

GENERAL MECHANICAL SYMBOLS		
SYMBOL	DESCRIPTION	ADDITIONAL REMARKS
	SHEET NOTE	DENOTES SPECIFIC REQUIREMENT FOR THE SHEET ON WHICH THE NOTE APPEARS AND IS USED TO DESCRIBE WORK THAT IS TOO LENGTHY TO PLACE ON PLAN.
	PIPING - SOLID LINE INDICATES SYSTEM SUPPLY - DASHED LINE INDICATES SYSTEM RETURN	NUMBER INDICATES NOMINAL DIAMETER IN INCHES. LETTERS INDICATES SYSTEM TYPE. REFER TO ABBREVIATIONS FOR SYSTEM TYPE.
	DIAMETER	
	DENOTES CONNECTION OF NEW WORK TO EXISTING SYSTEM	PROTECT EXISTING SYSTEM FROM ENTRANCE OF FOREIGN DEBRIS DURING WORK.
	ARROW INDICATES DIRECTION OF FLOW IN PIPING	
	ARROW INDICATES DOWNWARD PIPE SLOPE # INDICATES SLOPE IN INCHES PER FOOT	WHERE PIPING IS NOT MARKED, REFER TO SPECIFICATIONS FOR REQUIREMENTS
	ISOLATION VALVE	REFER TO SPECIFICATIONS FOR TYPE BASED ON SIZE AND SYSTEM
	CHECK VALVE OR BACKWATER VALVE ARROW INDICATES DIRECTION OF NORMAL FLOW	REFER TO SPECIFICATIONS FOR TYPE BASED ON SIZE AND SYSTEM
	PIPE IN SLEEVE	REFER TO SPECIFICATIONS FOR TYPE BASED ON SIZE AND SYSTEM
	AUTOMATIC FLOW CONTROL VALVE # INDICATES FLOW TO BE BALANCED IN GPM	CIRCUIT SETTER, AUTOFLOW, ETC. REFER TO SPECIFICATIONS FOR TYPE BASED ON SIZE AND SYSTEM
	ELBOW UP ELBOW DOWN	
	TEE UP TEE DOWN	
	TEE HORIZONTAL	
	PIPE REDUCER	INDICATES POINT WHERE PIPING CHANGES FROM ONE SIZE TO ANOTHER. SMALL POINT OF ARROW INDICATES SMALLER SIZE SIDE OF TRANSITION.
	UNION	
	Y STRAINER WITH BLOWDOWN	REFER TO SPECIFICATIONS FOR TYPE AND ACCESSORIES
	Y STRAINER	
	PRESSURE GAUGE	REFER TO SPECIFICATIONS FOR TYPE AND ACCESSORIES
	PRESSURE GAUGE STEAM	REFER TO SPECIFICATIONS FOR TYPE AND ACCESSORIES
	THERMOMETER - HORIZONTAL PIPE	REFER TO SPECIFICATIONS FOR TYPE AND ACCESSORIES
	THERMOMETER - VERTICAL PIPE	REFER TO SPECIFICATIONS FOR TYPE AND ACCESSORIES
	REQUIRED SERVICE CLEARANCE FOR EQUIPMENT	
	DUCT CONTINUATION	
	AIR VENT	
	BACKFLOW PREVENTER	
	CALIBRATED BALANCING VALVE	
	VALVE - THROTTLING SERVICE	
	VALVE - SHUTOFF SERVICE	
	PIT PORT	
	PIPE CAP	
	PIPE CONTINUATION	
	PRESSURE REDUCING VALVE	
	PUMP	
	RELIEF VALVE	
	SENSOR	
	SUCTION DIFFUSER	
	VACUUM BREAKER	
	STEAM TRAP	

GENERAL ABBREVIATIONS			
NOT ALL ABBREVIATIONS APPLY TO THIS SET OF DOCUMENTS			
ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION
AD	ACCESS DOOR/PANEL	LF	LINEAR FEET
AFF	ABOVE FINISHED FLOOR	MAX	MAXIMUM
AMB	AMBIENT	MC	MECHANICAL CONTRACTOR
SOB	BOTTOM OF BEAM	MFR	MANUFACTURER
CC	CONTROLS CONTRACTOR	MIN	MINIMUM
DN	DIAMETER	NIC	NOT IN CONTRACT
DOWN	DOWN	NTS	NOT TO SCALE
E	EXISTING	PC	PLUMBING CONTRACTOR
EC	ELECTRICAL CONTRACTOR	PSIG	POUNDS PER SQUARE INCH GAUGE
EFF	EFFICIENCY	RPM	REVOLUTIONS PER MINUTE
FPM	FEET PER MINUTE	SHT	SHEET
FPS	FEET PER SECOND	TOB	TOP OF BEAM
GC	GENERAL CONTRACTOR	TOS	TOP OF STEEL
GPM	GALLONS PER MINUTE	VEL	VELOCITY
L	LENGTH	VFD	VARIABLE FREQUENCY DRIVE

TEMPERATURE CONTROL SYMBOLS		
SYMBOL	DESCRIPTION	ADDITIONAL REMARKS
	WALL MOUNTED CONTROL DEVICE # INDICATES TYPE	REFER TO MOUNTING HEIGHTS DETAIL FOR MOUNTING ELEVATION. T = THERMOSTAT H = HUMIDISTAT S = SENSOR (CARBON MONOXIDE, ETC.)
	OCCUPANCY SENSOR	REFER TO ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION. WHEN SENSOR IS NOT SHOWN ON ELECTRICAL DRAWINGS IT SHALL BE PROVIDED AND INSTALLED BY THE TEMPERATURE CONTROLS CONTRACTOR.
	DUCT, PIPE, OR CEILING MOUNTED CONTROL SENSOR	REFER TO SPECIFICATIONS FOR TYPE. REFER TO SEQUENCES AND SCHEMATICS FOR ADDITIONAL INFORMATION AND REQUIREMENTS. T = THERMOSTAT H = HUMIDISTAT S = SENSOR (CARBON DIOXIDE, ETC.)
	CONTROL VALVE (3-WAY)	REFER TO SPECIFICATIONS FOR TYPE. REFER TO SEQUENCES AND SCHEMATICS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
	CONTROL VALVE (2-WAY)	REFER TO SPECIFICATIONS FOR TYPE. REFER TO SEQUENCES AND SCHEMATICS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
	PRESSURE/TEMPERATURE TEST PORT	
	FLOW MEASURING STATION	REFER TO SPECIFICATIONS FOR TYPE. REFER TO SEQUENCES AND SCHEMATICS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
	FLOW SWITCH	

HVAC SYMBOLS		
SYMBOL	DESCRIPTION	ADDITIONAL REMARKS
	RECTANGULAR DUCTWORK W = DIMENSION IN VIEW (INCHES) H = DIMENSION PERPENDICULAR TO VIEW (INCHES)	REFER TO DUCT CONSTRUCTION SCHEDULE AND SPECIFICATIONS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
	ROUND DUCTWORK D = DUCT DIAMETER	REFER TO DUCT CONSTRUCTION SCHEDULE AND SPECIFICATIONS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
	FLAT OVAL DUCTWORK W = DIMENSION IN VIEW (INCHES) H = DIMENSION PERPENDICULAR TO VIEW (INCHES)	REFER TO DUCT CONSTRUCTION SCHEDULE AND SPECIFICATIONS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
	TURNING VANES	REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
	DUCT CROSS SECTION - SUPPLY	CROSS SECTION INDICATES DUCT EXTENDING PERPENDICULAR TO THE PAGE. IN PLAN VIEW THIS INDICATES A DUCT RISE OR DROP TO ANOTHER LEVEL. SOLID FILLED REGION INDICATE EXTENSION UP. NO FILLED REGION INDICATES EXTENSION DOWN.
	DUCT CROSS SECTION - RETURN	
	DUCT CROSS SECTION - EXHAUST	
	MANUAL BALANCE DAMPER	REFER TO SPECIFICATIONS FOR TYPE. LOCATE MANUAL BALANCE DAMPERS IN AN ACCESSIBLE LOCATION AND AS CLOSE TO THE MAIN DUCT AS POSSIBLE.
	CONTROL DAMPER	DAMPER SHALL BE SAME SIZE AS DUCT UNLESS NOTED OTHERWISE. REFER TO SEQUENCES, SCHEMATICS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
	FIRE DAMPER	REFER TO SPECIFICATIONS FOR TYPE. LOCATE DAMPERS IN AN ACCESSIBLE LOCATION AND PROVIDE ACCESS DOORS/PANELS IN DUCT AND CEILING/WALL.
	SMOKE DAMPER	REFER TO SPECIFICATIONS FOR TYPE. LOCATE DAMPERS IN AN ACCESSIBLE LOCATION AND PROVIDE ACCESS DOORS/PANELS IN DUCT AND CEILING/WALL.
	FIRE/SMOKE DAMPER	REFER TO SPECIFICATIONS FOR TYPE. LOCATE DAMPERS IN AN ACCESSIBLE LOCATION AND PROVIDE ACCESS DOORS/PANELS IN DUCT AND CEILING/WALL.
	DIFFUSER	
	DIFFUSER BLANK OFF	SHADED AREA INDICATES QUADRANT OF DIFFUSER TO BE PROVIDED WITH BLANK OFF PANEL.
	RETURN GRILLE	
	EXHAUST GRILLE	
	WALL REGISTER / GRILLE	
	DUCT MOUNTED REGISTER / GRILLE	
	LINEAR SLOT	
	TRANSFER AIR ARROW D = TYPE # = # TYPE NUMBER ## = AIRFLOW IN CFM	ARROW INDICATES DIRECTION OF TRANSFER AIR.
	FLOW ARROW	ARROW INDICATES DIRECTION OF AIRFLOW FROM DIFFUSERS WITH ADJUSTABLE THROWS.
	DIFFUSER TAG D = TYPE # = # TYPE NUMBER ## = AIRFLOW IN CFM	REFER TO DIFFUSER SCHEDULE FOR TYPE DESCRIPTIONS AND SIZING. BALANCE TO AIRFLOW LISTED. WHEN TYPE IS NOT GIVEN AND ONLY CFM IS DESIGNATED, PROVIDE D1 FOR SUPPLY OR G1 FOR RETURN/EXHAUST.
	FLEXIBLE DUCT	REFER TO SPECIFICATIONS FOR TYPE. REFER TO DETAILS FOR INSTALLATION REQUIREMENTS. MAXIMUM LENGTH SHALL BE 48 INCHES UNLESS NOTED OTHERWISE ON THE PLANS OR IN THE SPECIFICATIONS.
	FLEXIBLE PIPING	REFER TO SPECIFICATIONS FOR TYPE.
	VARIABLE AIR VOLUME BOX - NO COIL	REFER TO SCHEDULE, DETAILS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION AND INSTALLATION REQUIREMENTS.
	VARIABLE AIR VOLUME BOX - HOT WATER COIL	REFER TO SCHEDULE, DETAILS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION AND INSTALLATION REQUIREMENTS.
	VARIABLE AIR VOLUME BOX - ELECTRIC COIL	REFER TO SCHEDULE, DETAILS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION AND INSTALLATION REQUIREMENTS.
	VARIABLE AIR VOLUME BOX - DUAL DUCT	REFER TO SCHEDULE, DETAILS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION AND INSTALLATION REQUIREMENTS.
	VAV BOX TAG # = REFERENCE NUMBER IN SCHEDULE ## = AIRFLOW IN CFM	REFER TO VARIABLE VOLUME BOX SCHEDULE FOR TYPES AND SIZING. AIRFLOW LISTED IS NOMINAL DESIGN CFM AND GPM. FINAL VALUES ARE TO BE DETERMINED BY TESTING AND BALANCING CONTRACTOR AND PROGRAMMED BY CONTROLS CONTRACTOR.
	VAV BOX TAG # = REFERENCE NUMBER IN SCHEDULE ## = WATER FLOW RATE IN GPM	REFER TO VARIABLE VOLUME BOX SCHEDULE FOR TYPES AND SIZING. AIRFLOW LISTED IS NOMINAL DESIGN CFM AND GPM. FINAL VALUES ARE TO BE DETERMINED BY TESTING AND BALANCING CONTRACTOR AND PROGRAMMED BY CONTROLS CONTRACTOR.

HVAC ABBREVIATIONS			
NOT ALL ABBREVIATIONS APPLY TO THIS SET OF DOCUMENTS			
ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION
AB	AIR BLENDER	HP	HORSEPOWER
AC	AIR CONDITIONING UNIT (SPLIT SYSTEM INDOOR UNIT)	HPC	HIGH PRESSURE STEAM CONDENSATE
AHU	AIR HANDLING UNIT	HPS	HIGH PRESSURE STEAM SUPPLY (86 PSIG AND ABOVE)
BFU	BOILER FEED UNIT	HRC	HEAT RECOVERY CHILLER
BLR	BOILER	HUM	HUMIDIFIER
CAV	CONSTANT AIR VOLUME BOX	HWR	HEATING HOT WATER RETURN
CC	COOLING COIL	HWS	HEATING HOT WATER SUPPLY
CD	CONDENSATE DRAIN	LPC	LOW PRESSURE STEAM CONDENSATE
CFM	CUBIC FEET PER MINUTE	LPS	LOW PRESSURE STEAM SUPPLY (0-12 PSIG)
CH	CHILLER	LV	LOUVER
CP	CONDENSATE PUMP	LWT	LEAVING WATER TEMPERATURE
CR	CONDENSER WATER RETURN	MBH	BTU (1000'S)
CS	CONDENSER WATER SUPPLY	MD	MANUAL DAMPER
CT	COOLING TOWER	MOD	MOTOR OPERATED DAMPER
CU	CONDENSING UNIT	MPC	MEDIUM PRESSURE STEAM CONDENSATE
CUH	CABINET UNIT HEATER	MPS	MEDIUM PRESSURE STEAM SUPPLY (13-85 PSIG)
CWR	CHILLED WATER RETURN	NC	NORMALLY CLOSED, NOISE CRITERIA
CWS	CHILLED WATER SUPPLY	NO	NORMALLY OPEN, NUMBER
D	DIFFUSER	OA	OUTDOOR AIR
DD	DUAL DUCT	P	PUMP
DX	DIRECT EXPANSION	PC	PUMPED CONDENSATE
EA	EXHAUST AIR	PRV	PRESSURE REDUCING VALVE
EAT	ENTERING AIR TEMPERATURE	PSG	PUMPED STEAM CONDENSATE
EF	EXHAUST FAN	R	REGISTER
EFF	EFFICIENCY	RA	RETURN AIR
ERC	ENERGY RECOVERY COIL	REA	RELIEF AIR
ERW	ENERGY RECOVERY WHEEL	REFL	REFRIGERANT DX LIQUID
ET	EXPANSION TANK	REFS	REFRIGERANT DX SUCTON GAS
EWT	ENTERING WATER TEMPERATURE	RF	RETURN FAN
FB	FILTER BANK (CONSISTING OF ONE OR MORE FILTERS)	RH	RELATIVE HUMIDITY
FCU	FAN COIL UNIT	RTU	ROOF TOP UNIT
FMS	FLOW MEASURING STATION	SA	SUPPLY AIR
FOR	FUEL OIL RETURN	SD	SMOKE DAMPER
FOG	FUEL OIL SUPPLY	SF	SUPPLY FAN
FOV	FUEL OIL VENT	SP	STATIC PRESSURE
FRD	FIRE DAMPER	STM	STEAM
FSD	FIRE SMOKE DAMPER	TEMP	TEMPERATURE
FTR	FINNED TUBE RADIATOR	TR	TRANSFER
G	GRILLE	UH	UNIT HEATER
GCWR	GLYCOL CHILLED WATER RETURN	VAV	VARIABLE AIR VOLUME BOX
GCWS	GLYCOL CHILLED WATER SUPPLY	VTR	VENT THROUGH ROOF
GE	GRAVITY EXHAUST	WB	WET BULB TEMPERATURE
GHWR	GLYCOL HEATING HOT WATER RETURN	WC	WATER COLUMN
GHWS	GLYCOL HEATING HOT WATER SUPPLY	WPD	WATER PRESSURE DROP
GI	GRAVITY INTAKE	WSHPR	WATER SOURCE HEAT PUMP RETURN
HC	HEATING COIL	WSHPS	WATER SOURCE HEAT PUMP SUPPLY

**MECHANICAL GENERAL NOTES:**

- THESE NOTES APPLY TO ALL SHEETS CONTAINING HVAC, PIPING, PLUMBING, MEDICAL GAS, TEMPERATURE CONTROLS, AND FIRE PROTECTION WORK. REFER TO PROJECT SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS. WHERE A DISCREPANCY EXISTS BETWEEN THESE PLANS AND THE PROJECT SPECIFICATIONS, THE SPECIFICATION REQUIREMENTS SHALL TAKE PRECEDENCE OVER THE DRAWINGS.
- VERIFY THE EXISTING CONDITIONS AT THE PROJECT SITE BEFORE SUBMITTING COST PROPOSAL. BE ADVISED THAT LOCATIONS SHOWN ARE APPROXIMATE. AN ATTEMPT HAS BEEN MADE TO SHOW ALL PIPING, FIXTURES, DUCTWORK, AND OUTLETS. CONTRACTOR SHALL VISIT THE SITE TO VERIFY COMPONENTS, LOCATIONS AND DEPTHS. ALL COMPONENTS NEED TO BE REMOVED IN THE DEMOLITION AREA AND NOTED ON THE DRAWINGS. IF DEVIATION BETWEEN EXISTING CONDITIONS AND NEW WORK IS FOUND, CONTRACTOR SHALL NOTIFY ENGINEER.
- CONTRACTOR SHALL REFER TO THE DRAWINGS OF ALL TRADES TO FAMILIARIZE THEMSELVES WITH EXTENT OF WORK INCLUDING BUT NOT LIMITED TO WHERE NEW PARTITIONING IS BEING INSTALLED, WHERE EXISTING PARTITIONING IS BEING REMOVED, WHERE GELINGS ARE BEING REMOVED AND/OR REPLACED, ETC.
- THESE DRAWINGS ARE NECESSARILY DIAGRAMMATIC IN NATURE. NOT ALL FITTINGS, OFFSETS, VENTS OR DRAINS ARE SHOWN. THE CONTRACTOR SHALL INCLUDE ALL FITTINGS, OFFSETS, VENTS, DRAINS, AND DEVICES REQUIRED TO PROVIDE A COMPLETE AND FUNCTIONING SYSTEM.
- PROVIDE ACCESS DOORS IN DUCTWORK AND/OR ARCHITECTURAL ELEMENTS WHERE REQUIRED TO ACCESS ALL EQUIPMENT REQUIRING MAINTENANCE AND ADJUSTMENT. THIS EQUIPMENT INCLUDES BUT IS NOT LIMITED TO SENSORS, DAMPERS, ACTUATORS, CONTROL DEVICES, VALVES, ETC. ACCESS DOORS SHALL BE SIZED TO PROVIDE APPROPRIATE ACCESS BASED ON HEIGHT OF ACCESS REQUIRED AND ACTIVITY. INSTALL SUCH THAT ACCESS DOOR IS FULLY OPERABLE WITHOUT THE REMOVAL OF ARCHITECTURAL ELEMENTS SUCH AS CEILING RUNNERS, SUPPORTS, ETC. INSTALL IN A LOCATION SUCH THAT STEPPING OR LEANING OVER PERMANENT EQUIPMENT OR FURNITURE IS NOT REQUIRED. WHERE ACCESS DOORS ARE REQUIRED IN ARCHITECTURAL ELEMENTS THAT PROVIDE A FIRE AND/OR SMOKE RATING, ACCESS DOOR SHALL MAINTAIN THE REQUIRED RATING.
- SEAL ALL WALL PENETRATIONS (DUCTWORK, PIPING, CONTROLS, CONDUITS, ETC.) WITH NON-COMBUSTIBLE MATERIAL. SEAL PENETRATIONS INTO ROOMS THAT REQUIRE PRESSURE CONTROL OR SOUND ISOLATION. WITH NON-COMBUSTIBLE MATERIAL AND CAULK.
- PIPING AND DUCTWORK SHALL NOT BE ROUTED OVER ELECTRICAL AND TELECOM ROOMS. WHERE ROUTING OVER SUCH ROOMS IS UNAVOIDABLE, CONTRACTOR SHALL COORDINATE WITH OWNER, DESIGN TEAM, AHJ, AND OTHER TRADES REGARDING LOCATION OF PANELS AND UTILITY ROUTING AND SHALL PROVIDE DRIP PANS UNDER ALL UTILITIES WITH MOISTURE SENSORS OR DRAIN PIPING AS REQUIRED BY THE SPECIFICATIONS.
- FLEXIBLE DUCTWORK SHALL HAVE A MAXIMUM LENGTH OF 48' REGARDLESS OF LENGTH SHOWN ON DRAWINGS. FLEX DUCT INSTALLATION SHALL BE AT TERMINAL ENDS ONLY. CONNECTIONS AT VAV BOX INLETS SHALL BE SOLID HARD DUCT. THE DUCTWORK AT ANY FIRE AND/OR FIRE SMOKE DAMPER SHALL BE HARD DUCT.
- LOCATE PIPING AND DUCTWORK IN EXTERIOR BUILDING WALLS ON THE WARM SIDE OF THE BUILDING AND VAPOR BARRIER. COORDINATE INSTALLATION OF BUILDING INSULATION TO RUN CONTINUOUS BETWEEN PIPING AND BUILDING WALL.
- SUPPORT ALL DUCTWORK, PIPING AND EQUIPMENT FROM BUILDING STRUCTURE MEMBERS. ROUTE DUCT MAINS TIGHT TO STRUCTURE UNLESS NOTED OTHERWISE. HOLD PIPING TIGHT TO BOTTOM OF STRUCTURAL MEMBERS OR RUN THROUGH JOIST WEBS IF POSSIBLE. DO NOT USE WIRE OR REFORCATED METAL TO SUPPORT PIPING. DO NOT SUPPORT PIPING FROM OTHER PIPING, DUCTWORK, AND/OR ELECTRICAL CONDUITS. SUPPORT FROM BOTTOM CHORD OR BAR JOISTS ONLY AT PANEL POINTS. ALL COMPONENTS REQUIRING MAINTENANCE SHALL BE SUPPORTED IN SUCH A MANNER AS TO BE READILY ACCESSIBLE WITHOUT REMOVAL OF THE CEILING SYSTEM AND TO ALLOW FOR REMOVAL FROM THE SYSTEM WHEN SUCH REMOVAL IS REQUIRED FOR MAINTENANCE.
- PROVIDE CONSTRUCTION FILTERS ON AIR MOVING EQUIPMENT. AT THE COMPLETION OF WORK, REMOVE ALL CONSTRUCTION FILTERS AND PROVIDE NEW FILTERS FOR ALL AIR MOVING EQUIPMENT.
- PROTECT ALL DUCTWORK AND PIPING DURING CONSTRUCTION. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION. AT A MINIMUM, DUCTWORK AND PIPING ENDS SHALL BE COVERED AND SEALED TO PREVENT THE COLLECTION OF DUST AND DEBRIS. CLEAN ALL INTERIOR SURFACES PRIOR TO INSTALLATION AND PROTECT ONCE INSTALLED. MEDICAL GAS PIPING SHALL BE PROTECTED IN ACCORDANCE WITH NFPA 99 REQUIREMENTS.
- AT THE COMPLETION OF WORK, CLEAN ALL STRAINERS PROVIDED AS A PART OF THE WORK AS WELL AS SYSTEM SYSTEM STRAINERS LOCATED AT PUMPS WHERE SYSTEMS WERE EXTENDED ON EXISTING EQUIPMENT. COORDINATE WORK WITH OWNER.
- PROVIDE INTERMEDIATE TESTING AND BALANCING AT THE COMPLETION OF EACH PHASE AND AS REQUIRED TO MAINTAIN PROPER OPERATION OF SYSTEMS SERVING AREAS OF THE FACILITY IN USE INCLUDING BUT NOT LIMITED TO OCCUPIED AREAS, STORAGE AREAS, AND OTHER AREAS DEEMED CRITICAL BY THE OWNER OR AHJ.
- UNLESS NOTED OTHERWISE, DETAILS SHOWN WITHIN THESE DOCUMENTS ARE APPLICABLE FOR ALL PIPING, EQUIPMENT AND DUCTWORK INSTALLATIONS WHETHER OR NOT SPECIFICALLY NOTED. REFER TO DETAIL SHEETS FOR GENERAL CONSTRUCTION DETAILS.
- REFER TO SCHEDULES FOR SIZES OF FINAL RUNOUTS TO EQUIPMENT, FIXTURES, DIFFUSERS, GRILLES, AND TERMINAL DEVICES. FINAL RUNOUT SIZES LISTED SHALL BE USED TO WITHIN 10 EQUIVALENT DIAMETERS OF FINAL CONNECTION POINT. FINAL PIPING CONNECTION TO EQUIPMENT SHALL MATCH EQUIPMENT CONNECTION SIZE. PROVIDE TRANSITIONS AS REQUIRED. REFER TO DETAILS, DIAGRAMS AND SCHEMATICS FOR ADDITIONAL FINAL CONNECTION REQUIREMENTS. REFER TO SCHEDULE SHEETS FOR PROVIDED SCHEDULES.
- FOR DUCTWORK PENETRATING A ONE HOUR FIRE RATED WALL WHERE A FIRE DAMPER IS NOT SHOWN, PROVIDE U.L. LISTED THROUGH PENETRATION FIRE STOPPING SYSTEM THAT IS SPECIFIC TO THE WALL CONSTRUCTION ASSEMBLY AND COMPLIANT WITH ASTM E814. THE SYSTEM SHALL BE FIRE TESTED PER ASTM E119 AND COMPLY WITH EXCEPTION 1 OF 2018 IBC PART 717.5.2. INSTALL SYSTEM IN STRICT COMPLIANCE WITH THE FIRE STOPPING MANUFACTURER'S U.L. APPROVED DETAIL. WHERE EXISTING WALLS ARE BEING UPGRADED TO A ONE HOUR FIRE RATED WALL, PROVIDE U.L. LISTED THROUGH PENETRATION FIRE STOPPING SYSTEM FOR ALL NEW AND EXISTING PENETRATIONS. REFER TO THE ARCHITECTURAL LIFE SAFETY PLANS FOR LOCATIONS OF FIRE RATED WALLS. ALL DUCTWORK PENETRATIONS SHALL BE INSPECTED BY AN APPROVED THIRD PARTY INSPECTION AGENCY IN ACCORDANCE WITH ASTM E2174. THE INSPECTION AGENCY SHALL BE PROCURED BY THE CONTRACTOR. DOCUMENTATION OF APPROVED INSPECTION SHALL BE INCLUDED WITH PROJECT CLOSEOUT DOCUMENTATION.
- FIRE ALARM CONTRACTOR SHALL PROVIDE A DUCT SMOKE DETECTOR FOR EACH SMOKE OR FIRE/SMOKE DAMPER AS REQUIRED BY CODE. MECHANICAL CONTRACTOR SHALL COORDINATE THE LOCATION OF EACH DUCT SMOKE DETECTOR AND SHALL INSTALL THEM IN THE DUCT.
- FOR ALL PIPING, CONDUIT, AND OTHER ITEMS PENETRATING A FIRE RATED WALL, PROVIDE U.L. LISTED THROUGH PENETRATION FIRE STOPPING SYSTEM THAT IS SPECIFIC TO THE WALL CONSTRUCTION ASSEMBLY AND COMPLIANT WITH ASTM E814. INSTALL SYSTEM IN STRICT COMPLIANCE WITH THE FIRE STOPPING MANUFACTURER'S U.L. APPROVED DETAIL. WHERE EXISTING WALLS ARE BEING UPGRADED TO FIRE RATED WALLS OR THE FIRE RATING IS BEING MODIFIED, PROVIDE U.L. LISTED THROUGH PENETRATION FIRE STOPPING SYSTEM FOR ALL NEW AND EXISTING PENETRATIONS. REFER TO THE ARCHITECTURAL LIFE SAFETY PLANS FOR LOCATIONS OF FIRE RATED WALLS.

SHEET INDEX - MECHANICAL	
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MH202	ROOF PLAN - MECHANICAL
MP201	FIRST FLOOR PLAN - HYDRO-PNEUMATIC PIPING
M500	ENLARGED PLANS
M500	MECHANICAL UL DETAILS
M501	MECHANICAL DETAILS
M600	MECHANICAL SCHEDULES
M601	MECHANICAL SCHEDULES
M602	MECHANICAL VENTILATION SCHEDULES
M701	MECHANICAL CONTROLS
M702	MECHANICAL CONTROLS
M703	MECHANICAL CONTROLS
M704	MECHANICAL CONTROLS

DESCRIPTION	ABBREVIATION
EXHAUST	EA RGB: 255-100-255
SUPPLY	SA RGB: 100-255-100
RETURN	RA RGB: 100-100-255
OUTSIDE AIR SUPPLY / TRANSFER DUCT	OA RGB: 200-200-100

**HVAC DUCT COLOR LEGEND**

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SES PROJECT # 22354

NOVANT ASC Leland

SHEET NAME  
**MECHANICAL SYMBOLS AND ABBREVIATIONS**

SHEET NUMBER  
**M000**

**NOVANT HEALTH**

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SHEET NAME  
**MECHANICAL SYMBOLS AND ABBREVIATIONS**

SHEET NUMBER  
**M000**

1

2

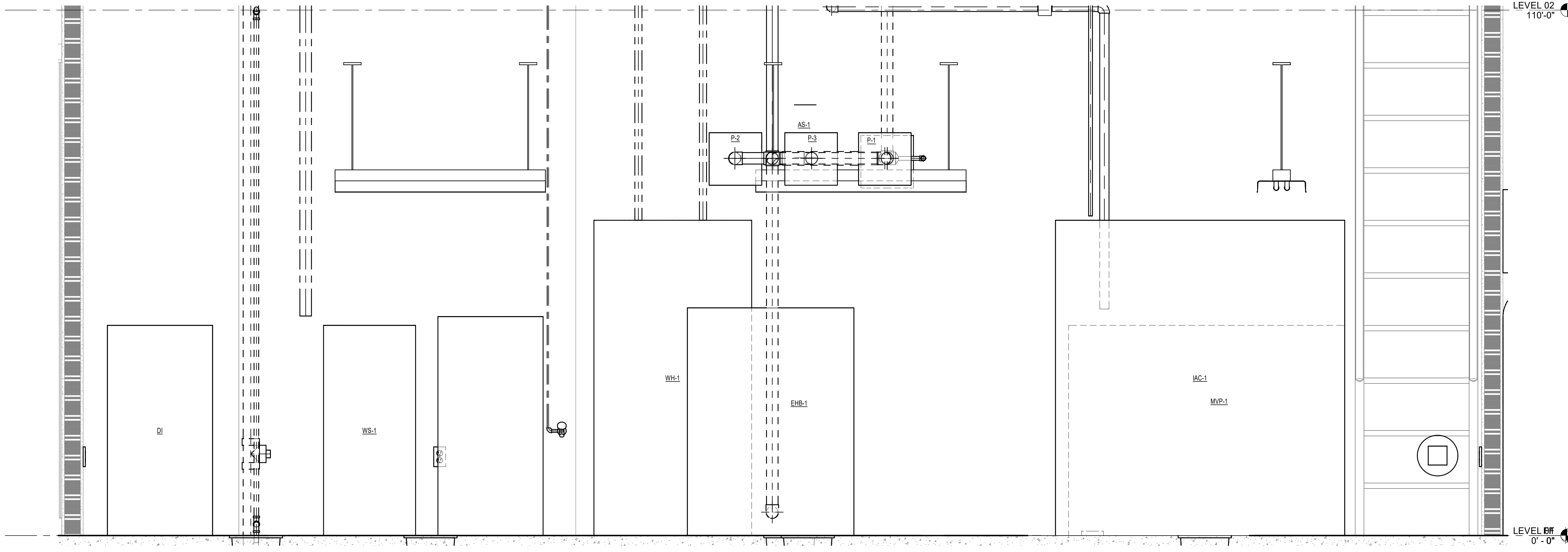
3

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D

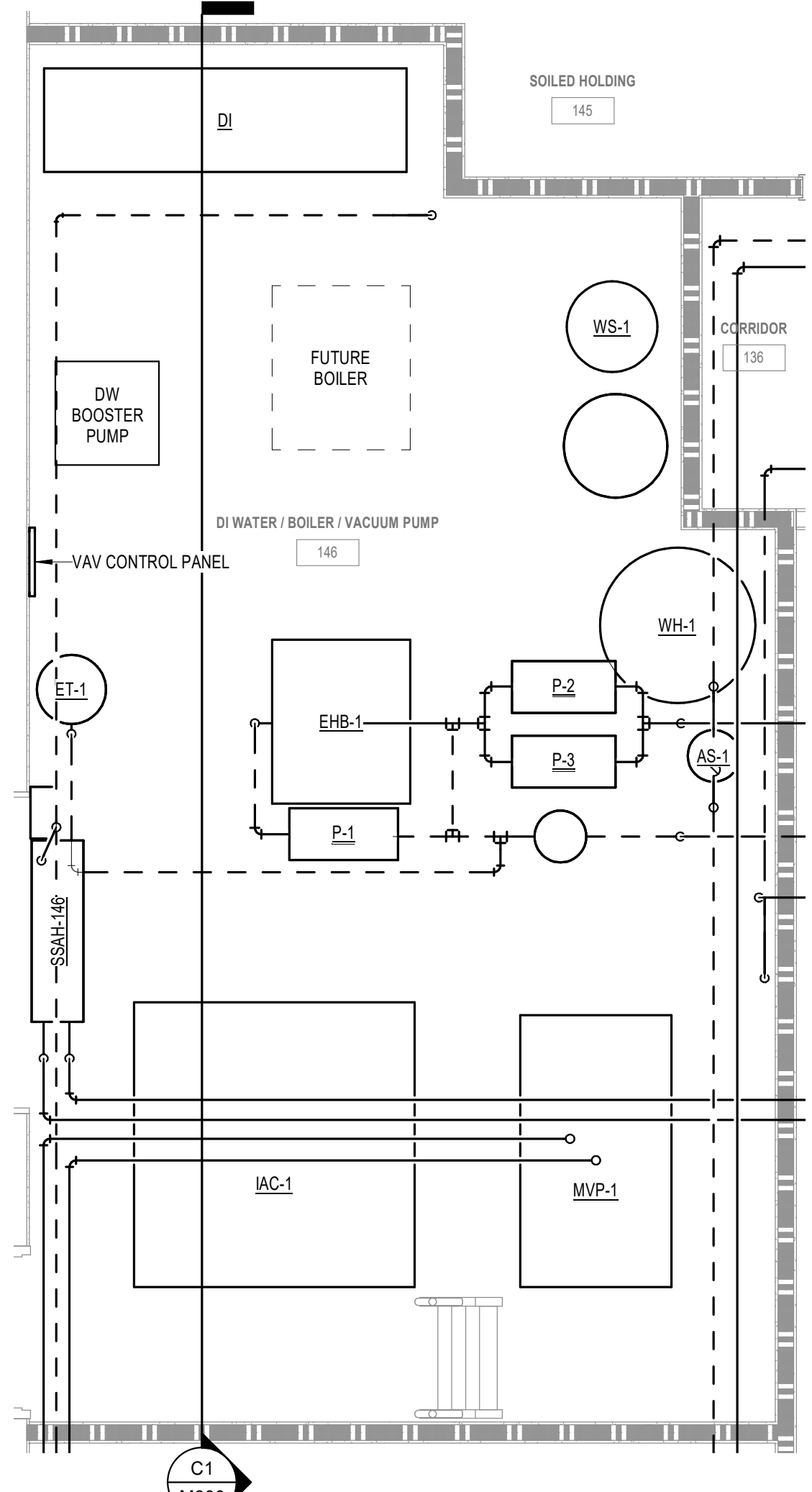
C



C1 MECHANICAL ROOM SECTION  
1" = 1'-0"

