

HVAC SYMBOL LEGEND					HVAC ABBREVIATIONS				GENERAL NOTES	
	CEILING DIFFUSER, ROUND NECK (CEILING DIFFUSERS ARE 4-WAY THROW UNO)		FIRE DAMPER (WITH ACCESS PANEL)		CHANGE OF ELEVATION	AC	AIR CONDITIONER	MBH	THOUSAND BTUS PER HOUR	<p>1. CONNECTION TO EQUIPMENT SHALL BE VERIFIED WITH MANUFACTURER'S CERTIFIED DRAWINGS. TRANSITIONS TO ALL EQUIPMENT SHALL BE VERIFIED AND PROVIDED FOR EQUIPMENT FURNISHED.</p> <p>2. DIMENSIONS SHALL BE FIELD VERIFIED AND COORDINATED PRIOR TO PROCUREMENT OR FABRICATION. COORDINATE THE WORK WITH OTHER TRADES INVOLVED. FIELD MODIFICATIONS SUCH AS OFFSETS IN PIPING OR DUCTWORK (INCLUDING DIVIDED DUCTWORK) NEEDED DUE TO OBSTRUCTIONS OR INTERFERENCES SHALL BE PROVIDED AT NO ADDITIONAL COST.</p> <p>3. DUCT CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE SMACNA HVAC DUCT CONSTRUCTION STANDARD.</p> <p>4. INSTALL ALL FIRE DAMPERS, SMOKE DAMPERS AND COMBINATION FIRE/SMOKE DAMPERS IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION DIRECTIONS. PROVIDE ACCESS DOORS TO ALLOW COMPLETE INSPECTION AND MAINTENANCE OF ALL DEVICES.</p> <p>5. PROVIDE 1.5R ELBOWS IN DUCTWORK AS INDICATED. IF 1.5R ELBOWS DO NOT FIT, PROVIDE 1.0R ELBOWS. IF 1.0R ELBOWS DO NOT FIT, PROVIDE 90 DEGREE RECTANGULAR DUCT ELBOWS WITH TURNING VANES.</p> <p>6. DUCT SIZES AND ALL OPENINGS THROUGH BUILDING CONSTRUCTION SHALL SUIT EQUIPMENT FURNISHED.</p> <p>7. COORDINATE DIFFUSER, GRILLE AND REGISTER LOCATIONS WITH ARCHITECTURAL REFLECTED CEILING PLANS AND EQUIPMENT OF ALL TRADES.</p> <p>8. LOCATE THERMOSTATS, TEMPERATURE SENSORS, HUMIDISTATS, AND HUMIDITY SENSORS AT 48" ABOVE FINISHED FLOOR UNLESS NOTED OTHERWISE. COORDINATE LOCATIONS WITH OTHER EQUIPMENT, FURNITURE, AND DOOR SWINGS.</p> <p>9. ALL EQUIPMENT, DUCTWORK, ETC., SHALL BE SUPPORTED AS DETAILED AND/OR SPECIFIED. PROVIDE ADDITIONAL SUPPORTS AS REQUIRED TO PROVIDE A VIBRATION-FREE, RIGID INSTALLATION.</p> <p>10. ALL DUCT SIZES SHOWN ARE INSIDE CLEAR DIMENSIONS.</p> <p>11. DAMPERS AND INSIDES OF DUCTS VISIBLE THROUGH GRILLES, REGISTERS AND DIFFUSERS SHALL BE PAINTED FLAT BLACK.</p> <p>12. REFER TO TYPICAL DETAILS FOR PIPING AND INSTALLATION OF EQUIPMENT.</p> <p>13. TRAPPED CONDENSATE DRAINS FROM ALL MECHANICAL EQUIPMENT SHALL BE PROVIDED FOR PROPER DRAINAGE TO SUIT EQUIPMENT FURNISHED.</p> <p>14. ACCESS PANELS IN DUCTWORK AND CEILINGS SHALL BE PROVIDED WHERE REQUIRED FOR OPERATION, BALANCING OR MAINTENANCE OF ALL MECHANICAL EQUIPMENT.</p> <p>15. ALL DUCTWORK AND PIPING IS SHOWN SCHEMATICALLY. PROVIDE ALL TRANSITIONS, TURNING VANES, ELBOWS, FITTINGS, ETC., TO ALLOW SMOOTH FLOWS. ALL SPLIT DUCT FITTINGS SHALL TRANSITION TO FULL SIZE OF THE SUM OF BOTH BRANCHES, UPSTREAM OF SPLIT.</p> <p>16. COORDINATE SIZE REQUIREMENTS OF ALL CONCRETE HOUSEKEEPING PADS UNDER ALL FLOOR-MOUNTED EQUIPMENT. SEE STRUCTURAL DRAWINGS FOR PAD DETAILS AND SPECIFICATIONS.</p> <p>17. VERIFY FINISH WITH ARCHITECT PRIOR TO PURCHASING GRILLES, REGISTERS, DIFFUSERS, LOUVERS AND OTHER AIR DISTRIBUTION DEVICES.</p> <p>18. PROVIDE FLEXIBLE DUCT CONNECTIONS ON ALL DUCTWORK CONNECTING TO FANS, AIR HANDLING UNITS, AND FAN COIL UNITS.</p> <p>19. PROVIDE TRANSITIONS AT DIFFUSER NECKS AS REQUIRED TO MATCH SIZES OF FLEX DUCTS TO BE CONNECTED.</p> <p>20. SLEEVE AND SEAL ALL PIPING PENETRATIONS THROUGH BUILDING PARTITIONS.</p> <p>21. MAINTAIN CLEARANCE OF A MINIMUM OF 6" BETWEEN DUCTWORK, PIPING, EQUIPMENT, ETC., AND ALL FIRE RATED AND FIRE/SMOKE RATED PARTITIONS, TO ALLOW FOR INSPECTIONS OF RATED WALLS.</p> <p>22. LOCATE ALL OUTSIDE AIR INTAKES A MINIMUM OF 25'-0" CLEAR FROM ALL PLUMBING VENTS AND EXHAUST AIR DISCHARGE LOCATIONS. LOWEST POINT OF EACH OUTSIDE AIR INTAKE ON ROOF SHALL BE A MINIMUM OF 3'-0" ABOVE ROOF.</p> <p>23. DUCT RUNOUTS TO DIFFUSERS SHALL MATCH THE SIZE OF THE DIFFUSER NECK.</p> <p>24. UNLESS OTHERWISE NOTED, ALL EQUIPMENT AND VALVE DRAINS SHALL BE INDEPENDENTLY PIPED FULL SIZE TO THE NEAREST PLUMBING DRAIN.</p> <p>25. PIPES SHALL NOT RUN ABOVE SERVER / I.T. ROOMS EXCEPT FOR PIPING SERVING IT ROOM EQUIPMENT. ANY PIPING SERVING EQUIPMENT IN SERVER / I.T. ROOM SHALL NOT RUN OVER IT EQUIPMENT.</p>
	CEILING RETURN		FIRE & SMOKE DAMPER (WITH ACCESS PANEL)		FLEXIBLE DUCT	AFB	ABOVE FINISHED FLOOR	MCA	MINIMUM CIRCUIT AMPS	
	CEILING EXHAUST		MOTOR OPERATED CONTROL DAMPER (MOD)		TRANSITION, CONCENTRIC	AHU	AIR HANDLING UNIT	MCP	MAXIMUM OVER CURRENT PROTECTION	
	CEILING DIFFUSER, RECTANGULAR OR SQUARE NECK (CEILING DIFFUSERS ARE 4-WAY THROW UNO)		MANUAL BALANCING DAMPER		TRANSITION, ECCENTRIC	BHP	BRAKE HORSEPOWER	MOD	MOTOR OPERATED CONTROL DAMPER (MOD)	
	SUPPLY REGISTER OR GRILLE (VERTICAL MOUNT, SIDEWALL)		DOOR GRILLE		TRANSITION, SQUARE TO ROUND	BL	BOILER	NC	NORMALLY CLOSED	
	RETURN/EXHAUST REGISTER OR GRILLE (VERTICAL MOUNT, SIDEWALL)		UNDERCUT DOOR		SQUARE THROAT ELBOW W/TURNING VANES	BTU	BRITISH THERMAL UNIT	NO	NORMALLY OPEN	
	CARBON DIOXIDE SENSOR		ACCESS DOORS, VERTICAL OR HORIZONTAL		RADIUS ELBOW	CD	CONDENSATE	NTS	NOT TO SCALE	
	THERMOSTAT/TEMPERATURE SENSOR		FLEXIBLE CONNECTION		RECTANGULAR/ROUND BRANCH TAKE-OFF	CH	CHILLER	OA	OUTSIDE AIR	
	HUMIDISTAT/HUMIDITY SENSOR		NEW DUCTWORK, FIRST DIMENSION IS SIDE SHOWN		SQUARE THROAT TEE	CHWP	CHILLED WATER PUMP	OAL	OUTSIDE AIR LOUVER	
	DUCT SMOKE DETECTOR		DUCT ELBOW, SUPPLY		RADIUS TEE	CO	CLEAN OUT	PRV	PRESSURE REDUCING VALVE	
	HUMIDITY SENSOR (DUCT MOUNTED)		DUCT ELBOW, EXHAUST		RECTANGLE-TO-ROUND TAKE-OFF	CV	CONSTANT AIR VOLUME	PRS	PRESSURE REDUCING STATION	
	CARBON DIOXIDE SENSOR (DUCT MOUNTED)		DUCT ELBOW, RETURN		STANDARD BRANCH TAKE-OFF	CFM	CUBIC FEET PER MINUTE	PSI	POUNDS PER SQUARE INCH	
	MOTORIZED CONTROL DAMPER		RECTANGULAR DUCT SECTION UP, POSITIVE PRESSURE, SUPPLY OR OUTSIDE AIR		SPIN-IN TAKE-OFF	CU	CONDENSING UNIT	PSIG	PSI GAUGE	
	TEMPERATURE SENSOR		RECTANGULAR DUCT SECTION UP, NEGATIVE PRESSURE, RETURN		EQUIPMENT WITH CLEARANCE	DN	DOWN	PTAC	PACKAGED TERMINAL AIR CONDITIONER	
	STATIC PRESSURE SENSOR		RECTANGULAR DUCT SECTION UP, EXHAUST			EA	EXHAUST AIR	PVC	POLYVINYL CHLORIDE PIPE	
	BACKDRAFT DAMPER		ROUND DUCT SECTION UP			EAT	ENTERING AIR TEMPERATURE	RA	RETURN AIR	
	CEILING MOUNTED ACCESS DOOR					EF	EXHAUST FAN	RHC	REHEAT COIL	
						ERV	ENERGY RECOVERY VENTILATOR	RHP	ROOFTOP HEAT PUMP	
						ESP	EXTERNAL STATIC PRESSURE	RPM	REVOLUTIONS PER MINUTE	
						EWT	ENTERING WATER TEMPERATURE	RS/L	REFRIGERANT SUCTION & LIQUID LINES	
						FAS	FIRE ALARM SYSTEM	RTU	ROOFTOP AIR HANDLING UNIT	
						FCU	FAN COIL UNIT	SA	SUPPLY AIR	
						FD	FIRE DAMPER	SP	STATIC PRESSURE	
						FLA	FULL LOAD AMPS	TSP	TOTAL STATIC PRESSURE	
						FRM	FEET PER MINUTE	UH	UNIT HEATER	
						GPM	GALLONS PER MINUTE	UWH	UNIT WALL HEATER	
						H	HUMIDIFIER	VIH	VOLTS/PHASE	
						HWP	HOT WATER PUMP	VAV	VARIABLE AIR VOLUME	
						KW	KILOWATT	VFD	VARIABLE FREQUENCY DRIVE	
						LAT	LEAVING AIR TEMPERATURE	VRF	VARIABLE REFRIGERANT FLOW	
						LWT	LEAVING WATER TEMPERATURE			

PIPING LEGEND

CONTROLS LEGEND

BASIC MATERIALS

DRAWING SYMBOLS

MECHANICAL DRAWING INDEX

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	CONDENSER WATER SUPPLY		CALIBRATED BALANCING VALVE		ALARM		ACTUATOR W/ 24VAC OR 120VAC ACTUATOR AS INDICATED		EXISTING TO BE REMOVED (HEAVY, DASHED LINE)
	CONDENSER WATER RETURN		SOLENOID VALVE (2-POSITION W/ ACTUATOR)		DIGITAL INPUT TO DDC CONTROLLER		2-WAY VALVE W/ 24VAC OR 120VAC ACTUATOR AS INDICATED		EXISTING TO REMAIN (THIN, HALFTONED, SOLID LINE)
	CHILLED WATER SUPPLY		FLANGES		DIGITAL OUTPUT FROM DDC CONTROLLER		SPACE TEMPERATURE SENSOR		NEW (HEAVY, SOLID LINE)
	CHILLED WATER RETURN		FLEXIBLE CONNECTOR		ANALOG INPUT TO DDC CONTROLLER		SPACE RH SENSOR		
	HOT WATER SUPPLY		Y-TYPE STRAINER		ANALOG OUTPUT FROM DDC CONTROLLER		SPACE PUSH-BUTTON OVERRIDE SWITCH		
	HOT WATER RETURN		PIPE ANCHORS		COM INPUT TO DDC CONTROLLER		STATIC PRESSURE SENSOR		
	LOW PRESSURE STEAM		CONCENTRIC REDUCER		COM OUTPUT FROM DDC CONTROLLER		INDICATES AVERAGING ELEMENT SENSOR		
	CONDENSATE		ECCENTRIC REDUCER		HARD-WIRED INTERLOCK		DIFF. PRESSURE INDICATING TRANSMITTER		
	PIPE CONNECTION		PRESSURE GAUGE		DRY CONTACT		VARIABLE FREQUENCY DRIVE		
	FLOW DIRECTION		WATER METER		CURRENT SENSING STATUS SWITCH		STATIC PRESSURE SENSOR		
	BALL VALVE		IN-LINE PUMP		STARTER		PARTICULATE TRANSMITTER		
	CALIBRATING BALANCING VALVE		CAP		DUCT SMOKE DETECTOR		MAGNETIC DIFFERENTIAL PRESSURE GAUGE		
	BUTTERFLY VALVE		CONNECTION, BOTTOM		IMMERSION TEMPERATURE TRANSMITTER W/ THERMOWELL		EMERGENCY PUSHBUTTON		
	STRAINER		CONNECTION, TOP		24VAC POWER		OPPOSED BLADE DAMPER		
	CONTROL VALVE		ELBOW, 90°		FLOW SWITCH		PARALLEL BLADE DAMPER		
	PSI REG.		ELBOW, 45°		SPACE CARBON DIOXIDE SENSOR/TRANSMITTER		INDICATES PROBE SENSOR		
	CHECK VALVE		ELBOW, TURNED DOWN		REFRIGERANT SENSOR		AIRFLOW SENSOR		
	FLOW SWITCH		ELBOW, TURNED UP		THERMOSTAT		CARBON DIOXIDE SENSOR		
	SLOPE DIRECTION (DOWN)		TEE, OUTLET DOWN		TRANSFORMER		CURRENT SENSOR		
	FLEX CONNECTION (DOUBLE SPHERE FOR PIPES 6" AND LARGER, SINGLE SPHERE FOR PIPES 4" AND SMALLER)		TEE, OUTLET UP		DIFF. PRESSURE SWITCH DIGITAL		DAMPER		
	THREE-WAY CONTROL VALVE		45° PIPE RISE (R/DROP (D))		FLOW METER		DIFFERENTIAL PRESSURE SENSOR		
	THERMOMETER		MANUAL VENT		AIR FLOW SENSOR		ENGINEERING CONTROL CENTER		
	RELIEF VALVE		MALE HOSE CONNECTION		ENTHALPY SENSOR		FREEZE STAT		
	VALVE ON RISER		P-TRAP				HUMIDITY SENSOR		
	TEST PLUG						STATIC PRESSURE SENSOR		
	FLOW SWITCH						STATIC PRESSURE SENSING STATION		
	GLOBE VALVE						ROOM THERMOSTAT/TEMPERATURE SENSOR		
	AUTOMATIC AIR VENT						TEMPERATURE SENSOR		

NOTE: SOME SYMBOLS SHOWN ON THIS LEGEND MAY NOT PERTAIN TO THIS PROJECT

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Revisions:	Revision Description	Date:

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Allen D. Lantz, P.E.  
MD License #41513

Office of  
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Management

VA U.S. Department  
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Drawing Title  
**MECHANICAL LEGENDS, SYMBOLS,  
& GENERAL NOTES**

Approved:

Phase  
**CONSTRUCTION  
DOCUMENTS**

**FULLY SPRINKLERED**

Project Title  
PROVIDENCE VAMC MENTAL  
HEALTH PHASE 2

Location  
PROVIDENCE, RI

Issue Date  
FEB 04 2022

Checked  
ADL

Drawn  
JJA

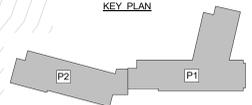
Project Number  
650-347

Building Number  
39

Drawing Number  
M-001

- CODED NOTES:**
- ① ISOLATION VALVES.
  - ② CONNECT NEW 4" CHWS & CHWR TO EXISTING 5" CHWS & CHWR.
  - ③ EXISTING 5" CHWS & CHWR CONTINUED INTO BUILDING.
  - ④ NEW CONCRETE MECHANICAL PAD. SEE CIVIL DRAWINGS FOR ADDITIONAL INFORMATION.
  - ⑤ MANUFACTURER'S RECOMMENDED CLEARANCE.

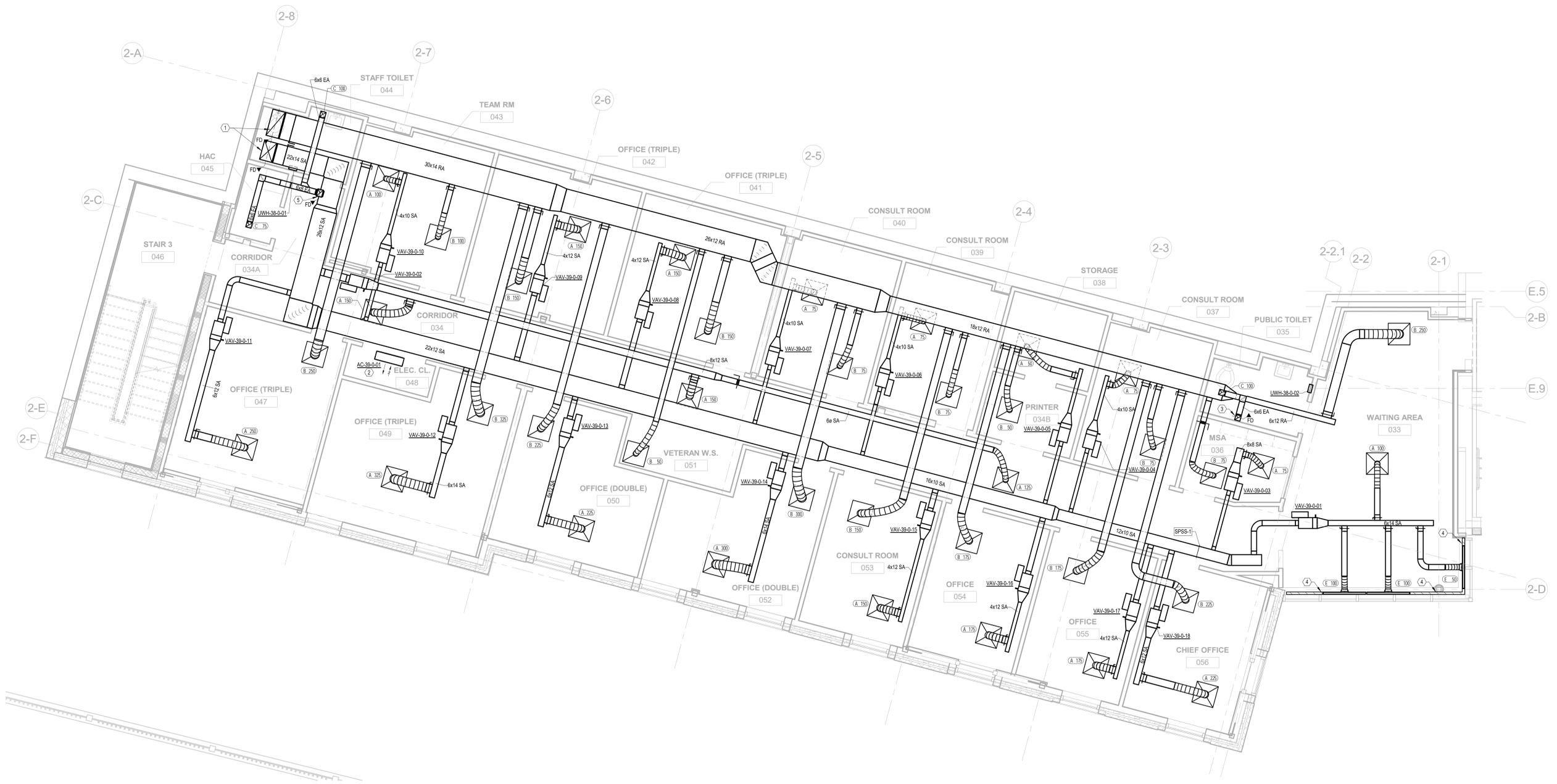
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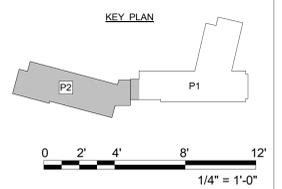
**F1 MECHANICAL SITE PLAN**  
1/8" = 1'-0"

		<b>ENGINEER</b>	<b>ARCHITECT/ENGINEER OF RECORD</b>	STAMP	Drawing Title <b>MECHANICAL SITE PLAN</b>	Phase <b>CONSTRUCTION DOCUMENTS</b>	Project Title <b>PROVIDENCE VAMC MENTAL HEALTH PHASE 2</b>	Project Number <b>650-347</b>		
		 www.abovegroupinc.com 305 East Dr., Suite H, Melbourne, Florida 32904 PH: 321.345.9026	 www.wbrcae.com BANGOR, MAINE 207-947-4511 PORTLAND, MAINE 207-828-4511 SARASOTA, FLORIDA 941-556-0757	 Allen D. Lantz, P.E. MD License #41513	 U.S. Department of Veterans Affairs	Approved:	<b>FULLY SPRINKLERED</b>	Location PROVIDENCE, RI	Issue Date FEB 04 2022	Checked ADL

- DRAWING NOTES:**
1. ALL VAV CONTROL PANELS SHALL HAVE SUFFICIENT CLEARANCE IN FRONT OF THE PANEL FOR MAINTENANCE.
  2. DUCT RUNOUTS TO DIFFUSERS SHALL MATCH THE SIZE OF THE DIFFUSER NECK.
- CODED NOTES:**
- ① 22x14 SA & 30x14 RA ROUTED DOWN FROM FLOOR ABOVE. REFER TO SHEET MH121 FOR CONTINUATION. PROVIDE FIRE DAMPER AT FLOOR PENETRATION. REFER TO DETAIL D7 SHEET M-501 FOR MORE INFORMATION.
  - ② MOUNT BOTTOM OF UNIT AC-38-0-01 TO BE 90" AFF.
  - ③ 6x6 EA DUCTWORK ROUTED UP TO LEVEL ABOVE. REFER TO SHEET MH121 FOR MORE INFORMATION. PROVIDE FIRE DAMPER AT LEVEL 1 FLOOR PENETRATION. REFER TO DETAIL D7 SHEET M-501 FOR MORE INFORMATION.
  - ④ BLANK OFF PORTION OF SLOT DIFFUSER.
  - ⑤ 6x6 EA DUCTWORK ROUTED UP TO LEVEL ABOVE. REFER TO SHEET MH121 FOR MORE INFORMATION. PROVIDE FIRE DAMPER AT LEVEL 1 FLOOR PENETRATION. REFER TO DETAIL D7 SHEET M-501 FOR MORE INFORMATION.



