the Laws of the State of Wisconsin.

ENGINEER SEAL



Print Names: Larry Nemer Date: <u>JUNE 4, 2018</u> License No: <u>E-30240</u>

 MARK
 DATE
 DESCRIPTION

 09.09.2017
 SCHEMATIC DESIGN SUBMISSION

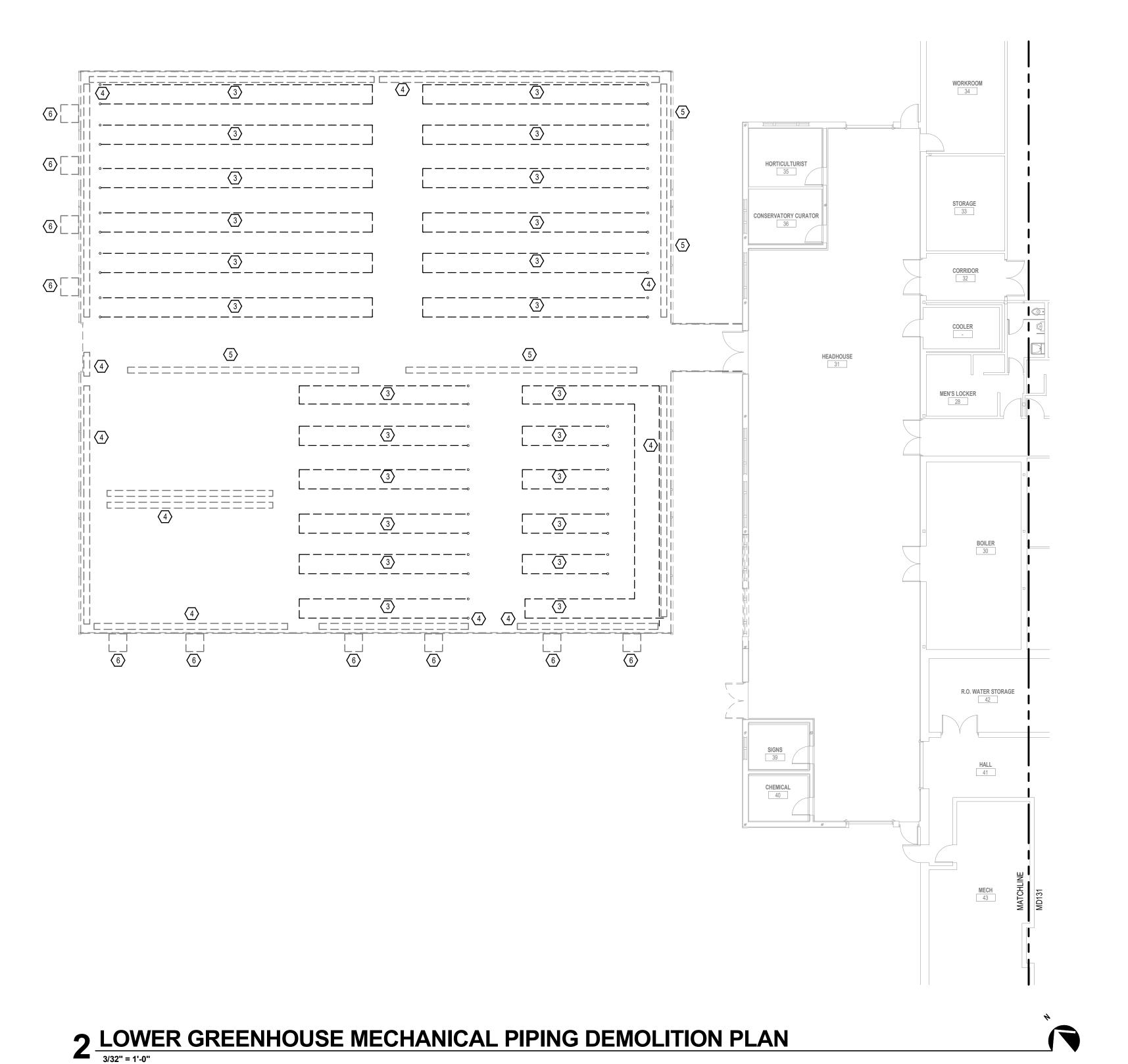
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 DD PRICING SET
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MECHANICAL TITLE

SHEET



FOR MECHANICAL NOTES, LEGENDS AND ABBREVIATION, REFER TO

KEYED NOTES

1) EXISTING GREENHOUSE TO BE DEMOLISHED. ALL HVAC PIPING

SHALL BE REMOVED. PIPE LOOPS ABOVE BENCHES AT BEAM

(2) 4" HWS AND HWR SHALL BE REMOVED BACK TO THIS POINT, AND

3 EXISTING GREENHOUSE TO BE DEMOLISHED. ALL HVAC PIPING

4 DEMOLISH FIN TUBE RADIATORS AND ASSOCIATED COMPONENTS

6 DEMOLISH EXHAUST FANS AND ALL ASSOCIATED COMPONENTS.

SHALL BE REMOVED; PIPE LOOPS BELOW BENCHES.

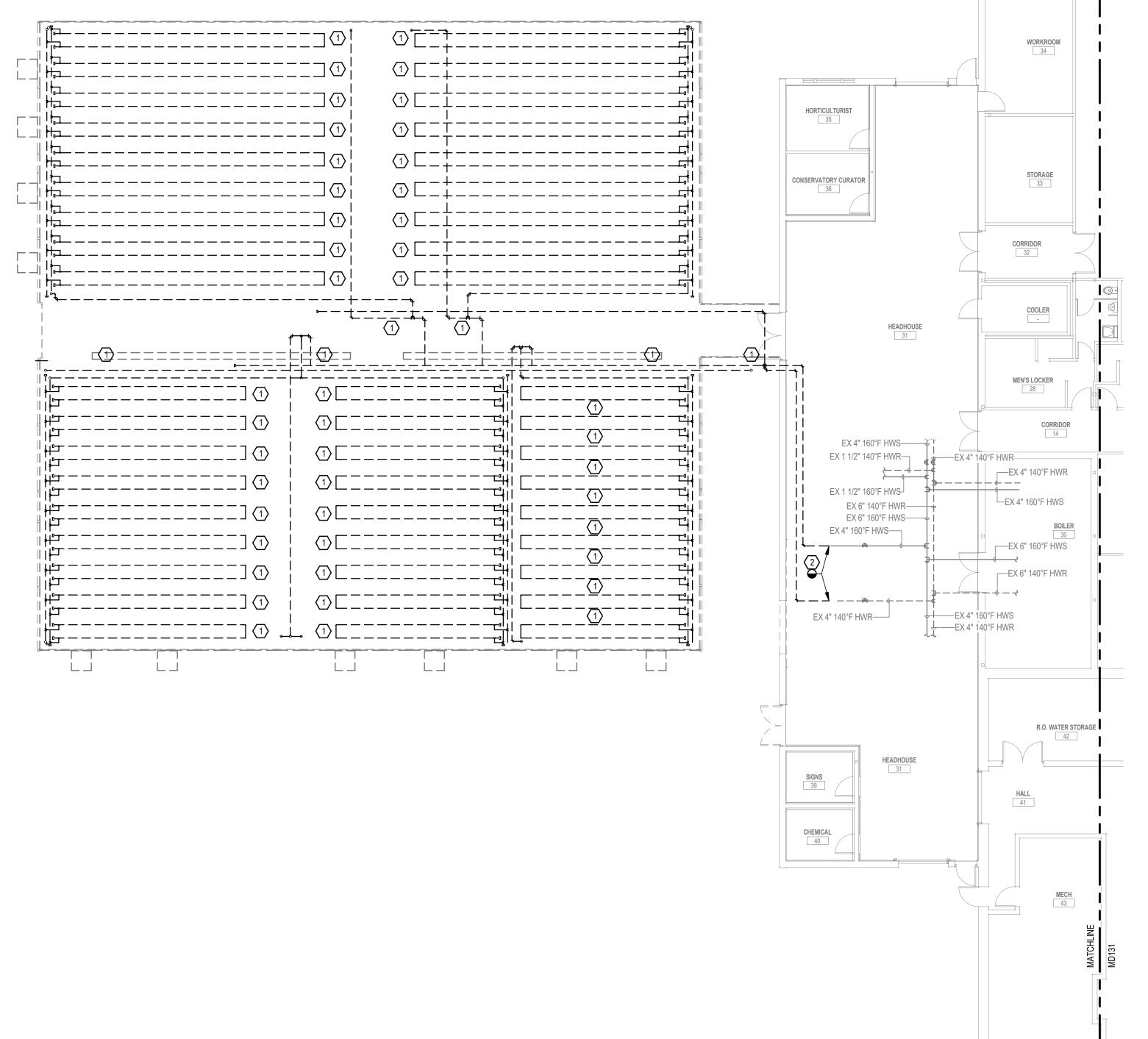
5 DEMOLISH EVAPORATIVE COOLERS AND ALL ASSOCIATED

CAPPED FOR FUTURE USE. SEE NEW PLAN.

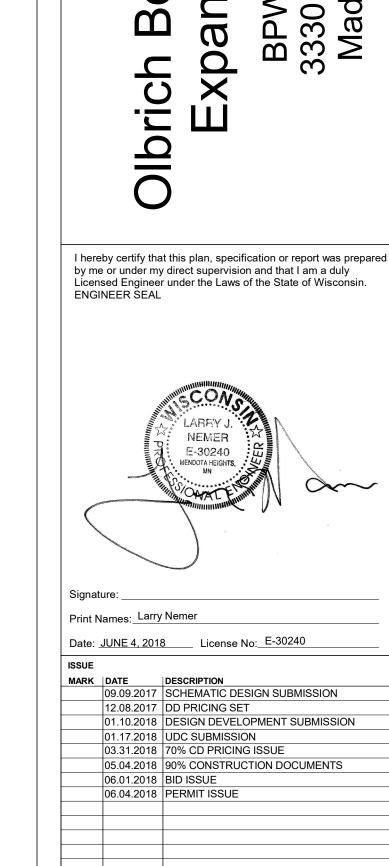
A. BOLD DASHED LINES INDICATE EQUIPMENT AND ASSOCIATED

COMPONENTS TO BE REMOVED.

COMPONENTS.



1 UPPPER GREENHOUSE MECHANICAL PIPING DEMOLITION PLAN



2017016

BID DOCUMENTS

GREENHOUSE

MECHANICAL

PIPING

DEMOLITION PLAN

EXHIBIT J

MD111

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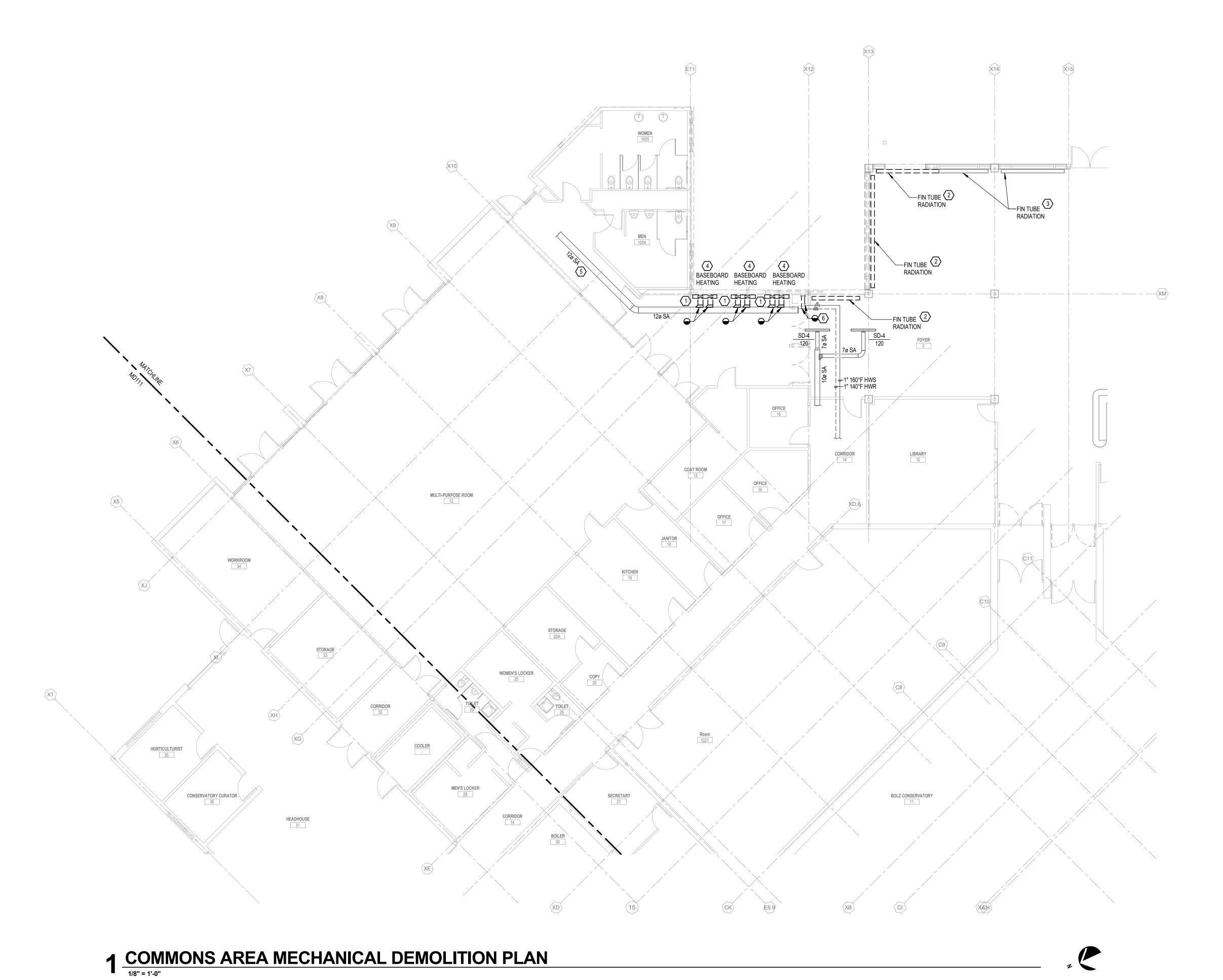
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A. BOLD DASHED LINES INDICATE EQUIPMENT AND ASSOCIATED COMPONENTS TO BE REMOVED.
 B. FOR MECHANICAL NOTES, LEGENDS AND ABBREVIATION, REFER TO M001.

KEYED NOTES

- 1) INDICATED SUPPLY DUCTWORK IS IN-FLOOR. SUPPLY DUCTWORK SHALL BE ABANDONED; DUCTWORK IN-FILLED BY OTHERS.
- $\langle 2 \rangle$ EXISTING FIN-TUBE RADIATION TO BE REMOVED.
- (3) EXISTING FIN-TUBE RADIATION TO REMAIN. RETAIN EXISTING SUPPLY AND RETURN CONNECTIONS FOR FUTURE. SEE NEW PLAN.

- REMOVE HWS/R PIPING BACK TO THIS POINT. RETAIN EXISTING CONTROL VALVE & BALANCING DEVICE, TO REMAIN IN USE. SEE NEW PLAN.

(4) INDICATED BASEBOARD HEATING SHALL AND ASSOCIATED COMPONENTS SHALL BE REMOVED.

(5) BELOW FLOOR DUCTWORK TO REMAIN.

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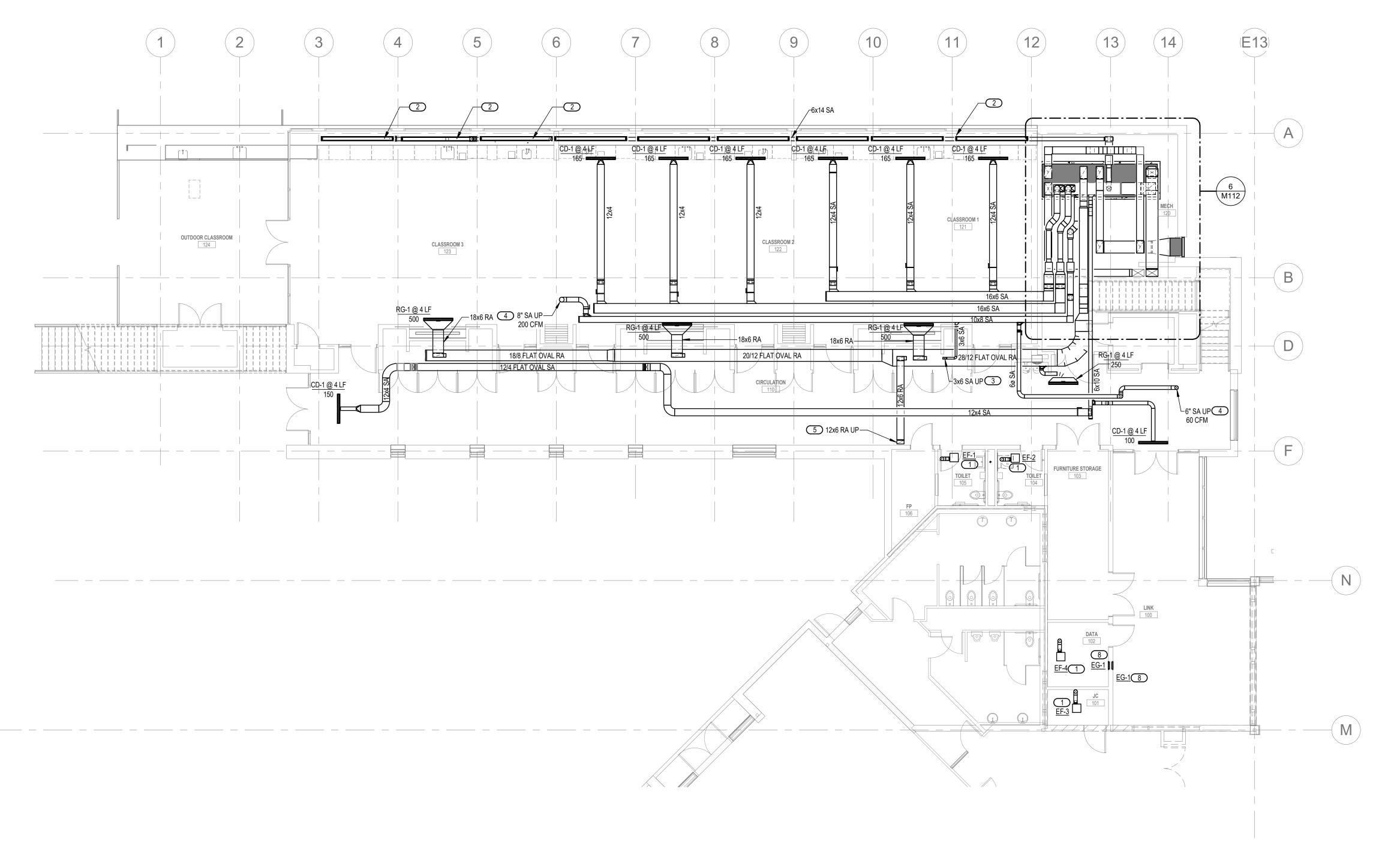
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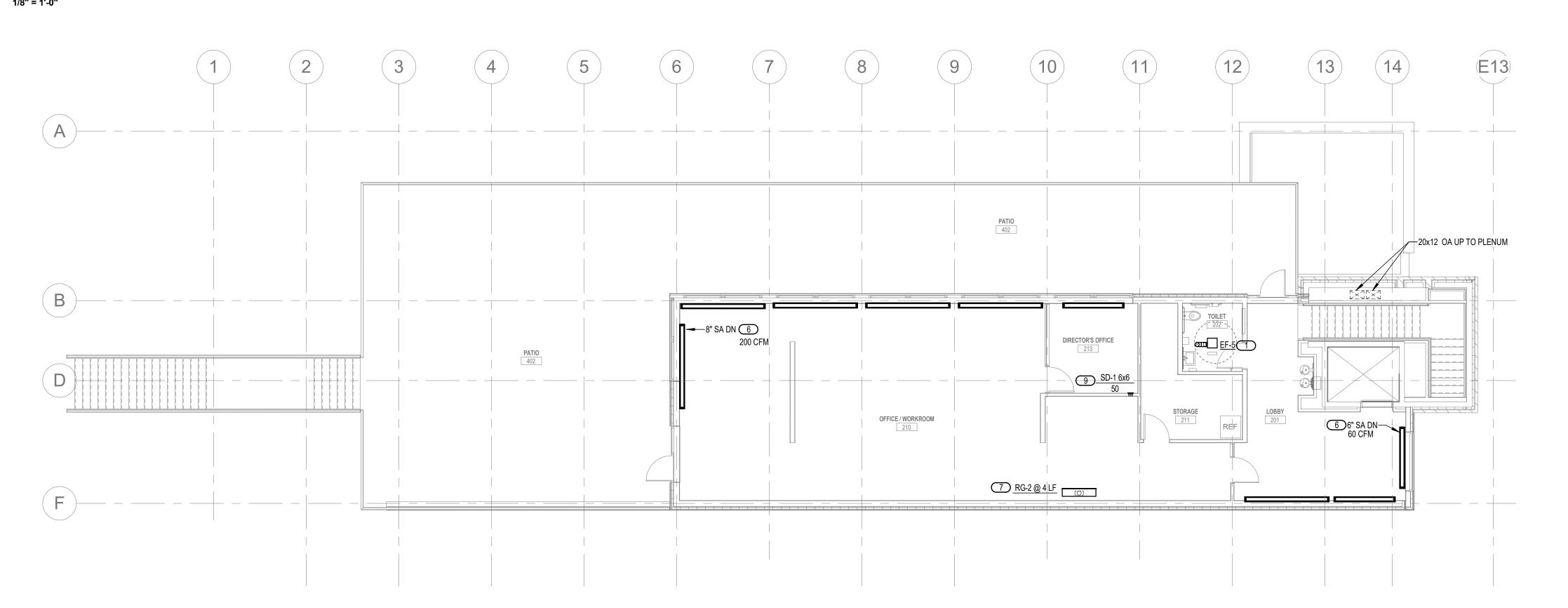
COMMONS AREA