B

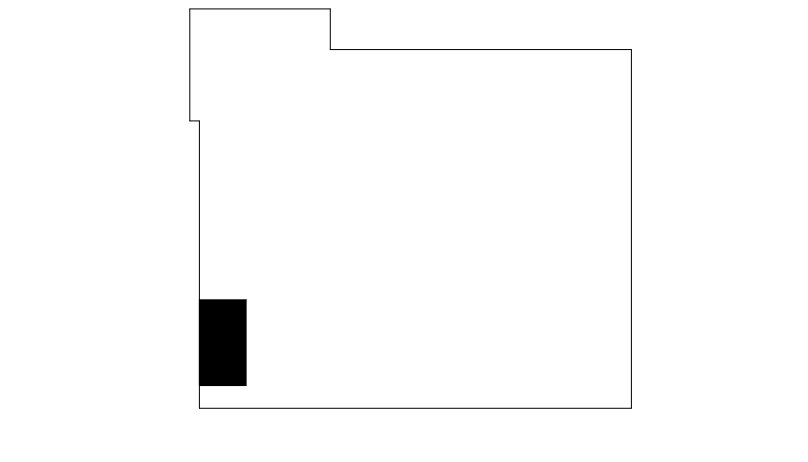
A



A1 ENLARGED PLAN - FIRST LEVEL - MECHANICAL ROOM  
3/8" = 1'-0"

**RATED WALLS & PARTITIONS**

FIRE BARRIER		FIRE & SMOKE BARRIER	
1-HOUR	[Symbol]	1-HOUR	[Symbol]
2-HOUR	[Symbol]	2-HOUR	[Symbol]
SMOKE TIGHT PARTITION			
SMOKE	[Symbol]		
SUITE PERIMETER	[Symbol]		



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Novant ASC Leland

SHEET NAME  
 ENLARGED PLANS

SHEET NUMBER  
 M300

CONSTRUCTION DOCUMENTS

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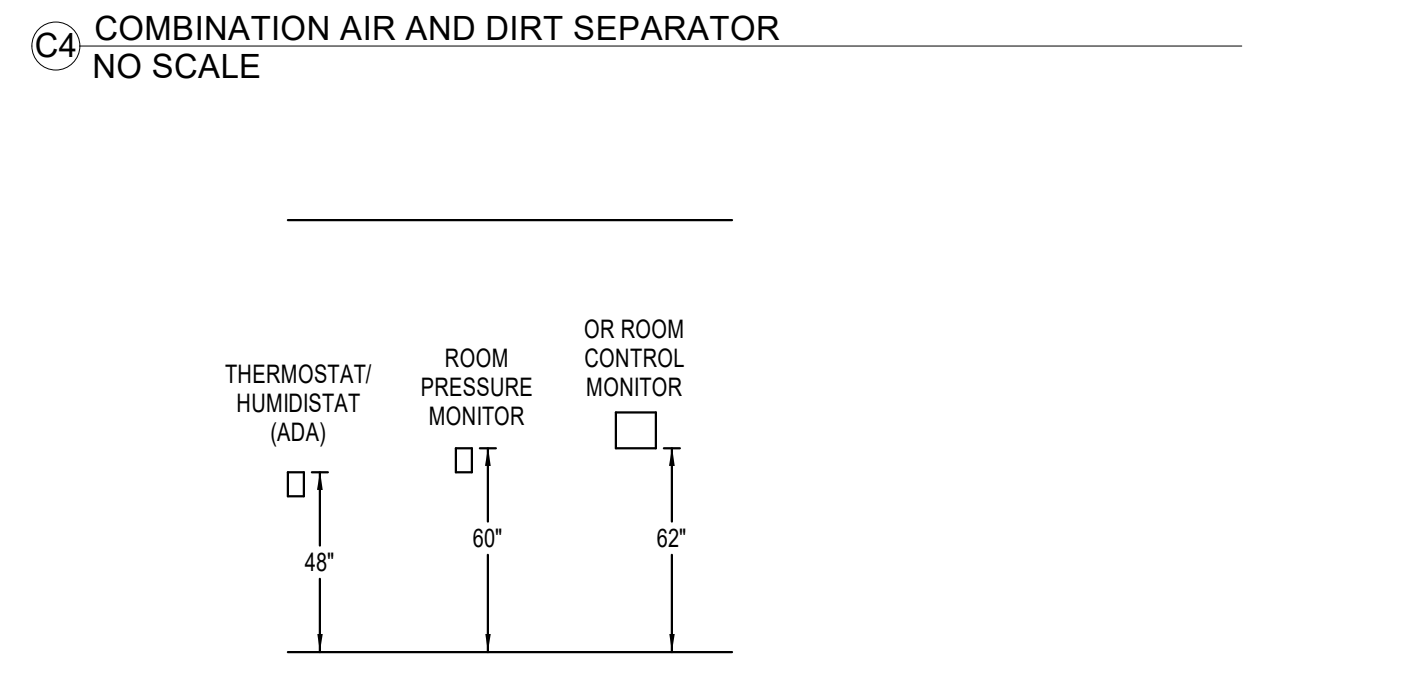
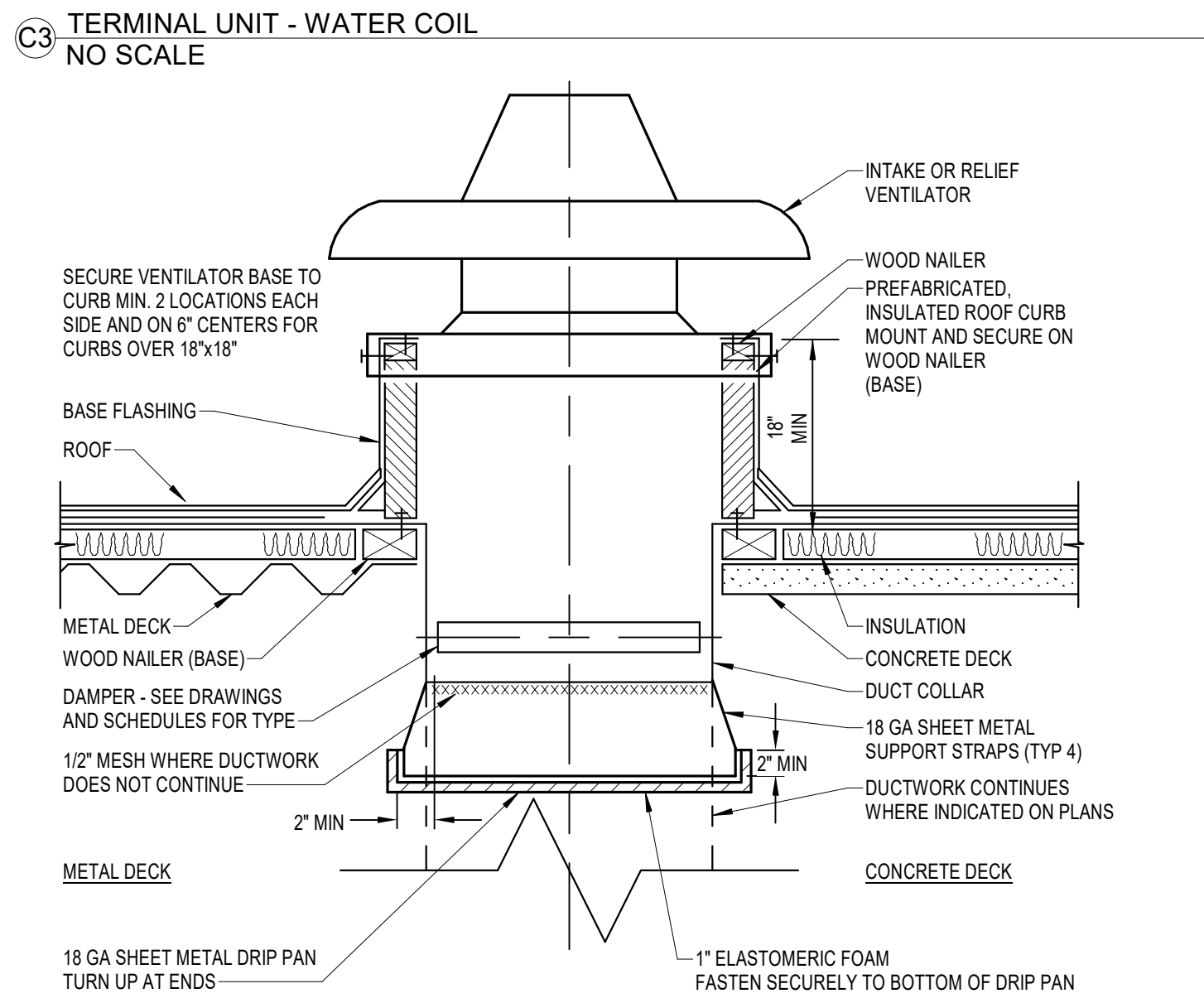
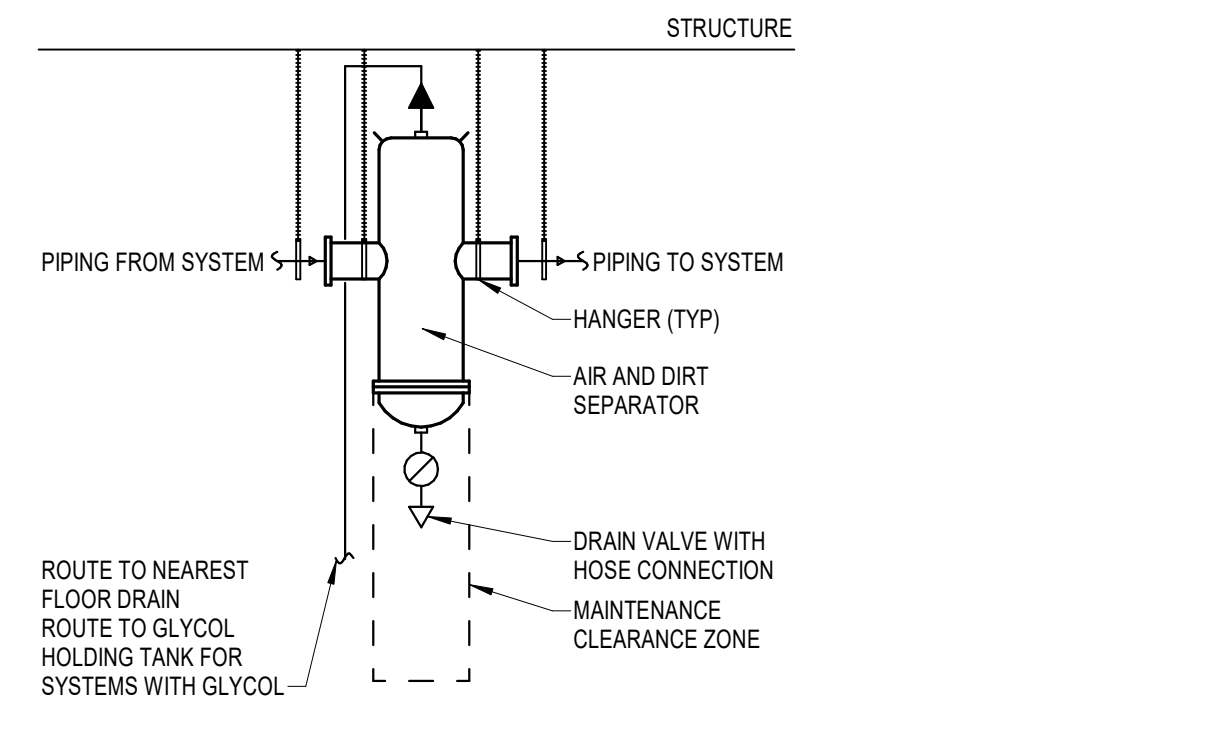
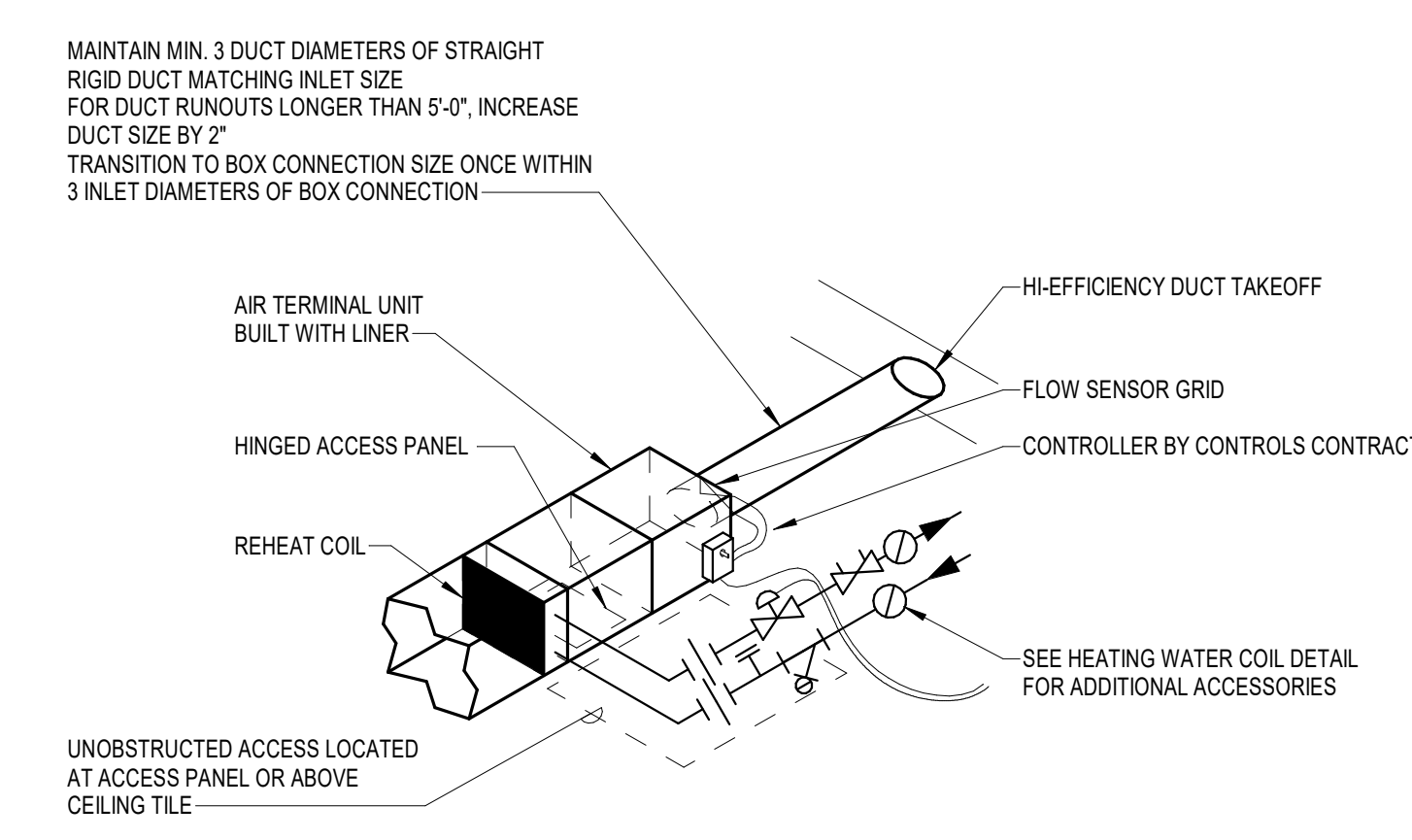
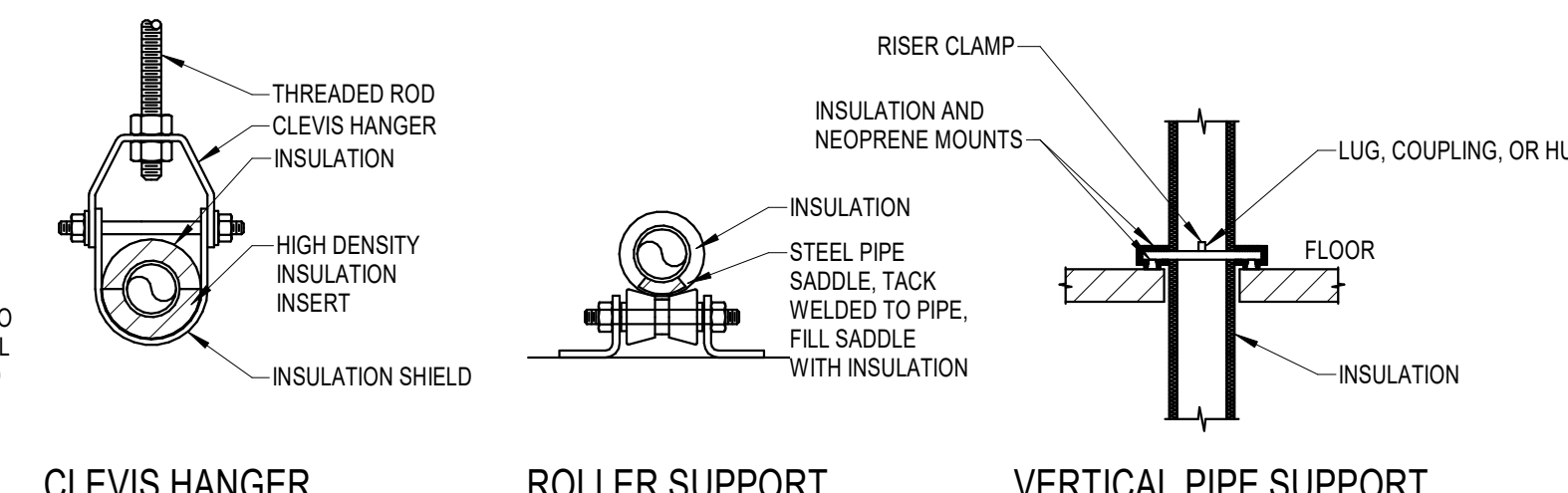
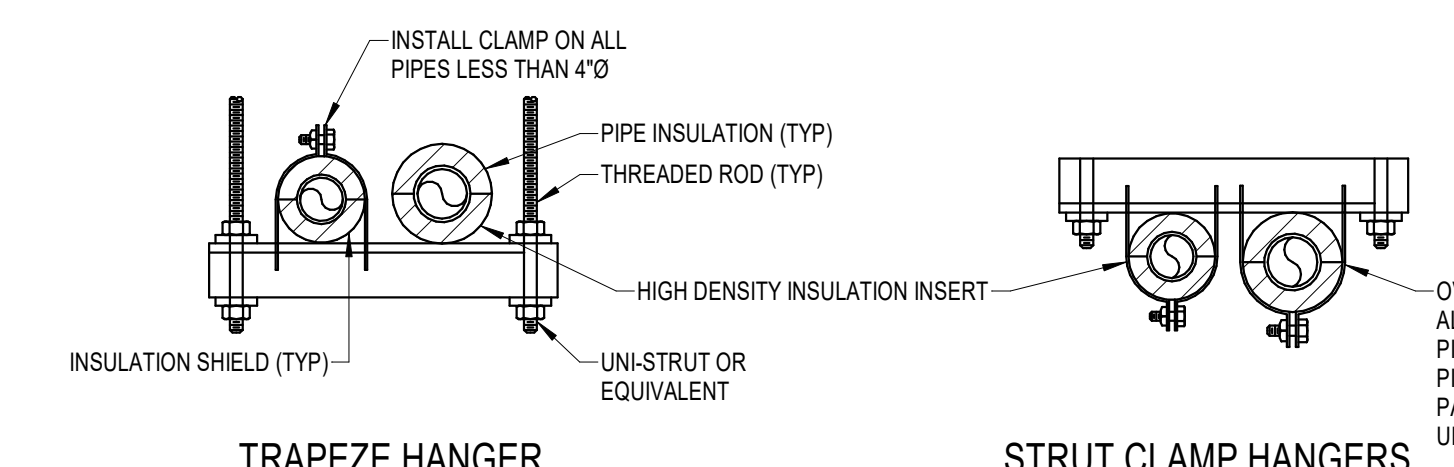
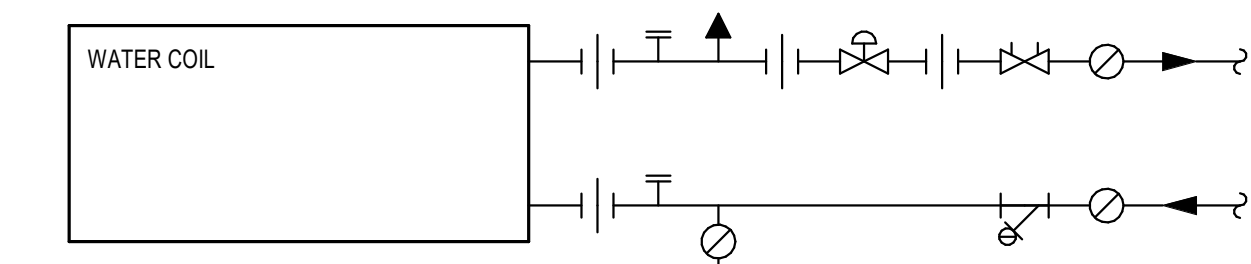
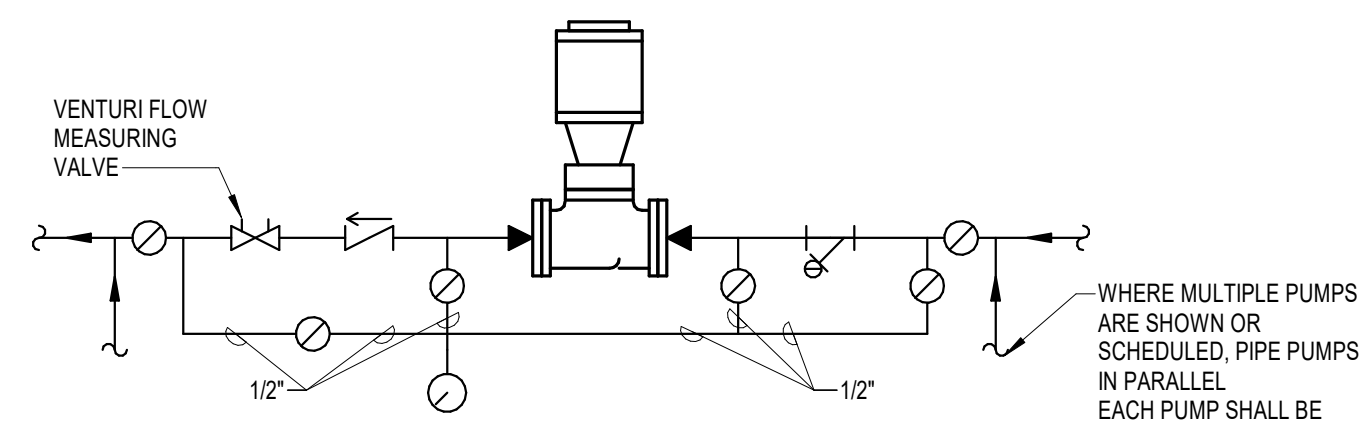
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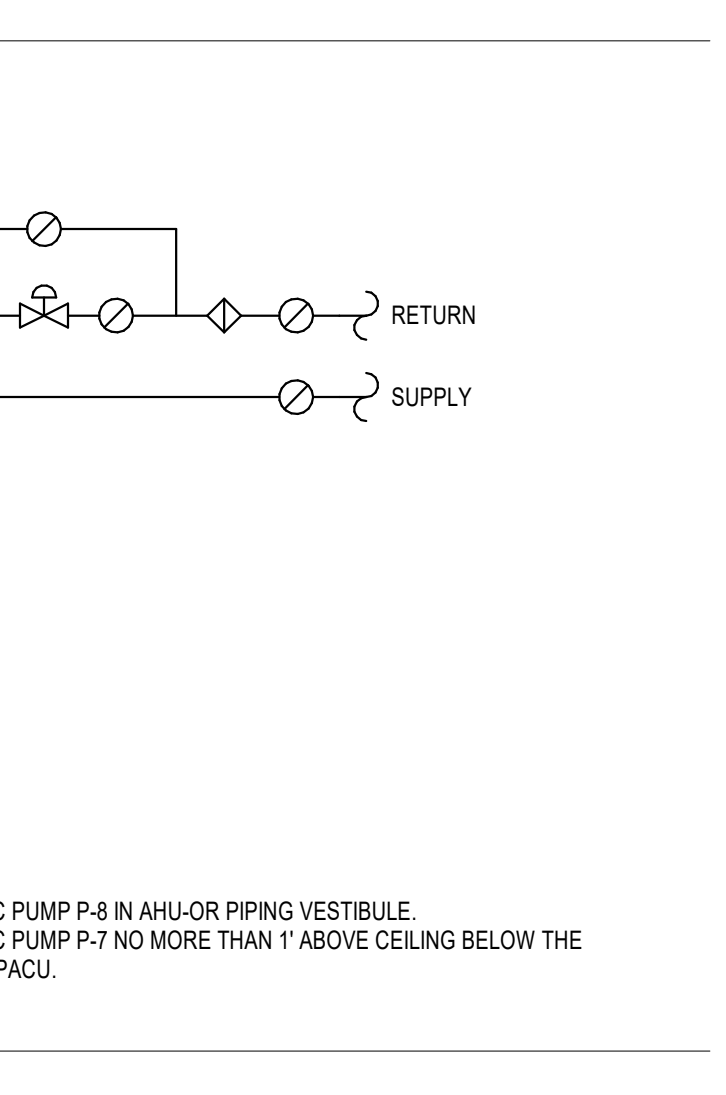
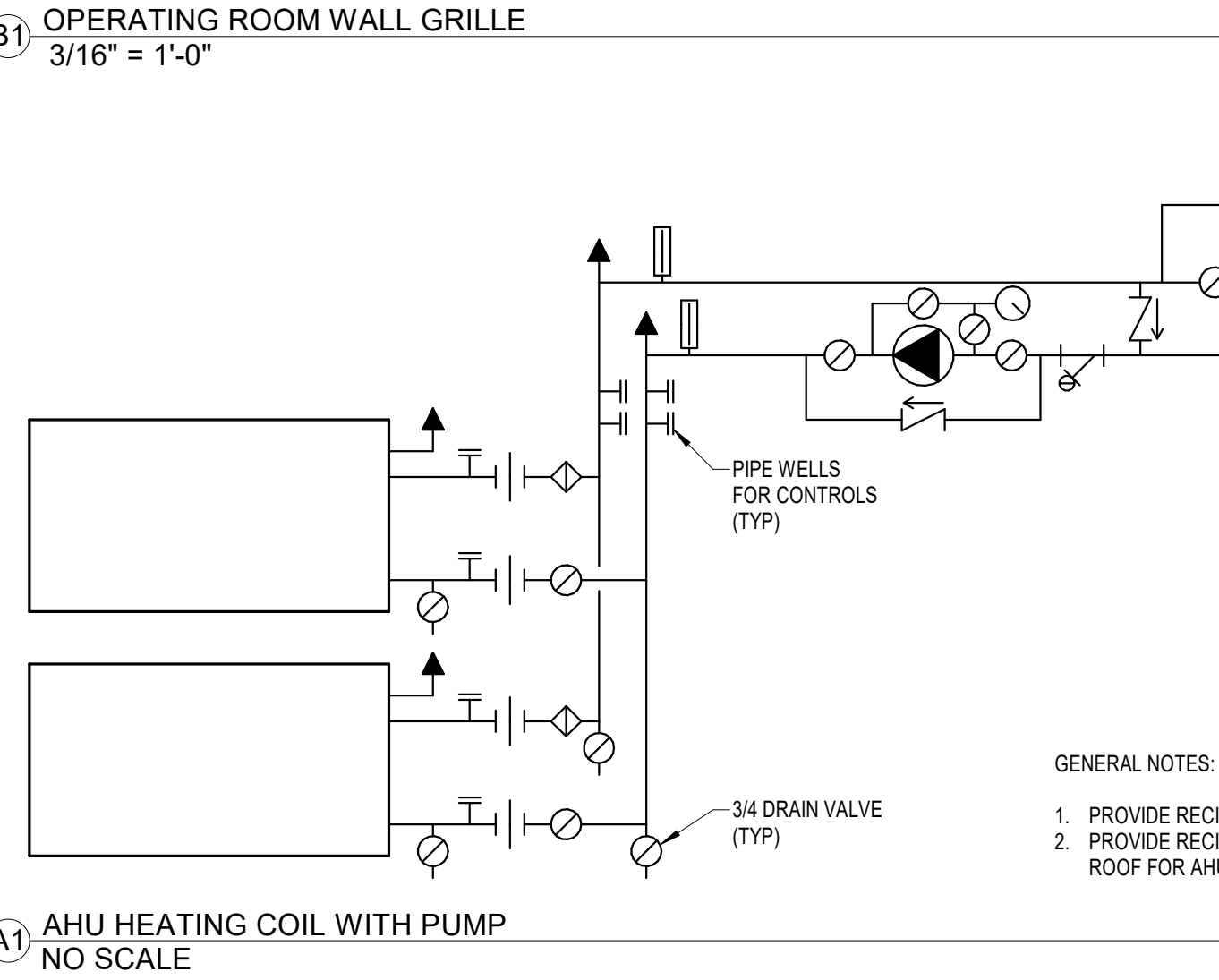
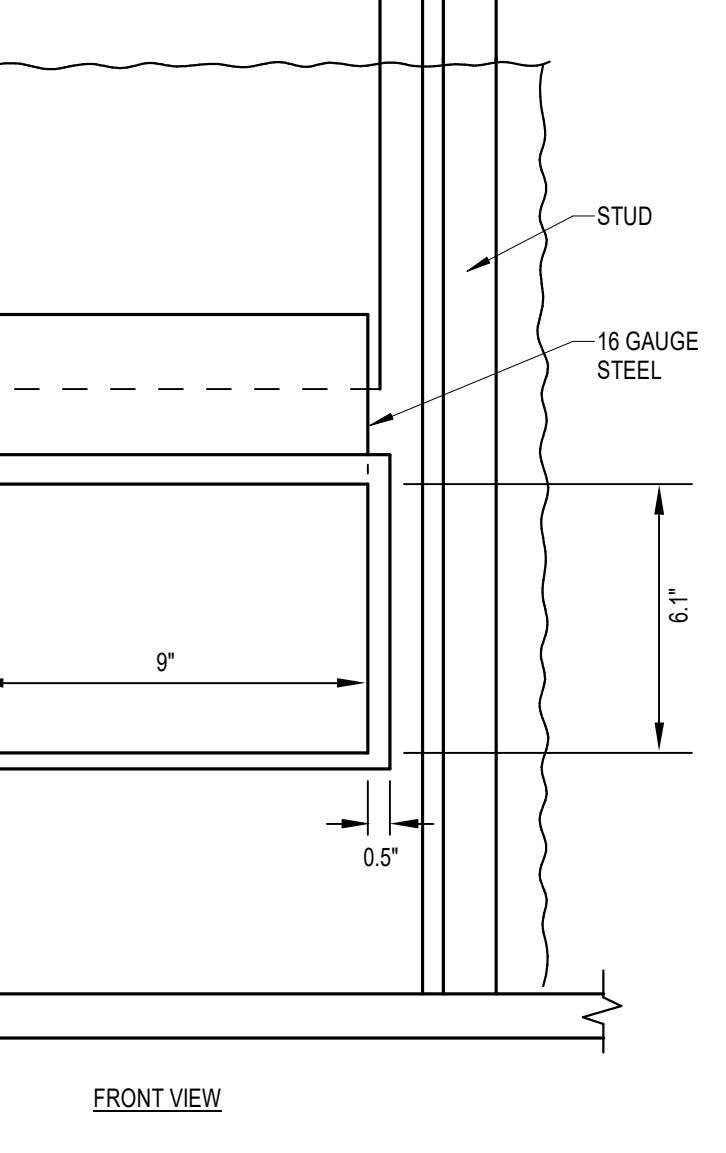
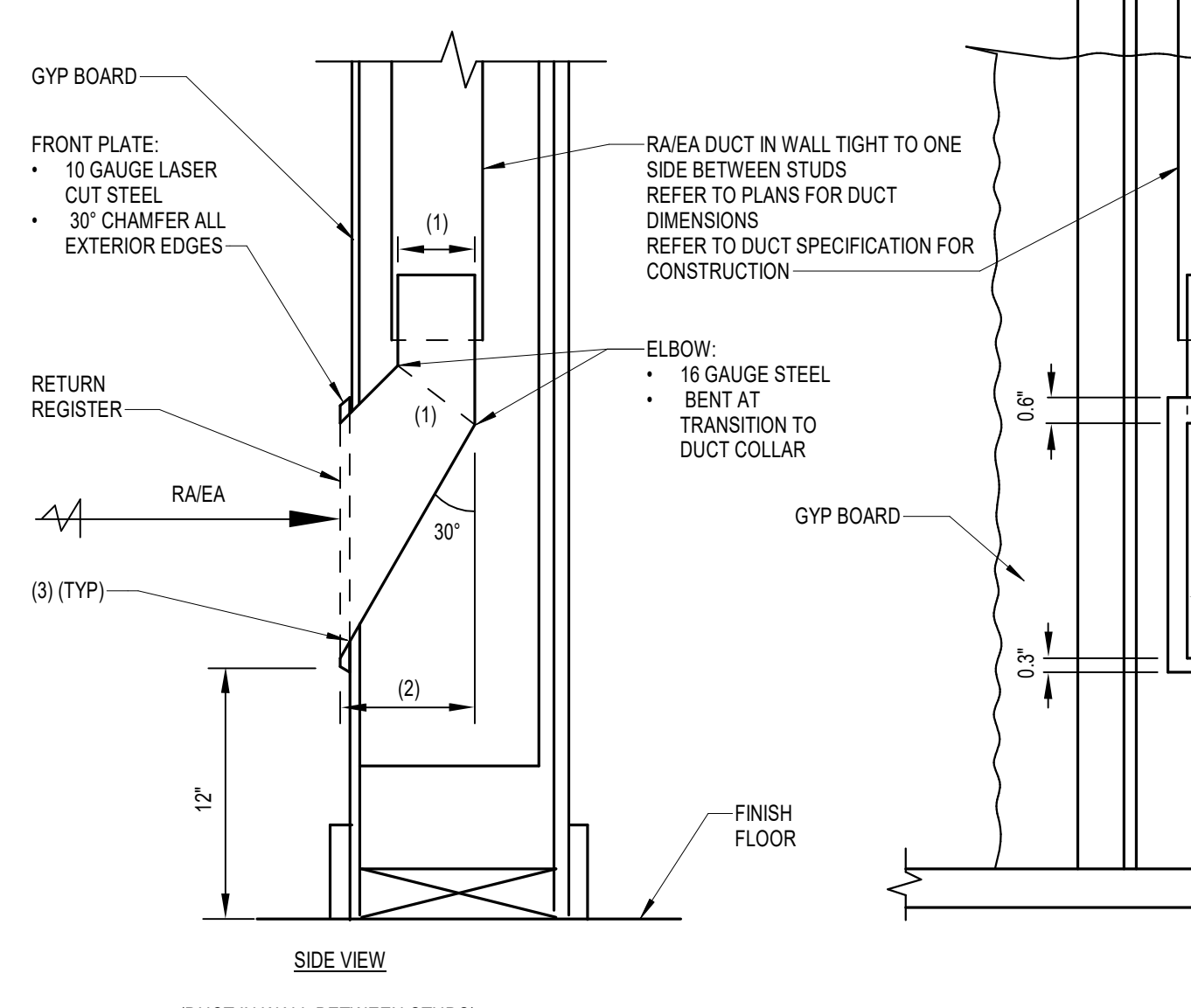
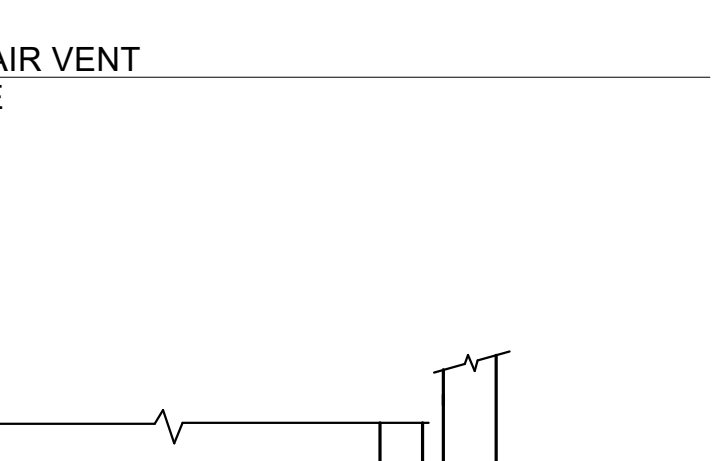
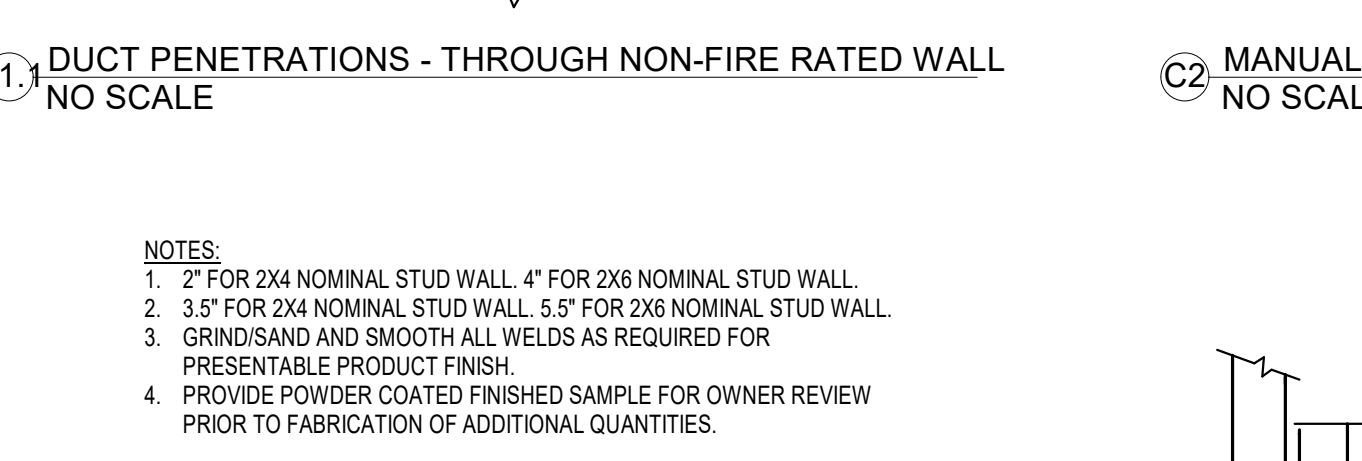
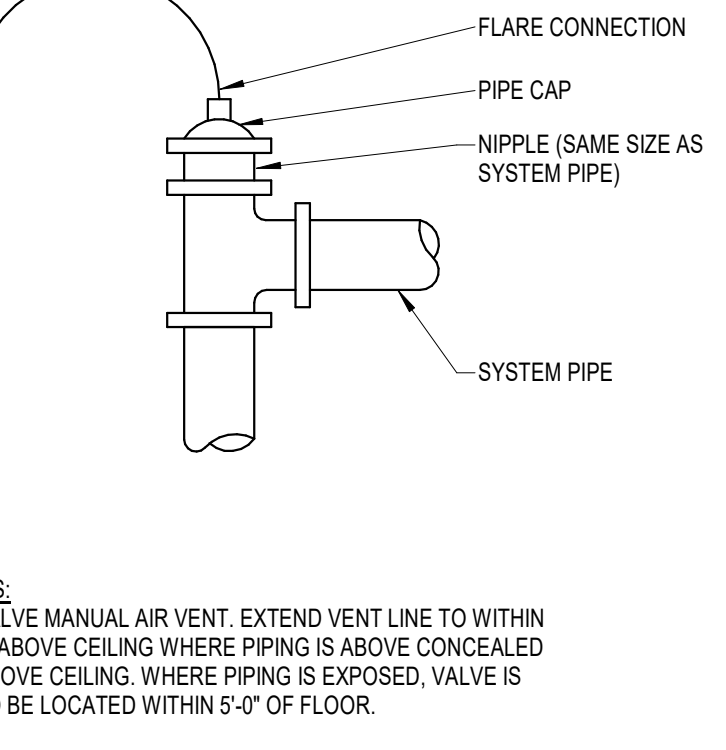
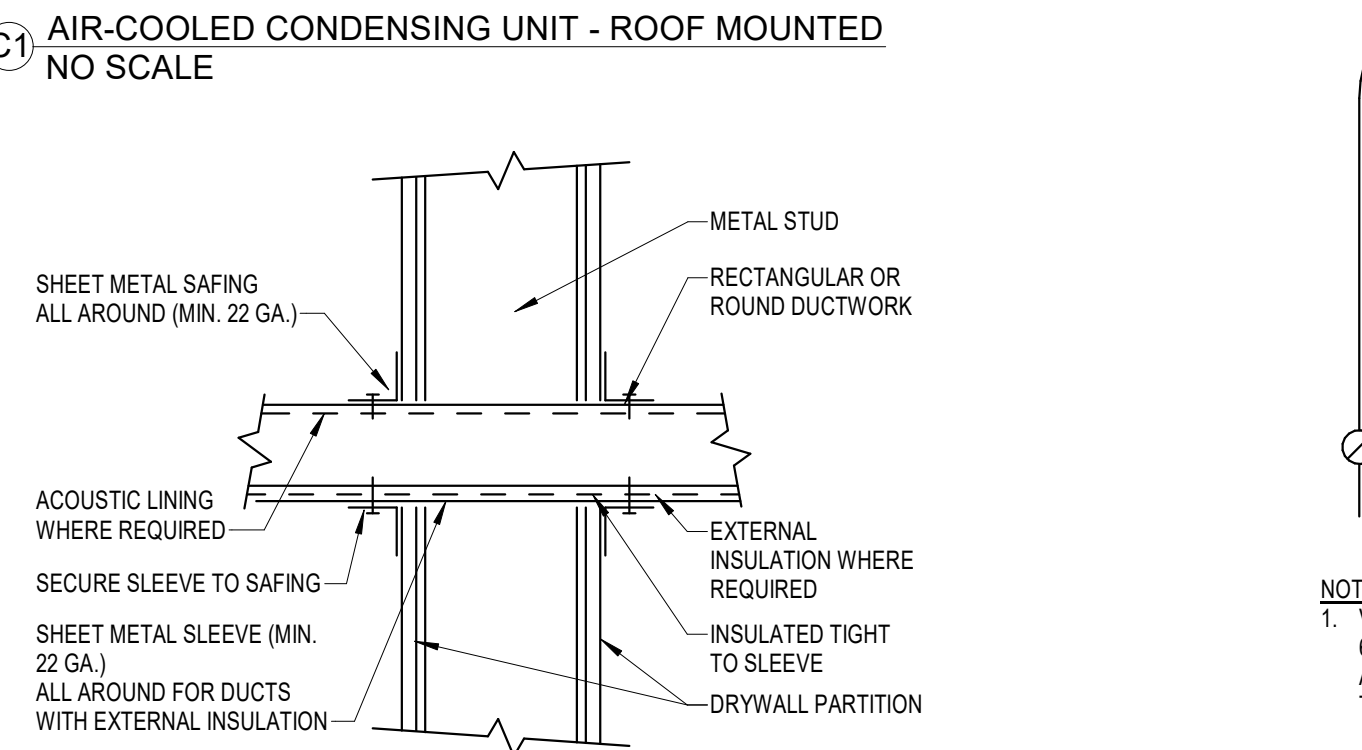
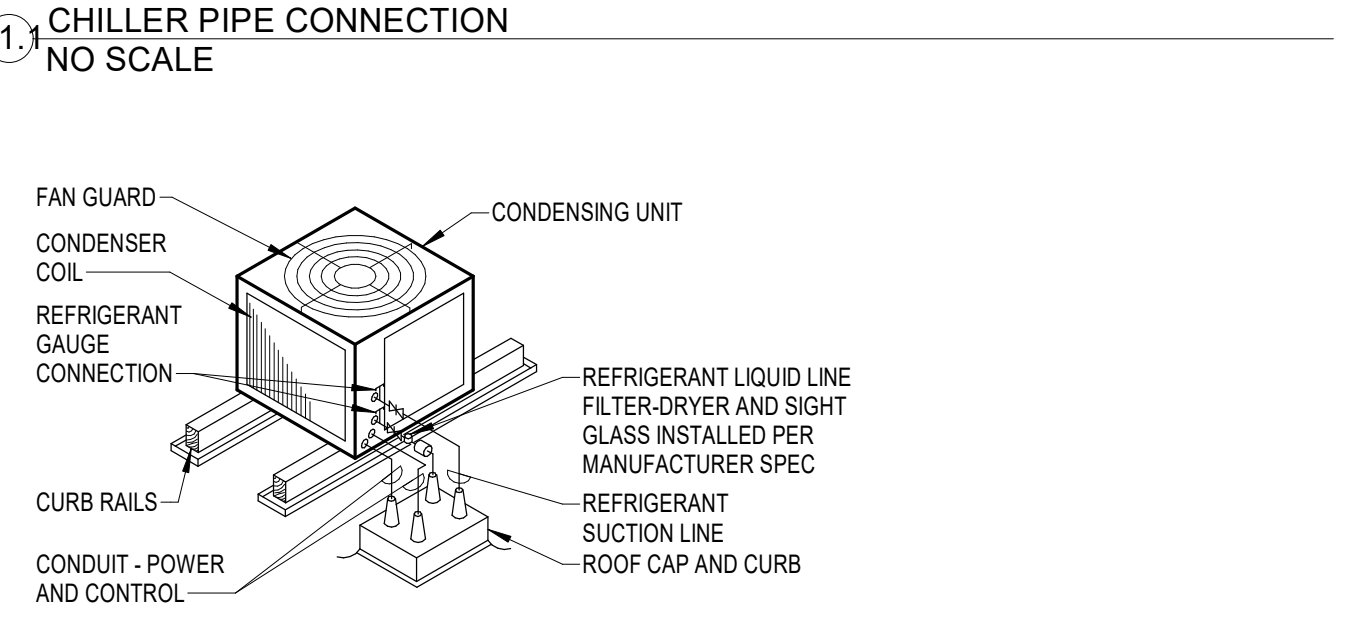
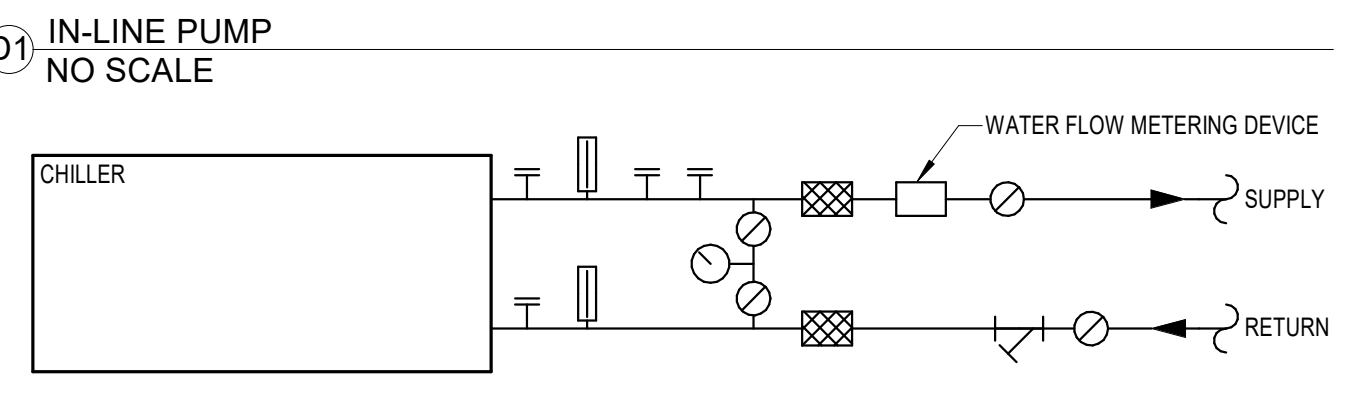
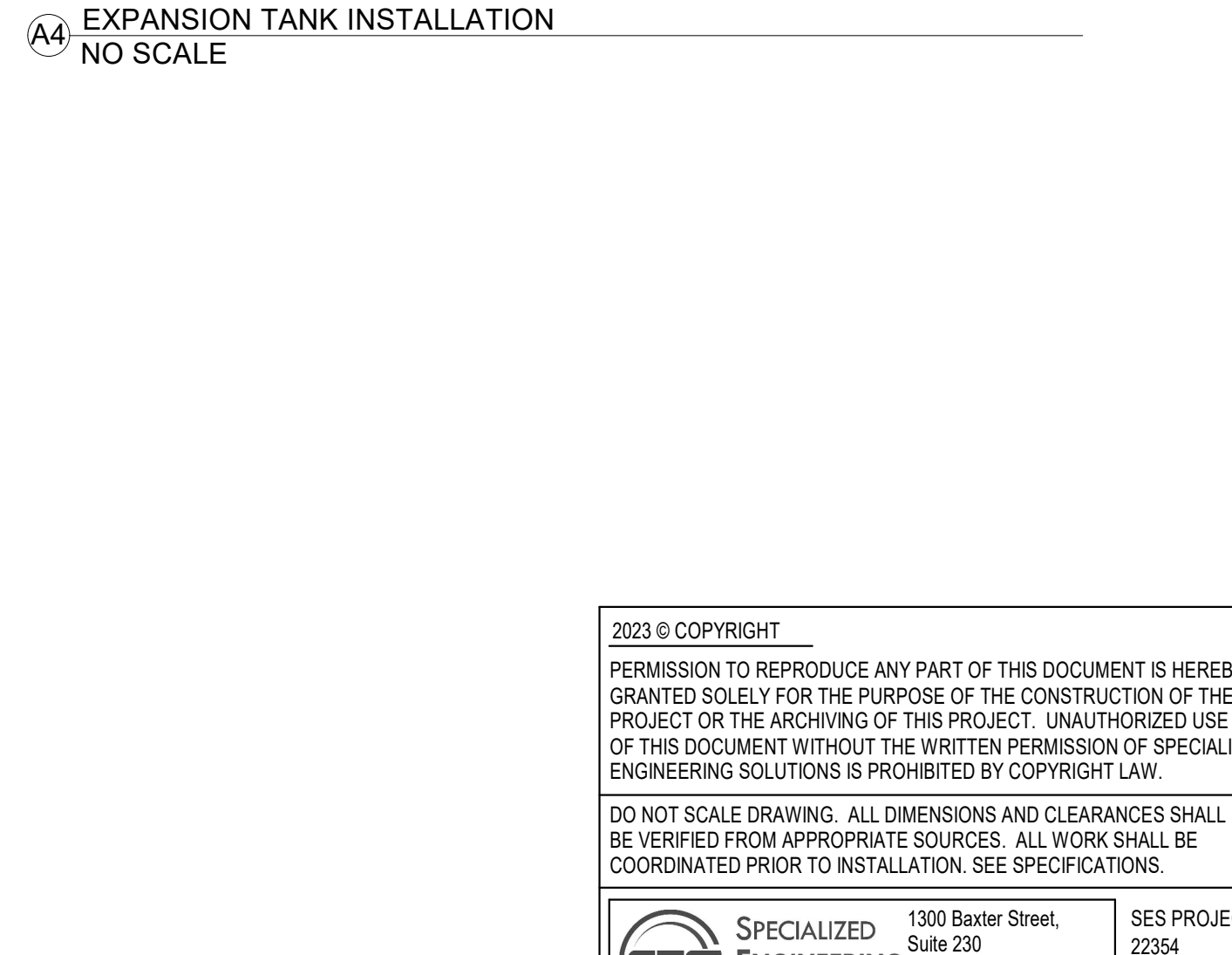
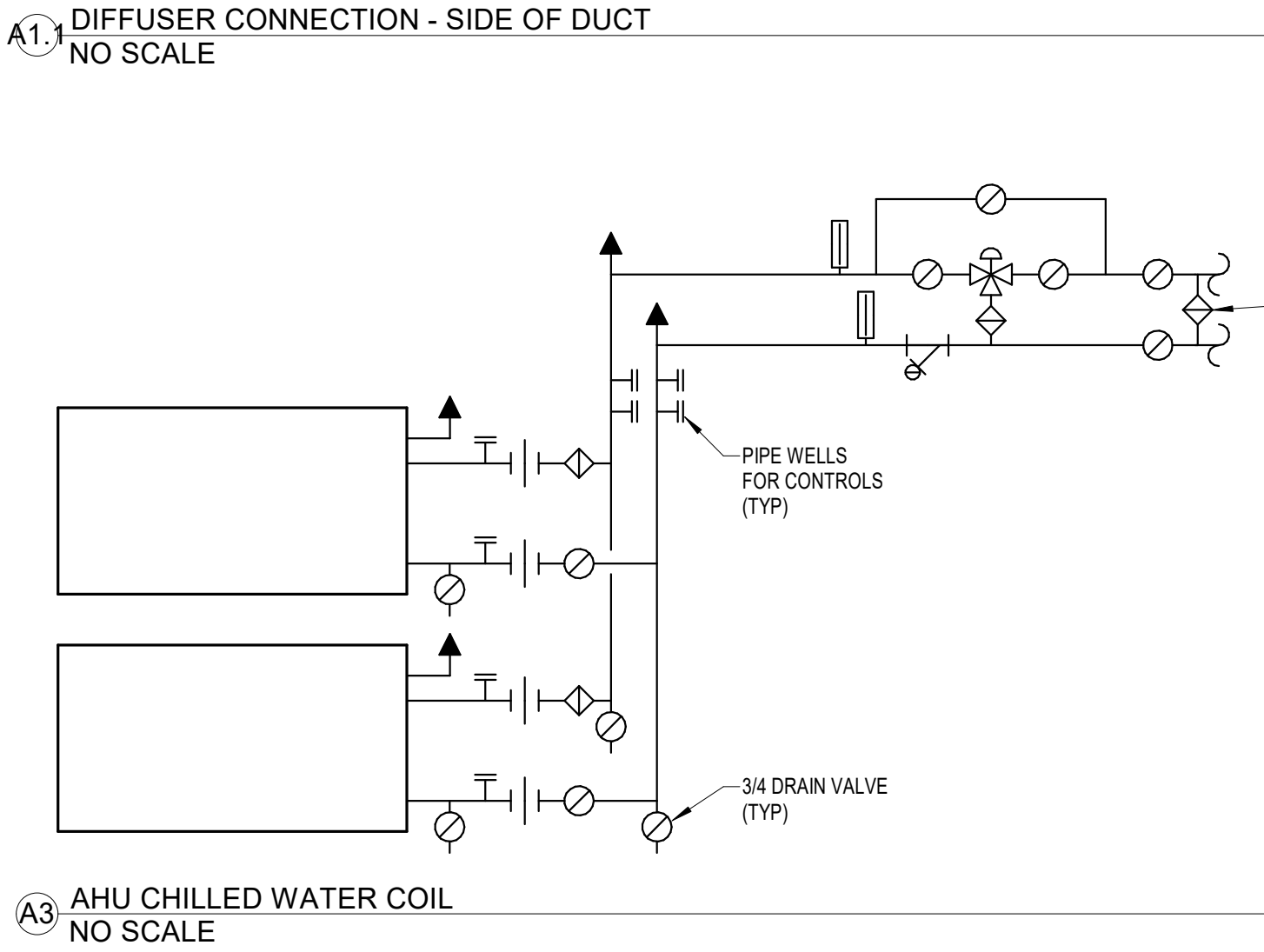
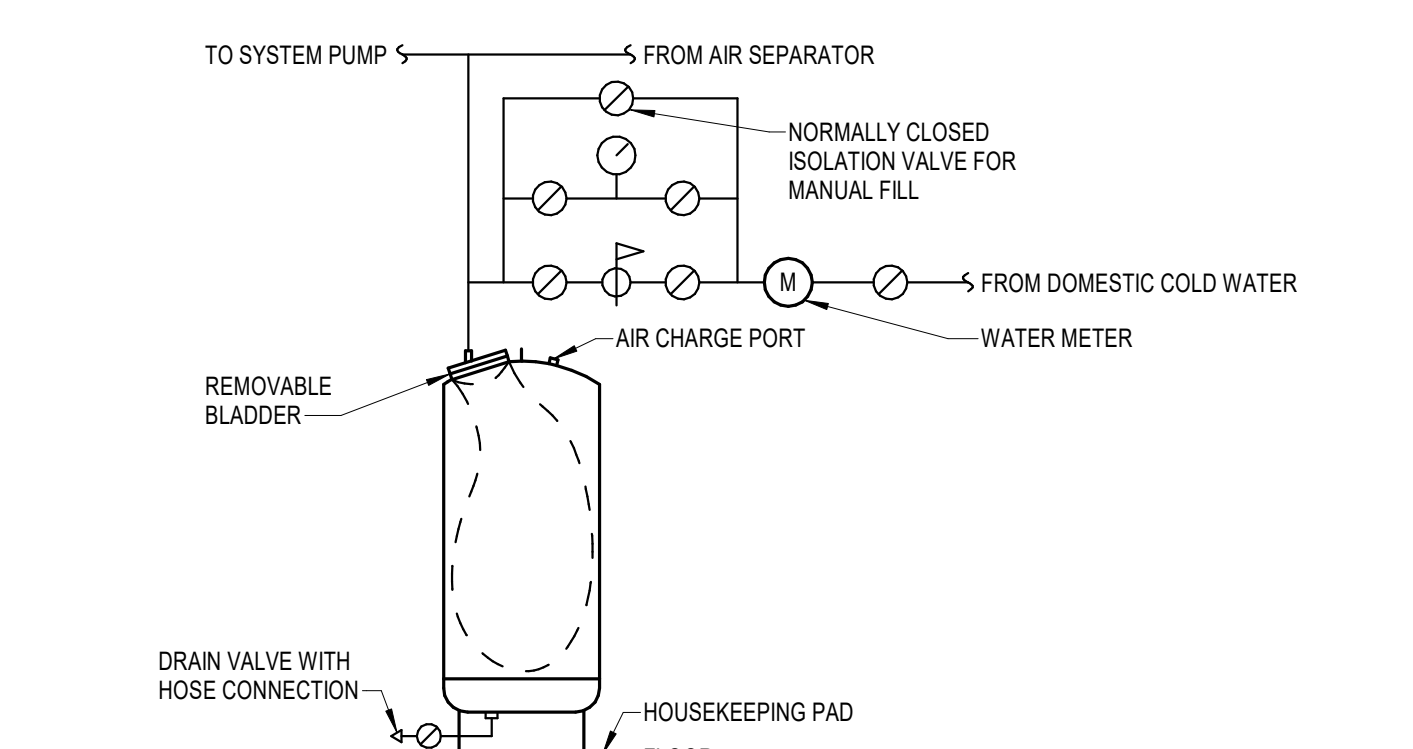
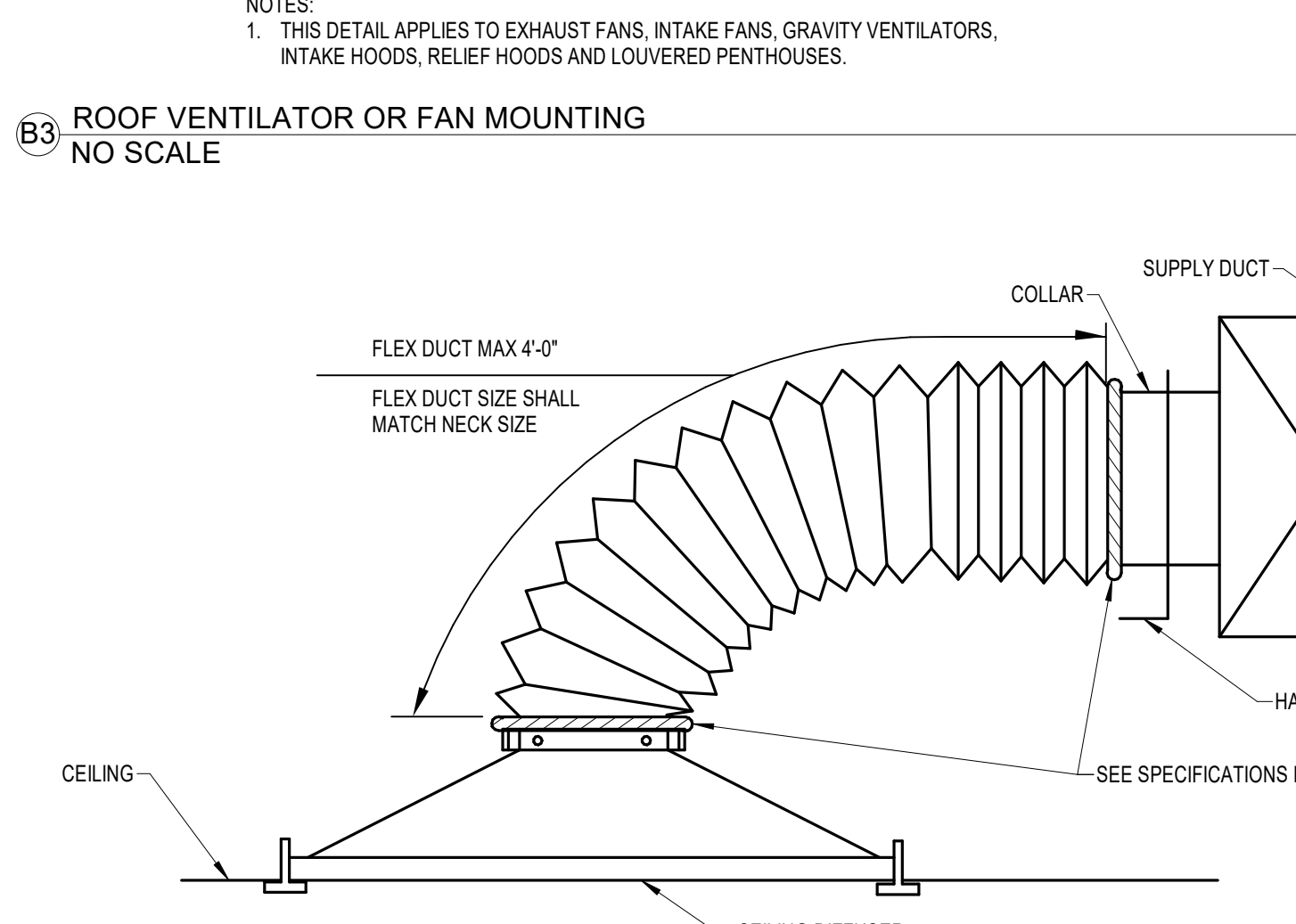