**F1 MECHANICAL HVAC PLAN - LEVEL B**  
1/4" = 1'-0"



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Drawing Title	MECHANICAL HVAC PLAN - LEVEL B
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Phase	CONSTRUCTION DOCUMENTS
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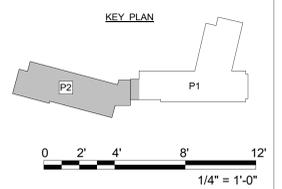
Project Title	PROVIDENCE VAMC MENTAL HEALTH PHASE 2
Location	PROVIDENCE, RI
Issue Date	FEB 04 2022
Checked	ADL
Drawn	JJA

Project Number	650-347
Building Number	39
Drawing Number	MH111

**DRAWING NOTES:**  
 PRESSURIZATION OF ROOMS WILL BE DISPLAYED AS FOLLOWS:  
 S = SUPPLY CFM  
 T = TRANSFER CFM (\*SHOWN WHERE APPLICABLE)  
 R = RETURN CFM  
 E = EXHAUST CFM  
 P = PRESSURIZATION CFM (SUM OF SUPPLY, RETURN, EXHAUST)



**F1 MECHANICAL PRESSURIZATION PLAN - LEVEL B**  
 1/4" = 1'-0"



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Drawing Title  
**MECHANICAL PRESSURIZATION PLAN - LEVEL B**

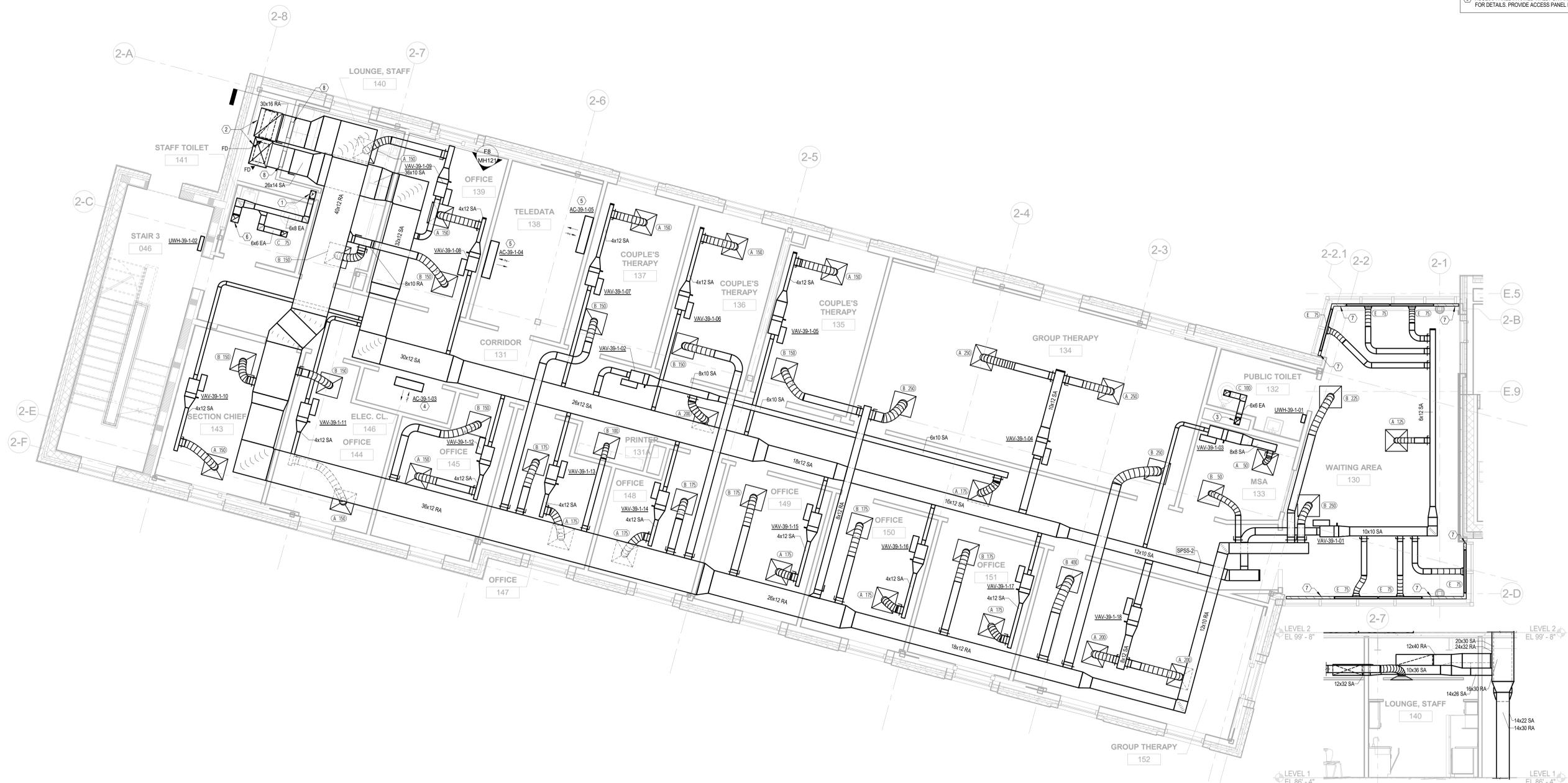
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Phase  
**CONSTRUCTION DOCUMENTS**

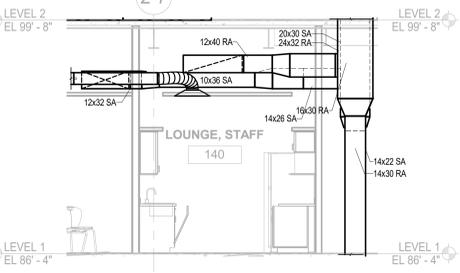
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Project Title PROVIDENCE VAMC MENTAL HEALTH PHASE 2	Project Number 650-347
Location PROVIDENCE, RI	Building Number 39
Issue Date FEB 04 2022	Checked ADL
Drawn JJA	Drawing Number MH112

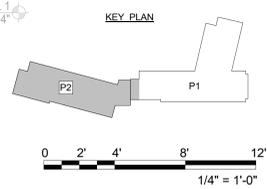
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  2. DUCT RUNOUTS TO DIFFUSERS SHALL MATCH THE SIZE OF THE DIFFUSER NECK.
- CODED NOTES:**
- 1 6X8 EA DUCTWORK ROUTED UP FROM FLOOR BELOW. REFER TO SHEET MH111 FOR MORE INFORMATION.
  - 2 30X20 SA & 32X24 RA ROUTED DOWN FROM FLOOR ABOVE. AFTER 1ST FLOOR BRANCH, 22"x14" SA & 30"x14" ROUTED DOWN TO FLOOR BELOW. REFER TO SHEET M-401 & MH111 FOR CONTINUATION.
  - 3 6X8 EA DUCTWORK ROUTED UP FROM FLOOR BELOW. AFTER BRANCH CONNECTION, 6X8 EA DUCTWORK ROUTED UP TO FLOOR ABOVE. REFER TO SHEET MH111 & MH131 FOR MORE INFORMATION.
  - 4 MOUNT BOTTOM OF UNIT AC-38-1-03 TO BE 9" AFF.
  - 5 MOUNT BOTTOM OF UNITS AC-38-1-04 & AC-38-1-05 TO BE 12" AFF.
  - 6 6X8 EA DUCTWORK ROUTED UP TO FLOOR ABOVE. REFER TO SHEET M-401 FOR MORE INFORMATION.
  - 7 BLANK OFF PORTION OF SLOT DIFFUSER.
  - 8 ACCESS PANEL IN RATED WALL FOR FIRE DAMPER ACCESS. REFER TO ARCHITECTURAL DRAWINGS FOR DETAILS. PROVIDE ACCESS PANEL IN DUCTWORK FOR DAMPER ACCESS.



**F1** MECHANICAL HVAC PLAN - LEVEL 1  
1/4" = 1'-0"



**F8** MECHANICAL SECTION VIEW  
1/4" = 1'-0"



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<p>PROJECT NORTH</p>		
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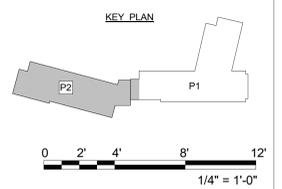
Phase	CONSTRUCTION DOCUMENTS
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Project Title	PROVIDENCE VAMC MENTAL HEALTH PHASE 2	Project Number	650-347
		Building Number	39
Location	PROVIDENCE, RI	Drawing Number	MH121
Issue Date	FEB 04 2022	Checked	ADL
		Drawn	JJA

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**F1 MECHANICAL PRESSURIZATION PLAN - LEVEL 1**  
 1/4" = 1'-0"



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Allen D. Lantz, P.E.  
 MD License #41513

**Office of Construction and Facilities Management**

**VA** U.S. Department of Veterans Affairs

Drawing Title  
**MECHANICAL PRESSURIZATION PLAN - LEVEL 1**

Approved: \_\_\_\_\_

Phase  
**CONSTRUCTION DOCUMENTS**

**FULLY SPRINKLERED**

Project Title  
**PROVIDENCE VAMC MENTAL HEALTH PHASE 2**

Location  
 PROVIDENCE, RI

Issue Date  
 FEB 04 2022

Checked  
 ADL

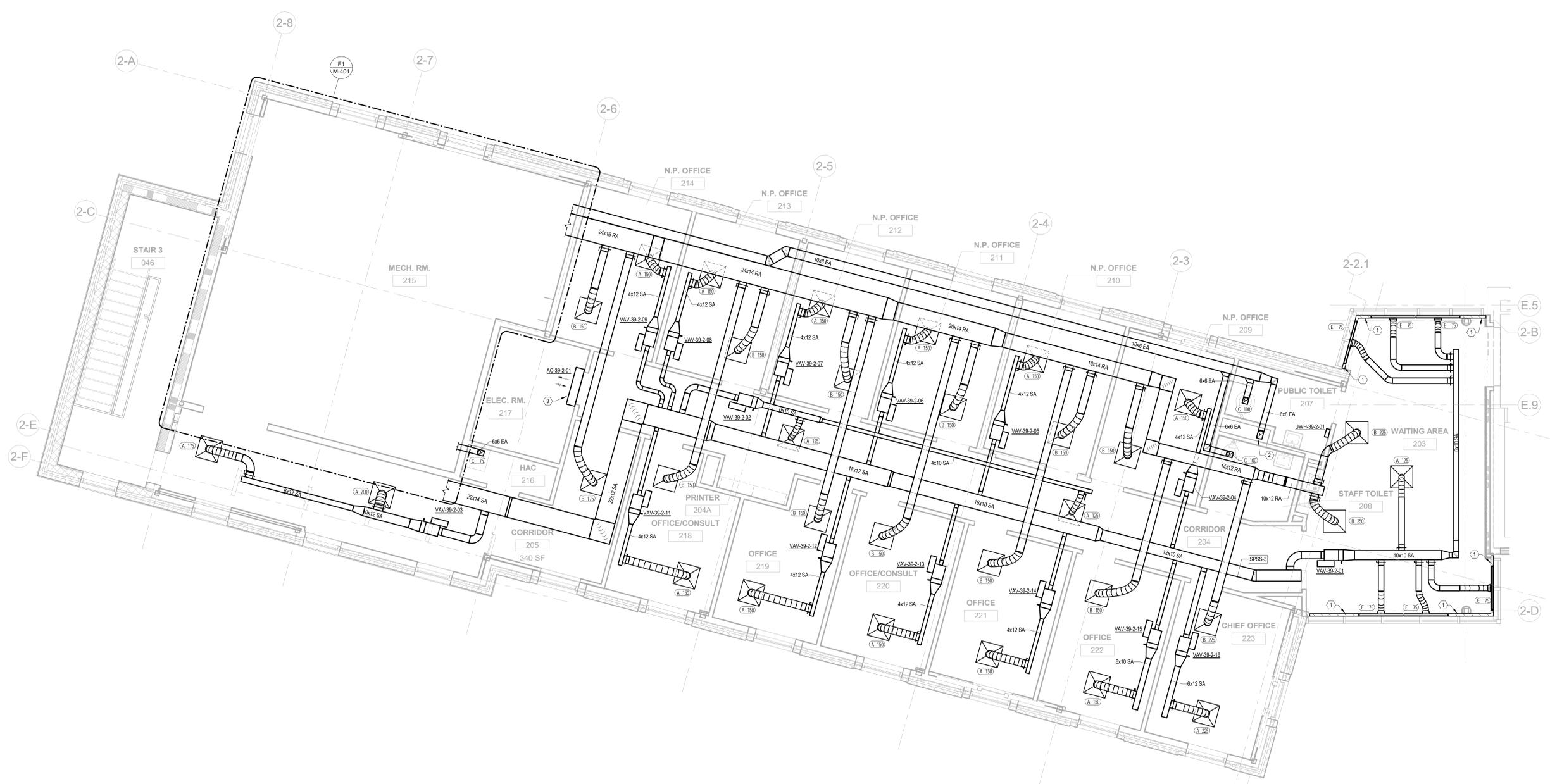
Drawn  
 JJA

Project Number  
**650-347**

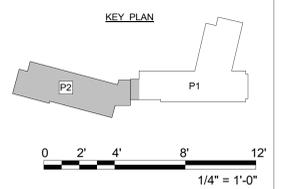
Building Number  
**39**

Drawing Number  
**MH122**

- DRAWING NOTES:**
- ALL VAV CONTROL PANELS SHALL HAVE SUFFICIENT CLEARANCE IN FRONT OF THE PANEL FOR MAINTENANCE.
  - DUCT RUNOUTS TO DIFFUSERS SHALL MATCH THE SIZE OF THE DIFFUSER NECK.
- CODED NOTES:**
- BLANK OFF PORTION OF SLOT DIFFUSER.
  - 6X8 EA DUCTWORK ROUTED UP FROM FLOOR BELOW. REFER TO SHEET MH121 FOR MORE INFORMATION.
  - MOUNT BOTTOM OF UNIT AC-39-2-01 TO BE 90" AFF.



**F1 MECHANICAL HVAC PLAN - LEVEL 2**  
1/4" = 1'-0"



15/10/2022 3:53:10 PM  
E:\360\0121004 - VA Providence Mental Health Building PH10121004 - VA Providence MHC Ph2 P12 E20\_Dw\_21\_22\_ & 23.rvt  
E:\360\0121004 - VA Providence Mental Health Building PH10121004 - VA Providence MHC Ph2 P12 E20\_Dw\_21\_22\_ & 23.rvt

Revisions:	Revision Description	Date:

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Drawing Title  
**MECHANICAL HVAC PLAN - LEVEL 2**

Approved:

Phase  
**CONSTRUCTION DOCUMENTS**

**FULLY SPRINKLERED**

Project Title  
PROVIDENCE VAMC MENTAL HEALTH PHASE 2

Location  
PROVIDENCE, RI

Issue Date  
FEB 04 2022

Checked  
ADL

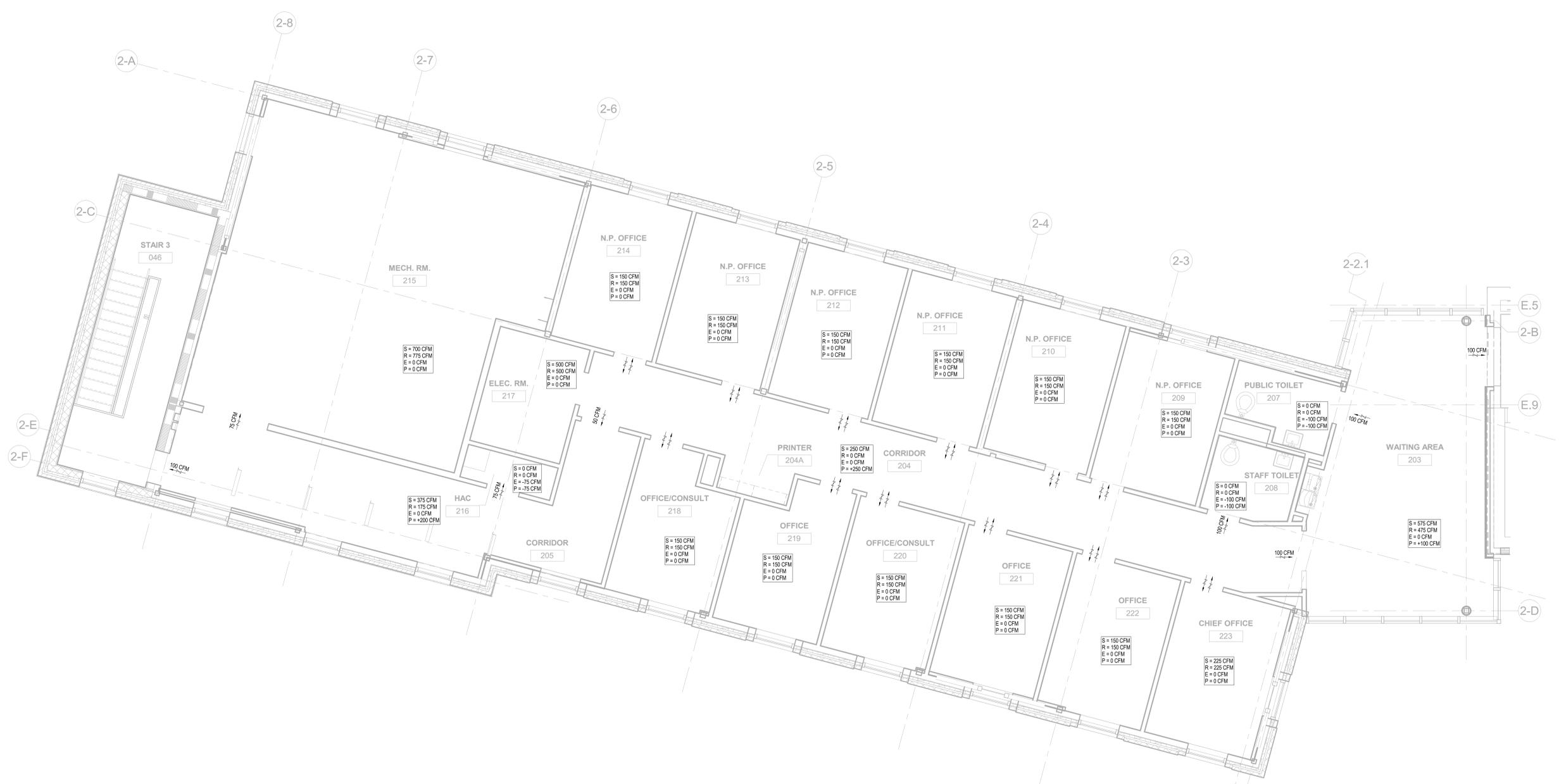
Drawn  
JJA

Project Number  
650-347

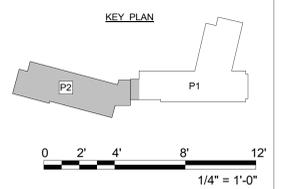
Building Number  
39

Drawing Number  
**MH131**

**DRAWING NOTES:**  
 PRESSURIZATION OF ROOMS WILL BE DISPLAYED AS FOLLOWS:  
 S = SUPPLY CFM  
 T = TRANSFER CFM (SHOWN WHERE APPLICABLE)  
 R = RETURN CFM  
 E = EXHAUST CFM  
 P = PRESSURIZATION CFM (SUM OF SUPPLY, RETURN, EXHAUST)



**F1 MECHANICAL PRESSURIZATION PLAN - LEVEL 2**  
 1/4" = 1'-0"



15/11/2025 3:53:19 PM  
 E:\360\012104 - VA Providence Mental Health Building PH10121004 - VA Providence MHC Ph2 P12 E20\_Dw 21\_22\_ & 23.rvt  
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Drawing Title  
**MECHANICAL PRESSURIZATION PLAN - LEVEL 2**

Approved:

Phase  
**CONSTRUCTION DOCUMENTS**

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Project Title  
**PROVIDENCE VAMC MENTAL HEALTH PHASE 2**