DEMOLITION PLAN EXHIBIT J MD131

MECHANICAL



1 LEARNING CENTER MECHANICAL DUCT PLAN LEVEL 1



2 LEARNING CENTER MECHANICAL DUCT PLAN LEVEL 2

GENERAL NOTES

A. FOR MECHANICAL NOTES, LEGENDS AND ABBREVIATION, REFER TO

1) EXHAUST FAN SHALL BE PROVIDED WITH GOOSENECK TERMINATION AT ROOF. PROVIDE BIRD SCREEN.

3 ROUTE SUPPLY AIR DUCTWORK IN RAISED FLOOR CAVITY. 3x6 SUPPLY AIR DUCTWORK SHALL CONNECT TO RFC ABOVE.

4 ROUTE SUPPLY AIR DUCTWORK UP TO RFC ABOVE. SEE 2/M101 FOR CONTINUATION. SEE ALSO M102.

5 ROUTE RETURN AIR DUCTWORK UP, SEE 2/M101 FOR

6 CONNECT SUPPLY DUCTWORK TO RFC.

7) RETURN GRILLE SET VERTICALLY AT TOE SPACE. SEE ARCHITECTURAL PLAN. CONNECT 8" RETURN DUCTWORK TO RG-2.

8 PROVIDE GRILLE AT LINK SIDE OF WALL, HIGH. CONNECT TO GRILLE ON DATA ROOM SIDE, LOW, WITH 8"x3" DUCT IN STUD

KEYED NOTES

ROUTE SUPPLY AIR DUCTWORK IN WALL CAVITY. SUPPLY AIR DUCTWORK, 165 CFM, SHALL CONNECT TO ALL <u>RFC-1D</u> IN CLASSROOM 3; EACH <u>RFC-1D</u> SHALL HAVE 8" DIAMETER INLET. SEE

CONTINUATION.

9 INSTALL 6x6 SA DIFFUSER IN WALL, APPROXIMATELY 8' ABOVE FINISHED FLOOR. ANGLE BLADES TO OBSTRUCT VIEW INTO DUCT.

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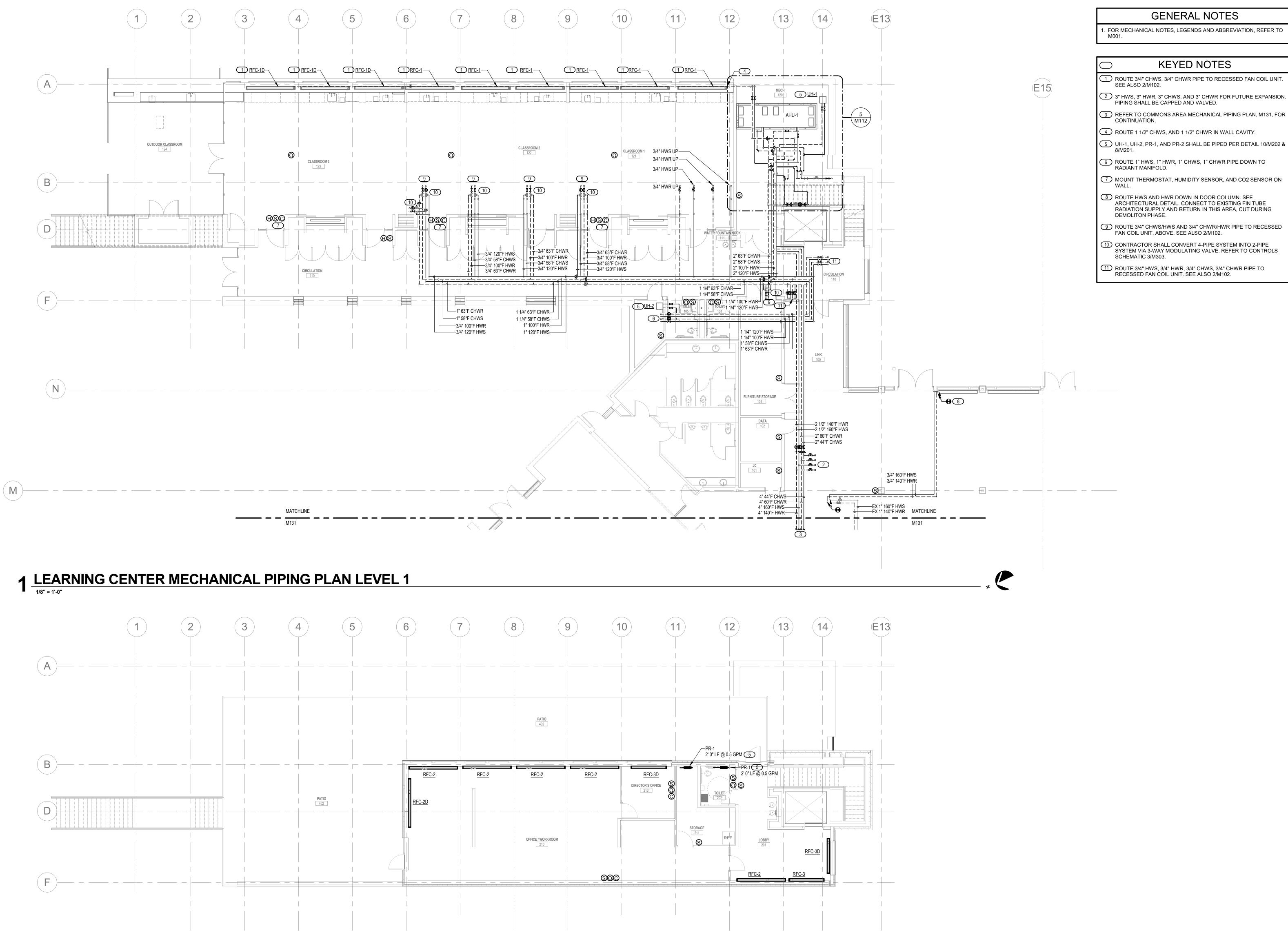
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LEARNING CENTER MECHANICAL **DUCTWORK PLAN**



FOR MECHANICAL NOTES, LEGENDS AND ABBREVIATION, REFER TO

KEYED NOTES

1 ROUTE 3/4" CHWS, 3/4" CHWR PIPE TO RECESSED FAN COIL UNIT.

- 2 3" HWS, 3" HWR, 3" CHWS, AND 3" CHWR FOR FUTURE EXPANSION.
- PIPING SHALL BE CAPPED AND VALVED.
- 4 ROUTE 1 1/2" CHWS, AND 1 1/2" CHWR IN WALL CAVITY. 5 UH-1, UH-2, PR-1, AND PR-2 SHALL BE PIPED PER DETAIL 10/M202 &
- 6 ROUTE 1" HWS, 1" HWR, 1" CHWS, 1" CHWR PIPE DOWN TO
- MOUNT THERMOSTAT, HUMIDITY SENSOR, AND CO2 SENSOR ON
- 8 ROUTE HWS AND HWR DOWN IN DOOR COLUMN. SEE ARCHITECTURAL DETAIL. CONNECT TO EXISTING FIN TUBE RADIATION SUPPLY AND RETURN IN THIS AREA, CUT DURING DEMOLITON PHASE.
- 9 ROUTE 3/4" CHWS/HWS AND 3/4" CHWR/HWR PIPE TO RECESSED FAN COIL UNIT, ABOVE. SEE ALSO 2/M102.
- 10 CONTRACTOR SHALL CONVERT 4-PIPE SYSTEM INTO 2-PIPE SYSTEM VIA 3-WAY MODULATING VALVE. REFER TO CONTROLS SCHEMATIC 3/M303.
- 11) ROUTE 3/4" HWS, 3/4" HWR, 3/4" CHWS, 3/4" CHWR PIPE TO RECESSED FAN COIL UNIT. SEE ALSO 2/M102.

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Print Names: Larry Nemer

Date: <u>JUNE 4, 2018</u> License No: <u>E-30240</u>

 MARK
 DATE
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 09.09.2017
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 12.08.2017 DD PRICING SET 01.10.2018 DESIGN DEVELOPMENT SUBMISSION 01.17.2018 UDC SUBMISSION 03.31.2018 70% CD PRICING ISSUE 05.04.2018 90% CONSTRUCTION DOCUMENTS

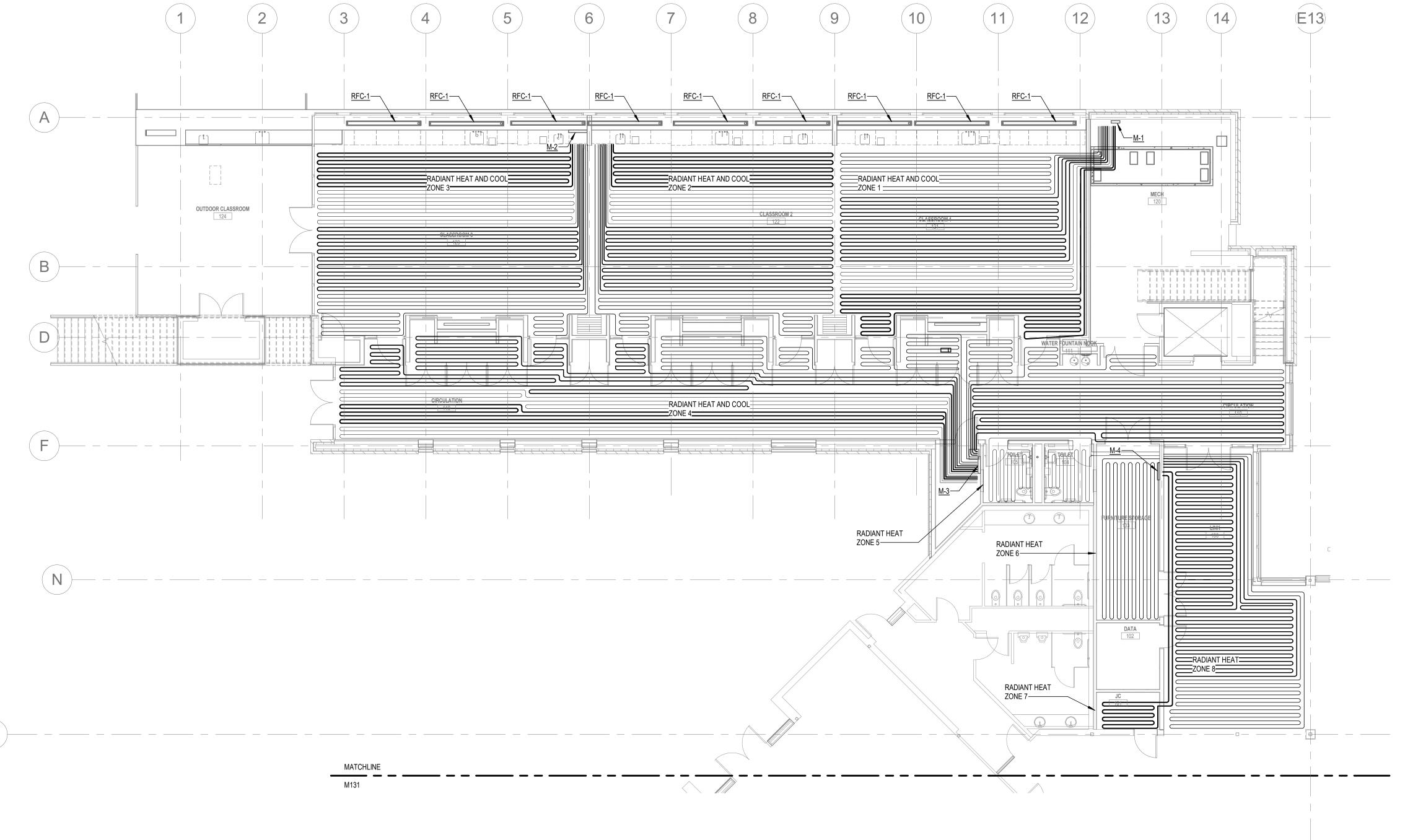
06.01.2018 BID ISSUE 06.04.2018 PERMIT ISSUE

2017016

BID DOCUMENTS

LEARNING CENTER **MECHANICAL**

PIPING PLAN



1 LEARNING CENTER RADIANT HEAT AND COOL

1/8" = 1'-0"

GENERAL NOTES

A. COORDINATE WITH ELECTRICAL, PLUMBING AND OTHER TRADES.
B. FOR MECHANICAL NOTES, LEGENDS AND ABBREVIATION, REFER TO

S

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> 2017016 BID DOCUMENTS

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LEARNING CENTER RADIANT HEAT AND

> **EXHIBIT J** M103

COOL

HORTICULTURIST
35 MULTI-PURPOSE ROOM CONSERVATORY CURATOR 4" 60°F CHWR— 4" 160°F HWS— 4" 44°F CHWS— √ 4" 140°F HWR— -----COOLER HEADHOUSE 31 الحبا + - - - - - - - - - - - - - - + إجار EX 1 1/2" 140°F HWR-EX 1 1/2" 160°F HWS-4" 44°F CHWS EX 4" 140°F HWR 44°F CHWS 0.5 TROPICAL ZONE ORCHIDS (INT. ZONE) ORCHIDS (COOL ZONE) EX 4" 160°F HWS EX 6" 140°F HWR-EX 6" 160°F HWS-----3 4" 44°F CHWS 4" 60°F CHWR— __4" 140°F HWR EX 4" 160°F HWS ÷ EX 4" 140°F HWR EX 4" 140°F HWR FOG PUMP ROOM R.O. WATER STORAGE BOLZ CONSERVATORY

1 GREENHOUSE MECHANICAL PIPING PLAN

1/8" = 1"-0"

GENERAL NOTES

1. FOR MECHANICAL NOTES, LEGENDS AND ABBREVIATION, REFER TO

1 TERMINATE WORK IN GREENHOUSE CORRIDOR WITH VALVED AND CAPPED PIPE. WORK BEYOND THIS POINT IS BY GREENHOUSE CONTRACTOR.

FOR CONTINUATION, REFER TO COMMONS AREA MECHANICAL PIPING PLAN, M131.

3 EXTERIOR PIPE SHALL BE INSULATED AND JACKETED PER SPECIFICATIONS.

(4) WALL PENETRATION AT 8" AFF.

(5) CONNECT TO EXISTING VALVED AND CAPPED 4" HWS/R IN THIS

REFER TO DETAIL 4/M202 FOR <u>CH-1</u> PIPING. CONCRETE PAD BY MECHANICAL CONTRACTOR.

PROVIDE 4" CAPPED & VALVED TAKE-OFFS FROM MAIN, FOR FUTURE USE.

