MECHANICAL PLAN NOTES:

M2 AREA WELL UP TO GRADE FOR PARKING GARAGE EXHAUST.

M4 PROVIDE PARKING AND GARAGE CO AND NO2 MONITORING SYSTEM TIED TO GARAGE EXHAUST FANS EF 1 AND EF 2.

M14 PROVIDE 1/4" ALUMINUM BIRD SCREEN OVER DUCT OPENING.

M49 LOUVERS BY ARCHITECT. REFER TO FREE AREA SCHEDULE ON M603 FOR MECHANICAL SYSTEM REQUIREMENTS. REFER TO ARCHITECTURAL PLANS FOR LOUVER DETAILS AND SPECIFICATIONS.

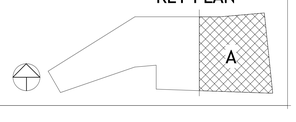
M50 MOUNT BOTTOM OF PLENUM 12'0" AFF.

M54 EXTEND EXHAUST DUCT 3FT FROM EXTERIOR WALL. SUPPORT FROM EXTERIOR WALL. PROVIDE INSECT SCREEN OVER DUCT OPENING.

M93 MOUNT BOTTOM OF FAN A MINIMUM OF 14'0" AFF.

1 HVAC - LEVEL 0 PLAN - AREA A
1/8" = 1'-0"

KEY PLAN



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Henderson Job Number:
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ARKANSAS REGISTERED PROFESSIONAL ENGINEER
No. 11283
AARON S. COOPER
06/07/2023

AWSOM
Bentonville, AR

Issue Date:
02.24.2023

REVISIONS

NUMBER	DATE	DESCRIPTION
1	03.10.23	Addendum 1
2	06.09.23	Addendum 2

Contents:
HVAC - LEVEL 0 PLAN - AREA A

THIS PAGE IS BEST VIEWED IN COLOR

M100A

MECHANICAL PLAN NOTES:

M1 MOUNT BOILER A MINIMUM OF 18" AFF.

M4 PROVIDE PARKING AND GARAGE CO AND NO2 MONITORING SYSTEM TIED TO GARAGE EXHAUST FANS EF 1 AND EF 2.

M49 LOUVERS BY ARCHITECT. REFER TO FREE AREA SCHEDULE ON M603 FOR MECHANICAL SYSTEM REQUIREMENTS. REFER TO ARCHITECTURAL PLANS FOR LOUVER DETAILS AND SPECIFICATIONS.

M51 MOUNT PUMP VFDS ON UNISTRUT.

M52 BOILER FLUE THRU WALL. REFER TO MANUFACTURER'S REQUIREMENTS FOR SIDE WALL FLUE INSTALLATION AND ACCESSORIES.

M53 BOILER INTAKE THRU WALL. REFER TO MANUFACTURER'S REQUIREMENTS FOR SIDE WALL INTAKE INSTALLATION AND ACCESSORIES.

M67 REFER TO ELECTRICAL PLANS FOR EMERGENCY BOILER SHUT-OFF.

M68 ROUTE 4"Ø WATER HEATER INTAKE UP THROUGH CHASE AND OUT OF SIDEWALL. PROVIDE SIDEWALL TERMINATION. REFER TO PLUMBING DRAWINGS FOR ADDITIONAL WATER HEATER INFORMATION. REFER TO MANUFACTURERS REQUIREMENTS FOR ROUTING REQUIREMENTS, MATERIAL TYPE AND ALL OTHER REQUIREMENTS.

M69 ROUTE 4"Ø WATER HEATER INTAKE AND EXHAUST TO WATER HEATER CONNECTION. VERIFY CONNECTION LOCATION AND TYPE WITH PURCHASED EQUIPMENT. REFER TO PLUMBING DRAWINGS FOR ADDITIONAL WATER HEATER INFORMATION. REFER TO MANUFACTURERS REQUIREMENTS FOR ALL VENTING CONSTRAINTS.

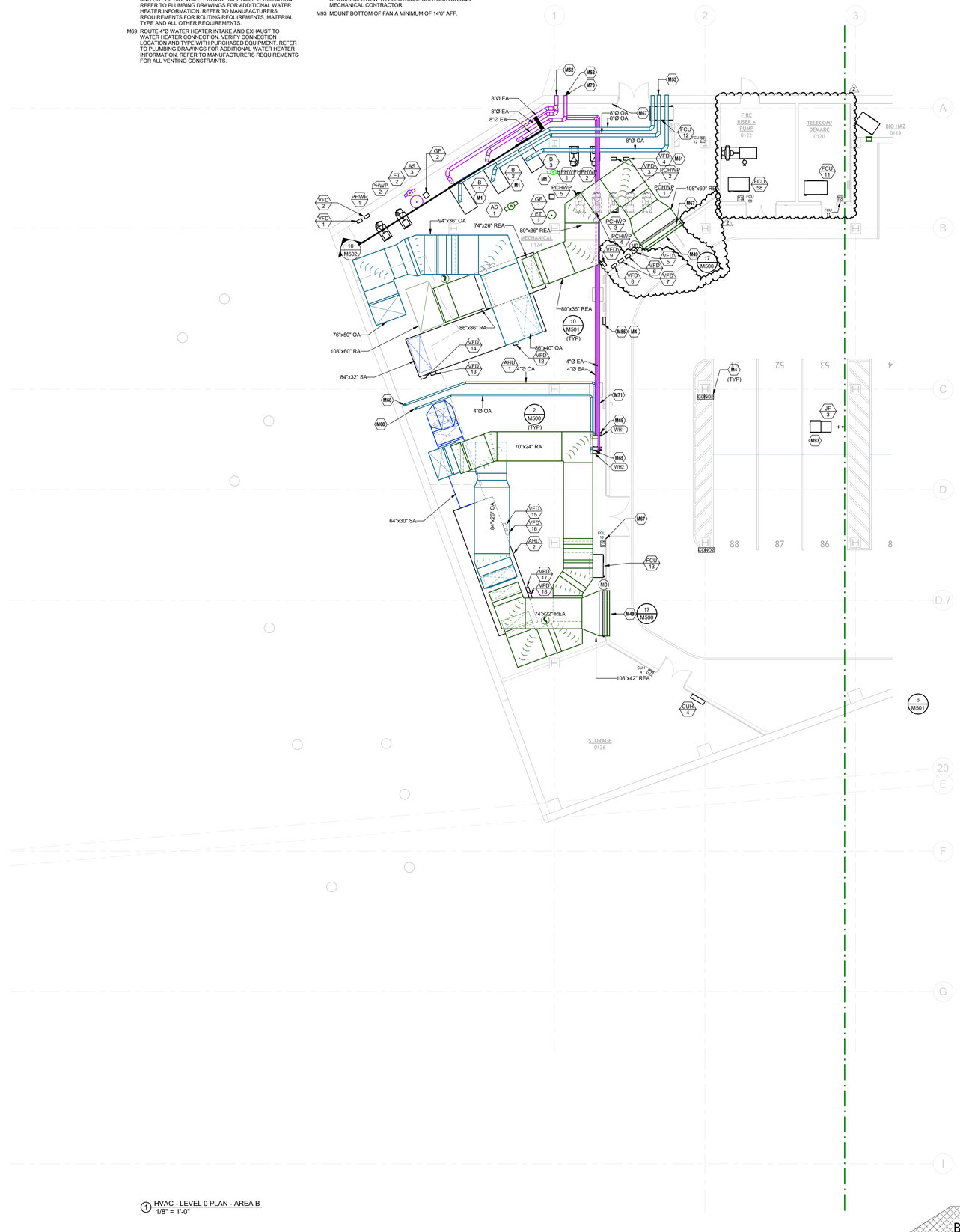
MECHANICAL PLAN NOTES:

M70 ROUTE 4"Ø WATER HEATER EXHAUST OUT OF SIDEWALL. PROVIDE SIDEWALL TERMINATION. REFER TO MANUFACTURER'S REQUIREMENTS FOR SIDE WALL FLUE INSTALLATION AND ACCESSORIES. INSTALL EXHAUST A MINIMUM OF 15 FEET FROM ANY HVAC OUTDOOR AIR INTAKES. REFER TO PLUMBING DRAWINGS FOR ADDITIONAL WATER HEATER INFORMATION. REFER TO MANUFACTURERS REQUIREMENTS FOR ROUTING REQUIREMENTS, MATERIAL TYPE AND ALL OTHER REQUIREMENTS.

M71 MAINTAIN A MINIMUM OF 10" FROM ELECTRICAL EQUIPMENT LOCATED ON MECHANICAL ROOM WALL. ALL DUCTWORK MUST ALSO BE LOCATED A MINIMUM 11'-0" AFF TO CONFORM TO ALL REQUIRED CLEARANCES.

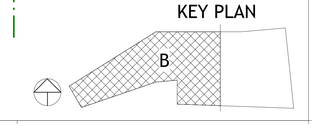
M85 PROVIDE VEHICLE EMISSION CONTROL PANEL FOR PARKING AND GARAGE CO AND NO2 MONITORING. NUMBER OF PANELS SHALL BE DETERMINED BY MANUFACTURER. FOLLOW ALL MANUFACTURER REQUIREMENTS AND RECOMMENDATIONS. COORDINATE ANY ADDITIONAL POWER REQUIREMENTS WITH ELECTRICAL CONTRACTOR AND MECHANICAL CONTRACTOR.

M93 MOUNT BOTTOM OF FAN A MINIMUM OF 14'0" AFF.



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

KEY PLAN



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STATE OF ARKANSAS 21 REGISTERED PROFESSIONAL ENGINEER No. 11265 MARION B. COOPER

06/07/2023

AWSOM
Bentonville, AR

Issue Date:
02.24.2023

REVISIONS

NUMBER	DATE	DESCRIPTION
2	06.09.23	Addendum 2

Contents:
HVAC - LEVEL 0 PLAN - AREA B

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M100B

MECHANICAL PLAN NOTES:

M12 LOCATE CONTROL POWER TRANSFORMERS IN THIS ROOM TO POWER LOCAL VAV BOXES. EACH CONTROL POWER TRANSFORMER SHALL SERVE UP TO FIVE VAV BOXES. DISTANCE BETWEEN TRANSFORMER AND VAV BOX SHALL NOT EXCEED 200 FEET.

M22 MOUNT BOTTOM OF FAN COIL UNIT 9 FT AFF.

M42 RETURN AIR THRU COVE ASSEMBLY. REFER TO ARCHITECTURAL PLANS FOR COVE LOCATION AND OPENING SIZE FOR RETURN AIR. OPENING SHALL BE MINIMUM 3" TALL AND FULL LENGTH OF COVE..

M55 INSTALL ELECTRIC TRENCH HEATER ALONG 10 DEGREE SLOPE. COORDINATE INSTALLATION REQUIREMENTS WITH SOHO MANUFACTURER.

M56 REFER TO M102A FOR CONTINUATION.

M57 COORDINATE WITH ARCHITECTURAL DRAWINGS TO LEAVE WALL DOWN ABOVE CEILING FOR RETURN PATHWAY.

M58 MOUNT BOTTOM OF GRILLE 10'8" AFF.

M59 MOUNT BOTTOM OF LINEAR SLOT DIFFUSER 11'6" AFF.

M72 PROVIDE HIGH EFFICIENCY DAMPER AT TAKEOFF.

M94 PROVIDE 2 BALANCE DAMPERS IN SERIES IN DUCT DROP TO EXHAUST LINEAR SLOT DIFFUSER.

M95 PROVIDE 4" HARD DUCT DOWN THRU CEILING TO 6 FEET AFF. BALANCE EXHAUST PORT TO 20 CFM. PROVIDE FLEXIBLE HOSE WITH BLAST GATE CONNECTION FROM 3D PRINTER TO HARD DUCT. COORDINATE RATING OF FLEXIBLE HOSE WITH MANUFACTURER'S REQUIREMENTS. REFER TO MAKER SPACE EQUIPMENT SCHEDULE IN ARCHITECTURAL PLANS AND SPECIFICATIONS.

MECHANICAL PLAN NOTES:

M96 PROVIDE 4" HARD DUCT DOWN THRU CEILING TO 6 FEET AFF. BALANCE EXHAUST PORT TO 50 CFM. PROVIDE FLEXIBLE HOSE WITH BLAST GATE CONNECTION FROM SMART PART WASHER TO HARD DUCT. COORDINATE RATING OF FLEXIBLE HOSE WITH MANUFACTURER'S REQUIREMENTS. REFER TO MAKER SPACE EQUIPMENT SCHEDULE IN ARCHITECTURAL PLANS AND SPECIFICATIONS.

M97 PROVIDE 4" HARD DUCT DOWN THRU CEILING TO 6 FEET AFF. BALANCE EXHAUST PORT TO 50 CFM. PROVIDE FLEXIBLE HOSE CONNECTION FROM ORBITAL SHAKER TO HARD DUCT. COORDINATE RATING OF FLEXIBLE HOSE WITH MANUFACTURER'S REQUIREMENTS. REFER TO MAKER SPACE EQUIPMENT SCHEDULE IN ARCHITECTURAL PLANS AND SPECIFICATIONS.

M98 PROVIDE 4" HARD DUCT DOWN THRU CEILING TO 9 FEET AFF. BALANCE EXHAUST PORT TO 80 CFM. PROVIDE FLEXIBLE HOSE WITH BLAST GATE CONNECTION FROM COMPRESSED AIR CLEANING CABINET TO HARD DUCT. COORDINATE RATING OF FLEXIBLE HOSE WITH MANUFACTURER'S REQUIREMENTS. REFER TO MAKER SPACE EQUIPMENT SCHEDULE IN ARCHITECTURAL PLANS AND SPECIFICATIONS.

M99 BUILDING DIFFERENTIAL PRESSURE SENSOR.

M109 ALL BASEBOARD HEATERS SHALL BE CONTINUOUS IF SERVED BY SAME PIPING. NO EXPOSED PIPING ALLOWED BETWEEN BASEBOARD HEATERS. PROVIDE BLANK BBH SECTION, IF REQUIRED (TYPICAL)

M147 ROUTE DUCTWORK ABOVE SLAT CEILING.

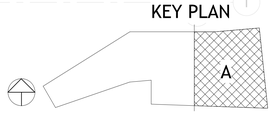
M167 BBH SHALL BE CONTROLLED BY ROOM THERMOSTAT. COORDINATE ROUTING OF CONTROL WIRING FROM VAV THERMOSTAT TO ASSOCIATED BBH VALVE.

M168 BBH 15 SHALL BE CONTROLLED BY VAV 1-22 THERMOSTAT.

M169 BBH 23 SHALL BE CONTROLLED BY VAV 1-26 THERMOSTAT.

1 HVAC - LEVEL 1 PLAN - AREA A
1/8" = 1'-0"

KEY PLAN



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STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11868
HENDERSON & COOPER

06/07/2023

AWSOM
Bentonville, AR

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Contents:
HVAC - LEVEL 1
PLAN - AREA A

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M101A

MECHANICAL PLAN NOTES:

M12 LOCATE CONTROL POWER TRANSFORMERS IN THIS ROOM TO POWER LOCAL VAV BOXES. EACH CONTROL POWER TRANSFORMER SHALL SERVE UP TO FIVE VAV BOXES. DISTANCE BETWEEN TRANSFORMER AND VAV BOX SHALL NOT EXCEED 200 FEET.

M02 MOUNT BOTTOM OF FAN COIL UNIT 11" AFF.

M49 LOUVERS BY ARCHITECT. REFER TO FREE AREA SCHEDULE ON M603 FOR MECHANICAL SYSTEM REQUIREMENTS. REFER TO ARCHITECTURAL PLANS FOR LOUVER DETAILS AND SPECIFICATIONS.

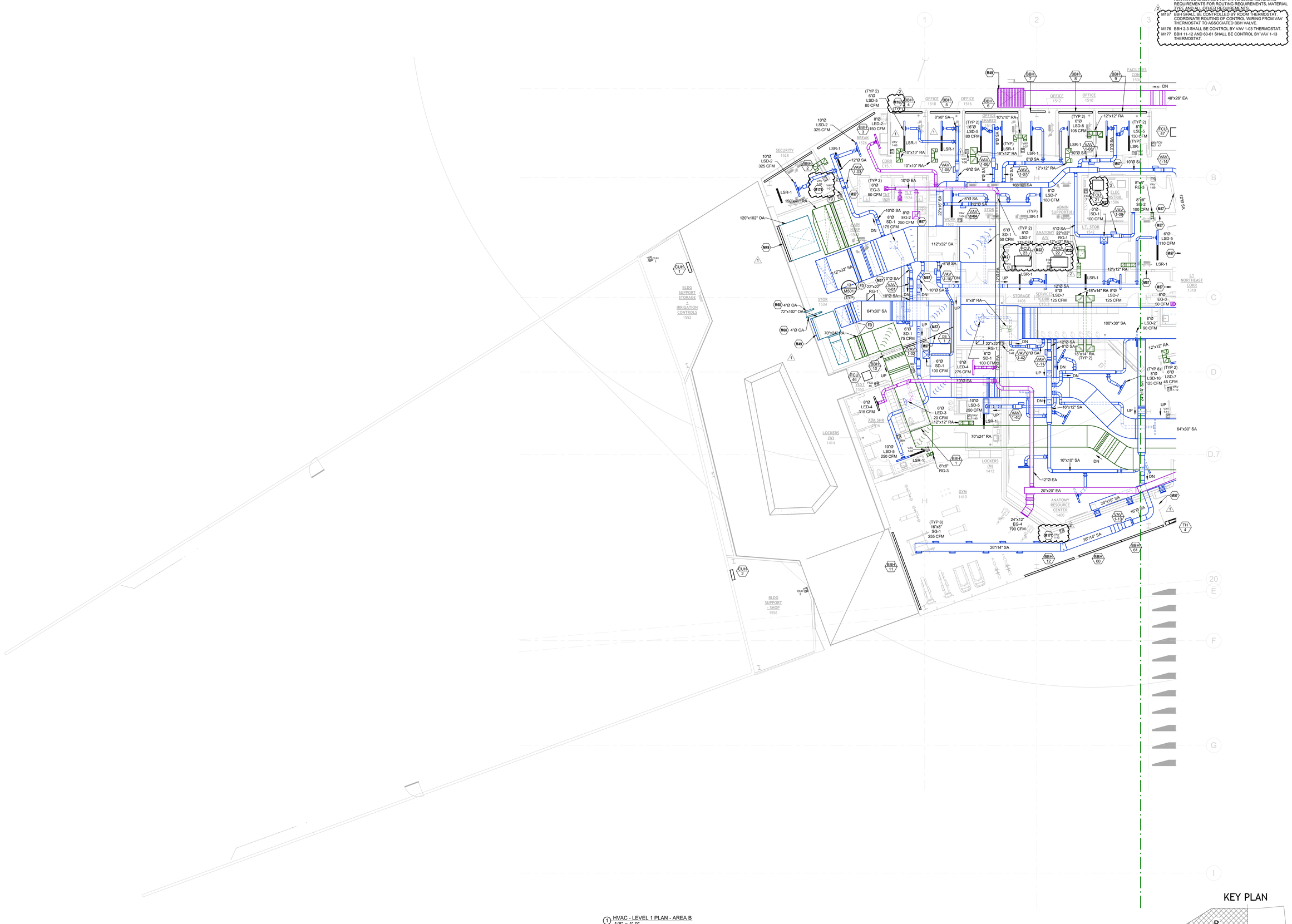
M57 COORDINATE WITH ARCHITECTURAL DRAWINGS TO LEAVE WALL DOWN ABOVE CEILING FOR RETURN PATHWAY.

M68 ROUTE 4"Ø WATER HEATER INTAKE UP THROUGH CHASE AND OUT OF SIDEWALL. PROVIDE SIDEWALL TERMINATION. REFER TO PLUMBING DRAWINGS FOR ADDITIONAL WATER HEATER INFORMATION. REFER TO MANUFACTURERS REQUIREMENTS FOR ROUTING REQUIREMENTS, MATERIAL TYPE AND ALL OTHER REQUIREMENTS.

M167 BBH SHALL BE CONTROLLED BY ROOM THERMOSTAT. COORDINATE ROUTING OF CONTROL WIRING FROM VAV THERMOSTAT TO ASSOCIATED BBH VALVE.

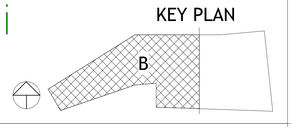
M176 BBH 2-3 SHALL BE CONTROL BY VAV 1-03 THERMOSTAT.

M177 BBH 11-12 AND 60-61 SHALL BE CONTROL BY VAV 1-13 THERMOSTAT.



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

KEY PLAN



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STATE OF ARKANSAS REGISTERED PROFESSIONAL ENGINEER No. 11865 BRYAN S. COOPER

06/07/2023

AWSOM
Bentonville, AR

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2	06.09.23	Addendum 2

Contents:
HVAC - LEVEL 1 PLAN - AREA B

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M101B

MECHANICAL PLAN NOTES:

M9 ROUTE 8"X7" EXHAUST AIR DUCT DOWN TO CONDENSATE HOOD CONNECTION. BALANCE TO 750 CFM. FOLLOW ALL MANUFACTURER RECOMMENDATIONS AND REQUIREMENTS. SLOPE ALL HOOD EXHAUST DUCT AT 1/4" PER FOOT.

M10 ROUTE 21"X10" EXHAUST AIR DUCT DOWN TO EXHAUST HOOD CONNECTION. BALANCE TO 2590 CFM. PROVIDE CONNECTION TO HOOD. REFER TO KITCHEN PLANS FOR EQUIPMENT CONNECTION SIZE AND MORE DETAILS. SLOPE ALL HOOD EXHAUST DUCT AT 1/4" PER FOOT BACK TOWARDS HOOD. FOLLOW ALL MANUFACTURER RECOMMENDATIONS AND REQUIREMENTS.

M11 ROUTE 10"X16" EXHAUST AIR DUCT DOWN TO EXHAUST HOOD CONNECTION. BALANCE TO 1945 CFM. PROVIDE CONNECTION TO HOOD. REFER TO KITCHEN PLANS FOR EQUIPMENT CONNECTION SIZE AND MORE DETAILS. SLOPE ALL HOOD EXHAUST DUCT AT 1/4" PER FOOT BACK TOWARDS HOOD. FOLLOW ALL MANUFACTURER RECOMMENDATIONS AND REQUIREMENTS.

M12 LOCATE CONTROL POWER TRANSFORMERS IN THIS ROOM TO POWER LOCAL VAV BOXES. EACH CONTROL POWER TRANSFORMER SHALL SERVE UP TO FIVE VAV BOXES. DISTANCE BETWEEN TRANSFORMER AND VAV BOX SHALL NOT EXCEED 200 FEET.

M15 PROVIDE DEFLECTOR PLATE AS SHOWN. DO NOT BLOW AIR INTO THE DIRECTION OF THE KITCHEN HOOD.

MECHANICAL PLAN NOTES:

M22 MOUNT BOTTOM OF FAN COIL UNIT 9 FT AFF.

M42 RETURN AIR THRU COVE ASSEMBLY. REFER TO ARCHITECTURAL PLANS FOR COVE LOCATION AND OPENING SIZE FOR RETURN AIR. OPENING SHALL BE MINIMUM 3" TALL AND FULL LENGTH OF COVE.

M44 LINEAR SLOT DIFFUSER SUSPENDED FROM STRUCTURE. MOUNT LINEAR SLOT JUST PAST EDGE OF CEILING.

M49 LOUVERS BY ARCHITECT. REFER TO FREE AREA SCHEDULE ON M603 FOR MECHANICAL SYSTEM REQUIREMENTS. REFER TO ARCHITECTURAL PLANS FOR LOUVER DETAILS AND SPECIFICATIONS.

M57 COORDINATE WITH ARCHITECTURAL DRAWINGS TO LEAVE WALL DOWN ABOVE CEILING FOR RETURN PATHWAY.

M61 UP TO FLOOR GRILLE PLENUM.

M62 MOUNT BOTTOM OF GRILLE 12"10" AFF.

M63 MOUNT BOTTOM OF DRUM DIFFUSER 15'0" ABOVE FINISHED SECOND FLOOR.

M73 LOUVER ASSEMBLY IS SLANTED TO ALIGN WITH PRECAST PANELS. ATTACHED PLENUM SHALL NOT BE SLANTED. COORDINATE WITH ARCHITECT ON FINAL REQUIRED BLANK OFF PANEL LOCATIONS FOR LOUVER SECTIONS NOT CONNECTED TO PLENUM.

M86 PROVIDE GRILLE WITH FIRE DAMPER AT THE GRILLE FACE.

MECHANICAL PLAN NOTES:

M91 MOUNT BOTTOM OF RETURN GRILLE 13'9" AFF.

M92 ARCHITECT TO PROVIDE EXHAUST LOUVER. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR SIZE AND EXACT LOCATION.

M104 DUCTWORK SHALL BE ROUTED ABOVE CEILING ALONG EDGE OUTLINED ON DRAWING.

M105 MOUNT THERMOSTAT ON COLUMN 4'6" ABOVE NEAREST STAIR TREAD ELEVATION.

M109 ALL BASEBOARD HEATERS SHALL BE CONTINUOUS IF SERVED BY SAME PIPING. NO EXPOSED PIPING ALLOWED BETWEEN BASEBOARD HEATERS. PROVIDE BLANK BBH SECTION, IF REQUIRED (TYPICAL)

M110 SEAL PENETRATION THROUGH ACOUSTICAL CEILING WITH ACOUSTICAL SEALANT. REFER TO ARCHITECTURAL PLANS FOR ADDITIONAL INFORMATION.

M170 BBH 33, 34, 58 AND 59 SHALL BE CONTROLLED BY VAV 2-01 THERMOSTAT.

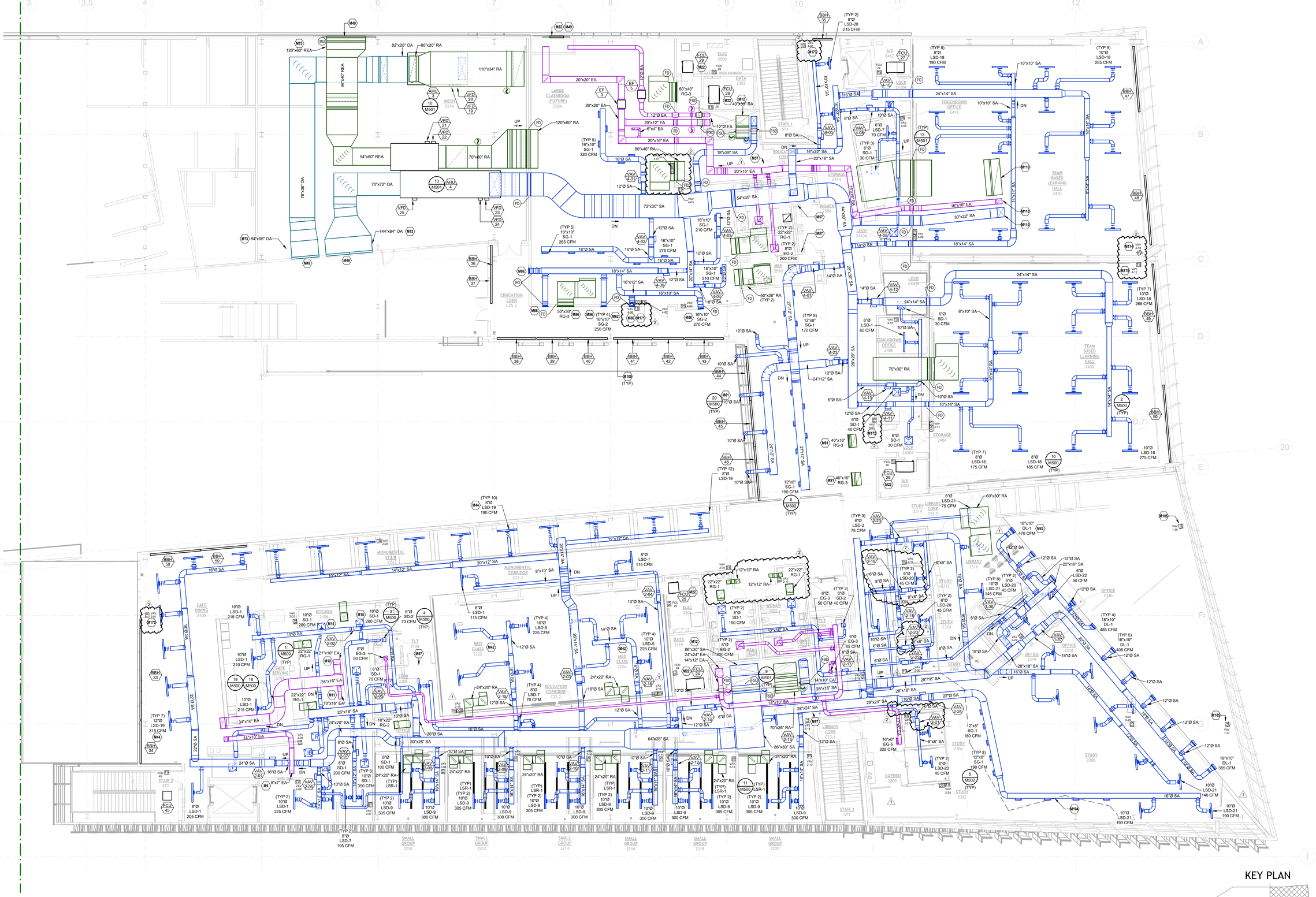
M171 BBH 37 - 43 SHALL BE CONTROLLED BY VAV 4-06 THERMOSTAT.