Location  
 PROVIDENCE, RI

Issue Date  
 FEB 04 2022

Checked  
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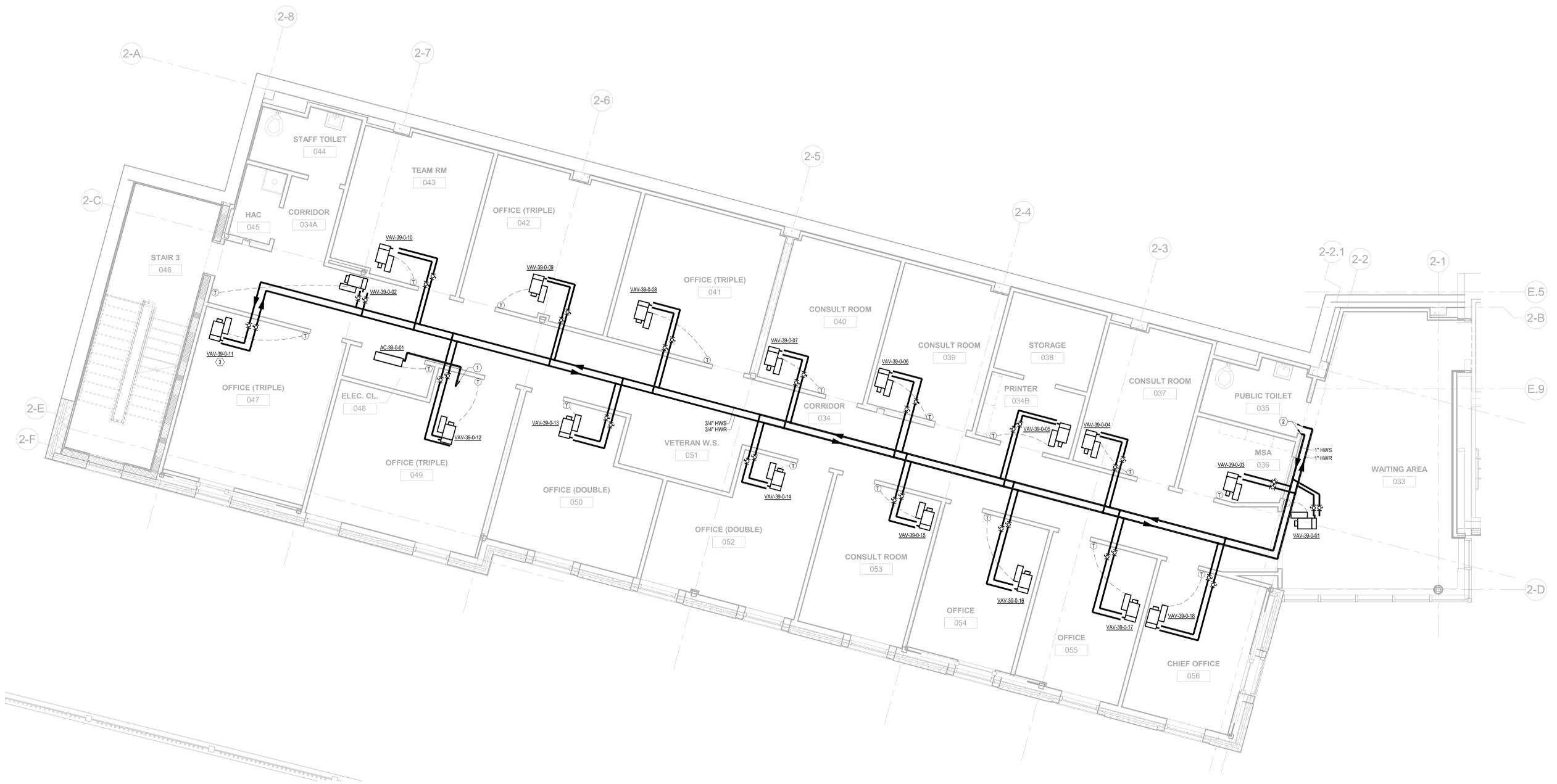
Drawn  
 JJA

Project Number  
**650-347**

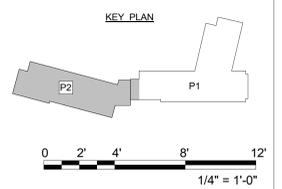
Building Number  
**39**

Drawing Number  
**MH132**

- DRAWING NOTES:**
- REFRIGERANT PIPING SHOWN AS SCHEMATIC. REFRIGERANT PIPING SHALL BE ROUTED, SIZED, AND PROVIDED WITH PIPING ACCESSORIES AS REQUIRED ACCORDING TO MANUFACTURERS INSTRUCTIONS.
  - ALL VAV CONTROL PANELS SHALL HAVE SUFFICIENT CLEARANCE IN FRONT OF THE PANEL FOR MAINTENANCE.
- CODED NOTES:**
- REFRIGERANT PIPING ROUTED FROM FLOOR ABOVE. REFER TO SHEET MP121 FOR CONTINUATION.
  - 1" HWS & R PIPING UP. REFER TO SHEET MP121 FOR CONTINUATION.
  - PROVIDE 3-WAY VALVE.



**F1 MECHANICAL PIPING PLAN - LEVEL B**  
1/4" = 1'-0"



1/31/2022 3:53:34 PM  
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E:\39010121\04 - VA Providence Mental Health Building (PHS)012104 - VA Providence MHC Phg E20\_Dv 21\_22\_ & 23.rvt

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Drawing Title  
**MECHANICAL PIPING PLAN - LEVEL B**

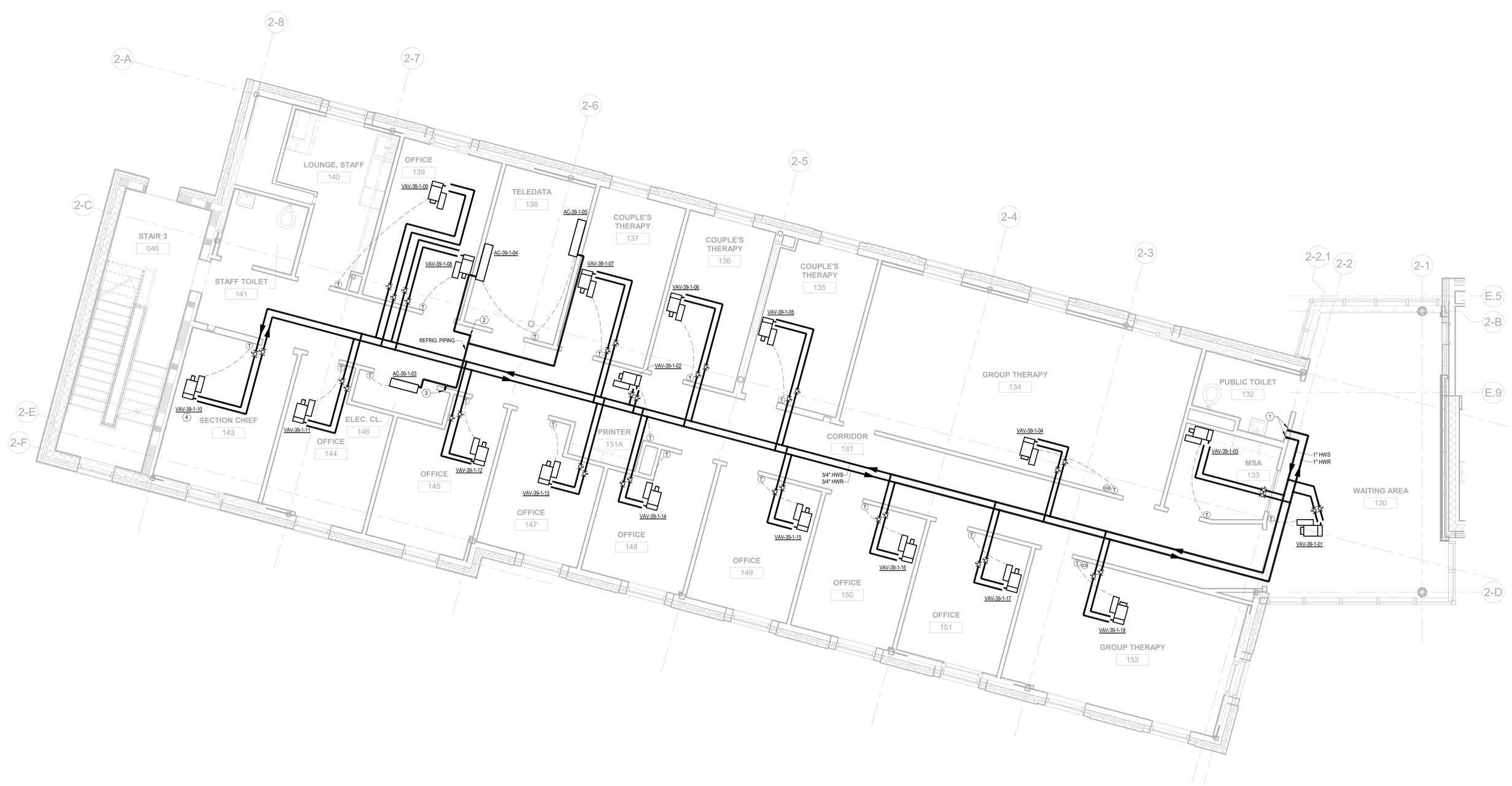
Approved:

Phase  
**CONSTRUCTION DOCUMENTS**

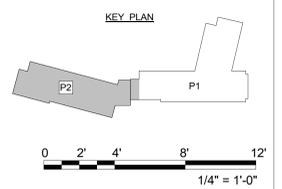
**FULLY SPRINKLERED**

Project Title PROVIDENCE VAMC MENTAL HEALTH PHASE 2	Project Number 650-347
Location PROVIDENCE, RI	Building Number 39
Issue Date FEB 04 2022	Checked ADL
Drawn JJA	Drawing Number <b>MP111</b>

- DRAWING NOTES:**
- REFRIGERANT PIPING SHOWN AS SCHEMATIC. REFRIGERANT PIPING SHALL BE ROUTED, SIZED, AND PROVIDED WITH PIPING ACCESSORIES AS REQUIRED ACCORDING TO MANUFACTURERS INSTRUCTIONS.
  - ALL VAV CONTROL PANELS SHALL HAVE SUFFICIENT CLEARANCE IN FRONT OF THE PANEL FOR MAINTENANCE.
- CODED NOTES:**
- 1-1/2" HWS & R PIPING UP/DOWN. AFTER 2ND FLOOR HWS & R PIPING CONNECTIONS, REDUCE TO 1" HWS & R AND CONTINUE DOWN TO FLOOR BELOW. REFER TO SHEET MP111 & MP131 FOR CONTINUATION.
  - REFRIGERANT PIPING ROUTED DOWN FROM FLOOR ABOVE. REFER TO SHEET MP131 FOR CONTINUATION.
  - REFRIGERANT PIPING ROUTED DOWN TO FLOOR BELOW. REFER TO SHEET MP111 FOR CONTINUATION.
  - PROVIDE 3-WAY VALVE.



**F1 MECHANICAL PIPING PLAN - LEVEL 1**  
1/4" = 1'-0"



1/31/2022 3:59:56 PM  
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Revisions:	Revision Description	Date:

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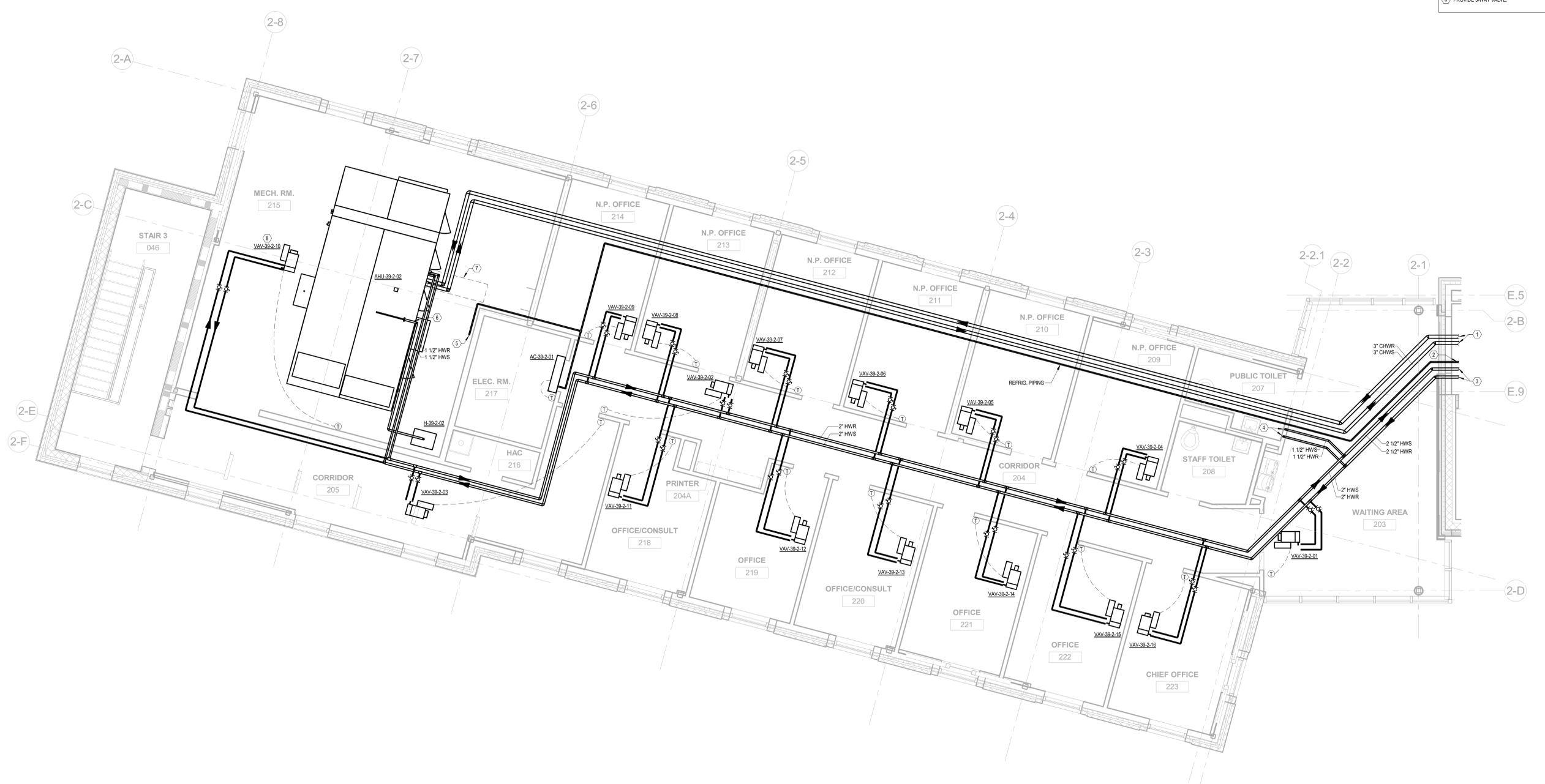
**VA** U.S. Department of Veterans Affairs

Drawing Title <b>MECHANICAL PIPING PLAN - LEVEL 1</b>
Approved:

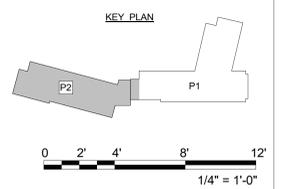
Phase <b>CONSTRUCTION DOCUMENTS</b>
<b>FULLY SPRINKLERED</b>

Project Title PROVIDENCE VAMC MENTAL HEALTH PHASE 2	Project Number 650-347
Location PROVIDENCE, RI	Building Number 39
Issue Date FEB 04 2022	Checked ADL
Drawn JJA	Drawing Number <b>MP121</b>

- DRAWING NOTES:**
- REFRIGERANT PIPING SHOWN AS SCHEMATIC. REFRIGERANT PIPING SHALL BE ROUTED, SIZED, AND PROVIDED WITH PIPING ACCESSORIES AS REQUIRED ACCORDING TO MANUFACTURER'S INSTRUCTIONS.
  - ALL VAV CONTROL PANELS SHALL HAVE SUFFICIENT CLEARANCE IN FRONT OF THE PANEL FOR MAINTENANCE.
- CODED NOTES:**
- 3" CHWS & CHWR PIPING ROUTED FROM PH1 MECHANICAL ROOM. REFER TO SHEET MP132 FOR CONTINUATION.
  - REFRIGERANT PIPING ROUTED FROM PH1 MECHANICAL ROOM. REFER TO SHEET MP132 FOR CONTINUATION.
  - 3-1/2" HWS & HWR PIPING ROUTED FROM PH1 MECHANICAL ROOM. REFER TO SHEET MP132 FOR CONTINUATION.
  - 1-1/2" HWS & HWR PIPING DOWN. REFER TO SHEET MP121 FOR CONTINUATION.
  - REFRIGERANT PIPING ROUTED DOWN TO FLOOR BELOW. REFER TO SHEET MP121 FOR CONTINUATION.
  - 1-1/2" LPS SERVING DUCT MOUNTED HUMIDIFIER. INSTALL PER MANUFACTURER'S INSTRUCTION.
  - COOLING/HEATING COILS MAINTENANCE CLEARANCE.
  - PROVIDE 3-WAY VALVE.



**F1 MECHANICAL PIPING PLAN - LEVEL 2**  
1/4" = 1'-0"



15/11/2025 3:54:09 PM  
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Drawing Title  
**MECHANICAL PIPING PLAN - LEVEL 2**

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Phase  
**CONSTRUCTION DOCUMENTS**

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Project Title <b>PROVIDENCE VAMC MENTAL HEALTH PHASE 2</b>		Project Number <b>650-347</b>	
Location <b>PROVIDENCE, RI</b>		Building Number <b>39</b>	
Issue Date <b>FEB 04 2022</b>	Checked <b>ADL</b>	Drawn <b>JJA</b>	Drawing Number <b>MP131</b>

A

B

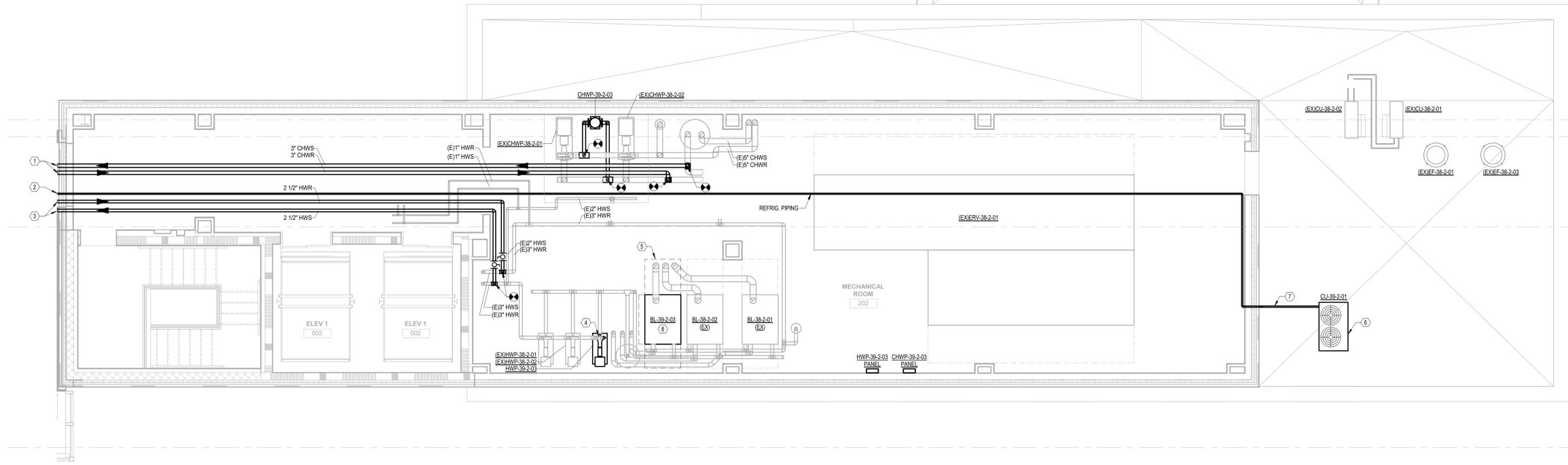
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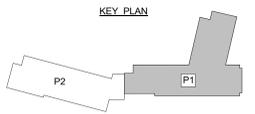
E

F

- DRAWING NOTES:**
- REFRIGERANT PIPING SHOWN AS SCHEMATIC. REFRIGERANT PIPING SHALL BE ROUTED, SIZED, AND PROVIDED WITH PIPING ACCESSORIES AS REQUIRED ACCORDING TO MANUFACTURER'S INSTRUCTIONS.
- CODED NOTES:**
- 3" CHWS & R PIPING FROM PH1 MECHANICAL ROOM. REFER TO SHEET MP131 FOR CONTINUATION.
  - REFRIGERANT PIPING FROM PH1 MECHANICAL ROOM. REFER TO SHEET MP131 FOR CONTINUATION.
  - 1" HWS & R PIPING FROM PH1 MECHANICAL ROOM. REFER TO SHEET MP131 FOR CONTINUATION.
  - CONTRACTOR SHALL MAKE CONNECTIONS TO EXISTING HEATING HOT WATER PIPING AS REQUIRED FOR CONNECTION TO NEW EQUIPMENT. REMOVE AND EXTEND CONNECTIONS AS NECESSARY. MAKE CONNECTIONS PER MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS.
  - MANUFACTURER'S RECOMMENDED CLEARANCE.
  - MOUNT CONDENSING UNIT ON RAIL SUPPORTS. COORDINATE CONDENSING UNIT LOCATION WITH STRUCTURAL FOR SNOW DRIFT.
  - MOUNT REFRIGERANT PIPING ON RAIL SUPPORTS.
  - CONTRACTOR SHALL MAKE CONNECTIONS TO EXISTING FLUE AND NATURAL GAS PIPING AS REQUIRED FOR CONNECTION TO NEW EQUIPMENT. REMOVE AND EXTEND CONNECTIONS AS NECESSARY. MAKE CONNECTIONS PER MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS.