KEYED NOTES

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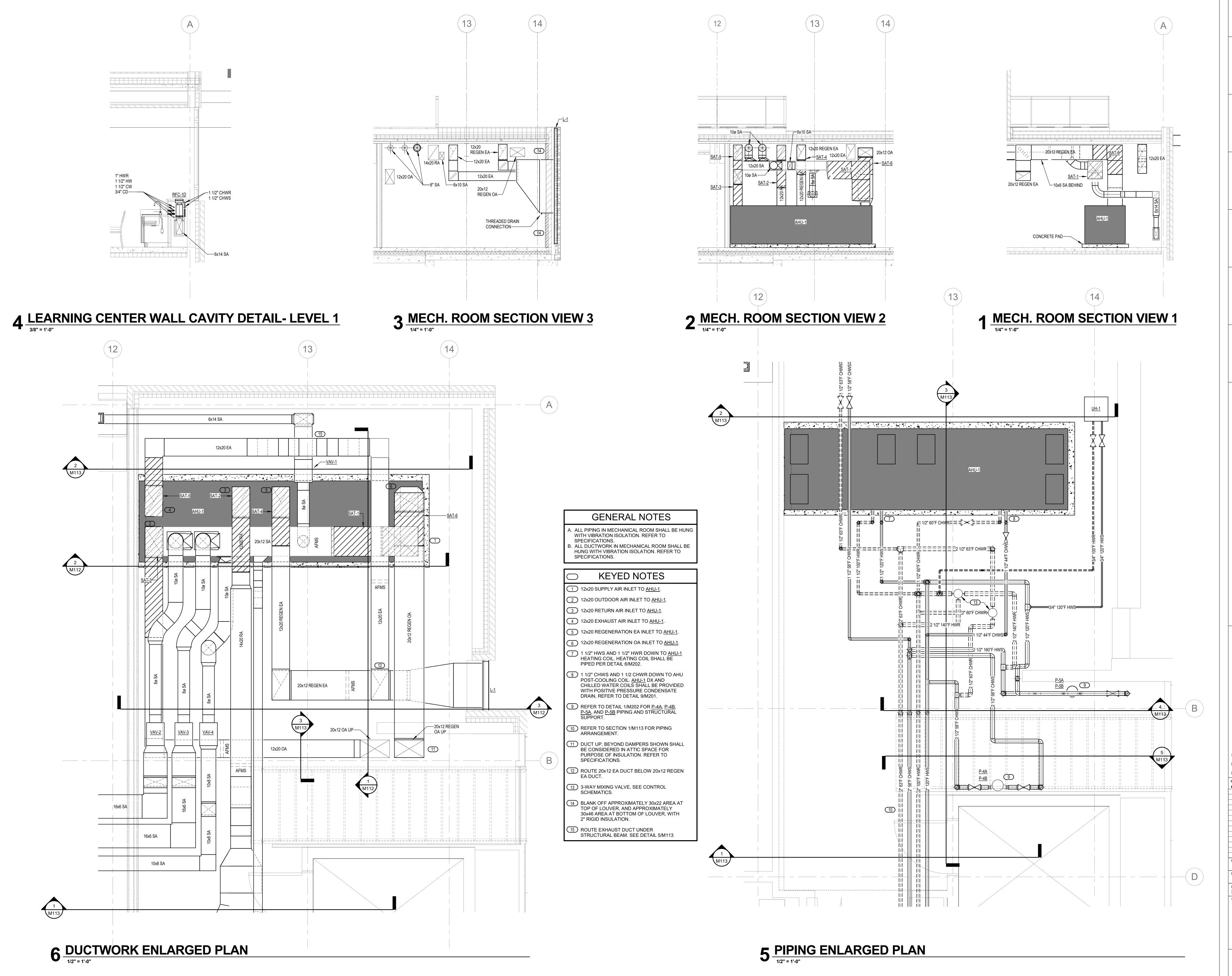
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GREENHOUSE MECHANICAL

PIPING PLAN



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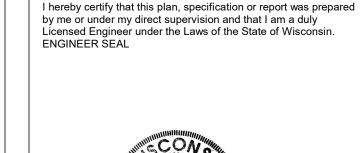
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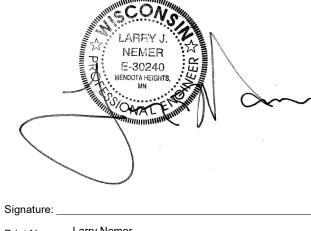
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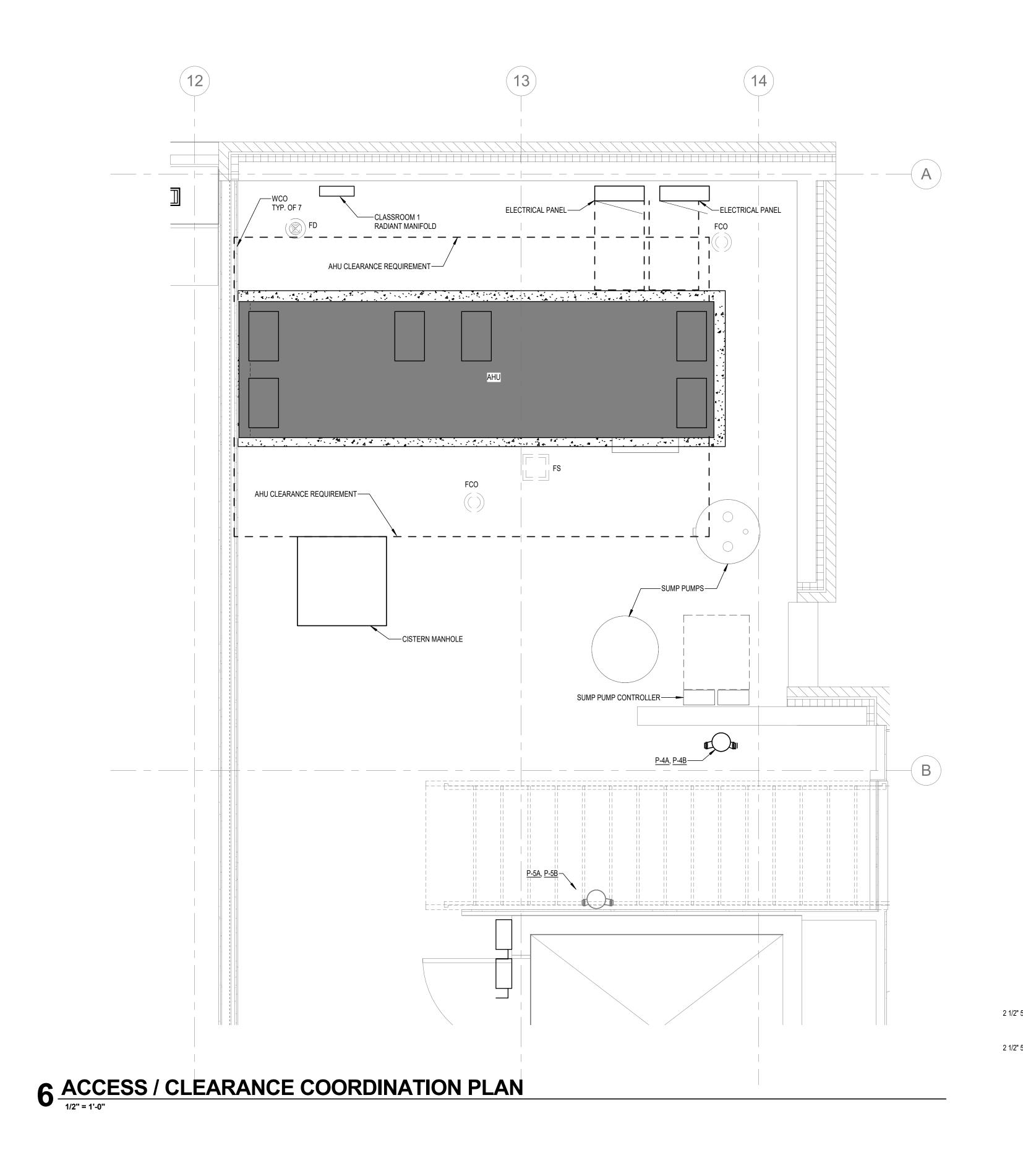
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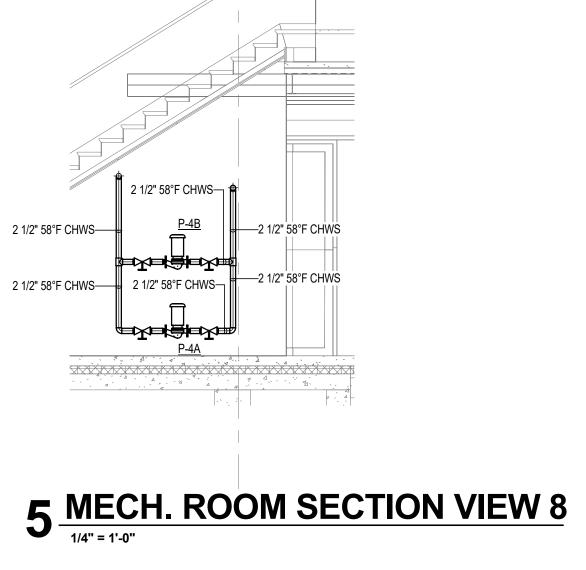
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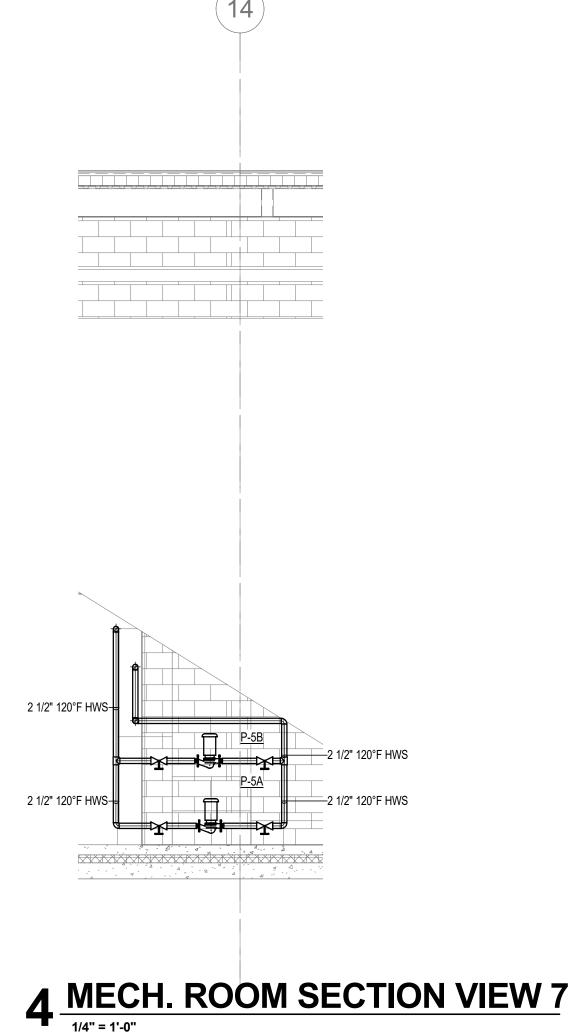
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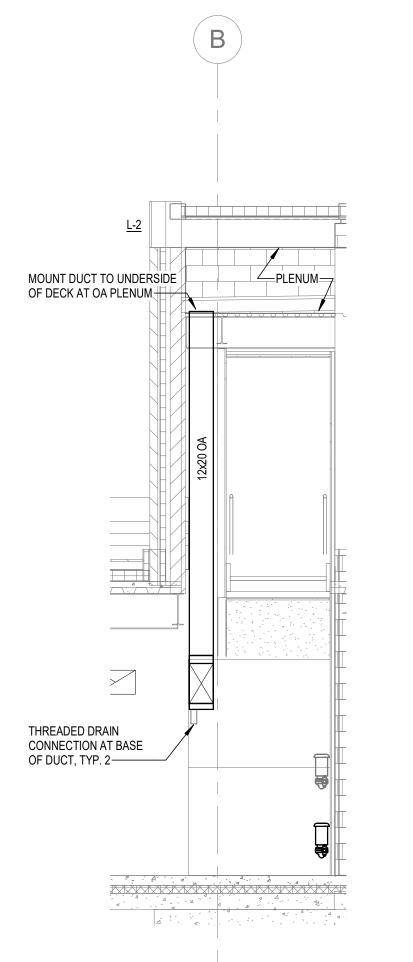
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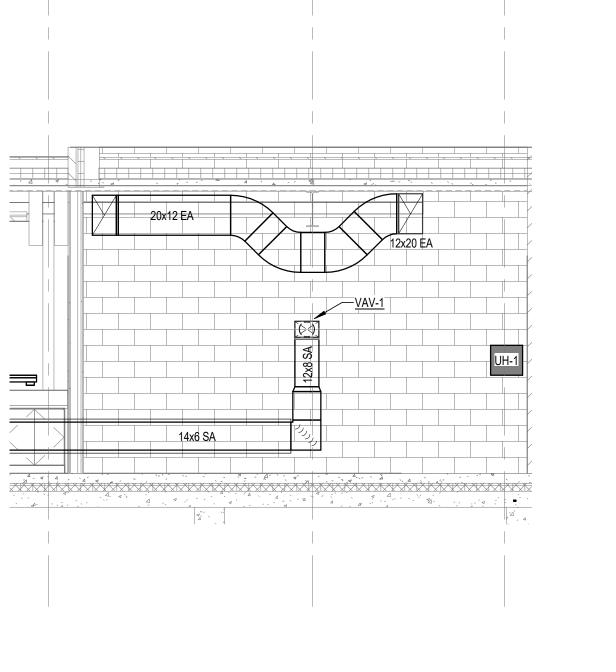
ENLARGED PLANS AND SECTIONS



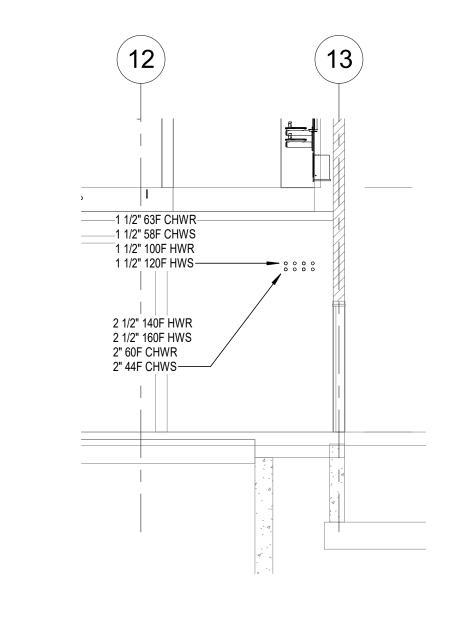








2 MECH. ROOM SECTION VIEW 5







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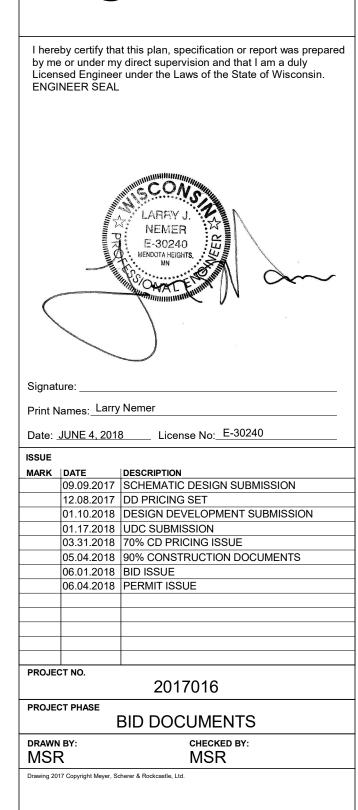
Landscape Architect

Clbrich Botanical Gard

Expansion Phase

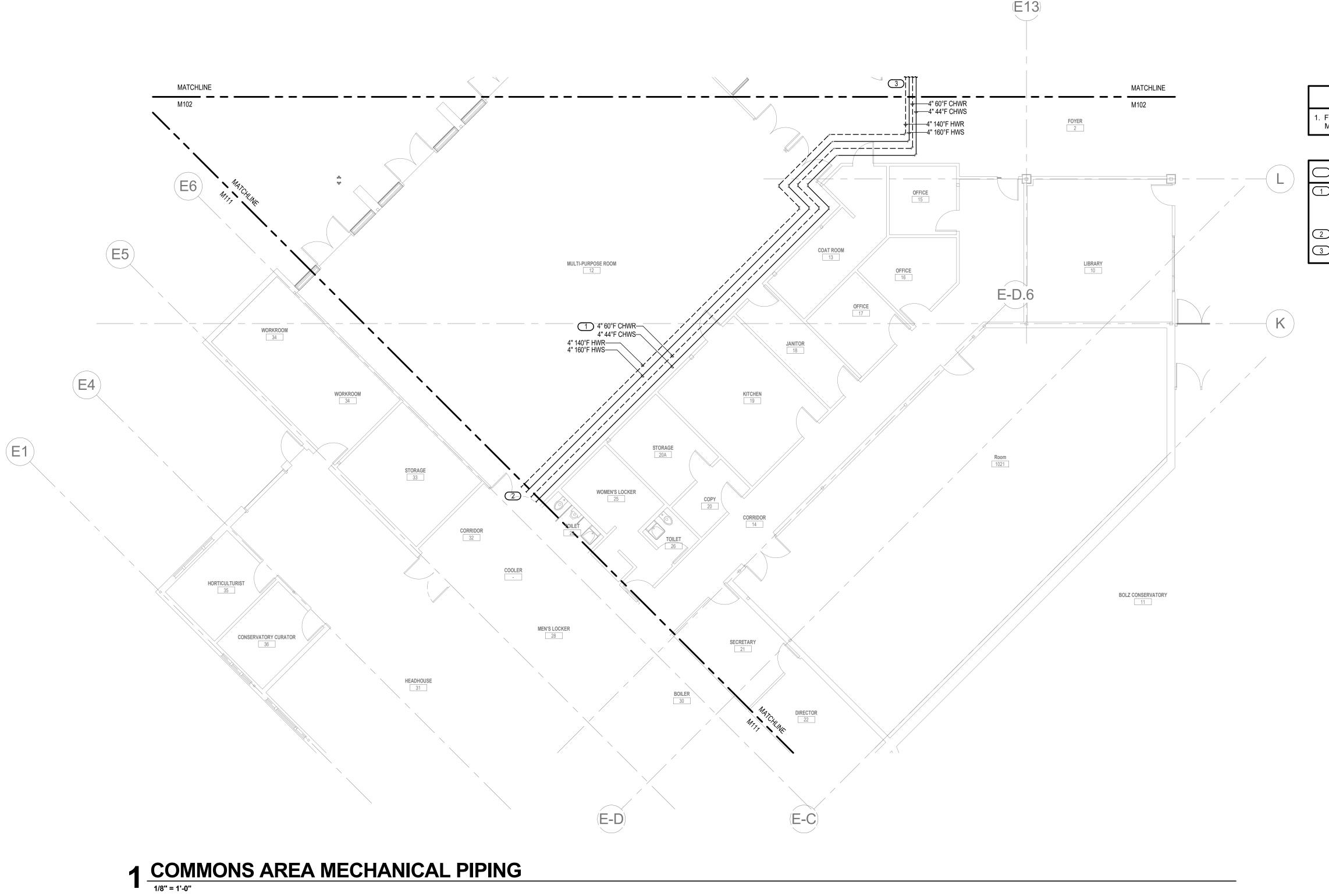
Expansion Phase

BPW Project #8162
3330 Atwood Avenue
Madison, WI 53704



3 MECH. ROOM SECTION VIEW 6

ENLARGED PLANS AND SECTIONS



1. FOR MECHANICAL NOTES, LEGENDS AND ABBREVIATION, REFER TO M001.

KEYED NOTES

1 NEW PIPING TO BE INSTALLED IN CEILING/CATWALK AREA ABOVE COMMONS. COORDINATE WITH OWNER NEEDS FOR ACCESS IN THIS AREA. COORDINATE WITH PLUMBING CONTRACTOR FOR ADDITIONAL PIPING IN THIS AREA.