M172 BBH 44-46 SHALL BE CONTROLLED BY VAV 4-07 THERMOSTAT.

M173 BBH 35 SHALL BE CONTROLLED BY VAV4-05 THERMOSTAT.

M174 BBH 47-48 SHALL BE CONTROL BY VAV 4-10 THERMOSTAT.

M175 BBH 49-50 SHALL BE CONTROL BY VAV 4-12 THERMOSTAT.



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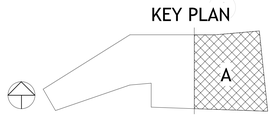

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ARKANSAS REGISTERED PROFESSIONAL ENGINEER No. 11868 JASON S. COOPER

06/07/2023

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Bentonville, AR

Issue Date:
02.24.2023

REVISIONS

NUMBER	DATE	DESCRIPTION
1	03.10.23	Addendum 1
2	06.09.23	Addendum 2

Contents:
HVAC - LEVEL 2 PLAN - AREA A

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M102A

MECHANICAL PLAN NOTES:

M12 LOCATE CONTROL POWER TRANSFORMERS IN THIS ROOM TO POWER LOCAL VAV BOXES. EACH CONTROL POWER TRANSFORMER SHALL SERVE UP TO FIVE VAV BOXES. DISTANCE BETWEEN TRANSFORMER AND VAV BOX SHALL NOT EXCEED 200 FEET.

M13 ROUTE 8" Ø OA DUCT UP INTO CEILING AND LEAVE OPEN FOR FIREPLACE MAKE-UP AIR.

M22 MOUNT BOTTOM OF FAN COIL UNIT 9 FT AFF.

M42 RETURN AIR THRU COVE ASSEMBLY. REFER TO ARCHITECTURAL PLANS FOR COVE LOCATION AND OPENING SIZE FOR RETURN AIR. OPENING SHALL BE MINIMUM 3" TALL AND FULL LENGTH OF COVE.

M44 LINEAR SLOT DIFFUSER SUSPENDED FROM STRUCTURE. MOUNT LINEAR SLOT JUST PAST EDGE OF CEILING.

M57 COORDINATE WITH ARCHITECTURAL DRAWINGS TO LEAVE WALL DOWN ABOVE CEILING FOR RETURN PATHWAY.

M58 MOUNT BOTTOM OF GRILLE 10'8" AFF.

MECHANICAL PLAN NOTES:

M60 WRAP FIREPLACE FLUE IN FIRE WRAP FROM FIREPLACE DISCHARGE TO MECHANICAL SHAFT. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.

M64 MOUNT BOTTOM OF GRILLE 12'0" AFF.

M65 MOUNT BOTTOM OF DRUM 12'10" AFF.

M66 MOUNT BOTTOM OF DRUM 13'10" AFF IN BULKHEAD. REFER TO ARCHITECTURAL DRAWINGS FOR BULKHEAD DETAILS.

M72 PROVIDE HIGH EFFICIENCY DAMPER AT TAKEOFF.

M87 MOUNT BOTTOM OF DRUM LOUVER 12'9" AFF.

M88 MOUNT BOTTOM OF RETURN GRILLE 13'7" AFF.

M89 MOUNT BOTTOM OF SUPPLY GRILLE 14'-0" AFF IN CEILING BULKHEAD. REFER TO ARCHITECTURAL DRAWINGS FOR BULKHEAD DETAILS.

M90 MOUNT BOTTOM OF RETURN GRILLE 17'6" AFF.

MECHANICAL PLAN NOTES:

M99 BUILDING DIFFERENTIAL PRESSURE SENSOR.

M106 MOUNT BOTTOM OF SUPPLY GRILLE 13'-2" AFF IN CEILING BULKHEAD. REFER TO ARCHITECTURAL DRAWINGS FOR BULKHEAD DETAILS.

M109 ALL BASEBOARD HEATERS SHALL BE CONTINUOUS IF SERVED BY SAME PIPING. NO EXPOSED PIPING ALLOWED BETWEEN BASEBOARD HEATERS. PROVIDE BLANK BBH ~~ACTUATOR CABINET OPTION~~.

M167 BBH SHALL BE CONTROLLED BY ROOM THERMOSTAT. COORDINATE ROUTING OF CONTROL WIRING FROM VAV THERMOSTAT TO ASSOCIATED BBH VALVE.

M178 BBH 52-55 SHALL BE CONTROL BY VAV 4-15 THERMOSTAT.

M179 BBH 56-57 SHALL BE CONTROL BY VAV 4-22 THERMOSTAT.

M180 BBH 71-74 SHALL BE CONTROL BY VAV 4-27 THERMOSTAT.

MECHANICAL PLAN NOTES:

M181 BBH 68-70 SHALL BE CONTROL BY VAV 4-26 THERMOSTAT.

M182 BBH 65-67 SHALL BE CONTROL BY VAV 4-25 THERMOSTAT.

M183 BBH 120 SHALL BE CONTROL BY VAV 5-44 THERMOSTAT.

M184 BBH 117-119 SHALL BE CONTROL BY VAV 5-34 THERMOSTAT.

M185 BBH 115-116 SHALL BE CONTROL BY VAV 5-33 THERMOSTAT.

M186 BBH 107-114 SHALL BE CONTROL BY VAV 5-32 THERMOSTAT.

M187 BBH 100-106 SHALL BE CONTROL BY VAV 5-25 THERMOSTAT.

M188 BBH 93-99 SHALL BE CONTROL BY VAV 5-24 THERMOSTAT.

M189 BBH 87-91 SHALL BE CONTROL BY VAV 5-04 THERMOSTAT.

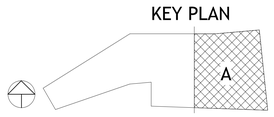
M190 BBH 76-80 SHALL BE CONTROL BY VAV 5-01 THERMOSTAT.

M191 BBH 81-83 SHALL BE CONTROL BY VAV 5-02 THERMOSTAT.

M192 BBH 84-86 SHALL BE CONTROL BY VAV 5-03 THERMOSTAT.

1 HVAC - LEVEL 3 PLAN - AREA A
1/8" = 1'-0"

KEY PLAN



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PSW Job Number:
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Henderson Job Number:
2150002607

ARKANSAS REGISTERED PROFESSIONAL ENGINEER
No. 11885
JASON S. COOPER
06/07/2023

AWSOM
Bentonville, AR

Issue Date:
02.24.2023

REVISIONS

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Contents:
HVAC - LEVEL 3
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M103A

MECHANICAL PLAN NOTES:

M12 LOCATE CONTROL POWER TRANSFORMERS IN THIS ROOM TO POWER LOCAL VAV BOXES. EACH CONTROL POWER TRANSFORMER SHALL SERVE UP TO FIVE VAV BOXES. DISTANCE BETWEEN TRANSFORMER AND VAV BOX SHALL NOT EXCEED 25 FEET.
M21 AREA OPEN TO FLOOR BELOW. DO NOT ROUTE HVAC PIPING, DUCTWORK, OR ANY ACCESSORIES INCLUDING CONTROL WIRING ACROSS AREA.
M22 MOUNT BOTTOM OF FAN COIL UNIT 9 FT AFF.
M42 RETURN AIR THRU COVE ASSEMBLY. REFER TO ARCHITECTURAL PLANS FOR COVE LOCATION AND OPENING SIZE FOR RETURN AIR. OPENING SHALL BE MINIMUM 3" TALL AND FULL LENGTH OF COVE. .
M43 RETURN AIR THRU SHORT END OF CEILING OVERLAY ASSEMBLY. REFER TO ARCHITECTURAL PLANS FOR OPENING LOCATION AND SIZE. OPENING SHALL BE MINIMUM 3" TALL AND FULL LENGTH OF SHORT SIDE.
M44 LINEAR SLOT DIFFUSER SUSPENDED FROM STRUCTURE. MOUNT LINEAR SLOT JUST PAST EDGE OF CEILING.

MECHANICAL PLAN NOTES:

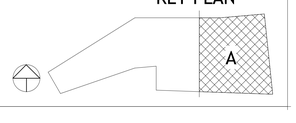
M45 UP TO RELIEF FAN ON ROOF.
M46 UP TO INTAKE HOOD ON ROOF.
M47 ROUTE RETURN DUCT DOWN ALONG WALL. PROVIDE SECOND ELBOW MOUNTED BOTTOM OF DUCT 1 FOOT ABOVE FINISHED FLOOR.
M57 COORDINATE WITH ARCHITECTURAL DRAWINGS TO LEAVE WALL DOWN ABOVE CEILING FOR RETURN PATHWAY.
M107 MOUNT BOTTOM OF SUPPLY GRILLE 12'-2" AFF IN CEILING BULKHEAD. REFER TO ARCHITECTURAL DRAWINGS FOR BULKHEAD DETAILS.
M109 ALL BASEBOARD HEATERS SHALL BE CONTINUOUS IF SERVED BY SAME PIPING. NO EXPOSED PIPING ALLOWED BETWEEN BASEBOARD HEATERS. PROVIDE BLANK ABLA SECTION IF REQUIRED. (TYPICAL)
M193 BBH 156-169 SHALL BE CONTROL BY VAV 5-73 THERMOSTAT.

MECHANICAL PLAN NOTES:

M194 BBH 170-180 SHALL BE CONTROL BY UH 1 AND UH 2 THERMOSTATS.
M195 BBH 148-150 SHALL BE CONTROL BY VAV 5-70 THERMOSTAT.
M196 BBH 140-147 SHALL BE CONTROL BY VAV 5-60 THERMOSTAT.
M197 BBH 136-139 SHALL BE CONTROL BY VAV 5-58 THERMOSTAT.
M198 BBH 121-125 SHALL BE CONTROL BY VAV 5-49 THERMOSTAT.
M199 BBH 126-128 SHALL BE CONTROL BY VAV 5-50 THERMOSTAT.
M200 BBH 129-132 SHALL BE CONTROL BY VAV 5-51 THERMOSTAT.
M201 BBH 133-134 AND 151-153, 155 SHALL BE CONTROL BY VAV 5-52 THERMOSTAT.

1 HVAC - LEVEL 4 PLAN - AREA A
1/8" = 1'-0"

KEY PLAN



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Henderson Job Number:
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ARKANSAS REGISTERED PROFESSIONAL ENGINEER No. 11283 BRYAN S. COOPER
06/07/2023

AWSOM
Bentonville, AR

Issue Date:
02.24.2023

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1	03.10.23	Addendum 1
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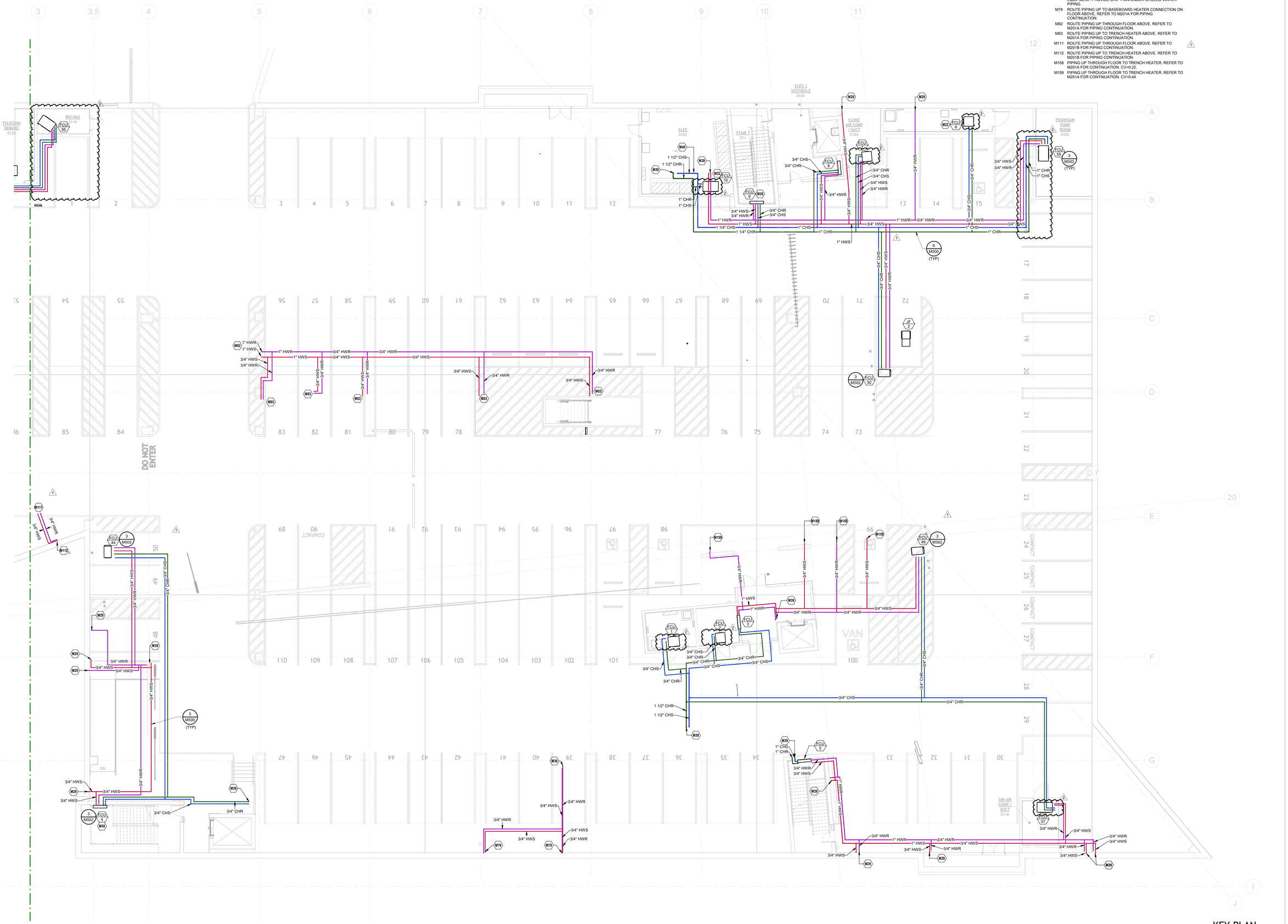
M104A

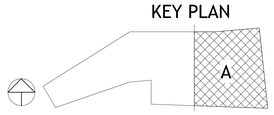
MECHANICAL PLAN NOTES:

- M22 MOUNT BOTTOM OF FAN COIL UNIT 9 FT AFF.
- M29 PIPING UP TO FLOOR ABOVE TO BASEBOARD HEATERS.
- M38 FLOOR MOUNTED FAN COIL UNIT BELOW STAIR LANDING.
- M39 PIPE THROUGH FLOOR. REFER TO M201A FOR CONTINUATION.
- M40 ROUTE HYDRONIC PIPING AROUND ELECTRICAL EQUIPMENT. PROVIDE DRIP PAIN UNDER CHILLED WATER PIPING.
- M79 ROUTE PIPING UP TO BASEBOARD HEATER CONNECTION ON FLOOR ABOVE. REFER TO M201A FOR PIPING CONTINUATION.
- M82 ROUTE PIPING UP THROUGH FLOOR ABOVE. REFER TO M201A FOR PIPING CONTINUATION.
- M83 ROUTE PIPING UP TO TRENCH HEATER ABOVE. REFER TO M201A FOR PIPING CONTINUATION.
- M111 ROUTE PIPING UP THROUGH FLOOR ABOVE. REFER TO M201B FOR PIPING CONTINUATION.
- M112 ROUTE PIPING UP TO TRENCH HEATER ABOVE. REFER TO M201B FOR PIPING CONTINUATION.
- M158 PIPING UP THROUGH FLOOR TO TRENCH HEATER. REFER TO M201A FOR CONTINUATION. CV=0.22.
- M159 PIPING UP THROUGH FLOOR TO TRENCH HEATER. REFER TO M201A FOR CONTINUATION. CV=0.44



1 PIPING - LEVEL 0 PLAN - AREA A
1/8" = 1'-0"

KEY PLAN



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PSW Job Number:
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Henderson Job Number:
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ARKANSAS REGISTERED PROFESSIONAL ENGINEER No. 11265 AARON S. COOPER
06/07/2023

AWSOM
Bentonville, AR

Issue Date:
02.24.2023

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M200A

MECHANICAL PLAN NOTES:

M36 ROUTE PIPE TIGHT TO STRUCTURE TO AVOID DUCTWORK MAINS ABOVE AIR HANDLER.

M67 REFER TO ELECTRICAL PLANS FOR EMERGENCY BOILER SHUT-OFF.

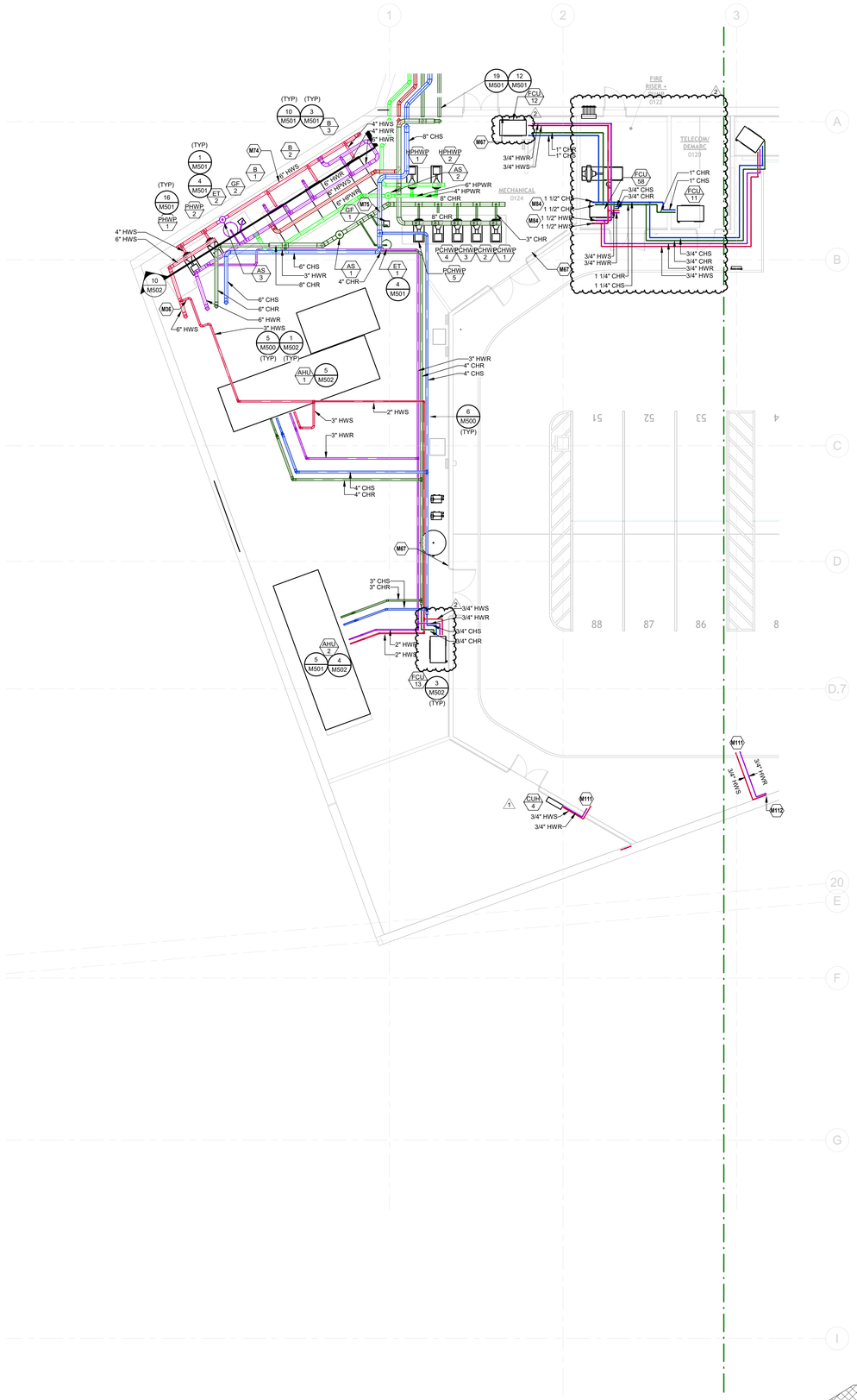
M74 LOCATION FOR HW FLOW METER. REFER TO CONTROLS DIAGRAM FOR FURTHER INFORMATION.

M75 LOCATION FOR CHW ELECTROMAGNETIC TYPE FLOW METER. REFER TO CONTROLS DIAGRAM FOR FURTHER INFORMATION.

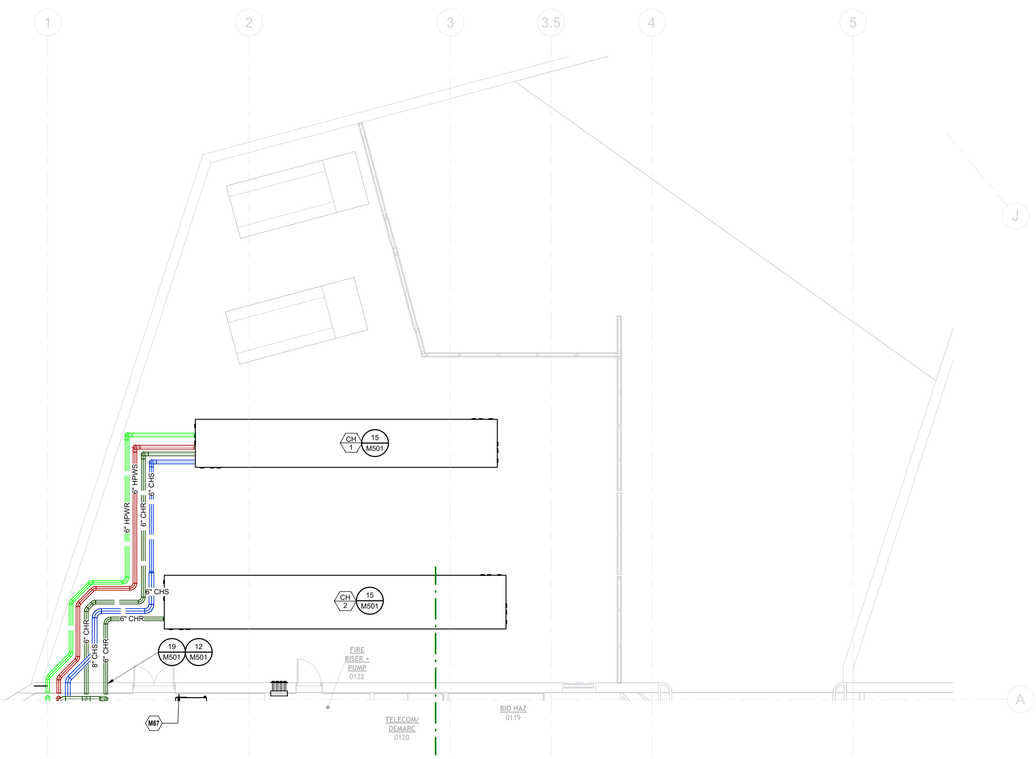
M84 ROUTE PIPING UP THROUGH FLOOR ABOVE. REFER TO M201B FOR PIPING CONTINUATION.

M111 ROUTE PIPING UP THROUGH FLOOR ABOVE. REFER TO M201B FOR PIPING CONTINUATION.

M112 ROUTE PIPING UP TO TRENCH HEATER ABOVE. REFER TO M201B FOR PIPING CONTINUATION.

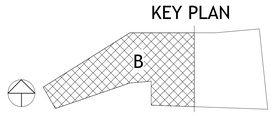


1 PIPING - LEVEL 0 PLAN - AREA B
1/8" = 1'-0"



2 PIPING - CHILLER YARD
1/8" = 1'-0"

KEY PLAN



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PLAN - AREA B

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M200B

MECHANICAL PLAN NOTES:

M19 REFER TO M200A FOR PIPING FROM BELOW TO HYDRONIC BASEBOARD HEATER.

M22 MOUNT BOTTOM OF FAN COIL UNIT 9 FT AFF.

M29 PIPING UP TO FLOOR ABOVE TO BASEBOARD HEATERS.

M30 ROUTE HEATING HOT WATER TIGHT TO STRUCTURE.

M31 PIPING DOWN IN WALL TO BASEBOARD HEATER.

M33 EXPANSION LOOP.

M34 REFER TO M200A FOR PIPING FROM BELOW TO HYDRONIC TRENCH HEATER.

M35 COORDINATE PIPE ROUTING WITH MOVABLE WALL STRUCTURE.

M77 ROUTE PIPING UP TO BASEBOARD HEATER CONNECTION ON FLOOR ABOVE. REFER TO M202A FOR PIPING CONTINUATION.

M80 ROUTE PIPING DOWN THROUGH FLOOR. REFER TO M200A FOR PIPING CONTINUATION.

M100 INCLUDE SOHO TRENCH HEATER HUB AND CONTROL PANEL. LOCATE CONTROLLER IN TRENCH HOUSING TRENCH HEATERS. PROVIDES POWER TO 3 UNITS.

M101 INCLUDE SOHO TRENCH HEATER HUB AND CONTROL PANEL. LOCATE CONTROLLER IN TRENCH HOUSING TRENCH HEATER. PROVIDES POWER TO 1 UNIT.

MECHANICAL PLAN NOTES:

M102 INCLUDE SOHO TRENCH HEATER HUB AND CONTROL PANEL. LOCATE CONTROLLER IN TRENCH HOUSING TRENCH HEATERS. PROVIDES POWER TO 2 UNITS.

M108 PROVIDE SHUT OFF VALVE IN PIPE VERTICAL PRIOR TO PENETRATING FLOOR TO SECOND FLOOR.

M109 ALL BASEBOARD HEATERS SHALL BE CONTINUOUS IF SERVED BY SAME PIPING. NO EXPOSED PIPING ALLOWED BETWEEN BASEBOARD HEATERS. PROVIDE BLANK BBH SECTION, IF REQUIRED (TYPICAL)

M113 PROVIDE CONTINUOUS TRENCH AS SHOWN.