**F1 MECHANICAL HVAC PLAN - LEVEL 2 PH1**  
1/4" = 1'-0"



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Drawing Title  
**MECHANICAL PIPING PLAN - LEVEL 2 PH1**

Approved: \_\_\_\_\_

Phase  
**CONSTRUCTION DOCUMENTS**

**FULLY SPRINKLERED**

Project Title  
**PROVIDENCE VAMC MENTAL HEALTH PHASE 2**

Location  
PROVIDENCE, RI

Issue Date  
FEB 04 2022

Checked  
ADL

Drawn  
JJA

Project Number  
**650-347**

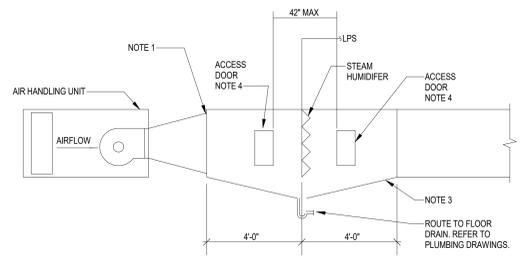
Building Number  
**39**

Drawing Number  
**MP132**



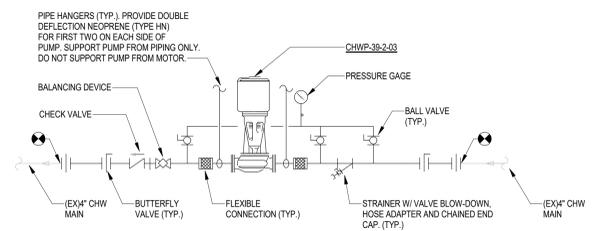


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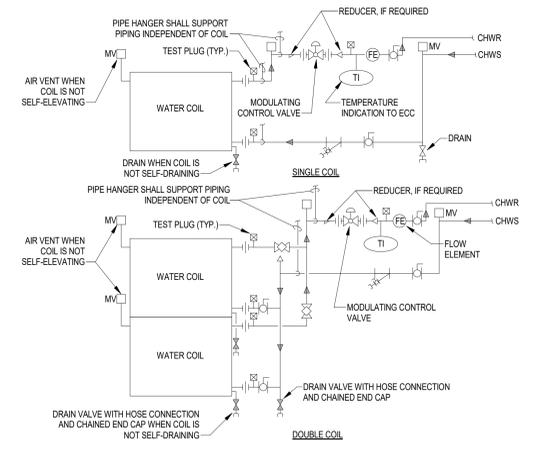


- NOTES:
1. TRANSITION WELDED STAINLESS STEEL 4" UPSTREAM OF HUMIDIFIER AND 4" DOWNSTREAM OF HUMIDIFIER.
  2. DETAIL ONLY APPLICABLE TO AHUS WITHOUT AFTER FILTER DOWNSTREAM OF THE SUPPLY AIR FAN.
  3. INTEGRAL STAINLESS STEEL DRAIN PAN SLOPE FROM ALL DIRECTIONS TO DRAIN CONNECTION. SLOPE: 1/2" PER 1'-0".
  4. PROVIDE MIN. 18" WIDE ACCESS DOOR, DIRECTLY UPSTREAM AND DOWNSTREAM OF HUMIDIFIER.

**B1** DUCT MOUNTED HUMIDIFIER  
N.T.S.

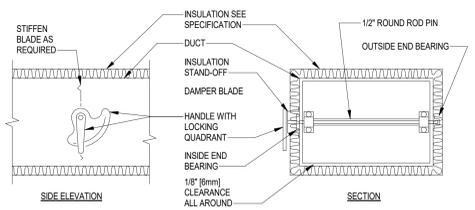


**B4** CHILLED WATER PUMP DETAIL  
N.T.S.



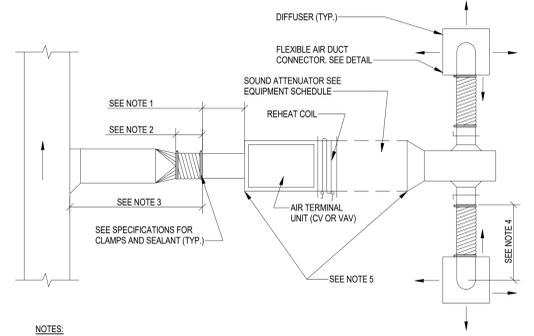
**B7** WATER COILS - PIPING CONNECTIONS  
N.T.S.

C



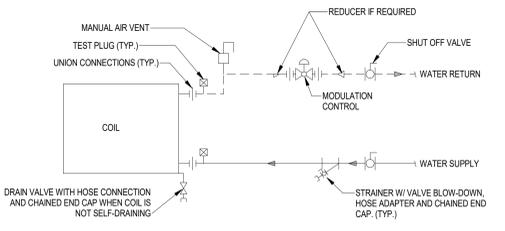
- NOTES:
1. DELETE INSULATION STAND-OFF ON DUCTWORK WITHOUT EXTERIOR INSULATION.
  2. DETAIL SHOWS SINGLE BLADE DAMPER. DAMPER INSTALLATION SHALL BE SIMILAR FOR MULTI-BLADE DAMPERS & ROUND DAMPERS.

**D1** VOLUME DAMPER DETAIL  
N.T.S.



- NOTES:
1. RIGID STRAIGHT TERMINAL UNIT INLET LENGTH SHALL BE A MINIMUM OF 3 TIMES THE DIAMETER OF INLET.
  2. A FLEXIBLE AIR DUCT CONNECTOR IS NOT MANDATORY FOR INLET TO THIS BOX, BUT ALLOWED TO ACCOMMODATE MINOR OFFSETS. MAXIMUM LENGTH: 1'-0" (300mm).
  3. A BRANCH DUCT SERVING AN INDIVIDUAL BOX MAY BE THE SAME SIZE AS THE BOX INLET, PROVIDED THE EQUIVALENT LENGTH OF THE BRANCH DUCT, AS SHOWN, DOES NOT EXCEED 10 FEET (3 METERS). FOR LONGER LENGTHS, INCREASE THE DUCT SIZE AND PROVIDE A DUCT TRANSITION TO MAINTAIN THE DUCT STATIC PRESSURE DROP AT OR BELOW 0.2"/100" (1.64Pa/m).
  4. FLEXIBLE AIR DUCT CONNECTORS, WHEN USED FROM TERMINAL UNIT SUPPLY AIR DUCT TO DIFFUSER, SHALL NOT EXCEED 2'-0" (1500mm). USE RIGID ELBOWS FOR CHANGE OF DIRECTION GREATER THAN 45°.
  5. COMPONENT ARRANGEMENT MAY VARY BY MANUFACTURER. PROVIDE INSULATION W/VAPOR BARRIER FOR CONNECTING DUCT SECTIONS.
  6. USE OF THE FLEXIBLE AIR DUCT CONNECTORS ARE NOT PERMITTED FOR THE DEDICATED AHU SERVING THE SURGICAL SUITE.

**D4** DUCT CONNECTIONS - AIR TERMINAL UNITS  
N.T.S.

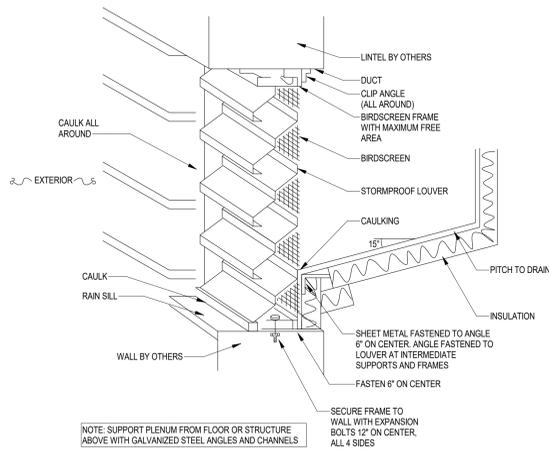


**D7** TERMINAL UNIT WATER COILS - PIPING CONNECTIONS  
N.T.S.

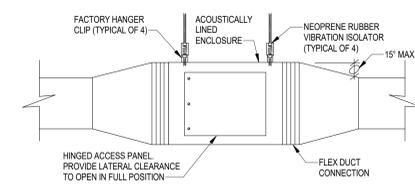
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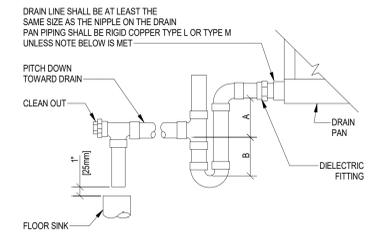
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**F1** WALL LOUVER/PLENUM DETAIL  
N.T.S.



**F4** INLINE CENTRIFUGAL EXHAUST FAN DETAIL  
N.T.S.



- NOTES:
1. CPVC PIPE MAY BE USED ONLY IF APPROVED BY LOCAL VA AND IS INDOORS AND DOES NOT PASS THROUGH RATED BARRIERS.
  2. DIELECTRIC FITTING TO BE USED WHEN TWO DISSIMILAR METALS ARE TO BE CONNECTED.

UNIT TYPE	A	B
DRAW THRU	2" (50mm) PLUS X	X
BLOW THRU	1" (25mm) MINIMUM	2X

WHERE X = STATIC PRESSURE IN PAN

**F7** AIR HANDLING UNIT DRAIN TRAP DETAIL  
N.T.S.

F

Revisions:	Revision Description	Date:

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Drawing Title  
**MECHANICAL DETAILS**

Approved:

Phase  
**CONSTRUCTION DOCUMENTS**

**FULLY SPRINKLERED**

Project Title  
**PROVIDENCE VAMC MENTAL HEALTH PHASE 2**

Location  
PROVIDENCE, RI

Issue Date  
FEB 04 2022

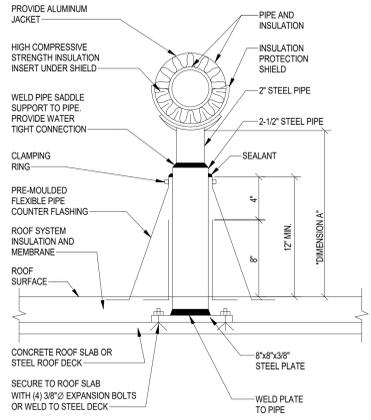
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ADL

Drawn  
JJA

Project Number  
650-347

Building Number  
39

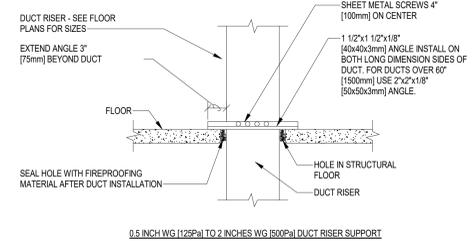
Drawing Number  
**M-502**



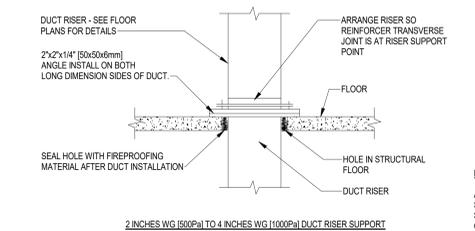
CLEARANCE REQUIREMENTS FOR ROOF TOP EQUIPMENT (DIMENSION A)	
WIDTH OF EQUIP. (INCHES)	CLEARANCE (INCHES)
UP TO 24	14
24 TO 36	18
37 TO 48	24
49 TO 60	30
61 & WIDER	48

NOTES:  
PROVIDE RESTRAINING CLAMPS 8'-0" O.C.

**B1** ROOF PIPE SUPPORT DETAIL  
N.T.S.



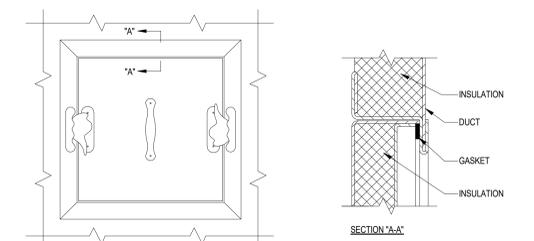
0.5 INCH WG (125Pa) TO 2 INCHES WG (500Pa) DUCT RISER SUPPORT



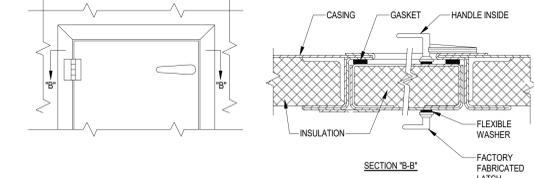
2 INCHES WG (500Pa) TO 4 INCHES WG (1000Pa) DUCT RISER SUPPORT

NOTE:  
ALL DUCT WORK RISERS WHICH ARE RUN EXPOSED, SUCH AS THRU ATTIC FLOORS AND FAN ROOM FLOORS SHALL BE PROVIDED WITH A 3\"/>

**B4** DUCT RISER SUPPORTS  
N.T.S.

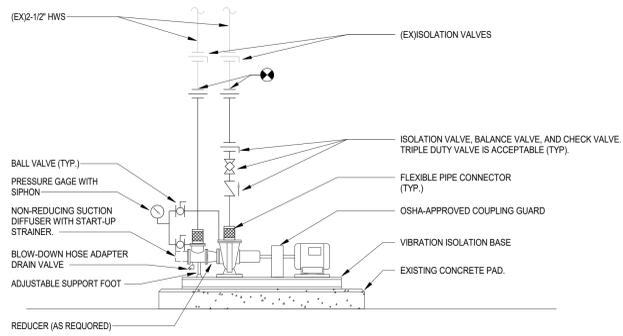


**ACCESS PANEL**

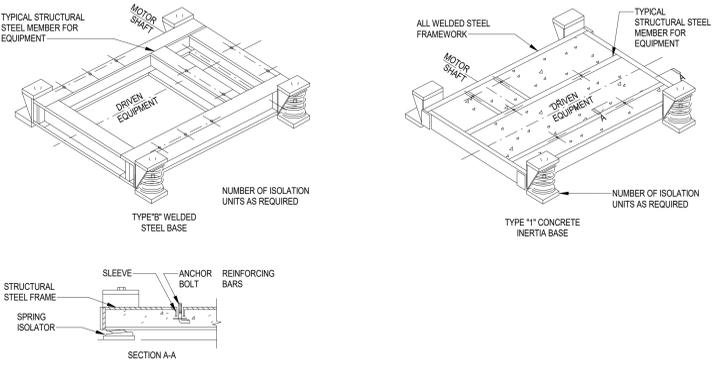


**ACCESS DOOR**

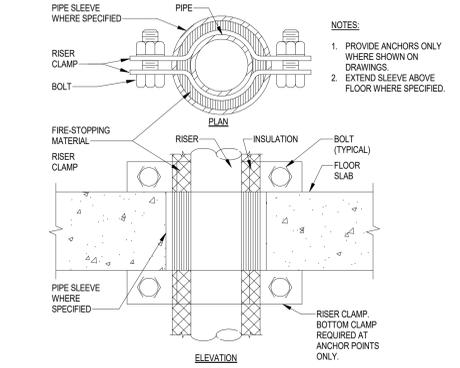
**B8** ACCESS PANEL AND DOOR DETAIL  
N.T.S.



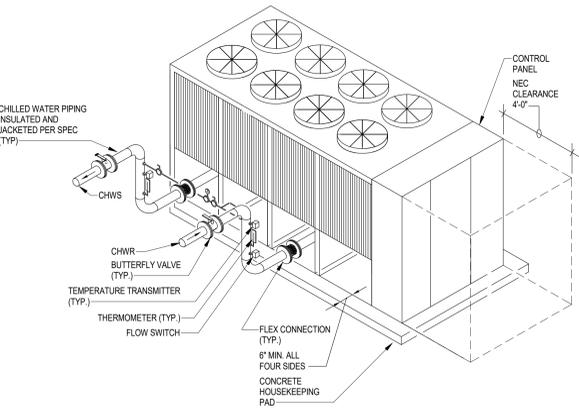
**D1** HOT WATER PUMP DETAIL  
N.T.S.



**D4** VIBRATION ISOLATION BASES  
N.T.S.

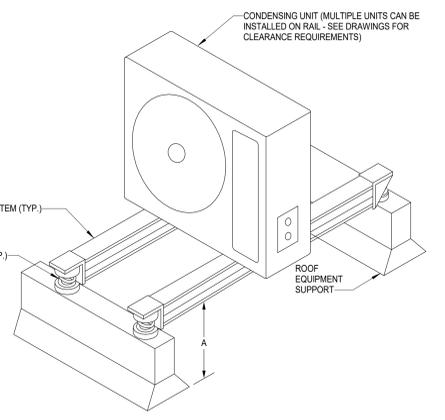


**D8** SUPPORT/ANCHOR FOR PIPE RISERS  
N.T.S.

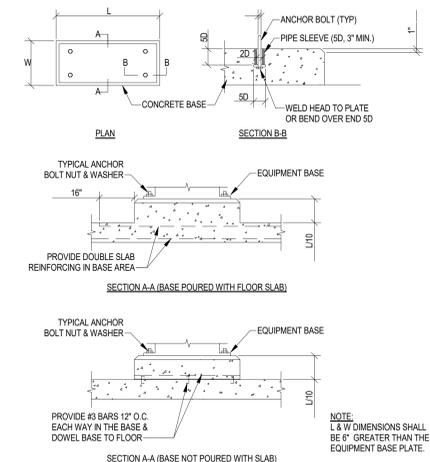


**F1** AIR COOLED CHILLER PIPING DETAIL  
N.T.S.

CLEARANCE REQUIREMENTS FOR CONDENSING UNITS (DIMENSION A)	
WIDTH OF EQUIP. (IN.)	CLEARANCE (IN.)
UP TO 24	14
25 TO 36	18
37 TO 48	24
49 TO 60	30
61 & WIDER	48



**F4** CU MOUNTED ON GRADE  
N.T.S.



**F8** CONCRETE EQUIPMENT BASES  
N.T.S.

15/11/2025 3:51:33 PM  
E:\360\0121004 - VA Providence Mental Health Building PH010121004 - VA Providence MHC Phg E20\_Div 21\_ZZ\_ & 25.rvt  
F:\360\0121004 - VA Providence Mental Health Building PH010121004 - VA Providence MHC Phg E20\_Div 21\_ZZ\_ & 25.rvt  
VA FORM 08 - 6231

Revisions:	Revision Description	Date:

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MD License #41513

**Office of Construction and Facilities Management**

VA U.S. Department of Veterans Affairs

Drawing Title  
**MECHANICAL DETAILS**

Approved:

Phase  
**CONSTRUCTION DOCUMENTS**

**FULLY SPRINKLERED**

Project Title  
**PROVIDENCE VAMC MENTAL HEALTH PHASE 2**

Location  
PROVIDENCE, RI

Issue Date  
FEB 04 2022

Checked  
ADL

Drawn  
JJA

Project Number  
650-347

Building Number  
39

Drawing Number  
**M-503**

**DRAWING NOTES:**

- CONTRACTOR SHALL PROVIDE COMPLETE DDC AUTOMATIC TEMPERATURE CONTROL SYSTEM COMPATIBLE WITH THE EXISTING METASYS BUILDING MANAGEMENT SYSTEM BY JOHNSON CONTROLS, INC. ALL HVAC SYSTEM AND ANCILLARY COMPONENTS SHALL BE CONTROLLED BY THE EXISTING METASYS BUILDING MANAGEMENT SYSTEM. FINAL CONNECTION OF NEW EQUIPMENT TO THE EXISTING METASYS BUILDING MANAGEMENT SYSTEM SHALL BE MADE BY A COMPANY AND TECHNICIANS FULLY QUALIFIED AND CERTIFIED BY JOHNSON CONTROLS, INC. TO PROGRAM, INSTALL, ADJUST, REPAIR, MAINTAIN, MODIFY, OR OTHERWISE MANIPULATE THE METASYS BUILDING MANAGEMENT SYSTEM. THE CONTRACTOR SHALL PROVIDE THE VA VIA SUBMITTAL COPIES OF FACTORY TRAINING CERTIFICATES FOR EACH TECHNICIAN WORKING ON THE PROVIDENCE VAMC METASYS SYSTEM PRIOR TO COMMENCEMENT OF ANY CONTROLS WORK. THE PROVIDENCE VAMC WILL REVIEW THE CERTIFICATIONS AS PART OF THE SUBMITTAL PROCESS. CONTRACTOR SHALL CARRY THE COST OF THIS WORK IN THEIR BID.
- ALL DDC CONTROLS SHALL BE PROVIDED BY THE CONTRACTOR AND SHALL BE BACNET METASYS CONTROLS BY JOHNSON CONTROLS FOR AHUs, CHILLERS, FANS, FCUs, VAVs, CIRCULATING PUMPS, CONTROL VALVES, MOTORIZED DAMPERS, AND ANY OTHER EQUIPMENT OR ACCESSORIES AS NOTED IN THE DRAWINGS AND SPECIFICATIONS.
- ALL CONTROLS SHALL HAVE OCCUPIED AND UNOCCUPIED FUNCTIONS.
- ALL SET POINTS SHALL BE FULLY ADJUSTABLE.
- ALL MONITORED POINTS, INCLUDING STATUS (ON, OFF, FAILED) AND ANY ALARMS SHALL DISPLAY AT THE DDC WORKSTATIONS.
- "COOLING MODE" SHALL BE DEFINED AS ANY TIME THE OUTSIDE AIR TEMPERATURE IS ABOVE 59°F (ADJUSTABLE) AND A CALL FOR HEATING EXISTS FROM ANY ASSOCIATED PIECE OF EQUIPMENT. "COOLING MODE" SHALL EXTEND TO 1 HOUR BEYOND THE CALL FOR COOLING IS SATISFIED TO PREVENT SHORT CYCLING.
- "HEATING MODE" SHALL BE DEFINED AS ANY TIME THE OUTSIDE AIR TEMPERATURE IS BELOW 68°F (ADJUSTABLE) AND A CALL FOR HEATING EXISTS FROM ANY ASSOCIATED PIECE OF EQUIPMENT.
- WHERE 100% REDUNDANT MOTORIZED EQUIPMENT IS INSTALLED, THE TWO (OR MORE) PIECES OF EQUIPMENT SHALL ALTERNATE OPERATION ON AN ADJUSTABLE, EQUAL RUN-TIME BASIS. THE DDC SYSTEM SHALL DISPLAY CUMULATIVE RUN-TIME OF EACH UNIT. IF ONE UNIT FAILS, THE OTHER UNIT SHALL START AUTOMATICALLY AND THE DDC SYSTEM SHALL GENERATE AN ALARM SIGNAL.
- HVAC SYSTEM SHALL BE DESIGNED IN ACCORDANCE WITH THE LATEST VERSION OF THE VA HVAC DESIGN MANUAL AND THE LATEST VERSIONS OF THOSE STANDARDS REFERENCED WITHIN THAT MANUAL. THE DESIGNER IS RESPONSIBLE FOR VERIFICATION OF THE LATEST VERSION.
- ALL INDIVIDUAL ROOM ENVIRONMENTAL PARAMETERS SHALL BE DESIGNED AND SET IN ACCORDANCE WITH THE LATEST VERSION OF THE VA HVAC DESIGN MANUAL.
- ALL EQUIPMENT SHALL BE ENERGY STAR CERTIFIED AND MAXIMUM EFFICIENCY.