- A. COORDINATE ELEVATION OF DEVICES WITH ALL ADJACENT DEVICES INCLUDING THOSE WITH OTHER TRADES. ALL DEVICES WHICH HAVE ADA AND NON-ADA HEIGHTS LISTED SHALL BE MOUNTED TO COMPLY WITH ADA EXCEPT WHERE NOTED ON THE PLANS AS NON-ADA.
- B. GROUP DEVICES IN AN ORGANIZED AND UNIFORM MANNER.
- C. REFER TO ARCHITECTURAL ELEVATIONS FOR ADDITIONAL REQUIREMENTS. WHERE THESE REQUIREMENTS DIFFER FROM THE ARCHITECTURAL PLANS, THE ARCHITECTURAL PLANS SHALL TAKE PRECEDENCE. WHERE DEVICES OR EQUIPMENT ARE SHOWN ON WALLS WHERE THE ARCHITECTURAL ELEVATION INDICATES A SURFACE OTHER THAN THE BASE PAINT FOR THE PROJECT, REQUEST CLARIFICATION ON THE MOUNTING LOCATION OF THE DEVICE OR EQUIPMENT. DEVICES AND EQUIPMENT SHALL NOT BE MOUNTED TO FEATURE WALLS AND WALLS CONSTRUCTED OF MATERIALS OTHER THAN DRYWALL WITHOUT WRITTEN APPROVAL OF THE ARCHITECT.
- D. REFER TO ARCHITECTURAL ELEVATIONS FOR ALL PLUMBING FIXTURES.
- E. ALL DEVICES SHALL BE COORDINATED SO AS NOT TO INTERRUPT A BACK SPLASH OR MATERIAL TRANSITIONS. REFER TO ARCHITECTURAL ELEVATION TO CONFIRM DEVICE IS NOT LOCATED WITHIN TRANSITION AREA.
- F. PROVIDE BACKING IN WALLS WHERE WALL MOUNTED DEVICES OR EQUIPMENT ARE INSTALLED. REFER TO ARCHITECTURAL SPECIFICATIONS.



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Revision Number	Revision Description	Revision Date

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Novant ASC Leland  
SHEET NAME  
MECHANICAL DETAILS  
SHEET NUMBER  
M501

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VENTURI VALVE SCHEDULE								
MARK	ROOM NAME	ROOM NUMBER	AIRFLOW [CFM]		BOX INLET [IN]	MANUFACTURER	MODEL	REMARKS
			CONNECTED	MINIMUM				
VALVE-E1	PREPPACK	140	1100	1100	14"	CRITICAL ROOM CONTROL	AIR VALVE	(1)(2)(3)(4)(5)(6)(7)
VALVE-E2	PREPPACK	140	1400	1400	14"	CRITICAL ROOM CONTROL	AIR VALVE	(1)(2)(3)(4)(5)(6)(7)
VALVE-R1	CORRIDOR	124	1540	770	16"	CRITICAL ROOM CONTROL	AIR VALVE	(1)(2)(3)(4)(5)(6)(7)
VALVE-R2	CORRIDOR	136	2075	1040	16"	CRITICAL ROOM CONTROL	AIR VALVE	(1)(2)(3)(4)(5)(6)(7)
VALVE-R3	CORRIDOR	136	1540	770	16"	CRITICAL ROOM CONTROL	AIR VALVE	(1)(2)(3)(4)(5)(6)(7)
VALVE-R4	CORRIDOR	136	1380	690	14"	CRITICAL ROOM CONTROL	AIR VALVE	(1)(2)(3)(4)(5)(6)(7)
VALVE-R5	EQUIPMENT ALCOVE	184	1380	690	14"	CRITICAL ROOM CONTROL	AIR VALVE	(1)(2)(3)(4)(5)(6)(7)
VALVE-R6	CORRIDOR	136	1400	700	14"	CRITICAL ROOM CONTROL	AIR VALVE	(1)(2)(3)(4)(5)(6)(7)
VALVE-S1	CORRIDOR	124	1840	920	14"	CRITICAL ROOM CONTROL	AIR VALVE	(1)(2)(3)(4)(5)(6)(7)
VALVE-S2	STRETCHER SCRUB ALCOVE	130	1840	920	14"	CRITICAL ROOM CONTROL	AIR VALVE	(1)(2)(3)(4)(5)(6)(7)
VALVE-S3	CORRIDOR	136	1680	840	14"	CRITICAL ROOM CONTROL	AIR VALVE	(1)(2)(3)(4)(5)(6)(7)
VALVE-S4	CORRIDOR	136	1680	840	14"	CRITICAL ROOM CONTROL	AIR VALVE	(1)(2)(3)(4)(5)(6)(7)
VALVE-S5	PREPPACK	140	1000	1000	10"	CRITICAL ROOM CONTROL	AIR VALVE	(1)(2)(3)(4)(5)(6)(7)
VALVE-S6	CORRIDOR	136	980	980	10"	CRITICAL ROOM CONTROL	AIR VALVE	(1)(2)(3)(4)(5)(6)(7)

REMARKS:  
 1. MAXIMUM FULL FLOW AIR PRESSURE DROP ACROSS THE VALVE ASSEMBLY INCLUDING HEATING COIL SHALL BE 0.75 IN. W.C.  
 2. MAXIMUM RADIATED SOUND LEVEL BASED ON ARI 880-98 AT 1.0 IN. W.C. DIFFERENTIAL PRESSURE SHALL NOT EXCEED NC 45.  
 3. MAXIMUM DISCHARGE SOUND LEVEL BASED ON ARI 880-98 AT 1.0 IN. W.C. DIFFERENTIAL PRESSURE SHALL NOT EXCEED NC 45.  
 4. PROVIDE ALL NECESSARY COMPONENTS FOR PROPER OPERATION INCLUDING CONTROLS, TRANSFORMERS, AND WIRING.  
 5. ACCURACY SHALL BE +5% OF MEASURED FLOW.  
 6. VALVE MATERIAL SHALL BE ALUMINUM.  
 7. VALVE MATERIAL SHALL BE PHENOLIC COATED ALUMINUM.