2 REFER TO M111 FOR CONTINUATION.

3 REFER TO M102 FOR CONTINUATION.

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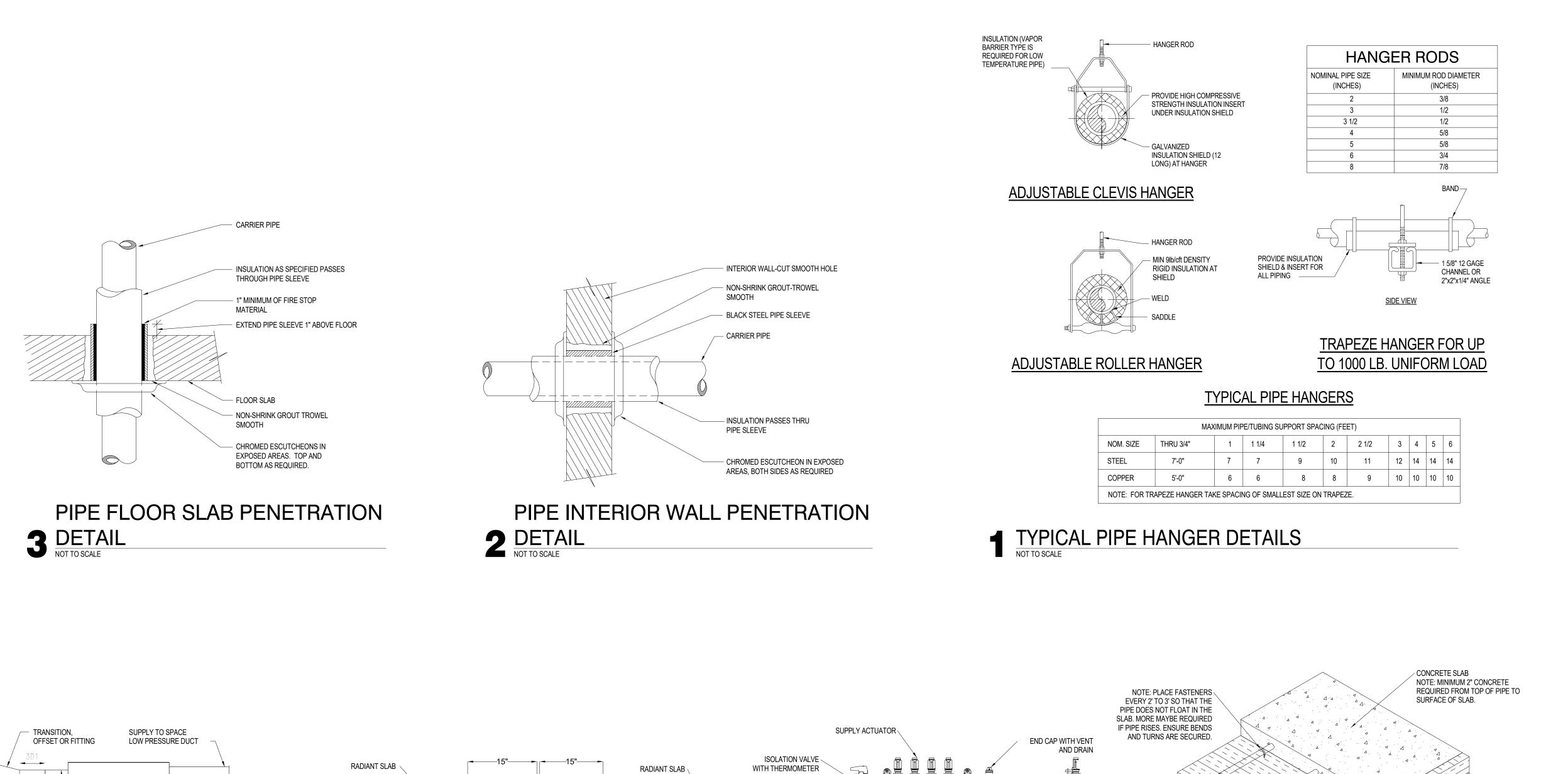
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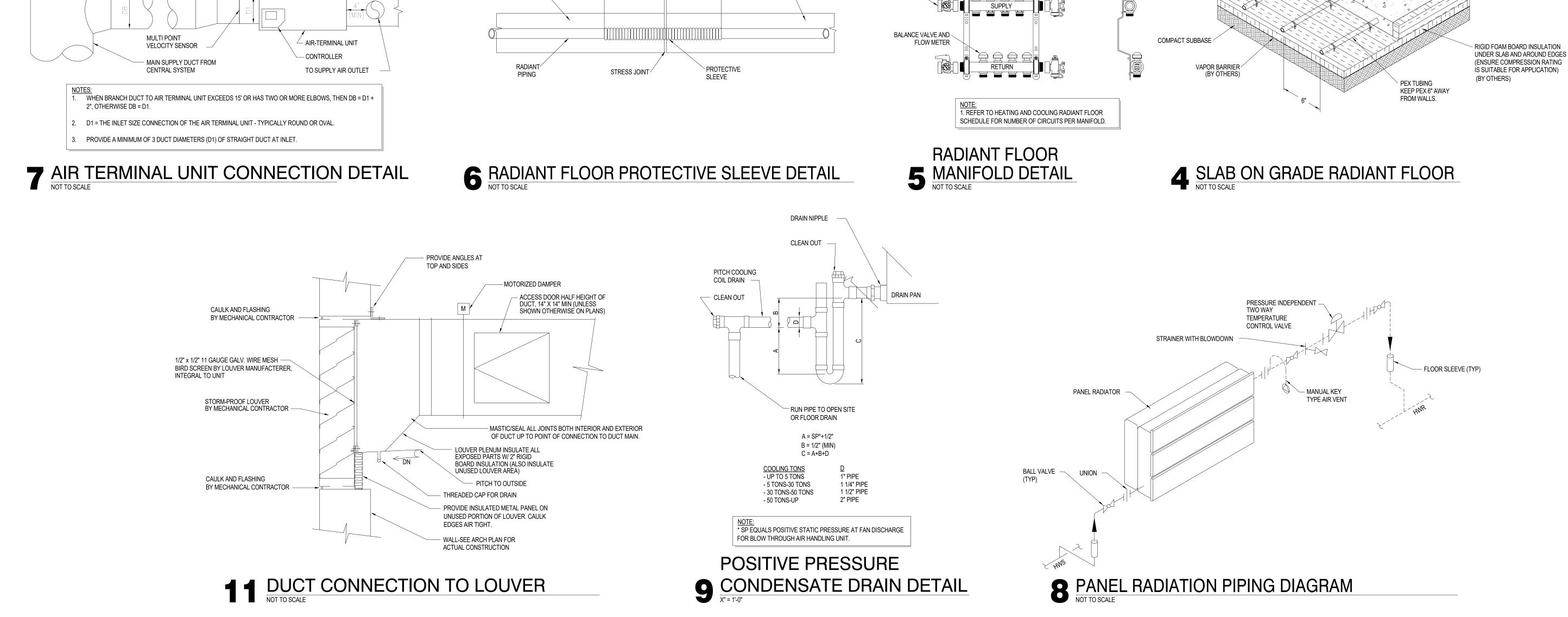
BID DOCUMENTS

COMMONS AREA

PIPING PLAN **EXHIBIT J**

MECHANICAL







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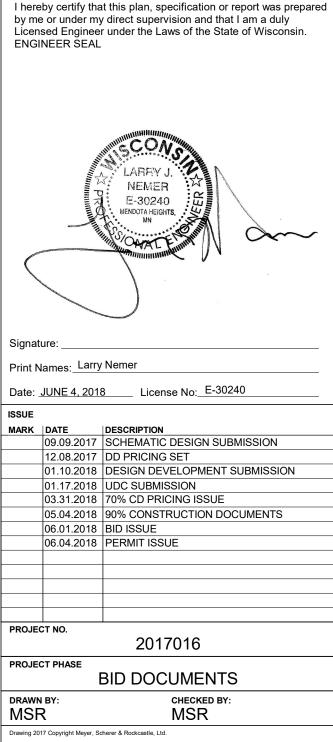
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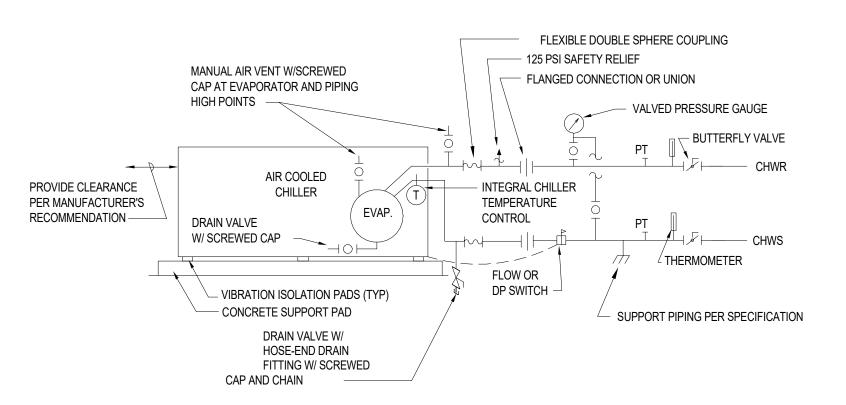


MECHANICAL

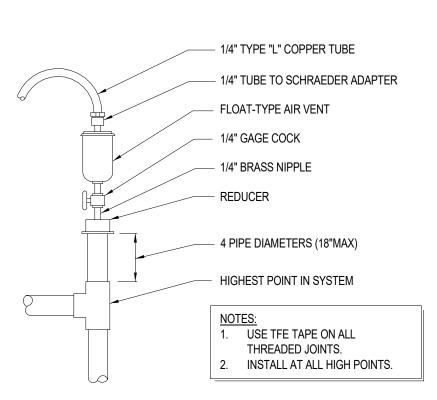
DETAILS

EXHIBIT J

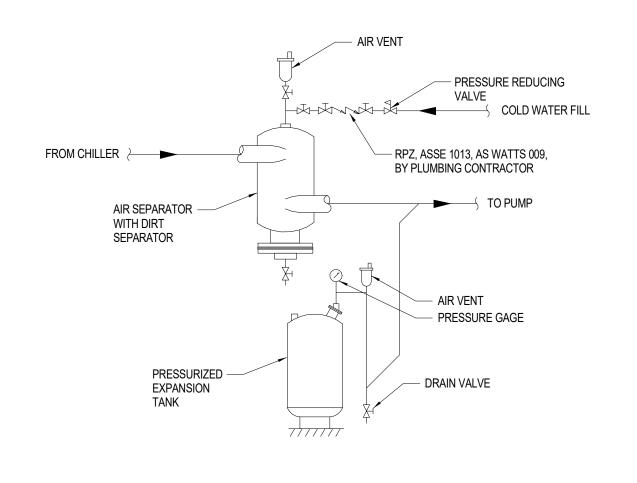
M201



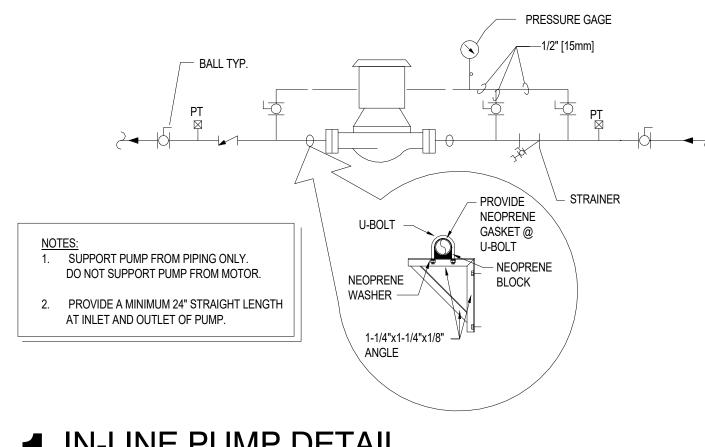
4 AIR COOLED CHILLER DETAIL NOT TO SCALE



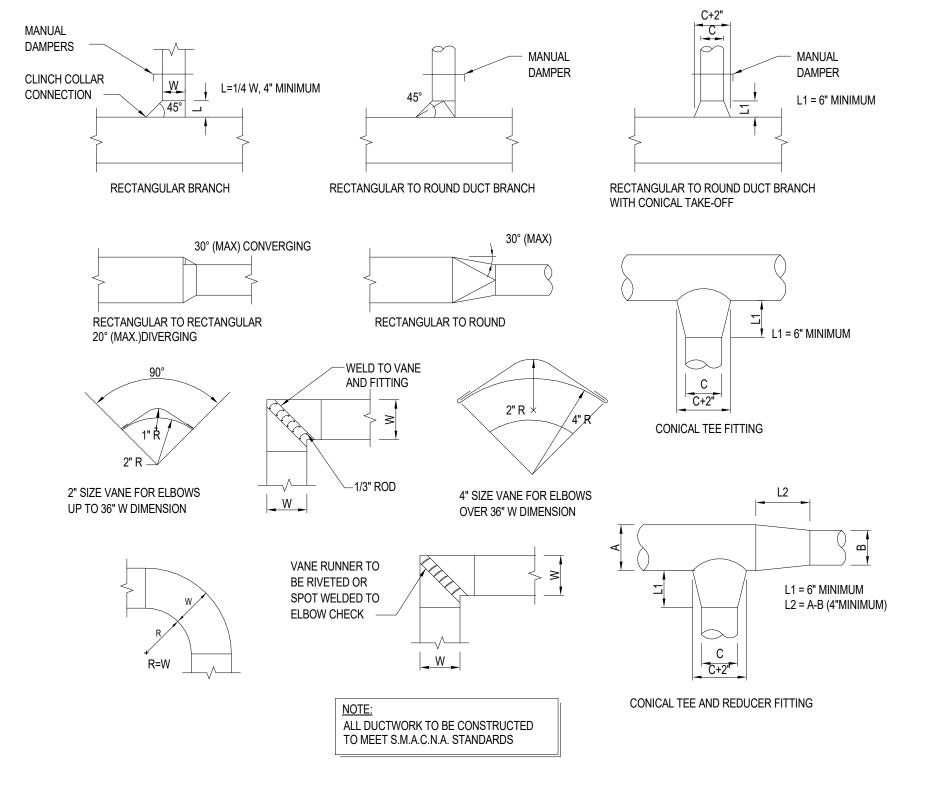




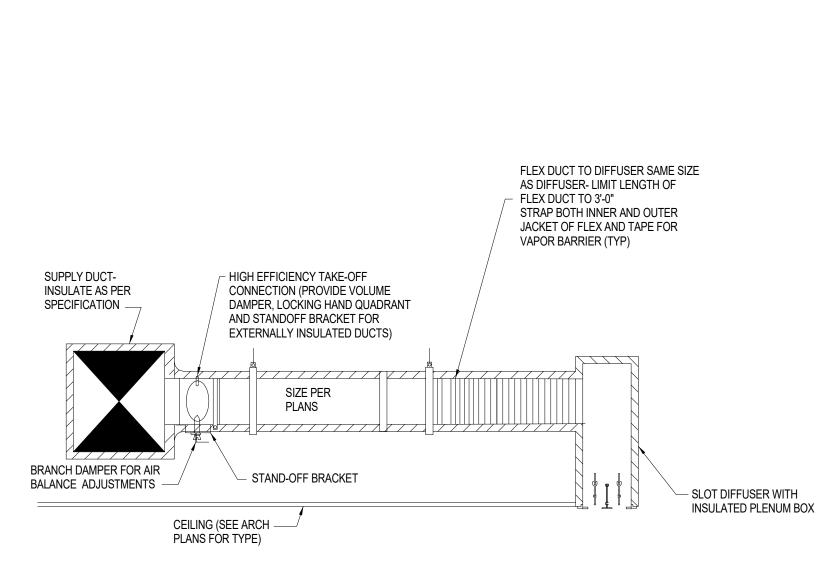
3 AUTOMATIC AIR VENT ASSEMBLY DETAIL 2 EXPANSION TANK/AIR SEPARATOR ASSEMBLY NOT TO SCALE



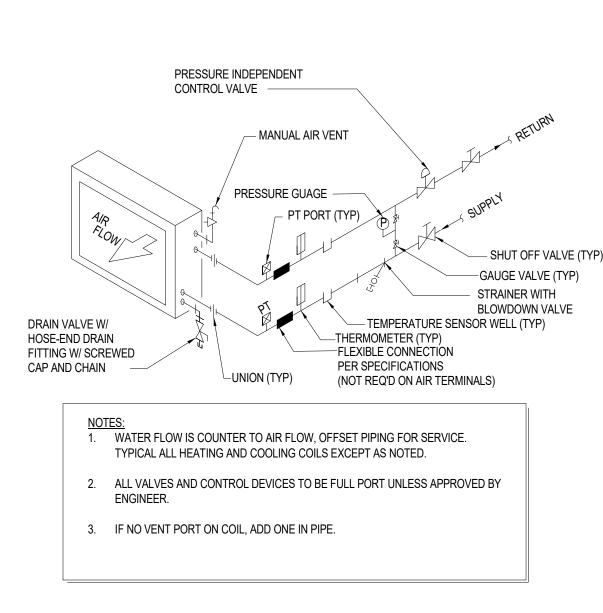
1 IN-LINE PUMP DETAIL
NOT TO SCALE



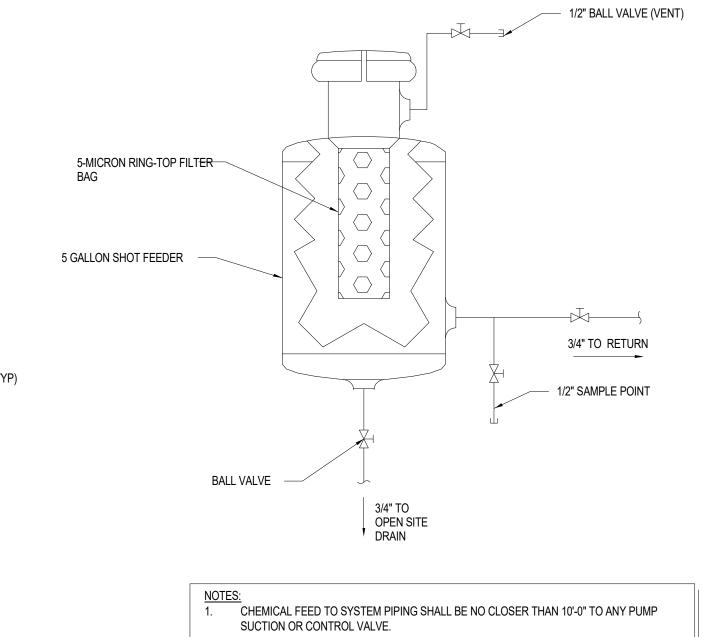




7 SLOT DIFFUSER DETAIL
NOT TO SCALE



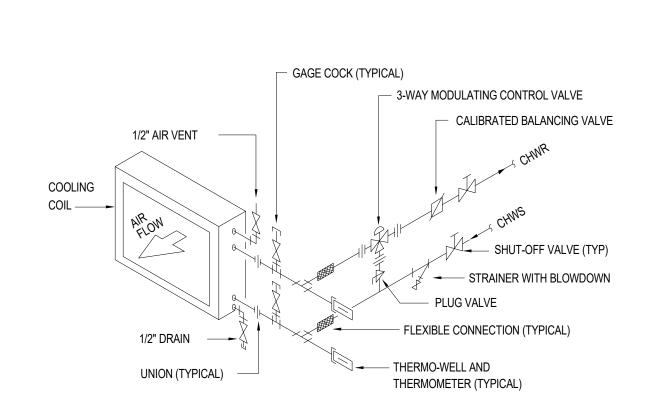
6 2-WAY AHU COIL DETAIL
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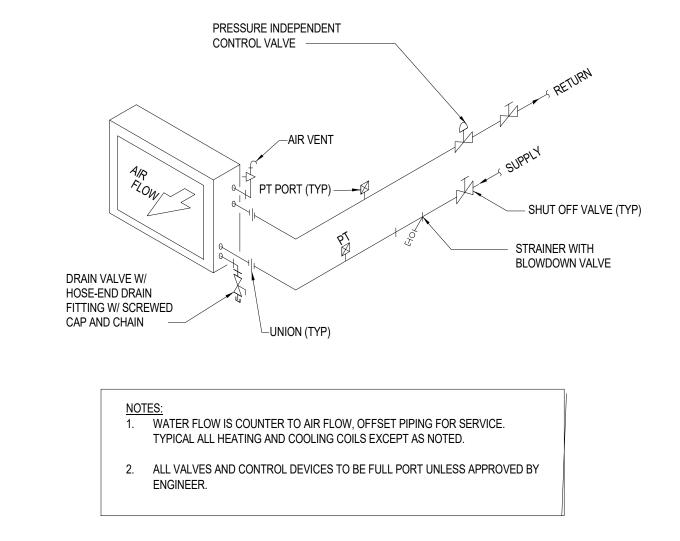
5 CHEMICAL BY-PASS FILTER FEEDER