**SEQUENCE OF OPERATION**

**SYSTEM DESCRIPTION:** THE AIR HANDLING UNIT (AHU) IS A VAV SYSTEM COMPRISED OF AN OUTSIDE AIR (OA) PATH WITH AN OUTSIDE AIR DAMPER AND AN AIRFLOW MONITORING STATION, A RETURN AIR (RA) PATH, AN ENERGY RECOVERY WHEEL WITH BYPASS DAMPERS (D-4 AND D-5), AN EXHAUST FAN WITH A VARIABLE FREQUENCY DRIVE (VFD), AN EXHAUST AIR (EA) PATH WITH AN EXHAUST AIR DAMPER, AN ECONOMIZER, A COOLING COIL, AIR FILTERS, AND A SUPPLY AIR FAN WITH A VFD, AND ALL ASSOCIATED APPURTENANCES AND DEVICES DEPICTED ON THE CONTROL SYSTEM DIAGRAM.

**GENERAL:** THE AIR HANDLING SYSTEM SHALL BE STARTED AND STOPPED THROUGH A SYSTEM HAND-OFF-AUTOMATIC (HOA) SWITCH, WHEN INDEXED TO "HAND", THE SYSTEM SHALL BE ENERGIZED TO OPERATE UNDER THE CONTROL SEQUENCE. WHEN INDEXED TO "OFF", THE SYSTEM SHALL BE DE-ENERGIZED. WHEN INDEXED TO "AUTOMATIC", THE SYSTEM SHALL BE STARTED AND STOPPED THROUGH THE BUILDING AUTOMATION SYSTEM (BAS). THE HO-A SWITCH POSITION SHALL BE MONITORED THROUGH THE BAS.

ALL SAFETIES AND ASSOCIATED CONTROL INTERLOCKS SHALL BE HARDWIRED AND REMAIN ACTIVE IN ALL HO-A SWITCH POSITIONS.

ALL CONTROLS SHALL BE AUTOMATIC AND ALL SETPOINTS SHALL BE ADJUSTABLE.

REMOTE EMERGENCY SHUTDOWN FOR SYSTEM SHUTDOWN SHALL BE PROVIDED THROUGH THE FIRE ALARM SYSTEM UNDER ANOTHER DIVISION.

ELECTRIC FREEZE/STAT F-1 SHALL STOP SA AND RA FANS AT 35 DEGREES F AND SEND AN ALARM TO THE BAS.

**SYSTEM START/STOP:** WHEN THE UNIT SUPPLY AIR FANS ARE ENERGIZED TO OPERATE, THE RETURN AIR FANS SHALL BE INTERLOCKED TO OPERATE, UNLESS OTHERWISE NOTED. AIR HANDLING UNIT SUPPLY AND RETURN AIR FANS SHALL BE SOFT STARTED THROUGH THEIR VFD.

STATIC PRESSURE SENSOR SPS-1 STOPS SA FAN SHOULD MIXING PLENUM PRESSURE FALL BELOW MINUS 2" WG AND SENDS AN ALARM TO THE ECC. STATIC PRESSURE SENSOR SPS-2 STOPS SA FAN SHOULD DISCHARGE PLENUM PRESSURE RISE ABOVE 6" WG AND SENDS AN ALARM TO THE ECC. STATIC PRESSURE SENSOR SPS-3 STOPS RA FAN SHOULD RELIEF DUCT PRESSURE RISE ABOVE 3" WG AND SENDS AN ALARM TO THE ECC.

WHENEVER FANS ARE STOPPED, THE OUTSIDE AIR AND EXHAUST AIR DAMPERS SHALL CLOSE. THE BYPASS DAMPER SHALL OPEN.

**OCCUPIED MODE:** THE SYSTEM FANS SHALL ENERGIZE CONTINUOUSLY. THE EA AND OA DAMPERS SHALL OPEN TO MINIMUM POSITION. AND THE EA BYPASS AIR, AND OA DAMPERS SHALL OPEN PER THE DAMPER CONTROL SEQUENCES. THE CONTROL VALVES SHALL MODULATE PER THE "SUPPLY AIR TEMPERATURE CONTROL" AND THE "OUTSIDE AIR DAMPER CONTROL".

WHEN OA AT TS-1 IS BELOW 60 DEGREES F (ADJUSTABLE), SA TEMPERATURE AT TS-6 SHALL MODULATE THE EA, OA, AND BYPASS DAMPERS AND THEN TS-6 SHALL MODULATE THE CHILLED WATER VALVE AT V-2. ALL IN SEQUENCE ON TEMPERATURE RISE. TO MAINTAIN 55 DEGREES F (ADJUSTABLE).

WHEN AHU IS AT MINIMUM AIRFLOW FOR 30 MINUTES (ADJUSTABLE), SA TEMPERATURE AT TS-6 SHALL RESET UP IN 1 DEGREE F INCREMENTS EVERY 30 MINUTES (ADJUSTABLE) UNTIL THE RA RELATIVE HUMIDITY AT H-3 RISES ABOVE 60 PERCENT. THE SA TEMPERATURE AT TS-6 SHALL, THEN BE RESET DOWN TO 55 DEGREES F IN 1 DEGREE F INCREMENTS EVERY 10 MINUTES (ADJUSTABLE).

**UNOCCUPIED MODE:** THE ECC SHALL MAINTAIN SETBACK TEMPERATURE SET POINTS DURING UNOCCUPIED PERIODS. THE UNOCCUPIED SPACE TEMPERATURE RANGE SHALL BE 60°F (ADJUSTABLE) TO 80°F (ADJUSTABLE). THE EA AND OA DAMPERS SHALL CLOSE AND THE BYPASS DAMPER SHALL OPEN. THE UNIT SHALL BE OFF.

UPON ANY SPACE TEMPERATURE FALLING BELOW THE UNOCCUPIED SET POINT, THE UNIT SHALL BE ENERGIZED AND THE BYPASS DAMPER SHALL OPEN AND HEATING SEQUENCES ENGAGED TO MAINTAIN DISCHARGE AIR TEMPERATURE SET POINT. ONCE SPACE TEMPERATURE SENSOR IS SATISFIED, UNIT SHALL BE DE-ENERGIZED. UNOCCUPIED HEATING DISCHARGE AIR TEMPERATURE SET POINT SHALL BE 70°F (ADJUSTABLE). THE FMS SHALL OPERATE ZONE RE-HEAT IN ON-OFF FASHION AS REQUIRED IN EACH SPACE.

UPON ANY SPACE TEMPERATURE RISING ABOVE THE UNOCCUPIED SET POINT, THE UNIT SHALL BE ENERGIZED AND COOLING SEQUENCES ENGAGED TO MAINTAIN DISCHARGE AIR TEMPERATURE SET POINT. ONCE SPACE TEMPERATURE SENSOR IS SATISFIED, UNIT SHALL BE DE-ENERGIZED. UNOCCUPIED COOLING DISCHARGE AIR TEMPERATURE SET POINT SHALL BE 55°F (ADJUSTABLE).

DURING THE MORNING WARM-UP PERIOD, THE SPACE TEMPERATURE SET POINTS SHALL REVERT TO THE OCCUPIED PERIOD SETTINGS. MORNING WARM-UP HEATING DISCHARGE AIR TEMPERATURE SET POINT SHALL BE 80°F (ADJUSTABLE). THE ECC SHALL OPERATE SPACE HEATING SEQUENCES AS DURING OCCUPIED PERIODS. ONCE ANY SPACE TEMPERATURE SENSOR IS SATISFIED, THE ECC SHALL REVERT TO NORMAL, OCCUPIED CONTROL.

**AIR FLOW CONTROL:** THE UNIT CONTROLLER SHALL MODULATE THE VFD FREQUENCY ECCED ON A SIGNAL FROM THE STATIC PRESSURE SENSOR LOCATED IN THE SUPPLY DUCT TO MAINTAIN THE STATIC PRESSURE SET POINT AS DETERMINED BY THE TEST AND BALANCE CONTRACTOR.

**OUTSIDE AIR DAMPER CONTROL:** THE OUTSIDE AIR DAMPER SHALL BE MODULATED TO MAINTAIN THE OUTSIDE AIR VOLUME SETPOINT AS SCHEDULED. THE BYPASS AND EXHAUST AIR DAMPERS SHALL BE OPENED TO 100% IF THE OUTSIDE AIR DAMPER IS OPEN 100% AND THE OUTSIDE AIR VOLUME IS BELOW SETPOINT. THE BYPASS AND EXHAUST AIR DAMPERS SHALL BE MODULATED TO MAINTAIN THE OUTSIDE AIR VOLUME SETPOINT. AN ALARM SHALL BE GENERATED AT THE ECC IF THE OUTSIDE AIRFLOW VARIES BY MORE THAN 10% FROM SETPOINT FOR MORE THAN 10 MINUTES (ADJ.).

**SUPPLY AIR TEMPERATURE CONTROL AND RESET:** WHEN THE SUPPLY FAN IS ON, THE CHILLED WATER VALVE SHALL MODULATE TO MAINTAIN THE LEAVING AIR TEMPERATURE SETPOINT. INITIALLY SET AT 55°F (ADJUSTABLE). DURING WINTER CONDITIONS, HEATING HOT WATER COIL VALVE SHALL MODULATE TO BRING MIXED AIR TEMPERATURE TO 60°F AND THE AHU SHALL RAMP DOWN TO MINIMUM AIRFLOW AND THE VAV BOXES HEATING HOT WATER VALVE SHALL MODULATE TO MAINTAIN ROOM TEMPERATURE SETPOINT (SEE VAV TERMINAL UNIT SEQUENCE OF OPERATION FOR MORE INFORMATION). THE DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE RESET TO THE OPTIMAL SETPOINT COMMUNICATED BY THE ECC. THE ECC SHALL RESET THE DISCHARGE AIR TEMPERATURE SETPOINT ECCED ON THE CURRENT OUTSIDE AIR TEMPERATURE, BUT SHALL OVERRIDE THIS RESET FUNCTION AND RETURN THE DISCHARGE AIR TEMPERATURE SETPOINT TO 55°F (ADJ.) IF MORE THAN TWO (2) ZONES BEYOND OVERHEAT. ALSO, THE ECC SHALL OVERRIDE THIS RESET FUNCTION WHENEVER OUTDOOR DEW POINT IS HIGHER THAN 60.0 DEG. F (ADJ.) OR INDOOR HUMIDITY IS HIGHER THAN 60% RH (ADJ.). IF THE DISCHARGE AIR TEMPERATURE DROPS BELOW THE MINIMUM LIMIT, A LOW TEMPERATURE ALARM SHALL ANNUNCIATE AND THE UNIT SHALL SHUT DOWN. IF THE DISCHARGE AIR TEMPERATURE RISES ABOVE THE MAXIMUM LIMIT, A HIGH TEMPERATURE ALARM SHALL ANNUNCIATE.

**ENERGY RECOVERY OPERATION:**  
 COOLING RECOVERY MODE: THE WHEEL SHALL BE ENERGIZED WHEN THE OUTSIDE AIR ENTHALPY IS HIGHER THAN THE RETURN AIR ENTHALPY AND THE OUTSIDE AIR TEMPERATURE IS ABOVE ECONOMIZER ENABLE SETPOINT. HEATING RECOVERY MODE: THE WHEEL SHALL BE ENERGIZED WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW THE ECONOMIZER ENABLE SETPOINT, THE COOLING COIL VALVE IS CLOSED, AND THE OUTSIDE AIR DAMPER IS SET TO MINIMUM POSITION. IF THE OUTSIDE AIR TEMPERATURE DROPS BELOW THE FROST THRESHOLD SETPOINT OF 33°F (ADJ.), THE WHEEL VFD SHALL ENERGIZE TO VARY THE WHEEL SPEED.

**ECONOMIZER:** WHEN OUTSIDE AIR ENTHALPY IS LOWER THAN RETURN AIR ENTHALPY AND THE OUTSIDE AIR IS 75°F DB OR LESS, THE HEATING AND COOLING COIL VALVES SHALL CLOSE. ENERGY WHEEL SHALL DE-ENERGIZE, AND THE OUTSIDE AIR DAMPER AND BYPASS DAMPER SHALL MODULATE TO MAINTAIN SUPPLY AIR TEMPERATURE. THE ECONOMIZER SHALL DISABLE WHEN OA ENTHALPY IS GREATER THAN RA ENTHALPY OR THE OUTSIDE AIR IS GREATER THAN 75°F DB. DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE DETERMINED VIA DEMAND-ECCED RESET.  
 1. INITIAL MAXIMUM DISCHARGE AIR TEMPERATURE SET POINT SHALL BE 65°F (ADJUSTABLE).  
 2. ECC SHALL POLE THE POSITION OF ALL VAV TERMINAL DAMPERS (D-1 ON VAV SEQUENCE) AND RESET THE STATIC PRESSURE SENSING STATIONS SETPOINT WITH THE GREATEST NEED UNTIL ONE DAMPER IS OPEN TO 75% (ADJUSTABLE) OF FULL AIR FLOW.

**VENTILATION CONTROL:** WHEN THE SPACE CO2 LEVEL IS GREATER THAN 350 PPM (ADJUSTABLE), THE OUTDOOR AIR DAMPER SHALL OPEN TO THE DESIGN MINIMUM OUTDOOR AIR DAMPER SETPOINT. AS SPACE CO2 LEVELS RISE TO THE MAXIMUM 1350 PPM (ADJUSTABLE) SETPOINT, THE OUTDOOR AIR DAMPER SHALL OPEN SHALL MODULATE TO 100% OPEN UNTIL DIFFERENTIAL FALLS BELOW 780 PPM OR UNTIL TS-3 CAN NO LONGER MAINTAIN ITS SETPOINT. SPACE TEMPERATURE SENSOR TS-1 SHALL MODULATE ITS ASSOCIATED VALVE TO MAINTAIN 75 DEGREE SPACE COOLING TEMPERATURE OR 60 DEGREE SPACE HEATING TEMPERATURE.

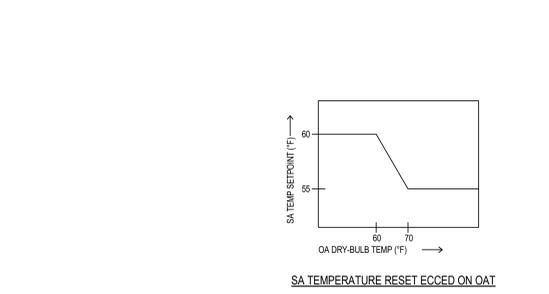
**HUMIDITY CONTROL:** WHENEVER SPACE RELATIVE HUMIDITY IS ABOVE 60% (ADJUSTABLE), THE UNIT SHALL MAINTAIN A COOL OF 60°F (ADJUSTABLE). IF THE VFD IS AT MINIMUM SPEED AND THE SPACE TEMPERATURE DROPS BELOW HEATING SETPOINT OF 70°F (ADJUSTABLE), THE VAV BOXES HEATING HOT WATER VALVE SHALL MODULATE TO PREVENT OVERCOOLING OF THE SPACE AND MAINTAIN SPACE TEMPERATURE SETPOINT. ONCE THE SPACE RELATIVE HUMIDITY HAS DROPPED BACK TO 50% RH (ADJUSTABLE) FOR MORE THAN 20 MINUTES (ADJUSTABLE), THE COOLING MODE SEQUENCE SHALL BE RESTORED. WHENEVER SPACE RELATIVE HUMIDITY IS BELOW 30% (ADJUSTABLE), STEAM HUMIDIFIER H-39-2-02 SHALL ENERGIZE. ONCE HUMIDITY IS ABOVE 50% (ADJUSTABLE) FOR MORE THAN 20 MINUTES (ADJUSTABLE), STEAM HUMIDIFIER H-39-2-02 SHALL DE-ENERGIZE.

**SMOKE DETECTION SHUTDOWN:** UPON A SIGNAL FROM THE ASSOCIATED, HARD WIRED, INTERLOCKED, SMOKE DETECTOR (FURNISHED AND WIRED BY DIVISION 28, MOUNTED BY DIVISION 23) THAT SMOKE IS DETECTED IN THE AIR STREAM, THE FIRE ALARM SYSTEM SHALL SHUT DOWN ASSOCIATED UNITS SUPPLY FANS, AND AT THE SAME TIME THE SMOKE DETECTOR SIGNAL SHALL DISPLAY AN ALARM ON THE UNIT GRAPHICAL USER INTERFACE THAT THE AIR HANDLING UNIT WAS SHUTDOWN FOR SMOKE DETECTION.

**HIGH LIMIT STATIC SHUTDOWN:** UPON HIGH STATIC SUPPLY DUCT PRESSURE SENSOR, THE SUPPLY FAN SHALL DE-ENERGIZE, THE OUTSIDE AIR DAMPER SHALL CLOSE, THE BYPASS DAMPER SHALL BE OPENED AND AN ALARM SHALL DISPLAY ON THE UNIT GRAPHICAL USER INTERFACE.

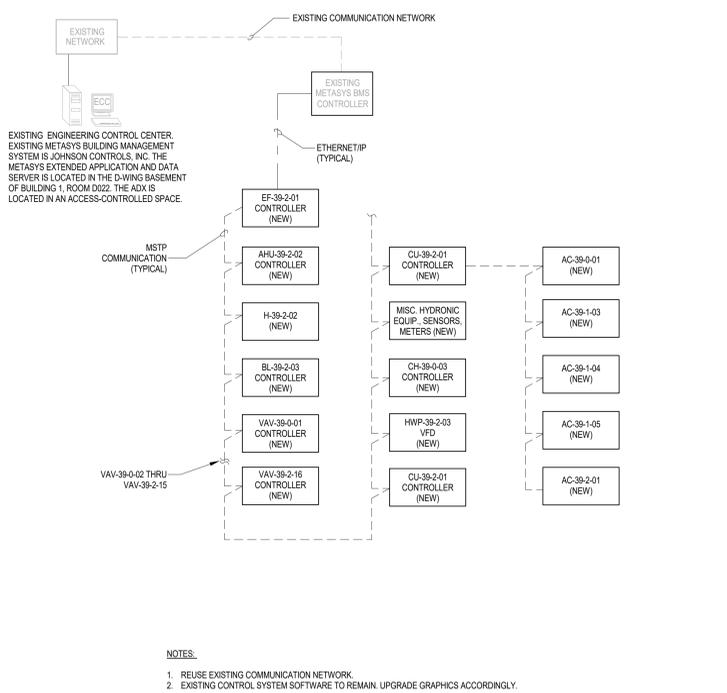
**FILTER STATUS:** A DIFFERENTIAL PRESSURE SWITCH SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS FILTER(S) WHEN THE FAN IS RUNNING. IF THE SWITCH CLOSURES DURING NORMAL OPERATION A DIRTY FILTER ALARM SHALL ANNUNCIATE AT THE ECC.

**GRAPHICAL USER INTERFACE:** PROVIDE A COMPLETE GRAPHIC DISPLAY OF THE SYSTEM AT THE ECC. THE DISPLAY SHALL SHOW ALL POINTS WITH THEIR MEASURED VALUES OR STATUS, WHICH SHALL BE UPDATED CONTINUOUSLY.