SPLIT SYSTEM SCHEDULE																				
MARK	SERVES	NOMINAL CAPACITY [TONS]	TOTAL COOLING CAPACITY [MBH]	TOTAL HEATING CAPACITY	INDOOR UNIT				OUTDOOR UNIT			ELECTRICAL DATA								
					AIRFLOW [CFM]	MODEL	SUMMER AMBIENT AIR [°F]	WINTER AMBIENT AIR [°F]	OPERATING WEIGHT [LBS]	MODEL	FLA	VOLTAGE	PHASE	MCCP	DISCONNECT BY	SCCR	MANUFACTURER	REMARKS		
SSAH-146	DI WATER / BOILER / VACUUM PUMP	2	24,000		835															
SSAH-148	MED GAS	1	12,000	14,000	335	PKA-A12LA1														
SSAH-151	EMERGENCY ELECTRICAL	1	12,000		335	PKA-A12LA1														
SSAH-152	ELECTRICAL	1	12,000		335	PKA-A12LA1														
SSAH-159	EMERGENCY ELECTRICAL	1	12,000		335	PKA-A12LA1														
SSAH-160	EMERGENCY ELECTRICAL	1	12,000		335	PKA-A12LA1														
SSCU-146	SSAH-146	2						105	19	151	FLY-A2NHAF	15	208 V	1	25	ELECTRICAL CONTRACTOR	5	MITSUBISHI	(1)(2)(3)(4)	
SSCU-148	SSAH-148	1						105	19	92	PUZ-A12NKA7	11	208 V	1	15	ELECTRICAL CONTRACTOR	5	MITSUBISHI	(1)(2)(3)(4)	
SSCU-151	SSAH-151	1						105	19	92	FLY-A12NKA7	11	208 V	1	15	ELECTRICAL CONTRACTOR	5	MITSUBISHI	(1)(2)(3)(4)	
SSCU-152	SSAH-152	1						105	19	92	FLY-A12NKA7	11	208 V	1	15	ELECTRICAL CONTRACTOR	5	MITSUBISHI	(1)(2)(3)(4)	
SSCU-159	SSAH-151	1						105	19	92	FLY-A12NKA7	11	208 V	1	15	ELECTRICAL CONTRACTOR	5	MITSUBISHI	(1)(2)(3)(4)	
SSCU-160	SSAH-151	1						105	19	0	FLY-A12NKA7	11	208 V	1	15	ELECTRICAL CONTRACTOR	5	MITSUBISHI	(1)(2)(3)(4)	

REMARKS:  
 1. PERFORMANCE BASED ON CONDITIONS INDICATED IN THIS SCHEDULE.  
 2. PROVIDE CURB RAILS AND ROOF SUPPORTS FOR OUTDOOR UNIT.  
 3. PROVIDE THE FOLLOWING ACCESSORIES: SINGLE POINT POWER CONNECTION, DISCONNECT, HAL GUARDS, LOW AMBIENT KIT, AND WIND Baffles.  
 4. EQUIPMENT SHORT CIRCUIT CURRENT RATING SHALL BE MINIMUM 120% OF THE AVAILABLE SHORT CIRCUIT CURRENT. REVIEW SHORT CIRCUIT CURRENT RATING WITH ELECTRICAL CONTRACTOR PRIOR TO ORDERING EQUIPMENT.

DIFFUSER, REGISTER, AND GRILLE SCHEDULE												
MARK	IMAGE	DESCRIPTION	MAX S.P.	MATERIAL	FINISH	FACE SIZE			AIRFLOW	MANUFACTURER	MODEL	REMARKS
						LENGTH	WIDTH	NECK SIZE				
D1		RIIDGE FACE STYLE SUPPLY DIFFUSER	0.10 in-wg	STEEL	PAINT, WHITE	24"	24"	6"	0-120 121-210 211-320 321-470 471-860	TITUS	OMNI	(1)(2)(3)
D2		DOUBLE DEFLECTION SUPPLY GRILLE	0.10 in-wg	STEEL	PAINT, WHITE	SEE PLAN	SEE PLAN	SEE PLAN	SEE PLAN	PRICE	520	(1)(2)(3)(4)
D3		LAMINAR FLOW WITH HEPA	0.30 in-wg	STEEL	PAINT, WHITE	48"	24"	6"	200-600	PRICE	LFDC	(1)(2)(3)
D4		LAMINAR FLOW WITH HEPA	0.30 in-wg	STEEL	PAINT, WHITE	36"	24"	6"	200-600	PRICE	LFDC	(1)(2)(3)
G1		PERFORATED RETURN GRILLE	0.10 in-wg	STEEL	PAINT, WHITE	24"	24"	6"x6" 8"x8" 10"x10" 12"x12" 14"x14"	0-125 126-225 226-350 351-500 501-700	TITUS KRUEGER PRICE	PAR 6490 PDDOR	(1)(2)(3)
G2		SINGLE DEFLECTION RETURN GRILLE	0.10 in-wg	STAINLESS STEEL	PAINT, WHITE	SEE PLAN	SEE PLAN	SEE PLAN	SEE PLAN	PRICE	730	(1)(2)(3)(4)
GE1		PERFORATED EXHAUST GRILLE	0.10 in-wg	STEEL	PAINT, WHITE	24"	24"	6"x6" 8"x8" 10"x10" 12"x12" 14"x14" 18"x18"	0-125 126-225 226-350 351-500 501-700 701-1125	TITUS KRUEGER PRICE	PAR 6490 PDDOR	(1)(2)(3)
GE2		PERFORATED RETURN GRILLE	0.10 in-wg	STEEL	PAINT, WHITE	24"	12"	6"x6" 8"x8" 10"x10"	0-125 126-180 181-210	TITUS KRUEGER PRICE	PAR 6490 PDDOR	(1)(2)(3)
GE3		SINGLE DEFLECTION RETURN GRILLE	0.10 in-wg	STEEL	PAINT, WHITE	SEE PLAN	SEE PLAN	SEE PLAN	SEE PLAN	PRICE	530	(1)(2)(3)(4)

REMARKS:  
 1. COORDINATE EXACT MODEL AND FRAME WITH CEILING / WALL TYPE.  
 2. COORDINATE LOCATION OF GRILLES WITH ARCHITECTURAL CEILING PLANS AND ELEVATIONS.  
 3. DIFFUSER / GRILLE CONSTRUCTION SHALL BE ALUMINUM CONSTRUCTION IN ALL RESTROOMS, TOILETS, RECEIVING AREAS, AND VESTIBULES.  
 4. WHEN INSTALLED IN A WALL, THE BLADES FOR THESE GRILLES SHALL BE SUCH THAT THE FRONT BLADES ARE HORIZONTAL (PARALLEL TO THE FLOOR). WHEN INSTALLED IN A CEILING, THE BLADES FOR THESE GRILLES SHALL BE SUCH THAT THE FRONT BLADES ARE PARALLEL TO THE LONG DIMENSION OF THE GRILLE.

VARIABLE VOLUME BOX - COOLING ONLY									
MARK	ROOM NAME	ROOM NUMBER	AIRFLOW [CFM]		BOX INLET [IN]	MANUFACTURER	MODEL	REMARKS	
			OCCUPIED	UNOCCUPIED					
VAV-OR-5	PREPPACK	140	500	250	8"	NALOR	3001	(1)(2)	

REMARKS:  
 1. MAXIMUM RADIATED SOUND LEVEL BASED ON ARI 880-98 AT 1.0 IN. W.C. DIFFERENTIAL PRESSURE SHALL NOT EXCEED NC 30.  
 2. MAXIMUM DISCHARGE SOUND LEVEL BASED ON ARI 880-98 AT 1.0 IN. W.C. DIFFERENTIAL PRESSURE SHALL NOT EXCEED NC 25.

FILTER SCHEDULE								
MARK	ASSOCIATED EQUIPMENT	FUNCTION	TYPE	DEPTH [IN]	MAX FACE VELOCITY [FPM]	MERV RATING	PRESSURE DROP [IN W.C.]	REMARKS
FL-2	AHU-OR	FINAL FILTER	CARTRIDGE	4"	475	14	1	(1)(2)
FL-3	AHU-PACU	PRE-FILTER	PLEATED	2"	315	8	0.57	(1)(2)
FL-4	AHU-PACU	FINAL FILTER	CARTRIDGE	4"	315	14	0.85	(1)(2)

REMARKS:  
 1. PROVIDE MAGNETIC GAUGE ACROSS HOUSING FILTER.  
 2. PROVIDE FILTER BANK HOLDING FRAME. SUPPORT FRAME FROM STRUCTURE.

HYDRONIC COIL SCHEDULE															
MARK	SERVES	FLUID TYPE	AIRFLOW [CFM]	MIN ROWS	MAX FINS PER INCH	MAX VELOCITY [FPM]	MAX AIR P.D. [IN W.C.]	ENTERING DB / WB [°F]	LEAVING DB / WB [°F]	TOTAL CAPACITY [MBH]	SENS. CAPACITY [MBH]	FLUID DATA			REMARKS
												FLOW [GPM]	EWT / LWT [°F]	MAX P.D. [FT]	
CC-OR	AHU-OR	WATER	10,500	6	10	460	0.6	73/59.5	48.7/49.2	283	259	49	42/57	6.4	(1)(2)(3)(4)
CC-PACU	AHU-PACU	WATER	8,250	-	-	339	0.23	82/67	55/53.7	382	243	47	42/57	1.15	(1)(2)(3)
HC-OR	AHU-OR	WATER	10,500	1	6	460	0.05	61	84.5	263	-	33	140/110	4.7	(1)(2)(3)
HC-PACU	AHU-PACU	WATER	8,250	-	-	339	0.05	65/53	80/82.5	227	-	16	140/110	6.78	(1)(2)(3)
HC-S1	VALVE-S1	WATER	1,840	2	-	-	0.75	55	100	81	-	5.5	140/110	1	(3)
HC-S2	VALVE-S2	WATER	1,840	2	-	-	0.75	55	100	81	-	5.5	140/110	1	(3)
HC-S3	VALVE-S3	WATER	1,840	2	-	-	0.75	55	100	81	-	5.5	140/110	1	(3)
HC-S4	VALVE-S4	WATER	1,840	2	-	-	0.75	55	100	81	-	5.5	140/110	1	(3)
HC-S5	VALVE-S5	WATER	1,000	2	-	-	0.75	55	100	40	-	2.7	140/110	1	(3)
HC-S6	VALVE-S6	WATER	960	2	-	-	0.75	55	100	40	-	2.7	140/110	1	(3)

REMARKS:  
 1. MAINTAIN COIL PULL SPACE ON INSTALLATION.  
 2. PROVIDE DOUBLE SLOPED DRAIN PAN.  
 3. CONTRACTOR TO PIPE UNIT AS INDICATED FROM FACTORY. COUNTERFLOW.  
 4. PROVIDE UV LIGHTS FOR COIL. LIGHTS SHALL PROVIDE PROPER COVERAGE OF COIL AND DRAIN PAN SURFACES WITHIN THE COIL DISCHARGE SECTION.

FAN SCHEDULE																			
MARK	TYPE	NUMBER OF FANS IN ARRAY	MAX WEIGHT [LBS]	AIRFLOW [CFM]	EXTERNAL STATIC [IN W.C.]	MAX FAN RPM	MAX FAN BHP	TOTAL HP	ELECTRICAL DATA										
									HP	FLA	VOLTAGE	PHASE	MCA	MCCP	DISCONNECT BY	SCCR	MANUFACTURER	MODEL	REMARKS
EF-1	EXHAUST FAN	N/A	41	675	0.75	1491	0.16	-	0.25	2.85	115 V	1	4	15	MANUFACTURER	5	GREENHECK	G-099-VG	(1)(2)(3)(5)
EF-2	EXHAUST FAN	N/A	49	1,225	0.25	1286	0.2	-	0.5	6.4	115 V	1	8	15	MANUFACTURER	5	GREENHECK	G-128-VG	(1)(2)(3)(5)
EF-3	EXHAUST FAN	N/A	65	2,500	0.5	1075	0.48	-	1	7	208 V	1	9	15	MANUFACTURER	5	GREENHECK	G-168-VG	(1)(2)(3)(5)
EF-4	EXHAUST FAN	N/A	50	500	0.5	1599	0.08	-	0.1	1.38	115 V	1	2	15	MANUFACTURER	5	GREENHECK	G-099-VG	(1)(2)(3)(5)
RF-OR	FAN ARRAY	4	292	10,500	3	2082	1.81	12	3	4	480 V	3	18.6	50	MANUFACTURER	5	GREENHECK	G-099-VG	(3)(4)(5)
RF-PACU	FAN ARRAY	2	7,000	2	1165	1.6	10.8	5.4	7.4	480 V	3	24.8	50	ELECTRICAL CONTRACTOR	5	-	-	(3)(4)(5)	
SF-OR	FAN ARRAY	4	286	13,500	5	2786	3.92	26	6.5	7.6	480 V	3	38.3	50	MANUFACTURER	5	-	-	(3)(4)(5)
SF-PACU	FAN ARRAY	2	8,000	2	1180	3.8	14.8	7.4	11	480 V	3	37.1	50	ELECTRICAL CONTRACTOR	5	-	-	(3)(4)(5)	

REMARKS:  
 1. PROVIDE DISCONNECT.  
 2. PROVIDE 1" ROOF CURB.  
 3. PROVIDE AUTOMATIC BACKDRAFT DAMPER INTERLOCKED WITH MOTOR.  
 4. PROVIDE VIBRATION ISOLATION.  
 5. EQUIPMENT SHORT CIRCUIT CURRENT RATING SHALL BE MINIMUM 120% OF THE AVAILABLE SHORT CIRCUIT CURRENT. REVIEW SHORT CIRCUIT CURRENT RATING WITH ELECTRICAL CONTRACTOR PRIOR TO ORDERING EQUIPMENT.

ADIABATIC HUMIDIFIER SCHEDULE																									
MARK	SERVICE	HUMIDIFIER TYPE	QUANTITY	NET LOAD [LB/HR]	MANUFACTURER	MODEL	ATOMIZING NOZZLES					HIGH PRESSURE PUMPING STATION													
							AIRSIDE			DISPERSION		ELECTRICAL INFORMATION			ELECTRICAL INFORMATION			RO (TAG/EXISTING)	REMARKS						
							AIR VOLUME [CFM]	AIR P.D. [IN W.C.]	ENTERING WB/DB [°F]	LEAVING WB/DB [°F]	WIDTH [IN]	HEIGHT [IN]	EVAPORATION DISTANCE [FT]	VOLTS	PHASE	AMPS	QUANTITY			MODEL	CAPACITY [LB/HR]	VOLTS	PHASE	MCA	DISCONNECT BY
HUM-OR	AHU-OR	ADIABATIC	17	115	CAREL	RHS00	13,500	0.48	60/44.5	53/44.1	74	73	5	230	1	2.2	1	UA1501D501	317	230	1	4.8	MANUFACTURER	INTEGRAL TO AHU-OR	(1)(2)
HUM-CONTROL	AHU-OR	ADIABATIC	17	115	CAREL	RHS00	13,500	0.48	60/44.5	53/44.1	74	73	5	230	1	2.2	1	UA1501D501	317	230	1	4.8	MANUFACTURER	INTEGRAL TO AHU-OR	(1)(2)

REMARKS:  
 1. RO SYSTEM SHALL BE PROVIDED WITH ADIABATIC HUMIDIFIER, RO GENERATOR AND PUMP SHALL BE INTEGRAL TO AHU-OR.  
 2. INSTALL MANIFOLD IN AIR HANDLING UNIT. SEAL AROUND MANIFOLD AIR TIGHT. VERIFY EXACT DIMENSIONS.

AIR HANDLING UNIT SCHEDULE																											
MARK	LOCATION	TYPE	OVERALL SIZE [LxWxH]	SUPPLY AIR	RETURN AIR	MINIMUM OUTSIDE AIR	SERVICE VESTIBULE	CAPACITY	SUPPLY FAN MARK	RETURN FAN MARK	COOLING COIL MARK	HEATING COIL MARK	HUMIDIFIER MARK	PRE FILTER MARK	FINAL FILTER MARK	AIR BLENDER MARK	ELECTRICAL DATA										
																	FLA	VOLTAGE	PHASE	MCA	MCCP	DISCONNECT BY	SCCR	MANUFACTURER	MODEL	REMARKS	
AHU-OR	ROOF	CUSTOM	(85x14x98)	13,500 CFM	10,500 CFM	2,000 CFM	NO	23 TON	SF-PACU	RF-OR	CC-OR	HC-OR	HUM-1	FL-1	FL-2	AB-1	64	480 V	3	66	80	MANUFACTURER	9	TEMTROL	KUMOR	EVOS 1150	(3)(4)(5)

REMARKS:  
 1. PROVIDE WITH UV LIGHTS WITH EXTERIOR CONTROL SWITCH.  
 2. PROVIDE WITH INTEGRAL VFD. VFDs SHALL BE IN SERVICE VESTIBULE FOR OR UNIT.  
 3. PROVIDE WITH STRUCTURAL BASE RAIL AND ON CURB WITH VIBRATION ISOLATION.  
 4. PROVIDE WITH PRESSURE RELIEF DOORS.  
 5. EQUIPMENT SHORT CIRCUIT CURRENT RATING SHALL BE MINIMUM 120% OF THE AVAILABLE SHORT CIRCUIT CURRENT. REVIEW SHORT CIRCUIT CURRENT RATING WITH ELECTRICAL CONTRACTOR PRIOR TO ORDERING EQUIPMENT.

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MARK	SERVICE	REFRIGERANT	AMBIENT TEMP [°F]	MIN OPERATING AMBIENT [°F]	MAX SOUND PRESSURE [dBA]	NOMINAL NET [TONS]	NUMBER OF STAGES	CAPACITY / PERFORMANCE				EVAPORATOR PERFORMANCE				ELECTRICAL DATA				REMARKS									
								100	75	50	25	NPLV / IPLV	EWT [°F]	LWT [°F]	FLOW [GPM]	FOULING FACTOR	MAX PRESSURE DROP [DPT]	FLUID	KW		FLA	VOLTAGE	PHASE	MCA	MOCF	DISCONNECT BY	SCCR	MANUFACTURER	MODEL
								12.45	16.31	18.47	14.88/16.26	57	42	103	0.0001	6.15	29% GLYCOL	81.3	133.6		480 V	3	167	225	MANUFACTURER	18.5	TRANE	CGAM	(1)(2)(3)(4)(5)(6)(7)(8)
CH-1	CHILLED WATER	R-410A	105	0	91	70	4	9.133	12.45	16.31	18.47	14.88/16.26	57	42	103	0.0001	6.15	29% GLYCOL	81.3	133.6	480 V	3	167	225	MANUFACTURER	18.5	TRANE	CGAM	(1)(2)(3)(4)(5)(6)(7)(8)

- REMARKS:**
- CHILLER PERFORMANCE BASED ON FLUID AND CONDITIONS INDICATED IN THIS SCHEDULE.
  - PROVIDE STRUCTURAL CONCRETE PAD, ANCHOR CHILLER TO PAD.
  - PROVIDE THE FOLLOWING ACCESSORIES: SINGLE POINT POWER CONNECTION, INTEGRAL NEMA 3R OR NEMA 4 DISCONNECT, HAIL GUARDS, COMPREHENSIVE SOUND PACKAGE, BACNET INTERFACE, VIBRATION ISOLATORS, PACKAGED UNIT CONTROLS, AND PUMP PACKAGE.
  - "SCCR" VALUE INDICATED IS AVAILABLE SHORT CIRCUIT CURRENT (SCC) IN KILOAMPS AT THE EQUIPMENT BASED ON PRELIMINARY DESIGN PHASE CALCULATIONS. EQUIPMENT SCCR SHALL BE MINIMUM 120% OF THE AVAILABLE SCC. RATING SHALL BE ADJUSTED IF REQUIRED BASED ON FINAL SCC CALCULATION. EQUIPMENT INDICATED WITH 5 KA MAY BE PROVIDED WITH 5 KA SCCR. REVIEW SCCR WITH ELECTRICAL CONTRACTOR PRIOR TO ORDERING EQUIPMENT.
  - PROVIDE WITH PACKAGED DUAL PUMPS. SEE PUMP SCHEDULE P-4 & P-5.
  - PROVIDE WITH PACKAGED EXPANSION TANK. SEE EXPANSION TANK SCHEDULE, ET-2.
  - PROVIDE WITH PACKAGED BUFFER TANK. SEE VESSEL SCHEDULE, BT-1.
  - PROVIDE ADDITIONAL ALLOWANCE FOR NOISE/SOUND MITIGATION.

EQUIPMENT	INSULATION		JACKET TYPE (2)	NCIS PLATE NUMBER (1)	REMARKS
	TYPE	THICKNESS			
HOT WATER AIR SEPARATORS	PT	2	ASJ	4-100, 4-120	
HOT WATER EXPANSION TANK	PT	2	ASJ	4-100, 4-120	
COLD WATER AIR SEPARATORS	E	1		4-200	

ABBREVIATIONS: PT=PIPE AND TANK INSULATION, MF=MINERAL FIBER(FIBERGLASS), CS=CALCIUM SILICATE, E=ELASTOMERIC.

- REMARKS:**
- NCIS (NATIONAL COMMERCIAL AND INDUSTRIAL INSULATION STANDARD) PLATE NUMBER REFERENCED ARE PROVIDED TO CLARIFY THE SCOPE OF INSTALLATION. INSTALL INSULATION AND ACCESSORY COMPONENTS PER APPLICABLE NCIS AND MANUFACTURERS RECOMMENDATIONS.
  - "JACKET TYPE" IS FOR INSULATION ONLY. REFER TO SPECIFICATIONS FOR INSTALLATIONS REQUIRING ADDITIONAL FIELD APPLIED JACKETING SUCH AS METAL OR PVC.

MARK	MEDIA	ELECTRIC [KW]	MINIMUM TURNDOWN	HOT WATER BOILER DATA			ELECTRICAL DATA				REMARKS				
				INPUT [MBH]	OUTPUT [MBH]	EWT / LWT [°F]	FLUID % GLYCOL	KW	VOLTAGE	PHASE		DISCONNECT BY	SCCR	MANUFACTURER	MODEL
EBH-1	HEATING HOT WATER	120	5:1	409	409	120 / 140	0	120	480 V	3	ELECTRICAL CONTRACTOR	22	LOCHINVAR	BWX1-120C	(1)(2)(3)(4)

- REMARKS:**
- BOILER PERFORMANCE BASED ON FLUID AND CONDITIONS INDICATED IN THIS SCHEDULE.
  - PROVIDE HOUSEKEEPING PAD, ANCHOR BOILER TO PAD.
  - PROVIDE BOILER CONTROLLER CAPABLE OF CONTROLLING THE BOILERS, FUTURE BOILER, ASSOCIATED EQUIPMENT, AND EQUIPMENT ASSOCIATED WITH THE FUTURE BOILER. CONTROLLER SHALL BE PROVIDED WITH BACNET INTERFACE FOR MONITORING OF BOILERS AND EQUIPMENT. BACNET INTERFACE SHALL BE CAPABLE OF INTERFACING ALL FUTURE EQUIPMENT.
  - EQUIPMENT SHORT CIRCUIT CURRENT RATING SHALL BE MINIMUM 120% OF THE AVAILABLE SHORT CIRCUIT CURRENT. REVIEW SHORT CIRCUIT CURRENT RATING WITH ELECTRICAL CONTRACTOR PRIOR TO ORDERING EQUIPMENT.

MARK	SERVES	CONFIGURATION	VOLUME [GAL]	MAX SIZE (DxH/L) [IN]	MANUFACTURER	MODEL	REMARKS

- REMARKS:**
- PROVIDE ASME RATED VESSEL.
  - MOUNT ON HOUSEKEEPING PAD.
  - PROVIDE PACKAGED WITH CHILLER CH-1. SEE AIR COOLED CHILLER SCHEDULE.

MARK	SERVES	CONFIGURATION	MAX SIZE (ØxH) [IN]	ACCEPTANCE VOLUME [GAL]	MANUFACTURER	MODEL	REMARKS
ET-2	CHILLED WATER	BLADDER		5	CHILLER MFR	B55	(1)(3)

- REMARKS:**
- PROVIDE WITH ASME RATED VESSEL, REPLACEABLE BLADDER, AND SIGHT GLASS.
  - MOUNT ON HOUSEKEEPING PAD.
  - PROVIDE PACKAGED WITH CHILLER CH-1. SEE AIR COOLED CHILLER SCHEDULE.

MARK	FLOW [GPM]	AVAILABLE HEAD [FT]	SHUT-OFF HEAD [FT]	MIN EFFICIENCY [%]	TYPE OF FLUID	MAX RPM	SUCTION / DISCHARGE SIZE [IN]	MAX IMPELLER DIAMETER [IN]	ELECTRICAL DATA				REMARKS			
									HP	VOLTAGE	PHASE	DISCONNECT BY		SCCR	MANUFACTURER	MODEL
P-1	50	10	11.5	55.2	WATER	1800	2/2	3.75	0.5	208 V	3	ELECTRICAL CONTRACTOR	5	BELL & GOSSET	E60	(1)(2)(3)(4)
P-2	50	25	28.3	62.1	WATER	1800	1 1/2" / 1 1/2"	5.25	1	208 V	3	ELECTRICAL CONTRACTOR	5	BELL & GOSSET	E60	(1)(2)(3)(4)
P-3	50	25	28.3	62.1	WATER	1800	1 1/2" / 1 1/2"	5.25	1	208 V	3	ELECTRICAL CONTRACTOR	5	BELL & GOSSET	E60	(1)(2)(3)(4)
P-4	103	104	115	92	25% GLYCOL	1800	-	-	7.5	480 V	3	CHILLER MFR	-	CHILLER MFR	-	(1)(2)(4)(5)
P-5	103	104	115	92	25% GLYCOL	1800	-	-	7.5	480 V	3	CHILLER MFR	-	CHILLER MFR	-	(1)(2)(4)(5)
P-6	32	5	29.8	42.7	WATER	1800	1 1/4" / 1 1/4"	-	1.5	208 V	3	ELECTRICAL CONTRACTOR	5	BELL & GOSSET	PD37	(1)(2)(3)(4)
P-7	17	7	34.9	33.7	WATER	1800	1 1/4" / 1 1/4"	-	1.5	208 V	3	ELECTRICAL CONTRACTOR	5	BELL & GOSSET	PD40	(1)(2)(3)(4)
P-146	1.25	5	21	-	WATER	-	-	-	0.033	115 V	1	-	5	LITTLE GIANT	VCMX-20ULS	(1)(2)(4)(6)(7)
P-148	1.25	5	21	-	WATER	-	-	-	0.033	115 V	1	-	5	LITTLE GIANT	VCMX-20ULS	(1)(2)(4)(6)
P-151	1.25	5	21	-	WATER	-	-	-	0.033	115 V	1	-	5	LITTLE GIANT	VCMX-20ULS	(1)(2)(4)(6)
P-152	1.25	5	21	-	WATER	-	-	-	0.033	115 V	1	-	5	LITTLE GIANT	VCMX-20ULS	(1)(2)(4)(6)
P-159	1.25	5	21	-	WATER	-	-	-	0.033	115 V	1	-	5	LITTLE GIANT	VCMX-20ULS	(1)(2)(4)(6)
P-160	1.25	5	21	-	WATER	-	-	-	0.033	115 V	1	-	5	LITTLE GIANT	VCMX-20ULS	(1)(2)(4)(6)

- REMARKS:**
- PERFORMANCE BASED ON FLUID AND CONDITIONS INDICATED IN THIS SCHEDULE.
  - PROVIDE WITH THE FOLLOWING ACCESSORIES: DISCONNECT, CHECK VALVE, VENTURI FLOW MEASURING DEVICE, FLEXIBLE CONNECTORS, UNIONS, AND TEMPERATURE AND PRESSURE GAUGES ON EACH CONNECTION.
  - PROVIDE BACNET INTERFACE.
  - EQUIPMENT SHORT CIRCUIT CURRENT RATING SHALL BE MINIMUM 120% OF THE AVAILABLE SHORT CIRCUIT CURRENT. REVIEW SHORT CIRCUIT CURRENT RATING WITH ELECTRICAL CONTRACTOR PRIOR TO ORDERING EQUIPMENT.
  - PROVIDE PACKAGED WITH CHILLER CH-1. SEE AIR COOLED CHILLER SCHEDULE.
  - PROVIDE WALL MOUNT BRACKET AND MOUNT NEAR SPLIT SYSTEM INDOOR UNIT.
  - PROVIDE WATER DETECTOR ALARMS ON THE FLOOR NEAR ALL SPLIT SYSTEM CONDENSATE PUMPS.

MARK	SERVES	CONFIGURATION	MAX OPERATING WEIGHT [LBS]	PIPE CONNECTION SIZE	MANUFACTURER	MODEL	REMARKS
AS-2	HEATING WATER	INLINE	139	3"	SPROTHERM	VDT-300FA	(1)(2)(3)(4)

- REMARKS:**
- PROVIDE AUTOMATIC AIR VENT, BLOWDOWN DRAIN VALVE WITH HOSE CONNECTION AND MAKE UP WATER CONNECTION.
  - COORDINATE INSTALLATION WITH OTHER EQUIPMENT. ENSURE PROPER CLEARANCE IS PROVIDED FOR MAINTENANCE AND PROPER OPERATION.
  - PROVIDE REMOVABLE END COVER FOR ACCESS TO SEPARATION CHAMBER.
  - VESSEL SHALL BE ASME CERTIFIED.

ITEM	SUPPLIER	INSTALLER	POWER	CONTROL (4)
MOTOR CONTROL CENTER	EC	EC	EC	CC
EQUIPMENT MOUNTED ELECTRICAL COMPONENTS	MC	MC	EC	CC
LOOSE MOUNTED ELECTRICAL COMPONENTS	EC	EC	EC	CC
CONTROL RELAYS, TRANSFORMERS, POWER	MC	EC	EC (4)	CC
TEMPERATURE CONTROL SENSORS	MC	MC	CC	CC
VARIABLE SPEED DRIVES	MC	MC	EC	CC
TERMINAL BOX CONTROLS	MC	MC	EC (4)	CC
PEEP SWITCHES, SOLENOID VALVES, ACTUATORS	CC	CC	EC (4)	CC
PUSHBUTTON STATIONS	EC	EC	EC (4)	CC
TIME CLOCKS	EC	EC	EC	CC
DX CONDENSING UNITS AND CONDENSERS	MC	MC	EC	CC (1)
SMOKE DAMPERS	MC	MC	EC	EC
MEDICAL GAS ALARM WIRING	MC	MC	EC	MC (2)

- REMARKS:**
- IF NO CC IN CONTRACT, MC TO WIRE CONTROLS AND EC TO PIPE CONDUIT.
  - ALL LOW VOLTAGE WIRING OF PANELS TO BE COVERED IN MC BID. WIRING CONTRACTOR TO BE SUBCONTRACTOR TO MC.
  - INSTALLING CONTRACTOR IS RESPONSIBLE FOR FIELD ALIGNMENT SERVICES WHEN REQUIRED BY COMMON MOTOR REQUIREMENTS SPECIFICATION OR BY INDIVIDUAL EQUIPMENT SPECIFICATIONS.
  - ALL HARDWARE, SOFTWARE, EQUIPMENT, ACCESSORIES, WIRING (POWER AND SENSOR), PIPING, RELAYS, SENSORS, POWER SUPPLIES, TRANSFORMERS, AND INSTRUMENTATION REQUIRED FOR A COMPLETE AND OPERATIONAL, OCC SYSTEM, BUT NOT SHOWN ON THE ELECTRICAL DRAWINGS, ARE THE RESPONSIBILITY OF THE CC.

MARK	TEMP. RANGE DEG. F.	THICKNESS IN INCHES FOR PIPE SIZES THROUGH SIZE LISTED					TYPE	JACKET TYPE (2)	NCIS PLATE NUMBER (1)	REMARKS
		<1	1 - 1.25	1.5 - 3	4 - 6	>= 8				
INDOOR HOT WATER	105 - 140	1	1	1.5	1.5	1.5	MF	ASJ-SSL	1-100	(3)
OUTDOOR HOT WATER	105 - 140	2	2	2.5	2.5	2.5	MF	ASJ-SSL	1-100	(3)
INDOOR COLD WATER	40 - 60	0.5	0.5	1	1	1	MF, E	ASJ-SSL	1-100, 1-200	(7)
OUTDOOR COLD WATER	40 - 60	1.5	1.5	2	2	2	E		1-200	(7)
REFRIGERANT	ANY	0.5	1	1	1	NA	E		1-200	(5)
PLASTIC IN RETURN AIR PLENUM	ANY	1	1	1	1	1	MF	ASJ-SSL	1-100	(7)
INDOOR CONDENSATE AND EQUIPMENT DRAINS	BELOW 60	0.5	0.5	0.5	0.5	0.5	MF, E	ASJ-SSL	1-100, 1-200	(6)

ABBREVIATIONS: MF = MINERAL FIBER(FIBERGLASS), E = ELASTOMERIC, CC = CELLULAR GLASS

- REMARKS:**
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  - "JACKET TYPE" IS FOR INSULATION ONLY. REFER TO SPECIFICATIONS FOR INSTALLATIONS REQUIRING ADDITIONAL FIELD APPLIED JACKETING SUCH AS METAL OR PVC.
  - HOT WATER SYSTEM TEMPERATURES EXCEEDING 200 DEG F TO BE TREATED FOR APPROPRIATE TEMPERATURE RANGE AS LISTED UNDER LPS OR HPS.
  - HEAT TRACED PIPING SHALL BE INSULATED TO THICKNESS INDICATED OR TO THICKNESS SPECIFIED FOR SPECIFIC SYSTEM, WHICHEVER IS GREATER.
  - UNDERGROUND REFRIGERANT PIPING SHALL BE INSULATED AS SPECIFIED FOR ABOVEGROUND PIPING AND INSTALLED IN PVC CONDUIT.
  - INCLUDES AIR CONDITIONING CONDENSATE, P-TRAPS FOR FLOOR DRAINS/SINKS RECEIVING AIR CONDITIONING CONDENSATE OR ICE MAKER DRAIN PIPING, AND SANITARY DRAINAGE PIPING FROM ELECTRIC WATER COOLERS TO MAIN.
  - INSULATION PRODUCT TO BE PLENUM RATED AND FULLY COMPLIANT PER APPLICABLE MECHANICAL AND PLUMBING CODES AS A UL LISTED AND LABELED PIPE INSULATION, UL CATEGORY "INSULATED PLASTIC PIPE ASSEMBLIES (BSMP) FOR INSTALLATION OVER POLYMER PIPES (I.E. PVC, POLYETHYLENE AND POLYPROPYLENE).

DUCT SYSTEM TYPE	INSULATION		JACKET TYPE	NCIS PLATE NUMBER (1)	REMARKS
	TYPE	INSTALLED R VALUE			
SUPPLY AIR (CONCEALED)	MF BLANKET	6	0.75	FSK	3-100 (5) (7)
RETURN AIR (CONCEALED)	MF BLANKET	6	0.75	FSK	3-100 (5) (7)

ABBREVIATIONS: MF=MINERAL FIBER(FIBERGLASS), E= ELASTOMERIC, PI = POLYISOCYANURATE

- REMARKS:**
- NCIS (NATIONAL COMMERCIAL AND INDUSTRIAL INSULATION STANDARD) PLATE NUMBER REFERENCED ARE PROVIDED TO CLARIFY THE SCOPE OF INSTALLATION. INSTALL INSULATION AND ACCESSORY COMPONENTS PER APPLICABLE NCIS AND MANUFACTURERS RECOMMENDATIONS.
  - "JACKET TYPE" IS FOR INSULATION ONLY. REFER TO SPECIFICATIONS FOR INSTALLATIONS REQUIRING ADDITIONAL FIELD APPLIED JACKETING SUCH AS METAL OR PVC.
  - FOR OUTSIDE AIR DUCTWORK DOWNSTREAM OF AN AIR HANDLING UNIT THAT HEATS OR COOLS THE OUTSIDE AIR, INSULATE AS SPECIFIED FOR SUPPLY AIR.
  - INSULATE FROM EXTERIOR LOUVER OR OPENING TO 20 FEET AWAY OR TO 5 FEET PAST CONTROL OR BACKDRAFT DAMPER, WHICHEVER IS LESS.
  - INSULATE FIRE DAMPERS, SMOKE DAMPERS AND COMBINATION FIRE/SMOKE DAMPERS AS RECOMMENDED BY THE SMACNA FIRE, SMOKE AND RADIATION DAMPER INSTALLATION GUIDE FOR HVAC.
  - PROVIDE WITH 22 GAUGE CORRUGATED ALUMINUM JACKET.
  - REFER TO NCIS PLATE 3-600 FOR INSULATION OF TRAPEZE OR ANGLE IRON DUCT SUPPORTS.