INTERNAL CONFIGURATION AND PIPING CONNECTIONS WITH MANUFACTURER'S IOM

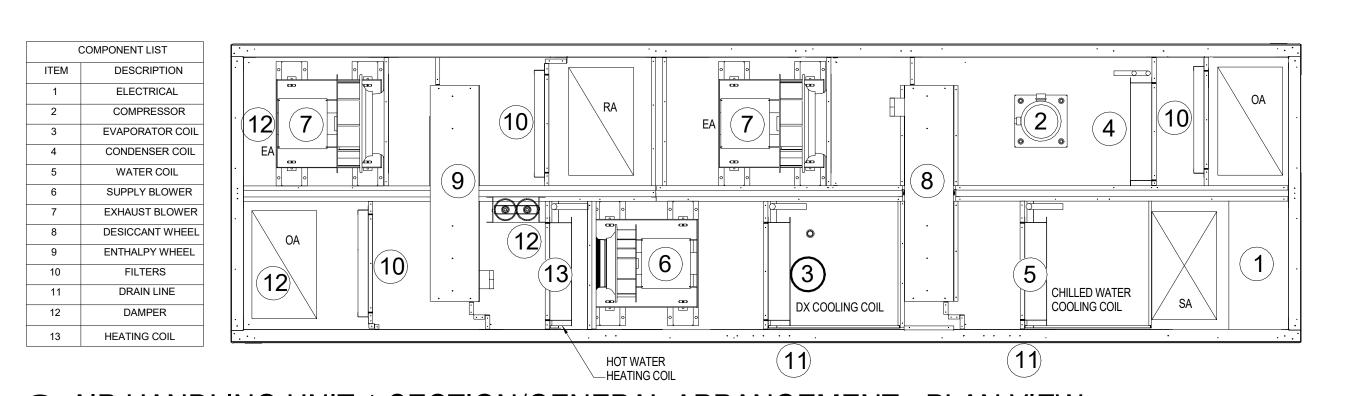
PIPING ARRANGEMENT BASED ON EFFICIENCY DYNAMICS FF100 MODEL. VERIFY



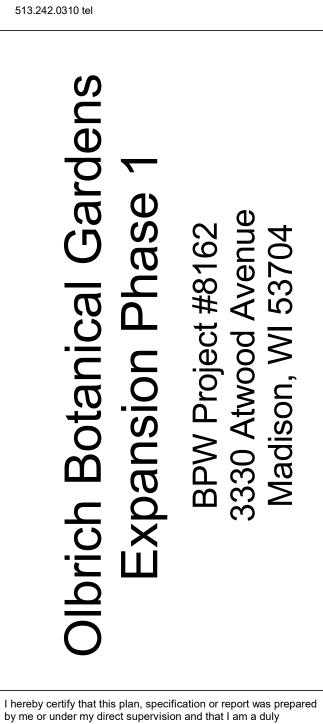
THREE-WAY MODULATING CHILLED 1 1 WATER COIL DETAIL
NOT TO SCALE



1 0 TERMINAL UNIT WATER COIL DETAIL
NOT TO SCALE



9 AIR HANDLING UNIT 1 SECTION/GENERAL ARRANGEMENT - PLAN VIEW



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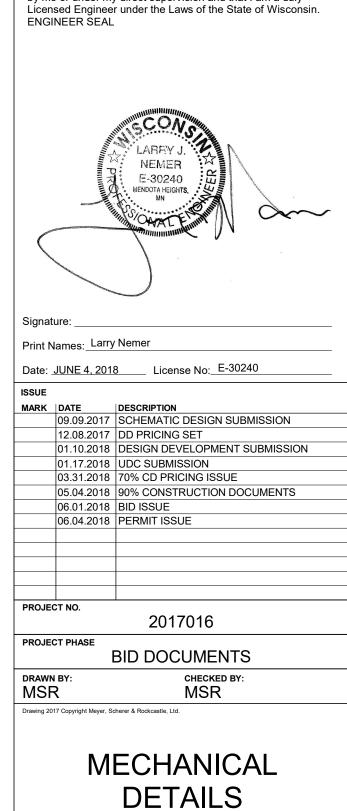
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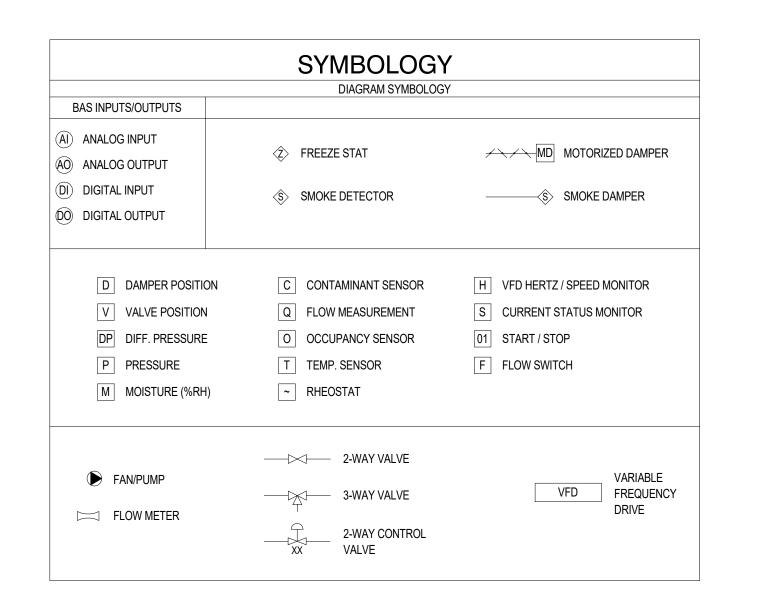


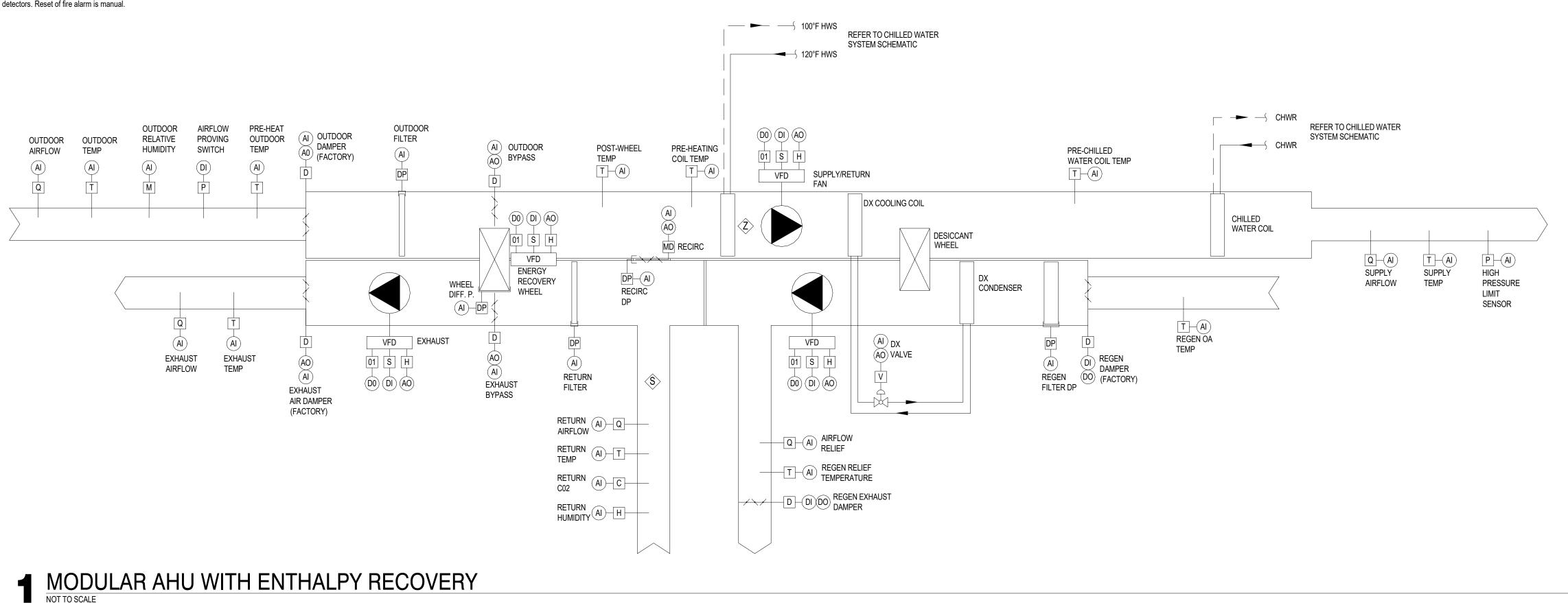
System description: Dedicated outdoor air air handler for dehumidification and primary air supply. Unit includes enthalpy wheel and intrinsic DX cooling with hot gas re-heat of desiccant wheel. Supply fan, exhaust fan, and regeneration fan. Heating coil and Manufacturer Controller: The manufacturer provides primary control of certain air handler functions, including those noted in the matrix shown on this page. Controls contractor shall coordinate all necessary work with the manufacturer during submittal phase. Air handler shall be scheduled through the BAS and shall operate under either occupied or unoccupied modes. Occupied / Unoccupied Modes: 1. During unoccupied mode: A. Unit shall be off (all dampers and valves shall be closed, all fans and the wheels shall be off) unless 2 (adj) or more zones exceed their setpoint. Then unit shall enter unoccupied cooling mode. For purposes of this sequence, only zones receiving airflow from the air handler shall be considered; no zones with dedicated cooling systems, heat only systems, or pass-through air only, shall be counted. B. In unoccupied cooling mode, if conditions do not allow for economizer operation, the recirculation damper shall open and all other dampers shall remain closed. The exhaust fan and regeneration fan shall be off. The supply fan and primary cooling coil shall all operate as specified for occupied mode. C. In unoccupied cooling mode, if conditions allow for economizer mode, the unit shall enter economizer mode. 2. The following sequences apply to occupied mode unless specifically noted otherwise. Fan operates to maintain duct static, with reset. 1. Fan shall modulate speed to maintain 0.8" w.c. (adj) at the duct static pressure sensor. Final nominal setpoint shall be confirmed and set by the balancing contractor. 2. Static pressure setpoint shall be reset using a trim and response logic, within the bounds of 0.6" w.c. (adj) and 1.0" w.c. (adj). Final maximum and minimum setpoints shall be confirmed and set by the balancing contractor based on a worst-case test (i.e. to satisfy worst case zone when all air valves at minimum and at maximum design condition). 3. Trim and response is as follows: A. Poll all variable air volume boxes. BAS shall allow for any zone to be removed from poll or added to poll through interface of VAV page. B. A zone pressure request is generated when a VAV is 95% (adj) or greater than maximum flow. The request is eliminated at 80% (adj) or below of flow. C. Fan shall adjust speed every 10 (adj) minutes. If more than 1 (adj) zones are sending a pressure request, the setpoint shall be increased by 0.04" wc (adj). If less than 1 (adj) zones are sending a pressure request, the setpoint shall be decreased by 0.04" wc (adj). If 1 (adj) zone are sending a pressure request, the setpoint shall not change. D. The controls contractor shall tune the reset after the building has been occupied to eliminate instability, and shall provide a trend graph to show stability. Fan operates to exhaust airflow equal to the outdoor airflow. 1. Fan shall modulate speed to exhaust airflow (as measured at the exhaust airflow measuring station) equal to the outdoor airflow rate (as measured at the outdoor airflow measuring station) LESS a programmed offset value of 200cfm 2. This sequence applies in occupied economizer or occupied non-economizer operation.3. During unoccupied operation, the exhaust fan shall be off. Fan operates at all times when unit is in dehumidification mode, and hot gas reheat is enabled (refer to sequence matrix). 1. Fan shall modulate speed to achieve 115F exhaust air stream after the desiccant wheel. (By unit controller.) Discharge Air Temperature Control: Unit DAT is allowed to float, with restrictions for heating and alarm. 1. Discharge air temperature shall be allowed to float between 62F (adj) and 77F (adj). (This allows for unit to enter regeneration mode, and other operating modes, without risk of or need for re-heat or sub-cool.) 2. If an alarm for temperature (see below) is generated, DAT shall be reset to 54F (adj). Cooling coil is last stage to meet discharge air temperature if economizer, energy recovery, nor regeneration heat can do so. 1. If discharge air temperature is above upper limit of setpoint range, and economizer is disabled or is at 100%, or enthalpy wheel is at full speed, then modulate valve open to achieve discharge air setpoint. 2. If discharge air temperature is below lower limit of setpoint range, and the valve is open, then modulate valve closed to achieve discharge air setpoint. 3. The cooling coil shall be locked out below 50F (adj) outdoor air temperature. Heating coil is last stage to meet discharge air temperature if economizer, energy recovery, nor regeneration heat can do so. 1. If discharge air temperature is below lower limit of setpoint range, and economizer is disabled or is at 100%, or enthalpy wheel is at full speed, then modulate valve open to achieve discharge air setpoint. 2. If discharge air temperature is above upper limit of setpoint range, and the valve is open, then modulate valve closed to achieve discharge air setpoint. 3. The heating coil shall be locked out above 65F (adj) outdoor air temperature. **Economizer Operation:** 1. Economizer will be enabled when the outdoor air temperature conditions align with the matrix column tagged 'Med. Enthalpy Vent' mode. 2. When enabled, the economizer shall modulate the outdoor air damper concurrently and inversely to the recirculation damper to achieve the discharge air setpoint. 3. Economizer mode damper operations shall not allow outdoor air to drop below minimum outdoor air airflow rates scheduled. **Enthalpy Wheel Operation:** Variable speed total energy recovery between exhaust and outdoor air; controlled by unit controller **Ventilation Air Control:** Resets ventilation air at air handler based on return air co2 levels. 1. Sequence applies only during occupied mode. 2. At the zone level: refer to VAV sequence. 3. At the air handler level: A. The air handler shall be programmed with minimum and reset outdoor air values. Ventilation requirements are noted on mechanical title sheet, with minimum outdoor air rate shown under Wisconsin Code requirements (approximately 750cfm) and full outdoor air noted under ASHRAE requirements (approximately 1500cfm). B. Nominal / setpoint CO2 level is 1000 (adj) ppm. C. If CO2 level is below setpoint, the air handler shall operate to maintain the minimum outdoor airflow rate scheduled at the outdoor airflow sensor. D. If CO2 is above setpoint, the air handler shall revise the outdoor airflow rate from minimum value to reset value until the return air CO2 level drops below setpoint by a set value (200ppm, adj), and then shall return to minimum **Damper Operations:** Unit includes modulating outdoor air damper (at unit), two-position exhaust air damper (at louver), modulating recirculation damper (in unit). 1. Outdoor air damper: A. Outdoor air damper shall be closed when the unit is in unoccupied mode, unless the unoccupied economizer operation is active. B. During occupied hours, if the unit is not in economizer mode, the outdoor air damper shall modulate to maintain the minimum outdoor airflow rate scheduled. C. If the unit is in economizer mode (occupied or unoccupied), the outdoor air damper shall operate as described in the economizer section. A. The exhaust air damper shall be closed when the unit is in unoccupied mode. B. During occupied hours, and during economizer operation, the relief air damper shall be open. 3. Recirculation damper shall at all times operate concurrently to, and in opposition to, the outdoor air damper. See also alarms section in specifications. 1. Alarm if any valve fails (all valves shall provide feedback on position). 2. Alarm if any damper fails (all dampers shall provide feedback on position). 3. Alarm if supply air temperature setpoint cannot be achieved (+/- 2F (adj) within 5 minutes (adj) of setpoint adjustment 4. Alarm if any filter differential pressure exceeds 1" w.c. (adj) 5. Alarm if any safety is tripped. 6. Alarm if the unit controller sends an alarm signal (generic). 7. Alarm if any space temperature remains beyond setpoint (and deadband) for greater than 30 minutes (adjustable). A. If this condition is for a space higher than setpoint (as opposed to a space lower than setpoint), enable the chilled water coil and set the discharge air temperature setpoint at 54F (adj). Remain in this mode until all spaces return to setpoint, and then return to nominal operation. All safeties shall be wired to the supply, return, and exhaust fan starters of the vfd safety circuits. If any safety is tripped, the starters shall not function in any mode (hand, off, auto). Similarly, vfds shall not function in any mode (hand, off, 1. Freezestat: freezstat shall trip if temperature drops below 35F (adj). Reset of freezstat is manual. 2. Supply fan high pressure limit: high pressure limit shall trip if the duct-mounted static pressure probe exceeds setpoint, 2" w.c. (adj). Reset of high pressure limit is manual. 3. Exhaust fan low pressure limit: low pressure limit shall trip if the duct-mounted static pressure probe drops below setpoint, -2" w.c. (adj). Reset of low pressure limit is manual. 4. Fire alarm: shall trip upon activation of duct smoke detectors. Reset of fire alarm is manual. OUTDOOR OUTDOOR (AI) OUTDOOR FILTER RELATIVE PROVING OUTDOOR DAMPER (AI) OUTDOOR SWITCH TEMP HUMIDITY) (FACTORY) BYPASS

The following table lists all possible unit operating modes and also lists the corresponding component operation for each mode.

					OCC MODE	OCC MODE	OCC MODE	OCC MODE	OCC MODE	OCC MODE	UNOCC MODE	UNOCC MODE	UNOCC MODE	UNOCC MODE
					HI ENTHALPY	HI ENTHALPY	MED ENTHALPY	MED ENTHALPY	MED ENTHALPY	LOW ENTHALPY	DEHUMID	DEHUMID	91	15
Control Inpu	ts				DEHUMID	COOLING	DEHUMID	COOLING	VENT	HEATING		HEAT	HEAT	COOL
		h _{OA} > 28	DP _{OA} > 45F	-	ON		8-8	92 5 8	J-8			3 . 8		F.
		Btu/lb	DP _{OA} < 45F		-	ON	SE 9	9.50	SE 9	G		-		
			DP _{OA} > 45F	7.			ON	55.50	150	7 (d) (d)	170	\$1 . 7%	7	
	Occupied Signal ON	were consider		$T_{OA} > 68F$	-	4.	1 7 81	ON	150	-	1.00	s. - √	7	
	3000	h _{OA} < 28 Btu/lb	DP _{OA} < 45F	T _{OA} < 68F & T _{OA} > 55F	-		-	(4)	ON		-	1	378	
				T _{OA} < 55F	27	=	8 2 8	7 2	32	ON	1211	2 2 8	7	22
		943	DP _{SPACE} >	T _{SPACE} >70F	-0	-	1	-	-	12	ON	-	-	<u>44</u>
	Occupied	:::=::::	45F	$T_{SPACE} < 70F$	-	25	888	785	888	184	148	ON	<u>ue</u>	7 <u>41</u>
	Signal OFF		DP _{SPACE} <	T _{SPACE} < 70F	=======================================	#≅	8 3 8	888	8#8	<u>=</u>	1948	13 4 3	ON	=
	·		45F	T _{SPACE} > 70F	÷1	*	300	040	390	÷	(4 1)	1040	*	ON
a .	** · · · · · · · · · · · · · · · · · ·	*	t. *	*	· · · · · · · · · · · · · · · · · · ·	1	6	1 8			r e	r e		r e
Components Regen VFD					ON/MOD.	ON/MOD.	ON/MOD.	ON/MOD.	OFF	OFF	ON/MOD.	ON/MOD.	OFF	OFF
Supply VFD					ON/MOD.	ON/MOD.	ON/MOD.	ON/MOD.	ON/MOD.	ON/MOD.	ON/MOD.	ON/MOD.	ON/MOD	ON/MOD
Exhaust VFD)				ON/MOD.	ON/MOD.	ON/MOD.	ON/MOD.	ON/MOD.	ON/MOD.	ON/MOD.	ON/MOD.	OFF	OFF
Exhaust VFL					OPEN/MOD.	OPEN/MOD	OPEN/MOD	OPEN/MOD	100% OPEN	100% OPEN	CLOSED	CLOSED.	CLOSED	CLOSED
OA Damper	iper				OPEN/MOD.	OPEN/MOD	OPEN/MOD	OPEN/MOD	100% OPEN	100% OPEN	CLOSED	CLOSED	CLOSED	CLOSED
Recirc Damp	er				CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	100% OPEN	100% OPEN	100% OPEN	100% OPEN
Main Compr					ON	ON	ON	ON	OFF	OFF	ON	ON	OFF	OFF
Enthalpy Wh					ON/MOD.	ON/MOD.	OFF	OFF	OFF	ON/MOD.	OFF	OFF	OFF	OFF
Desiccant W					ON	OFF	ON	OFF	OFF	OFF	ON	ON	OFF	OFF
	alve % Opening	g			OFF	OFF	OFF	OFF	OFF	OPEN/MOD	OFF	OPEN/MOD	ON/MOD	CLOSED
	Valve % Openia				OPEN/MOD.		OPEN/MOD	OPEN/MOD	CLOSED	CLOSED	OPEN/MOD	CLOSED	CLOSED	OPEN/MOI

T_{SPACE}= Space Temperature; DP_{SPACE} = Space Dew Point





MECHANICAL CONTROLS **SCHEMATICS**

EXHIBIT J M301

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I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Engineer under the Laws of the State of Wisconsin. ENGINEER SEAL

Print Names: Larry Nemer

Date: <u>JUNE 4, 2018</u> License No: <u>E-30240</u>

12.08.2017 DD PRICING SET

01.17.2018 UDC SUBMISSION

06.01.2018 BID ISSUE

PROJECT NO.