M115 EXTEND PIPING THROUGH BBH-13 AND BBH-14. CV=0.46

M116 EXTEND PIPING THROUGH BBH-19 AND BBH-20. CV=0.46

M117 EXTEND PIPING THROUGH BBH-22 AND BBH-21. CV=0.46

M118 EXTEND PIPING THROUGH TH-11 AND TH-12. CV=0.58

M119 EXTEND PIPING THROUGH TH-14 AND TH-15. CV=0.58

M121 EXTEND PIPING THROUGH TH-16, TH-17, AND TH-18. CV=0.76

M122 EXTEND PIPING THROUGH TH-21 AND TH-20. CV=0.44

M123 EXTEND PIPING THROUGH TH-22 AND TH-23. CV=0.44

M124 EXTEND PIPING THROUGH TH-24 AND TH-25. CV=0.44

M125 EXTEND PIPING THROUGH TH-2 AND TH-3. CV=0.44

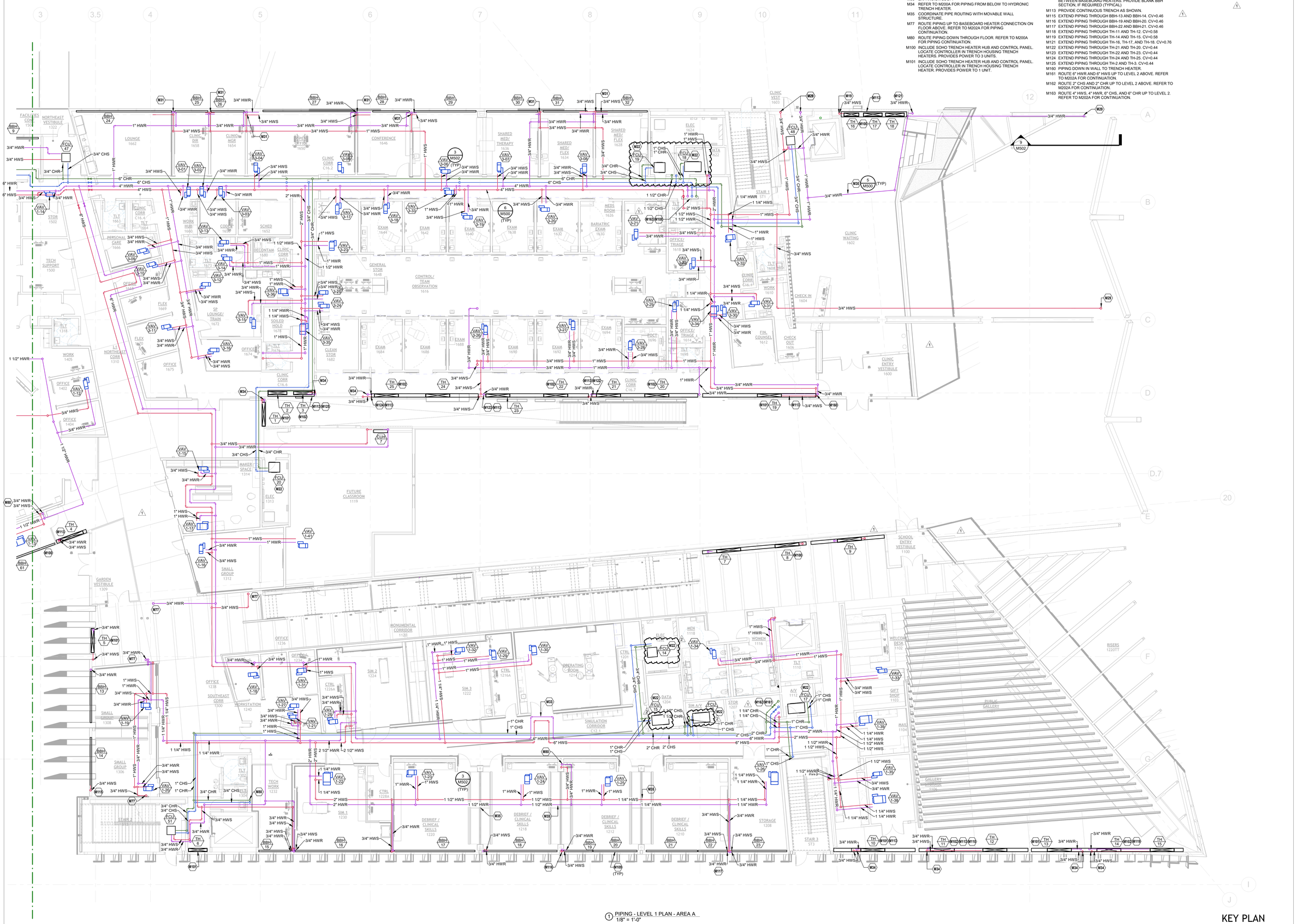
M160 PIPING DOWN IN WALL TO TRENCH HEATER.

M161 ROUTE 6" HWR AND 6" HWS UP TO LEVEL 2 ABOVE. REFER TO M202A FOR CONTINUATION.

M162 ROUTE 2" CHS AND 2" CHR UP TO LEVEL 2 ABOVE. REFER TO M202A FOR CONTINUATION.

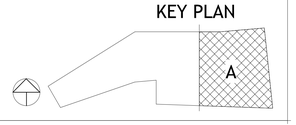
M163 ROUTE 4" HWS, 4" HWR, 6" CHS, AND 6" CHR UP TO LEVEL 2. REFER TO M202A FOR CONTINUATION.

MECHANICAL GENERAL NOTE:
ALL BASEBOARD HEATERS SHALL BE CONTINUOUS IF SERVED BY SAME PIPING. NO EXPOSED PIPING ALLOWED BETWEEN BASEBOARD HEATERS. PROVIDE BLANK BBH SECTION, IF REQUIRED (TYPICAL)



1 PIPING - LEVEL 1 PLAN - AREA A
1/8" = 1'-0"

KEY PLAN



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MCKEES ROCK, PA 14136
P: 844.231.7042

PSW Job Number:
993A

Henderson Job Number:
2150002607

ARKANSAS LICENSED REGISTERED PROFESSIONAL ENGINEER No. 11868 JASON S. COOPER

06/07/2023

AWSOM
Bentonville, AR

Issue Date:
02.24.2023

REVISIONS

NUMBER	DATE	DESCRIPTION
1	03.10.23	Addendum 1
2	06.09.23	Addendum 2

Contents:
PIPING - LEVEL 1
PLAN - AREA A

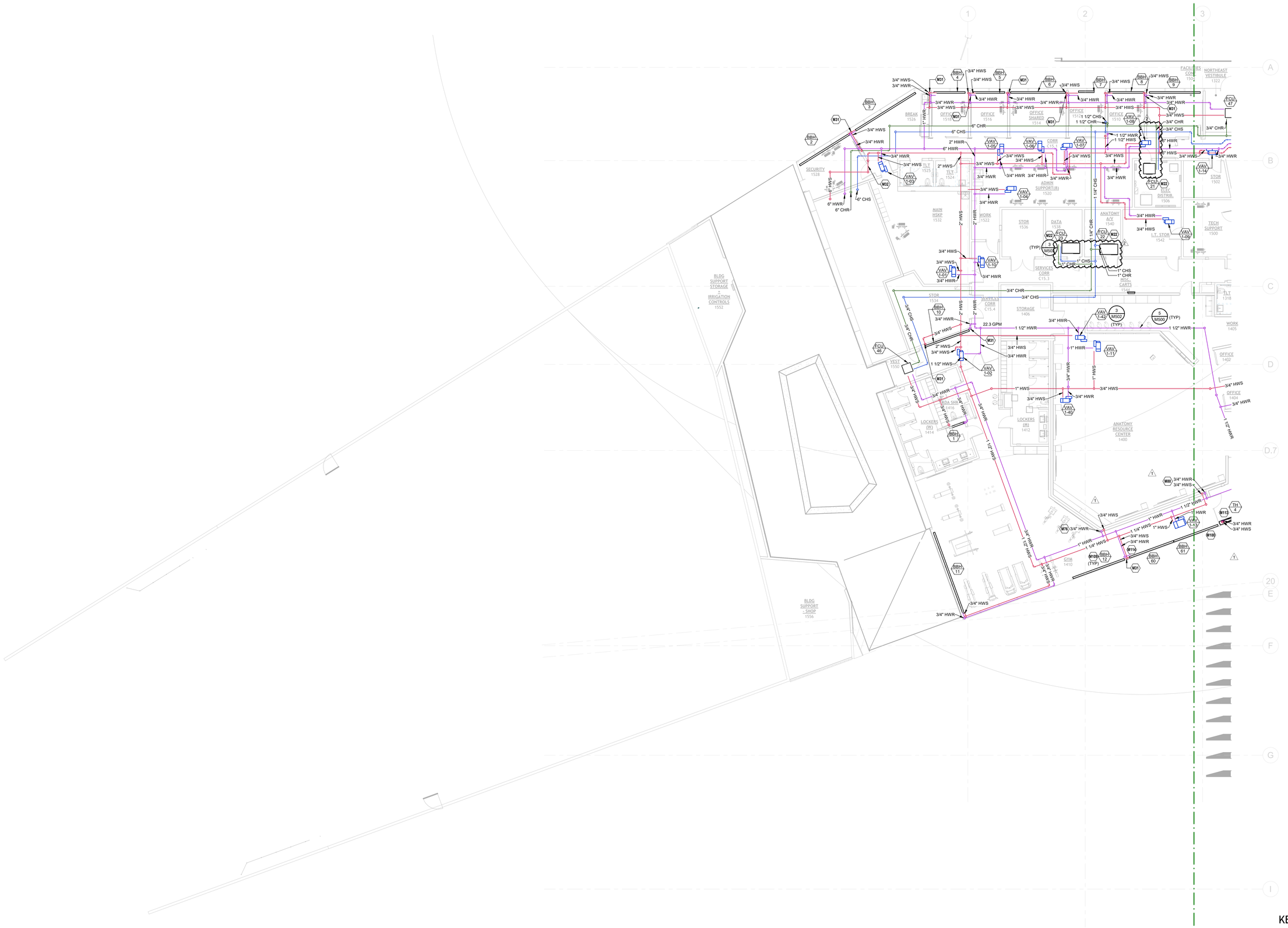
THIS PAGE IS BEST VIEWED IN COLOR

M201A

MECHANICAL PLAN NOTES:

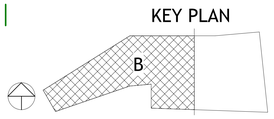
- M22 MOUNT BOTTOM OF FAN COIL UNIT 9 FT AFF.
- M31 PIPING DOWN IN WALL TO BASEBOARD HEATER.
- M32 ROUTE PIPE MAIN BELOW BEAM.
- M76 ROUTE PIPING DOWN TO LEVEL BELOW. REFER TO LEVEL 0 PIPING PLANS FOR CONTINUATION.
- M80 ROUTE PIPING DOWN THROUGH FLOOR. REFER TO M200A FOR PIPING CONTINUATION.
- M100 INCLUDE SOHO TRENCH HEATER HUB AND CONTROL PANEL. LOCATE CONTROLLER IN TRENCH HOUSING TRENCH HEATERS. PROVIDES POWER TO 3 UNITS.
- M109 ALL BASEBOARD HEATERS SHALL BE CONTINUOUS IF SERVED BY SAME PIPING. NO EXPOSED PIPING ALLOWED BETWEEN BASEBOARD HEATERS. PROVIDE BLANK BBH SECTION, IF REQUIRED (TYPICAL)
- M113 PROVIDE CONTINUOUS TRENCH AS SHOWN.
- M114 EXTEND PIPING THROUGH BBH-60 AND BBH-61. CV=0.46

MECHANICAL GENERAL NOTE:
ALL BASEBOARD HEATERS SHALL BE CONTINUOUS IF SERVED BY SAME PIPING. NO EXPOSED PIPING ALLOWED BETWEEN BASEBOARD HEATERS. PROVIDE BLANK BBH SECTION, IF REQUIRED (TYPICAL)



1 PIPING - LEVEL 1 PLAN - AREA B
1/8" = 1'-0"

KEY PLAN



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Henderson Job Number:
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ARKANSAS REGISTERED PROFESSIONAL ENGINEER No. 11265 BARRON B. COOPER
06/07/2023

AWSOM
Bentonville, AR

Issue Date:
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Contents:
PIPING - LEVEL 1 PLAN - AREA B

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M201B

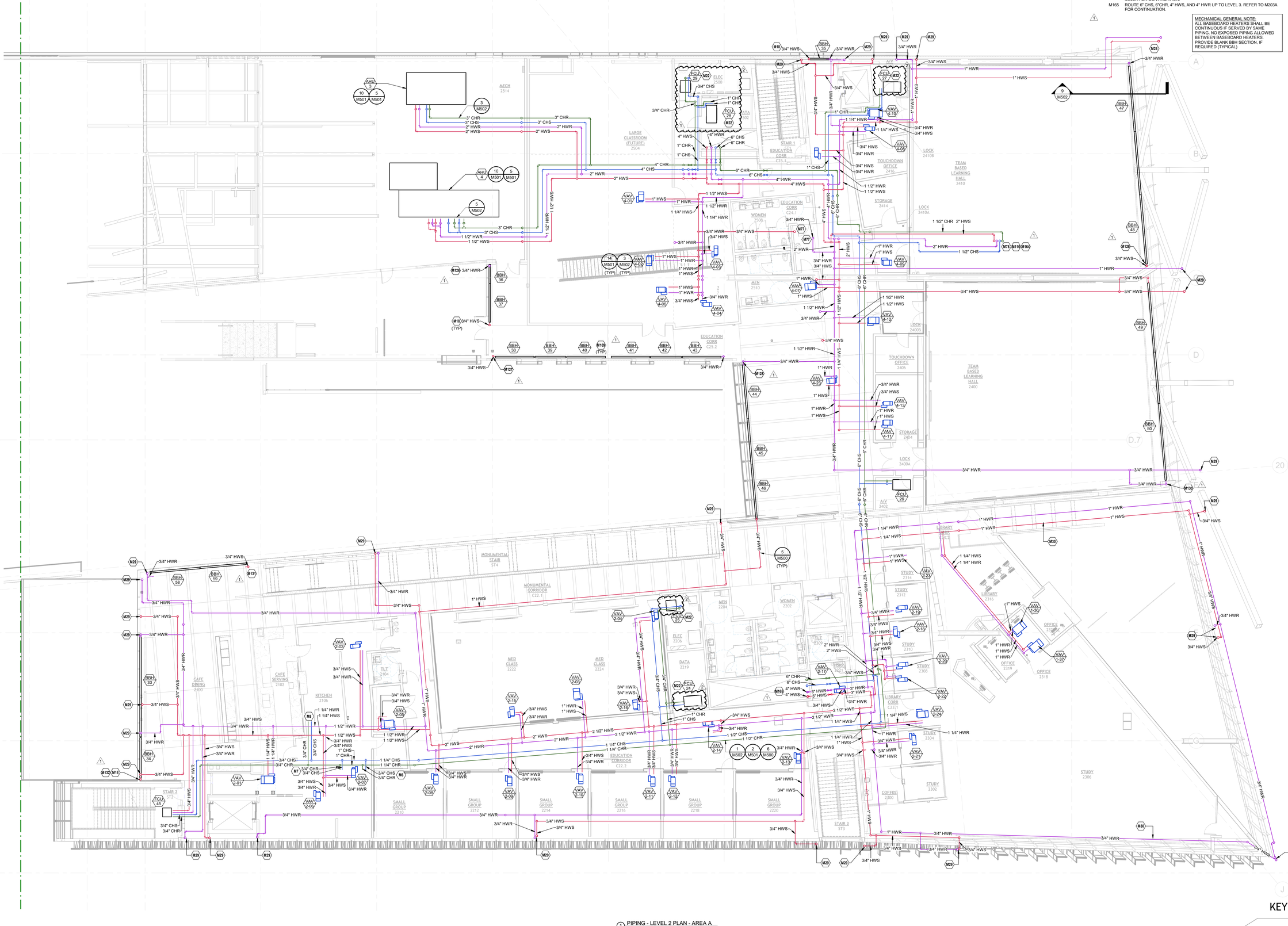
MECHANICAL PLAN NOTES:

- M6 PROVIDE 3/4" CHW/CHR TAP FOR CONNECTION TO FREEZER CONDENSER. BALANCE TO 3.60 GPM. PROVIDE CONNECTION TO EQUIPMENT. REFER TO KITCHEN PLANS FOR EQUIPMENT CONNECTION SIZE AND MORE DETAILS.
- M7 PROVIDE 3/4" CHW/CHR TAP FOR CONNECTION TO COOLER CONDENSER. BALANCE TO 1.80 GPM. PROVIDE CONNECTION TO EQUIPMENT. REFER TO KITCHEN PLANS FOR EQUIPMENT CONNECTION SIZE AND MORE DETAILS.
- M8 PROVIDE 3/4" CHW/CHR TAP FOR CONNECTION TO ICE MACHINE. BALANCE TO 2.80 GPM. PROVIDE CONNECTION TO EQUIPMENT. REFER TO KITCHEN PLANS FOR EQUIPMENT CONNECTION SIZE AND MORE DETAILS.
- M18 REFER TO M201A FOR PIPING FROM BELOW TO HYDRONIC BASEBOARD HEATER.
- M22 MOUNT BOTTOM OF FAN COIL UNIT 9 FT AFF.
- M24 ROUTE PIPING IN CEILING AND THEN PENETRATE HEATER FROM FLOOR BELOW. ALL PIPING SHALL BE INSTALLED INSIDE OF THE BUILDING AS 9/M502 SHOWS IN SECTION VIEW OF THE SLOPED EXTERIOR WALL. TYPICAL ALL BBHS AND THS THAT ARE SERVED FROM BELOW.
- M29 PIPING UP TO FLOOR ABOVE TO BASEBOARD HEATERS.
- M30 ROUTE HEATING HOT WATER TIGHT TO STRUCTURE.

MECHANICAL PLAN NOTES:

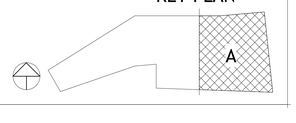
- M77 ROUTE PIPING UP TO BASEBOARD HEATER CONNECTION ON FLOOR ABOVE. REFER TO M202A FOR PIPING CONTINUATION.
- M78 ROUTE PIPING UP THROUGH FLOOR TO PLENUM ABOVE. REFER TO M202A FOR PIPING CONTINUATION.
- M109 ALL BASEBOARD HEATERS SHALL BE CONTINUOUS IF SERVED BY SAME PIPING. NO EXPOSED PIPING ALLOWED BETWEEN BASEBOARD HEATERS. PROVIDE BLANK BBH SECTION, IF REQUIRED (TYPICAL)
- M110 SEAL PENETRATION THROUGH ACOUSTICAL CEILING WITH ACOUSTICAL SEALANT. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
- M126 EXTEND PIPING THROUGH BBH-36 AND BBH-37. CV=0.22
- M127 EXTEND PIPING THROUGH BBH-38, BBH-39, BBH-40, BBH-41, BBH-42, AND BBH-43. CV=0.89
- M128 EXTEND PIPING THROUGH BBH-44, BBH-45, BBH-46. CV=0.46
- M129 EXTEND PIPING THROUGH BBH-47 AND BBH-48. CV=1.16
- M130 EXTEND PIPING THROUGH BBH-49 AND BBH-50. CV=0.62
- M131 EXTEND PIPING THROUGH BBH-58 AND BBH-59. CV=0.80
- M132 EXTEND PIPING THROUGH BBH-33 AND BBH-34. CV=0.76
- M164 ROUTE 2" HWS, 2" HWR, 1-1/2" CHS, AND 1-1/2" CHR UP TO LEVEL 3. REFER TO M203A FOR CONTINUATION.
- M165 ROUTE 6" CHS, 6"CHR, 4" HWS, AND 4" HWR UP TO LEVEL 3. REFER TO M203A FOR CONTINUATION.

MECHANICAL GENERAL NOTE:
ALL BASEBOARD HEATERS SHALL BE CONTINUOUS IF SERVED BY SAME PIPING. NO EXPOSED PIPING ALLOWED BETWEEN BASEBOARD HEATERS. PROVIDE BLANK BBH SECTION, IF REQUIRED (TYPICAL).



1 PIPING - LEVEL 2 PLAN - AREA A
1/8" = 1'-0"

KEY PLAN



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PSW Job Number:
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Henderson Job Number:
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ARKANSAS REGISTERED PROFESSIONAL ENGINEER No. 11283 BARRON B. COOPER
06/07/2023

AWSOM
Bentonville, AR

Issue Date:
02.24.2023

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Contents:
PIPING - LEVEL 2
PLAN - AREA A

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M202A

MECHANICAL PLAN NOTES:

M17 REFER TO M202A FOR PIPING FROM BELOW TO HYDRONIC BASEBOARD HEATER.

M22 MOUNT BOTTOM OF FAN COIL UNIT 9 FT AFF.

M28 AREA OPEN TO FLOOR ABOVE. DO NOT ROUTE HVAC PIPING, DUCTWORK, OR ANY ACCESSORIES INCLUDING CONTROL WIRING ACROSS AREA.

M29 PIPING UP TO FLOOR ABOVE TO BASEBOARD HEATERS.

M109 ALL BASEBOARD HEATERS SHALL BE CONTINUOUS IF SERVED BY SAME PIPING. NO EXPOSED PIPING ALLOWED BETWEEN BASEBOARD HEATERS. PROVIDE BLANK BBH SECTION, IF REQUIRED (TYPICAL)

M133 EXTEND PIPING THROUGH BBH-52, BBH-53, BBH-54, AND BBH-55. CV=0.46

M134 EXTEND PIPING THROUGH BBH-72, BBH-73, AND BBH-74. CV=0.93

M135 EXTEND PIPING THROUGH BBH-68, BBH69, BBH-70, BBH-71, AND BBH-72. CV=1.20

M136 EXTEND PIPING THROUGH BBH-65, BBH-66, AND BBH-67. CV=0.76

MECHANICAL PLAN NOTES:

M137 EXTEND PIPING THROUGH BBH-117, BBH-118, BBH-119, BBH-120. CV=2.22

M138 EXTEND PIPING THROUGH BBH-110, BBH-111, BBH-112, BBH-113, BBH-114, BBH-115, AND BBH-116. CV=1.20

M139 EXTEND PIPING THROUGH BBH-107, BBH-108, AND BBH-109 CV=0.23

M140 EXTEND PIPING THROUGH BBH-81, BBH-82, BBH-83, BBH-84, BBH-85, AND BBH-86. CV=1.33

M141 EXTEND PIPING THROUGH BBH-77, BBH-78, BBH-79, AND BBH-80. CV=0.89

M142 EXTEND PIPING THROUGH BBH-87, BBH-88, AND BBH-89. CV=0.23

M143 EXTEND PIPING THROUGH BBH-90 AND BBH-91. CV=0.23

M144 EXTEND PIPING THROUGH BBH-93, BBH-94, BBH-95, BBH-96, BBH-97, BBH-98, AND BBH-99. CV=0.89

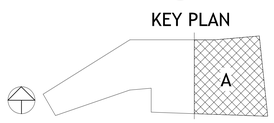
M145 EXTEND PIPING THROUGH BBH-100, BBH-101, BBH-102, BBH-103, BBH-104, BBH-105, AND BBH-106. CV=0.89

M166 ROUTE 4" CHS, 4"CHR, 3" HWS, AND 3" HWR UP TO LEVEL 4. REFER TO M204A FOR CONTINUATION.

MECHANICAL GENERAL NOTE:
ALL BASEBOARD HEATERS SHALL BE CONTINUOUS IF SERVED BY SAME PIPING. NO EXPOSED PIPING ALLOWED BETWEEN BASEBOARD HEATERS. PROVIDE BLANK BBH SECTION, IF REQUIRED (TYPICAL)

1 PIPING - LEVEL 3 PLAN - AREA A
1/8" = 1'-0"

KEY PLAN



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PSW Job Number:
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Henderson Job Number:
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ARKANSAS REGISTERED PROFESSIONAL ENGINEER No. 11265 MARCUS B. COOPER

06/07/2023

AWSOM
Bentonville, AR

Issue Date:
02.24.2023

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Contents:
PIPING - LEVEL 3 PLAN - AREA A

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M203A

MECHANICAL PLAN NOTES:

M16 REFER TO M203A FOR PIPING FROM BELOW TO HYDRONIC BASEBOARD HEATER.
M21 AREA OPEN TO FLOOR BELOW. DO NOT ROUTE HVAC PIPING, DUCTWORK, OR ANY ACCESSORIES INCLUDING CONTROL WIRING ACROSS AREA.
M22 MOUNT BOTTOM OF FAN COIL UNIT 9 FT AFF.
M23 MOUNT BOTTOM OF UNIT HEATER 10 FT AFF.
M26 CHILLED WATER BYPASS VALVE. POWER DIRECTLY TO CHILLER CONTROL PANEL. REFER TO CONTROLS FOR FURTHER INFORMATION.
M27 HEATING WATER BYPASS VALVE. REFER TO BOILER CONTROLS FOR FURTHER INFORMATION.

MECHANICAL PLAN NOTES:

M109 ALL BASEBOARD HEATERS SHALL BE CONTINUOUS IF SERVED BY SAME PIPING. NO EXPOSED PIPING ALLOWED BETWEEN BASEBOARD HEATERS. PROVIDE BLANK BBH SECTION, IF REQUIRED (TYPICAL).
M146 EXTEND PIPING THROUGH BBH-158, BBH-159, BBH-160, AND BBH-161. CV=0.46
M147 EXTEND PIPING THROUGH BBH-162, BBH-163, BBH-164, BBH-165, BBH-166, BBH-167, BBH-168, AND BBH-169. CV=0.67
M148 EXTEND PIPING THROUGH BBH-170, BBH-171, BBH-172, BBH-173, BBH-174, BBH-175, BBH-176, BBH-177, BBH-178, BBH-179, AND BBH-180. CV=1.33
M149 EXTEND PIPING THROUGH BBH-149 AND BBH-150. CV=0.23
M150 EXTEND PIPING THROUGH BBH-142, BBH-143, BBH-144, BBH-145, BBH-146, BBH-147, AND BBH-148. CV=0.67

MECHANICAL PLAN NOTES:

M151 EXTEND PIPING THROUGH BBH-136, BBH-137, BBH-138, BBH-139, BBH-140, BBH-141. CV=0.67.
M152 EXTEND PIPING THROUGH BBH-121 AND BBH-122. CV=0.46
M153 EXTEND PIPING THROUGH BBH-125, BBH-126, BBH-127, BBH-128, BBH-129, AND BBH-130. CV=1.20.
M154 EXTEND PIPING THROUGH BBH-131, BBH-132, BBH-133, AND BBH-134. CV=0.80.
M155 EXTEND PIPING THROUGH BBH-151, BBH-152, BBH-152, AND BBH-154. CV=0.49.
M156 EXTEND PIPING THROUGH BBH-156 AND BBH-157. CV=0.46.