MARK	ROOM NAME	ROOM NUMBER	AIRFLOW				BOX INLET [IN]	LEAVING AIR TEMP		COIL CAPACITY [MBH]	COIL FLOW [GPM]	MANUFACTURER	MODEL	REMARKS
			OCCUPIED		UNOCCUPIED			COOLING [°F]	HEATING [°F]					
			COOLING	HEATING	COOLING	HEATING								
VAV-OR-1	EQUIPMENT STORAGE	128	825	415	415	415	10	55	90	39.4	2.7 GPM	NAILOR	D30RW	(1)(2)(4)(3)(5)
VAV-OR-2	CLEAN CORE	127	850	425	425	425	10	55	90	39.4	2.7 GPM	NAILOR	D30RW	(1)(2)(4)(3)(5)
VAV-OR-3	CORRIDOR	136	1250	625	625	625	12	55	90	58.3	3.9 GPM	NAILOR	D30RW	(1)(2)(4)(3)(5)
VAV-OR-4	INSTRUMENT STORAGE	139	250	125	250	250	6	55	90	13.1	0.9 GPM	NAILOR	D30RW	(1)(2)(4)(3)(5)
VAV-PAU-1	CORRIDOR	102	300	150	150	150	6	55	90	13.1	0.9 GPM	NAILOR	D30RW	(1)(2)(4)(3)(5)
VAV-PAU-2	NURSE STATION	176	575	280	280	280	8	55	90	23.3	1.6 GPM	NAILOR	D30RW	(1)(2)(4)(3)(5)
VAV-PAU-3	CORRIDOR	102	375	180	180	180	8	55	90	23.3	1.6 GPM	NAILOR	D30RW	(1)(2)(4)(3)(5)
VAV-PAU-4	MEDS	179	450	225	225	225	8	55	90	23.3	1.6 GPM	NAILOR	D30RW	(1)(2)(4)(3)(5)
VAV-PAU-5	CORRIDOR	102	250	125	125	125	6	55	90	13.1	0.9 GPM	NAILOR	D30RW	(1)(2)(4)(3)(5)
VAV-PAU-6	CORRIDOR	102	150	75	75	75	6	55	90	13.1	0.9 GPM	NAILOR	D30RW	(1)(2)(4)(3)(5)
VAV-PAU-7	DISCHARGE LOBBY	119	250	125	125	125	6	55	90	13.1	0.9 GPM	NAILOR	D30RW	(1)(2)(4)(3)(5)
VAV-PAU-8	NURSE STATION	181	650	325	325	325	10	55	90	39.4	2.7 GPM	NAILOR	D30RW	(1)(2)(4)(3)(5)
VAV-PAU-9	PACU 5	173	300	150	150	150	6	55	90	13.1	0.9 GPM	NAILOR	D30RW	(1)(2)(4)(3)(5)
VAV-PAU-10	NURSE STATION	176	150	75	75	75	6	55	90	13.1	0.9 GPM	NAILOR	D30RW	(1)(2)(4)(3)(5)
VAV-PAU-11	PACU 2	170	200	100	100	100	6	55	90	13.1	0.9 GPM	NAILOR	D30RW	(1)(2)(4)(3)(5)
VAV-PAU-12	CORRIDOR	165	450	225	225	225	8	55	90	23.3	1.6 GPM	NAILOR	D30RW	(1)(2)(4)(3



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2018 NORTH CAROLINA STATE BUILDING CODE: MECHANICAL CODE										2022 FACILITY GUIDELINES INSTITUTE - OUTPATIENT FACILITIES										MINIMUM REQUIRED OUTSIDE AIR			MINIMUM REQUIRED EXHAUST AIR			
NUMBER	NAME	AREA (SF)	CEILING HEIGHT	SERVED BY	SUPPLY CFM	EXHAUST CFM	RETURN CFM	OCCUPANCY CLASSIFICATION	OCCUPANT DENSITY #1000 FT <sup>2</sup>	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R <sub>p</sub> CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE R <sub>a</sub> CFM/FT <sup>2</sup>	EXHAUST AIRFLOW RATE CFM/FT <sup>2</sup>	FUNCTION OF SPACE	PRESSURE RELATIONSHIP TO ADJACENT AREAS	MINIMUM OUTDOOR ACH	MINIMUM TOTAL ACH	ALL ROOM AIR EXHAUSTED DIRECTLY TO OUTDOORS	DESIGN RELATIVE HUMIDITY %	DESIGN TEMPERATURE (F°)	ACTUAL TOTAL ACH	NC MECH CODE	FGI	OUTSIDE AIR (CFM)	NC MECH CODE	FGI	EXHAUST AIR (CFM)
124	CORRIDOR	232	9	AHU-OR	175		175	CORRIDOR	0	0	0.06	0								5.0	14	0	14	0	0	0
125	ANESTHESIA STORAGE	262	9	AHU-OR	250		250	STORAGE ROOM	0	0	0.12	0								6.4	31	0	31	0	0	0
126	EQUIPMENT STORAGE	414	9	AHU-OR	400		400	STORAGE ROOM	0	0	0.12	0								6.4	50	0	50	0	0	0
127	CLEAN CORE	524	9	AHU-OR	850		750						STERILE SUPPLY STORAGE	POSITIVE	2	4	NR	MAX 60	72-78	10.8	0	157	157	0	0	0
128	OPERATING ROOM	488	10	AHU-OR	1840		1540						OPERATING ROOM	POSITIVE	4	20	NR	20-60	68-75	22.6	0	325	325	0	0	0
129	EQUIPMENT ALCOVE	63	9	AHU-OR																0.0	4	0	4	0	0	0
130	EQUIPMENT ALCOVE	62	9	AHU-OR																0.0	4	0	4	0	0	0
131	OPERATING ROOM	490	10	AHU-OR	1840		1540						OPERATING ROOM	POSITIVE	4	20	NR	20-60	68-75	22.5	0	327	327	0	0	0
132	PROCEDURE ROOM	493	10	AHU-OR	1680		1380						PROCEDURE ROOM	POSITIVE	3	15	NR	20-60	70-75	20.4	0	247	247	0	0	0
133	EQUIPMENT ALCOVE	61	9	AHU-OR																0.0	4	0	4	0	0	0
134	EQUIPMENT ALCOVE	61	9	AHU-OR																0.0	4	0	4	0	0	0
135	PROCEDURE ROOM	489	10	AHU-OR	1680		1380						PROCEDURE ROOM	POSITIVE	3	15	NR	20-60	70-75	20.6	0	245	245	0	0	0
136	CORRIDOR	778	9	AHU-OR	850		1300													7.3	47	0	47	0	0	0
137	OR CHARGE - RAD TECH	72	9	AHU-OR	100		100	OFFICE SPACE	5	5	0.06	0								9.3	6	0	6	0	0	0
138	MEDS ALCOVE	47	9	AHU-OR																0.0	3	0	3	0	0	0
139	INSTRUMENT STORAGE	278	9	AHU-OR	250		250	STORAGE ROOM	0	0	0.12	0								6.0	33	0	33	0	0	0
140	PREP/PACK	493	9	AHU-OR	1000		800						STERILE PROCESSING ROOM	NR	2	6	NR	NR	NR	13.5	0	148	148	0	0	0
141	STERILIZERS	79	9	AHU-OR	500		700													59.1	0	0	0	0	0	0
142	CASE CARTS	48	9	AHU-OR																0.0	3	0	3	0	0	0
144	DECONTAMINATION	289	9	AHU-OR	960		1100						DECONTAMINATION ROOM	NEGATIVE	2	6	YES	NR	60-73	25.4	0	87	87	0	260	260
182	CORRIDOR	212	9	AHU-OR	250		250													7.9	13	0	13	0	0	0
184	EQUIPMENT ALCOVE	87	9	AHU-OR																0.0	5	0	5	0	0	0

C1 AHU-OR VENTILATION SCHEDULE NO SCALE

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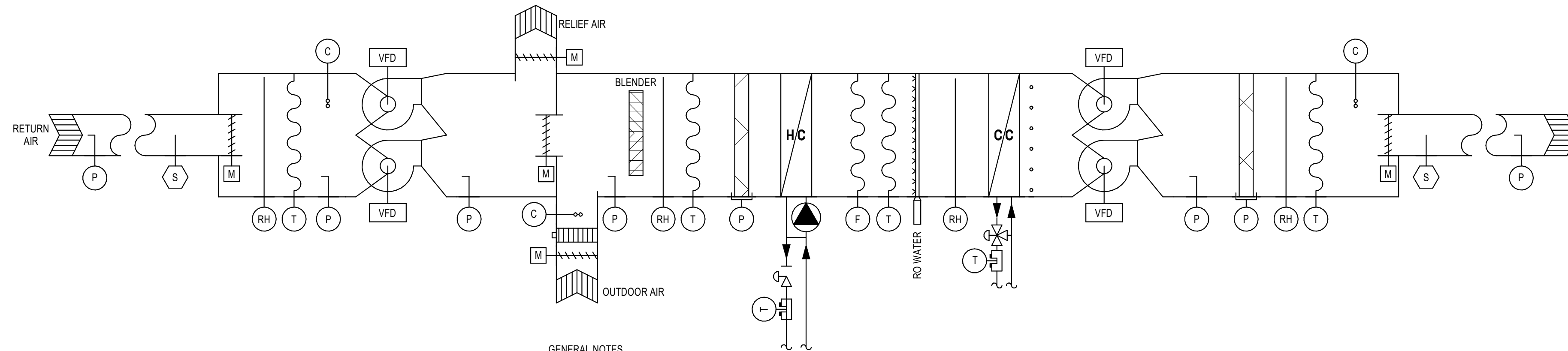
2018 NORTH CAROLINA STATE BUILDING CODE: MECHANICAL CODE										2022 FACILITY GUIDELINES INSTITUTE - OUTPATIENT FACILITIES										MINIMUM REQUIRED OUTSIDE AIR			MINIMUM REQUIRED EXHAUST AIR			
NUMBER	NAME	AREA (SF)	CEILING HEIGHT	SERVED BY	SUPPLY CFM	EXHAUST CFM	RETURN CFM	OCCUPANCY CLASSIFICATION	OCCUPANT DENSITY #1000 FT <sup>2</sup>	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R <sub>p</sub> CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE R <sub>a</sub> CFM/FT <sup>2</sup>	EXHAUST AIRFLOW RATE CFM/FT <sup>2</sup>	FUNCTION OF SPACE	PRESSURE RELATIONSHIP TO ADJACENT AREAS	MINIMUM OUTDOOR ACH	MINIMUM TOTAL ACH	ALL ROOM AIR EXHAUSTED DIRECTLY TO OUTDOORS	DESIGN RELATIVE HUMIDITY %	DESIGN TEMPERATURE (F°)	ACTUAL TOTAL ACH	NC MECH CODE	FGI	OUTSIDE AIR (CFM)	NC MECH CODE	FGI	EXHAUST AIR (CFM)
100	VESTIBULE	76	20	AHU-PACU	300			RECEPTION AREAS	30	5	0.06	0								11.8	16	0	16	0	0	0
101	WAITING	732	20	AHU-PACU	1500		1500	RECEPTION AREAS	30	5	0.06	0								6.1	154	0	154	0	0	0
102	CORRIDOR	757	9	AHU-PACU	600		325	CORRIDOR	0	0	0.06	0								5.3	45	0	45	0	0	0
103	WORK	150	9	AHU-PACU	150		143	OFFICE SPACE	5	5	0.06	0								7.0	12	0	12	0	0	0
104	REGISTRATION	65	9	AHU-PACU	75		75	OFFICE SPACE	5	5	0.06	0								7.7	6	0	6	0	0	0
105	CHECK-IN	85	9	AHU-PACU	75		75	OFFICE SPACE	5	5	0.06	0								5.9	7	0	7	0	0	0
106	CONSULT	71	9	AHU-PACU	100		100	OFFICE SPACE	5	5	0.06	0								9.4	6	0	6	0	0	0
107	TOILET	67	9	AHU-PACU		125		TOILET ROOM	0	0	0	50 CFM	TOILET ROOM	NEGATIVE	NR	10	YES	NR	NR	12.4	0	0	0	50	101	101
108	TOILET	67	9	AHU-PACU	50	100		TOILET ROOM	0	0	0	50 CFM	TOILET ROOM	NEGATIVE	NR	10	YES	NR	NR	10.0	0	0	0	50	101	101
109	PRE / POST 3	120	9	AHU-PACU	125		125	RECOVERY ROOM	NR	2	6	NR	RECOVERY ROOM	NR	2	6	NR	20-60	70-75	6.9	0	36	36	0	0	0
110	PRE / POST 4	120	9	AHU-PACU	125		125	RECOVERY ROOM	NR	2	6	NR	RECOVERY ROOM	NR	2	6	NR	20-60	70-75	6.9	0	36	36	0	0	0
111	PRE / POST 5	120	9	AHU-PACU	125		125	RECOVERY ROOM	NR	2	6	NR	RECOVERY ROOM	NR	2	6	NR	20-60	70-75	6.9	0	36	36	0	0	0
112	PRE / POST 6	120	9	AHU-PACU	125		125	RECOVERY ROOM	NR	2	6	NR	RECOVERY ROOM	NR	2	6	NR	20-60	70-75	6.9	0	36	36	0	0	0
113	PRE / POST 7	120	9	AHU-PACU	125		125	RECOVERY ROOM	NR	2	6	NR	RECOVERY ROOM	NR	2	6	NR	20-60	70-75	6.9	0	36	36	0	0	0
114	PRE / POST 8	120	9	AHU-PACU	125		125	RECOVERY ROOM	NR	2	6	NR	RECOVERY ROOM	NR	2	6	NR	20-60	70-75	6.9	0	36	36	0	0	0
115	PRE / POST 9	120	9	AHU-PACU	125		125	RECOVERY ROOM	NR	2	6	NR	RECOVERY ROOM	NR	2	6	NR	20-60	70-75	6.9	0	36	36	0	0	0
116	LINEN	60	9	AHU-PACU	125		75	CLEAN LINEN STORAGE ROOM	NR	2	NR	NR	CLEAN LINEN STORAGE ROOM	POSITIVE	NR	2	NR	NR	72-78	13.9	0	0	0	0	0	0
117	TOILET	58	9	AHU-PACU		100		TOILET ROOM	0	0	0	50 CFM	TOILET ROOM	NEGATIVE	NR	10	YES	NR	NR	11.5	0	0	0	50	87	87
118	STAFF TOILET	58	9	AHU-PACU	50	100		TOILET ROOM	0	0	0	50 CFM	TOILET ROOM	NEGATIVE	NR	10	YES	NR	NR	11.5	0	0	0	50	87	87
119	DISCHARGE LOBBY	112	9	AHU-PACU	100		100	RECEPTION AREAS	30	5	0.06	0								6.0	24	0	24	0	0	0
120	EVS	42	9	AHU-PACU		75		ENVIRONMENTAL SERVICES ROOM	NR	10	YES	NR	ENVIRONMENTAL SERVICES ROOM	NEGATIVE	NR	10	YES	NR	NR	11.9	0	0	0	0	63	63
121	WHEELCHAIR STORAGE	27	9	AHU-PACU				RECEPTION AREAS	30	5	0.06	0								0.0	6	0	6	0	0	0
122	CORRIDOR	200	9	AHU-PACU	150		75	CORRIDOR	0	0	0.06	0								5.0	12	0	12	0	0	0
123	ANESTHESIA OFFICE	108	9	AHU-PACU	100		100	OFFICE SPACE	5	5	0.06	0								6.2	9	0	9	0	0	0
143	EVS	81	9	AHU-PACU		125		ENVIRONMENTAL SERVICES ROOM	NR	10	YES	NR	ENVIRONMENTAL SERVICES ROOM	NEGATIVE	NR	10	YES	NR	NR	10.3	0	0	0	0	122	122
144	SOILED HOLDING	163	9	AHU-PACU	50	150		SOILED HOLDING ROOM	NR	6	YES	NR	SOILED HOLDING ROOM	NEGATIVE	NR	6	YES	NR	NR	6.1	0	0	0	0	147	147
149	DICTATION	115	9	AHU-PACU	125		125	OFFICE SPACE	5	5	0.06	0								7.2	10	0	10	0	0	0
150	MALE LOCKERS	212	9	AHU-PACU	250		350	TOILET ROOM	0	0	0	50 CFM	TOILET ROOM	NEGATIVE	NR	10	YES	NR	NR	11.0	0	0	0	50	318	318
153	FEMALE LOCKERS	293	9	AHU-PACU	350		450	TOILET ROOM	0	0	0	50 CFM	TOILET ROOM	NEGATIVE	NR	10	YES	NR	NR	10.2	0	0	0	50	440	440
154	CORRIDOR	370	9	AHU-PACU	300		200	CORRIDOR	0	0	0.06	0								5.4	22	0	22	0	0	0
155	CORRIDOR	163	9	AHU-PACU	125		125	CORRIDOR	0	0	0.06	0								5.1	10	0	10	0	0	0
156	BULK STORAGE	142	9	AHU-PACU	75		75	STORAGE ROOM	0	0	0.12	0								3.5	17	0	17	0	0	0
157	RECEIVING / VENDOR / SPECIMEN PICK UP	126	9	AHU-PACU	150		150	WAREHOUSE	0	0	0.12	0								7.9	15	0	15	0	0	0
158	ALCOVE BREAKDOWN	32	9	AHU-PACU				CORRIDOR	0	0	0.06	0								0.0	2	0	2	0	0	0
161	STAFF LOUNGE	402	9	AHU-PACU	300		300	OFFICE SPACE	5	5	0.06	0								5.0	34	0	34	0	0	0
162	LACTATION	80	9	AHU-PACU	75		75	OFFICE SPACE	5	5	0.06	0								6.3	7	0	7	0	0	0
163	ADMIN OFFICE	122	9	AHU-PACU	125		125	OFFICE SPACE	5	5	0.06	0								6.8	10	0	10	0	0	0
164	SUPERVISOR OFFICE	92	9	AHU-PACU	100		100	OFFICE SPACE	5	5	0.06	0								7.2	8	0	8	0	0	0
165	VITALS	52	9	AHU-PACU	50		50	CORRIDOR	0	0	0.06	0								6.4	3	0	3	0	0	0
166	CORRIDOR	207	9	AHU-PACU	150		150	CORRIDOR	0	0	0.06	0								4.8	12	0	12	0	0	0
167	PRE / POST																									

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- GENERAL NOTES**
- SERVICE DISCONNECT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR SHALL BE LOCATED WITHIN 6 FEET OF CONTROLLER.
  - CONTROLLER SHALL HAVE A MINIMUM SERVICE CLEARANCE OF 36 INCHES.
  - WIRE ALL SENSORS AND CONTROL DEVICES BACK TO CONTROLLER.
  - COORDINATE ALL CASING AND DUCT PENETRATIONS WITH FURNISHING CONTRACTOR. ENSURE ALL PENETRATIONS ARE PROPERLY SEALED.
  - DUCT STATIC PRESSURE SENSORS SHALL BE LOCATED APPROXIMATELY 2/3 OF THE DUCT RUN AWAY FROM THE AIR HANDLING EQUIPMENT. REFER TO FLOOR PLANS FOR LOCATIONS.

SEQUENCE OF OPERATION

**DESCRIPTION:**  
THE AIR HANDLING UNIT IS A VARIABLE AIR VOLUME UNIT AND CONSISTS OF A SUPPLY FAN ARRAY WITH VFDs, RETURN FAN ARRAY WITH VFDs, OUTDOOR AIR DAMPER, RETURN AIR DAMPER, RELIEF AIR DAMPER, BLENDER, PRE-FILTER BANK, HOT WATER HEATING COIL, CHILLED WATER COOLING COIL, UV LIGHTS, ADIABATIC HUMIDIFIER, FINAL FILTER BANK AND UNIT ISOLATION DAMPERS.

SUPPLY FAN CONTROL:

**START/STOP:** THE DDC SYSTEM SHALL START THE SUPPLY FANS VIA THE VFDs WITH A TIME DELAY TO ALLOW ALL FIRE/SMOKE AND SMOKE DAMPERS IN THE AIR HANDLING SYSTEM TO OPEN PRIOR TO SUPPLY FAN OPERATION. THE SUPPLY FANS SHALL RUN CONTINUOUSLY.

**VFD RESET:** IN CASE OF VFD FAULT DETECTION, THE DDC SYSTEM SHALL WAIT 30 SECONDS (ADJUSTABLE) AND THEN CALL THE VFD TO START. IF THE VFD DOES NOT START, THE DDC SYSTEM SHALL CALL A SECOND TIME. IF THE VFD STILL HAS NOT STARTED, AN ALARM SHALL BE SENT TO THE OPERATOR INTERFACE.

**CURRENT STATUS SWITCH:** INSTALL A CURRENT STATUS SWITCH FOR EACH INDIVIDUAL SUPPLY FAN AND REPORT STATUS TO BMS. IF THE CURRENT STATUS SWITCH DOES NOT PROVE OPERATION OF A GIVEN FAN IN VFD OR BYPASS MODE, SEND AN ALARM TO THE OPERATOR INTERFACE. IF THE CURRENT STATUS SWITCH FOR ALL FANS DOES NOT PROVE OPERATION, THE UNIT SHALL SHUT DOWN AND SEND AN ALARM TO THE OPERATOR INTERFACE.

**SPEED CONTROL:** THE PURPOSE OF THE SUPPLY FAN CONTROL IS TO MAINTAIN A MINIMUM STATIC PRESSURE IN THE SUPPLY DUCTWORK TO ENSURE PROPER TERMINAL AIR BOX OPERATION. THE DDC SYSTEM SHALL CONTROL THE SUPPLY FAN VFDs IN UNISON FROM THE SUPPLY DUCT DIFFERENTIAL PRESSURE TRANSDUCER SIGNAL. INITIAL SETPOINT SHALL BE +1.0" W.C. (ADJUSTABLE). FINAL SETPOINT SHALL BE OPTIMIZED BY THE BALANCING CONTRACTOR.

**STATIC PRESSURE RESET:** ON A DECREASE IN SYSTEM LOAD, THE DDC SYSTEM SHALL UTILIZE FEEDBACK FROM ALL TERMINAL AIR BOX POSITIONS TO RESET AND REDUCE THE SUPPLY DUCT DIFFERENTIAL STATIC PRESSURE UNTIL ONE TERMINAL AIR BOX DAMPER IS 95% OPEN. ON AN INCREASE IN SYSTEM LOAD, THE DDC SYSTEM SHALL UTILIZE FEEDBACK FROM ALL TERMINAL AIR BOX POSITIONS TO INCREASE THE SUPPLY DUCT DIFFERENTIAL STATIC PRESSURE (NOT TO EXCEED THE FINAL SETPOINT) UNTIL ONE TERMINAL AIR BOX DAMPER IS 95% OPEN. STATIC PRESSURE RESET SHALL UTILIZE TRIM AND RESPOND LOGIC.

**HIGH PRESSURE LIMIT:** DIFFERENTIAL PRESSURE SWITCH SHALL BE A MANUAL RESET TYPE AND WIRED IN SERIES WITH THE START/STOP CONTROL OF THE SUPPLY FAN. THE DDC SYSTEM SHALL MONITOR THE STATUS OF THE DIFFERENTIAL PRESSURE SWITCH. INITIAL SETPOINT SHALL BE +4.0" W.C. (ADJUSTABLE).

**HIGH SUCTION PRESSURE LIMIT:** DIFFERENTIAL PRESSURE SWITCH SHALL BE A MANUAL RESET TYPE AND WIRED IN SERIES WITH THE START/STOP CONTROL OF THE SUPPLY FAN. THE DDC SYSTEM SHALL MONITOR THE STATUS OF THE DIFFERENTIAL PRESSURE SWITCH. INITIAL SETPOINT SHALL BE -4.0" W.C. (ADJUSTABLE).

RETURN FAN CONTROL:

**START/STOP:** THE DDC SYSTEM SHALL START THE RETURN FANS VIA THE VFDs WITH A TIME DELAY TO ALLOW ALL FIRE/SMOKE AND SMOKE DAMPERS IN THE AIR HANDLING SYSTEM TO OPEN PRIOR TO RETURN FAN OPERATION. THE RETURN FANS SHALL RUN CONTINUOUSLY.

**VFD RESET:** IN CASE OF VFD FAULT DETECTION, THE DDC SYSTEM SHALL WAIT 30 SECONDS (ADJUSTABLE) AND THEN CALL THE VFD TO START. IF THE VFD DOES NOT START, THE DDC SYSTEM SHALL CALL A SECOND TIME. IF THE VFD STILL HAS NOT STARTED, AN ALARM SHALL BE SENT TO THE OPERATOR INTERFACE.

**CURRENT STATUS SWITCH:** INSTALL A CURRENT STATUS SWITCH FOR EACH INDIVIDUAL RETURN FAN AND REPORT STATUS TO BMS. IF THE CURRENT STATUS SWITCH DOES NOT PROVE OPERATION OF A GIVEN FAN IN VFD OR BYPASS MODE, SEND AN ALARM TO THE OPERATOR INTERFACE. IF THE CURRENT STATUS SWITCH FOR ALL FANS DOES NOT PROVE OPERATION, THE UNIT SHALL SHUT DOWN AND SEND AN ALARM TO THE OPERATOR INTERFACE.

**SPEED CONTROL:** THE PURPOSE OF THE RETURN FAN CONTROL IS TO MAINTAIN A MINIMUM STATIC PRESSURE IN THE RETURN DUCTWORK TO ENSURE PROPER TERMINAL AIR BOX OPERATION. THE DDC SYSTEM SHALL CONTROL THE RETURN FAN VFD FROM THE RETURN DUCT DIFFERENTIAL PRESSURE TRANSDUCER SIGNAL. INITIAL SETPOINT SHALL BE -1.0" W.C. (ADJUSTABLE).

**STATIC PRESSURE RESET:** ON A DECREASE IN SYSTEM LOAD, THE DDC SYSTEM SHALL UTILIZE FEEDBACK FROM ALL TERMINAL AIR BOX POSITIONS TO RESET AND REDUCE THE RETURN DUCT DIFFERENTIAL STATIC PRESSURE UNTIL ONE TERMINAL AIR BOX DAMPER IS 95% OPEN. ON AN INCREASE IN SYSTEM LOAD, THE DDC SYSTEM SHALL UTILIZE FEEDBACK FROM ALL TERMINAL AIR BOX POSITIONS TO INCREASE THE RETURN DUCT DIFFERENTIAL STATIC PRESSURE (NOT TO EXCEED THE FINAL SETPOINT) UNTIL ONE TERMINAL AIR BOX DAMPER IS 95% OPEN. STATIC PRESSURE RESET SHALL UTILIZE TRIM AND RESPOND LOGIC.

**LOW PRESSURE LIMIT:** DIFFERENTIAL PRESSURE SWITCH SHALL BE A MANUAL RESET TYPE AND WIRED IN SERIES WITH THE START/STOP CONTROL OF THE RETURN FANS. INITIAL SETPOINT SHALL BE -2.0" W.C. (ADJUSTABLE).

**DISCHARGE AIR CONTROL:** DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE RESET BETWEEN 55°F (ADJUSTABLE) AND 60°F (ADJUSTABLE). ON A DECREASE IN SYSTEM LOAD, THE DDC SYSTEM SHALL UTILIZE FEEDBACK FROM ALL SUPPLY TERMINAL AIR BOX POSITIONS TO RESET AND INCREASE THE DISCHARGE AIR TEMPERATURE UNTIL ONE TERMINAL AIR BOX DAMPER IS 95% OPEN. ON AN INCREASE IN SYSTEM LOAD, THE DDC SYSTEM SHALL UTILIZE FEEDBACK FROM ALL SUPPLY TERMINAL AIR BOX POSITIONS TO DECREASE THE DISCHARGE AIR TEMPERATURE SETPOINT UNTIL ONE TERMINAL AIR BOX DAMPER IS 95% OPEN. IF WHILE IN RESET MODE, THE RETURN AIR RELATIVE HUMIDITY EXCEEDS 60% (ADJUSTABLE), THE DISCHARGE AIR TEMPERATURE SHALL BE RESET IN REVERSE FASHION UNTIL THE RETURN AIR RELATIVE HUMIDITY IS BELOW 55% (ADJUSTABLE). DISCHARGE AIR TEMPERATURE RESET SHALL UTILIZE TRIM AND RESPOND LOGIC.

**WHENEVER THE DISCHARGE AIR TEMPERATURE IS ABOVE THE SETPOINT, THE FOLLOWING SHALL OCCUR IN SEQUENCE:**

- THE HEATING COIL CONTROL VALVE(S) SHALL MODULATE CLOSED AND THE HEATING COIL PUMP SHALL TURN OFF.
- IF THE OUTSIDE AIR ENTHALPY IS BELOW THE RETURN AIR ENTHALPY, THE OUTSIDE AIR DAMPER SHALL MODULATE OPEN AND THE RETURN AIR DAMPER SHALL MODULATE CLOSED. THIS SHALL CONTINUE UNTIL THE SETPOINT IS ACHIEVED OR THE OUTSIDE AIR DAMPER IS IN THE 100% OUTSIDE AIR POSITION.
- IF THE OUTSIDE AIR ENTHALPY IS ABOVE THE RETURN AIR ENTHALPY, THE OUTSIDE AIR DAMPER SHALL MODULATE OPEN AND THE RETURN AIR DAMPER SHALL MODULATE TO THEIR MINIMUM OUTSIDE AIR DAMPER POSITIONS.
- IF THE SETPOINT CANNOT BE ACHIEVED BY DAMPER MODULATION, THE DDC SYSTEM SHALL MODULATE THE CHILLED WATER CONTROL VALVE(S) OPEN.
- IF THE DISCHARGE AIR TEMPERATURE IS MORE THAN 10°F (ADJUSTABLE) ABOVE THE SETPOINT, SEND AN ALARM TO THE OPERATOR INTERFACE.

**WHENEVER THE DISCHARGE AIR TEMPERATURE IS BELOW THE SETPOINT, THE FOLLOWING SHALL OCCUR IN SEQUENCE:**

- THE CHILLED WATER CONTROL VALVE(S) SHALL MODULATE CLOSED.
- IF THE OUTSIDE AIR ENTHALPY IS BELOW THE RETURN AIR ENTHALPY, THE OUTSIDE AIR DAMPER SHALL MODULATE CLOSED AND THE RETURN AIR DAMPER SHALL OPEN. THIS SHALL CONTINUE UNTIL SETPOINT IS ACHIEVED OR THE DAMPERS ARE IN THE MINIMUM OUTSIDE AIR POSITION.
- IF THE SETPOINT CANNOT BE ACHIEVED BY DAMPER MODULATION, THE HEATING COIL CONTROL VALVE(S) SHALL MODULATE OPEN TO MAINTAIN SETPOINT. THE HEATING COIL PUMP SHALL START ON A CALL FOR HEAT IF THE OUTDOOR AIR REFERENCE TEMPERATURE IS BELOW 36°F (ADJUSTABLE). IF THE CURRENT STATUS SWITCH ON THE PUMP DOES NOT PROVE OPERATION, SEND AN ALARM TO THE OPERATOR INTERFACE.
- IF THE DISCHARGE AIR TEMPERATURE IS MORE THAN 10°F (ADJUSTABLE) BELOW THE SETPOINT, SEND AN ALARM TO THE OPERATOR INTERFACE.

**HUMIDIFIER CONTROL:** THE RETURN AIR RELATIVE HUMIDITY SETPOINT SHALL BE RESET FROM 30% AT -10°F (ADJUSTABLE) TO 40% AT 40°F (ADJUSTABLE). THE HUMIDIFIER CONTROL VALVE SHALL MODULATE TO MAINTAIN THE RETURN AIR RELATIVE HUMIDITY SETPOINT. THE DDC SYSTEM SHALL OVERRIDE THE SIGNAL TO THE HUMIDIFIER CONTROL VALVE TO LIMIT THE SUPPLY AIR RELATIVE HUMIDITY TO A MAXIMUM OF 70% (ADJUSTABLE). IF THE SUPPLY AIR RELATIVE HUMIDITY EXCEEDS 75% (ADJUSTABLE) AN ALARM SHALL BE SENT TO THE OPERATOR INTERFACE. WHENEVER THE OUTDOOR AIR DRY BULB REFERENCE TEMPERATURE IS ABOVE 40°F (ADJUSTABLE), THE DDC SYSTEM SHALL CLOSE THE HUMIDIFIER CONTROL VALVE AND DISABLE THE ALARM.

A1 AHU-OR SEQUENCE OF OPERATION NO SCALE

SEQUENCE OF OPERATION CONTINUED

VENTILATION AIR CONTROL:

**VENTILATION:** WHENEVER THE AIR HANDLING UNIT IS ENABLED AND IN OCCUPIED MODE, THE OUTSIDE AIR DAMPER SHALL BE OPEN TO AT LEAST ITS MINIMUM POSITION. WHEN THE AIR HANDLING UNIT IS DISABLED OR IN UNOCCUPIED MODE, THE OUTSIDE AIR DAMPER SHALL BE CLOSED. THE RETURN AIR DAMPER AND OUTSIDE AIR DAMPER SHALL MODULATE TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIR CFM, OR WHEN IN ECONOMIZER MODE, MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT.

**RELIEF AIR DAMPER:** THE RELIEF AIR DAMPER SHALL MODULATE TO MAINTAIN A POSITIVE PRESSURE OF 0.2" W.C. (ADJUSTABLE) AT THE DISCHARGE OF THE RETURN FAN RELATIVE TO THE EXTERIOR. EXTERIOR REFERENCE POINT SHALL BE IN THE SAME WALL AS THE RELIEF LOUVER OR OPENING.

**MIXED AIR TEMPERATURE AND HUMIDITY:** MONITOR THE MIXED AIR TEMPERATURE.

**AIRFLOW STATION:** MONITOR OUTSIDE AIRFLOW.

**UV LIGHTS:** THE UV LIGHTS SHALL BE ENABLED WHENEVER THE AIR HANDLING UNIT IS ENABLED AND RUN CONTINUOUSLY. MONITOR RUN-HOURS AND PROVIDE MAINTENANCE ALARMS AT INTERVALS RECOMMENDED BY THE MANUFACTURER. UV LIGHTS SHALL BE HARDWIRED TO THE AIR HANDLING UNIT DOOR SWITCH. IN THE EVENT THE DOOR OPENS, THE LIGHTS SHALL BE DISABLED.