06.04.2018 PERMIT ISSUE

03.31.2018 70% CD PRICING ISSUE

MARK DATE DESCRIPTION
09.09.2017 SCHEMATIC DESIGN SUBMISSION

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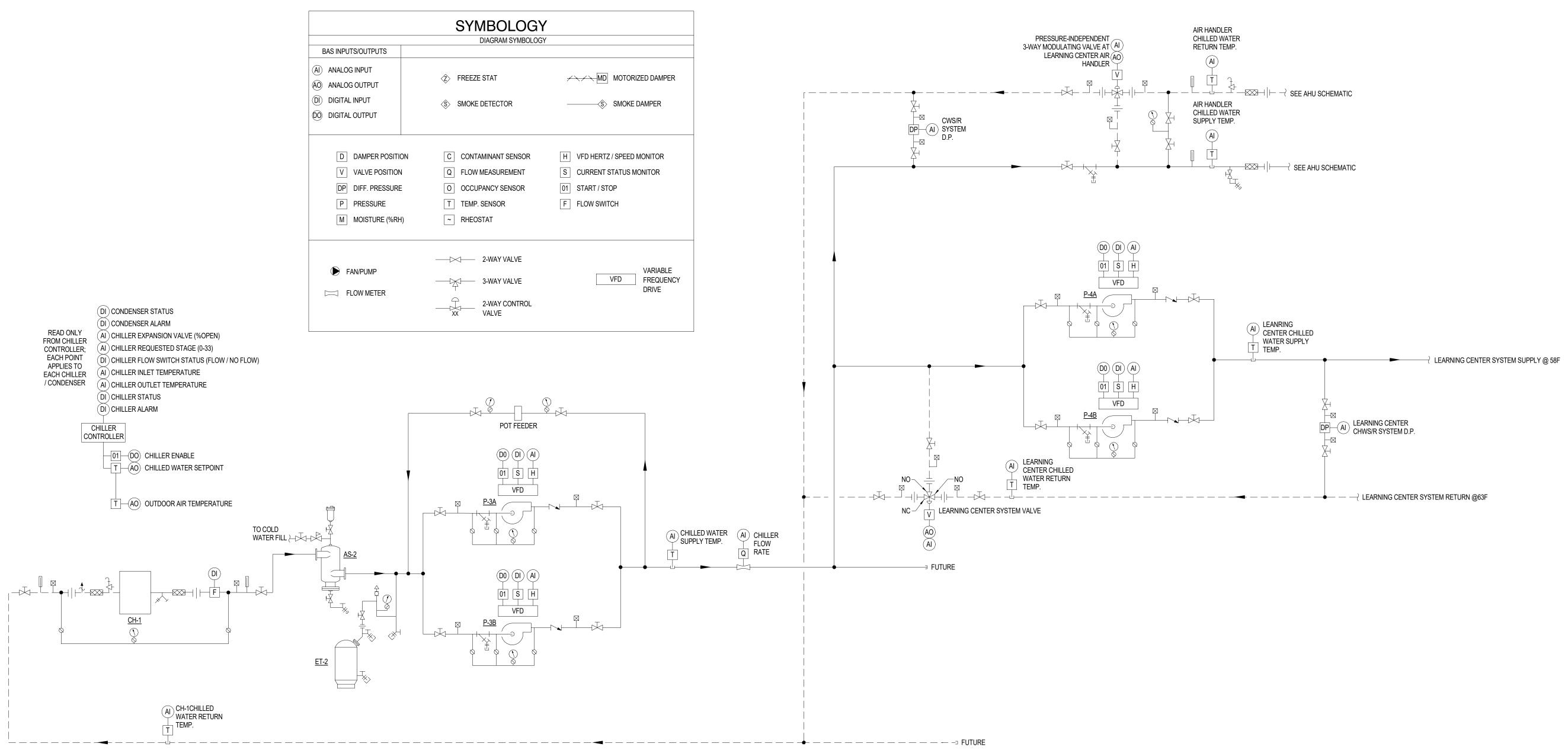
05.04.2018 90% CONSTRUCTION DOCUMENTS

2017016

BID DOCUMENTS

AIR HANDLER

1 HOT WATER PIPING SCHEMATIC NOT TO SCALE



2 CHILLED WATER PIPING SCHEMATIC

Air-cooled chiller plant with variable primary flow and differential pressure pump operation.

Chiller plant shall be enabled when outdoor air temperature is above 50F (adj).

Water temperature control:

Water temperature control shall be based on zone temperature and sent to the chiller controller by the BAS. 1. All zone temperatures and setpoints shall be compared.

2. The zone with temperature furthest from setpoint shall determine supply water setpoint. 3. If the zone furthest from setpoint is 3F (adj) from setpoint, the supply water temperature setpoint shall be 44F (adj). 4. If the zone furthest from setpoint is 0F (adj) from setpoint, the supply water temperature setpoint shall be 48F (adj). 5. Between maximum and minimum distance from setpoints noted, setpoint shall be determined by a linear function between the values given.

Chiller staging: Chillers shall be controlled by manufacturer-furnished chiller controller. This contractor is responsible for installing the chiller controller and providing complete control wiring for the installation. 1. Chiller supply water temperature shall be maintained internally by the chiller controller.

System pumps shall modulate speed based on system differential pressure, with a pressure reset schedule and minimum flow rate (based on chiller requirements).

1. Pumps operate as lead / lag, as follows: A. The lead pump shall be able to be chosen through a selectable day of the week and time of day, through the bas. B. Coordinate with owner for scheduling switchover and frequency. Unless otherwise directed, switchover shall be 10am

C. In any event, the lag pump shall be commanded on if the lead pump fails. 2. Pumps shall operate only when chillers are enabled and shall receive this signal from the BAS. 3. Lead pump shall modulate speed to maintain differential setpoint.

4. Differential setpoint shall be determined by balancing contractor, but shall be a minimum of 5 psig, and a maximum of 10 5. Differential pressure shall be reset based on a trim and respond logic using a poll of all system valve positions.

6. If a valve is 99% open, a pressure request shall be sent. 7. Increase pressure setpoint by 0.1 (adj) psig every 10 (adj) minutes if there are 3 (adj) or more pressure requests, up to a maximum of 10 (adj) psi. 8. Decrease pressure setpoint by 0.1 (adj) psig every 10 (adj) minutes if there are less than 3 (adj) pressure requests.

9. Make no adjustments to pressure setpoint if there are 3 (adj) requests. 10. In any event, flow rate when chillers are active shall never be allowed to drop below chiller minimum flow rate (18gpm,

New Learning Center High Temperature Water Control: Chilled water for high temperature systems shall be constant temperature, with reset based on zone humidity level 1. High temperature water setpoint shall be 58F (adj), nominal. 2. Every 2 minutes (adj) the BAS shall poll the Learning Center temperature and humidity sensors, and calculate dewpoint; BAS shall also poll space slab temperatures where in-floor cooling exists.

A. If all zone dewpoints are 2.0F (adj) or more lower than all in-floor slab temperature sensors, high temperature water setpoint shall remain unchanged. B. If any zone dewpoints are within 2.0F (adj) of any in-floor slab temperature sensor, the high temperature water setpoint shall be adjusted upward by 0.5F (adj). C. The high temperature water setpoint shall likewise be decreased by 0.5F (adj) if all zone dewpoints are 2.0F (adj) or more lower than all in-floor slab temperature sensors AND IF high temperature water setpoint is not at nominal 58F

D. BAS shall continue to poll all zones, thus, and increase or decrease by 0.5F (adj) until setpoint returns to 58F (adj) / nominal setpoint. New Learning Center System Valve Control:

Diverting 3-way modulating pressure-independent control valve controls Learning Center high temperature chilled water as 1. 3-way valve shall be normally closed as noted on plan to re-circulate all water back to Learning Center pumps. 2. If water temperature, as detected at the Learning Center chilled water supply temperature sensor, exceeds setpoint, the valve shall modulate open to maintain setpoint at the sensor.

New Learning Center Circulation Pumps:

System pumps shall modulate speed based on system differential pressure, with a pressure reset schedule. 1. Pumps operate as lead / lag, as follows: A. The lead pump shall be able to be chosen through a selectable day of the week and time of day, through the BAS. B. Coordinate with owner for scheduling switchover and frequency. Unless otherwise directed, switchover shall be 10am

C. In any event, the lag pump shall be commanded on if the lead pump fails.

3. The valve shall modulate back to closed upon a return of water to setpoint.

2. Pumps shall operate only when chiller is enabled. 3. Lead pump shall modulate speed to maintain differential setpoint. 4. Differential setpoint shall be determined by balancing contractor, but shall be a minimum of 5 psig, and a maximum of 10

5. Differential pressure shall be reset based on a trim and respond logic using a poll of all system valve positions. 6. If a valve is 99% open, a pressure request shall be sent. 7. Increase pressure setpoint by 0.1 (adj) psig every 10 (adj) minutes if there are 3 (adj) or more pressure requests. 8. Decrease pressure setpoint by 0.1 (adj) psig every 10 (adj) minutes if there are less than 3 (adj) pressure requests.

9. Make no adjustments to pressure setpoint if there are 3 (adj) requests.

4. Alarm on any chiller controller alarm.

See also alarms section in specifications. 1. Alarm if any valve fails (all valves shall provide feedback on position). 2. Alarm if any lead unit fails, requiring lag start-up. 3. Alarm if any chilled water pump fails, or associated VFD fails / is in fault

5. Alarm if chiller is manually shut off. 6. Alarm if chiller remains off 5 (adj) minutes after commanded on. Landscape Architect

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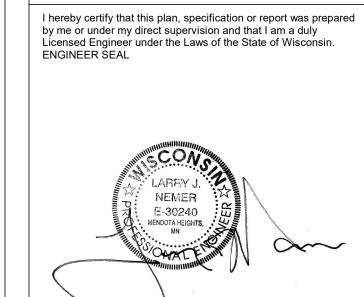
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Print Names: Larry Nemer Date: JUNE 4, 2018 License No: E-30240

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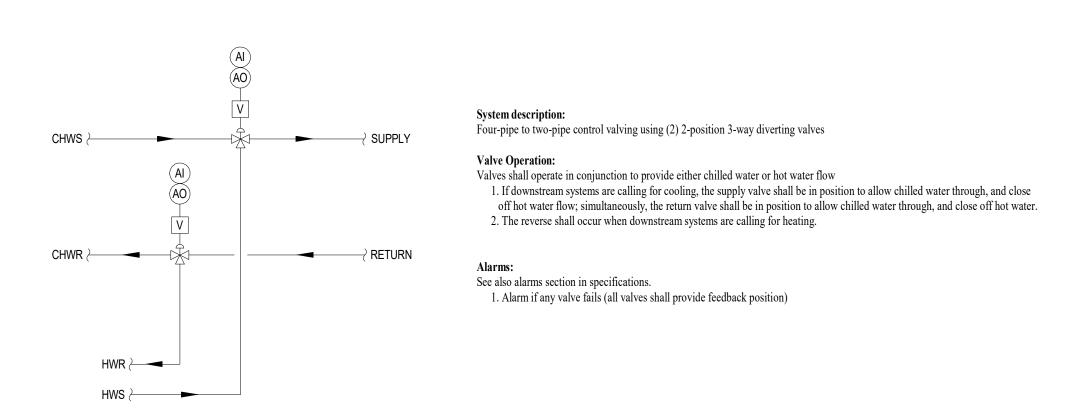
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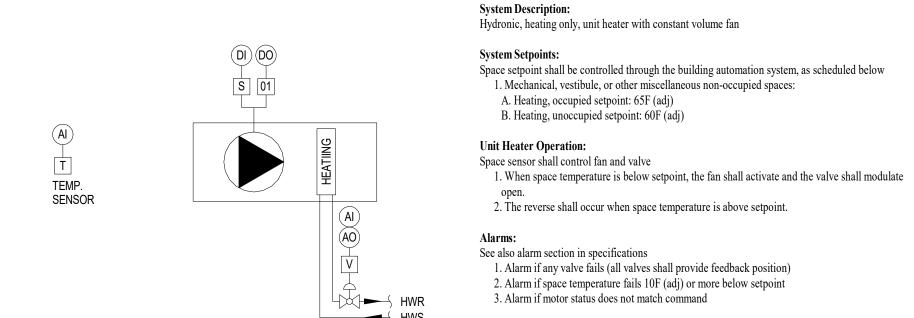
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> **SCHEMATICS EXHIBIT J**

CONTROLS

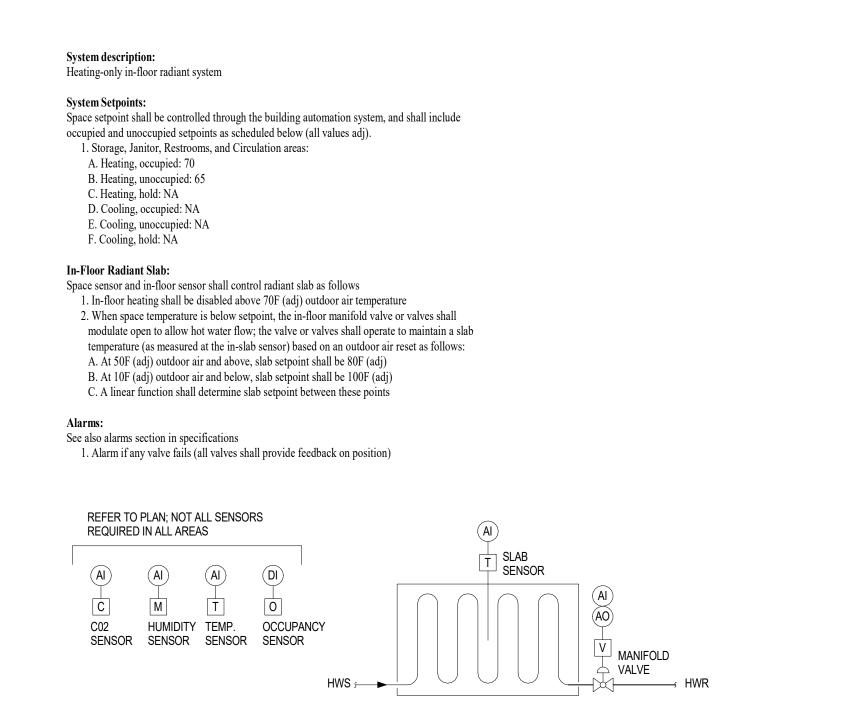


3 FOUR-PIPE TO TWO-PIPE VALVE CONTROL

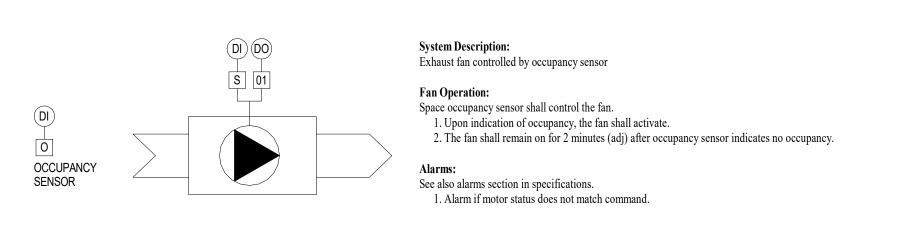


6 UNIT HEATER CONTROL DIAGRAM
NOT TO SCALE

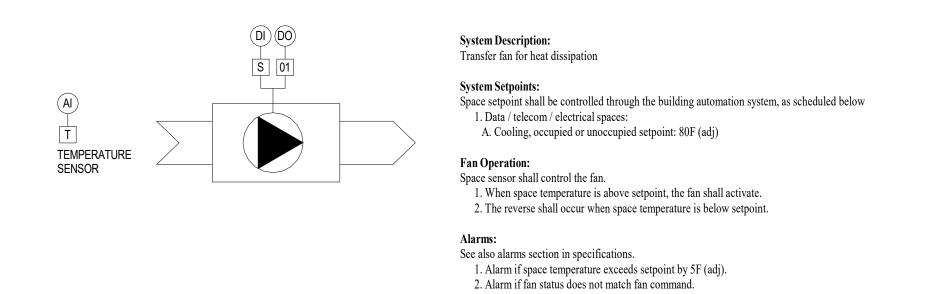
	SYMBOLOGY	•
	DIAGRAM SYMBOLOGY	(
BAS INPUTS/OUTPUTS		
AO ANALOG OUTPUT	⟨Z⟩ FREEZE STAT	MD MOTORIZED DAMPER
DI) DIGITAL INPUT DO) DIGITAL OUTPUT	♦ SMOKE DETECTOR	SMOKE DAMPER
D DAMPER POSITION	C CONTAMINANT SENSOR	H VFD HERTZ / SPEED MONITOR
V VALVE POSITION	Q FLOW MEASUREMENT	S CURRENT STATUS MONITOR
DP DIFF. PRESSURE	O OCCUPANCY SENSOR	01 START/STOP
P PRESSURE	T TEMP. SENSOR	F FLOW SWITCH
MOISTURE (%RH)	~ RHEOSTAT	<u>—</u>
	——————————————————————————————————————	
FAN/PUMP FLOW METER	3-WAY VALVE	VARIABLE VFD FREQUENCY DRIVE
I LOW WILTER	2-WAY CONTROL VALVE	



2 IN FLOOR RADIATION CONTROL DIAGRAM
NOT TO SCALE



5 EXHAUST FAN (RESTROOM, OCC SENSOR)



4 HEAT DISSIPATION FAN (EF-4)
NOT TO SCALE

System description:

System setpoints:

Radiation operation:

Heating only panel radiation

a. Heating, occupied setpoint: 65F (adj)

Space sensor shall control the radiation.