MECHANICAL GENERAL NOTE:
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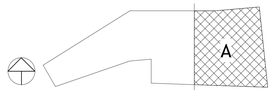
1 PIPING - LEVEL 4 PLAN - AREA A
1/8" = 1'-0"

KEY PLAN



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ARKANSAS REGISTERED PROFESSIONAL ENGINEER No. 11283 BARRON B. COOPER
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M204A

AIR HANDLING UNIT SCHEDULE (CHILLED WATER COOLING, HOT WATER HEATING)

MARK	MANUFACTURER	MODEL	SUPPLY FAN: UNIT TYPE	FAN TYPE	CFM	ESP (IN)	TSP (IN)	BHP PER FAN	NOM HP PER FAN	VFD (Y/N)	V/PH	EXHAUST / RETURN FAN: FAN TYPE	CFM	ESP (IN)	TSP (IN)	BHP PER FAN	NOM HP PER FAN	VFD (Y/N)	EXHAUST THRU WHEEL (CFM)	ENTHALPY WHEEL: SUMMER CONDITIONS OAT (°F DB)	SUMMER WHEEL SA LAT (°F WB)	SUMMER MIXED AIR LAT (°F DB)	SUMMER MIXED AIR LAT (°F WB)	WINTER CONDITIONS OAT (°F DB)	WINTER WHEEL SA LAT (°F WB)	WINTER MIXED AIR LAT (°F DB)	WINTER MIXED AIR LAT (°F WB)	TH (MBH)	SH (MBH)	COOLING COIL: EAT (°F DB)	EAT (°F WB)	LAT (°F DB)	LAT (°F WB)	FLOW (GPM)	EWT (°F)	LWT (°F)	MAX WPD (FT)	VALVE Cv	MAX APD (IN)	MAX VEL (FPM)	ROWS / FPI	NO OF COILS	COIL POSITION	HEATING COIL: CFM	CAP (MBH)	EAT (°F DB)	LAT (°F DB)	FLOW (GPM)	EWT (°F)	LWT (°F)	MAX WPD (FT)	VALVE Cv	MAX APD (IN)	MAX VEL (FPM)	ROWS / FPI	NO OF COILS	MIN O/A CFM	ABS MIN O/A	FILTERS: PRE-FILTERS MERV	PRE-FILTERS SP LOSS	FINAL FILTERS MERV	FINAL FILTERS SP LOSS	CONNECTIONS: SUPPLY AIR	RETURN AIR	OUTDOOR AIR	RELIEF/ EXHAUST AIR	DISC TYPE	STARTER TYPE	WEIGHT (LBS)	NOTES
AHU 1	JCI / YORK	XTI-120X96	MSVAV	SWSI	31600	2.5	5.40	11.18	15.00	Yes	480/3	EXH	25000	0.25	2.10	4.00	5	Yes	11250	95	75	85	69	79	65	10	9	38	36	40	36	1059.2	834.2	79	64.8	54.7	53.4	160	42	56	12.00	70.9	0.7	500	10/10	3	PREHEAT	13000	632.3	10.0	55.0	66	120	100	10.00	29.00	0.1	400	2/8	3	11975	9900	8	0.60	13	0.90	TOP	BACK	TOP	TOP	F	VFD	24000	A-E,G-T, W
AHU 2	JCI / YORK	XTI-75X99	MSVAV	SWSI	17000	2.2	4.10	4.91	7.50	Yes	480/3	RET	14000	1.20	1.40	1.43	3	Yes	N/A	0	0	0	0	0	0	0	0	0	0	743.0	533.7	83	67.4	54.0	53.2	112	42	56	14.00	49.6	0.7	500	8/11	2	PREHEAT	6700	325.9	10.0	55.0	34	120	100	3.00	15.00	0.1	400	1/12	2	6540	6540	8	0.60	13	0.90	FRONT	TOP	TOP	TOP	F	VFD	13100	A-F, H-T
AHU 3	JCI / YORK	XTI-63X90	MSVAV	SWSI	13000	1.5	4.10	4.13	5.00	Yes	480/3	N/A	0	0.00	0.00	0.00	0	Yes	N/A	0	0	0	0	0	0	0	0	0	0	579.3	409.9	82	67.1	53.4	52.5	87	42	56	10.60	38.6	1.0	500	10/10	1	PREHEAT	5300	240.6	13.0	55.0	25	120	100	8.40	11.10	0.1	400	1/10	1	5060	5060	8	0.60	13	0.90	BOTTOM	BOTTOM	BACK	N/A	F	VFD	7700	A-F, H-T
AHU 4	JCI / YORK	XTI-108X84	MSVAV	SWSI	21000	1.7	4.40	6.88	10.00	Yes	480/3	EXH	18000	0.25	1.50	2.01	3	Yes	8100	95	75	85	69	80	65	10	9	38	36	34	27	821.7	604.4	79	65.3	53.3	52.2	124	42	56	10.80	55	0.5	500	8/12	6	PREHEAT	10675	519.2	10.0	55.0	55	120	100	10.00	24.10	0.1	400	2/10	2	8910	6000	8	0.60	13	0.90	TOP	FRONT	BACK	BACK	F	VFD	22400	A-E, G-Y
AHU 5	JCI / YORK	XTI-96X132	MSVAV	SWSI	34300	2.2	5.50	12.97	15.00	Yes	480/3	N/A	0	0.00	0.00	0.00	0	Yes	N/A	0	0	0	0	0	0	0	0	0	0	1340.7	1014.3	81	66.3	54.0	53.5	202	42	56	19.00	89.5	1.0	500	8/11	2	PREHEAT	12600	476.6	20.0	55.0	50	120	100	13.10	22.20	0.1	400	2/10	2	10350	8000	8	0.60	13	0.90	TOP	BACK	TOP	N/A	F	VFD	14000	A-F, H-T

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:

A. PROVIDE FACTORY MOUNTED DISCONNECT SWITCH INSTALLED ON SERVICE SIDE OF UNIT.
B. PROVIDE WITH 10KVA SCCR RATING.
C. PROVIDE WITH MINIMUM 4 FANS PER FAN ARRAY.
D. PROVIDE MINIMUM 1 VARIABLE FREQUENCY DRIVE FURNISHED PER FAN ROW.
E. PROVIDE SHAFT GROUNDING SYSTEM ON MOTOR. REFER TO MOTOR SPECIFICATION FOR ADDITIONAL INFORMATION.
F. PROVIDE SINGLE POINT POWER CONNECTION.
G. PROVIDE INDIVIDUAL POWER CONNECTIONS TO THE SUPPLY TUNNEL, EXHAUST TUNNEL, AND ENERGY RECOVERY WHEEL SECTION.
H. SPECIFIED FAN ESP ACCOUNTS FOR DUCT LOSSES EXTERNAL TO UNIT. ESP EXCLUDES UNIT INLET AND OUTLET OPENING LOSSES.
J. SPECIFIED FAN TSP INCLUDES EXTERNAL STATIC PRESSURE LOSSES, UNIT INLET AND OUTLET OPENING LOSSES, AND INTERNAL FILTER, COIL, AND CASING LOSSES. FILTER LOSS IS AT A MAXIMUM OF 400 FPM FACE VELOCITY. MAXIMUM PRESSURE DROP THROUGH EACH RETURN AIR, SUPPLY AIR, ECONOMIZER AIR, AND MIXED AIR OPENING SHALL BE 0.3 INCHES W.C.
K. PROVIDE MOTOR HORSEPOWER TO OVERCOME INTERNAL UNIT STATIC PRESSURE DROP PLUS SPECIFIED EXTERNAL STATIC PRESSURE DROP. NOMINAL MOTOR HP SHALL BE NO LARGER THAN THE FIRST AVAILABLE NOMINAL MOTOR SIZE GREATER THAN THE REQUIRED BHP.
L. DIVISION 28 CONTRACTOR SHALL PROVIDE SMOKE DETECTORS IN RETURN AIR DUCT(S).
M. UNIT SHALL BE DRAW THRU CONFIGURATION.
N. PROVIDE CONCRETE HOUSEKEEPING PAD PER SPECIFICATIONS.
P. SELECT EQUIPMENT FOR ELEVATION OF 1300 FEET ABOVE SEA LEVEL.
Q. ABS. MIN. O/A IS THE ABSOLUTE MINIMUM OUTSIDE AIR CFM USING VENTILATION RESET OR DEMAND CONTROL VENTILATION.
R. DIVISION 23 TEMPERATURE CONTROLS CONTRACTOR SHALL PROVIDE CONTROL VALVE SIZED USING THE SCHEDULED CONTROL VALVE AUTHORITY FLOW COEFFICIENT (Cv).
S. PROVIDE RETURN AIR, RELIEF AIR, AND OUTSIDE AIR DAMPERS.
T. COOLING COIL AND HEATING COIL VALVE Cv IS BASED ON SPECIFIC GRAVITY OF PROPYLENE GLYCOL AT A CONCENTRATION OF 30%.
U. PROVIDE STAGGERED HEATING AND COOLING COILS. COIL PULL CLEARANCE SHALL BE NO MORE THAN 8 FEET.
W. PROVIDE MERV 8 FILTER SECTION UPSTREAM AND DOWNSTREAM OF ENERGY RECOVERY WHEEL.
X. PROVIDE STAGGERED COOLING COIL WITH 12" STAGGER.
Y. PROVIDE STAGGERED HEATING COIL WITH 4" STAGGER.

OCTAVE BAND SOUND POWER LEVELS (dB)

	SUPPLY AIR (Hz)								RETURN AIR (Hz)								RADIATED							
	63	125	250	500	1000	2000	4000	8000	63	125	250	500	1000	2000	4000	8000	63	125	250	500	1000	2000	4000	8000
AHU 1	90	92	97	91	90	87	84	84	90	92	97	91	90	87	84	84	82	79	80	70	72	57	52	51
AHU 2	93	94	94	99	95	91	89	90	82	82	88	89	78	78	78	73	82	79	76	78	75	60	55	54
AHU 3	87	88	87	94	88	86	84	85	81	81	79	91	78	75	72	71	78	75	69	75	72	57	53	52
AHU 4	93	95	95	100	96	92	90	92	81	81	90	83	78	78	78	72	84	81	76	80	77	62	57	57
AHU 5	93	94	94	98	93	90	87	88	86	82	81	90	76	72	67	65	86	83	78	80	79	63	57	56

MAXIMUM ALLOWABLE EQUIPMENT DIMENSIONS

MARK	LENGTH (INCHES)	WIDTH (INCHES)	HEIGHT (INCHES)	NOTES
AHU 1 SUPPLY	323	96	126	A-B
AHU 1 EXHAUST	152	90	126	A-B
AHU 2	318	99	81	A-B
AHU 3	185	99	69	A-B
AHU 4 SUPPLY	311	84	114	A-B
AHU 4 EXHAUST	148	84	114	A-B
AHU 5	248	132	102	A-B

NOTES:

A. SHIPPING SPLIT SHALL NOT EXCEED 5'-6".
B. HEIGHT INCLUDES 6" BASERAIL.

FAN COIL UNIT SCHEDULE (HYDRONIC COILS)

MARK	MANUFACTURER	MODEL	CONFIG	SUPPLY FAN: CFM	ESP (IN)	NOM HP	HP	RPM	SHEAVE	BELT	FLOW	COOLING COIL: EWT (°F)	LWT (°F)	MAX WPD (FT)	VALVE Cv	MAX APD (IN)	MAX VEL (FPM)	HEATING COIL: EAT (°F)	LAT (°F)	EWT (°F)	LWT (°F)	VALVE Cv	MAX VEL (FPM)	ELECTRICAL: V/PH	MCA	MOCP	DISC TYPE	STARTER TYPE	WEIGHT (LBS)	NOTES
FCU 1	JCI	FNX08	SUSPENDED	930	0.50	0.33	14.2	14.2	69.0	55.0	2.2	42	56	0.98	550	0.0	0.0	0.0	0	0	0	-	0	277/1	3.3 A	15 A	NF	COMBI	200	A-N, R
FCU 2	JCI	FNX06	SUSPENDED	670	0.50	0.33	8.4	8.4	65.0	55.0	1.3	42	56	0.58	550	0.0	0.0	0.0	0	0	0	-	0	277/1	3.0 A	15 A	NF	COMBI	200	A-N, R
FCU 3	JCI	FWX-C06	RECESSED FLOOR MOUNTED	600	0.00	0.25	13.3	12.6	65.0	55.0	2.0	42	56	0.93	550	13.1	70.0	90.0	1.4	120	100	0.62	600	277/1	1.5 A	15 A	NF	COMBI	250	A-E, G-L, Q, R
FCU 4	JCI	FWX-C06	FLOOR MOUNTED	600	0.00	0.25	11.8	11.8	75.0	55.0	1.8	42	56	0.8	550	12.8	70.0	90.0	1.4	120	100	0.62	600	277/1	1.5 A	15 A	NF	COMBI	250	A-E, G-L, Q, R
FCU 5	JCI	FW-12	FLOOR MOUNTED	1100	0.00	0.50	34.3	34.3	65.0	55.0	5.2	42	56	2.34	550	27.6	70.0	90.0	2.9	120	100	1.33	600	277/1	2.5 A	15 A	NF	COMBI	300	A-E, G-L, Q, R
FCU 6	JCI	FNX06	SUSPENDED	700	0.50	0.33	7.2	7.2	65.0	55.0	1.1	42	56	0.49	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	3.0 A	15 A	NF	COMBI	200	A-N, R
FCU 7	JCI	FNX06	SUSPENDED	300	0.50	0.33	5.3	5.3	65.0	55.0	0.9	42	56	0.4	550	4.0	70.0	90.0	0.5	120	100	0.22	600	277/1	3.0 A	15 A	NF	COMBI	200	A-N, R
FCU 8	JCI	FWX-C04	RECESSED FLOOR MOUNTED	400	0.00	0.25	7.3	7.3	65.0	55.0	1.1	42	56	0.27	550	8.1	70.0	90.0	0.9	120	100	0.4	600	277/1	1.0 A	15 A	NF	COMBI	300	A-E, G-L, Q, R, S
FCU 9	JCI	FWX-C04	FLOOR MOUNTED	575	0.00	0.25	11.8	11.8	65.0	55.0	1.8	42	56	0.8	550	12.0	70.0	90.0	1.3	120	100	0.58	600	277/1	1.5 A	15 A	NF	COMBI	300	A-E, G-L, Q, R
FCU 10	JCI	FNX14	SUSPENDED	1700	0.50	0.50	31.9	31.9	65.0	55.0	4.9	42	56	2.17	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	5.9 A	15 A	NF	COMBI	300	A-N, R
FCU 11	JCI	FNX16	SUSPENDED	2000	0.50	0.50	36.0	36.0	65.0	55.0	5.5	42	56	2.43	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	5.9 A	15 A	NF	COMBI	300	A-N, R
FCU 12	JCI	FNX16	SUSPENDED	2000	0.50	0.50	47.7	47.7	65.0	55.0	7.3	42	56	3.2	550	11.4	70.0	90.0	1.2	120	100	0.53	600	277/1	5.9 A	15 A	NF	COMBI	300	A-N, R
FCU 13	JCI	FNX16	SUSPENDED	2000	0.50	0.50	47.7	47.7	65.0	55.0	7.3	42	56	3.2	550	11.4	70.0	90.0	1.2	120	100	0.53	600	277/1	5.9 A	15 A	NF	COMBI	300	A-N, R
FCU 14	JCI	FNX06	SUSPENDED	700	0.50	0.33	8.9	8.9	65.0	55.0	1.4	42	56	0.62	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	5.9 A	15 A	NF	COMBI	200	A-N, R
FCU 15	JCI	FNX16	SUSPENDED	2000	0.50	0.50	36.0	36.0	65.0	55.0	5.5	42	56	2.4	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	5.9 A	15 A	NF	COMBI	300	A-N, R
FCU 16	JCI	FNX16	SUSPENDED	2000	0.50	0.50	36.0	36.0	65.0	55.0	5.5	42	56	2.4	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	5.9 A	15 A	NF	COMBI	300	A-N, R
FCU 17	JCI	FNX16	SUSPENDED	2000	0.50	0.50	36.0	36.0	65.0	55.0	5.5	42	56	2.4	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	5.9 A	15 A	NF	COMBI	300	A-N, R
FCU 18	JCI	FNX16	SUSPENDED	2000	0.50	0.50	36.0	36.0	65.0	55.0	5.5	42	56	2.4	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	5.9 A	15 A	NF	COMBI	300	A-N, R
FCU 19	JCI	FNX08	SUSPENDED	900	0.50	0.33	11.1	11.1	65.0	55.0	1.7	42	56	0.75	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	3.3 A	15 A	NF	COMBI	200	A-N, R
FCU 20	JCI	FNX08	SUSPENDED	900	0.50	0.33	11.1	11.1	65.0	55.0	1.7	42	56	0.75	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	3.3 A	15 A	NF	COMBI	200	A-N, R
FCU 21	JCI	FNX08	SUSPENDED	900	0.50	0.00	13.2	13.2	65.0	55.0	2.1	42	56	0.93	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	3.3 A	15 A	NF	COMBI	200	A-N, R
FCU 22	JCI	FNX16	SUSPENDED	2000	0.50	0.50	36.0	36.0	65.0	55.0	5.5	42	56	2.4	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	5.9 A	15 A	NF	COMBI	300	A-N, R
FCU 23	JCI	FNX16	SUSPENDED	2000	0.50	0.50	36.0	36.0	65.0	55.0	5.5	42	56	2.4	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	5.9 A	15 A	NF	COMBI	300	A-N, R
FCU 24	JCI	FNX16	SUSPENDED	2000	0.50	0.50	36.0	36.0	65.0	55.0	5.5	42	56	2.4	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	5.9 A	15 A	NF	COMBI	300	A-N, R
FCU 25	JCI	FNX06	SUSPENDED	670	0.50	0.33	8.9	8.9	65.0	55.0	1.4	42	56	0.62	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	3.0 A	15 A	NF	COMBI	200	A-N, R
FCU 26	JCI	FNX16	SUSPENDED	2000	0.50	0.50	36.0	36.0	65.0	55.0	5.5	42	56	2.4	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	5.9 A	15 A	NF	COMBI	300	A-N, R
FCU 27	JCI	FNX16	SUSPENDED	2000	0.50	0.50	36.0	36.0	65.0	55.0	5.5	42	56	2.4	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	5.9 A	15 A	NF	COMBI	300	A-N, R
FCU 28	JCI	FNX16	SUSPENDED	2000	0.50	0.50	36.0	36.0	65.0	55.0	5.5	42	56	2.4	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	5.9 A	15 A	NF	COMBI	300	A-N, R
FCU 29	JCI	FNX08	SUSPENDED	1000	0.50	0.33	11.6	11.6	65.0	55.0	1.8	42	56	0.8	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	3.3 A	15 A	NF	COMBI	200	A-N, R
FCU 30	JCI	FNX16	SUSPENDED	2000	0.50	0.50	36.0	36.0	65.0	55.0	5.5	42	56	2.4	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	5.9 A	15 A	NF	COMBI	300	A-N, R
FCU 31	JCI	FNX08	SUSPENDED	1000	0.50	0.33	11.3	11.3	65.0	55.0	1.8	42	56	0.8	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	3.3 A	15 A	NF	COMBI	200	A-N, R
FCU 32	JCI	FNX08	SUSPENDED	1000	0.50	0.33	11.5	11.5	65.0	55.0	1.8	42	56	0.8	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	3.3 A	15 A	NF	COMBI	200	A-N, R
FCU 33	JCI	FNX06	SUSPENDED	300	0.50	0.33	5.6	5.6	65.0	55.0	0.9	42	56	0.4	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	3.0 A	15 A	NF	COMBI	200	A-N, R
FCU 34	JCI	FNX16	SUSPENDED	2000	0.50	0.50	36.0	36.0	65.0	55.0	5.5	42	56	2.4	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	5.9 A	15 A	NF	COMBI	300	A-N, R
FCU 35	JCI	FHP-D12	CEILING CONCEALED DUCTED	800	0.50	0.25	24.0	24.0	65.0	55.0	3.7	42	56	1.64	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	2.0 A	15 A	NF	COMBI	150	A-L, N, P, R
FCU 36	JCI	FNX16	SUSPENDED	2000	0.50	0.50	36.0	36.0	65.0	55.0	5.5	42	56	2.4	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	5.9 A	15 A	NF	COMBI	300	A-N, R
FCU 37	JCI	FNX06	SUSPENDED	700	0.50	0.33	11.7	11.7	65.0	55.0	1.8	42	56	0.8	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	3.0 A	15 A	NF	COMBI	200	A-N, R
FCU 38	JCI	FHP-D10	CEILING CONCEALED DUCTED	800	0.50	0.25	24.0	24.0	65.0	55.0	3.7	42	56	1.64	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	2.0 A	15 A	NF	COMBI	150	A-L, N, P, R
FCU 39	JCI	FNX10	SUSPENDED	1000	0.50	0.50	26.3	26.3	65.0	55.0	4.1	42	56	1.82	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	3.3 A	15 A	NF	COMBI	300	A-N, R
FCU 40	JCI	FNX16	SUSPENDED	2000	0.50	0.50	36.0	36.0	65.0	55.0	5.2	42	56	2.3	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	5.9 A	15 A	NF	COMBI	300	A-N, R
FCU 41	JCI	FNX06	SUSPENDED	700	0.50	0.33	11.7	11.7	65.0	55.0	1.8	42	56	0.8	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	3.0 A	15 A	NF	COMBI	200	A-N, R
FCU 42	JCI	FHP-D12	CEILING CONCEALED DUCTED	800	0.50	0.25	24.0	24.0	65.0	55.0	3.7	42	56	1.64	550	0.0	0.0	0.0	0.0	0	0	-	0	277/1	2.0 A	15 A	NF	COMBI	150	A-L, N, P, R
FCU 43	MULTI AQUA	MHCFC4E-04	CEILING CASSETTE	350	0.00	0.03	11.8	11.8	75.0	55.0	1.8	42	56	0.8	550	12.8	70.0	90.0	1.4	120	100	0.62	600	208/1	0.5 A	1 A	NF	COMBI	75	A-L, R
FCU 44	JCI	AHD08	SUSPENDED	400	0.90	0.50	12.0	10.5	80.0	55.0	1.8	42	56	0.8	550	23.8	30.0	85.0	2.5	120	100	1.14	600	277/1	4.1 A	15 A	NF	COMBI	250	A-L, N, P, R
FCU 45	MULTI AQUA	MHCFC4E-04	CEILING CASSETTE	320	0.00	0.03	11.8	11.8	75.0	55.0	1.8	42	56	0.44	550	12.8	70.0	90.0	1.4	120	100	0.62	600	208/1	0.5 A	1 A	NF	COMBI	75	A-L, R
FCU 46	MULTI AQUA	MHCFC4E-04	CEILING CASSETTE	320	0.00	0.03	6.0	6.0	75.0	55.0	1.0	42	56	0.44	550	14.0	70.0	90.0	1.5	120	100	0.67	600	208/1	0.5 A	1 A	NF	COMBI	75	A-L, R
FCU 47	MULTI AQUA	MHCFC4E-04	CEILING CASSETTE	320	0.00	0.03	6.0	6.0	75.0	55.0	1.0	42	56	0.44	550	14.0	70.0	90.0	1.5	120	100	0.67	600	208/1	0.5 A	1 A	NF	COMBI	75	A-L, R
FCU 48	MULTI AQUA	MHCFC4E-04	CEILING CASSETTE	320	0.00	0.03	6.0	6.0	75.0	55.0	1.0	42	56	0.44	550	14.0	70.0	90.0	1.5	120	100	0.67	600	208/1	0.5 A	1 A	NF	COMBI	75	A-L, R
FCU 49	JCI	AHD08	SUSPENDED	400	0.90	0.50	12.0	10.5	80.0	55.0	1.8	42	56	0.8	550	23.8	30.0	85.0	2.5	120	100	1.14	600	277/1	4.1 A	15 A	NF	COMBI	250	A-L, N, P, R
FCU 50	JCI	AHD08	SUSPENDED	400	0.90	0.50	12.0	10.5	80.0	55.0	1.8	42	56	0.8	550	23.8	30.0	85.0	2.5	120	100	1.14	600	277/1	4.1 A	15 A	NF	COMBI	250	A-L, N, P, R
FCU 51	MULTI AQUA	MHCFC4E-04	CEILING CASSETTE	320	0.00	0.03	11.8	11.8	75.0	55.0	1.8	42	56	0.8	550	12.8	70.0	90.0	1.4	120	100	0.62	600	208/1	0.5 A	1 A	NF	COMBI	75	A-L, R
FCU 52	MULTI AQUA	MHCFC4E-04	CEILING CASSETTE	320	0.00	0.03	11.8	11.8	75.0	55.0	1.8	42	56	0.8	550	12.8	70.0	90.0	1.4	120	100	0.62	600	208/1	0.5 A	1 A	NF	COMBI	75	A-L, R
FCU 53	MULTI AQUA	MHCFC4E-04	CEILING CASSETTE	320	0.00	0.03	11.8	11.8	75.0	55.0	1.8	42	56	0.8	550	12.8	70.0	90.0	1.4	120	100	0.62	600	208/1	0.5 A	1 A	NF	COMBI	75	A-L, R
FCU 54	MULTI AQUA	MHCFC4E-04	CEILING CASSETTE	320	0.00	0.03	11.8	11.8	75.0	55.0	1.8	42	56	0.8	550	12.8	70.0	90.0	1.4	120	100	0.62	600	208/1	0.5 A	1 A	NF	COMBI	75	A-L, R
FCU 55	JCI	FNX14	SUSPENDED	1700	0.00	0.50	36.0	36.0	75.0	55.0	5.5	42	56	2.4	550	24.0	70.0	90.0	2.8	120	100	1.14	600	277/1	5.9 A	15 A	NF	COMBI	300	A-N, R
FCU 56	JCI	FNX08	SUSPENDED	500	0.50	0.50	11.7	9.7	96.0	75.0	5.5	42	56	1.8	550	27.0	0.0	50.0	2.9	120	100	0.53	600	277/1	5.0 A	15 A	NF	COMBI	300	A-N, R
FCU 57	JCI	FNX12	SUSPENDED	1500	0.50	0.50	24.0	24.0	65.0	55.0	3.6	42	56	1.64	550	14.0	70.0	90.0	4.9	120	100	0.53	600	277/1	5.0 A	15 A	NF	COMBI	300	A-N, R
FCU 58	JCI	FNX08	SUSPENDED	500	0.50	0.50	11.7	9.7	96.0	75.0	5.5	42	56	1.8	550	27.0	0.0	50.0	2.9	120	100	0.53	600	277/1	5.0 A	15 A	NF	COMBI	300	A-N, R

MODEL NUMBERS

HEAT PUMP HEAT RECOVERY CHILLER SCHEDULE (AIR-COOLED)

				MIN EFF				COOLING							HEAT PUMP						HEAT RECOVERY																											
								EVAPORATOR					CONDENSER								SIMULTANEOUS COOLING						SIMULTANEOUS HEATING																				MAX SOUND POWER RATING OCTAVE BAND (HZ)									
MARK	MANUFACTURER	MODEL	CAP (TONS)	(EER-FL)	(EER-IPLV)	NO. MODULES	REFR TYPE	DESIGN GPM	MIN GPM	EWT (°F)	LWT (°F)	MAX WPD (FT)	AMB TEMP	MIN NO OF STAGES PER MODULE	CAP (MBH)	DESIGN GPM	MIN GPM	EWT (°F)	LWT (°F)	MAX WPD (FT)	CAP (MBH)	DESIGN GPM	MIN GPM	EWT (°F)	LWT (°F)	MAX WPD (FT)	CAP (MBH)	DESIGN GPM	MIN GPM	EWT (°F)	LWT (°F)	MAX WPD (FT)	VOLTS	PH	DISC TYPE	STARTER TYPE	VFD (Y/N)	MCA	MOCP	63	125	250	500	1000	2000	4000	8000	WEIGHT (LBS)	NOTES
CH 1	MULTI-STACK	ARA030	217.0	8.63	14	9	R410A	393	44	56	42	7.0	105	2	1668.0	350	44	100	110	18.07	102.8	184.8	44	56	42	6.98	1616	330	44	100	110	18	480	3	FUSED	VFD	Yes	650	800	72	75	66	66	65	64	60	57	32500	ALL

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:

A. PROVIDE FACTORY MOUNTED STARTERS AND DISCONNECT SWITCH.
B. COORDINATE SIZE OF CONDUCTOR TERMINATION LUGS WITH CONDUCTOR SIZES SHOWN ON ELECTRICAL DRAWINGS.
C. EVAPORATOR AND CONDENSER BASED ON FOULING FACTOR OF 0.0001
D. PROVIDE CONCRETE HOUSEKEEPING PAD PER SPECIFICATIONS.
E. PROVIDE LOW AMBIENT CONTROL TO 0° F.
F. CHILLER SHALL BE SELECTED FOR 30% PROPYLENE GLYCOL SOLUTION.
G. EQUIPMENT SIZED FOR 105°F AMBIENT TEMPERATURE.
H. PROVIDE DIFFERENTIAL PRESSURE SWITCH FOR FIELD INSTALLATION.
J. PROVIDE CONDENSER COIL HAIR GUARDS.
K. SELECT EQUIPMENT FOR ELEVATION OF 1300 FEET ABOVE SEA LEVEL.
L. PROVIDE 5FT CONDENSER FAN STACKS.
M. PROVIDE COMPRESSOR WRAPS.
N. PROVIDE FACTORY CHILLER CONTROL PANEL THAT INCLUDES AN ANALOG OUTPUT SIGNAL TO DIRECTLY CONTROL A HEAD PRESSURE CONTROL VALVE.
P. SCHEDULED MINIMUM EFFICIENCY IS AT AHRI CONDITIONS.
Q. PROVIDE WITH 25KVA SCCR RATING.
R. CHILLER SHALL BE ABLE TO OPERATE IN THREE MODES - HEATING, HEAT RECOVERY, COOLING.