UNIT SHUTDOWN:

**THE SUPPLY AND RETURN FANS SHALL STOP:**  
THE OUTSIDE AIR DAMPERS AND RELIEF AIR DAMPERS SHALL CLOSE AND THE RETURN DAMPERS SHALL OPEN.  
THE CHILLED WATER CONTROL VALVE(S) SHALL CLOSE.  
THE HUMIDIFIER CONTROL VALVE SHALL CLOSE.  
THE HEATING COIL CONTROL VALVE(S) SHALL CLOSE. FREEZESTAT SHALL OVERRIDE HEATING CONTROL VALVE(S) AS REQUIRED.  
ALL FIRE/SMOKE AND SMOKE DAMPERS ASSOCIATED WITH THE AIR HANDLING SYSTEM SHALL CLOSE.

UNOCCUPIED CONTROL:

**OCCUPIED/UNOCCUPIED SCHEDULE SHALL BE SET AT THE OPERATOR INTERFACE.**  
THE SUPPLY AND RETURN FANS SHALL SHUTDOWN. WHEN USING CONSTANT VOLUME OFFSET FOR RETURN AIR FAN CONTROL, THE OFFSET SHALL GO TO ZERO AND SUPPLY FAN SHALL BE LIMITED TO THE MAXIMUM RETURN FAN AIRFLOW.  
THE OUTSIDE AIR AND RELIEF AIR DAMPERS SHALL CLOSE AND THE RETURN AIR DAMPER SHALL OPEN. ECONOMIZER CYCLE SHALL TAKE PRECEDENCE OVER DAMPER POSITION. IF ANY OF THE SPACE TEMPERATURES FALL BELOW 60°F (ADJUSTABLE), THE DDC SYSTEM SHALL RESTART THE SUPPLY AND RETURN FANS AND COOLING CAPABILITIES SHALL BE DISABLED. THE FANS SHALL CONTINUE RUNNING UNTIL THE SPACE TEMPERATURE RISES 5°F (ADJUSTABLE).  
IF ANY OF THE SPACE TEMPERATURES RISE ABOVE 80°F (ADJUSTABLE), THE DDC SYSTEM SHALL RESTART THE SUPPLY AND RETURN FANS AND MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT. THE FANS SHALL CONTINUE RUNNING UNTIL THE SPACE TEMPERATURE FALLS 5°F (ADJUSTABLE).

**HEATING OPTIMUM START-UP:** THIS CYCLE SHALL OVERRIDE THE UNOCCUPIED CYCLE. IF THE SYSTEM WAS OPERATING AS A RESULT OF THE UNOCCUPIED CYCLE, THE SYSTEM SHALL CONTINUE TO OPERATE. THE DDC SYSTEM SHALL MEASURE EACH OF THE SPACE TEMPERATURES AND THE OUTSIDE AIR DRY BULB REFERENCE TEMPERATURE TO DETERMINE THE MINIMUM RUN TIME TO WARM THE SPACES TO THEIR SETPOINT. WHEN THE COMPUTED START TIME IS REACHED, THE DDC SYSTEM SHALL START THE AIR HANDLING SYSTEM AND OPERATE WITH THE OUTSIDE AIR AND RELIEF AIR DAMPERS CLOSED AND THE RETURN AIR DAMPER OPEN. THE AIR HANDLING UNIT DISCHARGE AIR TEMPERATURE SHALL BE MAINTAINED AT A SETPOINT OF 60°F (ADJUSTABLE). THE SYSTEM SHALL CONTINUE TO OPERATE IN THIS MODE UNTIL ALL TEMPERATURES EXCEED A SETPOINT OF 60°F (ADJUSTABLE). AT THAT TIME, THE DDC SYSTEM SHALL SWITCH TO OCCUPIED CONTROL. THE VENTILATION AIR CONTROL SHALL BE INACTIVE.

**COOLING OPTIMUM START-UP:** THIS CYCLE SHALL OVERRIDE THE UNOCCUPIED CYCLE. IF THE SYSTEM WAS OPERATING AS A RESULT OF THE UNOCCUPIED CYCLE, THE SYSTEM SHALL CONTINUE TO OPERATE. THE DDC SYSTEM SHALL MEASURE EACH OF THE SPACE TEMPERATURES AND THE OUTSIDE AIR DRY BULB REFERENCE TEMPERATURE TO DETERMINE THE MINIMUM RUN TIME TO COOL THE SPACES TO THEIR SETPOINT. WHEN THE COMPUTED START TIME IS REACHED, THE DDC SYSTEM SHALL START THE AIR HANDLING SYSTEM AND OPERATE WITH OUTSIDE AIR AND RELIEF AIR DAMPERS CLOSED AND THE RETURN AIR DAMPER OPEN. THE AIR HANDLING UNIT DISCHARGE AIR TEMPERATURE SHALL BE MAINTAINED AT A SETPOINT OF 50°F (ADJUSTABLE). THE SYSTEM SHALL CONTINUE TO OPERATE IN THIS MODE UNTIL ALL SPACE TEMPERATURES ARE LESS THAN A SETPOINT OF 78°F (ADJUSTABLE). AT THAT TIME, THE DDC SYSTEM SHALL SWITCH TO OCCUPIED CONTROL. THE ECONOMIZER CYCLE SHALL TAKE PRECEDENCE OVER THIS MODE OF CONTROL. THE VENTILATION AIR CONTROL SHALL BE INACTIVE.

FILTER MONITORING:

**FOR EACH FILTER BANK WITH RATING OF MERV 8 AND BELOW, PROVIDE AN ALARM TO THE OPERATOR INTERFACE WHEN THE DIFFERENTIAL STATIC PRESSURE EXCEEDS 0.8" W.C. (ADJUSTABLE).**  
**FOR EACH FILTER BANK WITH RATING OF MERV 9 TO MERV 16, PROVIDE AN ALARM TO THE OPERATOR INTERFACE WHEN THE DIFFERENTIAL STATIC PRESSURE EXCEEDS 1.0" W.C. (ADJUSTABLE).**

ALARM MONITORING:

**FREEZE PROTECTION:** INSTALL AN ELECTRIC FREEZESTAT DOWNSTREAM OF THE HEATING COIL PER MANUFACTURER'S RECOMMENDATION. PROVIDE A STAGED FREEZE PROTECTION APPROACH AS INDICATED BELOW.

- IF THE HEATING COIL DISCHARGE AIR TEMPERATURE DROPS BELOW 40°F (ADJUSTABLE) FOR 5 MINUTES, OVERRIDE THE RETURN AIR AND OUTSIDE AIR DAMPERS TO MAINTAIN THE MINIMUM OUTSIDE AIRFLOW AND MODULATE THE HEATING COIL CONTROL VALVE TO MAINTAIN A HEATING COIL DISCHARGE AIR TEMPERATURE OF AT LEAST 50°F (ADJUSTABLE). DISABLE THIS FUNCTION WHEN THE HEATING COIL DISCHARGE AIR TEMPERATURE RISES ABOVE 45°F (ADJUSTABLE) FOR 5 MINUTES.
- IF THE HEATING COIL DISCHARGE AIR TEMPERATURE DROPS BELOW 38°F (ADJUSTABLE) FOR 5 MINUTES, FULLY CLOSE THE OUTSIDE AIR DAMPER FOR ONE HOUR AND SEND AN ALARM TO THE OPERATOR INTERFACE INDICATING THE OUTSIDE AIR DAMPER HAS CLOSED. AFTER ONE HOUR, THE AIR HANDLING UNIT SHALL RESUME MINIMUM VENTILATION AND ENTER THE PREVIOUS STAGE OF FREEZE PROTECTION.
- IF THE FREEZESTAT SENSES A TEMPERATURE AT OR BELOW 32°F (ADJUSTABLE), SHUT DOWN THE SUPPLY AND RETURN FANS, CLOSE THE OUTDOOR AIR DAMPER, OPEN THE COOLING COIL CONTROL VALVE TO 100% AND ENABLE ITS ASSOCIATED CHILLED WATER SYSTEM PUMP. MODULATE THE HEATING COIL CONTROL VALVE TO MAINTAIN A HEATING COIL DISCHARGE AIR TEMPERATURE OF 80°F (ADJUSTABLE). THE FREEZESTAT SHALL SHUT DOWN THE UNIT INDEPENDENTLY OF THE DDC SYSTEM VIA RELAYS. A SECOND SET OF CONTACTS SHALL NOTIFY THE DDC SYSTEM THAT SHALL SEND AN ALARM TO THE OPERATOR INTERFACE (MANUAL RESET TYPE).

**FIRE ALARM INTERFACE:** UPON ACTUATION OF THE FIRE ALARM SYSTEM, THE UNIT SHALL BE SHUT DOWN AND ALL FIRE/SMOKE AND SMOKE DAMPERS WITHIN THIS SYSTEM SHALL CLOSE. THE FIRE ALARM SYSTEM SHALL NOTIFY THE OPERATOR INTERFACE WHENEVER AN ALARM CONDITION IS EXPERIENCED.

CONTROLS SYMBOL LEGEND

SYMBOL	NAME
	AIR MONITORING STATION
	BLENDER
	CARBON DIOXIDE SENSOR
	COOLING COIL WITH TWO-WAY CONTROL VALVE
	DIFFERENTIAL PRESSURE SENSOR
	DUCT PRESSURE SENSOR
	DUCT TEMPERATURE SENSOR
	DUCT TEMPERATURE SENSOR - SHORT
	DX COOL
	FAN
	FAN ARRAY -VFD
	FILTER WITH DIFFERENTIAL PRESSURE SENSOR
	FIRE ALARM SYSTEM SMOKE DETECTOR
	FREEZESTAT
	HEATING COIL WITH TWO-WAY CONTROL VALVE
	HEATING COIL WITH TWO-WAY CONTROL VALVE WITH PUMP

CONTROLS SYMBOL LEGEND

SYMBOL	NAME
	HUMIDIFIER GRID
	HUMIDISTAT
	INLINE CENTRIFUGAL PUMP
	OCCUPANCY SENSOR
	PARALLEL-BLADE MOTOR-OPERATED DAMPER
	RELATIVE HUMIDITY SENSOR
	TEMPERATURE SENSOR
	THERMOSTAT
	UV LIGHTS
	VAV BOX DAMPER - RETURN/EXHAUST
	VAV BOX DAMPER COOLING ONLY
	VAV BOX DAMPER WITH REHEAT

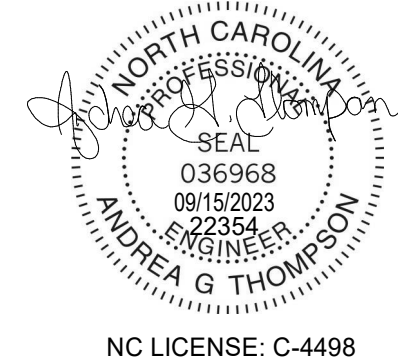
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MECHANICAL CONTROLS

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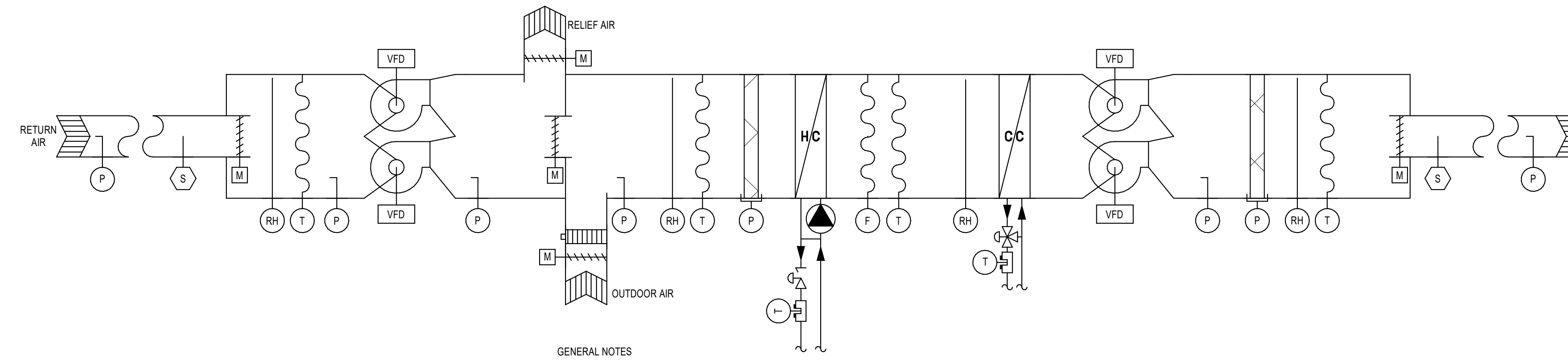
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CONSTRUCTION DOCUMENTS

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- GENERAL NOTES**
- SERVICE DISCONNECT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR SHALL BE LOCATED WITHIN 6 FEET OF CONTROLLER.
  - CONTROLLER SHALL HAVE A MINIMUM SERVICE CLEARANCE OF 36 INCHES.
  - WIRE ALL SENSORS AND CONTROL DEVICES BACK TO CONTROLLER.
  - COORDINATE ALL CASING AND DUCT PENETRATIONS WITH FURNISHING CONTRACTOR. ENSURE ALL PENETRATIONS ARE PROPERLY SEALED.
  - DUCT STATIC PRESSURE SENSORS SHALL BE LOCATED APPROXIMATELY 2/3 OF THE DUCT RUN AWAY FROM THE AIR HANDLING EQUIPMENT. REFER TO FLOOR PLANS FOR LOCATIONS.

**SEQUENCE OF OPERATION**

**DESCRIPTION:**  
THE AIR HANDLING UNIT IS A VARIABLE AIR VOLUME UNIT AND CONSISTS OF A SUPPLY FAN ARRAY WITH VFDs, RETURN FAN ARRAY WITH VFDs, OUTDOOR AIR DAMPER, RETURN AIR DAMPER, RELIEF AIR DAMPER, PRE-FILTER BANK, HOT WATER HEATING COIL, CHILLED WATER COOLING COIL, FINAL FILTER BANK AND UNIT ISOLATION DAMPERS.

**SUPPLY FAN CONTROL:**

**START/STOP:** THE DDC SYSTEM SHALL START THE SUPPLY FANS VIA THE VFDs WITH A TIME DELAY TO ALLOW ALL FIRE/SMOKE AND SMOKE DAMPERS IN THE AIR HANDLING SYSTEM TO OPEN PRIOR TO SUPPLY FAN OPERATION. THE SUPPLY FANS SHALL RUN CONTINUOUSLY.

**VFD RESET:** IN CASE OF VFD FAULT DETECTION, THE DDC SYSTEM SHALL WAIT 30 SECONDS (ADJUSTABLE) AND THEN CALL THE VFD TO START. IF THE VFD DOES NOT START, THE DDC SYSTEM SHALL CALL A SECOND TIME. IF THE VFD STILL HAS NOT STARTED, AN ALARM SHALL BE SENT TO THE OPERATOR INTERFACE.

**CURRENT STATUS SWITCH:** INSTALL A CURRENT STATUS SWITCH FOR EACH INDIVIDUAL SUPPLY FAN AND REPORT STATUS TO BMS. IF THE CURRENT STATUS SWITCH DOES NOT PROVE OPERATION OF A GIVEN FAN IN VFD OR BYPASS MODE, SEND AN ALARM TO THE OPERATOR INTERFACE. IF THE CURRENT STATUS SWITCH FOR ALL FANS DOES NOT PROVE OPERATION, THE UNIT SHALL SHUT DOWN AND SEND AN ALARM TO THE OPERATOR INTERFACE.

**SPEED CONTROL:** THE PURPOSE OF THE SUPPLY FAN CONTROL IS TO MAINTAIN A MINIMUM STATIC PRESSURE IN THE SUPPLY DUCTWORK TO ENSURE PROPER TERMINAL AIR BOX OPERATION. THE DDC SYSTEM SHALL CONTROL THE SUPPLY FAN VFDs IN UNISON FROM THE SUPPLY DUCT DIFFERENTIAL PRESSURE TRANSMITTER SIGNAL. INITIAL SETPOINT SHALL BE +1.0" W.C. (ADJUSTABLE). FINAL SETPOINT SHALL BE OPTIMIZED BY THE BALANCING CONTRACTOR.

**STATIC PRESSURE RESET:** ON A DECREASE IN SYSTEM LOAD, THE DDC SYSTEM SHALL UTILIZE FEEDBACK FROM ALL TERMINAL AIR BOX POSITIONS TO RESET AND REDUCE THE SUPPLY DUCT DIFFERENTIAL STATIC PRESSURE UNTIL ONE TERMINAL AIR BOX DAMPER IS 95% OPEN. ON AN INCREASE IN SYSTEM LOAD, THE DDC SYSTEM SHALL UTILIZE FEEDBACK FROM ALL TERMINAL AIR BOX POSITIONS TO INCREASE THE SUPPLY DUCT DIFFERENTIAL STATIC PRESSURE (NOT TO EXCEED THE FINAL SETPOINT) UNTIL ONE TERMINAL AIR BOX DAMPER IS 95% OPEN. STATIC PRESSURE RESET SHALL UTILIZE TRIM AND RESPOND LOGIC.

**HIGH PRESSURE LIMIT:** DIFFERENTIAL PRESSURE SWITCH SHALL BE A MANUAL RESET TYPE AND WIRED IN SERIES WITH THE START/STOP CONTROL OF THE SUPPLY FAN. THE DDC SYSTEM SHALL MONITOR THE STATUS OF THE DIFFERENTIAL PRESSURE SWITCH. INITIAL SETPOINT SHALL BE +4.0" W.C. (ADJUSTABLE).

**HIGH SUCTION PRESSURE LIMIT:** DIFFERENTIAL PRESSURE SWITCH SHALL BE A MANUAL RESET TYPE AND WIRED IN SERIES WITH THE START/STOP CONTROL OF THE SUPPLY FAN. THE DDC SYSTEM SHALL MONITOR THE STATUS OF THE DIFFERENTIAL PRESSURE SWITCH. INITIAL SETPOINT SHALL BE +4.0" W.C. (ADJUSTABLE).

**RETURN FAN CONTROL:**

**START/STOP:** THE DDC SYSTEM SHALL START THE RETURN FANS VIA THE VFDs WITH A TIME DELAY TO ALLOW ALL FIRE/SMOKE AND SMOKE DAMPERS IN THE AIR HANDLING SYSTEM TO OPEN PRIOR TO RETURN FAN OPERATION. THE RETURN FANS SHALL RUN CONTINUOUSLY.

**VFD RESET:** IN CASE OF VFD FAULT DETECTION, THE DDC SYSTEM SHALL WAIT 30 SECONDS (ADJUSTABLE) AND THEN CALL THE VFD TO START. IF THE VFD DOES NOT START, THE DDC SYSTEM SHALL CALL A SECOND TIME. IF THE VFD STILL HAS NOT STARTED, AN ALARM SHALL BE SENT TO THE OPERATOR INTERFACE.

**CURRENT STATUS SWITCH:** INSTALL A CURRENT STATUS SWITCH FOR EACH INDIVIDUAL RETURN FAN AND REPORT STATUS TO BMS. IF THE CURRENT STATUS SWITCH DOES NOT PROVE OPERATION OF A GIVEN FAN IN VFD OR BYPASS MODE, SEND AN ALARM TO THE OPERATOR INTERFACE. IF THE CURRENT STATUS SWITCH FOR ALL FANS DOES NOT PROVE OPERATION, THE UNIT SHALL SHUT DOWN AND SEND AN ALARM TO THE OPERATOR INTERFACE.

**SPEED CONTROL:** THE PURPOSE OF THE RETURN FAN CONTROL IS TO MAINTAIN A SLIGHTLY POSITIVE BUILDING PRESSURE. +0.05" W.C. (ADJUSTABLE). THE RETURN FAN VFDs SHALL MODULATE TO MAINTAIN A CONSTANT CFM OFFSET FROM THE SUPPLY FAN TO ACCOUNT FOR TOTAL EXHAUST FROM THE BUILDING WHILE MAINTAINING A SLIGHTLY POSITIVE PRESSURE. PROVIDE AN ADJUSTABLE FREQUENCY OFFSET ALGORITHM FOR THE RETURN FAN RELATIVE TO THE SUPPLY FAN. WORK WITH THE BALANCER TO ESTABLISH THE CORRECT RETURN FAN VFD SPEED RELATIVE TO THE SUPPLY FAN SPEED TO ACHIEVE THE MAXIMUM SUPPLY CFM AND AT 5% OF THE MAXIMUM SUPPLY CFM. A LINEAR EQUATION SHALL THEN BE DEVELOPED FOR THE RETURN FAN SPEED. RETURN FAN AIRFLOW MEASURING SHALL BE USED FOR MONITORING PURPOSES AND TO DEVELOP THE ADJUSTABLE FREQUENCY OFFSET ALGORITHM ONLY.

**LOW PRESSURE LIMIT:** DIFFERENTIAL PRESSURE SWITCH SHALL BE A MANUAL RESET TYPE AND WIRED IN SERIES WITH THE START/STOP CONTROL OF THE RETURN FANS. INITIAL SETPOINT SHALL BE -2.0" W.C. (ADJUSTABLE).

**DISCHARGE AIR TEMPERATURE SETPOINT:** DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE RESET BETWEEN 55°F (ADJUSTABLE) AND 60°F (ADJUSTABLE). ON A DECREASE IN SYSTEM LOAD, THE DDC SYSTEM SHALL UTILIZE FEEDBACK FROM ALL SUPPLY TERMINAL AIR BOX POSITIONS TO RESET AND INCREASE THE DISCHARGE AIR TEMPERATURE UNTIL ONE TERMINAL AIR BOX DAMPER IS 95% OPEN. ON AN INCREASE IN SYSTEM LOAD, THE DDC SYSTEM SHALL UTILIZE FEEDBACK FROM ALL SUPPLY TERMINAL AIR BOX POSITIONS TO DECREASE THE DISCHARGE AIR TEMPERATURE SETPOINT UNTIL ONE TERMINAL AIR BOX DAMPER IS 95% OPEN. IF, WHILE IN RESET MODE, THE RETURN AIR RELATIVE HUMIDITY EXCEEDS 60% (ADJUSTABLE), THE DISCHARGE AIR TEMPERATURE SHALL BE RESET IN REVERSE FASHION UNTIL THE RETURN AIR RELATIVE HUMIDITY IS BELOW 55% (ADJUSTABLE). DISCHARGE AIR TEMPERATURE RESET SHALL UTILIZE TRIM AND RESPOND LOGIC.

- WHENEVER THE DISCHARGE AIR TEMPERATURE IS ABOVE THE SETPOINT, THE FOLLOWING SHALL OCCUR IN SEQUENCE:
- THE HEATING COIL CONTROL VALVE(S) SHALL MODULATE CLOSED.
  - IF THE OUTSIDE AIR ENTHALPY IS BELOW THE RETURN AIR ENTHALPY, THE OUTSIDE AIR DAMPER SHALL MODULATE OPEN AND THE RETURN AIR DAMPER SHALL MODULATE CLOSED. THIS SHALL CONTINUE UNTIL THE SETPOINT IS ACHIEVED OR THE OUTSIDE AIR DAMPER IS IN THE 100% OUTSIDE AIR POSITION.
  - IF THE OUTSIDE AIR ENTHALPY IS ABOVE THE RETURN AIR ENTHALPY, THE OUTSIDE AIR DAMPER SHALL CLOSE AND RETURN AIR DAMPER SHALL OPEN TO THEIR MINIMUM OUTSIDE AIR DAMPER POSITIONS.
  - IF THE SETPOINT CANNOT BE ACHIEVED BY DAMPER MODULATION, THE DDC SYSTEM SHALL MODULATE THE CHILLED WATER CONTROL VALVE(S) OPEN.
  - IF THE DISCHARGE AIR TEMPERATURE IS MORE THAN 1°F (ADJUSTABLE) ABOVE THE SETPOINT, SEND AN ALARM TO THE OPERATOR INTERFACE.

- WHENEVER THE DISCHARGE AIR TEMPERATURE IS BELOW THE SETPOINT, THE FOLLOWING SHALL OCCUR IN SEQUENCE:
- THE CHILLED WATER CONTROL VALVE(S) SHALL MODULATE CLOSED.
  - IF THE OUTSIDE AIR ENTHALPY IS BELOW THE RETURN AIR ENTHALPY, THE OUTSIDE AIR DAMPER SHALL MODULATE CLOSED AND RETURN AIR DAMPER SHALL OPEN. THIS SHALL CONTINUE UNTIL SETPOINT IS ACHIEVED OR THE DAMPERS ARE IN THE MINIMUM OUTSIDE AIR POSITION.
  - IF THE SETPOINT CANNOT BE ACHIEVED BY DAMPER MODULATION, THE HEATING COIL CONTROL VALVE SHALL MODULATE OPEN TO MAINTAIN SETPOINT. THE HEATING COIL PUMP SHALL START ON A CALL FOR HEAT IF THE OUTDOOR AIR REFERENCE TEMPERATURE IS BELOW 38°F (ADJUSTABLE). IF THE CURRENT STATUS SWITCH ON THE PUMP DOES NOT PROVE OPERATION, SEND AN ALARM TO THE OPERATOR INTERFACE.
  - IF THE DISCHARGE AIR TEMPERATURE IS MORE THAN 1°F (ADJUSTABLE) BELOW THE SETPOINT, SEND AN ALARM TO THE OPERATOR INTERFACE.

**A2 AHU - PACU SEQUENCE OF OPERATIONS**  
**NO SCALE**

**SEQUENCE OF OPERATION CONTINUED**

**VENTILATION AIR CONTROL:**

**VENTILATION:** WHENEVER THE AIR HANDLING UNIT IS ENABLED AND IN OCCUPIED MODE, THE OUTSIDE AIR DAMPER SHALL BE OPEN TO AT LEAST ITS MINIMUM POSITION. WHEN THE AIR HANDLING UNIT IS DISABLED OR IN UNOCCUPIED MODE, THE OUTSIDE AIR DAMPER SHALL BE CLOSED. THE RETURN AIR DAMPER AND OUTSIDE AIR DAMPER SHALL MODULATE TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIR CFM, OR WHEN IN ECONOMIZER MODE, MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT.

**RELIEF AIR DAMPER:** THE RELIEF AIR DAMPER SHALL MODULATE TO MAINTAIN A POSITIVE PRESSURE OF 0.2" W.C. (ADJUSTABLE) AT THE DISCHARGE OF THE RETURN FAN RELATIVE TO THE EXTERIOR. EXTERIOR REFERENCE POINT SHALL BE IN THE SAME WALL AS THE RELIEF LOUVER OR OPENING.

**MIXED AIR TEMPERATURE AND HUMIDITY:** MONITOR THE MIXED AIR TEMPERATURE.

**AIRFLOW STATION:** MONITOR OUTSIDE AIRFLOW.

**UNIT SHUTDOWN:**

THE SUPPLY AND RETURN FANS SHALL STOP.  
THE OUTSIDE AIR DAMPERS AND RELIEF AIR DAMPERS SHALL CLOSE AND THE RETURN DAMPERS SHALL OPEN.  
THE CHILLED WATER CONTROL VALVE(S) SHALL CLOSE.  
THE HUMIDIFIER CONTROL VALVE SHALL CLOSE.  
THE HEATING COIL CONTROL VALVE(S) SHALL CLOSE. FREEZE/STAT SHALL OVERRIDE HEATING CONTROL VALVE(S) AS REQUIRED.  
ALL FIRE/SMOKE AND SMOKE DAMPERS ASSOCIATED WITH THE AIR HANDLING SYSTEM SHALL CLOSE.

**UNOCCUPIED CONTROL:**

**OCCUPIED/UNOCCUPIED SCHEDULE:** SHALL BE SET AT THE OPERATOR INTERFACE.  
THE SUPPLY AND RETURN FANS SHALL SHUTDOWN. WHEN USING CONSTANT VOLUME OFFSET FOR RETURN AIR FAN CONTROL, THE OFFSET SHALL GO TO ZERO AND SUPPLY FAN SHALL BE LIMITED TO THE MAXIMUM RETURN FAN AIRFLOW.  
THE OUTSIDE AIR AND RELIEF AIR DAMPERS SHALL CLOSE AND THE RETURN AIR DAMPER SHALL OPEN. ECONOMIZER CYCLE SHALL TAKE PRECEDENCE OVER DAMPER POSITION. IF ANY OF THE SPACE TEMPERATURES FALL BELOW 60°F (ADJUSTABLE), THE DDC SYSTEM SHALL RESTART THE SUPPLY AND RETURN FANS AND COOLING CAPABILITIES SHALL BE DISABLED. THE FANS SHALL CONTINUE RUNNING UNTIL THE SPACE TEMPERATURE RISES 3°F (ADJUSTABLE).  
IF ANY OF THE SPACE TEMPERATURES RISE ABOVE 80°F (ADJUSTABLE), THE DDC SYSTEM SHALL RESTART THE SUPPLY AND RETURN FANS AND MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT. THE FANS SHALL CONTINUE RUNNING UNTIL THE SPACE TEMPERATURE FALLS 3°F (ADJUSTABLE).

**HEATING OPTIMUM START-UP:** THIS CYCLE SHALL OVERRIDE THE UNOCCUPIED CYCLE. IF THE SYSTEM WAS OPERATING AS A RESULT OF THE UNOCCUPIED CYCLE, THE SYSTEM SHALL CONTINUE TO OPERATE. THE DDC SYSTEM SHALL MEASURE EACH OF THE SPACE TEMPERATURES AND THE OUTSIDE AIR DRY BULB REFERENCE TEMPERATURE TO DETERMINE THE MINIMUM RUN TIME TO WARM THE SPACES TO THEIR SETPOINT. WHEN THE COMPUTED START TIME IS REACHED, THE DDC SYSTEM SHALL START THE AIR HANDLING SYSTEM AND OPERATE WITH THE OUTSIDE AIR AND RELIEF AIR DAMPERS CLOSED AND THE RETURN AIR DAMPER OPEN. THE AIR HANDLING UNIT DISCHARGE AIR TEMPERATURE SHALL BE MAINTAINED AT A SETPOINT OF 58°F (ADJUSTABLE). THE SYSTEM SHALL CONTINUE TO OPERATE IN THIS MODE UNTIL ALL TEMPERATURES EXCEED A SETPOINT OF 69°F (ADJUSTABLE). AT THAT TIME, THE DDC SYSTEM SHALL SWITCH TO OCCUPIED CONTROL. THE VENTILATION AIR CONTROL SHALL BE INACTIVE.

**COOLING OPTIMUM START-UP:** THIS CYCLE SHALL OVERRIDE THE UNOCCUPIED CYCLE. IF THE SYSTEM WAS OPERATING AS A RESULT OF THE UNOCCUPIED CYCLE, THE SYSTEM SHALL CONTINUE TO OPERATE. THE DDC SYSTEM SHALL MEASURE EACH OF THE SPACE TEMPERATURES AND THE OUTSIDE AIR DRY BULB REFERENCE TEMPERATURE TO DETERMINE THE MINIMUM RUN TIME TO COOL THE SPACES TO THEIR SETPOINT. WHEN THE COMPUTED START TIME IS REACHED, THE DDC SYSTEM SHALL START THE AIR HANDLING SYSTEM AND OPERATE WITH OUTSIDE AIR AND RELIEF AIR DAMPERS CLOSED AND THE RETURN AIR DAMPER OPEN. THE AIR HANDLING UNIT DISCHARGE AIR TEMPERATURE SHALL BE MAINTAINED AT A SETPOINT OF 55°F (ADJUSTABLE). THE SYSTEM SHALL CONTINUE TO OPERATE IN THIS MODE UNTIL ALL SPACE TEMPERATURES ARE LESS THAN A SETPOINT OF 78°F (ADJUSTABLE). AT THAT TIME, THE DDC SYSTEM SHALL SWITCH TO OCCUPIED CONTROL. THE ECONOMIZER CYCLE SHALL TAKE PRECEDENCE OVER THIS MODE OF CONTROL. THE VENTILATION AIR CONTROL SHALL BE INACTIVE.

**FILTER MONITORING:**

FOR EACH FILTER BANK WITH RATING OF MERV 8 AND BELOW, PROVIDE AN ALARM TO THE OPERATOR INTERFACE WHEN THE DIFFERENTIAL STATIC PRESSURE EXCEEDS 0.6" W.C. (ADJUSTABLE).  
FOR EACH FILTER BANK WITH RATING OF MERV 9 TO MERV 16, PROVIDE AN ALARM TO THE OPERATOR INTERFACE WHEN THE DIFFERENTIAL STATIC PRESSURE EXCEEDS 1.0" W.C. (ADJUSTABLE).

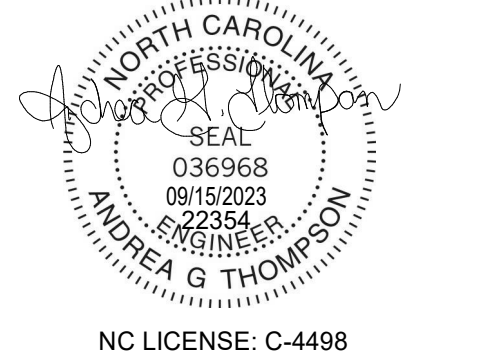
**ALARM MONITORING:**

- FREEZE PROTECTION:** INSTALL AN ELECTRIC FREEZE/STAT DOWNSTREAM OF THE HEATING COIL PER MANUFACTURER'S RECOMMENDATION. PROVIDE A STAGED FREEZE PROTECTION APPROACH AS INDICATED BELOW.
- IF THE HEATING COIL DISCHARGE AIR TEMPERATURE DROPS BELOW 40°F (ADJUSTABLE) FOR 5 MINUTES, OVERRIDE THE RETURN AIR AND OUTSIDE AIR DAMPERS TO MAINTAIN THE MINIMUM OUTSIDE AIRFLOW AND MODULATE THE HEATING COIL CONTROL VALVE TO MAINTAIN A HEATING COIL DISCHARGE AIR TEMPERATURE OF AT LEAST 50°F (ADJUSTABLE). DISABLE THIS FUNCTION WHEN THE HEATING COIL DISCHARGE AIR TEMPERATURE RISES ABOVE 45°F (ADJUSTABLE) FOR 5 MINUTES.
  - IF THE HEATING COIL DISCHARGE AIR TEMPERATURE DROPS BELOW 38°F (ADJUSTABLE) FOR 5 MINUTES, FULLY CLOSE THE OUTSIDE AIR DAMPER FOR ONE HOUR AND SEND AN ALARM TO THE OPERATOR INTERFACE INDICATING THE OUTSIDE AIR DAMPER HAS CLOSED. AFTER ONE HOUR, THE AIR HANDLING UNIT SHALL RESUME MINIMUM VENTILATION AND ENTER THE PREVIOUS STAGE OF FREEZE PROTECTION.
  - IF THE FREEZE/STAT SENSES A TEMPERATURE AT OR BELOW 32°F (ADJUSTABLE), SHUT DOWN THE SUPPLY AND RETURN FANS, CLOSE THE OUTDOOR AIR DAMPER, OPEN THE COOLING COIL CONTROL VALVE TO 100% AND ENABLE ITS ASSOCIATED CHILLED WATER SYSTEM PUMP. MODULATE THE HEATING COIL CONTROL VALVE TO MAINTAIN A HEATING COIL DISCHARGE AIR TEMPERATURE OF 50°F (ADJUSTABLE). THE FREEZE/STAT SHALL SHUT DOWN THE UNIT INDEPENDENTLY OF THE DDC SYSTEM VIA RELAYS. A SECOND SET OF CONTACTS SHALL NOTIFY THE DDC SYSTEM THAT SHALL SEND AN ALARM TO THE OPERATOR INTERFACE (MANUAL RESET TYPE).