See also alarms section in specifications.

b. Heating, unoccupied setpoint: 60F (adj)

Space setpoint shall be controlled through the building automation system, as scheduled below

1. When space temperature is below setpoint, the radiation valve shall modulate open.

2. The reverse shall occur when space temperature is above setpoint.

1. Alarm if any valve fails (all valves shall provide feedback position)

2. Alarm if space temperature fails 10F (adj) or more below setpoint

REFER TO PLAN; NOT ALL SENSORS

TEMP. OCCUPANCY SENSOR SENSOR

RADIATION

1 PANEL RADIATION CONTROL DIAGRAM
NOT TO SCALE

REQUIRED IN ALL AREAS

1. Restrooms, storage, and other partially occupied spaces:



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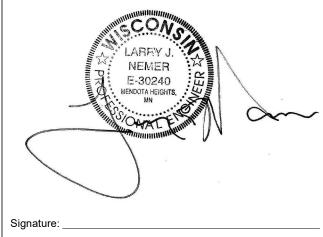
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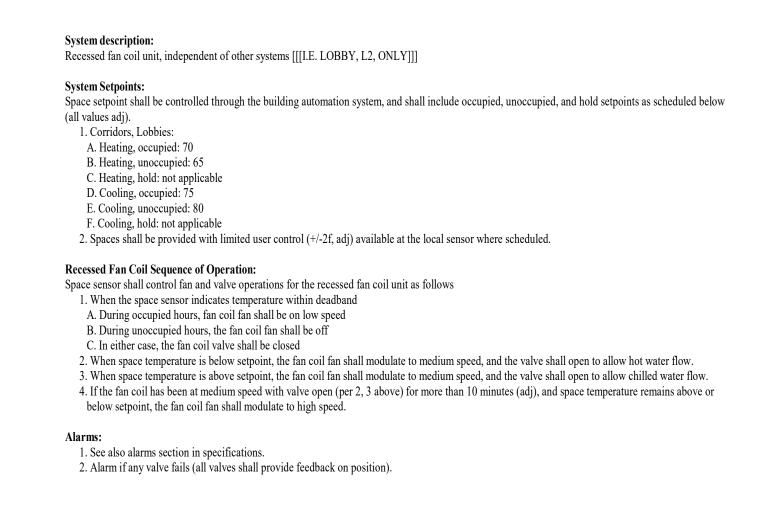


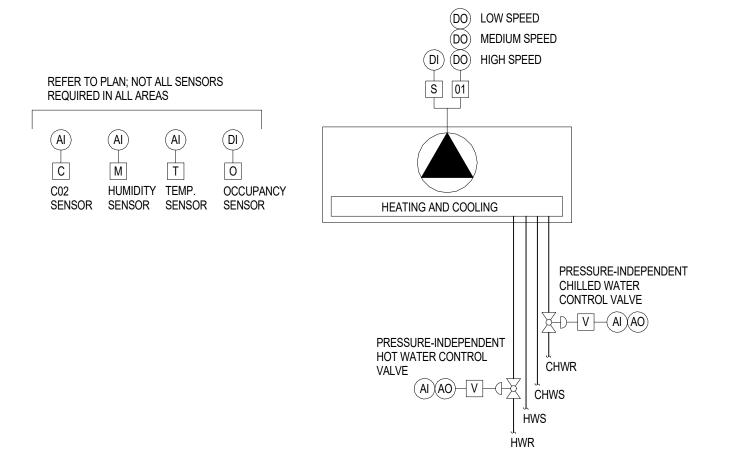
Print Names: Larry Nemer Date: <u>JUNE 4, 2018</u> License No: <u>E-30240</u> MARKDATEDESCRIPTION09.09.2017SCHEMATIC DESIGN SUBMISSION12.08.2017DD PRICING SET 01.10.2018 DESIGN DEVELOPMENT SUBMISSION 01.17.2018 UDC SUBMISSION 03.31.2018 70% CD PRICING ISSUE 05.04.2018 90% CONSTRUCTION DOCUMENTS 06.01.2018 BID ISSUE 06.04.2018 PERMIT ISSUE

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> > SCHEMATICS EXHIBIT J M303

CONTROLS





SYMBOLOGY

⟨Z⟩ FREEZE STAT

C CONTAMINANT SENSOR

Q FLOW MEASUREMENT

O OCCUPANCY SENSOR

3-WAY VALVE

2-WAY CONTROL VALVE

T TEMP. SENSOR

~ RHEOSTAT

BAS INPUTS/OUTPUTS

(AI) ANALOG INPUT

(AO) ANALOG OUTPUT (DI) DIGITAL INPUT

(DO) DIGITAL OUTPUT

D DAMPER POSITION

V VALVE POSITION

DP DIFF. PRESSURE

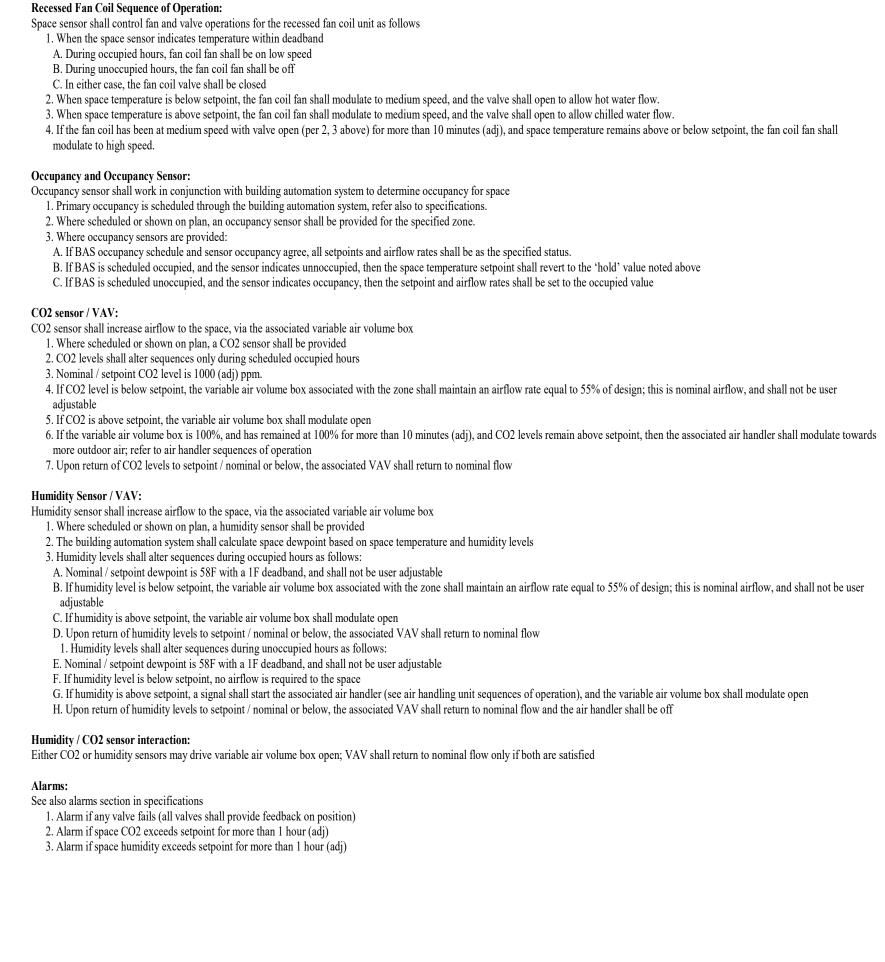
M MOISTURE (%RH)

FAN/PUMP

FLOW METER

DIAGRAM SYMBOLOGY

3 RECESSED FAN COIL UNIT (RFCU), INDEPENDENT



Space setpoint shall be controlled through the building automation system, and shall include occupied, unoccupied, and hold setpoints as scheduled below (all values adj).

System description:

1. Office areas, meeting rooms:

B. Heating, unoccupied: 65

A. Heating, occupied: 70

D. Cooling, occupied: 75

E. Cooling, unoccupied: 80

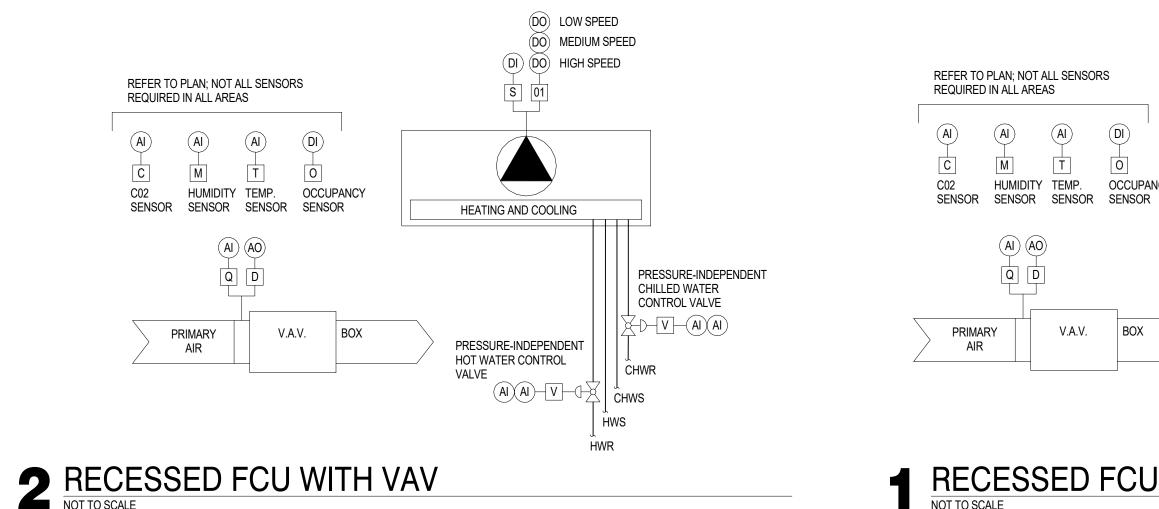
C. Heating, hold: 70

F. Cooling, hold: 75

Recessed fan coil unit, with variable air volume box to same zone [[[I.E. L2 OFFICES]]]

2. Spaces shall be provided with limited user control (+/-2f, adj) available at the local sensor where scheduled.







System description:

A. Heating, occupied: 70 B. Heating, unoccupied: 65

C. Heating, hold: 70 D. Cooling, occupied: 75

F. Cooling, hold: 75

In-Floor Radiant Slab:

E. Cooling, unoccupied: 80

outdoor air the system shall be in cooling mode.

Recessed fan coil unit, with variable air volume box to same zone, and in-floor radiant heating and cooling slab [[[I.E. CLASSROOMS]]]

Radiant slab shall act as first stage of heating and cooling when available; space sensor and in-floor sensor shall control radiant slab as follows

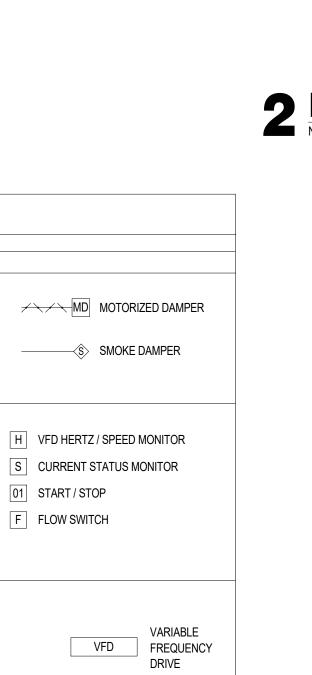
2. When the space sensor indicates temperature within space setpoint deadband, the in-floor manifold valve or valves shall remain closed

2. Spaces shall be provided with limited user control (+/-2f, adj) available at the local sensor where scheduled.

Space setpoint shall be controlled through the building automation system, and shall include occupied, unoccupied, and hold setpoints as scheduled below (all values adj).

1. In-floor heating and cooling shall be disabled between 55F (adj) and 75F (adj) outdoor air temperature (to eliminate rapid changeover from heating to cooling modes); below 55F outdoor air, the system shall be in heating mode; above 75F

3. When space temperature is below setpoint and the system is in heating mode, the in-floor manifold valve or valves shall modulate open to allow hot water flow; the valve or valves shall operate to achieve a slab temperature (as measured at the



) HIGH SPEED

PRESSURE-INDEPENDENT CHILLED WATER

> FROM 4-PIPE TO 2-PIPE CONTROL

VALVE ASSEMBLY

HWS/CHWS 5----

CONTROL VALVE

 \leftarrow V \rightarrow (AI)(AI)

SENSOR

MANIFOLD VALVE

HEATING AND COOLING

PRESSURE-INDEPENDENT

HOT WATER CONTROL

VALVE

HUMIDITY TEMP. OCCUPANCY

ch <u>q</u>O hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Engineer under the Laws of the State of Wisconsin. Print Names: Larry Nemer Date: JUNE 4, 2018 License No: E-30240 09.09.2017 SCHEMATIC DESIGN SUBMISSION 12.08.2017 DD PRICING SET 01.10.2018 DESIGN DEVELOPMENT SUBMISSION 01.17.2018 UDC SUBMISSION 03.31.2018 70% CD PRICING ISSUE 05.04.2018 90% CONSTRUCTION DOCUMENTS 06.01.2018 BID ISSUE 06.04.2018 | PERMIT ISSUE 2017016 **BID DOCUMENTS** Drawing 2017 Copyright Meyer, Scherer & Rockcastle, Ltd.

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CONTROLS

SCHEMATICS

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			AIR HANDLER S	UMEDULE
			AHU# TYPE	1 AIR HANDLING UNIT
			OA AIRFLOW (CFM)	2100
			EA AIRFLOW (CFM)	2100
			AIRSIDE P.D. (IN W.C)	2.0
			OA DB (°F)	80.6
AHU DESICCANT WHEEL			OA WB (°F) RA DB (°F)	75.1 68.0
'AN	8	í	RA WB (°F)	55.2
SIC	SIMMER		SA DB (°F)	63.0
] [<u>v</u>	5	SA WB (°F)	52.8
HH.			EA DB (°F)	76.9
	"	.	EA WB (°F)	69.3 MERV-11
	FII TERS		REGENERATION AIR FILTER (TYPE/SIZE) RETURN AIR FILTER (TYPE/SIZE)	MERV-13
	≣	-	OUTDOOR AIR FILTER (TYPE/SIZE)	MERV-13
Ī			SUPPLY AIRFLOW (CFM)	2100
	SI IPPI Y FAN		OUTDOOR AIRFLOW (CFM)	2100
	<u>></u>	;	EXTERNAL STATIC PRESSURE (IN W.C)	2.3 PLENUM
	ď	5	TYPE MOTOR HP	5.0
	0.	,	MOTOR ELEC. CHAR. (V/HZ/PH)	208/3/60
.	Z		EXHAUST AIRFLOW (CFM)	2100
<u> </u>	T FA	-	EXTERNAL STATIC PRESSURE (IN W.C)	0.5
AIR HANDLER UNIT	EXHALIST FAN	9	TYPE	PLENUM
IQN\	ΉX:	- -	MOTOR HP MOTOR ELEC. CHAR. V/HZ/PH	1.5 208/3/60
꿈			REGENERATION OUTDOOR AIRFLOW	2100
₹	<u>N</u>	5	REGENERATION EXHAUST AIRFLOW	2100
	:RAT	ĀN	EXTERNAL STATIC PRESSURE (IN W.C)	0.8
	FGENERATION		TYPE	PLENUM
	RFG	j	MOTOR FLEC CHAR (V//17/DH)	3.0
			MOTOR ELEC. CHAR. (V/HZ/PH) RETURN AIRFLOW (CFM)	208/3/60
			EA AIRFLOW (CFM)	2100
╘			OA AIRFLOW (CFM)	2100
3			OA DB (°F)	80.6
<u> </u>		OA WB (°F)	75.1	
8	G.	í	RA DB (°F) RA WB (°F)	68.0 55.2
W	SIMMER	2	SA DB (°F)	73.9
AIR HANDLER UNIT ENERGY RECOVERY UNIT	<u>v</u>	5	SA WB (°F)	63.7
			EA DB (°F)	76.9
불			EA WB (°F)	96.3
ا ا			OA M/R (°F)	-15.0
	~		OA WB (°F) RA DB (°F)	-15.0 68.0
HA!	WINTER	<u>.</u>	RA WB (°F)	51.0
AR	<u> </u>	= >	SA DB (°F)	29.9
			SA WB (°F)	25.9
			EA DB (°F)	23.1
			EA WB (°F) TOTAL MBH	23.0 158.5
	5	5	SENSIBLE MBH	46
	٢	2	EER	18.2
	5	5	SA AIRFLOW (CFM)	2100
	PRIMARY DX COOLING COIL	3	OA AIRFLOW (CFM)	2100
	<u> </u>	<u> </u>	REFRIGERANT TYPE	R410A
	ΛΔR	Ź	EAT (DB °F) EAT (WB °F)	73.9 63.7
			LAT (WB 1)	53.6
			LAT (WB °F)	53.6
OILS	ဗ		FLUID	100% WATER
OLER UNIT COILS	R C	ш	EAT (DB °F)	73.3
$\frac{1}{2}$	ED WATER		EAT (WB °F) LAT (DB °F)	56.9 63.0
<u>ا</u> ب		AIR	LAT (WB °F)	52.8
AIR HAND		E	EWT (°F)	44.0
ᇫ	- CHILI	RSII	LWT (°F)	60.0
1	POST	ATE	EWT (°F) LWT (°F) FLOW (GPM) WATERSIDE PD (FT)	3.0
-		Š	WATERSIDE PD (FT)	1.1
	덩	Ш	TOTAL MBH AIR PRESSURE DROP	136.3 N/A
	HOT WATER HEATING COIL	S	AIR PRESSURE DROP EAT (°F)	29.9
	EATI	AIR	LAT (°F)	90.0
	R H	SIDE	EWT (°F)	120
	ATE	RSI	LWT (°F)	105.0
	,W T	WATER	FLOW (GPM)	18.6
	오	<u>```</u>	WATERSIDE PD (FT) MANUFACTURER	7.9 NOVEL AIRE TECHNOLOGIES
			MODEL	2000 DES/DX ERV
		ı	····	LUUU DEU/D/ LIV

1. INSTALL PER MANUFACTURER'S WRITTEN INSTRUCTIONS.

2. UNIT TO BE INSTALLED ON HOUSEKEEPING PAD. PAD PROVIDED BY MECHANICAL. 3. ALL FANS SHALL BE PROVIDED WITH VFD. ALL VFDs ARE FURNISHED BY CONTROLS CONTRACTOR AND WIRED BY ELECTRICAL.

4. PROVIDE UNIT WITH SINGLE POINT CONNECTION.

5. DUCT SMOKE DETECTOR FURNISHED AND WIRED BY ELECTRICAL; INSTALLED BY MECHANICAL. 6. REFER TO DETAIL FOR COIL PIPING CONNECTIONS.