CHILLER SCHEDULE (AIR-COOLED)

				MIN EFF			EVAPORATOR						CONDENSER										MAX SOUND POWER RATING OCTAVE BAND (HZ)									
MARK	MANUFACTURER	MODEL	CAP (TONS)	(EER-FL)	(EER-IPLV)	REFR TYPE	DESIGN GPM	MIN GPM	EWT (°F)	LWT (°F)	MAX WPD (FT)	MAX WORKING PRESS (PSIG)	AMB TEMP	MIN NO OF STAGES PER MODULE	VOLTS	PH	DISC TYPE	STARTER TYPE	VFD (Y/N)	MCA	MOCP	63	125	250	500	1000	2000	4000	8000	WEIGHT (LBS)	NOTES
CH 2	MULTI-STACK	ACF	305.0	10.1	20.64	R134A	554	333	56	42	31.4	150.00	105	2	480	3	FUSED	VFD	Yes	611	800	72	77	69	65	61	61	57	56	32500	ALL

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NOTES:

A. PROVIDE FACTORY MOUNTED STARTERS AND DISCONNECT SWITCH.
B. COORDINATE SIZE OF CONDUCTOR TERMINATION LUGS WITH CONDUCTOR SIZES SHOWN ON ELECTRICAL DRAWINGS.
C. EVAPORATOR BASED ON FOULING FACTOR OF 0.0001
D. PROVIDE CONCRETE HOUSEKEEPING PAD PER SPECIFICATIONS.
E. PROVIDE LOW AMBIENT CONTROL TO 0 F.
F. CHILLER SHALL BE SELECTED FOR 30% PROPYLENE GLYCOL SOLUTION.
G. EQUIPMENT SIZED FOR 105°F AMBIENT TEMPERATURE.
H. PROVIDE DIFFERENTIAL PRESSURE SWITCH FOR FIELD INSTALLATION.
J. PROVIDE CONDENSER COIL HAIR GUARDS.
K. SELECT EQUIPMENT FOR ELEVATION OF 1300 FEET ABOVE SEA LEVEL.
L. PROVIDE 5FT CONDENSER FAN STACKS.
M. PROVIDE COMPRESSOR WRAPS.
N. PROVIDE FACTORY CHILLER CONTROL PANEL THAT INCLUDES AN ANALOG OUTPUT SIGNAL TO DIRECTLY CONTROL A HEAD PRESSURE CONTROL VALVE.
P. SCHEDULED MINIMUM EFFICIENCY IS AT AHRI CONDITIONS.
Q. PROVIDE WITH 25KVA SCCR RATING.

ELECTRIC TRENCH HEATER SCHEDULE

MARK	MANUFACTURER	MODEL	MOUNTING LOCATION	LENGTH	WIDTH	KW	CFM	EAT DB (°F)	MAX LAT (°F)	APD (IN)	MCA	MOP	V/PH	NOTES
THe 1	AIRFIXTURE	SOHO-E	HORIZONTAL TRENCH	77"	6"	2	250	65	95	0.1	9	10	277/1	A-C
THe 2	AIRFIXTURE	SOHO-E	HORIZONTAL TRENCH	77"	6"	2	250	65	95	0.1	9	10	277/1	A-C
THe 3	AIRFIXTURE	SOHO-E	HORIZONTAL TRENCH	77"	6"	2	250	65	95	0.1	9	10	277/1	A-C
THe 4	AIRFIXTURE	SOHO-E	HORIZONTAL TRENCH	77"	6"	1.5	250	65	95	0.1	9	10	277/1	A-C
THe 5	AIRFIXTURE	SOHO-E	HORIZONTAL TRENCH	77"	6"	2	250	65	95	0.1	9	10	277/1	A-C
THe 6	AIRFIXTURE	SOHO-E	HORIZONTAL TRENCH	77"	6"	2	250	65	95	0.1	9	10	277/1	A-C
THe 7	AIRFIXTURE	SOHO-E	HORIZONTAL TRENCH	77"	6"	2	250	65	95	0.1	9	10	277/1	A-C
THe 8	AIRFIXTURE	SOHO-E	HORIZONTAL TRENCH	77"	6"	1.5	250	65	95	0.1	9	10	277/1	A-C
THe 9	AIRFIXTURE	SOHO-E	HORIZONTAL TRENCH	84"	6"	3	225	65	95	0.1	11.2	15	277/1	A-C
THe 10	AIRFIXTURE	SOHO-E	HORIZONTAL TRENCH	84"	6"	3	225	65	95	0.1	11.2	15	277/1	A-C
THe 11	AIRFIXTURE	SOHO-E	HORIZONTAL TRENCH	84"	6"	3	225	65	95	0.1	11.2	15	277/1	A-C
THe 12	AIRFIXTURE	SOHO-E	HORIZONTAL TRENCH	84"	6"	3	225	65	95	0.1	11.2	15	277/1	A-C
THe 13	AIRFIXTURE	SOHO-E	HORIZONTAL TRENCH	84"	6"	3	225	65	95	0.1	11.2	15	277/1	A-C
THe 14	AIRFIXTURE	SOHO-E	HORIZONTAL TRENCH	84"	6"	3	225	65	95	0.1	11.2	15	277/1	A-C
THe 15	AIRFIXTURE	SOHO-E	HORIZONTAL TRENCH	84"	6"	3	225	65	95	0.1	11.2	15	277/1	A-C
THe 16	AIRFIXTURE	SOHO-E	HORIZONTAL TRENCH	84"	6"	3	225	65	95	0.1	11.2	15	277/1	A-C
THe 17	AIRFIXTURE	SOHO-E	HORIZONTAL TRENCH	84"	6"	3	225	65	95	0.1	11.2	15	277/1	A-C
THe 18	AIRFIXTURE	SOHO-E	HORIZONTAL TRENCH	84"	6"	3	225	65	95	0.1	11.2	15	277/1	A-C

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NOTES

A. PROVIDE STAINLESS STEEL GRILLE WITH 1/4" GAP SPACING WITH 0" DEFLECTION FULL LENGTH OF TRENCH. MINIMUM LOAD RATING SHALL BE 800 PSI. REFER TO PLANS FOR GRILLE LENGTH. FINALIZE GRILLE LENGTH WITH MECHANICAL CONTRACTOR.
B. CONTROLS CONTRACTOR SHALL PROVIDE RELAY FOR TYING TEMPERATURE SENSOR INTO ELECTRIC TRENCH HEATERS. REFER TO HVAC DRAWINGS FOR WHICH ELECTRIC TRENCH HEATERS SHARE A TEMPERATURE SENSOR.
C. PROVIDE ELECTRIC TRENCH HEATER WITH BACNET CAPABILITY FOR TIE-IN TO BUILDINGS BAS.

TRENCH HEATER SCHEDULE

MARK	MANUFACTURER	MODEL	MOUNTING LOCATION	LENGTH	WIDTH	MIN BTU PER LINEAR FT	CFM	EAT DB (°F)	MAX LAT (°F)	FLOW GPM	EWT (°F)	LWT (°F)	APD (IN)	WPD (FT HD)	ROWS	FPI	Cv	V/PH	NOTES
TH 1	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	78"	8"	370	200	65	100	0.5	120	90	0.1	1.2	4	12	0.22	277/1	ALL
TH 2	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	62"	8"	1070	145	65	100	0.5	120	90	0.1	1.2	4	12	0.22	277/1	ALL
TH 3	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	62"	8"	1070	145	65	100	0.5	120	90	0.1	1.2	4	12	0.22	277/1	ALL
TH 4	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	78"	8"	680	325	65	100	0.5	120	90	0.1	1.2	4	12	0.22	277/1	ALL
TH 5	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	78"	8"	960	325	65	100	0.5	120	90	0.1	1.2	4	12	0.22	277/1	ALL
TH 6	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	62"	8"	900	145	65	100	0.5	120	90	0.1	1.2	4	12	0.22	277/1	ALL
TH 7	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	78"	8"	1030	325	65	100	0.5	120	90	0.1	1.2	4	12	0.22	277/1	ALL
TH 8	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	78"	8"	1030	325	65	100	0.5	120	90	0.1	1.2	4	12	0.22	277/1	ALL
TH 9	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	78"	8"	1030	325	65	100	0.5	120	90	0.1	1.2	4	12	0.22	277/1	ALL
TH 10	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	78"	8"	1370	325	65	100	0.65	120	90	0.1	1.2	4	12	0.29	277/1	ALL
TH 11	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	78"	8"	1370	325	65	100	0.65	120	90	0.1	1.2	4	12	0.29	277/1	ALL
TH 12	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	78"	8"	1370	325	65	100	0.65	120	90	0.1	1.2	4	12	0.29	277/1	ALL
TH 13	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	78"	8"	1370	325	65	100	0.65	120	90	0.1	1.2	4	12	0.29	277/1	ALL
TH 14	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	78"	8"	1370	325	65	100	0.65	120	90	0.1	1.2	4	12	0.29	277/1	ALL
TH 15	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	78"	8"	1370	325	65	100	0.65	120	90	0.1	1.2	4	12	0.29	277/1	ALL
TH 16	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	48"	8"	1620	130	65	100	0.5	120	90	0.1	1.2	4	12	0.22	277/1	ALL
TH 17	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	62"	8"	1620	145	65	100	0.6	120	90	0.1	1.2	4	12	0.27	277/1	ALL
TH 18	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	62"	8"	1620	145	65	100	0.6	120	90	0.1	1.2	4	12	0.27	277/1	ALL
TH 19	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	78"	8"	900	325	65	100	0.5	120	90	0.1	1.2	4	12	0.22	277/1	ALL
TH 20	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	78"	8"	900	325	65	100	0.5	120	90	0.1	1.2	4	12	0.22	277/1	ALL
TH 21	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	78"	8"	900	325	65	100	0.5	120	90	0.1	1.2	4	12	0.22	277/1	ALL
TH 22	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	78"	8"	670	325	65	100	0.5	120	90	0.1	1.2	4	12	0.22	277/1	ALL
TH 23	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	78"	8"	670	325	65	100	0.5	120	90	0.1	1.2	4	12	0.22	277/1	ALL
TH 24	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	78"	8"	670	325	65	100	0.5	120	90	0.1	1.2	4	12	0.22	277/1	ALL
TH 25	AIRFIXTURE	SOHO-W	HORIZONTAL TRENCH	78"	6"	670	325	65	100	0.5	120	90	0.1	1.2	4	12	0.22	277/1	ALL

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NOTES

A. SIZE SYSTEM FOR WATER WITH 30% PROPYLENE GLYCOL SOLUTION.
B. PROVIDE STAINLESS STEEL GRILLE WITH 1/4" GAP SPACING WITH 0" DEFLECTION FULL LENGTH OF TRENCH. MINIMUM LOAD RATING SHALL BE 800 PSI. REFER TO PLANS FOR GRILLE LENGTH. FINALIZE GRILLE LENGTH WITH MECHANICAL CONTRACTOR.
C. PROVIDE WITH SOHO HUB AND CONTROL BOX. REFER TO PLANS FOR QUANTITIES AND LOCATIONS.
D. REFER TO PIPING DRAWINGS FOR CV VALUES IN SITUATIONS WHERE PIPING IS EXTENDED THROUGH MORE THAN ONE TRENCH HEATER.
E. REFER TO PIPING DRAWINGS FOR INSTANCES WHERE A CONTINUOUS TRENCH IS REQUIRED.

CABINET UNIT HEATER SCHEDULE (ELECTRIC)

MARK	MANUFACTURER	MODEL	MIN OUT (MBH)	NOM (KW)	CFM	MOUNTING TYPE	INLET	OUTLET	V/PH	MCA	DISC TYPE	NOTES
CUH 1	JCI / YORK	FWI-10	10.7	4.0	330	FLOOR	FRONT	TOP	277/1	14	NF	ALL
CUH 2	JCI / YORK	FWI-10	14.1	5.0	435	FLOOR	FRONT	TOP	277/1	18	NF	ALL

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NOTES:

A. PROVIDE WITH WALL MOUNTED THERMOSTAT.
B. PROVIDE NECESSARY MOUNTING BRACKET AND ACCESSORIES FOR MOUNTING SPECIFIED.
C. PROVIDE FACTORY MOUNTED DISCONNECT SWITCH INSTALLED ON SERVICE SIDE OF UNIT.

CABINET UNIT HEATER SCHEDULE (HOT WATER)

MARK	MANUFACTURER	MODEL	MIN OUT (MBH)	EWT (°F)	GPM	MAX WPD (FT)	CV	EAT (°F)	CFM	ESP (IN WC)	MOUNTING TYPE	INLET	OUTLET	V/PH	NOTES
CUH 4	DAIKIN	FHVC102	15.6	120.0	1	0.5	0.44	70.0	200	0.00	FLOOR	FRONT	FRONT	120/1	A-F
CUH 7	DAIKIN	FHVC106	36.0	120.0	3.8	4.4	1.68	70.0	600	0.00	FLOOR	FRONT	FRONT	120/1	A-F

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:

A. MOUNT 1 FEET ABOVE FINISHED FLOOR WITHOUT OBSTRUCTING AIRFLOW.
B. PROVIDE WITH UNIT MOUNTED THERMOSTAT.
C. PROVIDE NECESSARY MOUNTING BRACKET AND ACCESSORIES FOR SPECIFIED MOUNTING.
D. PROVIDE FACTORY MOUNTED DISCONNECT SWITCH INSTALLED ON SERVICE SIDE OF UNIT.
E. SIZE UNITS FOR A WATER TEMPERATURE DROP OF 20 °F.
F. ARCHITECT SHALL SELECT CABINET COLOR.

PUMP SCHEDULE

MARK	SERVICE	MANUFACTURER	MODEL	SIZE	MOUNTING	MIN FLOW GPM	GPM	FTHD	NOM HP	RPM	VFD (Y/N)	V/PH	DISC TYPE	STARTER TYPE	WEIGHT	NOTES
HPHWP 1	HEAT PUMP CHILLER HEATING WATER	BELL & GOSSETT	2.5 BB	e-1510	BASE	44	200	66	7.50	1655	Yes	480/3	F	VFD	370	ALL
HPHWP 2	HEAT PUMP CHILLER HEATING WATER	BELL & GOSSETT	2.5 BB	e-1510	BASE	44	200	66	7.50	1655	Yes	480/3	F	VFD	370	ALL
PCHWP 1	PRIMARY CHILLED WATER	BELL & GOSSETT	2AD	e-1532	BASE	44	190	120	15.00	3092	Yes	480/3	F	VFD	360	ALL
PCHWP 2	PRIMARY CHILLED WATER	BELL & GOSSETT	2AD	e-1532	BASE	44	190	120	15.00	3092	Yes	480/3	F	VFD	360	ALL
PCHWP 3	PRIMARY CHILLED WATER	BELL & GOSSETT	2AD	e-1532	BASE	44	190	120	15.00	3092	Yes	480/3	F	VFD	360	ALL
PCHWP 4	PRIMARY CHILLED WATER	BELL & GOSSETT	2AD	e-1532	BASE	44	190	120	15.00	3092	Yes	480/3	F	VFD	360	ALL
PCHWP 5	PRIMARY CHILLED WATER	BELL & GOSSETT	2AD	e-1532	BASE	44	190	120	15.00	3092	Yes	480/3	F	VFD	360	ALL
PHWP 1	HEATING HOT WATER	BELL & GOSSETT	2.5 AC	e-1510	BASE	83	275	105	15.00	3191	Yes	480/3	F	VFD	330	ALL
PHWP 2	HEATING HOT WATER	BELL & GOSSETT	2.5 AC	e-1510	BASE	83	275	105	15.00	3191	Yes	480/3	F	VFD	330	ALL

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NOTES:

A. PROVIDE CONCRETE HOUSEKEEPING PAD PER SPECIFICATIONS.
B. VFD FURNISHED BY DIVISION 23 CONTRACTOR.
C. PUMP MOTOR SHALL BE NON-OVERLOADING THROUGHOUT THE FULL RANGE OF THE PUMP CURVE.
D. PROVIDE WITH 10KVA SCCR.

UNIT HEATER SCHEDULE (HYDRONIC)

MARK	LOCATION	MANUFACTURER	MODEL	MIN OUT (MBH)	EAT (°F)	LAT (°F)	FLOW (GPM)	EWT (°F)	LWT (°F)	MAX WPD (FT)	CV	CFM	MOTOR HP	V/PH	DISC TYPE	NOTES
UH 1	LVL 4 SHELL	MODINE	HCH 67	41.8	35.0	65.0	4	120	100	5.00	1.75	1150	0.17	120/1	NF	ALL
UH 2	LVL 4 SHELL	MODINE	HCH 67	41.8	35.0	65.0	4	120	100	5.00	1.75	1150	0.17	120/1	NF	ALL

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NOTES:

A. MOUNT 10 FEET ABOVE FINISHED FLOOR WITHOUT OBSTRUCTING AIRFLOW.
B. PROVIDE WITH WALL MOUNTED THERMOSTAT.
C. PROVIDE NECESSARY MOUNTING BRACKET AND ACCESSORIES FOR [VERTICAL][HORIZONTAL][WALL] MOUNTING.
D. PROVIDE FACTORY MOUNTED DISCONNECT SWITCH INSTALLED ON SERVICE SIDE OF UNIT.
E. PROVIDE 24 V MOTOR OPERATED TWO-POSITION TWO-WAY CONTROL VALVE.
F. VALVE Cv IS BASED ON SPECIFIC GRAVITY OF PROPYLENE GLYCOL AT A CONCENTRATION OF 30%.

NATURAL GAS HOT WATER BOILER SCHEDULE

MARK	MANUFACTURER	MODEL	MIN OUT (MBH)	MIN EFF (%)	MIN NO OF STAGES	DESIGN FLOW (GPM)	MINIMUM FLOW (GPM)	EWT (°F)	LWT (°F)	MAX WPD (FT)	MAX WORKING PRESS (PSIG)	V/PH	WEIGHT (LBS)	NOTES
B 1	LOCHINVAR	FB1751	1750	95	25	185	10	100	120	10	150.00	120/1	2500	ALL
B 2	LOCHINVAR	FB1751	1750	95	25	185	10	100	120	10	150.00	120/1	2500	ALL
B 3	LOCHINVAR	FB1751	1750	95	25	185	10	100	120	10	150.00	120/1	2500	ALL

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:

A. BOILER BURNER TRIM AND CONTROLS TO MEET LOCALLY ADOPTED ASME CSD-1 REQUIREMENTS.
B. PROVIDE CONCRETE HOUSEKEEPING PAD PER SPECIFICATIONS.
D. PROVIDE FACTORY MOUNTED DISCONNECT SWITCH(ES).
F. PROVIDE SINGLE POINT POWER CONNECTION.
G. SELECT EQUIPMENT FOR ELEVATION OF 1300 FEET ABOVE SEA LEVEL.
H. VERIFY PRESSURE SWITCH ON BOILER IS SET AT 12 PSIG PER MANUFACTURER'S REQUIREMENTS.

EXPANSION TANK SCHEDULE

MARK	MANUFACTURER	MODEL	LOCATION	MOUNTING	TANK SIZE (GAL)	ACCEPTANCE (GAL)	MIN TEMP (°F)	MAX TEMP (°F)	MIN PRESS (PSIG)	MAX PRESS (PSIG)	WEIGHT (LBS)	NOTES
ET 1	BELL & GOSSETT	D60	MECH RM	FLOOR	19	10.9	40.0	100.0	39.0	108.0	400	ALL
ET 2	BELL & GOSSETT	D260	MECH RM	FLOOR	150	83.6	40.0	120.0	37.0	103.0	1900	ALL

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:

A. PROVIDE PRECHARGED DIAPHRAGM-TYPE ASME RATED TANK.
B. VERTICAL TANKS SHALL BE INSTALLED TO ACCOMMODATE BOTTOM DRAIN CONNECTION.
C. PROVIDE CONCRETE HOUSEKEEPING PAD PER SPECIFICATIONS FOR FLOOR-MOUNTED UNITS.
D. SCHEDULED WEIGHT INCLUDES WEIGHT OF TANK AND WATER UNDER FULL ACCEPTANCE.

WATER SPECIALTIES SCHEDULE

PLAN MARK	MANUFACTURER	MODEL	SYSTEM TYPE	SYSTEM OPERATING TEMP (F)	MAX WORKING PRESS (PSIG)	FLOW RATE (GPM)	PRESS. DROP (FT)	SIZE (IN.)	VOLT/PHASE	NOTES
AS 1	BELL & GOSSETT	CRS-8F	CHILLED WATER	56	150.00	950.0	2.4	8.0	-	ALL
AS 2	BELL & GOSSETT	CRS-8F	HEATING HOT WATER	120	150.00	400.0	1.3	6.0	-	ALL
AS 3	BELL & GOSSETT	CRSN-8F	HEATING HOT WATER	120	150.00	550.0	0.8	6.0	-	ALL
GF 1	BELL & GOSSETT	GMU-60P	CHILLED WATER	56	60.00	5.0	0	1.0	120/1	-
GF 2	BELL & GOSSETT	GMU-100P	HEATING HOT WATER	120	60.00	5.0	0	1.0	120/1	-

SYSTEM OPERATING TEMPERATURE: CHILLED WATER: 42-56°F, HEATING WATER: 100-120°F
SYSTEM WORKING PRESSURE: CHILLED WATER: 150 PSIG, HEATING WATER: 150 PSIG

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
A. PROVIDE AIR SEPARATOR WITH INTEGRAL STRAINER.

POLK STANLEY WILCOX

801 South Spring Street
Little Rock, AR 72201
501.378.0878 office

509 W. Spring St. | Suite 150
Fayetteville, AR 72701
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CIVIL
McClelland Consulting Engineers, Inc.
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FAYETTEVILLE, AR 72703
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LANDSCAPE
OSD
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BROOKLYN, NY 11217
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STRUCTURAL
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BENTONVILLE, AR 72712
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MEPF + LOW VOLTAGE
Henderson Engineers
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LENEXA, KS 66214
P: 913.660.6187

SUSTAINABILITY
SOM
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CHICAGO, IL 60604
P: 312.360.4121

SIGNAGE + WAYFINDING
TWO TWELVE
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FOOD SERVICE
JME HOSPITALITY
9595 SIX PINES DR., SUITE 8210
THE WOODLANDS, TX 77380
P: 609.641.2222

VARIABLE AIR VOLUME TERMINAL SCHEDULE (HYDRONIC HEAT) AHU 1

MARK	SERVED FROM	MANUFACTURER	MODEL	INLET SIZE (IN)	PRIMARY CFM	MIN PRIM CFM	MIN HEAT CFM	MAX HEAT CFM	HEATING COIL HTG EWT	HTG LWT	EAT	LAT	MBH	GPM	ROW	WPD (FT)	CV	V/PH	SOUND POWER RADIATED	DISCHARGE	CONTROL TYPE	NOTES
VAV 1-01	AHU-1	PRICE	SDV	8"	250	125	125	125	120 °F	100 °F	55.0	85.0	4.1	1.0	2	5.00	0.44	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-02	AHU-1	PRICE	SDV	8"	250	125	125	125	120 °F	100 °F	55.0	85.0	4.1	1.0	2	5.00	0.44	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-03	AHU-1	PRICE	SDV	8"	650	195	195	325	120 °F	100 °F	55.0	85.0	10.5	2.5	2	5.00	1.1	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-04	AHU-1	PRICE	SDV	8"	530	159	159	265	120 °F	100 °F	55.0	85.0	8.6	2.1	2	5.00	0.93	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-05	AHU-1	PRICE	SDV	6"	160	65	48	80	120 °F	100 °F	55.0	85.0	2.6	0.6	2	5.00	0.27	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-06	AHU-1	PRICE	SDV	6"	160	65	65	80	120 °F	100 °F	55.0	85.0	2.6	0.6	2	5.00	0.27	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-07	AHU-1	PRICE	SDV	8"	210	125	125	125	120 °F	100 °F	55.0	85.0	3.4	0.8	2	5.00	0.35	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-08	AHU-1	PRICE	SDV	8"	260	78	78	130	120 °F	100 °F	55.0	85.0	4.2	1.0	2	5.00	0.44	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-09	AHU-1	PRICE	SDV	6"	100	65	65	65	120 °F	100 °F	55.0	85.0	1.6	0.5	2	5.00	0.22	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-10	AHU-1	PRICE	SDV	8"	610	183	183	305	120 °F	100 °F	55.0	85.0	9.9	2.4	2	5.00	1.06	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-11	AHU-1	PRICE	SDV	10"	1090	545	545	545	120 °F	100 °F	55.0	85.0	17.7	4.2	2	5.00	1.86	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-12	AHU-1	PRICE	SDV	4"	90	50	50	50	120 °F	100 °F	55.0	85.0	1.5	0.5	2	5.00	0.22	24/1	35	35	CONSTANT VOLUME	A-M
VAV 1-13	AHU-1	PRICE	SDV	14"	2040	1020	1020	1020	120 °F	100 °F	55.0	85.0	33.0	7.9	2	5.00	3.5	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-14	AHU-1	PRICE	SDV	8"	400	125	125	200	120 °F	100 °F	55.0	85.0	6.5	1.6	2	5.00	0.71	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-15	AHU-1	PRICE	SDV	8"	410	205	205	205	120 °F	100 °F	55.0	85.0	6.6	1.6	2	5.00	0.71	24/1	35	35	CONSTANT VOLUME	A-M
VAV 1-16	AHU-1	PRICE	SDV	8"	270	125	125	135	120 °F	100 °F	55.0	85.0	4.4	1.1	2	5.00	0.49	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-17	AHU-1	PRICE	SDV	14"	1710	513	513	855	120 °F	100 °F	55.0	85.0	27.7	6.7	2	5.00	2.97	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-18	AHU-1	PRICE	SDV	8"	470	141	141	235	120 °F	100 °F	55.0	85.0	7.6	1.8	2	5.00	0.79	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-19	AHU-1	PRICE	SDV	10"	850	255	255	425	120 °F	100 °F	55.0	85.0	13.8	3.3	2	5.00	1.46	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-20	AHU-1	PRICE	SDV	10"	860	258	258	430	120 °F	100 °F	55.0	85.0	13.9	3.3	2	5.00	1.46	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-21	AHU-1	PRICE	SDV	8"	490	147	147	245	120 °F	100 °F	55.0	85.0	7.9	1.9	2	5.00	0.84	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-22	AHU-1	PRICE	SDV	16"	2550	765	765	1275	120 °F	100 °F	55.0	85.0	41.3	9.9	2	5.00	4.4	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-23	AHU-1	PRICE	SDV	12"	1230	369	369	615	120 °F	100 °F	55.0	85.0	19.9	4.8	2	5.00	2.13	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-24	AHU-1	PRICE	SDV	12"	1380	414	414	690	120 °F	100 °F	55.0	85.0	22.4	5.4	2	5.00	2.39	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-25	AHU-1	PRICE	SDV	12"	1380	414	414	690	120 °F	100 °F	55.0	85.0	22.4	5.4	2	5.00	2.39	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-26	AHU-1	PRICE	SDV	16"	2570	771	771	1285	120 °F	100 °F	55.0	85.0	41.6	10.0	2	5.00	4.4	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-27	AHU-1	PRICE	SDV	6"	130	65	65	65	120 °F	100 °F	55.0	85.0	2.1	0.5	2	5.00	0.22	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-28	AHU-1	PRICE	SDV	10"	990	297	297	495	120 °F	100 °F	55.0	85.0	16.0	3.9	2	5.00	1.73	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-29	AHU-1	PRICE	SDV	10"	990	297	297	495	120 °F	100 °F	55.0	85.0	16.0	3.9	2	5.00	1.73	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-30	AHU-1	PRICE	SDV	12"	1210	363	363	605	120 °F	100 °F	55.0	85.0	19.6	4.7	2	5.00	2.08	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-31	AHU-1	PRICE	SDV	10"	970	291	291	485	120 °F	100 °F	55.0	85.0	15.7	3.8	2	5.00	1.68	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-32	AHU-1	PRICE	SDV	10"	1080	324	324	540	120 °F	100 °F	55.0	85.0	17.5	4.2	2	5.00	1.86	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-33	AHU-1	PRICE	SDV	8"	690	207	207	345	120 °F	100 °F	55.0	85.0	11.2	2.7	2	5.00	1.12	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-34	AHU-1	PRICE	SDV	6"	150	65	65	75	120 °F	100 °F	55.0	85.0	2.4	0.6	2	5.00	0.26	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-35	AHU-1	PRICE	SDV	8"	320	125	125	160	120 °F	100 °F	55.0	85.0	5.2	1.2	2	5.00	0.53	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-36	AHU-1	PRICE	SDV	16"	2410	723	723	1205	120 °F	100 °F	55.0	85.0	39.0	9.4	2	5.00	4.16	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-37	AHU-1	PRICE	SDV	16"	2410	723	723	1205	120 °F	100 °F	55.0	85.0	39.0	9.4	2	5.00	4.16	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-38	AHU-1	PRICE	SDV	16"	3130	1565	1565	1565	120 °F	100 °F	55.0	85.0	50.7	12.2	2	5.00	5.4	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-39	AHU-1	PRICE	SDV	16"	2250	1125	1125	1125	120 °F	100 °F	55.0	85.0	36.5	8.8	2	5.00	3.9	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-40	AHU-1	PRICE	SDV	8"	250	125	125	125	120 °F	100 °F	55.0	85.0	4.1	1.0	2	5.00	0.44	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-41	AHU-1	PRICE	SDV	10"	1000	500	500	500	120 °F	100 °F	55.0	85.0	16.2	3.9	2	5.00	1.73	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 1-42	AHU-1	PRICE	SDV	6"	100	65	65	65	120 °F	100 °F	55.0	85.0	1.6	0.5	2	5.00	0.22	24/1	35	35	SINGLE MIN, DUAL MAX	A-M