**FIRE ALARM INTERFACE:** UPON ACTUATION OF THE FIRE ALARM SYSTEM, THE UNIT SHALL BE SHUT DOWN AND ALL FIRE/SMOKE AND SMOKE DAMPERS WITHIN THIS SYSTEM SHALL CLOSE. THE FIRE ALARM SYSTEM SHALL NOTIFY THE OPERATOR INTERFACE WHENEVER AN ALARM CONDITION IS EXPERIENCED.



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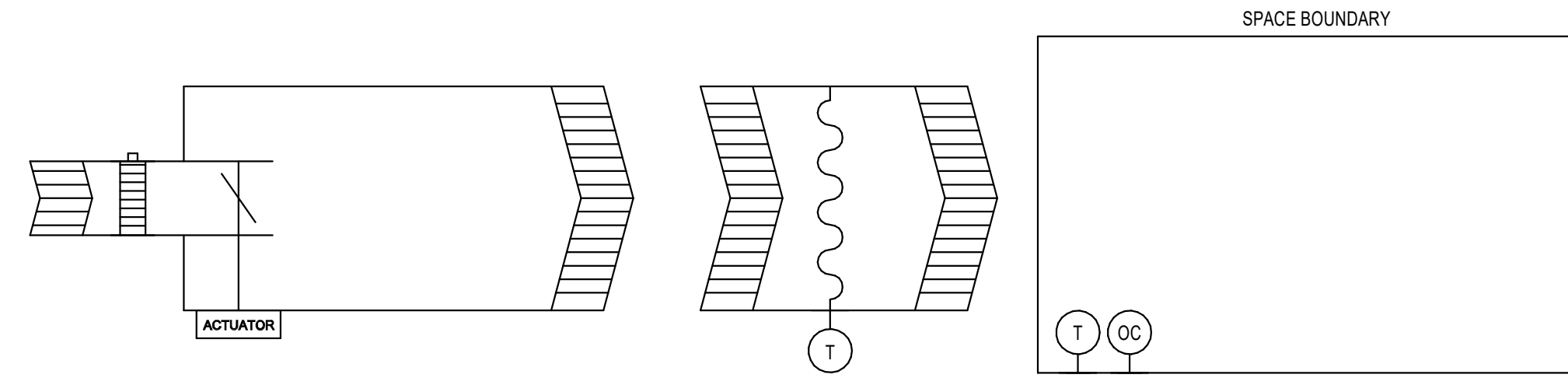
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SEQUENCE OF OPERATION

EACH ZONE HAS A TERMINAL AIR BOX WITH A HOT WATER REHEAT COIL, REHEAT COIL CONTROL VALVE, AND A DIRECT DIGITAL CONTROLLER. INSTALL A SINGLE POINT TEMPERATURE SENSOR 5'-0" DOWNSTREAM OF THE TERMINAL BOX OR BEFORE THE FIRST TAKEOFF DOWNSTREAM OF THE TERMINAL BOX. INSTALL A WALL MOUNTED THERMOSTAT TO MAINTAIN A SPACE TEMPERATURE OF 72° (ADJUSTABLE) WITH A DEAD BAND RANGE OF 5° F WITHIN WHICH THE SUPPLY OF HEATING AND COOLING ENERGY TO THE ZONE IS REDUCED TO A MINIMUM. SEE DRAWINGS FOR SENSOR REQUIREMENTS.

ON A CALL FOR COOLING, THE TERMINAL AIR BOX DAMPER SHALL MODULATE BETWEEN ITS MINIMUM AND MAXIMUM AIRFLOWS TO MAINTAIN THE SPACE TEMPERATURE SETPOINT. THE REHEAT COIL CONTROL VALVE SHALL BE CLOSED.

ON A CALL FOR HEATING, THE TERMINAL AIR BOX DAMPER AND REHEAT COIL CONTROL VALVE SHALL MODULATE OPEN IN UNISON UNTIL THE SPACE TEMPERATURE SETPOINT IS MAINTAINED OR UNTIL THE MAXIMUM HEATING CFM IS REACHED.

FOR SPACES WITH OCCUPANCY SENSORS AS SHOWN ON THE ELECTRICAL DRAWINGS, THE TERMINAL AIR BOX SHALL HAVE OCCUPIED/UNOCCUPIED CONTROL MODES. TERMINAL BOX CONTROLS SHALL INTERFACE TO THE LIGHTING OCCUPANCY SENSOR VIA AN AUXILIARY CONTACT IN THE SENSOR. WHEN OCCUPIED, THE TERMINAL AIR BOX SHALL OPERATE IN ITS NORMAL MODE. IF THE OCCUPANCY SENSOR DOES NOT DETECT MOTION FOR 15 MINUTES (ADJUSTABLE), THE TERMINAL AIR BOX SHALL ENTER UNOCCUPIED MODE. IN UNOCCUPIED MODE, THE TERMINAL AIR BOX SHALL INITIALLY CLOSE, OVERRIDING THE MINIMUM AIRFLOW SETTING. THE TERMINAL AIR BOX SHALL THEN OPERATE TO MAINTAIN THE SPACE TEMPERATURE ABOVE 55 DEGREES IN WINTER (ADJUSTABLE) AND BELOW 85 DEGREES IN SUMMER (ADJUSTABLE). WHERE MULTIPLE ROOMS ARE SERVED BY A SINGLE TERMINAL AIR BOX, THE TERMINAL AIR BOX WILL OPERATE IN THE OCCUPIED MODE WHENEVER ANY ONE OF THE ROOMS BEING SERVED IS DETERMINED TO BE OCCUPIED.

THE DDC SYSTEM SHALL UTILIZE FEEDBACK FROM ALL TERMINAL AIR BOX POSITIONS TO RESET THE SUPPLY DUCT DIFFERENTIAL STATIC PRESSURE.

IF THE HEATING WATER SYSTEM TEMPERATURE IS 5° F (ADJUSTABLE) BELOW SETPOINT ON A CALL FOR HEATING, THE TERMINAL AIR BOX SHALL REMAIN AT ITS MINIMUM AIRFLOW.

GENERAL NOTES

1. TERMINAL AIR BOX CONTROLLER SHALL HAVE A MINIMUM SERVICE CLEARANCE OF 24 INCHES AND MUST BE WITHIN 3 FEET OF CEILING.
2. WHERE MULTIPLE SPACES ARE SERVED BY A SINGLE TERMINAL AIR BOX, WIRE ALL OCCUPANCY SENSORS TO THE TERMINAL AIR BOX CONTROLLER.
3. MOUNT ALL ROOM SENSORS AT 48" ABOVE FINISHED FLOOR. COORDINATE LOCATION WITH NEARBY DEVICES SUCH AS LIGHT SWITCHES.

C1 VAV BOX - HOT WATER REHEAT NO SCALE

SEQUENCE OF OPERATION

OUTDOOR REFERENCE:

- CONSISTS OF A WEATHER STATION CAPABLE OF PROVIDING DRY BULB TEMPERATURE, RELATIVE HUMIDITY, ATMOSPHERIC PRESSURE, AND CARBON DIOXIDE LEVELS.
- REPORT VALUES OF OUTDOOR REFERENCE SENSORS TO DDC AND MAKE AVAILABLE TO ALL EQUIPMENT WITH SEQUENCES REQUIRING THE REFERENCE INFORMATION.

FIRE ALARM STATUS:

- CONSISTS OF AN OUTPUT FROM THE FIRE ALARM PANEL RELAY TO THE DDC.
- REPORT STATUS OF FIRE ALARM SYSTEM TO DDC AND MAKE AVAILABLE TO ALL EQUIPMENT WITH SEQUENCES REQUIRING THE REFERENCE INFORMATION.

UTILITY METERS:

- CONSISTS OF OUTPUTS FROM THE VARIOUS BUILDING UTILITY METERS. WHEN METERS DO NOT HAVE A DIRECT OUTPUT, PROVIDE A PULSE COUNTER AND RELAY TO DDC.
- REPORT UTILITY METER CONSUMPTION VALUES TO DDC. REPORT TOTALED VALUES BASED ON DAY, MONTH AND YEAR.

PLUMBING EQUIPMENT:

- CONSISTS OF OUTPUTS FROM EQUIPMENT SUPPLIED CONTROLS.
- REPORT STATUS OF EQUIPMENT ALARM TO DDC.

MEDICAL GAS EQUIPMENT:

- NFPA ALLOWS A BMS TO SERVE AS SECOND MEANS OF MONITORING/ALARMING MEDICAL GAS SOURCE. PROJECT INCLUDES TWO (2) SUCH MASTER ALARMS: ONE IN RECEPTION AND ONE IN THE SUPERVISOR'S OFFICE. BMS TO SERVE AS A THIRD SOURCE TO MONITOR MASTER ALARM FOR MEDICAL VACUUM, MEDICAL AIR, WASTE ANESTHESIA GAS DISPOSAL AND OXYGEN MAIN SOURCE.

EMERGENCY GENERATOR:

- CONSISTS OF OUTPUTS FROM EQUIPMENT SUPPLIED CONTROLS.
- REPORT STATUS OF EQUIPMENT ALARM TO DDC.

SPLIT SYSTEM DX AIR:

- CONSISTS OF WALL/CEILING MOUNTED BLOWER EVAPORATOR UNIT, ROOFGRADE MOUNTED CONDENSING UNIT, WALL MOUNTED CONDITIONING SYSTEMS. THERMOSTAT PROVIDED BY TEMPERATURE CONTROLS CONTRACTOR, AND MANUFACTURER SUPPLIED TEMPERATURE CONTROLLER.
- CYCLE CONDENSING UNIT AND INDOOR UNIT IN UNISON TO MAINTAIN A SPACE TEMPERATURE SETPOINT OF 75° F (ADJUSTABLE). MONITOR ROOM TEMPERATURE, EQUIPMENT STATUS AND CONDENSATE ALARM OUTPUTS FROM EQUIPMENT SUPPLIED CONTROLS THROUGH DDC. SEND ALARM TO THE OPERATOR INTERFACE IF THE SPACE TEMPERATURE EXCEEDS 90° F (ADJUSTABLE).

DOMESTIC HOT WATER:

- CONSISTS OF DIGITAL HOT WATER MIXING VALVE, MANUFACTURER SUPPLIED CONTROL MODULE, TEMPERATURE SENSOR AND CIRCULATING PUMP.
- PROVIDE SETPOINT OF 120° F (ADJUSTABLE) FROM DDC TO MANUFACTURER SUPPLIED CONTROL MODULE. REPORT WATER TEMPERATURES AND ALARMS FROM MANUFACTURER SUPPLIED CONTROL MODULE. SEND ALARM TO THE OPERATOR INTERFACE IF THE HOT WATER OUTLET TEMPERATURE EXCEEDS 140° F (ADJUSTABLE).
- HOT WATER CIRCULATING PUMP SHALL OPERATE TO MAINTAIN A HOT WATER CIRCULATING RETURN TEMPERATURE OF 110° F (ADJUSTABLE). SEND ALARM TO OPERATOR INTERFACE IF HOT WATER RETURN RETURN TEMPERATURE FALLS BELOW 105° F (ADJUSTABLE) OR IF ADJUSTAT DOES NOT PROVE FLOW.

SECONDARY CONTAMINANT:

- CONSISTS OF MOISTURE SENSOR LOCATED IN CONTAMINANT PAN. COORDINATE QUANTITY AND LOCATIONS WITH OTHER TRADES.

PAN MOISTURE SENSORS:

- SEND ALARM TO THE OPERATOR INTERFACE IF MOISTURE IS DETECTED.

WATER DETECTOR ALARM:

- CONSISTS OF MICROPROCESSOR BASED WATER DETECTOR MOUNTED TO FLOOR OR ON WALL WITH REMOTE DETECTION CABLE. WATER DETECTOR SHALL BE GREYSTONE WD-100 SERIES OR APPROVED EQUAL. PROVIDE AT THE FOLLOWING LOCATIONS:
  1. EACH MECHANICAL ROOM
  2. EACH REDUCED PRESSURE BACKFLOW PREVENTER LOCATION
  3. EACH EQUIPMENT ROOM SERVING CENTRAL STERILE OR RADIOLOGY EQUIPMENT
- SEND ALARM TO OPERATOR INTERFACE IF MOISTURE IS DETECTED, POWER IS LOST, OR DUE TO SENSOR FAILURE.

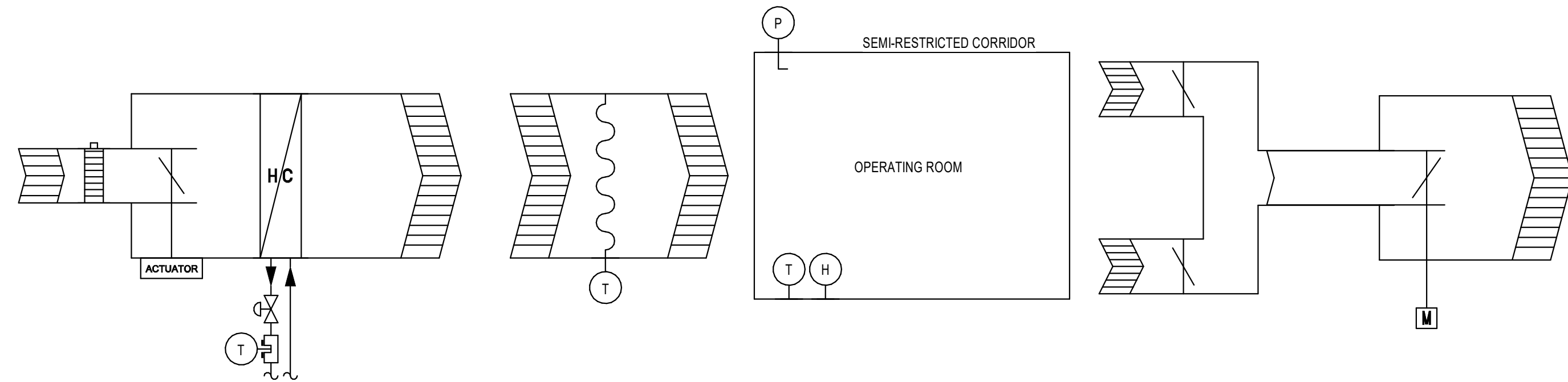
DRAIN COOLER

- CONSISTS OF DRAIN COOLER WITH TEMPERATURE SENSOR ON DISCHARGE PIPING PROVIDED BY TEMPERATURE CONTROLS CONTRACTOR.
  1. IF DISCHARGE TEMPERATURE EXCEEDS 140° F (ADJUSTABLE), THE CONTROL VALVE OR CONTROL SWITCH OF THE DEVICE SERVED BY THE DRAIN COOLER SHALL CLOSE OR BE SWITCHED OFF AND AN ALARM SENT TO THE OPERATOR INTERFACE.

GENERAL NOTES

1. WIRE ALL SENSORS AND CONTROL DEVICES BACK TO CONTROLLER.
2. COORDINATE EQUIPMENT INTERFACES WITH OTHER TRADES.

A1 MISCELLANEOUS NO SCALE



SEQUENCE OF OPERATION

DESCRIPTION: EACH OPERATING ROOM HAS A SUPPLY TERMINAL AIR BOX WITH A HOT WATER REHEAT COIL, REHEAT COIL CONTROL VALVE, SUPPLY DIFFUSERS, RETURN TERMINAL AIR BOX, ROOM PRESSURE CONTROLLER, AND DIRECT DIGITAL CONTROLLER. INSTALL A SINGLE POINT TEMPERATURE SENSOR 5'-0" DOWNSTREAM OF THE TERMINAL BOX OR BEFORE THE FIRST TAKEOFF DOWNSTREAM OF THE TERMINAL BOX. INSTALL A WALL MOUNTED THERMOSTAT TO MAINTAIN A SPACE TEMPERATURE OF 65° F (ADJUSTABLE). INSTALL A WALL MOUNTED HUMIDITY SENSOR TO MONITOR SPACE RELATIVE HUMIDITY. WHERE SHOWN ON PLANS, PROVIDE A WALL MOUNTED ROOM PRESSURE CONTROLLER PROGRAMMED WITH TWO MODES AS DESCRIBED BELOW. SEE DRAWINGS FOR SENSOR REQUIREMENTS.

OR SETBACK MODE:

- WHEN THE ROOM PRESSURE CONTROLLER INDICATES THAT THE ROOM IS IN NORMAL MODE, THE ROOM PRESSURE MONITOR SYSTEM ALARM SHALL BE DISABLED.
- THE SUPPLY TERMINAL AIR BOX SHALL MODULATE TO MAINTAIN 6 ACH (ADJUSTABLE) WITHIN THE OPERATING ROOM.
- ON A CALL FOR HEATING, THE REHEAT COIL CONTROL VALVE SHALL MODULATE OPEN UNTIL SETPOINT IS MAINTAINED OR THE MAXIMUM HEATING DISCHARGE AIR TEMPERATURE IS REACHED. THE SUPPLY TERMINAL AIR BOX SHALL CONTINUE TO MAINTAIN 6 ACH (ADJUSTABLE) WITHIN THE OPERATING ROOM.
- IF THE SPACE TEMPERATURE VARIES MORE THAN 9° F (ADJUSTABLE) FROM SETPOINT, SEND ALARM TO THE OPERATOR INTERFACE.
- IF THE SPACE HUMIDITY EXCEEDS 80% (ADJUSTABLE) OR DROPS BELOW 20% (ADJUSTABLE), SEND ALARM TO THE OPERATOR INTERFACE.
- THE DDC SYSTEM SHALL MODULATE THE RETURN TERMINAL AIR BOX TO MAINTAIN A POSITIVE DIFFERENTIAL PRESSURE OF 0.02 INCHES W.C. (ADJUSTABLE) WITH RESPECT TO THE ADJACENT CORRIDOR.

OPERATION ROOM ACTIVE MODE:

- WHEN THE ROOM PRESSURE CONTROLLER INDICATES THAT THE ROOM IS IN POSITIVE ISOLATION MODE, THE ROOM PRESSURE MONITOR SYSTEM ALARM SHALL BE ACTIVE AND SHALL SEND AN ALARM TO THE OPERATOR INTERFACE WHENEVER THE POSITIVE DIFFERENTIAL PRESSURE IS LESS THAN 0.01 INCHES W.C. (ADJUSTABLE). PROVIDE A DOOR INTERLOCK SWITCH ON DOOR ENTERING ROOM TO DISABLE ALARM FOR 30 SECONDS (ADJUSTABLE) WHEN THE DOOR IS OPENED.
- THE SUPPLY TERMINAL AIR BOX SHALL MODULATE TO MAINTAIN 20 ACH (ADJUSTABLE) WITHIN THE OPERATING ROOM.
- ON A CALL FOR HEATING, THE REHEAT COIL CONTROL VALVE SHALL MODULATE OPEN UNTIL SETPOINT IS MAINTAINED OR THE MAXIMUM HEATING DISCHARGE AIR TEMPERATURE IS REACHED. THE SUPPLY TERMINAL AIR BOX SHALL CONTINUE TO MAINTAIN 20 ACH (ADJUSTABLE) WITHIN THE OPERATING ROOM.
- IF THE SPACE TEMPERATURE VARIES MORE THAN 5° F (ADJUSTABLE) FROM SETPOINT, SEND ALARM TO THE OPERATOR INTERFACE.
- IF THE SPACE HUMIDITY EXCEEDS 60% (ADJUSTABLE) OR DROPS BELOW 20% (ADJUSTABLE), SEND ALARM TO THE OPERATOR INTERFACE.
- THE DDC SYSTEM SHALL MODULATE THE RETURN TERMINAL AIR BOX TO MAINTAIN A POSITIVE DIFFERENTIAL PRESSURE OF 0.02 INCHES W.C. (ADJUSTABLE) WITH RESPECT TO THE ADJACENT CORRIDOR.

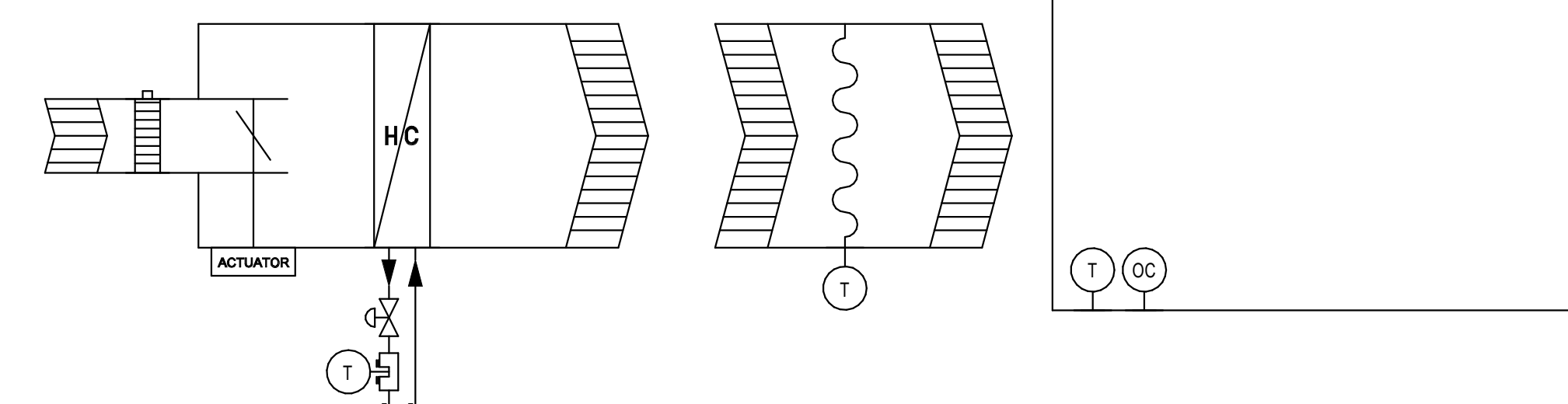
FILTER MONITORING:

- FOR EACH FILTER DIFFUSER, PROVIDE AN ALARM TO THE OPERATOR INTERFACE WHEN THE DIFFERENTIAL STATIC PRESSURE EXCEEDS 1.5" W.C. (ADJUSTABLE). REFER TO PLANS FOR TOTAL NUMBER OF FILTER DIFFUSERS.

GENERAL NOTES

1. TERMINAL AIR BOX CONTROLLER SHALL HAVE A MINIMUM SERVICE CLEARANCE OF 24 INCHES AND MUST BE WITHIN 3 FEET OF CEILING.
2. MOUNT ALL SENSORS AT 48" ABOVE FINISHED FLOOR. COORDINATE LOCATION WITH NEARBY DEVICES SUCH AS LIGHT SWITCHES.
3. SEAL ALL SPACE BOUNDARY PENETRATIONS AIR TIGHT. PENETRATION SEALS MUST INCLUDE EXTERIOR AND INTERIOR OF CONDUITS.
4. THE DDC SYSTEM SHALL UTILIZE FEEDBACK FROM ALL SUPPLY TERMINAL AIR BOX POSITIONS TO RESET THE SUPPLY DUCT DIFFERENTIAL STATIC PRESSURE.

A2 OPERATING ROOM NO SCALE



SEQUENCE OF OPERATION

EACH ZONE HAS A TERMINAL AIR BOX WITH A DIRECT DIGITAL CONTROLLER. INSTALL A SINGLE POINT TEMPERATURE SENSOR 5'-0" DOWNSTREAM OF THE TERMINAL BOX OR BEFORE THE FIRST TAKEOFF DOWNSTREAM OF THE TERMINAL BOX. INSTALL A WALL MOUNTED THERMOSTAT TO MAINTAIN A SPACE TEMPERATURE OF 72° F (ADJUSTABLE) WITH A DEAD BAND RANGE OF 5° F WITHIN WHICH THE SUPPLY OF COOLING ENERGY TO THE ZONE IS REDUCED TO A MINIMUM. SEE DRAWINGS FOR TEMPERATURE SENSOR REQUIREMENTS.

ON A CALL FOR COOLING, THE TERMINAL AIR BOX DAMPER SHALL MODULATE BETWEEN ITS MINIMUM AND MAXIMUM AIRFLOWS TO MAINTAIN THE SPACE TEMPERATURE SETPOINT.

FOR SPACES WITH OCCUPANCY SENSORS AS SHOWN ON THE ELECTRICAL DRAWINGS, THE TERMINAL AIR BOX SHALL HAVE OCCUPIED/UNOCCUPIED CONTROL MODES. TERMINAL BOX CONTROLS SHALL INTERFACE TO THE LIGHTING OCCUPANCY SENSOR VIA AN AUXILIARY CONTACT IN THE SENSOR. WHEN OCCUPIED, THE TERMINAL AIR BOX SHALL OPERATE IN ITS NORMAL MODE. IF THE OCCUPANCY SENSOR DOES NOT DETECT MOTION FOR 15 MINUTES (ADJUSTABLE), THE TERMINAL AIR BOX SHALL ENTER UNOCCUPIED MODE. IN UNOCCUPIED MODE, THE TERMINAL AIR BOX SHALL INITIALLY CLOSE, OVERRIDING THE MINIMUM AIRFLOW SETTING. THE TERMINAL AIR BOX SHALL THEN OPERATE TO MAINTAIN THE SPACE TEMPERATURE ABOVE 55 DEGREES (ADJUSTABLE) AND BELOW 85 DEGREES (ADJUSTABLE). WHERE MULTIPLE ROOMS ARE SERVED BY A SINGLE TERMINAL AIR BOX, THE TERMINAL AIR BOX WILL OPERATE IN THE OCCUPIED MODE WHENEVER ANY ONE OF THE ROOMS BEING SERVED IS DETERMINED TO BE OCCUPIED.

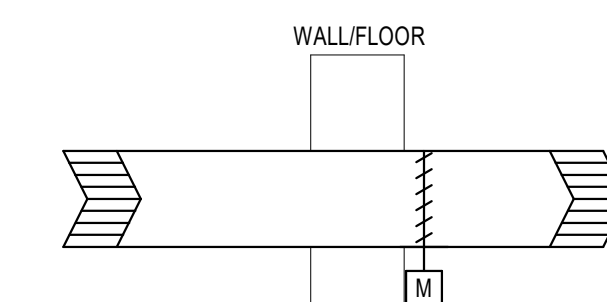
FOR SPACES INDICATED ON PLANS, TERMINAL AIR BOX SHALL HAVE A "PURGE" MODE AS INDICATED BY AN OVERRIDE BUTTON AT THE THERMOSTAT. IN "PURGE" MODE, THE TERMINAL AIR BOX SHALL OPEN TO ITS MAXIMUM CFM FOR A PERIOD OF TIME REQUIRED TO ACHIEVE 99.9% CONTAMINANT REMOVAL PER THE AIRBORNE CONTAMINANT REMOVAL TABLE PROVIDED BY THE CDC.

THE DDC SYSTEM SHALL UTILIZE FEEDBACK FROM ALL TERMINAL AIR BOX POSITIONS TO RESET THE SUPPLY DUCT DIFFERENTIAL STATIC PRESSURE.

GENERAL NOTES

1. TERMINAL AIR BOX CONTROLLER SHALL HAVE A MINIMUM SERVICE CLEARANCE OF 24 INCHES AND MUST BE WITHIN 3 FEET OF CEILING.
2. WHERE MULTIPLE SPACES ARE SERVED BY A SINGLE TERMINAL AIR BOX, WIRE ALL OCCUPANCY SENSORS TO THE TERMINAL AIR BOX CONTROLLER.
3. MOUNT ALL ROOM SENSORS AT 48" ABOVE FINISHED FLOOR. COORDINATE LOCATION WITH NEARBY DEVICES SUCH AS LIGHT SWITCHES.

C4 VAV BOX - COOLING ONLY NO SCALE



SEQUENCE OF OPERATION

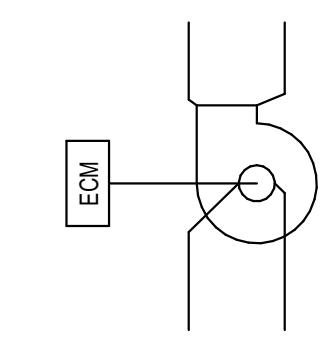
THE DAMPER SHALL REMAIN OPEN AT ALL TIMES EXCEPT THE DAMPER SHALL CLOSE UPON THE FOLLOWING CONDITIONS:

1. AIR HANDLING UNIT SUPPLY/RETURN FAN STATUS = OFF
2. FIRE ALARM STATUS FOR ZONE CONTAINING DAMPER = ALARM
3. SMOKE DETECTOR STATUS = ALARM

GENERAL NOTES

1. PROVIDE TEST AND RESET SWITCHES FOR EACH DAMPER LOCATED AT THE CONTROL PANEL OR ABOVE CEILING AT AN ACCESSIBLE LOCATION WITHIN SIGHT OF DAMPER.

B4 SMOKE DAMPER - FIRE SMOKE DAMPER NO SCALE



SEQUENCE OF OPERATION - EF-1 & EF-2

EACH FAN HAS AN ISOLATION DAMPER WITH END SWITCH TO PROVE DAMPER OPEN AND CURRENT STATUS SWITCH TO PROVE FAN OPERATION. IF THE END SWITCH DOES NOT PROVE OPEN, SEND AN ALARM TO THE OPERATOR INTERFACE. IF THE CURRENT STATUS SWITCH DOES NOT PROVE OPERATION, SEND AN ALARM TO THE OPERATOR INTERFACE.

FAN SHALL RUN AND MOTORIZED DAMPER SHALL BE OPEN WHEN THE BUILDING IS OCCUPIED. THE MOTORIZED DAMPER SHALL CLOSE ON LOSS OF POWER TO FAN. OCCUPIED/UNOCCUPIED MODE SHALL BE SET BY SCHEDULE ADJUSTABLE AT THE OPERATOR INTERFACE.

GENERAL NOTES

1. WHERE MULTIPLE SPACES ARE SERVED BY A SINGLE EXHAUST FAN, WIRE ALL OCCUPANCY SENSORS TO EXHAUST FAN CONTROLLER.

SEQUENCE OF OPERATION - EF-3 & EF-4

EACH FAN HAS AN ISOLATION DAMPER WITH END SWITCH TO PROVE DAMPER OPEN AND CURRENT STATUS SWITCH TO PROVE FAN OPERATION. IF THE END SWITCH DOES NOT PROVE OPEN, SEND AN ALARM TO THE OPERATOR INTERFACE. IF THE CURRENT STATUS SWITCH DOES NOT PROVE OPERATION, SEND AN ALARM TO THE OPERATOR INTERFACE.

FAN SHALL RUN CONTINUOUSLY. MOTORIZED DAMPER SHALL CLOSE ON LOSS OF POWER TO FAN.

A4 EXHAUST FAN NO SCALE

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Novant ASC Leland

SHEET NAME MECHANICAL CONTROLS

SHEET NUMBER M703



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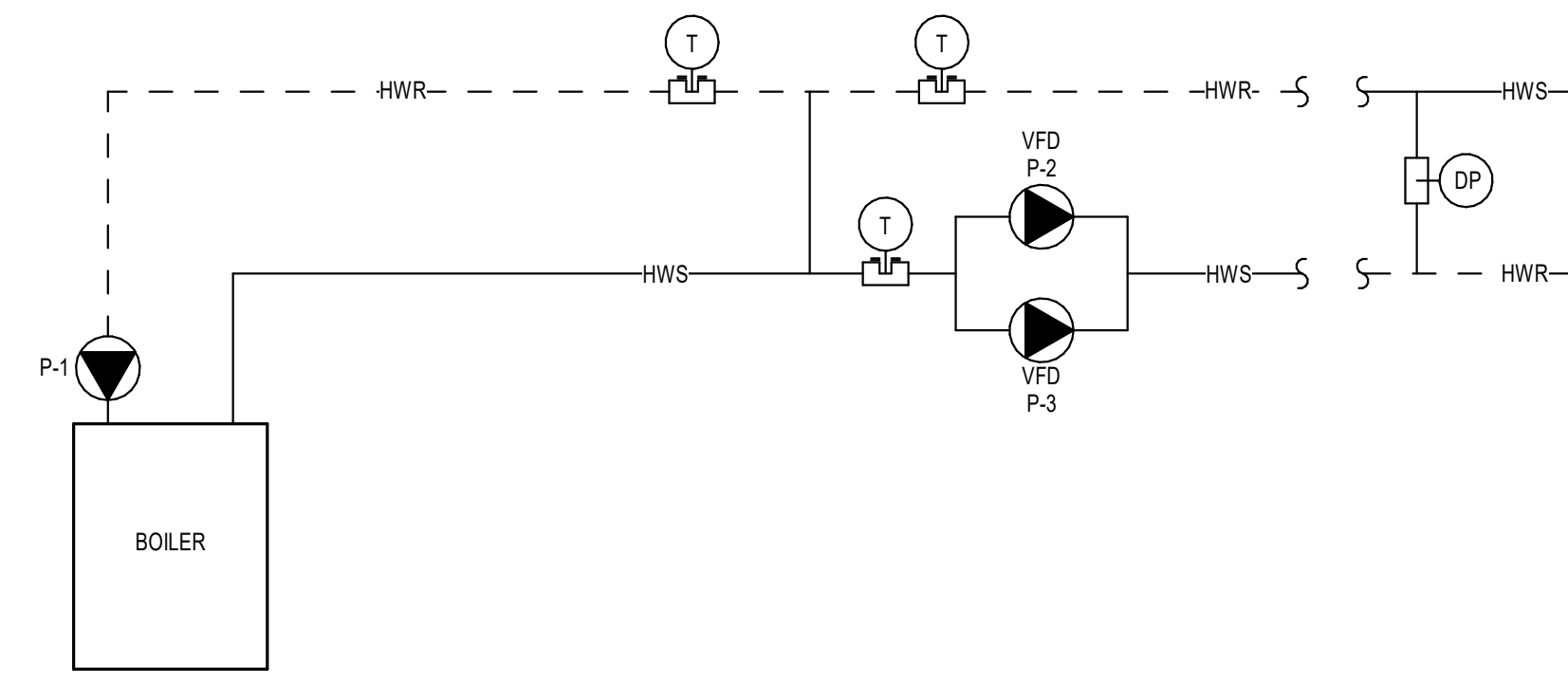
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**SEQUENCE OF OPERATION**

DESCRIPTION: THE HEATING SYSTEM CONSISTS OF ONE ELECTRIC BOILER AND ASSOCIATED CONSTANT SPEED PRIMARY PUMP, SIZED FOR 100% OF BUILDING LOAD, AND TWO VARIABLE SPEED SECONDARY PUMPS, EACH SIZED FOR BUILDING LOAD.