**F1 AHU-39-2-02 CONTROLS**  
N.T.S.

SYSTEM	INPUT/OUTPUT SUMMARY										REMARKS									
	INDICATION					CONTROL														
	STATUS	TEMPERATURE	RELATIVE HUMIDITY	PPM	CFM	STATIC PRESSURE	DIFF. PRESSURE	POSITION	RUN TIME	HERTZ	LOW	HIGH	CRITICAL	PROGRAM START/STOP	HAND-OFF-AUTO	MAINTENANCE	MODULATE	MIN/MAX	OPEN/CLOSED	
AHU-39-2-02	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
SYSTEM	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	ECC, HOA
SUPPLY AIR FAN	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	DPS-3, CS-1, AFS-2
EXHAUST AIR FAN	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	DPS-5, CS-2
OUTDOOR AIR	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	AFS-1, TS-1, H-1, CO2-1
RETURN AIR	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	TS-7, H-3
SUPPLY AIR	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	TS-4, H-2, AFS-2, SPSS-1, SPSS-2, SPSS-3
MIXED AIR	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	TS-3
CC/EAT	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	TS-4, F-1
ECC IAT	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	TS-4
VALVE & FLOW	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	V-1, WFS-1, V-2, WFS-2, V-3
SMOKE DETECTOR	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	SD-1, SD-2, INTERLOCK W/ FAS
FILTERS	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	DPS-1, DPS-2, DPS-4
COMPRESSORS	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	COMPRESSOR OPERATING CAPACITY
HIGH/LOW STATIC PRESSURE	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	SPS-1, SPS-2, SPS-3
DAMPERS	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	D-1, D-2, D-3, D-4, D-5
SPACE	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	TS-2, CO2-2



Revisions:	Revision Description	Date:

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**STAMP**

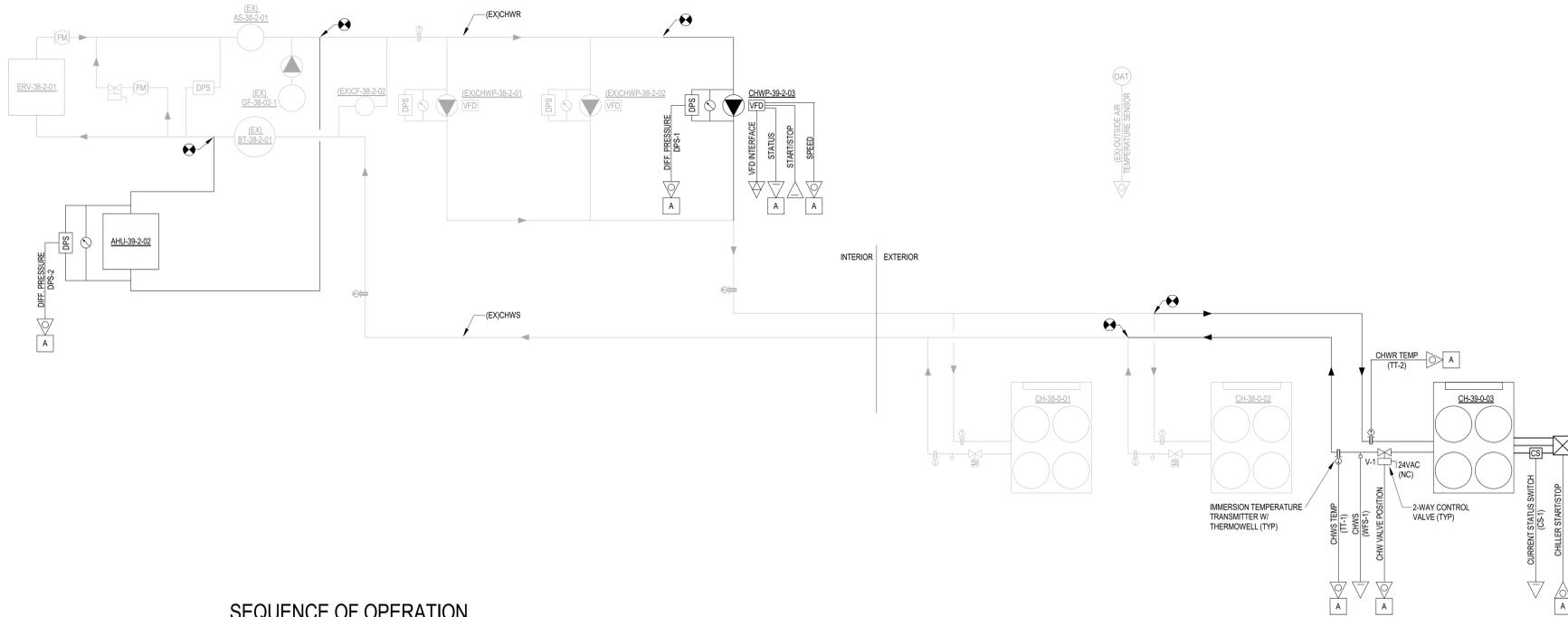
**Office of Construction and Facilities Management**

Drawing Title  
**MECHANICAL CONTROLS**  
 Approved:

Phase  
**CONSTRUCTION DOCUMENTS**  
**FULLY SPRINKLERED**

Project Title  
**PROVIDENCE VAMC MENTAL HEALTH PHASE 2**  
 Location  
PROVIDENCE, RI  
 Issue Date  
FEB 04 2022  
 Checked  
ADL  
 Drawn  
JJA  
 Project Number  
650-347  
 Building Number  
39  
 Drawing Number  
M-701

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- ALL CONTROLS SHALL HAVE OCCUPIED AND UNOCCUPIED FUNCTIONS.
- ALL SET POINTS SHALL BE FULLY ADJUSTABLE.
- ALL MONITORED POINTS, INCLUDING STATUS (ON, OFF, FAILED) AND ANY ALARMS SHALL DISPLAY AT THE DDC WORKSTATION(S).
- "COOLING MODE" SHALL BE DEFINED AS ANY TIME THE OUTSIDE AIR TEMPERATURE IS ABOVE 50°F (ADJUSTABLE) AND A CALL FOR COOLING EXISTS FROM ANY ASSOCIATED PIECE OF EQUIPMENT. "COOLING MODE" SHALL EXTEND TO 1 HOUR BEYOND THE CALL FOR COOLING IS SATISFIED TO PREVENT SHORT CYCLING.
- "HEATING MODE" SHALL BE DEFINED AS ANY TIME THE OUTSIDE AIR TEMPERATURE IS BELOW 68°F (ADJUSTABLE) AND A CALL FOR HEATING EXISTS FROM ANY ASSOCIATED PIECE OF EQUIPMENT.
- WHERE 100% REDUNDANT MOTORIZED EQUIPMENT IS INSTALLED, THE TWO (OR MORE) PIECES OF EQUIPMENT SHALL ALTERNATE OPERATION ON AN ADJUSTABLE, EQUAL RUN-TIME BASIS. THE DDC SYSTEM SHALL DISPLAY CUMULATIVE RUN-TIME OF EACH UNIT. IF ONE UNIT FAILS, THE OTHER UNIT SHALL START AUTOMATICALLY AND THE DDC SYSTEM SHALL GENERATE AN ALARM SIGNAL.
- HVAC SYSTEM SHALL BE DESIGNED IN ACCORDANCE WITH THE LATEST VERSION OF THE VA HVAC DESIGN MANUAL AND THE LATEST VERSIONS OF THOSE STANDARDS REFERENCED WITHIN THAT MANUAL. THE DESIGNER IS RESPONSIBLE FOR VERIFICATION OF THE LATEST VERSION.
- ALL INDIVIDUAL ROOM ENVIRONMENTAL PARAMETERS SHALL BE DESIGNED AND SET IN ACCORDANCE WITH THE LATEST VERSION OF THE VA HVAC DESIGN MANUAL.
- ALL EQUIPMENT SHALL BE ENERGY STAR CERTIFIED AND MAXIMUM EFFICIENCY.



**SEQUENCE OF OPERATION**

**SYSTEM DESCRIPTION:** THE CHILLED WATER PLANT CONSISTS OF (2) EXISTING 60-TON AIR COOLED CHILLERS, (1) NEW 60-TON AIR COOLED CHILLER, (2) EXISTING PUMPS, (1) NEW PUMP, AND CONTROLS VALVES AS SHOWN ON THE CONTROL DIAGRAM. THE NEW CHILLER SHALL BE PROVIDED WITH A NEW CHILLED WATER PUMP. A NEW 2-WAY MODULATING VALVE SHALL BE PROVIDED. A DIRECT DIGITAL CONTROL (DDC) SYSTEM SHALL BE PROVIDED THAT INTERFACES WITH THE CHILLER FACTORY CONTROLS TO PROVIDE FULL REMOTE CONTROL AND ALL INFORMATION FOR MONITORING AVAILABLE IN THE CHILLER CONTROLLER. THE PUMPS ARE EACH SERVED BY A SEPARATE VFD.

**GENERAL:** UNIT SHALL BE NORMALLY STARTED AND STOPPED REMOTELY AT THE ENGINEERING CONTROL CENTER (ECC). H-O-A SWITCH SHALL BE KEPT IN THE "AUTO" POSITION. "HAND" AND "OFF" POSITIONS SHALL BE USED FOR MAINTENANCE ONLY. ALL CONTROLS SHALL BE AUTOMATIC AND ALL SETPOINTS SHALL BE ADJUSTABLE.

**SYSTEM START/STOP:** UPON A REQUEST FOR THE LEAD CHILLER, THE DDC SYSTEM SHALL ENERGIZE THE LEAD CHILLED WATER PUMP. UPON PROOF OF PRIMARY FLOW, THE DDC SYSTEM SHALL THEN ENERGIZE THE LEAD CHILLER THROUGH ITS LOCAL CONTROL PANEL. THE ASSOCIATED ISOLATION CONTROL VALVE SHALL SHUT UPON THE CHILLER SHUTTING DOWN. CHILLERS SHALL NOT START UNTIL FLOW IS PROVED BY WATER FLOW SWITCH WIRED TO CHILLER CONTROL PANEL. AFTER ENABLING THE LOCAL CHILLER PANEL, THE DDC SYSTEM SHALL MONITOR THE CHILLER RUNNING LOAD AMPS FOR PROOF OF OPERATION.

**CHILLER STAGING:** CHILLERS WILL OPERATE IN A LEAD / LAG SEQUENCE, SO THAT THE LAST CHILLER ENABLED IS THE FIRST TO BE DISABLED. THE COOLING PLANT SYSTEM SHALL INITIATE THE START OF THE NEXT CHILLER IN THE SEQUENCE WHENEVER THE CHILLED WATER LOAD AS DETERMINED BY THE SYSTEM SUPPLY WATER TEMPERATURE, IS NOT MET FOR 15 MINUTES (ADJ.). THE DDC SHALL INITIATE THE SHUT DOWN OF THE NEXT CHILLER IN THE SEQUENCE WHENEVER EXCESS CHILLED WATER CAPACITY EXISTS, AS DETERMINED BY PERCENT RUN LOAD AMPS, FOR 60 MINUTES (ADJ.). CHILLER LEAD/LAG SEQUENCE ORDER WILL BE BASED ON A ROUND ROBIN LOGIC (ROUND ROBIN LOGIC EXAMPLE: 1-2-3, THEN 2-3-1, THEN 3-1-2, THEN 1-2-3, ETC.).

THE CHILLER SEQUENCE ORDER SHALL BE ROTATED ON A SCHEDULE FROM THE ECC. CHILLER ROTATIONS WILL BE PROGRAMMED TO OCCUR AT ONE OF THE FOLLOWING OPERATOR-DEFINED INTERVALS:

NEVER: CHILLERS WILL ALWAYS HAVE THE SAME SEQUENCE NUMBER.

DAY OF WEEK: CHILLERS WILL ROTATE ON AN OPERATOR DEFINED DAY AND TIME ONCE PER WEEK.

FIXED NUMBER OF DAYS: CHILLERS WILL ROTATE AFTER THE NUMBER OF DAYS SPECIFIED HAS ELAPSED.

RUN HOURS: CHILLERS ROTATE TO ATTEMPT TO EVEN OUT THE AMOUNT OF TIME EACH CHILLER RUNS. WHEN ANY CHILLER REACHES THE OPERATOR DEFINED RUN HOURS SETPOINT (WHICH IS MEASURED ONLY FROM THE LAST ROTATION), THE SYSTEM CONTROLLER CAN RE-SEQUENCE THE CHILLERS, IF NECESSARY, TO PUT THE CHILLER WITH THE LEAST TOTAL RUN HOURS INTO A HIGHER-USE POSITION IN THE SEQUENCE.

ROTATIONAL INPUT: CHILLERS WILL ROTATE WHEN THE SPECIFIED REFERENCE COMMANDS THEM TO ROTATE. FROM THE ECC INTERFACE, AN OPERATOR SHALL BE ABLE TO MANUALLY CHANGE THE LEAD/LAG SEQUENCE OR REQUEST ANY CHILLER TO BE UNAVAILABLE WHICH WOULD REMOVE IT FROM THE ROTATION SEQUENCE.

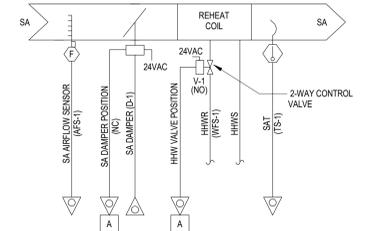
**SUPPLY TEMPERATURE SET POINT:** SET POINT SHALL BE RESET ON A LINEAR SCHEDULE BASED ON OUTSIDE AIR TEMPERATURE. PROVIDE CONTROL FUNCTIONS AS REQUIRED. SET POINT SHALL BE 44°F (ADJ.) AT 70°F (ADJ.) OUTDOOR AIR TEMPERATURE, AND 48°F (ADJ.) AT 50°F (ADJ.).

**DISTRIBUTION PUMPING OPERATION:** THE DDS SHALL START LEAD PUMPS UPON A CALL TO ENERGIZE THE LEAD CHILLERS. EACH LEAD PUMP SHALL BE INTERLOCKED WITH LEAD CHILLER OPERATION. DIFFERENTIAL PRESSURE SENSOR ACROSS HYDRONIC SUPPLY AND RETURN MAIN SHALL MODULATE CHILLED WATER DISTRIBUTION PUMP SPEED AS REQUIRED. VIA INDIVIDUAL VARIABLE FREQUENCY DRIVES. TO MAINTAIN SET POINT. INITIAL SET POINT SHALL BE 5 PSI (ADJ.). SET POINT TO BE DETERMINED IN FIELD BY TAB CONTRACTOR. MINIMUM PUMP FLOW SHALL BE MAINTAINED VIA A DIFFERENTIAL PRESSURE BY-PASS VALVE. REFER TO CHILLER MANUFACTURER'S IOM FOR MINIMUM FLOW SETPOINT. EACH PUMP SHALL BE CAPABLE OF PROVIDING CHILLED WATER TO ANY OF THE CHILLERS.

**PUMP STAGING:** PUMPS SHALL HAVE AUTOMATED LEAD / LAG SEQUENCE. REFER TO CHILLER STAGING FOR SEQUENCE.

**FREEZE PROTECTION:** THE CHILLED WATER PUMPS SHALL OPERATE WHEN OUTDOOR AIR TEMPERATURE IS 25°F (ADJ.) OR BELOW TO AVOID EVAPORATOR FREEZE.

**GRAPHICAL USER INTERFACE:** PROVIDE A COMPLETE GRAPHIC DISPLAY OF THE SYSTEM AT THE ECC TO MATCH THE EXISTING CHILLERS GRAPHICS, SCREENS, AND LOGS. THE DISPLAY SHALL SHOW ALL POINTS WITH THEIR MEASURED VALUES OR STATES, WHICH SHALL BE UPDATED CONTINUOUSLY AND SHOWN AS CURRENT VALUE.



**SEQUENCE OF OPERATION**

**GENERAL:** THE AIR TERMINAL UNITS ARE FED BY THE AIR HANDLING UNIT AND ARE COMPRISED OF AN AIRFLOW SENSOR, A SUPPLY AIR (SA) DAMPER, AND AN HEATING HOT WATER REHEAT COIL.

**OPERATION:** THE VAV TERMINAL UNIT SHALL MAINTAIN ROOM SETPOINT OF 75°F (ADJUSTABLE) BY MODULATING THE NORMALLY CLOSED DAMPER BETWEEN ITS MAXIMUM AND MINIMUM POSITIONS THROUGH A TERMINAL UNIT CONTROLLER (TUC) MOUNTED ON THE TERMINAL UNIT. ONCE THE DAMPER REACHES MINIMUM POSITION, THE SPACE TEMPERATURE SHALL BE ALLOWED TO DROP THROUGH A DEADBAND TO 68°F (ADJUSTABLE). IF THE SPACE TEMPERATURE CONTINUES TO FALL, THE DAMPER SHALL OPEN TO 50% AND THE HEATING HOT WATER CONTROL VALVE SHALL MODULATE TO MAIN SPACE TEMPERATURE.

**OCCUPIED/UNOCCUPIED MODES:** EACH VAV TERMINAL UNIT SHALL HAVE THE OPTION FOR OCCUPIED AND UNOCCUPIED MODES WITHIN THE UNIT CONTROLLER. OCCUPIED/UNOCCUPIED MODES SHALL HAVE UPPER AND LOWER SPACE TEMPERATURE SETPOINT LIMITS THAT SHALL BE PROGRAMMABLE THROUGH THE OPERATOR'S WORKSTATION. VALUES SHALL BE DETERMINED BY THE VA IF UNOCCUPIED MODE IS ENABLED.

SYSTEM		INDICATION										ALARM			CONTROL			REMARKS				
CHILLED WATER		GRAPHIC	STATUS	TEMPERATURE	RELATIVE HUMIDITY	PPH	CPH	STATIC PRESSURE	DIFF. PRESSURE	POSITION	RUN TIME	HERTZ	LOW	HIGH	CRITICAL	MAINTENANCE	PROGRAM START/STOP		HAND-OFF-AUTO	MODULATE	MIN/MAX	OPEN/CLOSED
SYSTEM	CURRENT SWITCH	●													●		●					CH-38-2-03
SYSTEM	CHW TEMP		●										●	●	●							TT-1, TT-2
SYSTEM	CHW VALVE																					V-1
SYSTEM	CHW FLOW									●												WFS-1
SYSTEM	VFD	●	●										●	●	●							CHWP-38-2-03
SYSTEM	PUMP DIFF. PRESSURE							●							●							DPS-1, DPS-2

SYSTEM		INDICATION										ALARM			CONTROL			REMARKS				
VAV VOLUME TERMINAL UNIT		GRAPHIC	STATUS	TEMPERATURE	RELATIVE HUMIDITY	PPH	CPH	STATIC PRESSURE	DIFF. PRESSURE	POSITION	RUN TIME	HERTZ	LOW	HIGH	CRITICAL	MAINTENANCE	PROGRAM START/STOP		HAND-OFF-AUTO	MODULATE	MIN/MAX	OPEN/CLOSED
SYSTEM	SUPPLY AIR	●																				OPERATOR'S WORKSTATION
SYSTEM	DAMPER																					AFS-1
SYSTEM	SPACE			●																		D-1
SYSTEM	HHV VALVE & FLOW																					T-1
SYSTEM	DISCHARGE AIR																					V-1, WFS-1
SYSTEM																						TS-1

**F1** CHILLED WATER CONTROLS  
N.T.S.

**F8** VARIABLE AIR VOLUME TERMINAL BOX - HEATING HOT WATER  
N.T.S.

BM 3601/01/21/04 - VA Providence Mental Health Building PH01/15/04 - VA Providence MHC Phg E20\_Dw 21\_22\_ & 25.rvt  
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Revisions:	Revision Description	Date:

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**Office of Construction and Facilities Management**

**VA** U.S. Department of Veterans Affairs

Drawing Title  
**MECHANICAL CONTROLS**

Approved:

Phase  
**CONSTRUCTION DOCUMENTS**

**FULLY SPRINKLERED**

Project Title  
**PROVIDENCE VAMC MENTAL HEALTH PHASE 2**

Location  
PROVIDENCE, RI

Issue Date  
FEB 04 2022

Checked  
ADL

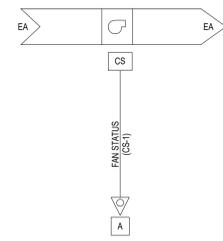
Drawn  
JJA

Project Number  
**650-347**

Building Number  
**39**

Drawing Number  
**M-702**

- CONTRACTOR SHALL PROVIDE COMPLETE DDC AUTOMATIC TEMPERATURE CONTROL SYSTEM COMPATIBLE WITH THE EXISTING METASYS BUILDING MANAGEMENT SYSTEM BY JOHNSON CONTROLS, INC. ALL HVAC SYSTEM AND ANCILLARY COMPONENTS SHALL BE CONTROLLED BY THE EXISTING METASYS BUILDING MANAGEMENT SYSTEM. FINAL CONNECTION OF NEW EQUIPMENT TO THE EXISTING METASYS BUILDING MANAGEMENT SYSTEM SHALL BE MADE BY A COMPANY AND TECHNICIANS FULLY QUALIFIED AND CERTIFIED BY JOHNSON CONTROLS, INC. TO PROGRAM, INSTALL, ADJUST, REPAIR, MAINTAIN, MODIFY, OR OTHERWISE MANIPULATE THE METASYS BUILDING MANAGEMENT SYSTEM. THE CONTRACTOR SHALL PROVIDE THE VA, VIA SUBMITTAL, COPIES OF FACTORY TRAINING CERTIFICATES FOR EACH TECHNICIAN WORKING ON THE PROVIDENCE VAMC METASYS SYSTEM PRIOR TO COMMENCEMENT OF ANY CONTROLS WORK. THE PROVIDENCE VAMC WILL REVIEW THE CERTIFICATIONS AS PART OF THE SUBMITTAL PROCESS. CONTRACTOR SHALL CARRY THE COST OF THIS WORK IN THEIR BID.
- ALL DDC CONTROLS SHALL BE PROVIDED BY THE CONTRACTOR AND SHALL BE BACNET METASYS CONTROLS BY JOHNSON CONTROLS FOR AHU'S, CHILLERS, FANS, FUS, FANS, VALVES, CIRCULATING PUMPS, CONTROL VALVES, MOTORIZED DAMPERS, AND ANY OTHER EQUIPMENT OR ACCESSORIES AS NOTED IN THE DRAWINGS AND SPECIFICATIONS.
- ALL CONTROLS SHALL HAVE OCCUPIED AND UNOCCUPIED FUNCTIONS.
- ALL SET POINTS SHALL BE FULLY ADJUSTABLE.
- ALL MONITORED POINTS, INCLUDING STATUS (ON, OFF, FAILED) AND ANY ALARMS SHALL DISPLAY AT THE DDC WORKSTATIONS.
- "COOLING MODE" SHALL BE DEFINED AS ANY TIME THE OUTSIDE AIR TEMPERATURE IS ABOVE 50°F (ADJUSTABLE) AND A CALL FOR COOLING EXISTS FROM ANY ASSOCIATED PIECE OF EQUIPMENT. "COOLING MODE" SHALL EXTEND TO 1 HOUR BEYOND THE CALL FOR COOLING IS SATISFIED TO PREVENT SHORT CYCLING.
- "HEATING MODE" SHALL BE DEFINED AS ANY TIME THE OUTSIDE AIR TEMPERATURE IS BELOW 68°F (ADJUSTABLE) AND A CALL FOR HEATING EXISTS FROM ANY ASSOCIATED PIECE OF EQUIPMENT.
- WHERE 100% REDUNDANT MOTORIZED EQUIPMENT IS INSTALLED, THE TWO (OR MORE) PIECES OF EQUIPMENT SHALL ALTERNATE OPERATION ON AN ADJUSTABLE, EQUAL RUN-TIME BASIS. THE DDC SYSTEM SHALL DISPLAY CUMULATIVE RUN-TIME OF EACH UNIT. IF ONE UNIT FAILS, THE OTHER UNIT SHALL START AUTOMATICALLY AND THE DDC SYSTEM SHALL GENERATE AN ALARM SIGNAL.
- HVAC SYSTEM SHALL BE DESIGNED IN ACCORDANCE WITH THE LATEST VERSION OF THE VA HVAC DESIGN MANUAL AND THE LATEST VERSIONS OF THOSE STANDARDS REFERENCED WITHIN THAT MANUAL. THE DESIGNER IS RESPONSIBLE FOR VERIFICATION OF THE LATEST VERSION.
- ALL INDIVIDUAL ROOM ENVIRONMENTAL PARAMETERS SHALL BE DESIGNED AND SET IN ACCORDANCE WITH THE LATEST VERSION OF THE VA HVAC DESIGN MANUAL.
- ALL EQUIPMENT SHALL BE ENERGY STAR CERTIFIED AND MAXIMUM EFFICIENCY.