VARIABLE AIR VOLUME TERMINAL SCHEDULE (HYDRONIC HEAT) AHU 2

MARK	SERVED FROM	MANUFACTURER	MODEL	INLET SIZE (IN)	PRIMARY CFM	MIN PRIM CFM	MIN HEAT CFM	MAX HEAT CFM	HEATING COIL HTG EWT	HTG LWT	EAT	LAT	MBH	GPM	ROW	WPD (FT)	CV	V/PH	SOUND POWER RADIATED	DISCHARGE	CONTROL TYPE	NOTES
VAV 2-01	AHU-2	PRICE	SDV	16"	2410	723	723	1205	120 °F	100 °F	55.0	85.0	39.0	9.4	2	5.00	4.16	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-02	AHU-2	PRICE	SDV	8"	640	320	320	320	120 °F	100 °F	55.0	85.0	10.4	2.5	2	5.00	1.1	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-03	AHU-2	PRICE	SDV	14"	1900	570	570	950	120 °F	100 °F	55.0	85.0	30.8	7.4	2	5.00	3.27	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-04	AHU-2	PRICE	SDV	8"	230	125	125	125	120 °F	100 °F	55.0	85.0	3.7	0.9	2	5.00	0.4	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-05	AHU-2	PRICE	SDV	16"	2800	1400	1400	1400	120 °F	100 °F	55.0	85.0	45.4	9.2	2	5.00	6.3	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-06	AHU-2	PRICE	SDV	10"	750	225	225	375	120 °F	100 °F	55.0	85.0	12.2	2.9	2	5.00	1.3	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-07	AHU-2	PRICE	SDV	8"	390	125	125	195	120 °F	100 °F	55.0	85.0	6.3	1.5	2	5.00	0.66	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-08	AHU-2	PRICE	SDV	10"	910	273	273	455	120 °F	100 °F	55.0	85.0	14.7	3.5	2	5.00	1.55	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-09	AHU-2	PRICE	SDV	10"	910	273	273	455	120 °F	100 °F	55.0	85.0	14.7	3.5	2	5.00	1.55	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-10	AHU-2	PRICE	SDV	10"	910	273	273	455	120 °F	100 °F	55.0	85.0	14.7	3.5	2	5.00	1.55	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-11	AHU-2	PRICE	SDV	10"	910	273	273	455	120 °F	100 °F	55.0	85.0	14.7	3.5	2	5.00	1.55	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-12	AHU-2	PRICE	SDV	10"	910	273	273	455	120 °F	100 °F	55.0	85.0	14.7	3.5	2	5.00	1.55	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-13	AHU-2	PRICE	SDV	10"	910	273	273	455	120 °F	100 °F	55.0	85.0	14.7	3.5	2	5.00	1.55	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-14	AHU-2	PRICE	SDV	8"	280	125	125	140	120 °F	100 °F	55.0	85.0	4.5	1.1	2	5.00	0.5	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-15	AHU-2	PRICE	SDV	10"	900	450	450	450	120 °F	100 °F	55.0	85.0	14.6	3.5	2	5.00	1.55	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-16	AHU-2	PRICE	SDV	10"	900	450	450	450	120 °F	100 °F	55.0	85.0	14.6	3.5	2	5.00	1.55	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-17	AHU-2	PRICE	SDV	8"	380	125	125	190	120 °F	100 °F	55.0	85.0	6.2	1.5	2	5.00	0.7	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-18	AHU-2	PRICE	SDV	8"	300	125	125	150	120 °F	100 °F	55.0	85.0	4.9	1.2	2	5.00	0.5	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-19	AHU-2	PRICE	SDV	4"	90	50	50	50	120 °F	100 °F	55.0	85.0	1.5	0.5	2	5.00	0.2	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-20	AHU-2	PRICE	SDV	4"	90	50	50	50	120 °F	100 °F	55.0	85.0	1.5	0.5	2	5.00	0.2	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-21	AHU-2	PRICE	SDV	4"	90	50	50	50	120 °F	100 °F	55.0	85.0	1.5	0.5	2	5.00	0.2	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-22	AHU-2	PRICE	SDV	6"	140	65	65	70	120 °F	100 °F	55.0	85.0	2.3	0.5	2	5.00	0.2	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-23	AHU-2	PRICE	SDV	12"	1300	650	650	650	120 °F	100 °F	55.0	85.0	21.1	5.1	2	5.00	2.24	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 2-24	AHU-2	PRICE	SDV	14"	2080	624	624	1040	120 °F	100 °F	55.0	85.0	33.7	8.1	2	5.00	3.55	24/1	35	35	SINGLE MIN, DUAL MAX	A-M

VARIABLE AIR VOLUME TERMINAL SCHEDULE (HYDRONIC HEAT) AHU 3

MARK	SERVED FROM	MANUFACTURER	MODEL	INLET SIZE (IN)	PRIMARY CFM	MIN PRIM CFM	MIN HEAT CFM	MAX HEAT CFM	HEATING COIL HTG EWT	HTG LWT	EAT	LAT	MBH	GPM	ROW	WPD (FT)	CV	V/PH	SOUND POWER RADIATED	DISCHARGE	CONTROL TYPE	NOTES
VAV 3-01	AHU-3	PRICE	SDV	8"	530	159	159	265	120 °F	100 °F	55.0	85.0	8.6	2.1	2	5.00	0.93	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-02	AHU-3	PRICE	SDV	6"	160	65	65	80	120 °F	100 °F	55.0	85.0	2.6	0.6	2	5.00	0.26	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-03	AHU-3	PRICE	SDV	6"	170	65	65	85	120 °F	100 °F	55.0	85.0	2.8	0.7	2	5.00	0.31	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-04	AHU-3	PRICE	SDV	8"	550	165	165	275	120 °F	100 °F	55.0	85.0	8.9	2.1	2	5.00	0.93	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-05	AHU-3	PRICE	SDV	8"	340	125	125	170	120 °F	100 °F	55.0	85.0	5.5	1.3	2	5.00	0.57	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-06	AHU-3	PRICE	SDV	8"	670	201	201	335	120 °F	100 °F	55.0	85.0	10.9	2.6	2	5.00	1.15	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-07	AHU-3	PRICE	SDV	8"	680	204	204	340	120 °F	100 °F	55.0	85.0	11.0	2.6	2	5.00	1.15	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-08	AHU-3	PRICE	SDV	10"	880	264	264	440	120 °F	100 °F	55.0	85.0	14.3	3.4	2	5.00	1.50	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-09	AHU-3	PRICE	SDV	4"	90	50	50	50	120 °F	100 °F	55.0	85.0	1.5	0.5	2	5.00	0.22	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-10	AHU-3	PRICE	SDV	6"	100	65	65	65	120 °F	100 °F	55.0	85.0	1.6	0.5	2	5.00	0.22	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-11	AHU-3	PRICE	SDV	6"	120	65	65	65	120 °F	100 °F	55.0	85.0	1.9	0.5	2	5.00	0.22	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-12	AHU-3	PRICE	SDV	8"	510	255	255	255	120 °F	100 °F	55.0	85.0	8.3	2.0	2	5.00	0.88	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-13	AHU-3	PRICE	SDV	6"	120	65	65	65	120 °F	100 °F	55.0	85.0	1.9	0.5	2	5.00	0.22	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-14	AHU-3	PRICE	SDV	6"	80	80	80	80	120 °F	100 °F	55.0	85.0	1.3	0.5	2	5.00	0.22	24/1	35	35	CONSTANT VOLUME	A-N
VAV 3-15	AHU-3	PRICE	SDV	4"	50	50	50	50	120 °F	100 °F	55.0	85.0	0.6	0.5	2	5.00	0.22	24/1	35	35	CONSTANT VOLUME	A-N
VAV 3-16	AHU-3	PRICE	SDV	4"	60	50	50	50	120 °F	100 °F	55.0	85.0	1.0	0.5	2	5.00	0.22	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-17	AHU-3	PRICE	SDV	4"	50	50	50	50	120 °F	100 °F	55.0	85.0	0.8	0.5	2	5.00	0.22	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-18	AHU-3	PRICE	SDV	6"	170	65	65	85	120 °F	100 °F	55.0	85.0	2.8	0.7	2	5.00	0.31	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-19	AHU-3	PRICE	SDV	6"	170	65	65	85	120 °F	100 °F	55.0	85.0	2.8	0.7	2	5.00	0.31	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-20	AHU-3	PRICE	SDV	6"	170	65	65	85	120 °F	100 °F	55.0	85.0	2.8	0.7	2	5.00	0.31	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-21	AHU-3	PRICE	SDV	4"	80	50	50	50	120 °F	100 °F	55.0	85.0	1.3	0.5	2	5.00	0.22	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-22	AHU-3	PRICE	SDV	4"	70	50	50	50	120 °F	100 °F	55.0	85.0	1.1	0.5	2	5.00	2.7	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-23	AHU-3	PRICE	SDV	12"	1570	785	785	785	120 °F	100 °F	55.0	85.0	25.4	0.5	2	5.00	0.22	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-24	AHU-3	PRICE	SDV	4"	50	50	50	50	120 °F	100 °F	55.0	85.0	0.8	0.5	2	5.00	0.22	24/1	35	35	CONSTANT VOLUME	A-N
VAV 3-25	AHU-3	PRICE	SDV	6"	170	65	65	85	120 °F	100 °F	55.0	85.0	2.8	0.7	2	5.00	0.31	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-26	AHU-3	PRICE	SDV	6"	170	65	65	85	120 °F	100 °F	55.0	85.0	2.8	0.7	2	5.00	0.31	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-27	AHU-3	PRICE	SDV	6"	170	65	65	85	120 °F	100 °F	55.0	85.0	2.8	0.7	2	5.00	0.31	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-28	AHU-3	PRICE	SDV	6"	110	110	110	110	120 °F	100 °F	55.0	85.0	1.8	0.5	2	5.00	0.22	24/1	35	35	CONSTANT VOLUME	A-N
VAV 3-29	AHU-3	PRICE	SDV	4"	70	50	50	50	120 °F	100 °F	55.0	85.0	1.1	0.5	2	5.00	0.22	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-30	AHU-3	PRICE	SDV	4"	70	50	50	50	120 °F	100 °F	55.0	85.0	1.1	0.5	2	5.00	0.22	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-31	AHU-3	PRICE	SDV	6"	120	65	65	65	120 °F	100 °F	55.0	85.0	1.9	0.5	2	5.00	0.22	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-32	AHU-3	PRICE	SDV	12"	1160	348	348	580	120 °F	100 °F	55.0	85.0	20.0	4.8	2	5.00	2.13	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-33	AHU-3	PRICE	SDV	10"	1010	303	303	505	120 °F	100 °F	55.0	85.0	16.4	3.9	2	5.00	1.71	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-34	AHU-3	PRICE	SDV	14"	2160	648	648	1080	120 °F	100 °F	55.0	85.0	35.0	8.4	2	5.00	3.7	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-35	AHU-3	PRICE	SDV	14"	2160	648	648	1080	120 °F	100 °F	55.0	85.0	35.0	8.4	2	5.00	3.7	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 3-36	AHU-3	PRICE	SDV	12"	1410	423	423	705	120 °F	100 °F	55.0	85.0	24.4	5.9	2	5.00	2.6	24/1	35	35	SINGLE MIN, DUAL MAX	A-M

VARIABLE AIR VOLUME TERMINAL SCHEDULE (HYDRONIC HEAT) AHU 4

MARK	SERVED FROM	MANUFACTURER	MODEL	INLET SIZE (IN)	PRIMARY CFM	MIN PRIM CFM	MIN HEAT CFM	MAX HEAT CFM	HEATING COIL HTG EWT	HTG LWT	EAT	LAT	MBH	GPM	ROW	WPD (FT)	CV	V/PH	SOUND POWER RADIATED	DISCHARGE	CONTROL TYPE	NOTES
VAV 4-01	AHU-4	PRICE	SDV	12"	1600	800	800	800	120 °F	100 °F	55.0	85.0	25.9	6.2	2	5.00	2.8	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 4-02	AHU-4	PRICE	SDV	12"	1600	800	800	800	120 °F	100 °F	55.0	85.0	25.9	6.2	2	5.00	2.8	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 4-03	AHU-4	PRICE	SDV	8"	210	125	125	125	120 °F	100 °F	55.0	85.0	3.4	0.8	2	5.00	0.4	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 4-04	AHU-4	PRICE	SDV	8"	210	125	125	125	120 °F	100 °F	55.0	85.0	3.4	0.8	2	5.00	0.4	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 4-05	AHU-4	PRICE	SDV	8"	430	172	172	215	120 °F	100 °F	55.0	85.0	7.0	1.7	2	5.00	0.8	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 4-06	AHU-4	PRICE	SDV	12"	1270	381	381	635	120 °F	100 °F	55.0	85.0	20.6	4.9	2	5.00	2.2	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 4-07	AHU-4	PRICE	SDV	14"	1680	504	504	840	120 °F	100 °F	55.0	85.0	27.2	6.5	2	5.00	2.9	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 4-08	AHU-4	PRICE	SDV	6"	160	65	65	80	120 °F	100 °F	55.0	85.0	2.6	0.6	2	5.00	0.3	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 4-09	AHU-4	PRICE	SDV	12"	1520	760	760	760	120 °F	100 °F	55.0	85.0	24.6	5.9	2	5.00	2.6	24/1	35	35	SINGLE MIN, DUAL MAX	A-M
VAV 4-10	AHU-4	PRICE

VARIABLE FREQUENCY DRIVES (VFD'S)

MARK	SERVING EQUIPMENT	NUMBER OF MOTORS	HP OF EACH MOTOR ON THE DRIVE	MANUFACTURER	VOLT/PHASE	ENCLOSURE	MOUNTING LOCATION	NOTES
VFD 1	PHWP 1	1	7.5	ABB	480/3	NEMA 1	WALL	A-F
VFD 2	PHWP 2	1	7.5	ABB	480/3	NEMA 1	WALL	A-F
VFD 3	HPHWP 1	1	15.0	ABB	480/3	NEMA 1	UNISTRUT	A-F
VFD 4	HPHWP 2	1	15.0	ABB	480/3	NEMA 1	UNISTRUT	A-F
VFD 5	PCHWP 1	1	15.0	ABB	480/3	NEMA 1	WALL	A-F
VFD 6	PCHWP 2	1	15.0	ABB	480/3	NEMA 1	WALL	A-F
VFD 7	PCHWP 3	1	15.0	ABB	480/3	NEMA 1	WALL	A-F
VFD 8	PCHWP 4	1	15.0	ABB	480/3	NEMA 1	WALL	A-F
VFD 9	PCHWP 5	1	15.0	ABB	480/3	NEMA 1	WALL	A-F
VFD 10	AHU-1 EF	2	5.0	ABB	480/3	NEMA 1	UNIT	A-F
VFD 11	AHU-1 EF	2	5.0	ABB	480/3	NEMA 1	UNIT	A-F
VFD 12	AHU ERW.	1	1.0	ABB	480/3	NEMA 1	UNIT	A-F
VFD 13	AHU-1 SF	2	15.0	ABB	480/3	NEMA 1	UNIT	A-F
VFD 14	AHU-1 SF	2	15.0	ABB	480/3	NEMA 1	UNIT	A-F
VFD 15	AHU-2 SF	2	7.5	ABB	480/3	NEMA 1	UNIT	A-F
VFD 16	AHU-2 SF	2	7.5	ABB	480/3	NEMA 1	UNIT	A-F
VFD 17	AHU-2 RF	2	3.0	ABB	480/3	NEMA 1	UNIT	A-F
VFD 18	AHU-2 RF	2	3.0	ABB	480/3	NEMA 1	UNIT	A-F
VFD 19	AHU-3 SF	2	5.0	ABB	480/3	NEMA 1	UNIT	A-F
VFD 20	AHU-3 SF	2	5.0	ABB	480/3	NEMA 1	UNIT	A-F
VFD 21	AHU-4 EF	2	3.0	ABB	480/3	NEMA 1	UNIT	A-F
VFD 22	AHU-4 EF	2	3.0	ABB	480/3	NEMA 1	UNIT	A-F
VFD 23	AHU-4 SF	2	10.0	ABB	480/3	NEMA 1	UNIT	A-F
VFD 24	AHU-4 SF	2	10.0	ABB	480/3	NEMA 1	UNIT	A-F
VFD 25	AHU-4 ERW	1	0.5	ABB	480/3	NEMA 1	UNIT	A-F
VFD 26	AHU-5 SF	2	15.0	ABB	480/3	NEMA 1	UNIT	A-F
VFD 27	AHU-5 SF	2	15.0	ABB	480/3	NEMA 1	UNIT	A-F
VFD 28	EF 1	1	10.0	ABB	480/3	NEMA 3R	WALL	A-H
VFD 29	EF 2	1	10.0	ABB	480/3	NEMA 3R	WALL	A-H

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

GENERAL NOTES APPLICABLE TO ALL ITEMS:
1. DRIVE AMPS SHALL BE RATED PER NATIONAL ELECTRICAL CODE TABLE 430.250

SCHEDULE NOTES:
A. PROVIDE "EARLY BREAK" AUXILIARY CONTACTS IN MOTOR DISCONNECT THAT DEACTIVATES THE VFD WHEN MOTOR DISCONNECT SWITCH IS OPEN.
B. PROVIDE OUTPUT REACTOR.
C. PROVIDE BACNET MSTP INTEGRATION CARD.
D. INTERLOCK WITH SMOKE DETECTOR OR FREEZESTAT TO SHUT DOWN FAN ON ALARM.
E. PROVIDE SURGE SUPPRESSION ON THE INPUT OF THE DRIVE
F. PROVIDE ANTI-SINGLE PHASING PROTECTION.
G. EQUIPMENT SIZED FOR 100°F AMBIENT TEMPERATURE.
H. PROVIDE WITH LOCKABLE COVER.

FREE AREA SCHEDULE

MARK	SERVICE	CFM	MIN FREE AREA (SF)	FPM	MAX APD (IN W.C.)	NOTES
LVR 1	EXHAUST	45000	64.00	700	0.06	ALL
LVR 2A	INTAKE	13000	27.00	500	0.05	ALL
LVR 2B	INTAKE	19000	38.00	500	0.05	ALL
LVR 3	INTAKE	25000	50.00	500	0.05	ALL
LVR 4	INTAKE	16000	32.00	500	0.05	ALL
LVR 5	RELIEF	10000	20.00	500	0.05	ALL
LVR 6	EXHAUST	3630	7.50	500	0.05	ALL
LVR 7	RELIEF	18000	22.50	800	0.08	ALL
LVR 8	RELIEF	14000	17.00	800	0.08	ALL
LVR 9	RELIEF	25000	30.00	800	0.08	ALL

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:

A. LOUVER MARK CORRESPONDS WITH ARCHITECTURAL PLAN TAG. IF MULTIPLE PLENUMS ARE CONNECTED TO SAME LOUVER, THEY ARE DENOTED BY A LETTER AFTER THE NUMBER.
B. REFER TO ARCHITECTURAL PLANS AND SPECIFICATIONS FOR LOUVER SIZE, FINISH, AND MANUFACTURER.
C. SCHEDULED FREE AREA REPRESENTS REQUIRED ACTIVE SECTION OF LOUVER FOR CONNECTION TO BY MECHANICAL CONTRACTOR.
D. MECHANICAL CONTRACTOR SHALL CONNECT PLENUM SHOWN ON DRAWINGS TO LOUVER ASSEMBLY.

DUCT SILENCER SCHEDULE

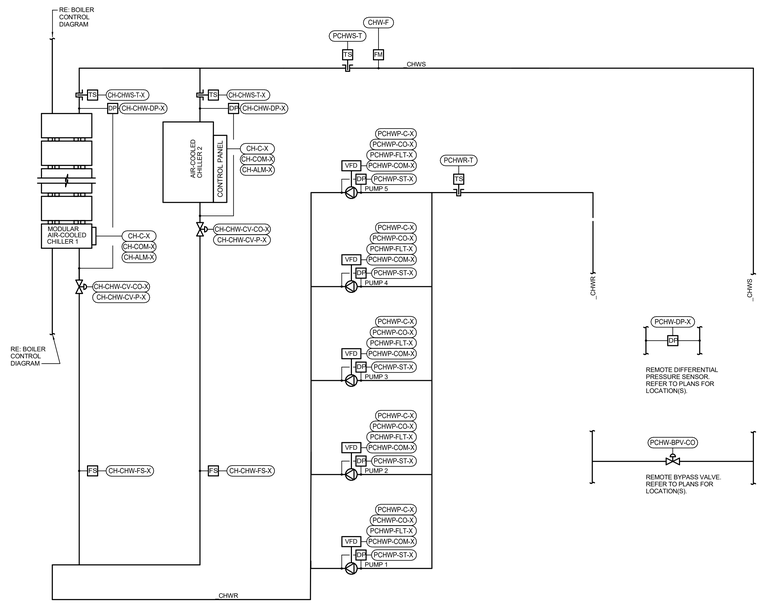
MARK	SERVICE	MANUFACTURER	MODEL	LENGTH (IN)	CFM	MAX APD (IN)	DYNAMIC INSERTION LOSS 63	125	250	500	1000	2000	4000	8000	NOTES
DS 1	AHU 2 SUPPLY	PRICE	RH	36	17000	0.2	3	3	8	17	22	20	14	12	A

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
A. STATIC PRESSURE DROP SHALL NOT EXCEED SCHEDULED AMOUNT AT SPECIFIED AIRFLOW.

BASEBOARD HEATER SCHEDULE (HOT WATER)

MARK	MANUFACTURER	MODEL	LENGTH (IN)	MIN OUTPUT (MBH)	EWT (°F)	LWT (°F)	GPM	CV	EAT (°F)	MOUNTING TYPE	NOTES
BBH 1	RUNTAL	R2F-5	48"	3.1	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 2	RUNTAL	R2F-2	180"	4.8	120	100	0.6	0.27	70.0	PEDESTAL	A-D, F
BBH 3	RUNTAL	R2F-1	216"	4.8	120	100	0.6	0.27	70.0	PEDESTAL	A-D, F
BBH 4	RUNTAL	R2F-2	96"	2.2	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 5	RUNTAL	R2F-2	96"	2.2	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 6	RUNTAL	R2F-2	168"	4.4	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 7	RUNTAL	R2F-2	48"	1.6	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 8	RUNTAL	R2F-1	108"	1.6	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 9	RUNTAL	R2F-2	156"	5.3	120	100	0.6	0.27	70.0	PEDESTAL	A-D, F
BBH 10	RUNTAL	R2F-2	144"	4.6	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 11	RUNTAL	R3F-3	264"	12.9	120	100	1.4	0.62	70.0	PEDESTAL	A-D, F
BBH 12	RUNTAL	R3F-3	168"	8.1	120	100	0.9	0.40	70.0	PEDESTAL	A-D, F
BBH 13	RUNTAL	R2F-1	168"	2.3	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 14	RUNTAL	R2F-1	168"	2.2	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 15	RUNTAL	R2F-1	108"	2.0	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 16	RUNTAL	R2F-1	312"	4.6	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 17	RUNTAL	R2F-2	264"	3.6	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 18	RUNTAL	R2F-2	240"	4.6	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 19	RUNTAL	R2F-2	96"	1.6	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 20	RUNTAL	R2F-2	144"	3.0	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 21	RUNTAL	R2F-2	168"	3.0	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 22	RUNTAL	R2F-2	96"	1.1	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 23	RUNTAL	R3F-1	180"	5.0	120	100	0.6	0.27	70.0	PEDESTAL	A-D, F
BBH 24	RUNTAL	R3F-3	312"	7.3	120	100	0.8	0.36	70.0	PEDESTAL	A-D, F
BBH 25	RUNTAL	R2F-2	108"	2.9	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 26	RUNTAL	R2F-2	108"	2.8	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 27	RUNTAL	R2F-2	300"	7.8	120	100	0.9	0.40	70.0	PEDESTAL	A-D, F
BBH 28	RUNTAL	R2F-2	120"	3.6	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 29	RUNTAL	R3F-2	204"	6.2	120	100	0.7	0.31	70.0	PEDESTAL	A-D, F
BBH 30	RUNTAL	R3F-2	168"	6.1	120	100	0.7	0.31	70.0	PEDESTAL	A-D, F
BBH 31	RUNTAL	R2F-2	144"	3.5	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 32	RUNTAL	R2F-2	168"	3.5	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 33	RUNTAL	R2F-2	312"	10.8	120	100	1.2	0.54	70.0	PEDESTAL	A-D, F
BBH 34	RUNTAL	R2F-2	132"	4.2	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 35	RUNTAL	R2F-1	60"	0.7	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 36	RUNTAL	R2F-1	60"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E
BBH 37	RUNTAL	R2F-1	120"	2.7	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 38	RUNTAL	R2F-1	120"	2.7	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 39	RUNTAL	R2F-1	96"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 40	RUNTAL	R2F-1	120"	2.7	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 41	RUNTAL	R2F-1	120"	2.7	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 42	RUNTAL	R2F-1	96"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 43	RUNTAL	R2F-1	120"	2.7	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 44	RUNTAL	R2F-1	168"	3.1	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 45	RUNTAL	R2F-1	144"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 46	RUNTAL	R2F-1	168"	3.1	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 47	RUNTAL	R3F-3	204"	11.6	120	100	1.3	0.58	70.0	PEDESTAL	A-D, F
BBH 48	RUNTAL	R3F-3	216"	11.6	120	100	1.3	0.58	70.0	PEDESTAL	A-D, F
BBH 49	RUNTAL	R2F-2	216"	6.5	120	100	0.7	0.31	70.0	PEDESTAL	A-D, F
BBH 50	RUNTAL	R2F-2	240"	6.5	120	100	0.7	0.31	70.0	PEDESTAL	A-D, F
BBH 51	RUNTAL	R2F-2	120"	4.0	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 52	RUNTAL	R2F-2	36"	1.0	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 53	RUNTAL	R2F-1	96"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 54	RUNTAL	R2F-1	108"	2.2	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 55	RUNTAL	R2F-1	96"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 56	RUNTAL	R2F-1	120"	2.4	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 57	RUNTAL	R2F-1	84"	1.7	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 58	RUNTAL	R2F-2	156"	7.5	120	100	0.9	0.23	70.0	PEDESTAL	A-D, F
BBH 59	RUNTAL	R2F-2	144"	7.5	120	100	0.9	0.40	70.0	PEDESTAL	A-D, F
BBH 60	RUNTAL	R3F-3	144"	4.5	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 61	RUNTAL	R3F-3	144"	4.5	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 65	RUNTAL	R3F-1	144"	4.1	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 66	RUNTAL	R3F-1	168"	4.1	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 67	RUNTAL	R3F-1	216"	6.2	120	100	0.7	0.31	70.0	PEDESTAL	A-D, F
BBH 68	RUNTAL	R3F-1	156"	4.0	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 69	RUNTAL	R3F-1	168"	4.0	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 70	RUNTAL	R3F-1	168"	4.0	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 71	RUNTAL	R3F-1	108"	4.0	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 72	RUNTAL	R3F-1	240"	6.5	120	100	0.7	0.31	70.0	PEDESTAL	A-D, F
BBH 73	RUNTAL	R3F-1	240"	6.5	120	100	0.7	0.31	70.0	PEDESTAL	A-D, F
BBH 74	RUNTAL	R3F-1	240"	6.5	120	100	0.7	0.31	70.0	PEDESTAL	A-D, F
BBH 75	RUNTAL	R2F-3	60"	2.8	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 76	RUNTAL	R2F-2	108"	3.9	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 77	RUNTAL	R2F-2	96"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 78	RUNTAL	R2F-2	240"	8.6	120	100	1.0	0.45	70.0	PEDESTAL	A-D, F
BBH 79	RUNTAL	R2F-2	240"	8.6	120	100	1.0	0.45	70.0	PEDESTAL	A-D, F
BBH 80	RUNTAL	R2F-2	96"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 81	RUNTAL	R2F-2	96"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 82	RUNTAL	R2F-2	240"	8.6	120	100	1.0	0.45	70.0	PEDESTAL	A-D, F
BBH 83	RUNTAL	R2F-2	240"	8.6	120	100	1.0	0.45	70.0	PEDESTAL	A-D, F
BBH 84	RUNTAL	R2F-2	96"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 85	RUNTAL	R2F-2	96"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 86	RUNTAL	R2F-2	240"	8.6	120	100	1.0	0.45	70.0	PEDESTAL	A-D, F
BBH 87	RUNTAL	R2F-2	60"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 88	RUNTAL	R2F-2	84"	3.0	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 89	RUNTAL	R2F-2	60"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 90	RUNTAL	R2F-2	36"	1.3	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 91	RUNTAL	R2F-2	72"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 92	RUNTAL	R2F-1	72"	1.6	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 93	RUNTAL	R2F-1	120"	2.6	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 94	RUNTAL	R2F-1	120"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 95	RUNTAL	R2F-1	108"	2.3	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 96	RUNTAL	R2F-1	120"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 97	RUNTAL	R2F-1	120"	2.6	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 98	RUNTAL	R2F-1	96"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 99	RUNTAL	R2F-1	120"	2.6	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 100	RUNTAL	R2F-1	120"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 101	RUNTAL	R2F-1	96"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 102	RUNTAL	R2F-1	120"	2.6	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 103	RUNTAL	R2F-1	120"	2.6	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 104	RUNTAL	R2F-1	120"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 105	RUNTAL	R2F-1	144"	2.6	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 106	RUNTAL	R2F-1	120"	2.6	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 107	RUNTAL	R2F-1	48"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 108	RUNTAL	R2F-1	144"	3.0	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 109	RUNTAL	R2F-1	48"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 110	RUNTAL	R2F-1	120"	2.2	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 111	RUNTAL	R2F-1	120"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 112	RUNTAL	R2F-1	120"	2.2	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 113	RUNTAL	R2F-1	120"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 114	RUNTAL	R2F-1	120"	2.2	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 115	RUNTAL	R2F-3	240"	10.9	120	100	1.2	0.54	70.0	PEDESTAL	A-D, F
BBH 116	RUNTAL	R2F-3	108"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 117	RUNTAL	R2F-3	120"	4.9	120	100	0.6	0.27	70.0	PEDESTAL	A-D, F
BBH 118	RUNTAL	R2F-3	240"	10.9	120	100	1.2	0.54	70.0	PEDESTAL	A-D, F
BBH 119	RUNTAL	R2F-3	312"	14.2	120	100	1.5	0.67	70.0	PEDESTAL	A-D, F
BBH 120	RUNTAL	R2F-3	336"	15.8	120	100	1.7	0.76	70.0	PEDESTAL	A-D, F
BBH 121	RUNTAL	R2F-2	108"	3.9	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 122	RUNTAL	R2F-2	96"	3.4	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 123	RUNTAL	R2F-2	168"	6.0	120	100	0.7	0.31	70.0	PEDESTAL	A-D, F
BBH 124	RUNTAL	R2F-2	72"	2.6	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 125	RUNTAL	R2F-2	108"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 126	RUNTAL	R2F-2	228"	8.2	120	100	0.9	0.40	70.0	PEDESTAL	A-D, F
BBH 127	RUNTAL	R2F-2	108"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 128	RUNTAL	R2F-2	228"	8.2	120	100	0.9	0.40	70.0	PEDESTAL	A-D, F
BBH 129	RUNTAL	R2F-2	108"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 130	RUNTAL	R2F-2	228"	8.2	120	100	0.9	0.40	70.0	PEDESTAL	A-D, F
BBH 131	RUNTAL	R2F-2	108"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 132	RUNTAL	R2F-2	228"	8.2	120	100	0.9	0.40	70.0	PEDESTAL	A-D, F
BBH 133	RUNTAL	R2F-2	108"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 134	RUNTAL	R2F-2	228"	8.2	120	100	0.9	0.40	70.0	PEDESTAL	A-D, F
BBH 135	RUNTAL	R2F-2	60"	3.0	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 136	RUNTAL	R2F-2	120"	4.3	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 137	RUNTAL	R2F-2	144"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 138	RUNTAL	R2F-2	96"	3.4	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 139	RUNTAL	R2F-2	144"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 140	RUNTAL	R2F-2	96"	3.4	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 141	RUNTAL	R2F-2	144"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 142	RUNTAL	R2F-2	96"	3.4	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 143	RUNTAL	R2F-2	144"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 144	RUNTAL	R2F-2	96"	3.4	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 145	RUNTAL	R2F-2	96"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 146	RUNTAL	R2F-2	96"	3.4	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 147	RUNTAL	R2F-2	108"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 148	RUNTAL	R2F-2	36"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 149	RUNTAL	R2F-2	168"	3.8	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 150	RUNTAL	R2F-2	48"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 151	RUNTAL	R2F-2	168"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 152	RUNTAL	R2F-2	60"	1.0	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 153	RUNTAL	R2F-2	60"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 154	RUNTAL	R2F-2	72"	3.1	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 156	RUNTAL	R2F-1	84"	1.9	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 157	RUNTAL	R2F-1	168"	3.7	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 158	RUNTAL	R2F-1	144"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 159	RUNTAL	R2F-1	120"	2.7	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 160	RUNTAL	R2F-1	120"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 161	RUNTAL	R2F-1	120"	2.7	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 162	RUNTAL	R2F-1	48"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 163	RUNTAL	R2F-1	120"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 164	RUNTAL	R2F-1	120"	2.7	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 165	RUNTAL	R2F-1	120"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 166	RUNTAL	R2F-1	132"	2.9	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 167	RUNTAL	R2F-1	120"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 168	RUNTAL	R2F-1	120"	2.7	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 169	RUNTAL	R2F-1	120"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 170	RUNTAL	R2F-1	72"	1.6	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 171	RUNTAL	R2F-1	120"	0.0	120	100	-	-	70.0	PEDESTAL	A-C,E, F
BBH 172	RUNTAL	R2F-1	120"	2.7	120	100	0.5	0.23	70.0	PEDESTAL	A-D, F
BBH 173	RUNTAL	R2F-1	120"	0.0	120	100	-	-	70.0	PEDESTAL