**BOILER CONTROL:**

- SENSE HEATING WATER SUPPLY TEMPERATURE IN THE COMMON SUPPLY PIPING BETWEEN THE DECOUPLE LINE AND THE PUMPS. SENSE THE HEATING WATER RETURN TEMPERATURE IN THE COMMON RETURN PIPING BEFORE THE DECOUPLE LINE AND IN THE PRIMARY LOOP TO THE BOILER. TEMPERATURE SENSORS IN THE COMMON PIPING SHALL BE INDEPENDENT OF THE BOILER SYSTEM CONTROLS.
- WIRE AND INSTALL HEATING WATER SUPPLY AND RETURN TEMPERATURE SENSORS SHIPPED LOOSE WITH THE BOILER REQUIRED FOR THE BOILER SYSTEM CONTROLS.
- THE BOILER SYSTEM CONTROLS SHALL ENABLE AND MODULATE THE BOILER AS REQUIRED TO MAINTAIN THE HEATING WATER SUPPLY TEMPERATURE SETPOINT. THE DDC SYSTEM SHALL MONITOR BOILER STATUS AND BOILER RUNTIME.
- PROVIDE INTERLOCK WIRING BETWEEN THE BOILER AND ASSOCIATED PRIMARY PUMP TO SO THE PUMP RUNS CONTINUOUSLY WHEN THE BOILER IS ENABLED. INTERLOCK WIRING SHALL BE INDEPENDENT OF THE BMS. PROVIDE A CURRENT STATUS SWITCH FOR EACH PUMP TO PROVE OPERATION. IF THE CURRENT STATUS SWITCH DOES NOT PROVE OPERATION, SEND AN ALARM TO THE OPERATOR INTERFACE.
- THE TEMPERATURE OF THE HEATING WATER SUPPLY SHALL BE CONTROLLED TO MAINTAIN A SETPOINT AS DETERMINED BY THE OUTDOOR AIR DRY BULB TEMPERATURE. THE SETPOINT SHALL CORRESPOND LINEARLY BASED ON THE FOLLOWING CORRESPONDING POINTS (SCHEDULED SETPOINTS SHALL BE ADJUSTABLE):

OUT	HWS TEMPERATURE
64°F	107°F
50°F	107°F
20°F	140°F (ADJUSTABLE)

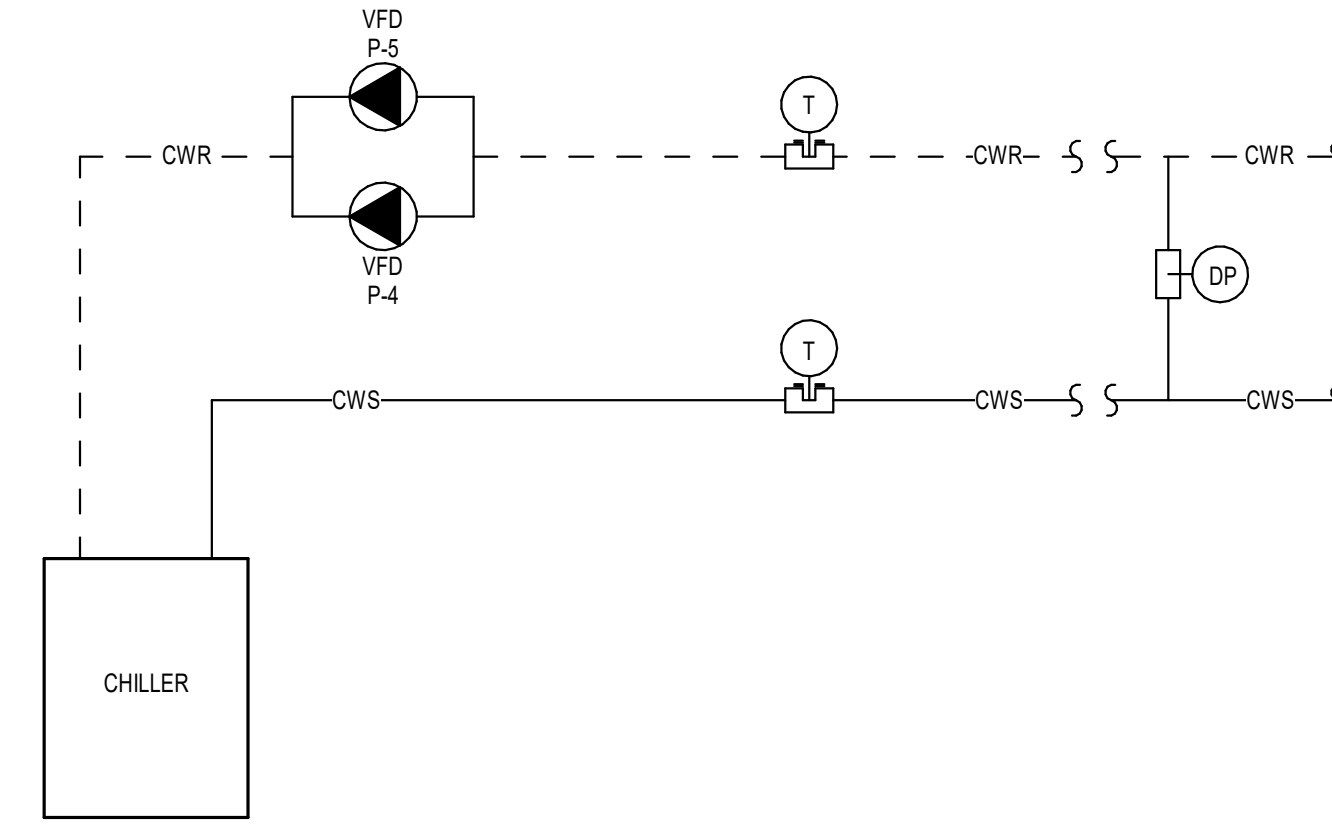
**SECONDARY HEATING WATER PUMP CONTROL:**

- THE DDC SYSTEM SHALL START THE LEAD PUMP VIA THE VFD AND SHALL RUN CONTINUOUSLY WHEN THE BOILER PLANT IS ENABLED. THE LAG PUMP SHALL REMAIN OFF.
- IN CASE OF VFD FAULT DETECTION, THE DDC SYSTEM SHALL WAIT 30 SECONDS (ADJUSTABLE) AND THEN CALL THE VFD TO START. IF THE VFD DOES NOT START, THE DDC SYSTEM SHALL CALL A SECOND TIME. IF THE VFD STILL HAS NOT STARTED, AN ALARM SHALL BE SENT TO THE OPERATOR INTERFACE.
- INSTALL A CURRENT STATUS SWITCH TO PROVE LEAD AND LAG PUMP OPERATION. LOCATE SWITCHES SO THEY SENSE PUMP STATUS WHEN OPERATED BY THE VFD OR IN BYPASS MODE. IF THE LEAD PUMP CURRENT STATUS SWITCH DOES NOT PROVE OPERATION, AN ALARM SHALL BE SENT TO THE OPERATOR INTERFACE AND THE DDC SYSTEM SHALL START THE LAG PUMP VIA THE VFD. IF THE LAG PUMP CURRENT STATUS SWITCH DOES NOT PROVE OPERATION, A SECOND ALARM SHALL BE SENT TO THE OPERATOR INTERFACE. THE SEQUENCE SHALL BE REPEATED TWICE. IF SYSTEM DOES NOT PROVE OPERATION, THE LAG PUMP SHALL REMAIN ON.
- THE DDC SYSTEM SHALL CONTROL THE OPERATING PUMP VFD FROM THE DIFFERENTIAL PRESSURE. INITIAL SETPOINT SHALL BE 10 PSIG (ADJUSTABLE). FINAL SETPOINT SHALL BE OPTIMIZED BY THE BALANCING CONTRACTOR.
- THE DDC SYSTEM SHALL ALTERNATE THE LEAD/LAG STATUS OF THE PUMPS ON A WEEKLY (ADJUSTABLE) BASIS.

**GENERAL NOTES**

- SERVICE DISCONNECT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR SHALL BE LOCATED WITHIN 6 FEET OF CONTROLLER.
- CONTROLLER SHALL HAVE A MINIMUM SERVICE CLEARANCE OF 36 INCHES.
- WIRE ALL SENSORS AND CONTROL DEVICES BACK TO CONTROLLER.
- ALL SENSORS SHALL BE INSTALLED IN TEES OR THREAD-O-LETS. PIT PLUGS ARE NOT ACCEPTABLE.
- DIFFERENTIAL PRESSURE SENSOR SHALL BE LOCATED IN THE SUPPLY AND RETURN PIPING APPROXIMATELY 2/3 OF THE RUN AWAY FROM THE BOILERS (VERIFY LOCATION WITH ENGINEER PRIOR TO INSTALLATION).

**A2 HEATING WATER LOOP CONTROL - ELECTRIC BOILER**  
NO SCALE



**SEQUENCE OF OPERATION**

DESCRIPTION: THE CHILLED WATER SYSTEM CONSISTS OF ONE AIR-COOLED CHILLER SIZED FOR 100% OF BUILDING LOAD, AND TWO CONSTANT SPEED PRIMARY PUMPS, EACH SIZED FOR BUILDING LOAD.

**CHILLER CONTROL:**

- SENSE CHILLED WATER SUPPLY TEMPERATURE IN THE COMMON SUPPLY PIPING BETWEEN THE CHILLER AND THE BYPASS CONTROL VALVE. SENSE THE CHILLED WATER RETURN TEMPERATURE IN THE COMMON RETURN PIPING BETWEEN THE BYPASS CONTROL VALVE AND PUMPS. TEMPERATURE SENSORS IN THE COMMON PIPING SHALL BE INDEPENDENT OF THE CHILLER CONTROLS.
- THE CHILLER SHALL BE INITIALIZED AS FOLLOWS THROUGH THE DDC SYSTEM:
  - WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 50°F (ADJUSTABLE) OR WHEN ONE CONNECTED CHILLED WATER COIL IS CALLING FOR COOLING, THE CHILLER SHALL BE ENABLED AND MAINTAIN THE CHILLED WATER SUPPLY TEMPERATURE SETPOINT.
  - THE CHILLER SHALL NOT BE ALLOWED TO START UNTIL FLOW IS PROVEN THROUGH THE EVAPORATOR AS SENSED BY THE FLOW SWITCH FURNISHED BY THE CHILLER MANUFACTURER. THE FLOW SWITCH SHALL BE WIRED DIRECTLY TO THE CHILLER CONTROL PANEL INDEPENDENT OF THE BMS AS DICTATED BY THE CHILLER MANUFACTURER.
  - THE CHILLED WATER TEMPERATURE SETPOINT SHALL BE RESET WITHIN THE RANGE OF 42°F (ADJUSTABLE) AND 50°F (ADJUSTABLE). ON A DECREASE IN SYSTEM LOAD, THE DDC SYSTEM SHALL UTILIZE FEEDBACK FROM ALL COOLING COIL CONTROL VALVES TO RESET AND INCREASE THE CHILLED WATER SUPPLY TEMPERATURE UNTIL ONE CONTROL VALVE IS 90% OPEN. ON AN INCREASE IN SYSTEM LOAD, THE DDC SYSTEM SHALL UTILIZE FEEDBACK FROM ALL COOLING COIL CONTROL VALVES TO RESET AND DECREASE THE CHILLED WATER SUPPLY TEMPERATURE SETPOINT UNTIL ONE CONTROL VALVE IS 90% OPEN. RESET OF THE CHILLED WATER SUPPLY TEMPERATURE SHALL UTILIZE TRIM AND RESPOND LOGIC. THE CHILLED WATER SETPOINT SHALL BE DETERMINED BY THE DDC SYSTEM AND CONTROL THE CHILLER THROUGH THE CHILLER'S EXTERNAL CHILLED WATER SETPOINT (EWS) INPUTS. THE RESET FUNCTION PROVIDED WITH THE CHILLER'S CONTROLLER SHALL NOT BE USED.

**CHILLED WATER PUMP CONTROL:**

- PACKAGED CHILLED WATER PUMP CONTROL SHALL BE PROVIDED WITH THE AIR COOLED CHILLER. CONTROLS BY MANUFACTURER.

**CHILLED WATER MINIMUM FLOW CONTROL:**

- THE MINIMUM FLOW FOR THE CHILLER WILL BE MADE BY FLOW THROUGH BOTH AIR HANDLER COOLING COILS AND A CALIBRATED BALANCING VALVE AT THE END OF THE RUN TO THE OR AIR HANDLER.
- THE DDC SYSTEM WILL MODULATE THE THREE WAY VALVES AT THE AIR HANDLER COILS CLOSED TO BYPASS FLOW AND OPEN TO THE AIR HANDLER COIL.

**GENERAL NOTES**

- SERVICE DISCONNECT PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR SHALL BE LOCATED WITHIN 6 FEET OF CONTROLLER.
- CONTROLLER SHALL HAVE A MINIMUM SERVICE CLEARANCE OF 36 INCHES.
- WIRE ALL SENSORS AND CONTROL DEVICES BACK TO CONTROLLER.
- ALL SENSORS SHALL BE INSTALLED IN TEES OR THREAD-O-LETS. PIT PLUGS ARE NOT ACCEPTABLE.
- DIFFERENTIAL PRESSURE SENSOR SHALL BE LOCATED IN THE SUPPLY AND RETURN PIPING NEAR THE DEVICE WITH THE HIGHEST PRESSURE DROP (VERIFY LOCATION WITH ENGINEER PRIOR TO INSTALLATION).

**A4 CHILLED WATER LOOP CONTROL**  
NO SCALE

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Novant ASC Leland

SHEET NAME  
**MECHANICAL CONTROLS**

SHEET NUMBER  
**M704**

CONSTRUCTION DOCUMENTS

Novant ASC Leland

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**GENERAL NOTES:**

- A. COVER SHEET GENERAL NOTES APPLY TO ALL SHEETS.
- B. ON DEMOLITION PLANS, EXISTING MECHANICAL SYSTEMS TO BE REMOVED ARE SHOWN HATCHED AND/OR DASHED. EXISTING MECHANICAL SYSTEMS TO REMAIN ARE SHOWN LIGHT LINE WEIGHT. ON ALL OTHER PLANS, NEW MECHANICAL SYSTEMS ARE INDICATED WITH HEAVY LINE WEIGHTS.
- C. UNLESS NOTED OTHERWISE, DETAILS SHOWN WITHIN THESE DOCUMENTS ARE APPLICABLE FOR ALL PIPING, EQUIPMENT AND DUCTWORK INSTALLATIONS WHETHER OR NOT SPECIFICALLY NOTED.
- D. THE OWNER AND ENGINEER ARE NOT RESPONSIBLE FOR THE CONTRACTOR'S SAFETY PRECAUTIONS OR FOR THE MEANS, METHODS, TECHNIQUES, CONSTRUCTION SEQUENCES, OR PROCEDURES REQUIRED TO PERFORM THIS WORK.

**SHEET NOTES:**

- 1. 24" WIDE x 12" HIGH OUTSIDE AIR INTAKE LOUVER PROVIDED AND INSTALLED BY GENERAL CONTRACTOR. MECHANICAL CONTRACTOR SHALL PROVIDE SHEET METAL PLENUM CONNECTION AND MOTOR OPERATED DAMPER AT LOUVER.
- 2. EXHAUST DUCT SHALL EXTEND DOWN TO 4" ABOVE FINISHED FLOOR. INSTALL EXHAUST GRILLE 8" ABOVE FINISHED FLOOR. COORDINATE WITH MEDICAL GAS EQUIPMENT.
- 3. PROVIDE REFRIGERANT LINES TO OUTDOOR UNIT. SIZE PER MANUFACTURER'S RECOMMENDATIONS.



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ISSUE: 09/15/23  
9/15/2023 00:47 PM

A/E #: 22354

Novant ASC Leland

SHEET NAME  
FIRST FLOOR PLAN -  
DUCTWORK

SHEET NUMBER  
MH201

**RATED WALLS & PARTITIONS**

FIRE BARRIER		FIRE & SMOKE BARRIER	
1-HOUR	[Symbol]	1-HOUR	[Symbol]
2-HOUR	[Symbol]	2-HOUR	[Symbol]
SMOKE TIGHT PARTITION		SMOKE	
SMOKE		SMOKE	
SUITE PERIMETER		SUITE PERIMETER	

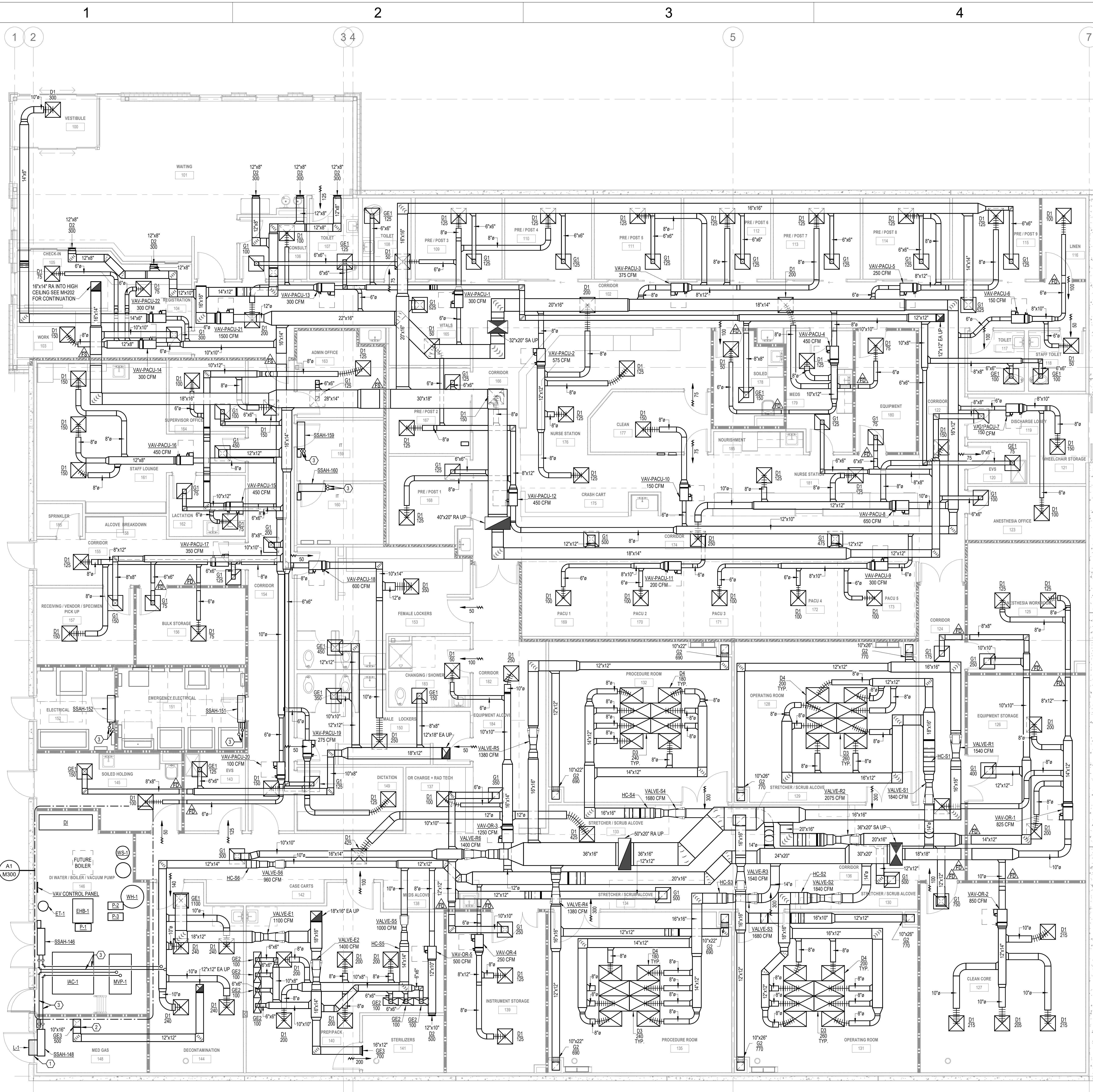
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A1 FIRST FLOOR PLAN - DUCTWORK  
3/16" = 1'-0"

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**GENERAL NOTES:**

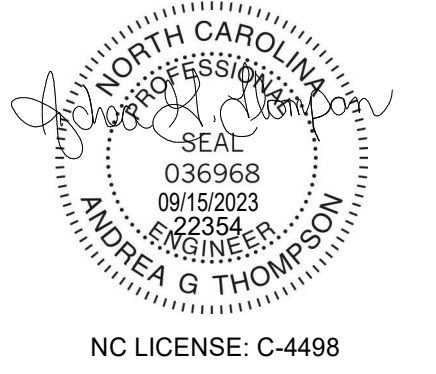
- A. COVER SHEET GENERAL NOTES APPLY TO ALL SHEETS.
- B. ON DEMOLITION PLANS, EXISTING MECHANICAL SYSTEMS TO BE REMOVED ARE SHOWN HATCHED AND/OR DASHED. EXISTING MECHANICAL SYSTEMS TO REMAIN ARE SHOWN LIGHT LINE WEIGHT. ON ALL OTHER PLANS, NEW MECHANICAL SYSTEMS ARE INDICATED WITH HEAVY LINE WEIGHTS.
- C. UNLESS NOTED OTHERWISE, DETAILS SHOWN WITHIN THESE DOCUMENTS ARE APPLICABLE FOR ALL PIPING, EQUIPMENT AND DUCTWORK INSTALLATIONS WHETHER OR NOT SPECIFICALLY NOTED.
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**SHEET NOTES:**

- 1. EXHAUST FANS AND VENT PIPING SHALL MAINTAIN 25' CLEARANCE FROM OUTSIDE AIR INTAKE.



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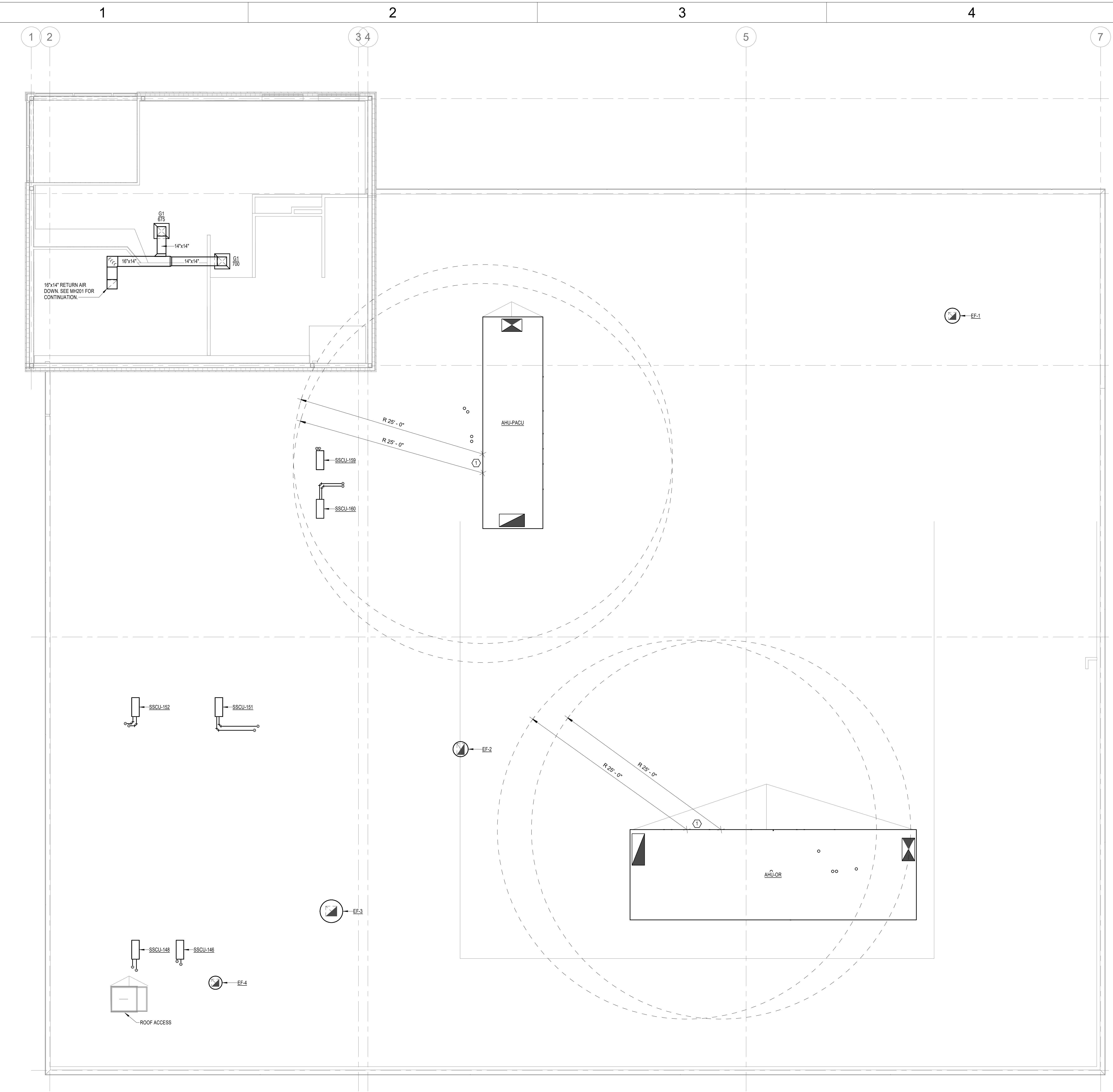
SHEET NAME  
**ROOF PLAN - MECHANICAL**

SHEET NUMBER  
**MH202**

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**A1** ROOF PLAN - MECHANICAL  
3/16" = 1'-0"

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**GENERAL NOTES:**

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**SHEET NOTES:**

- 1. PROVIDE A LABEL NEAR PUMPED CONDENSATE SYSTEM PUMPS NOTING THE TERMINATION LOCATION. SEE SPECIFICATION SECTION 220553.
- 2. PROVIDE DOMESTIC COLD WATER PIPING FROM THE BACKFLOW PREVENTOR TO THE RO WATER GENERATOR IN AHU-OR.
- 3. PROVIDE PUMP P-7 NO MORE THAN 1' ABOVE THE CEILING.
- 4. 1" DRAIN FROM REVERSE OSMOSIS IN AHU-OR PIPE TO FLOOR DRAIN IN MECHANICAL ROOM.



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SHEET NAME  
**FIRST FLOOR PLAN -  
HYDRONIC PIPING**

SHEET NUMBER  
**MP201**

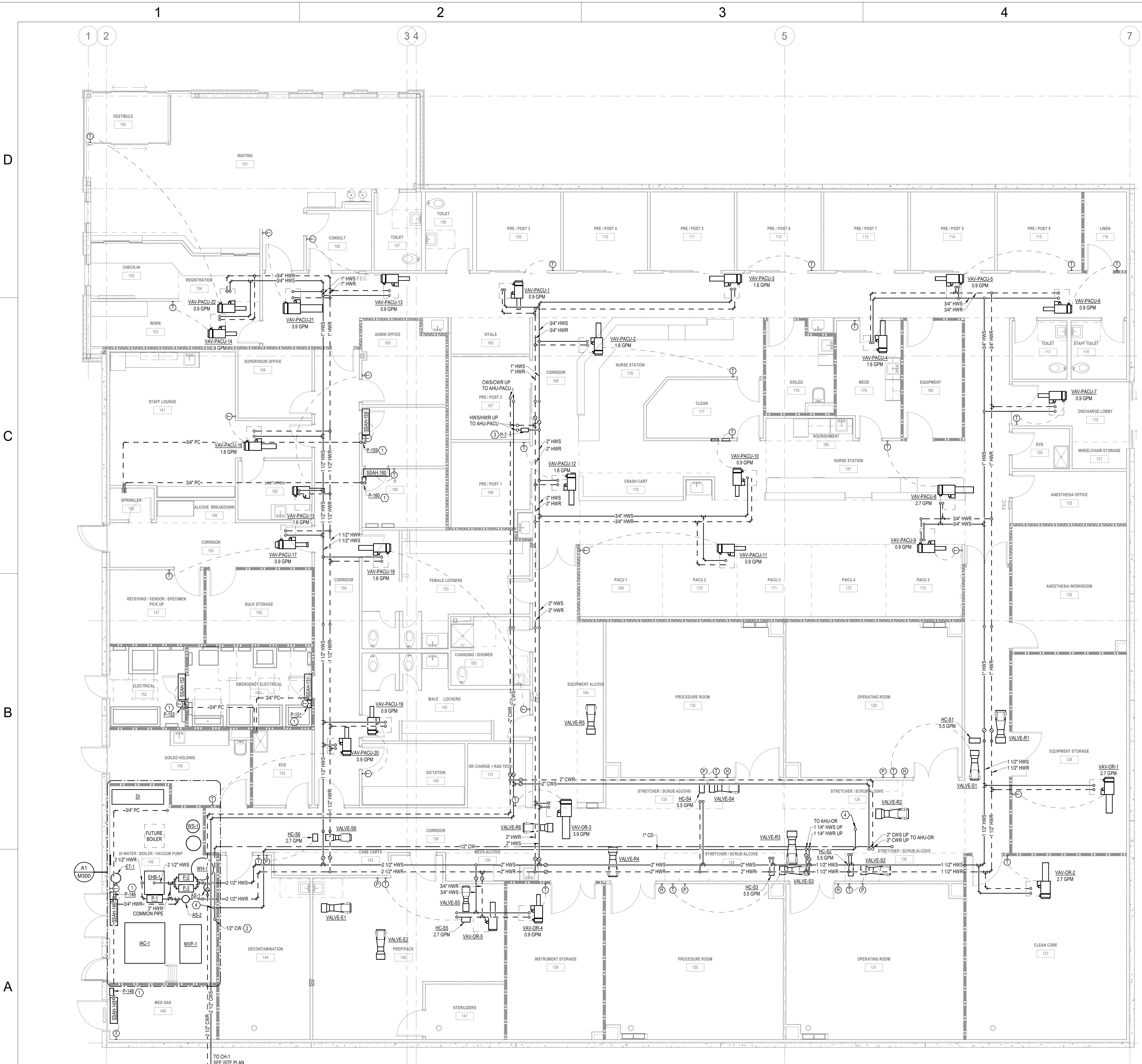
**RATED WALLS & PARTITIONS**

<b>FIRE BARRIER</b>	<b>FIRE &amp; SMOKE BARRIER</b>
1-HOUR [Symbol]	1-HOUR [Symbol]
2-HOUR [Symbol]	2-HOUR [Symbol]
<b>SMOKE TIGHT PARTITION</b>	
SMOKE [Symbol]	
SUITE PERIMETER [Symbol]	

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**FIRST FLOOR PLAN - HYDRONIC PIPING**  
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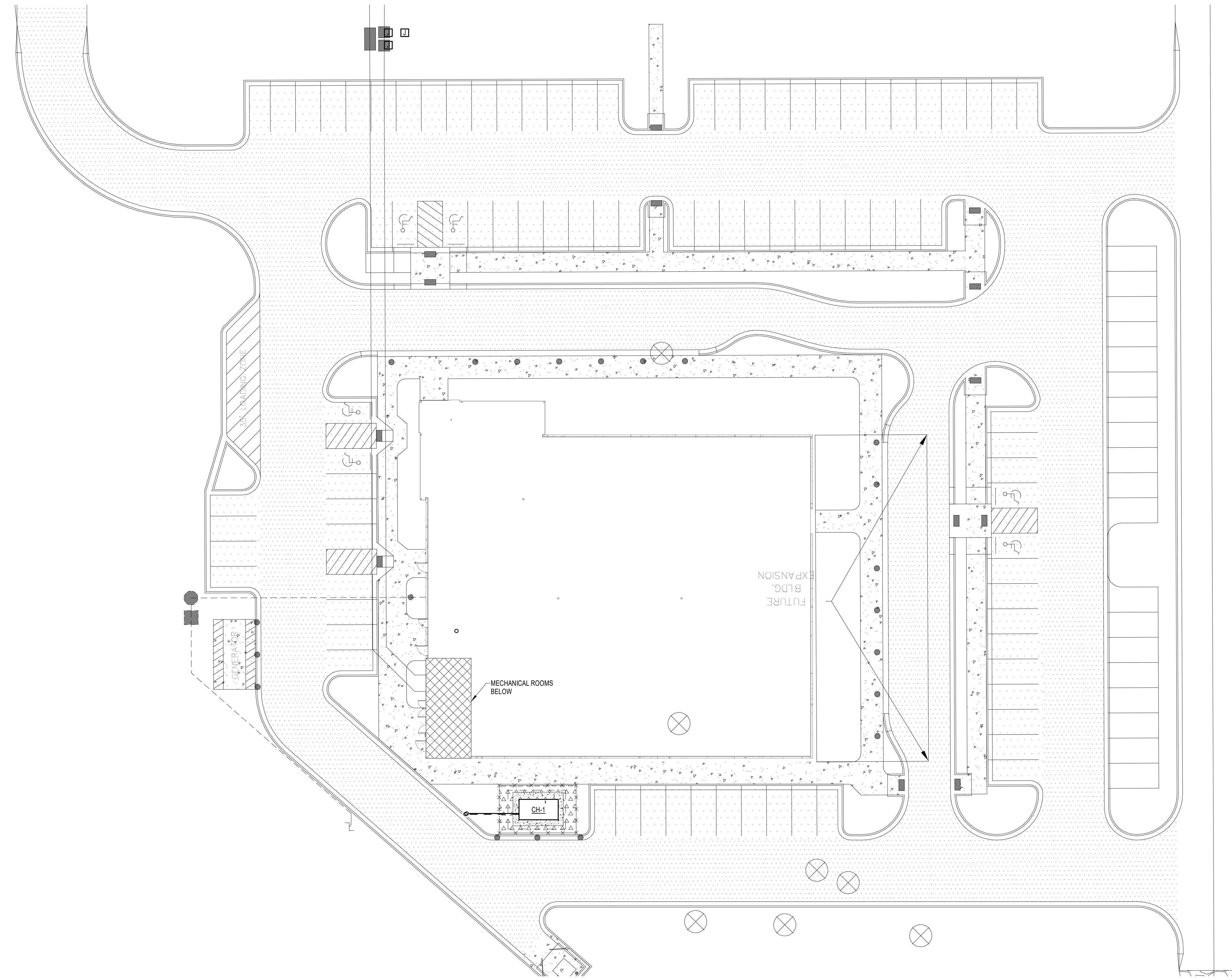
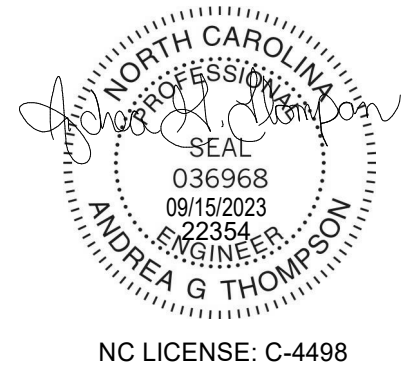
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A1 SITE PLAN - MECHANICAL  
1" = 20'-0"

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SHEET NAME  
SITE PLAN - MECHANICAL

SHEET NUMBER

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