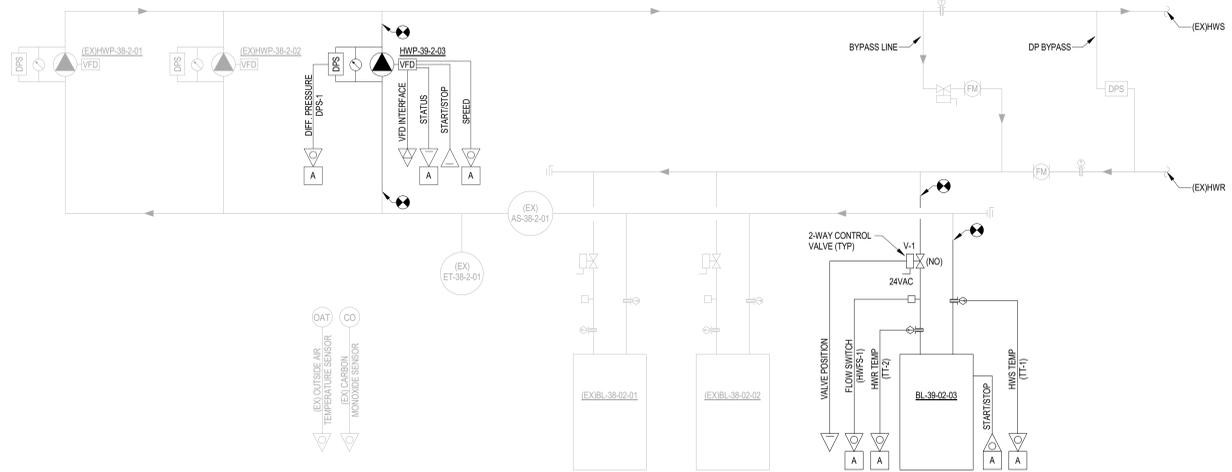


**SEQUENCE OF OPERATION**

**GENERAL:** THE BAS SHALL INDEX FAN TO UNOCCUPIED / OCCUPIED CONTROL. FAN SERVES GENERAL EXHAUST FOR LEVEL B, LEVEL 1, AND LEVEL 2.  
**STARTUP/SHUTDOWN:** EXHAUST FAN SHALL BE INTERLOCKED WITH AIR HANDLING UNIT (AHU-39-2-02) DURING OCCUPIED HOURS ONLY FOR OPERATION. EXHAUST FAN SHALL DE-ENERGIZE BASED UPON AIR HANDLING UNIT SHUTDOWN. UNOCCUPIED CONTROL ALARM SHALL BE SENT TO ENGINEERING CONTROL CENTER UPON FAILURE OF FAN.

INPUT/OUTPUT SUMMARY																						
SYSTEM	GRAPHIC	INDICATION				ALARM			CONTROL			REMARKS										
		STATUS	TEMPERATURE	RELATIVE HUMIDITY	PPM	CMV	STATIC PRESSURE	DIFF. PRESSURE	POSITION	RUN TIME	HERTZ		LOW	HIGH	CRITICAL	MAINTENANCE	PROGRAM START/STOP	HAND-OFF-AUTO	MODULATE	MIN/MAX	OPEN/CLOSED	
CONSTANT VOLUME FAN																						
EXHAUST FAN																						ASSOCIATED AHU CS-1

**C6 CONSTANT VOLUME EXHAUST FAN**  
N.T.S.



**SEQUENCE OF OPERATION**

**SYSTEM DESCRIPTION:** THE HEATING HOT WATER SYSTEM CONSISTS OF (2) EXISTING CONDENSING FIRE TUBE BOILERS AND (1) NEW CONDENSING FIRE TUBE BOILER PIPED IN PARALLEL IN A LEAD / LAG PUMPING CONFIGURATION WITH REVERSE RETURN AND (1) REDUNDANT VARIABLE VOLUME DISTRIBUTION PUMPS. ALL HEATING HOT WATER CONTROL SYSTEM SET POINTS SHALL BE FULLY ADJUSTABLE. THE HEATING HOT WATER BOILER CONTROL SYSTEM SHALL BE PROVIDED BY THE BOILER MANUFACTURER AND SHALL BE COMPATIBLE FOR FULL INTEGRATION INTO THE PROVIDENCE VAMC JOHNSON CONTROLS METASYS BUILDING MANAGEMENT SYSTEM.

**GENERAL:** HOT WATER SUPPLY SET POINT SHALL BE RESET ON A LINEAR SCHEDULE BASED ON OUTSIDE AIR TEMPERATURE. PROVIDE CONTROL FUNCTIONS AS REQUIRED. SET POINT SHALL BE 140°F (ADJUSTABLE) AT 0°F (ADJUSTABLE) OUTDOOR AIR TEMPERATURE, AND 120°F (ADJUSTABLE) AT 68°F (ADJUSTABLE).

**SYSTEM START/STOP:** THE HEATING WATER SYSTEM CONTROL VALVE SHALL OPEN AND THE BOILER SHALL START IN RESPONSE TO A BINARY SIGNAL FROM THE ENERGY MANAGEMENT CONTROL SYSTEM. UPON THE START OF THE HEATING HOT WATER SYSTEM, THE HEATING HOT WATER CONTROL SYSTEM SHALL AUTOMATICALLY START TRENDS/LOG REPORTS AS INDICATED IN THE TRENDS/LOGGING SECTION. THE ASSOCIATED ISOLATION CONTROL VALVE SHALL SHUT UPON THE BOILER SHUTTING DOWN. BOILER(S) SHALL NOT START UNTIL FLOW IS PROVIDED BY WATER FLOW SWITCH WIRE TO BOILER CONTROL PANEL.

**HOT WATER STAGING:** THE HEATING HOT WATER CONTROL SYSTEM SHALL START AND STOP THE HEATING HOT WATER PUMPS AND BOILERS BASED UPON SYSTEM LOAD. WHEN THE HEATING HOT WATER SYSTEM IS ENABLED THE HEATING HOT WATER CONTROL SYSTEM SHALL:

- SEND AN ENABLE SIGNAL TO THE LEAD BOILER(S).
- DIFFERENTIAL PRESSURE SENSOR ACROSS HYDRONIC SUPPLY AND RETURN MAIN SHALL MODULATE HOT WATER DISTRIBUTION PUMP SPEED AS REQUIRED, VIA INDIVIDUAL VARIABLE FREQUENCY DRIVES, TO MAINTAIN SET POINT. INITIAL SET POINT SHALL BE 5 PSI (ADJ.). SET POINT TO BE DETERMINED IN FIELD BY TAB CONTRACTOR.
- OPEN THE BOILER CONTROL VALVE.
- WHEN THE CONTROL VALVE IS CONFIRMED TO BE 100% OPEN, THE LEAD DISTRIBUTION PUMP IN THE SEQUENCE SHALL BE STARTED IF:
- THE AMBIENT TEMPERATURE IS BELOW 90°F (ADJ.) OR,
- THERE IS A CALL FOR HEAT AT ANY AIR HANDLER CONTROL VALVE(S) OR,
- THERE IS A CALL FOR HEAT AT ANY OF DDC MONITORING SENSORS).
- THE PUMP SHALL BE CONTROLLED TO MAINTAIN THE DESIGN DIFFERENTIAL PRESSURE SETPOINT FOR THE SYSTEM AS MEASURED BY DIFFERENTIAL PRESSURE TRANSMITTER.
- UPON CONFIRMATION OF HEATING HOT WATER FLOW BY BOTH SYSTEM FLOW METER AND BOILER FLOW INDICATION DEVICE, THE BOILER SHALL START AND CONTROL ITSELF TO MAINTAIN HEATING HOT WATER SUPPLY SET POINT 140° (ADJUSTABLE).
- UPON THE START OF EACH BOILER, THE HEATING HOT WATER CONTROL SYSTEM SHALL AUTOMATICALLY START BOILER SPECIFIC TRENDS/LOG REPORTS AS INDICATED IN THE TRENDS/LOGGING SECTION.

THE HEATING HOT WATER CONTROL SYSTEM SHALL INITIATE THE START OF THE NEXT BOILER IN THE SEQUENCE WHENEVER THE HEATING HOT WATER LOAD, AS DETERMINED BY THE SYSTEM SUPPLY WATER TEMPERATURE, IS NOT MET FOR 10 MINUTES (ADJUSTABLE).

**BOILERS AND PUMPS STAGING:** BOILER ROTATION SHALL BE INITIATED BASED ON AN OPERATOR ENTERED DAY INTERVAL OR BY THE CYCLING OF A BINARY POINT. THE METHOD OF SEQUENCE SHALL BE OPERATOR SELECTABLE. BOILER CYCLING CAUSED BY NORMAL SYSTEM LOAD FLUCTUATIONS SHALL CAUSE THE BOILERS TO CHANGE ROTATION SEQUENCE OR, AT THE OPERATORS OPTION, BOILERS MAY BE FORCED INTO THE NEW ROTATION SEQUENCE AT THE TIME OF SEQUENCE CHANGE. PUMP ROTATION SHALL BE INITIATED BY A SCHEDULE OR BY THE CYCLING OF A BINARY POINT.

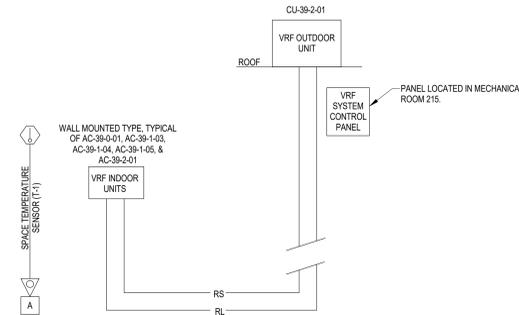
**ALARMS / SAFETIES:** THE CONTROL SYSTEM SHALL INITIATE ALARMS IN ACCORDANCE WITH ANY OF THE CONDITIONS BELOW, INDICATE AND DESCRIBE ANY ALARM AT THE FMS' GRAPHIC USER INTERFACE. WHENEVER A UNIT IS SHUT DOWN BECAUSE OF ONE OF THE SAFETIES, THE CONTROL SYSTEM SHALL RETAIN IN MEMORY THE READING AND SET POINT OF EACH DEVICE TO HELP THE OPERATOR IN ISOLATING THE REASON FOR THE PROBLEM.

- ANY PUMP IS COMMANDED TO RUN AND RUN STATUS IS NOT SENSED VIA CURRENT TRANSFORMER AFTER A START-UP DELAY OF 15 SECONDS (ADJUSTABLE). REGISTER AS A PUMP FAILURE AND START STAND-BY PUMP.
- HOT WATER SUPPLY TEMPERATURE VARIES MORE THAN 5°F (ADJUSTABLE) ABOVE OR BELOW SET POINT FOR 15 MINUTES (ADJUSTABLE) OR LONGER.
- SYSTEM DIFFERENTIAL PRESSURE VARIES MORE THAN 2 PSI (ADJUSTABLE) ABOVE SET POINT FOR 15 MINUTES (ADJUSTABLE) OR LONGER.
- ON A CALL FOR BOILER OPERATION, COMBUSTION AIR DAMPER OPEN STATUS IS NOT SENSED VIA END SWITCH.
- ON A CALL FOR BOILER OPERATION, RUN STATUS IS NOT SENSED VIA CURRENT TRANSFORMER AT THE BOILER ROOM EXHAUST FAN.
- CARBON MONOXIDE SENSOR REACHES 'WARNING' LEVEL.
- CARBON MONOXIDE SENSOR READING REACHES 'HIGH LIMIT'. REGISTER AS CO ALARM AND SHUT DOWN ALL GAS-FIRED BOILERS AND WATER HEATERS.

**GRAPHICAL USER INTERFACE:** PROVIDE A COMPLETE GRAPHIC DISPLAY OF THE SYSTEM AT THE ECC TO MATCH THE EXISTING BOILER GRAPHICS, SCREENS, AND LOGS. THE DISPLAY SHALL SHOW ALL POINTS WITH THEIR MEASURED VALUES OR STATES, WHICH SHALL BE UPDATED CONTINUOUSLY AND SHOWN AS CURRENT VALUE.

INPUT/OUTPUT SUMMARY																						
SYSTEM	GRAPHIC	INDICATION				ALARM			CONTROL			REMARKS										
		STATUS	TEMPERATURE	RELATIVE HUMIDITY	PPM	CMV	STATIC PRESSURE	DIFF. PRESSURE	POSITION	RUN TIME	HERTZ		LOW	HIGH	CRITICAL	MAINTENANCE	PROGRAM START/STOP	HAND-OFF-AUTO	MODULATE	MIN/MAX	OPEN/CLOSED	
CHILLED WATER																						
SYSTEM																						
HW TEMP																						BL-39-2-03
HW VALVE																						TT-1, TT-2
HW FLOW SWITCH																						V-1
VFD																						HWFB-1
PUMP DIFF. PRESSURE																						HWP-39-2-03
																						DPS-1

**F1 HOT WATER CONTROLS**  
N.T.S.



**SEQUENCE OF OPERATION**

**SYSTEM DESCRIPTION:** THE CONDENSING UNIT (CU) IS A VARIABLE REFRIGERANT FLOW (VRF) SYSTEM COMPRISED OF A FACTORY VRF SYSTEM CONTROL PANEL, SPACE TEMPERATURE SENSORS, AND INDOOR WALL-MOUNTED UNITS.

**GENERAL:** THE UNIT SHALL BE STARTED AND STOPPED THROUGH A BACNET SYSTEM CONTROL PANEL PROVIDED BY THE SYSTEM MANUFACTURER. PROVIDE BACNET INTERFACE FOR CONNECTION TO A ENGINEERING CONTROL CENTER (ECC). SYSTEM SHALL BE CAPABLE OF BEING MONITORED AND CONTROLLED THROUGH THE ECC. ALL SAFETIES AND ASSOCIATED CONTROL INTERLOCKS SHALL REMAIN ACTIVE IN ALL HOA SWITCH POSITIONS. WHERE 100% REDUNDANT EQUIPMENT IS INSTALLED, THE TWO PIECES OF EQUIPMENT SHALL ALTERNATE OPERATION ON AN ADJUSTABLE, EQUAL RUN-TIME BASIS. THE DDC SYSTEM SHALL DISPLAY CUMULATIVE RUN-TIME OF EACH UNIT. IF ONE UNIT FAILS, THE OTHER UNIT SHALL START AUTOMATICALLY AND THE DDC SYSTEM SHALL GENERATE AN ALARM SIGNAL. SPACE TEMPERATURE SENSOR, T-T, CONTROLS ITS RESPECTIVE INDOOR UNIT THROUGH MANUFACTURER'S SUPPLIED CONTROLS TO MAINTAIN SPACE TEMPERATURE OF 68°F (ADJUSTABLE). AIR-COOLED CONDENSING UNITS REJECT/ABSORB EXCESS HEAT BASED ON THE INDOOR UNIT(S) REQUIREMENTS THROUGH THE MANUFACTURER'S SYSTEM CONTROL PANEL AND SHALL OPERATE 24-HOURS AS REQUIRED TO MAINTAIN SPACE TEMPERATURE SENSOR(S).

**START/STOP:** WHEN THE SYSTEM IS ENERGIZED TO OPERATE, INDOOR UNITS START AND ASSOCIATED AIR-COOLED CONDENSING UNITS ARE ENERGIZED. SYSTEM OPERATES THROUGH MANUFACTURER'S SUPPLIED SYSTEM CONTROL PANEL. WHEN SYSTEM IS DE-ENERGIZED, INDOOR UNIT(S) STOP AND AIR-COOLED CONDENSING UNITS STOP.

INPUT/OUTPUT SUMMARY																						
SYSTEM	GRAPHIC	INDICATION				ALARM			CONTROL			REMARKS										
		STATUS	TEMPERATURE	RELATIVE HUMIDITY	PPM	CMV	STATIC PRESSURE	DIFF. PRESSURE	POSITION	RUN TIME	HERTZ		LOW	HIGH	CRITICAL	MAINTENANCE	PROGRAM START/STOP	HAND-OFF-AUTO	MODULATE	MIN/MAX	OPEN/CLOSED	
VRF UNITS																						
SYSTEM																						
VRF INDOOR UNITS																						ECC, SYSTEM CONTROL PANEL
AIR-COOLED CONDENSING UNIT																						CU-39-0-01
SUPPLY AIR FAN																						AC-39-0-01, AC-39-1-03, AC-39-1-04, AC-39-1-05, & AC-39-2-01
SUPPLY AIR																						AC-39-0-01, AC-39-1-03, AC-39-1-04, AC-39-1-05, & AC-39-2-01
SPACE TEMPERATURE SENSOR																						T-1

**F6 VRF SYSTEM CONTROLS W/O BRANCH SELECTOR BOX**  
N.T.S.

Revisions:	Revision Description	Date:

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Drawing Title  
**MECHANICAL CONTROLS**  
 Approved:  
 Phase  
**CONSTRUCTION DOCUMENTS**  
 Fully Sprinklered

Project Title  
**PROVIDENCE VAMC MENTAL HEALTH PHASE 2**  
 Location  
 PROVIDENCE, RI  
 Issue Date  
 FEB 04 2022  
 Checked  
 ADL  
 Drawn  
 JJA

Project Number  
 650-347  
 Building Number  
 39  
 Drawing Number  
**M-703**

ENERGY RECOVERY VENTILATION UNIT SCHEDULE

MARK	AREA SERVING	MAKE	MODEL NO.	AIR FLOWS				SUPPLY FAN ASSEMBLY				EXHAUST FAN ASSEMBLY				ENERGY WHEEL				HOT WATER PREHEAT COIL				COOLING COIL				PRE-FILTER		AFTER-FILTER		FINAL FILTER																							
				WEIGHT (LBS)	SUPPLY CFM	OA CFM	AIRFLOW CFM	FAN QTY.	ESP (IN.WG)	TSP (IN.WG)	MOTOR BHP PER FAN	MOTOR HP	MAX RPM	ARI/FLOW CFM	FAN QTY	ESP (IN.WG)	TSP (IN.WG)	MOTOR BHP PER FAN	HP	MAX RPM	SUM. / W.N. OA (*F DB)	SUM. / W.N. OA (*F WB)	SUM. / W.N. RA (*F DB)	SUM. / W.N. RA (*F WB)	SUM. / W.N. EA (*F DB)	SUM. / W.N. EA (*F WB)	TOTAL EFFEC. (%)	EAT (*F DB)	LAT (*F DB)	TOT. CAP. (MBH)	PRESSURE DROP (IN-WG)	EWT (*F)	LWT (*F)	FLOW (GPM)	PRESSURE DROP (FT HD)	EAT (*F DB)	EAT (*F WB)	MAX LAT (*F DB)	MAX LAT (*F WB)	SEN. CAP. (MBH)	TOT. CAP. (MBH)	MAX. VEL. (FPM)	MIN. ROWS	PRESSURE DROP (IN-WG)	EWT (*F)	LWT (*F)	FLOW (GPM)	PRESSURE DROP (FT HD)	LOCATION	DEPTH	MIN. RATING	DEPTH	MIN. RATING	DEPTH	MIN. RATING
AHU-39-2-02	BLDG39 ADMIN	TEMPROL	CUSTOM	15000	11100	4550	11100	4	2.5	5.71	3.86	6	3465	9700	4	1.5	2.22	1.78	3	1780	95.0/0.0	76.4/0.0	75.0/70.0	83.1/63.1	80.4/51.1	67.3/63.1	83.7/86.9	32.0	56.5	316.4	0.07	140	110	22.1	9.44	83.2	68.4	52.1	52.1	365.3	536.2	500	3	1.06	44	54	118	9.46	DOWNSTREAM OF OCC	2'	MERV 8	12'	MERV 11	12'	MERV 14

NOTES:  
 1. REFER TO DRAWINGS FOR SUPPLY DISCHARGE AND RETURN INTAKE CONNECTION LOCATIONS.  
 2. PROVIDE FACTORY UNIT MOUNTED DISCONNECT FOR SUPPLY & EXHAUST FAN.  
 3. PROVIDE INTERIOR LED MARINE LIGHTS.  
 4. PROVIDE DISCONNECT FOR UV LIGHTS BY ELECTRICAL. REFER TO ELECTRICAL DRAWINGS.  
 5. PROVIDE DISCONNECT FOR MARINE LIGHTS BY ELECTRICAL. REFER TO ELECTRICAL DRAWINGS.  
 6. PROVIDE (3) SEPARATE ELECTRICAL CONNECTIONS.  
 A. (1) 480V/3-PH SINGLE POINT CONNECTION FOR SUPPLY & EXHAUST FAN ARRAY INCLUDING VFD PANELS.  
 B. (1) 120V/1-PH SINGLE POINT CONNECTION FOR UV LIGHTS  
 C. (1) 120V/1-PH SINGLE POINT CONNECTION FOR MARINE LIGHTS  
 7. CAPACITIES SHOWN ARE MINIMUM AND PRESSURE DROPS ARE MAXIMUM.  
 8. TOTAL STATIC PRESSURE INCLUDES FILTERS AT FULLY LOADED MIDDLE POSITION.  
 9. FILTER EFFICIENCY BASED ON ANSIASHRAE 52.2 TEST METHOD.

HUMIDIFIER SCHEDULE

MARK	MAKE	MODEL	TYPE	LOCATION	SERVES	AIRFLOW (CFM)	EAT (*F)	CAPACITY (LBS/HR)	ELECTRICAL		CONTROLS		BY
									VPHHZ	MCA	TYPE	TYPE	
H-39-2-02	HAVTECH	UE685MMU1	ELECTRIC	MECH RM 215	AHU-39-2-02	11100	55	143	480/380	81.19	DDC	ATC	ATC

NOTES:  
 1. AHU VENDOR TO PROVIDE THE HUMIDIFIER EQUIPMENT PACKAGE (STEAM GENERATOR, STEAM DISPERSION GRID AND ASSOCIATED HUMIDIFIER ACCESSORIES). HUMIDIFIER EQUIPMENT PACKAGED TO BE SHIPPED LOOSE.  
 2. HUMIDIFIER PACKAGE TO BE INSTALLED BY THE MECHANICAL CONTRACTOR. MECHANICAL CONTRACTOR TO ENSURE THAT HUMIDIFIER PACKAGE IS FULLY COORDINATED WITH ERV-39-2-02.  
 3. PROVIDE DRAIN COOLER.  
 4. REFER TO PROJECT SPECIFICATIONS FOR ALL REQUIRED OPTIONS AND ACCESSORIES.