1 CHILLER CONTROL DIAGRAM
NTS

POINTS LIST - CHILLED WATER PLANT

POINT ID	DESCRIPTION	POINT TYPE	DEFAULT SETPOINT	SETPOINT RESET RANGE	FAIL POSITION	STATUS ALARM	ALARM RANGE	NOTES
GLOBAL VALUES								
DATE	DATE	AV						B, G
TIME	TIME	AV						B, G
FA-SD	FIRE ALARM SHUTDOWN AND STATUS	BV						B
OAT	OUTSIDE AIR DRY BULB TEMPERATURE	AV						B, G
OAWB	OUTSIDE AIR WET BULB TEMPERATURE	AV						B, G
PSD	PLANT LOSS OF POWER START DELAY	AV	TBD					J, K
CHILLER SENSORS AND VALVES (TYPICAL ALL CHILLERS)								
CH-CHW-DP-X	CHILLER EVAPORATOR DIFFERENTIAL PRESSURE	AI						A
CH-CHW-DP-MIN-X	CHILLER MINIMUM DIFFERENTIAL PRESSURE SETPOINT	BV	TBD					J, K
CH-CHW-FS-X	CHILLER CHILLED WATER FLOW SWITCH	BI						D
CH-CHWS-T-X	CHILLER CHILLED WATER SUPPLY TEMPERATURE	AI	SCHWS-T					A, C, O
CH-CHW-CV-CO-1	CHILLER CHILLED WATER CONTROL VALVE CONTROL OUTPUT	AO			NO			A, L
CH-CHW-CV-CO-2	CHILLER CHILLED WATER CONTROL VALVE CONTROL OUTPUT	BO			NO			
CH-CHW-CV-P-1	CHILLER CHILLED WATER CONTROL VALVE POSITION	AI				X	CH-CHW-CV-P <> CH-CHW-CV-CO	
CH-CHW-CV-P-2	CHILLER CHILLED WATER CONTROL VALVE POSITION	BO				X	CH-CHW-CV-P <> CH-CHW-CV-CO	
CH-CHW-CV-P-X	CHILLER CHILLED WATER CONTROL VALVE POSITION	AI						
CH-CHW-CV-P-X (CH-CHW-CV-P-2 SUBLEVEL)								
CH-ALM-X	CHILLER ALARM	BI				X	COMMON ALARM	
CH-COM-X	CHILLER COMMUNICATION	COM						
CH-C-X	CHILLER ENABLE/DISABLE COMMAND	BO						
CH-PLR-X	CHILLER PART LOAD RATIO	AV		0-100%				F
CH-DS-N/A	CHILLER DISCONNECT SWITH NOT IN AUTO	BV				X	COMMON ALARM	
CH-ST-X	CHILLER STATUS	BV				X	CH-ST <> CH-C	
CH-CO-X	CHILLER VFD SPEED	AV						H
CH-CAP-X	CHILLER DELIVERED CAPACITY (TONS)	AV						
CH-SFT-ST-T-DB	CHILLER SOFT START TEMPERATURE DEADBAND	AV	15 F					J
PRIMARY CHILLED WATER LOOP								
PCHWS-T	PRIMARY CHILLED WATER RETURN TEMPERATURE	AI	SCHWR-T - 1 F					A, J, G
PCHWS-T	PRIMARY CHILLED WATER SUPPLY TEMPERATURE	AI	42 F	42-46 F		X	40 F > PCHWS-T > 55 F	A, J, G
PCHWS-T-DB	PRIMARY CHILLED WATER SUPPLY TEMPERATURE DEADBAND	AV	2 F					J
PCHW-F	PRIMARY CHILLED WATER FLOW	AI						A, G
PCHW-DP-X	PRIMARY CHILLED WATER DIFFERENTIAL PRESSURE	AI	TBD	TBD		X	PCHW-DP +/- 5 PSIG OF SPT	A, J, K
PCHW-BPV-CO	PRIMARY BYPASS VALVE CONTROL OUTPUT	AO			NC			A, C, O
PRIMARY CHILLED WATER PUMP (TYPICAL ALL PCHWP)								
PCHWP-C-X	PRIMARY PUMP COMMAND	BO						
PCHWP-CO-X	PRIMARY PUMP SPEED OUTPUT	AO	TBD	MIN. - 60 Hz		X	PCHWP-CO < MINIMUM	J, K
PCHWP-COM-X	PRIMARY PUMP VFD COMMUNICATION	COM						
PCHWP-FLT-X	PRIMARY PUMP VFD FAULT	BI				X	COMMON ALARM	
PCHWP-ST-X	PRIMARY PUMP STATUS	BI				X	PCHWP-ST <> PCHWP-C	

ALL POINTS SHOWN SHALL BE PROVIDED BY BAS CONTRACTOR UNLESS NOTED OTHERWISE.

NOTES:
A. BAS CONTRACTOR SHALL PROVIDE DEVICE.
B. DISPLAY VALUE WITH CENTRAL PLANT GRAPHIC AT BAS FRONT END. REFERENCE GLOBAL BUILDING MONITORING SCHEDULE FOR CONTROL POINT.
C. VALVE SHALL BE QUICK STROKE WITH LESS THAN 60 SECOND RESPONSE TIME.
D. DEVICE FURNISHED WITH CHILLER.
E. CALCULATE POINT FROM CH-CHW-DP-X.
F. CHILLER PART LOAD RATIO (CH-PLR-X) SHALL BE DEFINED AS THE MEASURED AMPS DIVIDED BY THE RATED FULL LOAD AMPS.
G. INCLUDE POINT IN DAILY LOG REPORT FOR CHILLER AS RECOMMENDED BY ASHRAE STANDARD 147.
H. POINT APPLIES ONLY TO CHILLERS WITH VFD. REFERENCE CHILLER SCHEDULE FOR ADDITIONAL INFORMATION.
J. POINT SHALL BE ADJUSTABLE.
K. DETERMINE SETPOINT IN FIELD.
L. PROVIDE SLOW-ACTING VALVE. COORDINATE WITH CHILLER MANUFACTURER FOR MINIMUM ACTUATING TIME PERIOD TO MAINTAIN CHILLER OPERATIONAL DURING STAGING ON/OFF CHILLERS.
M. DISPLAY POINT AT BAS FRONT END FOR MEASUREMENT AND VERIFICATION.
O. VALVE SHALL BE DIRECT WIRED TO CHILLER CONTROL PANEL

CHILLER PLANT LOAD STAGING CONTROL MATRIX

PLANT LOAD STAGE	MAXIMUM STAGE CAPACITY (TONS)	STAGE LOAD RANGE CHW-LOAD (TONS) (NOTE 1)		CHILLER STATUS (NOTE 2)		CHILLED WATER CONTROL VALVE STATUS UPSTREAM		PRIMARY CHW BYPASS VALVE
		LOW	HIGH	CH 1	CH 2	CH 1	CH 2	
0	0	0	0	OFF	OFF	CLOSED	CLOSED	CLOSED
1	215	15	215	ON	OFF	OPEN	CLOSED	MODULATING
2	305	100	305	OFF	ON	CLOSED	OPEN	CLOSED (NOTE 4)
3	520	305	520	ON	ON	OPEN	OPEN	CLOSED

NOTES:
(1) CHILLER STAGE UP LOGIC: WHEN THE CHILLER PLANT REACHES STAGE MAXIMUM...
CHILLER STAGE DOWN LOGIC: WHEN THE CHILLER PLANT REACHES STAGE MINIMUM LOAD.
CHW-LOAD = 473 x (SCHW-F) x (SCHWS-T - SCHWR-T) / 12000
(2) WHEN IN FREEZE PROTECTION MODE AND PLANT LOAD STAGE IS ZERO: THE LEAD CHILLER ISOLATION VALVE SHALL BE OPEN.
(3) USE STEP CONTROL LOGIC WITH VFD TO PROVIDE SPECIFIED GPM AT EACH PLANT LOAD STAGE.
(4) VALVE SHALL MODULATE TO MAINTAIN CHILLER MINIMUM FLOW AT LOW STAGE LOAD RANGE.

SEQUENCE OF OPERATIONS
CENTRAL CHILLED WATER PLANT

This sequence of operations is organized into the following main categories: operating modes, control setpoint resets, safeties, overrides and interlocks, and component control loops. The operating modes describe the criteria that either enable or disable the various modes of operation. If a mode of operation is not listed within a component control loop section then that mode of operation has no direct influence on the operation of the component. The control setpoint reset section describes the logic and reference variables that will be used to reset control setpoints to a new value within its reset range. The safeties, overrides, and interlocks section outlines the hardwired interlocks that will be required to meet life safety requirements. Safeties and interlocks take precedence over all other control strategies outlined in this document. The control responses of each component for the various modes of operation are described in the component control loop sections.

The sequence of operations, the points list and control diagrams shall be used to provide a complete description of the control philosophy for the controlled equipment. Individual setpoint values, reset ranges, and alarm action levels are listed in the points list. Components and control sensor locations are graphically depicted on the control diagram. The controls contractor shall be responsible for coordinating any necessary time delay setpoints to establish stable system operation.

GENERAL DESCRIPTION
The chilled water plant described by this sequence of operations consist(s) of (1) air cooled mag-lev chiller (CH-2), (1) air cooled modular heat pump/heat recovery chiller (CH-1), and (5) primary chilled water pumps.
The chiller plant shall be controlled via a proprietary controller specifically designed to optimize energy efficiency. Coordinate with controller manufacturer for sequencing.
BAS Control Requirements
The building automation system (BAS) shall provide a remote enable signal; remote setpoint adjustments; and visibility of the local factory chiller control operation at the operator's workstation as defined in the chilled water plant points list. The communication protocol shall be coordinated with the provided chiller. Reference the points list and control logic section of this sequence for scope of work coordination between the contractor and equipment manufacturer for valves, sensors, and equipment.
Factory Chiller Control Requirements
The factory chiller control panel shall be responsible for controlling the chiller subject to the associated equipment related safeties and interlocks to maintain the chiller leaving water temperature setpoint. The chiller control panel shall control the associated chilled water (CH-CHW-CV).

OPERATING MODES
CHILLED WATER PLANT DISABLED MODE:
The chilled water plant shall be in disabled mode when
There is no call from the enable modes as defined below;
Or- when the operator has manually disabled the chilled water plant at the operator's workstation.
CHILLED WATER PLANT ENABLED MODE:
The chilled water plant shall be enabled when any of the following enable methods is employed and the conditions are satisfied. The automatic enable mode shall be the basis of design enable mode.
Automatic Enable Mode: The plant shall be enabled when there is a call for chilled water among active cooling coil valves. BAS shall be capable of excluding valves from the active cooling coil valve listed.
The following valves shall be included in the automatic enable mode:
All cooling coil valves shall be included in the analysis.
A call for cooling is generated by the BAS when chilled water temperature, as measured by CHWS-T, is 4°F above setpoint and any three active cooling coil valve is commanded at least 15% open for greater than 10 minutes;
Or- any one cooling coil valve is at least 80% open for 10 minutes.
Manual Enable Mode Option: The chilled water plant is in manual enable mode when the operator manually places the plant in enable mode at the operator work station.
AHU FREEZE PROTECTION MODE:
The chiller plant shall be in freeze protection mode upon a signal that any associated air handling unit is in a freeze protection mode while the chilled water plant is in the disabled mode.
LOSS OF POWER RESTART DELAY MODE:
The plant shall be in loss of power mode upon restoration of power after an unexpected loss of power. The plant shall remain in this mode for the duration as defined by the plant start delay (PSD) setpoint. Once the plant start delay duration has elapsed, the plant shall return to its previous mode prior to loss of power.
CHILLER STAGE-ON MODE:
The chilled water plant shall be in chiller stage-on mode when conditions defined for stage-up in the Chiller Plant Load Staging Control Matrix are met. The chilled water plant shall return to Chilled Water Plant Enabled Mode when the operational chiller factory controls have proven stable operation.
STAGE 1 OPERATING MODE
The chiller plant shall be in Stage 1 Operating mode when conditions defined in the Chiller Plant Load Staging Control Matrix are met. Chiller 1 shall operate.
STAGE 2 OPERATING MODE
The chiller plant shall be in Stage 2 Operating mode when conditions defined in the Chiller Plant Load Staging Control Matrix are met. Chiller 1 shall stage off and Chiller 2 shall stage on and operate within the conditions defined in Chiller Plant Load Staging Control Matrix.
STAGE 3 OPERATING MODE
The chiller plant shall be in Stage 3 Operating mode when conditions defined in the Chiller Plant Load Staging Control Matrix are met. Chiller 2 shall remain fully loaded and Chiller 1 shall stage on to support Chiller 2 and operate within the conditions defined in Chiller Plan Load Staging Control Matrix.
CHILLER STAGE-OFF MODE:
The chilled water plant shall be in chiller stage-off mode when conditions defined in the Chiller Plant Load Staging Control Matrix are met. The chilled water plant shall return to Chilled Water Plant Enabled Mode when the operational chiller factory controllers have proven stable operation.
CHILLER FAILURE MODE:
A chiller shall be in failure mode when:
The enable signal is set to on;
And- The leaving chilled water supply temperature as measured by (CH-CHWS-T-X) is greater than 5 F (adj.) above setpoint for greater than 20 minutes (adj.);
Or- The chiller power input is equal to 0-kW for greater than 20 minutes (adj.);
CHILLER MANUAL START MODE:
The display at the operator workstation shall indicate manual start mode when:
A chiller is started manually at the local chiller control panel in lieu of through the BAS subject to the chiller status signal (CH-ST-X);
Or- The enable signal is set to off and the temperature delta across the chiller is > 3 F (adj.);
Or- The enable signal is set to off and the chiller power input > 10% of the total kW Input Rating.
PUMP FAILURE MODE:
A pump shall be in failure mode when:
The pump is given a start signal;
And- The pump status indicates it is off.

CONTROL SETPOINT RESETS
CHILLED WATER PUMP DIFFERENTIAL PRESSURE RESET:
The primary chilled water differential pressure setpoint (PCHW-DP) shall be reset using valve command position within the range limits scheduled on the points list via trim and respond logic. The trim and respond function shall reset the setpoint incrementally downward to maintain one active control valve output signal greater than 90% open.
Trim and respond logic:
When pump is off, reset setpoint to the default value.
While pump is proven on:
If all control valves included in the analysis are less than 90% open (adj.), every 2 minutes (adj.) decrease setpoint by 0.5 psig (adj). Repeat trim and respond logic until at least one (adj.) control valve is greater than 90% open.
If at least one control valve is greater than 95% open (adj.), every 2 minutes (adj.) increase setpoint by 0.5 psig.
While the pressure reset sequence is enabled, the chilled water supply temperature setpoint shall be held constant at its maximum reset value. The pressure reset sequence shall be disabled when:
The primary chilled water differential pressure setpoint (PCHW-DP) has reached its minimum reset value for 10 minutes (adj.)
And- when any 3 (adj.) active cooling coil control valves included in the reset analysis are greater than 90% open.
CHILLED WATER PLANT TEMPERATURE RESET:
The primary chilled water supply temperature (PCHWS-T) shall be reset within the temperature range limits scheduled on the points list using trim and respond logic. The trim and respond function shall reset the setpoint incrementally upward to maintain one control valve serving an air handling unit greater than 90% open. BAS shall be capable of excluding zone valves from the temperature reset analysis subject to a feedback signal enable/disable switch.
Trim and respond logic:
When pump is off, reset setpoint to the default value.
While pump is proven on:
If all control valves included in the analysis are less than 90% open (adj.), every 2 minutes (adj.) increase setpoint by 0.5º F (adj). Repeat trim and respond logic until at least one (adj.) control valve is greater than 90% open.
If at least one control valve is greater than 95% open (adj.), every 2 minutes (adj.) decrease setpoint by 0.5º F.
When using both a pressure reset and temperature reset and the pressure reset is programmed to be enabled first, the temperature reset sequence shall not be enabled until
The primary chilled water differential pressure setpoint (PCHW-DP) has reached its minimum reset value for 10 minutes (adj.).
And- All active control valves included in the reset analysis are less than 90% open.

SAFETIES, OVERRIDES AND INTERLOCKS
CHILLER PROOF OF FLOW INTERLOCK:
Chiller(s) shall start upon proof of flow subject to a differential pressure sensor wired to the local chiller control panel.
CHILLER CONTROL VALVE INTERLOCK:
Interlock the chilled water control valve(s) (CH-CHW-CV) to open when required by the chiller plant load staging matrix to enable flow through the chiller(s). Interlock shall apply when the chiller is under automatic or manual control.

CONTROL LOOPS
CHILLER CHILLED WATER CONTROL VALVE (CH-CHW-CV-CO-1)
The chiller chilled water control valve shall be furnished by the BAS contractor, installed by the mechanical contractor, and controlled by the BMS.
When in chilled water plant disabled mode:
The valve shall be positioned according to the Chiller Plant Load Staging Matrix.
When in chilled water plant enabled mode:
The valve shall be positioned according to the Chiller Plant Load Staging Matrix.
Modulating valve on CH-1 shall maintain the scheduled differential pressure across each chiller evaporator as measured by CH-CHW-DP-X. The valve shall be fast acting.
When in chiller stage-on mode:
The valve serving the chiller staging on shall sequence with other components in the order described under the Chiller Control Loop. The valve shall open slowly over 5 minutes (adj.) to minimize sudden flow or temperature changes through the other operating chillers.
When in stage 1 operating mode:
Chiller 1 valve shall sequence with other components in the order described under the Chiller Control Loop. The valve shall open slowly over 5 minutes (adj.) to minimize sudden flow or temperature changes through the other operating chillers.
When in stage 2 operating mode:
Chiller 2 valve shall sequence with other components in the order described under the Chiller Control Loop. The valve shall open slowly over 5 minutes (adj.) to minimize sudden flow or temperature changes through the other operating chillers.
When in stage 3 operating mode:
Chiller 2 valve shall remain open.
Chiller 1 valve shall sequence with other components in the order described under the Chiller Control Loop. The valve shall open slowly over 5 minutes (adj.) to minimize sudden flow or temperature changes through the other operating chillers. The modulating valve shall maintain the scheduled differential pressure across the chiller evaporator as measured by CH-CHW-DP-X.
When in chiller stage-off mode:
The valve serving the chiller staging down shall sequence with other components in the reverse order described under the Chiller Control Loop. The valve shall close slowly over 5 minutes (adj.) after the chiller staging down has turned off.
When in chiller failure mode:
The valve shall close and be locked out of the lead/lag sequencing until the failure alarm is cleared. When the failure alarm is cleared the valve shall operate as in chilled water plant enabled mode.

CHILLED WATER CONTROL VALVE (CH-CHW-CV-CO-2)
The chiller chilled water control valve shall be furnished by the BAS contractor, installed by the mechanical contractor, and controlled by the BMS.
When in chilled water plant disabled mode:
The valve shall be positioned according to the Chiller Plant Load Staging Matrix.
When in chilled water plant enabled mode:
The valve shall be positioned according to the Chiller Plant Load Staging Matrix.
The valve on CH-2 shall maintain the scheduled differential pressure across the chiller evaporator as measured by CH-CHW-DP-X.
When in chiller stage-on mode:
The valve serving the chiller staging on shall sequence with other components in the order described under the Chiller Control Loop. The valve shall open slowly over 5 minutes (adj.) to minimize sudden flow or temperature changes through the other operating chillers.
When in stage 1 operating mode:
Chiller 1 valve shall sequence with other components in the order described under the Chiller Control Loop. The valve shall open slowly over 5 minutes (adj.) to minimize sudden flow or temperature changes through the other operating chillers.
When in stage 2 operating mode:
Chiller 2 valve shall sequence with other components in the order described under the Chiller Control Loop. The valve shall open slowly over 5 minutes (adj.) to minimize sudden flow or temperature changes through the other operating chillers.
When in stage 3 operating mode:
Chiller 2 valve shall remain open.
Chiller 1 valve shall sequence with other components in the order described under the Chiller Control Loop. The valve shall open slowly over 5 minutes (adj.) to minimize sudden flow or temperature changes through the other operating chillers. The modulating valve shall maintain the scheduled differential pressure across the chiller evaporator as measured by CH-CHW-DP-X.
When in chiller stage-off mode:
The valve serving the chiller staging down shall sequence with other components in the reverse order described under the Chiller Control Loop. The valve shall close slowly over 5 minutes (adj.) after the chiller staging down has turned off.
When in chiller failure mode:
The valve shall close and be locked out of the lead/lag sequencing until the failure alarm is cleared. When the failure alarm is cleared the valve shall operate as in chilled water plant enabled mode.

CHILLED WATER SUPPLY BYPASS VALVE (PCHW-BPV)
The bypass control valve shall be sized for 120 GPM with 10.0 feet of pressure drop. Coordinate final minimum flow and pressure drop with actual chiller manufacturer provided. The valve shall be furnished by the BAS controls contractor, installed by the mechanical contractor, and controlled by the BAS.
When in chilled water plant disabled mode:
The valve shall be closed.
When in chilled water plant enabled mode:
The valve shall operate as described in stage 1, stage 2, or stage 3 operating mode.
When in chiller stage-on mode:
The valve shall operate as in chilled water plant enabled mode.
When in stage 1 operating mode:
The valve shall modulate to maintain the minimum differential pressure across Chiller 1 as measured by CH-CHW-DP-X.
When in stage 2 operating mode:
The valve shall maintain the minimum chilled water flowrate of CH-2, as measured by chilled water flow meter CHW-F.
When in stage 3 operating mode:
When chiller 1 and chiller 2 are operating simultaneously the valve shall be closed.

When in chiller stage-off mode:
The valve shall operate as in chilled water plant enabled mode.