7. AHU DATA BASED ON ASHRAE DEHUMIDIFICATION DAY.

								SO	UND AT	TENUAT	OR SCH	IEDULE						
MADIZ	LOCATION	CEDVICE	TYPF	(CFM)				DYNAMIC IN	ISERTION LOSS				FACE VELOCITY (FDM)	MAYIMUM AID DD /FT\	I FNOTH (IN)	DIMENCIONE (MACLI) (IN)	MANUFACTURER	
MARK	LOCATION	SERVICE	ITPE	(CFIVI)	63 (HZ)	125 (HZ)	250 (HZ)	500 (HZ)	1000 (HZ)	2000 (HZ)	4000 (HZ)	8000 (HZ)	FACE VELOCITY (FPM)	MAXIMUM AIR PD (FT)	LENGTH (IN)	DIMENSIONS (WxH) (IN)	MANUFACTURER	MODEL
SAT-1	MECHANICAL 120	AHU-1 SA	ELBOW WITH EXTENDED WIDTH	2100	12	15	22	28	33	33	29	20	1260	0.15	84	12x20; 24x20	VAW SYSTEMS	REL-EW
SAT-2	MECHANICAL 120	AHU-1 RA	ELBOW	2000	9	13	18	26	29	29	24	20	1260	0.11	96	20x12	VAW SYSTEMS	REL
SAT-3	MECHANICAL 120	AHU-1 OA	ELBOW WITH EXTENDED WIDTH	2100	10	16	20	28	36	32	27	22	1260	0.11	108	20x12	VAW SYSTEMS	REL
SAT-4	MECHANICAL 120	AHU-1 REGENERATION EA	ELBOW	2100	5	6	11	18	27	29	25	18	1260	0.08	60	20x12	VAW SYSTEMS	REL
SAT-5	MECHANICAL 120	AHU-1 EA	ELBOW	2100	9	13	17	25	31	30	26	20	1260	0.11	96	20x12	VAW SYSTEMS	REL
SAT-6	MECHANICAL 120	AHU-1 REGENERATION OA	ELBOW	2100	4	7	10	18	24	25	25	16	1260	0.14	60	12x20	VAW SYSTEMS	REL
					-	•		<u>'</u>	-		<u> </u>		<u> </u>					

						AIR CC	OLED	CHILL	LER SC	CHEDU	JLE							
MADIZ	MARK LOCATION REFRIGERANT	DEEDICEDANT TYPE	CADACITY TONG	EED		EVAPOR	ATOR				CONDE	NSER	ELECTRICAL		ODEDATING WEIGHT (LDC)	MANUEACTURER		NOTES
WARK		REFRIGERANT TYPE CAPACITY	CAPACITY TONS	EER	FLUID PROPERTY	EWT (°F)	LWT (°F)	GPM	PD (FT)	EAT (°F)	FAN QTY	COMPRESSOR QTY	V / PH / HZ	MCA	OPERATING WEIGHT (LBS)	MANUFACTURER	MODEL	NOTES
CH-1	OUTSIDE	410A	13.21	9.9	100% WATER	60	44.0	20	5.0	95.0	1	1	2083/3/60	64.5	800	CARRIER	30RAP016	1,2,3

1. INSTALL PER MANUFACTURER'S WRITTEN INSTRUCTIOINS.

2. SINGLE POINT CONNECTION. DISCONNECT FURNISHED BY MANUFACTURER AND WIRED BY ELECTRICAL.

3. CHILLER IS TO BE INSTALLED ON GRADE. PAD AND SUPPORT BY MECHANICAL.

				HVAC E	EXPANSION TA	NK						
			SIZE	CAP	ACITY	PRE-CHARGE	MAXIMUM PRESSURE IN	SYSTEM WATER	SYSTEM CONNECTION SIZE			
SYSTEM	LOCATION	HEIGHT (IN)	DIAMETER (IN)	ACCEPT. VOLUME (GAL.)	MIN. TANK VOLUME (GAL)	(PSIG)	TANK (PSI)	VOLUME (GAL)	(IN)	MANUFACTURER	MODEL	NOTES
CHILLED WATER	HEADHOUSE	37	10	10	10	15	40	715	1	BELL & GOSSETT	B-35LA	1,2,3,4
					SYSTEM LOCATION HEIGHT (IN) DIAMETER (IN) ACCEPT. VOLUME (GAL.)	SYSTEM LOCATION HEIGHT (IN) DIAMETER (IN) ACCEPT. VOLUME (GAL.) MIN. TANK VOLUME (GAL)	SYSTEM LOCATION HEIGHT (IN) DIAMETER (IN) ACCEPT. VOLUME (GAL.) MIN. TANK VOLUME (GAL) (PSIG)	SYSTEM LOCATION HEIGHT (IN) DIAMETER (IN) ACCEPT. VOLUME (GAL.) MIN. TANK VOLUME (GAL) PRE-CHARGE (PSIG) TANK (PSI)	SYSTEM LOCATION SIZE CAPACITY PRE-CHARGE MAXIMUM PRESSURE IN SYSTEM WATER VOLUME (GAL.) MIN. TANK VOLUME (GAL) (PSIG) TANK (PSI) VOLUME (GAL)	SYSTEM LOCATION SIZE CAPACITY PRE-CHARGE MAXIMUM PRESSURE IN SYSTEM WATER SYSTEM CONNECTION SIZE (IN) DIAMETER (IN) ACCEPT. VOLUME (GAL.) MIN. TANK VOLUME (GAL) (PSIG) TANK (PSI) VOLUME (GAL) (IN)	SYSTEM LOCATION HEIGHT (IN) DIAMETER (IN) ACCEPT. VOLUME (GAL.) MIN. TANK VOLUME (GAL) PRE-CHARGE (PSIG) TANK (PSI) SYSTEM WATER SYSTEM CONNECTION SIZE (IN) MANUFACTURER	SYSTEM LOCATION HEIGHT (IN) DIAMETER (IN) ACCEPT. VOLUME (GAL.) MIN. TANK VOLUME (GAL) PRE-CHARGE (PSIG) TANK (PSI) SYSTEM WATER VOLUME (GAL) SYSTEM WATER VOLUME (GAL) WANUFACTURER MODEL

1. REFER TO DETAIL 2/M202.

2. ASME RATED BLADDER TYPE VESSEL.

3. INCLUDE OPTIONAL SIGHT GLASS.

4. INSTALL PER MANUFACTURER'S WRITTEN INSTRUCTIONS.

					HVA	AC FA	ANS								
MARK	ROOM LOCATION	SYSTEM	AIRFLOW (CFM)	STATIC PRESSURE (IN W.G)	WHEEL TYPE & SIZE (IN)	RPM	V/ø/Hz	AMPS	DAMPER	DRIVE	FAN TYPE	WEIGHT	MANUFACTURER	MODEL	NOTES
EF-1	RESTROOM 105	EXHAUST	75	0.5	FORWARD CURVED, 7.64	935	115/1/60	0.1	BACK DRAFT	DIRECT	CEILING		Greenheck	SP-80-VG	1,2,3
EF-2	RESTROOM 104	EXHAUST	75	0.5	FORWARD CURVED, 7.64	935	115/1/60	0.1	BACK DRAFT	DIRECT	CEILING		Greenheck	SP-80-VG	1,2,3
EF-3	JC 101	EXHAUST	90	0.5	FORWARD CURVED, 7.64	935	115/1/60	0.1	BACK DRAFT	DIRECT	CEILING		Greenheck	SP-80-VG	2,3,5
EF-4	DATA 102	EXHAUST	90	0.5	FORWARD CURVED, 7.64	935	115/1/60	0.1	BACK DRAFT	DIRECT	CEILING		Greenheck	SP-80-VG	2,3,4
EF-5	RESTROOM 202	EXHAUST	75	0.5	FORWARD CURVED, 7.64	935	115/1/60	0.1	BACK DRAFT	DIRECT	CEILING		Greenheck	SP-80-VG	1,2,3

1. EXHAUST FAN SHALL BE INTERLOCKED WITH OCCUPANCY SENSOR. CONTROLS BY CONTROLS CONTRACTOR; LINE VOLTAGE WIRING BY ELECTRICAL.

2. INSTALL PER MANUFACTURER'S WRITTEN INSTRUCTIOINS.

3. DISCONNECT BY ELECTRICAL.

4. EXHAUST FAN CONTROLLED BY THERMOSTAT. CONTROLS BY CONTROLS CONTRACTOR; LINE VOLTAGE WIRING BY ELECTRICAL.

5. EXHAUST FAN ALWAYS ON.

			AIR S	EPARATOR SCHED	JLE			
MARK	LOCATION	SYSTEM	GPM	MAXIMUM PRESSURE DROP (FEET)	SIZE (IN)	MANUFACTURER	MODEL	NOTES
AS-2	HEADHOUSE	BUILDING CHILLED WATER	20	1.0	4	SPIROTHERM	VDN400	1,2,3,4,5,6

1. UNIT IS COMBINATION OF AIR ELIMINATOR AND DIRT SEPARATOR.

2. REFER TO DETAIL 2/M202.

3. UNIT SHALL BE WITH REMOVABLE HEAD.

4. TRANSTION TO CONNECTION SIZE 12" BEFORE AND AFTER UNIT. 5. TREADED OR FLANGED CONNECTION ACCEPTABLE. 6. INSTALL PER MANUFACTURER'S WRITTEN INSTRUCTIONS.

			LC	DUVER SCHEDU	JLE			
MARK	SERVES	SIZE W" x H"	CFM	LOUVER FACE VELOCITY (FPM)	TYPE	MANUFACTURER	MODEL	NOTES
L-1	AHU-1 EXHAUST AND REGENRATION EXHAUST	30x78	4000	1000	ACOUSTIC LOUVER	PRICE INDUSTRIES	QAF845	1,2,4
1-2	AHI J-1 OA INTAKE	48x18	4000	400	LOUVER	GREENHECK	FSD-202	123

1. LOUVERS SPECIFIED IN DIV 8. FURNISHED AND INSTALLED BY MECHANICAL CONTRACTOR.

2. FACE VELOCITY AT MAXIMUM AHU AIRFLOW.

3. REFER TO ARCHITECTURAL PLANS FOR QUANTITY. FIELD VERIFY PRIOR TO START OF WORK. 4. FACE VELOICTY CALCULATED OVER ACTIVE AREA OF LOUVER; REFER TO PLAN FOR BLANK OFF SECTION.

						UN	IT HE	ATER SO	CHED	JLE						
				FAN DATA				Н	OT WATER HE	ATING COIL						
	LOCATION	TOTAL CFM	HP	RPM	VOLTS	PHASE	MBH	NO. OF ROWS		WATE	R SIDE		DIMENSIONS H"xW"xD"	MANUFACTURER	MODEL	NOTES
UNIT HEATER #		TOTAL CEW	ПР	KFIVI	VOLIS	PHASE	IVIDIT	NO. OF ROWS	EWT (F)	LWT (F)	GPM	PD (FT)				
UH-1	MECH. 120	400	FRAC.	1550	115	1	24	1	120	100	0.5	0.11	16x16x18	REZNOR	WS	1,2
UH-2	FP 106	400	FRAC.	1550	115	1	18	1	120	100	0.5	0.11	16x16x18	REZNOR	WS	1,2
		ı	1	-1		1	I			l.				1	1	1

1. INSTALL PER MANUFACTURER'S WRITTEN INSTRUCTIOINS. 2. DISCONNECT AND WIRING BY ELECTRICAL.

	GRILLE, REGISTER & DIFFUSER				
PLAN SYMBOL	DISCRIPTION	MANUFACTURER	MODEL NUMBER	MATERIAL	NOTES
CD-1	8" INLET, (2)1.0" SLOTS, 4' LONG WITH 8" HIGH INSULATED PLENUM.	TITUS	TBD-10	ALUMINUM	1,2
RG-1	4' LONG, (4) 1.0" SLOTS	TITUS	TBR-30	ALUMINUM	1,2
RG-2	LINEAR BAR DIFFUSE, 18/" BARS, 0 DEGREE DEFLECTION, 2" NOMINAL DUCT SIZE.	TITUS	CT-580	ALUMINUM	1,3
SD-1	RECTANGULAR SUPPLY DIFFUSER WITH 1/2" BLADE SPACING AND 35 DEGREE DEFLECTION	TITUS	355RL	STEEL	1
TES.		-		•	

1. SEE PLANS FOR SPECIFIC SIZE 2. INSULATED PLENUM BOX PROVIDED BY MANUFACTURER.

3. FABRICATED PLENUM BOX, PER PLAN.

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I hereby certify that this plan, specification or report was prepared

Print Names: Larry Nemer Date: <u>JUNE 4, 2018</u> License No: <u>E-30240</u>

05.04.2018 90% CONSTRUCTION DOCUMENTS 06.01.2018 BID ISSUE 06.04.2018 PERMIT ISSUE

2017016 BID DOCUMENTS

> MECHANICAL SCHEDULES

									RE	CESSED	FAN COIL	UNIT S	CHEDULE	-								
		- AN 0514		FAN	MOTOR				COO	LING COIL						HE/	ATING COIL					
MARK	PRIMARY SA (CFM)	FAN CFM (HIGH/MED)	LENGTH (IN)	DDIVE TVDE	CUAD (// ~ / UZ)	CENCIDI E (MDII)		WATER SIDE			AIR	SIDE			WATER	SIDE		AIF	R SIDE	MANUFACTURER		NOTES
		(HIGH/WIED)		DRIVE TYPE	CHAR. (V / ø / HZ)	SENSIBLE (MBH)	EWT (°F)	LWT (°F)	GPM	EAT (DB°F)	EAT (WB°F)	LAT (DB°F)	LAT (WB°F)	EWT (°F)	LWT (°F)	GPM	PD (FT)	EAT (°F)	LAT (°F)		MODEL	
RFC-1	-	650/300	110	DIRECT	24 V	5300	58	63	2.0	68	55.2	63	52.8	-	-	-	-	-	-	JAGA	QUAF.01928034/2/BNA	1,2,3
RFC-1D	165	650/300	120	DIRECT	24 V	5300	58	63	1.7	63	52.8	63	52.8	-	-	-	-	-	-	JAGA	QUAF.01928034/2/BNA	1,2,3,4
RFC-2	-	650/430	110	DIRECT	24 V	4985	58	63	1.9	68	55.2	63	52.8	120	100	1.11	1.0	70	90	JAGA	QUAF.01928034BNA	1,2,3
RFC-2D	200	650/430	120	DIRECT	24 V	4985	58	63	1.9	63	52.8	63	52.8	120	100	1.11	1.0	90	90	JAGA	QUAF.01928034BNA	1,2,3,4
RFC-3	-	440/200	79	DIRECT	24 V	3560	58	63	1.5	68	55.2	63	52.8	120	100	0.75	1.0	70	90	JAGA	QUAF.01920034/2/BNA	1,2,3
RFC-3D	SEE PLAN	650/430	87	DIRECT	24 V	3560	58	63	1.4	68	55.2	63	52.8	120	100	1.11	1.0	70	90	JAGA	QUAF.01920034/2/BNA	1,2,3,4

NOTES:
1. UNIT INCLUDES 24 V SPEED CONTROL. 2. PROVIDE OAK VARNISHED WOODEN GRILLE.

3. INSTALL PER MANUFACTURER'S WRITTEN INSTRUCTIOINS.

4. UNIT SHALL BE EXTENDED TO SPECIFIED LENGTH TO ALLOW 6"/8" PRIMARY AIR CONNECTION.

					H\/	AC PUMP SCH	4EDI 11 F	=				
					110	ACTOWN SCI		_				
MARK	LOCATION	SERVES	PUMP TYPE	DESIGN FLOW (GPM)	HEAD (FT)	MOTOR		PU	MP SIZE	MANUFACTURER	MODEL	NOTES
WANN	LOCATION	SERVES	POWIP ITPE	DESIGN FLOW (GFM)	HEAD (F1)	ELECTRICAL CHAR	HP	SUCTION (IN)	DISCHARGE (IN)	WIANOFACTORER	MODEL	NOTES
P-3A	HEADHOUSE	HOUSE CHILLED WATER	INLINE	20	10	208/1/60	1/6	1 1/2	1 1/2	BELL AND GOSSETT	ECOCIRC-XL-36-45	1,2,3
P-3B	HEADHOUSE	HOUSE CHILLED WATER	INLINE	20	10	208/1/60	1/6	1 1/2	1 1/2	BELL AND GOSSETT	ECOCIRC-XL-36-45	1,2,3
P-4A	MECH. ROOM 120	LEARNING CENTER CHILLED WATER	INLINE	49	33	208/1/60	1.0	1 1/2	1 1/2	BELL AND GOSSETT	ECOCIRC-XL-65-130	1,2,3
P-4B	MECH. ROOM 120	LEARNING CENTER CHILLED WATER	INLINE	49	33	208/1/60	1.0	1 1/2	1 1/2	BELL AND GOSSETT	ECOCIRC-XL-65-130	1,2,3
P-5A	MECH. ROOM 120	LEARING CENTER HOT WATER	INLINE	49	32	208/1/60	1.0	1 1/2	1 1/2	BELL AND GOSSETT	ECOCIRC-XL-65-130	1,2,3
P-5B	MECH. ROOM 120	LEARING CENTER HOT WATER	INLINE	49	32	208/1/60	1.0	1 1/2	1 1/2	BELL AND GOSSETT	ECOCIRC-XL-65-130	1,2,3

NOTES:

1. INSTALL PER MANUFACTURER'S WRITTEN INSTRUCTIONS.

2. DISCONNECT AND WIRING BY ELECTRICAL.

3. REFER TO DETAIL 1/M202.

				PANEL F	RADIATOR SCHEI	DULE		
MARK	LOCATION	CAPACITY (BTUH/FT)	GPM	EWT (DEG F)	LWT (DEG F)	PANEL LENGTH	MANUFACTURER & MODEL NO.	NOTES
PR-1	SEE PLAN	541.0	SEE PLAN	120	100	SEE PLAN	RUNTAL, R3F	1,2
PR-2	SEE PLAN	541.0	SEE PLAN	120	100	SEE PLAN	RUNTAL, R3F	1,2

NOTES:

1. INSTALL PER MANUFACTURER'S WRITTEN INSTRUCTIOINS. 2. REFER TO DETAIL 8/M201.

RADIA	NT HEAT/COC	L MANIFOL	D SCHEDUL	E		
NUMBER OF CIPCUITS	HOT WATER	CHILLED WATER	MANIFOLD ▲P	MAX ▲P	FLOW RATE	ı

MARK	SERVES	NUMBER OF CIRCUITS	HOT WATER SUPPLY TEMP (°F)	CHILLED WATER SUPPLY TEMP (°F)	MANIFOLD ▲P (FT H2O)	MAX ▲P (FT H20)	FLOW RATE (GPM)	NOTES
M-1	ZONE 1	5	120	58	1.0	4.0	3.8	1,3,4
M-2	ZONE 2,3	10	120	58	1.0	3.5	7.4	1,3,4
M-3	ZONE 4	9	120	58	1.1	4.2	7.4	1,3,4
M-4	ZONE 4,5,6,7,8	6	120	-	1.1	4.0	4.0	1,2,3

NOTES: 1. INSTALL PER MANUFACTURER'S WRITTEN INSTRUCTIONS. 2. MANIFOLD HAS HEATING ONLY.

3. REFER TO DETAIL 5/M201.

4. WHERE MANIFOLD SUPPLIES HOT OR CHILLED WATER, INCLUDE 4-WAY TO 2-WAY VALVING ASSEMBLY (BY CONTROLS CONTRACTOR).

	VAV SCHEDULE											
MARK	LOCATION	SERVES	MAX. CFM	MIN. CFM	INLET SIZE (IN)	TOTAL DELTA P (IN WG)	MANUFACTURER & MODEL NO.	NOTES				
VAV-1	MECH. ROOM 120	CLASSROOM 3	500	250	7	0.5	TITUS, DESV	1,2,3,4				
VAV-2	MECH. ROOM 120	CLASSROOM 1	500	250	7	0.5	TITUS, DESV	1,2,3,4				
VAV-3	MECH. ROOM 120	CLASSROOM 2	500	250	7	0.5	TITUS, DESV	1,2,3,4				
VAV-4	MECH. ROOM 120	SECOND FLOOR	310	160	6	0.5	TITUS, DESV	1,2,3,4				

NOTES: 1. VAV WITH LOW VOLTAGE CONTROLLER.

2. REFER TO DETAIL 7/M201. 3. INSTALL WITH CONTROL BOX AT THE BOTTOM OF UNIT, TO ALLOW 3' 0" CLEAR ACCESS TO SAME.

4. REFER TO PLAN FOR SENSOR TYPE ASSOCIATED WITH EACH VAV.

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I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly
Licensed Engineer under the Laws of the State of Wisconsin.
ENGINEER SEAL



Print Names: Larry Nemer

Date: JUNE 4, 2018 License No: E-30240

 MARK
 DATE
 DESCRIPTION

 09.09.2017
 SCHEMATIC DESIGN SUBMISSION

 12.08.2017
 DD PRICING SET

 01.10.2018
 DESIGN DEVELOPMENT SUBMISSION
 01.17.2018 UDC SUBMISSION 03.31.2018 70% CD PRICING ISSUE 05.04.2018 90% CONSTRUCTION DOCUMENTS

06.01.2018 BID ISSUE 06.04.2018 PERMIT ISSUE

2017016 PROJECT PHASE
BID DOCUMENTS

MECHANICAL

SCHEDULES