BOILER SCHEDULE

MARK	MAKE	MODEL	LOCATION	TYPE	SERVICE	OUTPUT (MBH)	MIN EFF. (%)	FUEL DATA			ELECTRICAL	
								INPUT (SCFH)	MIN INLET PRESSURE (IN WC)	FLA (A)	VPHHZ	TYPE
BL-39-2-03	ADVANCED THERMAL HYDRONICS	KN-10	MECH RM 202	CONDENSING	HEATING HOT WATER	920	92	NATURAL GAS	1000	3	7	208/180

NOTES:  
 1. MOUNT UNIT ON 4" CONCRETE HOUSEKEEPING PAD. PAD INSTALLED BY GENERAL CONTRACTOR.  
 2. PROVIDE NON-FUSED FACTORY DISCONNECT SWITCH.  
 3. PROVIDE FLUE CONDENSATE NEUTRALIZATION EQUIPMENT.  
 4. REFER TO PROJECT SPECIFICATIONS FOR ALL REQUIRED OPTIONS AND ACCESSORIES.

EXHAUST FAN SCHEDULE

MARK	MAKE	MODEL NO.	TYPE	CFM	ESP (IN-WG)	FAN RPM	ELECTRICAL		DRIVE TYPE	MAX SONES
							FLA/HP	VPHHZ		
EF-39-2-01	GREENHECK	SQ-120-VG	INLINE	725	0.75	1238	6.6/1/2	120/180	DIRECT	6.6

NOTES:  
 1. PROVIDE FACTORY WIRED DISCONNECT SWITCH.  
 2. PROVIDE BACKDRAFT DAMPER.  
 3. INTERLOCK FAN OPERATION WITH AHU-39-2-02.

VRF OUTDOOR UNIT SCHEDULE

MARK	MAKE	MODEL NO.	NOM. TONS	AMBIENT TEMP. (*F)	MCA	MOP	VPHHZ	ASSOCIATED IDU
CU-39-2-01	DAIKIN	RYO637YDN	8	95	20.6	25.0	480/380	AC-39-2-01, AC-39-1-03, AC-39-1-04, AC-39-1-05, AC-39-2-01

NOTES:  
 1. MODEL NUMBERS AND UNIT SELECTIONS ARE BASED ON DAIKIN.  
 2. PROVIDE SINGLE POINT ELECTRICAL CONNECTION.  
 3. DISCONNECT PROVIDED BY ELECTRICAL. REFER TO ELECTRICAL DRAWINGS.  
 4. SIZE REFRIGERANT LINES PER MANUFACTURER'S RECOMMENDATIONS. PROVIDE OVERSIZE LINES AND/OR REFRIGERATION LINE EXTENSION KIT BASED ON MANUFACTURER RECOMMENDATIONS FOR EXTENDED REFRIGERATION LINE RUNS.  
 5. PROVIDE LOW AMBIENT KIT.  
 6. AMBIENT DESIGN TEMPERATURE IS 95° F.  
 7. PROVIDE 5 YEAR COMPRESSOR WARRANTY.  
 8. PROVIDE ANTI-RECYCLE COMPRESSOR TIMER.  
 9. PROVIDE CONDENSER COIL GUARDS.  
 10. HEATING SHALL BE DISABLED AND SHALL BE COOLING ONLY.

VRF INDOOR UNIT SCHEDULE

MARK	MAKE	MODEL NO.	TYPE	SA CFM (MAX.)	TOTAL COOLING CAPACITY (MBH)	TOTAL HEATING CAPACITY (MBH)	MCA	MOP	VPHHZ
AC-39-0-01, AC-39-1-03	DAIKIN	FXAQ07P/UJ	WALL MOUNT	260	7.5	-	0.4	15	208/180
AC-39-1-04, AC-39-1-05	DAIKIN	FXAQ24P/UJ	WALL MOUNT	635	24.0	-	0.6	15	208/180
AC-39-2-01	DAIKIN	FXAQ18P/UJ	WALL MOUNT	500	18.0	-	0.5	15	208/180

NOTES:  
 1. PROVIDE SINGLE POINT ELECTRICAL CONNECTION.  
 2. DISCONNECT PROVIDED BY ELECTRICAL. REFER TO ELECTRICAL DRAWINGS.  
 3. PROVIDE FACTORY 24V CONDENSATE PUMP OPTION FOR AC-39-1-03, AC-39-1-04, AC-39-1-05, AC-39-2-01. CONDENSATE PUMP FOR AC-39-0-01 SHALL HANDLE MINIMUM 15 FT HEAD. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.  
 4. PROVIDE INLINE CHECK VALVE LOCATED IN DRAIN LINE.  
 5. PROVIDE REFRIGERANT BRANCH KITS AS REQUIRED AND PER MANUFACTURER'S RECOMMENDATIONS.  
 6. HEATING SHALL BE DISABLED AND SHALL BE COOLING ONLY.

UNIT WALL HEATER SCHEDULE

MARK	MAKE	MODEL	LOCATION	TYPE	CAPACITY (KW)	VOLTS	AMPS	NOTES
UWH-39-0-01, UWH-39-0-02	QMARK	CWH3150F	TOILET 035, TOILET 044, TOILET 132, TOILET 207	ELECTRIC	1.5	120	12.5	1,2,3,4
UWH-39-1-01, UWH-39-2-01	QMARK	CWH34083F	STAIR 3-3	ELECTRIC	4.0	208	11.1	1,2,3,5

NOTES:  
 1. PROVIDE SINGLE POINT ELECTRICAL CONNECTION.  
 2. PROVIDE FACTORY DISCONNECT.  
 3. PROVIDE WITH BUILT IN THERMOSTAT.  
 4. PROVIDE RECESSED WALL BOX MOUNTED 12" ABOVE FINISHED FLOOR WITH SLEEVE EXTENDER AS REQUIRED.  
 5. PROVIDE SURFACE MOUNT FRAME.

AIR DISTRIBUTION SCHEDULE

MARK	CFM	NECK SIZE	FACE SIZE	DESCRIPTION
A	0-125 126-250 251-325 326-475	60 80 100 120	24X24 24X24 24X24 24X24	SUPPLY DIFFUSER BASIS OF DESIGN: TITUS - TDC-AA COLOR: WHITE MATERIAL: ALUMINUM OPPOSED BLADE DAMPER: NO
B	0-125 126-225 226-400	60 80 100	24X24 24X24 24X24	RETURN DIFFUSER BASIS OF DESIGN: TITUS - PAR-AA COLOR: WHITE MATERIAL: ALUMINUM OPPOSED BLADE DAMPER: YES
C	0-100	6X6	6X6	EXHAUST GRILLE BASIS OF DESIGN: TITUS - 355FL COLOR: WHITE MATERIAL: ALUMINUM OPPOSED BLADE DAMPER: YES
D	0-700	12X12	12X12	SIDEWALL SUPPLY GRILLE BASIS OF DESIGN: TITUS - 300FL COLOR: WHITE MATERIAL: ALUMINUM OPPOSED BLADE DAMPER: NO
E	0-100	60	48" - 1 SLOT	LINEAR SUPPLY DIFFUSER BASIS OF DESIGN: TITUS ML-39 (1" SLOT) COLOR: WHITE MATERIAL: ALUMINUM PLENUM: TITUS MP3-39
F	0-775	12X12	12X12	SIDEWALL RETURN GRILLE BASIS OF DESIGN: TITUS - 355FL COLOR: WHITE MATERIAL: ALUMINUM OPPOSED BLADE DAMPER: YES

NOTES:  
 1. AIR DISTRIBUTION DEVICES LOCATED WITHIN ACOUSTICAL TILE CEILINGS SHALL BE PROVIDED WITH BORDER TYPE 3 FOR LAY-IN MOUNTING. AIR DISTRIBUTION DEVICES LOCATED WITHIN GYPSUM BOARD CEILINGS OR WALLS SHALL BE PROVIDED WITH BORDER TYPE 1 FOR SURFACE MOUNTING. REFER TO ARCHITECTURAL DOCUMENTS FOR CEILING TYPES.  
 2. AIR DISTRIBUTION DEVICES LOCATED IN SMALL ROOMS WHERE FULL 24"X24" GRID ARE NOT AVAILABLE SHALL BE PROVIDED WITH SURFACE MOUNTING BORDERS IN LIEU OF LAY-IN. SECURE EACH DEVICE TO CEILING GRID WITH FIELD-FABRICATED SUPPORTS.  
 3. LINEAR DIFFUSERS LOCATED WITHIN ACOUSTICAL TILE CEILINGS SHALL BE PROVIDED WITH BORDER TYPE FOR LAY-IN MOUNTING AND LINEAR DIFFUSERS LOCATED IN GYPSUM BOARD SHALL BE CONCEALED MOUNTING TYPE.  
 4. PROVIDE ALL MATERIALS AND EQUIPMENT REQUIRED FOR A COMPLETE INSTALLATION OF ALL LINEAR AND MODULAR SLOT AIR DISTRIBUTION SYSTEMS AS SHOWN ON THE ARCHITECTURAL AND MECHANICAL DRAWINGS AND/OR INDICATED IN THE SPECIFICATIONS. THE SYSTEMS SHALL BE COMPLETE IN EVERY RESPECT AND SHALL INCLUDE ALL REQUIRED APPURTENANCES. MECHANICAL CONTRACTOR SHALL FURNISH AND INSTALL ALL PLENUMS, BLANK-OFFS AND ASSOCIATED SHEET METAL COMPONENTS INCLUDING ALL DUCT CONNECTIONS THERETO.

CHILLER SCHEDULE

MARK	MAKE	MODEL	CAPACITY (TONS)	FLUID	EWT (*F)	LWT (*F)	FLOW (GPM)	MAX. PD (FT)	AMBIENT AIR TEMP (*F)	CIRCUIT QTY	EER	MAX SOUND (DBA)	MAX SOUND PRESS. (AT 30 FT) (DBA)	VPHHZ	MCA	MOP
CH-39-0-03	DAIKIN	AGZ060E	97	30% P.G. CHW	54	44	145	23.5	95	2	10.87	87	60	480/380	132	150

NOTES:  
 1. PROVIDE EPOXY COATED FINS.  
 2. PROVIDE COMPRESSOR ACOUSTICAL BLANKET (SOUND INSULATION).  
 3. PROVIDE SINGLE POINT ELECTRICAL POWER CONNECTION.  
 4. PROVIDE SUCTION SHUT-OFF VALVES (ONE PER CIRCUIT), LIQUID LINE SHUT-OFF VALVE AND DISCHARGE SHUT-OFF VALVE.  
 5. PROVIDE NON-FUSED FACTORY DISCONNECT SWITCH.  
 6. PROVIDE GFI CONVENIENCE OUTLET.  
 7. PROVIDE BACNET COMMUNICATION INTERFACE.  
 8. REFRIGERANT SHALL BE R-410A.  
 9. INSTALLED WEIGHT: APPROXIMATELY 3,200 LBS.  
 10. PROVIDE FACTORY STRAINER.  
 11. FEMP FEDERAL ENERGY MANAGEMENT PROGRAM CERTIFIED.  
 12. REFER TO PROJECT SPECIFICATIONS FOR ALL REQUIRED OPTIONS AND ACCESSORIES.

HOT WATER PUMP SCHEDULE

MARK	MAKE	MODEL	LOCATION	SERVICE	TYPE	FLUID FLOW (GPM)	HEAD (FT WG)	SUCTION INLET (IN)	DISCHARGE OUTLET (IN)	IMPELLER DIA. (IN)	HP	RPM	VPHHZ	TYPE	FURNISHED BY	SUCTION DIFF.	TRIPLE DUTY VALVE	STRAINER
HWP-39-2-03	BELL & GOSSETT	1510	MECH RM 202	HEATING HOT WATER	END-SUCTION	40	75	1.25	1.25	8.5	3	1800	483/60	DDC	ATC	YES	YES	YES

NOTES:  
 1. REMOTE MOUNTED VFD.  
 2. PROVIDE W/ DISCONNECT SWITCH.  
 3. MOUNT ON 4" CONCRETE HOUSING PAD. PAD INSTALLED BY GENERAL CONTRACTOR.  
 4. REFER TO PROJECT SPECIFICATIONS FOR ALL REQUIRED OPTIONS AND ACCESSORIES.

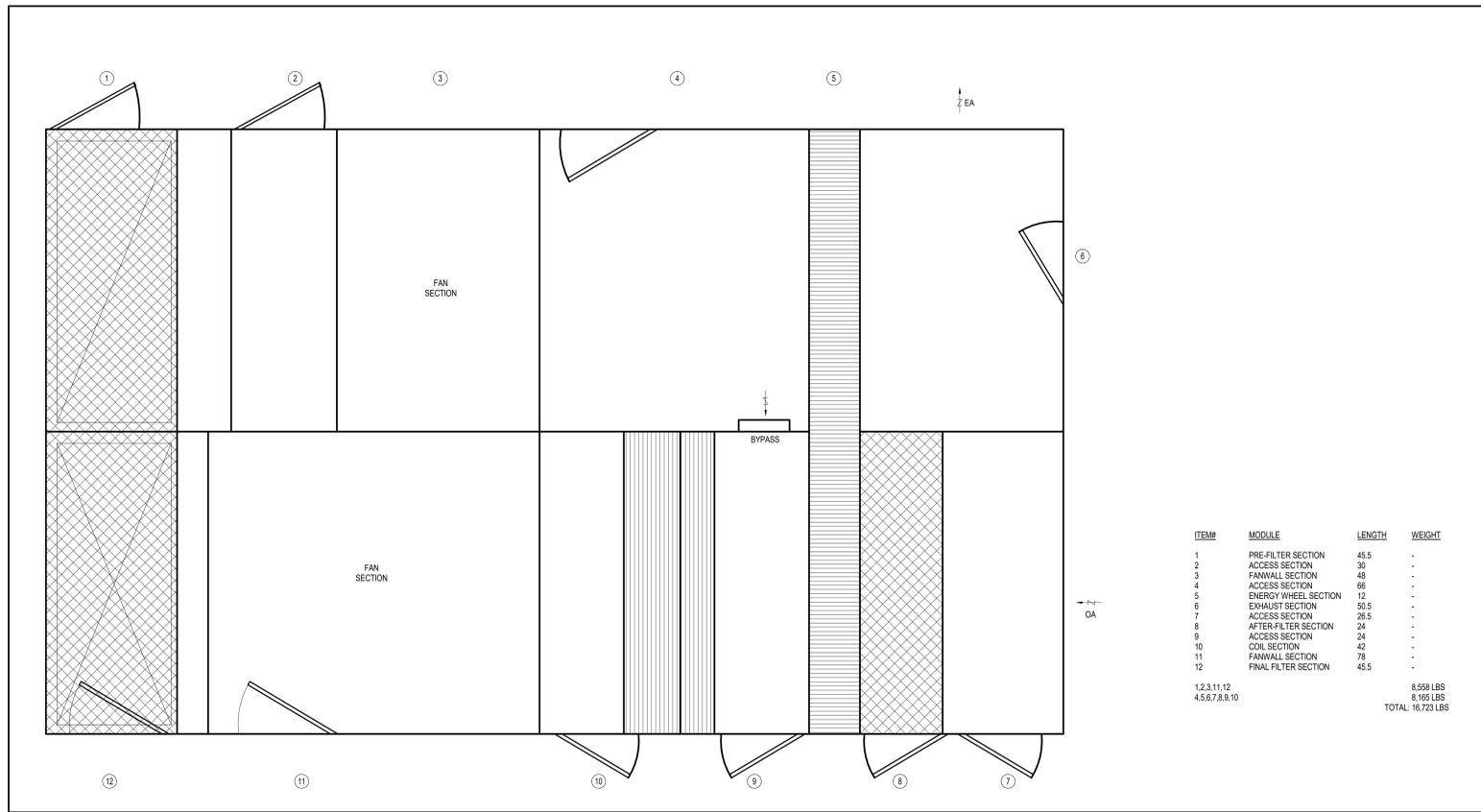
CHILLED WATER PUMP SCHEDULE

MARK	MAKE	MODEL	LOCATION	SERVICE	TYPE	FLUID FLOW (GPM)	HEAD (FT WG)	SUCTION INLET (IN)	DISCHARGE OUTLET (IN)	IMPELLER DIA. (IN)	HP	RPM	VPHHZ	TYPE	FURNISHED BY	SUCTION DIFF.	TRIPLE DUTY VALVE	STRAINER
CHWP-39-2-03	GOLDS	469V	MECH RM 202	CHILLED WATER	VERTICAL	190	115	3	3	10.19	7.5	1780	480/380	DDC	ATC	YES	YES	YES

NOTES:  
 1. REMOTE MOUNTED VFD.  
 2. PROVIDE W/ DISCONNECT SWITCH.  
 3. RATED FOR 30% P.G. CHW.  
 4. MOUNT ON 4" CONCRETE HOUSING PAD. PAD INSTALLED BY GENERAL CONTRACTOR.  
 5. REFER TO PROJECT SPECIFICATIONS FOR ALL REQUIRED OPTIONS AND ACCESSORIES.

VARIABLE AIR VOLUME TERMINAL UNIT SCHEDULE

MARK	CFM			INLET SIZE (IN.)	SOUND REQUIREMENTS			HOT WATER HEATING COIL									
	MAX.	MIN.	HEATING CFM		UNIT MAX. SP. AT MAX. CFM (IN-WG)	AT MAX. ROOM NC (IN-WG)	MAX. NC RATING	EAT (*F)	EWT (*F)	LWT (*F)	GPM	PIPE BRANCH SIZE (IN.)	MAX. WATER PD (FT)	TOTAL CAPACITY (MBH)			
VAV-39-0-01	350	350	350	6	0.5	1.0	25	52	73	140	110	0.5	34	2.0	7.8		
VAV-39-0-02	425	425	425	8	0.5	1.0	25	52	72	140	110	0.5	34	2.0	8.3		
VAV-39-0-03	75	75	75	4	0.5	1.0	25	52	70	140	110	0.5	34	2.0	1.5		
VAV-39-0-04	75	50	50	4	0.5	1.0	25	52	70	140	110	0.5	34	2.0	1.5		
VAV-39-0-05	50	75	75	4	0.5	1.0	25	52	70	140	110	0.5	34	2.0	1.5		
VAV-39-0-06	75	75	75	4	0.5	1.0	25	52	70	140	110	0.5	34	2.0	1.5		
VAV-39-0-07	75	75	75	4	0.5	1.0	25	52	74	140	110	0.5	34	2.0	1.5		
VAV-39-0-08	150	125	125	4	0.5	1.0	25	52	71	140	110	0.5	34	2.0	2.5		
VAV-39-0-09	150	125	125	4	0.5	1.0	25	52	70	140	110	0.5	34	2.0	2.5		
VAV-39-0-10	100	100	100	4	0.5	1.0	25	52	72	140	110	0.5	34	2.0	2.0		
VAV-39-0-11	250	125	125	6	0.5	1.0	25	52	73	140	110	0.5	34	2.0	2.7		
VAV-39-0-12	325	150	150	6	0.5	1.0	25	52	72	140	110	0.5	34	2.0	3.5		
VAV-39-0-13	225	125	125	6	0.5	1.0	25	52	73	140	110	0.5	34	2.0	2.7		
VAV-39-0-14	300	150	150	6	0.5	1.0	25	52	71	140	110	0.5	34	2.0	3.4		
VAV-39-0-15	150	100	100	4	0.5	1.0	25	52	72	140	110	0.5	34	2.0	2.1		
VAV-39-0-16	175	100	100	6	0.5	1.0	25	52	72	140	110	0.5	34	2.0	2.1		
VAV-39-0-17	175	100	100	6	0.5	1.0	25	52	74	140	110	0.5	34	2.0	2.1		
VAV-39-0-18	225	100	100	6	0.5	1.0	25	52	70	140	110	0.5	34	2.0	2.4		
VAV-39-1-01	575	350	350	8	0.5	1.0	25	52	70	140	110	0.5	34	2.0	7.3		
VAV-39-1-02	375	375	375	6	0.5	1.0	25	52	72	140	110	0.5	34	2.0	1.0		
VAV-39-1-03	50	50	50	4	0.5	1.0	25	52	71	140	110	0.5	34	2.0	9.2		
VAV-39-1-04	500	425	425	8	0.5	1.0	25	52	71	140	110	0.5	34	2.0	2.5		
VAV-39-1-05	150	125	125	4	0.5	1.0	25	52	71	140	110	0.5	34	2.0	2.5		
VAV-39-1-06	150	125	125	4	0.5	1.0	25	52	71	140	110	0.5	34	2.0	2.5		
VAV-39-1-07	150	125	125	4	0.5	1.0	25	52	73	140	110	0.5	34	2.0	2.1		
VAV-39-1-08	150	100	100	4	0.5	1.0	25	52	71	140	110	0.5	34	2.0	2.1		
VAV-39-1-09	150	100	100	6	0.5	1.0	25	52	71	140	110	0.5	34	2.0	2.1		
VAV-39-1-10	150	100	100	4	0.5	1.0	25	52	71	140	110	0.5	34	2.0	2.1		
VAV-39-1-11	150	100	100	4	0.5	1.0	25	52	71	140	110	0.5	34	2.0	2.1		
VAV-39-1-12	150	100	100	4	0.5	1.0	25	52	7								



E3 AHU-39-2-02 COMPONENT DIAGRAM-DO NOT USE  
N.T.S.

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BM 36010121004 - VA Providence Mental Health Building PH150121004 - VA Providence MHC Phg E20\_Dv 21\_ZZ\_ & 25.rvt  
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<b>ENGINEER</b>  ABOVE GROUP ENGINEERING   DESIGN   CONSULTING www.abovegroupinc.com 305 East Dr., Suite H, Melbourne, Florida 32904 PH: 321.345.9026	<b>ARCHITECT/ENGINEER OF RECORD</b>  WBRC ARCHITECTS • ENGINEERS www.wbrcae.com BANGOR, MAINE 207-947-4511 PORTLAND, MAINE 207-838-4511 SARASOTA, FLORIDA 941-556-0757	STAMP  Allen D. Lantz, P.E. MD License #41513	Office of Construction and Facilities Management VA U.S. Department of Veterans Affairs	Drawing Title MECHANICAL EQUIPMENT DIAGRAM	Phase CONSTRUCTION DOCUMENTS	Project Title PROVIDENCE VAMC MENTAL HEALTH PHASE 2	Project Number 650-347
				Approved:	FULLY SPRINKLERED	Location PROVIDENCE, RI	Building Number 39