Variable Primary Pump Control
VARIABLE PRIMARY PUMP CONTROL (PCHWP-1 – PCHWP-5)
The pump(s) shall be controlled by the BAS.
When in chilled water plant disabled mode:
The pump shall be off.
When in chilled water plant enabled mode:
The pumps shall energize subject to a lead/lag sequence. Sequence shall be based on equal run time.
A pump that is energized shall start on low speed and ramp up to maintain the chilled water differential pressure set point as measured by the differential pressure sensor(s) (PCHW-DP-X)]. Initial differential setpoint shall be determined during system startup. Multiple operating pumps shall ramp together to meet setpoint.
Pump capacity staging algorithm: Pumps shall energize on and off based on pump capacity. If the operating pump(s) is at or above 95% of maximum speed for a period of 10 minutes (adj.), the BAS shall energize the next lag pump.
When staging on a lag pump:
1. Ramp the operating pumps down to minimum speed.
2. Turn the lag pump on.
3. Ramp the operating pumps together to meet setpoint.
If multiple pumps are operating and their speed is less than 75% of maximum speed for a period of 10 minutes (adj.), de-energize the lag pump. When staging off a lag pump:
1. Ramp the operating pumps down to minimum speed.
2. Turn the lag pump off.
3. Ramp the remaining operating pumps together to meet setpoint.
When in AHU freeze protection mode:
The pump(s) shall operate as in chilled water plant enabled mode.
When in chiller stage-on mode:
The pump shall sequence with other components in the order described under the Chiller Control Loop. Prior to opening the chilled water isolation valve, temporarily lock out the normal pump staging algorithm, energize the next lag pump, and complete the pump stage-on sequence. The intent of staging on an additional pump is to ensure enough flow is available for the chillers as the isolation valve opens.
When the chilled water plant completes chiller stage-on mode, enable the pump staging algorithm.
When in chiller stage-off mode:
The pump shall sequence with other components in the reverse order described under the Chiller Control Loop. Temporarily lock out the normal pump staging algorithm and maintain all operating pumps ON until the plant exits chiller stage-off mode.
When the chilled water plant completes chiller stage-off mode, enable the pump staging algorithm.
When in pump failure mode:
The next lag pump shall be energized and operate as in chilled water plant enabled mode.

Chiller Control
CHILLER CONTROL (CH-1 – CH-2)
The chiller shall be controlled by the chiller manufacturer control panel. The chiller shall be subject to manufacturer programmed safeties, overrides, and interlocks.
When in chilled water plant disabled mode:
The chiller shall be off.
When in chilled water plant enabled mode:
The chiller(s) shall be on or off as described in the Chiller Plant Load Staging Control Matrix –Variable Primary Pumping. Chillers shall stage on or off according to the staging modes described below.
Soft Start Sequence: When the plant is off for an extended time period and the chilled water loop temperature has drifted out of range, a soft start sequence shall be initiated to limit the quantity of chillers operating to cool the loop back to setpoint and prevent spiking electrical demand.
The soft start sequence shall be enabled when the primary chilled water return temperature (PCHWR-T) is greater than the primary chilled water supply temperature setpoint (PCHWS-T) plus the chiller soft start temperature dead band (CH-SFT-ST-T-DB). When a chiller starts, as long as the chilled water return temperature is decreasing greater than 0.5 F (adj.) per minute, no additional chillers shall be added. If the chilled water return temperature does not drop at this rate after a time delay, the next chiller plant load stage shall energize.
When the primary chilled water supply temperature is within the primary chilled water supply temperature setpoint plus 2 F (adj.), the chillers shall exit the soft start sequenceand shall be subject to the Chiller Plant Load Staging Control Matrix.
Chiller Operation: A chiller that is on shall modulate its cooling capacity subject to the factory chiller controller to maintain the chilled water supply temperature setpoint (CH-CHWS-T-X).
The chillers shall operate subject to a lead/lag sequence. Chiller 1 shall always lead and Chiller 2 shall always lag.
When in chiller stage-on mode:
Chillers shall turn on subject to initial factory start up sequences.
The interlocks associated with the Plant Load Stage shall have proven the associated equipment is on in the following order:
- The primary chilled water pump has completed it stage up mode;
- The chilled water isolation valve has proven open (CH-CHW-CV);
The chillers shall operate per the Chiller Plant Load Staging Matrix. Chiller 1 shall always lead (Stage 1). When the primary chilled water temperature rises above the temperature set point for more than 10 minutes, Chiller 2 shall stage on and Chiller 1 shall stage off (Stage 2). When the primary chilled water supply temperature rises above the temperature setpoint for more than 10 minutes Chiller 1 shall stage on (Stage 3).
When in stage 1 operating mode:
The chillers shall operate per the Chiller Plant Load Staging Matrix. Chiller 1 shall always lead.
When in stage 2 operating mode:
The chillers shall operate per the Chiller Plant Load Staging Matrix. Chiller 1 shall always lead. When the primary chilled water temperature rises above the temperature set point for more than 10 minutes, Chiller 2 shall stage on and Chiller 1 shall stage off.
When in stage 3 operating mode:
The chillers shall operate per the Chiller Plant Load Staging Matrix. When the primary chilled water supply temperature rises above the temperature setpoint for more than 10 minutes when Chiller 2 is at design capacity, Chiller 1 shall stage on.
When in chiller stage-off mode:
The lag chiller shall turn OFF according to its factory shut-down sequences and the interlocks associated with the Plant Load Stage have proven the associated equipment in the reverse order per sequences described in the chiller stage-on mode.
When in chiller failure mode:
The failed chiller shall be off; the associated chiller stage is locked out of the staging sequence and an alarm is generated.
Enable the next lag chiller.
Or- A downstream chiller fails, disable the failed chiller and generate an alarm. Reset the chiller chilled water supply temperature setpoint (CH-CHWS-T) on the upstream chiller to the system chilled water supply temperature setpoint (PCHWS-T).
When in chiller manual start mode:
The chiller shall turn on; the associated chiller stage is locked out of the staging sequence and an alarm is generated at the operator workstation.

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BARNES & COCKRILL
06/07/2023

AWSOM
Bentonville, AR

Issue Date:
02.24.2023

REVISIONS

NUMBER	DATE	DESCRIPTION
2	06.09.23	Addendum 2

Contents:
MECHANICAL CONTROLS

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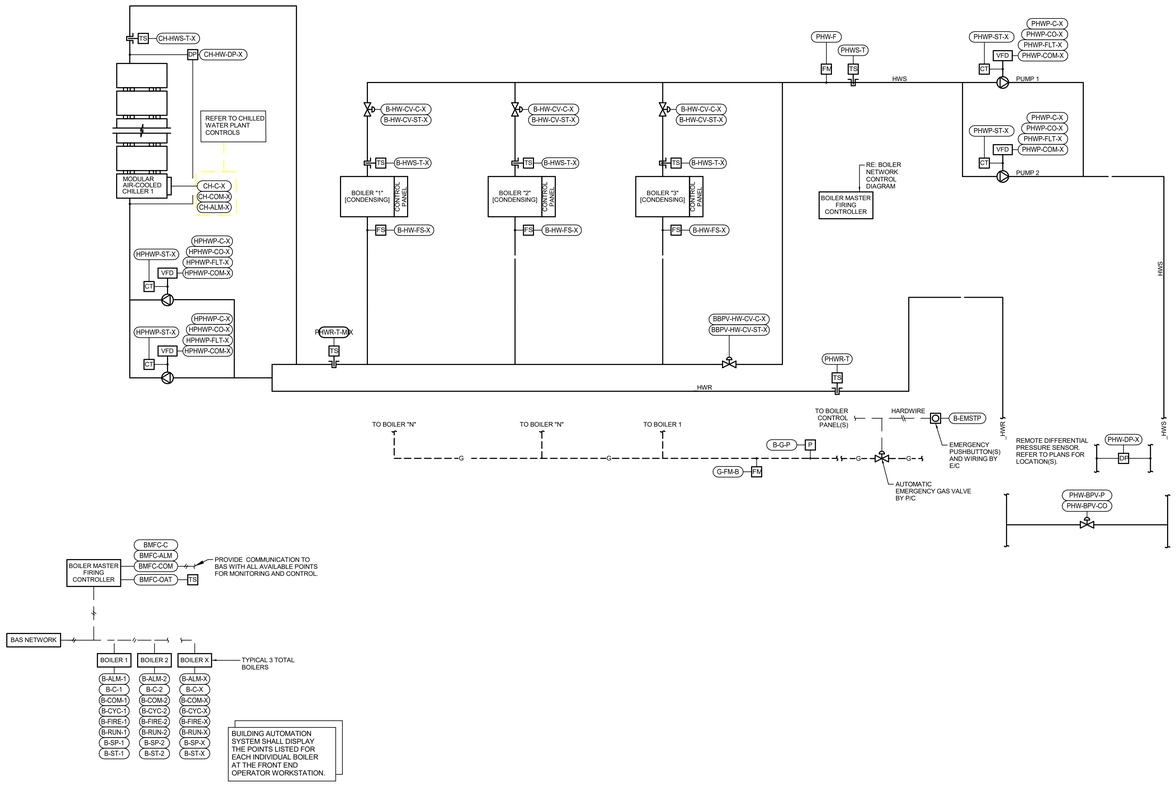

1 BOILER CONTROL DIAGRAM
NTS

POINTS LIST - HEATING HOT WATER PLANT

POINT ID	DESCRIPTION	POINT TYPE	DEFAULT SETPOINT	SETPOINT RESET RANGE	FAIL POSITION	STATUS ALARM	ALARM RANGE	NOTES
GLOBAL VALUES								
B-EMSTP	HOT WATER PLANT EMERGENCY PUSHBUTTON	BI				X	ON ACTIVATION	C, F
FA-SD	FIRE ALARM SHUTDOWN AND STATUS	BV						B
OAT	OUTSIDE AIR DRY BULB TEMPERATURE	AV						B
PSD	PLANT LOSS OF POWER RESTART DELAY	AV	TBD					J, K
BOILER MASTER FIRING CONTROLLER								
BMFC-C	CONTROLLER COMMAND	BO						E
BMFC-COM	CONTROLLER COMMUNICATION	COM						G
BMFC-ALM	CONTROLLER ALARM	BI				X	COMMON ALARM	
BMFC-OAT	CONTROLLER OUTSIDE AIR DRY BULB TEMPERATURE	AV						E
BOILER CONTROL PANEL (TYPICAL ALL BOILERS)								
B-ALM-X	BOILER ALARM	BI				X	COMMON ALARM	R
B-C-X	BOILER COMMAND (START/STOP)	BO						
B-COM-X	BOILER COMMUNICATION	COM						G
B-CYC-X	BOILER BURNER CYCLES	AV						R
B-FIRE-X	BOILER PERCENT FIRING RATE	AV						R
B-RUN-X	BOILER OPERATING HOURS	AV						R
B-SP-X	BOILER HOT WATER SUPPLY TEMPERATURE SETPOINT	AV	120 F	100 - 120 F				R
B-ST-X	BOILER STATUS	BV						R
BOILER SENSORS AND VALVES								
B-HW-CV-C-X	BOILER HOT WATER ISOLATION VALVE COMMAND	BO			NO			A, L
B-HW-CV-ST-X	BOILER HOT WATER ISOLATION VALVE STATUS	BI				X	B-HW-CV-ST <> B-HW-CV-C	A, L
B-HWS-T-X	BOILER HOT WATER SUPPLY TEMPERATURE	AI	120 F	100 - 120 F				A, F, J, R
B-HW-FS-X	BOILER FLOW SWITCH	BI						A, F, R
BOILER BYPASS VALVES								
BBPV-HW-CV-C-X	BOILER HOT WATER ISOLATION VALVE COMMAND	BO			NO			A, L
BBPV-HW-CV-ST-X	BOILER HOT WATER ISOLATION VALVE STATUS	BI				X	B-HW-CV-ST <> B-HW-CV-C	A, L
NATURAL GAS PIPING								
G-FM-B	GAS SUPPLY FLOW METER TO BOILERS (TOTAL)	AI						A
B-G-P	GAS SUPPLY PRESSURE	AI						A
PRIMARY HOT WATER LOOP								
PHWR-T	PRIMARY HOT WATER RETURN TEMPERATURE	AI						A
PHWR-T-MIX	PRIMARY HOT WATER MIX TEMPERATURE	AI	120 F					A
PHWS-T	PRIMARY HOT WATER SUPPLY TEMPERATURE	AI	120 F	100 -120 F				A, J
PHW-F	PRIMARY HOT WATER FLOW	AI						A
PHW-DP-X	PRIMARY HOT WATER DIFFERENTIAL PRESSURE	AI	TBD	TBD			PHW-DP +/- 5 PSIG OF SPT	A, J, K
PHW-BPV-CO	PRIMARY BYPASS VALVE CONTROL OUTPUT	AO			NO			A
PHW-BPV-P	PRIMARY BYPASS VALVE POSITION	AI				X	PHW-BPV-P <> PHW-BPV-CO	
HOT WATER PUMP (TYPICAL ALL PUMPS)								
PHWP-C-X	PRIMARY HOT WATER PUMP COMMAND	BO						
PHWP-CO-X	PRIMARY HOT WATER PUMP SPEED OUTPUT	AO	TBD	MIN - 60 Hz		X	PHWP-CO < MINIMUM	J, K
PHWP-COM-X	PRIMARY HOT WATER PUMP VFD COMMUNICATION	COM						G
PHWP-FLT-X	PRIMARY HOT WATER PUMP FAULT	BI				X	COMMON ALARM	
PHWP-ST-X	PRIMARY HOT WATER PUMP STATUS	BI				X	PHWP-ST <> PHWP-C	
HEAT PUMP CHILLER HOT WATER PUMP								
HPHWP-C-X	HEAT PUMP CHILLER HOT WATER PUMP COMMAND	BO						
HPHWP-CO-X	HEAT PUMP CHILLER HOT WATER PUMP SPEED OUTPUT	AO	TBD	MIN - 60 Hz		X	PHWP-CO < MINIMUM	J, K
HPHWP-COM-X	HEAT PUMP CHILLER HOT WATER PUMP VFD COMMUNICATION	COM						G
HPHWP-FLT-X	HEAT PUMP CHILLER HOT WATER PUMP FAULT	BI				X	COMMON ALARM	
HPHWP-ST-X	HEAT PUMP CHILLER HOT WATER PUMP STATUS	BI				X	PHWP-ST <> PHWP-C	
HEAT PUMP HEAT RECOVERY CHILLER SENSORS AND VALVES								
CH-HW-DP-X	CHILLER CONDENSER DIFFERENTIAL PRESSURE	AI						A
CH-HWS-T-X	BOILER HOT WATER RETURN TEMPERATURE	AI	120 F					A

ALL POINTS SHOWN SHALL BE PROVIDED BY BAS CONTRACTOR UNLESS NOTED OTHERWISE.

NOTES:
A. BAS CONTRACTOR SHALL PROVIDE DEVICE.
B. DISPLAY VALUE WITH CENTRAL PLANT GRAPHIC AT BAS FRONT END. REFERENCE GLOBAL BUILDING MONITORING SCHEDULE FOR CONTROL POINT.
C. DIVISION 26 SHALL SHALL PROVIDE DEVICE. PROVIDE ONE EMERGENCY PUSH BUTTON AT EACH EXIT DOOR TO THE BOILER ROOM. REFERENCE PLANS FOR LOCATION.
D. HOT WATER PLANT MANAGER MANUFACTURER SHALL PROVIDE DEVICE.
E. CONNECT TO GLOBAL OA TEMPERATURE SENSOR.
F. HARD-WIRE POINT DIRECTLY TO THE BOILER CONTROL PANEL.
G. PROVIDE RS-232 OR RS-485 COMMUNICATION LINK.
H. REFERENCE MACHINE ROOM REFRIGERANT PURGE CONTROL SEQUENCE FOR POINT DESCRIPTION.
J. POINT SHALL BE ADJUSTABLE.
K. DETERMINE SETPOINT IN FIELD.
L. PROVIDE FAST ACTING VALVE. COORDINATE VALVE ACTUATING TIME PERIOD WITH BOILER MANUFACTURER TO MAINTAIN OPERATION DURING BOILER STAGING.
M. DISPLAY POINT AT BAS FRONT END FOR MEASUREMENT AND VERIFICATION.
N. SENSOR SHALL BE PROVIDED AS PART OF BTU METER.
R. OBTAIN POINT THROUGH THE BOILER MASTER FIRING CONTROLLER.

SEQUENCE OF OPERATIONS
HOT WATER HEATING PLANT

This sequence of operations is organized into the following main categories: operating modes; control setpoint resets; safeties, overrides and interlocks; and component control loops. The operating modes describe the criteria that either enable or disable the various modes of operation. If a mode of operation is not listed within a component control loop section then that mode of operation has no direct influence on the operation of the component. The control setpoint reset section describes the logic and reference variables that will be used to reset control setpoints to a new value within its reset range. The safeties, overrides, and interlocks section outlines the hardwired interlocks that will be required to meet life safety requirements. Safetes and interlocks take precedence over all other control strategies outlined in this document. The control responses of each component for the various modes of operation are described in the component control loop sections. Setpoints shall be adjustable (adj.) as noted.

The sequence of operations, the points list and control diagrams shall be used to provide a complete description of the control philosophy for the controlled equipment. Individual setpoint values, reset ranges, and alarm action levels are listed in the points list. Components and control sensor locations are graphically depicted on the control diagram. The controls contractor shall be responsible for coordinating any necessary time delay setpoints to establish stable system operation.

GENERAL DESCRIPTION
The heating hot water plant described by this sequence of operations consist(s) of a heat pump / heat recovery chiller with dedicated heating water pumps, boilers and primary heating hot water pumps.

BAS Control Requirements (CH 1)
The building automation system (BAS) shall provide a remote enable signal; remote setpoint adjustments; and visibility of the local factory chiller control operation at the operator's workstation as defined in the chilled water plant points list. The communication protocol shall be coordinated with the provided chiller. Reference the points list and control loops section of this sequence for scope of work coordination between the contractor and equipment manufacturer for valves, sensors, and equipment. The heat recovery chiller heating mode shall be enabled whenever the Hot Water Plan is in enabled mode.

OPERATING MODES
HOT WATER PLANT DISABLED MODE:
The hot water plant shall be in disabled mode when:
The operator has manually disabled the plant at the operator's workstation or by a local disable switch;
Or- there is no call from the automatic or manual enabled modes as defined below.
HOT WATER PLANT ENABLED MODE:
The plant shall be in enabled mode when any of the following enable methods is employed and the conditions are satisfied. The automatic enable mode shall be the basis of design enable mode.
Automatic Enable Mode: The plant shall be enabled when there is a call for heating among active heating coil valves. BAS shall be capable of excluding valves from the active heating coil valve list..
A call for heating is generated by the BAS when any five active heating coil valve is commanded at least 15% open for greater than 10 minutes;
Or- Any one heating coil valve is at least 80% open for 10 minutes.
Or- When the outside air is less than 50 F subject to the boiler master controller outside air temperature sensor (BMFC-OAT).
Manual Enable Mode Option: The plant shall be manually enabled when the operator manually places the plant in enabled mode at the operator workstation or at the master firing controller furnished with the boiler(s).
BOILER ENABLED/DISABLED MODE:
A boiler shall be enabled and disabled via command from the boiler master firing controller (BFMC).
BOILER MANUAL START MODE:
A boiler shall be in manual start mode when manually enabled through the equipment control panel.
BOILER FAILURE MODE:
A boiler shall be in failure mode when the equipment control panel reads any alarm condition.
AHU FREEZE PROTECTION MODE:
The boiler plant shall be in freeze protection mode upon a signal that any associated air handling unit (AHU) is in a freeze protection mode while the heating hot water plant is in disabled mode.
LOSS OF POWER RESTART DELAY MODE:
The plant shall be in loss of power mode upon restoration of power after an unexpected loss of power. The plant shall remain in this mode for the duration as defined by the plant start delay (PSD) setpoint. Once the plant start delay duration has elapsed, the plant shall return to its previous mode prior to loss of power.
PUMP FAILURE MODE:
A pump shall be in failure mode when:
The pump is given a start signal;
And- The pump status indicates it is off.

CHILLED WATER PLANT ENABLED MODE:
The chilled water plant shall be in enabled mode as defined within the Central Chilled Water Plant control sequence.
CHILLER FAILURE MODE:
A heat pump/heat recovery chiller shall be in failure mode as defined by the chiller failure mode within the Central Chilled Water Plant control sequence.
CHILLER MANUAL START MODE:
The BAS shall indicate manual start mode as defined by the chiller manual start mode within the Central Chilled Water Plant control sequence.

CONTROL SETPOINT RESETS
HOT WATER PUMP DIFFERENTIAL PRESSURE RESET:
The primary hot water differential pressure setpoint (PHW-DP) shall be reset using valve command position within the range limits scheduled on the points list via trim and respond logic. The trim and respond function shall reset the setpoint incrementally downward to maintain one active control valve output signal greater than 90% open.
Trim and respond logic:
When pump is off, reset setpoint to the default value.
While pump is proven on:
If all control valves included in the analysis are less than 90% open (adj.), every 2 minutes (adj.) decrease setpoint by 0.5 psig (adj). Repeat trim and respond logic until at least one (adj.) control valve is greater than 90% open.
If at least one control valve is greater than 95% open (adj.), every 2 minutes (adj.) increase setpoint by 0.5 psig.
When using both a trim and respond temperature reset and pressure reset and the temperature reset is programmed to be enabled first, the pressure reset sequence shall not be enabled until:
The primary hot water supply temperature (PHWS-T) has reached its minimum reset value for 10 minutes (adj.)
And- All active control valves included in the reset analysis are less than 90% open.
HOT WATER PLANT TEMPERATURE RESET:
Reset Based on Outside Air Temperature: The primary hot water supply temperature setpoint (PHWS-T) shall linearly reset based on the outside air temperature (BMFC-OAT) by the following schedule:

(BMFC-OAT)	(PHWS-T)
60 F	100 F
40 F	120 F

While the temperature reset sequence is enabled, the primary hot water differential pressure setpoint shall be held constant at its minimum reset value. The reset sequence shall be disabled when:
The primary hot water supply temperature has reached its minimum reset value for 10 minutes (adj.)
And- when any 3 (adj.) active heating coil control valves included in the reset analysis are greater than 90% open.

SAFETIES, OVERRIDES AND INTERLOCKS
BOILER FACTORY FURNISHED SAFETIES:
The boiler master firing controller shall monitor the factory provided safeties and interlocks and prevent firing of the boiler(s) until the internal safety conditions are met.
PRIMARY SAFETY SHUTDOWN PER ASME CSD-1:
The boiler shall shutdown and requires a manual supervised restart. Primary safety shutdown shall occur upon:
- Boiler flame failure – The boiler shall be allowed to cycle a second time before a primary safety shutdown is initiated. An alarm shall generate and the boiler shall enter Boiler Failure Mode.
- Emergency stop switch (B-EMSTP) – The emergency stop switch shall interrupt power to the boilers and close the main gas valve.

HOT WATER PUMP(S) INTERLOCK:
Dedicated heat pump / heat recovery chiller hot water pump(s) shall start when the associated chiller is enabled and the onboard factory controller calls for hot water flow. The building automation system shall provide visibility when the chiller is in heat pump / heat recovery mode.
SMOKE CONTROL FIRE ALARM INTERLOCK:
Boiler(s) shall shut down when a signal is received by the BAS from the fire alarm control panel. All equipment and accessories shall be in disabled mode.

COMPONENT CONTROL LOOPS
Boiler Master Firing Controller
BOILER MASTER FIRING CONTROLLER (BMFC)
The BMFC shall be furnished by the boiler manufacturer.
When in hot water plant disabled mode:
The boiler(s) are off subject to their own internal safeties and time delays.
When in hot water plant enabled mode:
The BMFC shall sequence the boiler(s) and boiler isolation valve(s) to maintain the primary heating hot water set point as measured by the hot water supply temperature sensor (HWS-T). The hot water temperature sensor shall be furnished by the BAS contractor.
The boilers shall be enabled and disabled according to a lead/lag schedule. The schedule shall be based on equal run time or cycle count, whichever comes first.
If the BMFC determines heat is required, it shall enable the lead boiler.The BMFC shall monitor the water flow through the system using the communication protocol from the BAS. The controller shall stage on additional boilers based on maximum flow through a boiler and the supply header temperature sensor.
Sequential Staging: If the BMFC determines additional heat is required, it shall increase the firing rate of the lead boiler until it is at full fire. The BMFC shall enable lag boilers and modulate them up to full fire as required to maintain the hot water supply temperature setpoint.
If the BMFC determines less heat is required, it shall modulate the last enabled boiler down as required until it is at minimum fire.
If the primary hot water temperature continues to rise, the BMFC shall disable the lag boilers in reverse order, with the last boiler on to be the first boiler off.
When the last operating boiler stages off or a boiler stages off on high heat (HWS-T-HL), the boiler(s) shall not be allowed to stage back on until the hot water supply temperature is below the hot water supply temperature deadband (HWS-T-DB).

BOILER ISOLATION VALVE (B-HW-CV)
The boiler isolation valve shall be furnished by the BAS contractor, installed by the mechanical contractor, and shall be controlled by the BAS.
When in boiler disabled mode:
The valve shall remain open for 5 minutes (adj.) after boiler shutdown for flow to dissipate residual heat. After the time period, the valve shall be closed.
When in boiler enabled mode:
The valve shall be open when the associated boiler is enabled. The valve shall be fast acting.
When in boiler manual start mode:
The valve shall operate as in boiler enabled mode.
When in boiler failure mode:
The valve associated with the boiler in alarm shall be closed.
When in AHU freeze protection mode:
The valve shall be open.

Boiler Bypass Valve
BOILER BYPASS VALVE (BP-HW-CV)
When in hot water plant disabled mode:
The bypass valve shall be closed.
When in hot water plant enabled mode:
1 The valve shall open to bypass the boilers when PHWR-T-MIX is equal to or greater than the heating water supply temperature setpoint (HWS-T).
The valve shall close to send water through the boilers when PHWR-T-MIX is below the heating water supply temperature setpoint (HWS-T).

2 **HW Bypass Valve (Maintain Min. Flow)**
HOT WATER SYSTEM BYPASS VALVE CONTROL (PHW-BPV)
The bypass control valve shall be sized for 60 gpm and 18 feet pressure drop.
~~When in hot water plant enabled mode:~~
The bypass valve shall be closed.
When in hot water plant enabled mode:
The valve shall modulate to maintain the minimum hot water flow rate, as measured by the hot water flow meter (PHWS-F). The minimum hot water flow rate shall be determined in the field and coordinated with the final boiler and pump manufacturer prior to initial system startup. The valve shall be fast acting.
HOT WATER PUMPING CONTROL
Chiller Hot Water Pumping Control (Dedicated)
VARIABLE PRIMARY PUMP CONTROL (HPHWP-1 – HPHWP-N)
The pump shall be operated by the BAS
When in hot water plant disabled mode:
The associated pump shall be off.
When in hot water plant enabled mode:
The pumps shall energize subject to a lead/lag sequence. Sequence shall be based on equal run time.
The lead pump shall start on low speed and ramp up to maintain the hot water differential pressure set point as measured by the differential pressure sensor(s) (CH-HW-DP-X)]. Initial differential setpoint shall be determined during system startup. Multiple operating pumps shall maintain setpoint. When the speed of both pumps reduce below 40% of full speed, stop lag pump and modulate the lead pump to maintain setpoint.
When in chiller manual start mode:
The associated pump shall operate as in hot water plant enabled mode.
When in chiller failure mode:
The associated pump shall operate as in hot water plant disabled mode.
When in pump failure mode:
The associated pump shall operate as in boiler disabled mode.

Variable Primary Pumping Control
VARIABLE PRIMARY PUMP CONTROL (PHWP-1 – PHWP-N)
The pump shall be operated by the BAS
When in hot water plant disabled mode:
The pump shall be off.
When in hot water plant enabled mode:
The pumps shall energize subject to a lead/lag sequence. Sequence shall be based on equal run time.
The lead pump shall start on low speed and ramp up to maintain the hot water differential pressure setpoint as measured by the differential pressure sensor(s) (PHW-DP-X). Initial differential setpoint shall be determined during system startup. When lead pump reaches full speed, reduce speed of lead pump and start lag pump to ramp pumps together to have the multiple operating pumps shall maintain setpoint. When the speed of both pumps reduce below 40% of full speed, stop lag pump and modulate the lead pump to maintain setpoint.
When in AHU freeze protection mode:
The pump(s) shall operate as in hot water plant enabled mode.
When in pump failure mode:
The next lag pump shall be energized and operate as in hot water plant enabled mode.
CONTROL
BOILER CONTROL –MODULATION (B-01 – B-03)
When in boiler disabled mode:
The boiler shall be off subject to its own internal safeties and time delays.
When in boiler enabled mode:
Boiler Master Firing Control: The boiler shall stage on and operate subject to the boiler master firing controller, If heating water is satisfied through the heat pump / heat recovery chiller, measured by PHWR-T-MIX being equal to or greater than the heating water supply temperature setpoint (HWS-T), the boilers shall be bypassed.

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REVISIONS

NUMBER	DATE	DESCRIPTION
1	03.10.23	Addendum 1
2	06.09.23	Addendum 2

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MECHANICAL CONTROLS

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