REPLACE HEAT PUMPS
EW THOMPSON STATE SCHOOL
SEDALIA, MISSOURI

OWNER: STATE OF MISSOURI
MIKE KEHOE, GOVERNOR
DEPARTMENT OF
SECONDARY AND ELEMENTARY EDUCATION

PROJECT MANAGEMENT: OFFICE OF ADMINISTRATION DIVISION
OF FACILITIES MANAGEMENT, DESIGN AND
CONSTRUCTION

MECH / ELEC ENGINEER:

MMEA ENGINEERS

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Missouri Certificate of Authority Number:
2018019632

STATE OF MISSOURI
WAYNE A. STROPE
NUMBER E-20010816
REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 12-31-25

Wayne A. Strope

Wayne A. Strope

The Engineer, whose signature appears on the mechanical, plumbing, & electrical drawings, assumes responsibility only for what appears on the drawings, and disclaims (pursuant to Section 327.11 RsMo) any responsibility for all other plans, specifications, estimates, reports, or other documents or instruments not sealed by the above Engineer relating to, or intended to be used for, any part or parts of the project to which these drawings refer.

SHEET INDEX

ENGINEER: MID MO ENGINEERING ALLIANCE

PROJECT NUMBER: E2328-01

SITE NUMBER: 2034
ASSET NUMBER: 5012034003

HDPE POLY BALL VALVE SPEC FOR UNDERGROUND APPLICATION

ITEM: 12EIVS_

SIZE RANGE: 1" IPS OR 1" CTS ÷ 8" IPS

SDR: 11

FUSION RANGE: FOR BUTT FUSION – SDR 11
FOR ELECTROFUSION – SDR 11 AND UP

MATERIAL: VALVE: HDPE PE4710 ACCORDING WITH ASTM D3350
SEALS: NBR (STANDARD SIZE O-RING)

COLOR: BLACK

INSTALLATION INSTRUCTIONS:
BUTT FUSION – TO PIPE OR FITTINGS IN ACCORDANCE WITH ASTM F2620, PPI TR-33 AND NUPI ELOFIT INSTALLATION MANUAL
ELECTROFUSION - IN ACCORDANCE WITH ASTM F1290 AND NUPI ELOFIT INSTALLATION MANUAL WITH SEPARATE EF FITTINGS

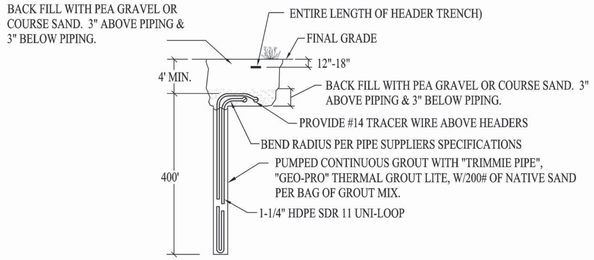
HYGIENIC LAW AND SPECIFICATIONS: NSF 61 (DRINKING WATER SYSTEM COMPONENTS – HEALTH EFFECTS).

STANDARDS:
ASME B16.40 (MANUALLY OPERATED THERMOPLASTIC GAS SHUTOFFS AND VALVES IN GAS DISTRIBUTION SYSTEMS), AND IAPMO Z1157 (BALL VALVES). COUPLED WITH PIPES ACCORDING TO ASTM D2513 (STANDARD SPECIFICATION FOR POLYETHYLENE (PE) GAS PRESSURE PIPE, TUBING, AND FITTINGS), ASTM D3350 (STANDARD SPECIFICATION FOR POLYETHYLENE PLASTICS PIPE AND FITTINGS MATERIALS), AWWA C901 (POLYETHYLENE (PE) PRESSURE PIPE AND TUBING, ½ IN. (13 MM) THROUGH 3 IN. (76 MM), FOR WATER SERVICE), AWWA C906 (POLYETHYLENE (PE) PRESSURE PIPE AND FITTINGS, 4 IN. (100 MM) THROUGH 63 IN. (1,600 MM), FOR WATER DISTRIBUTION AND TRANSMISSION).

PRESSURE RATING: GAS 125 PSI
WATER 200 PSI

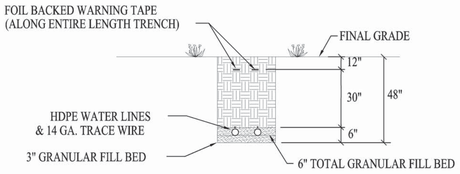
WARRANTY: PRODUCT WARRANTY OF 30 YEARS AFTER PRESSURE TESTING OF PIPING.
ELOFIT IS BASIS OF DESIGN. EQUIVALENT PRODUCT BY INTEGRITY FUSION PRODUCTS OR ISCO-PIPE ARE APPROVED.

PRODUCT INFORMATION AND APPLICATION USE:
ELOFIT VALVES ARE DESIGNED TO BE JOINED BY BUTT FUSION AND ELECTRO FUSION IN ACCORDANCE WITH THE APPLICABLE STANDARDS AND INSTALLATION INSTRUCTIONS. THE DIMENSIONS AND PERFORMANCE OF THE FITTINGS COMPLY WITH THE REQUIREMENTS OF ASTM B16.40, IAPMO Z1157. THE VALVES ARE DESIGNED WITH A SUFFICIENT THICKNESS AND LENGTH OF THE MELTING ZONE TO MEET THE PRESSURE RATING OF THE CORRESPONDING PIPE SDR. VALVES ARE ASSEMBLED FROM PARTS FABRICATED BY INJECTION MOLDING AND PIPE MACHINING. INTENDED USE IS FOR: NATURAL GAS, WATER, INDUSTRIAL APPLICATIONS (REF. PPI TR-19). THE HYGIENIC PROPERTIES FOR DRINKING WATER SYSTEMS COMPLY WITH NSF 61 REQUIREMENTS.



02 VERTICAL U-BEND WELL DETAIL

SCALE: NONE

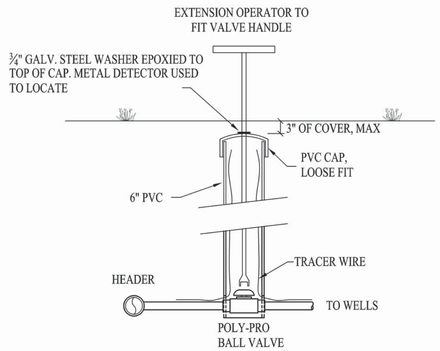


NOTE:

ALL NON-METAL LINES TO BE TRACED WITH 14 GA. WIRE (TYPICAL). TERMINATE WIRE AT ACCESSABLE VALVE PIT.

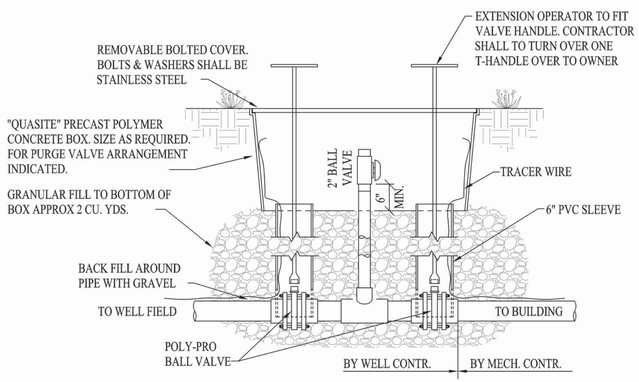
03 SECTION DETAIL

SCALE: NONE



04 WELL FIELD ISOLATION VALVE DETAIL

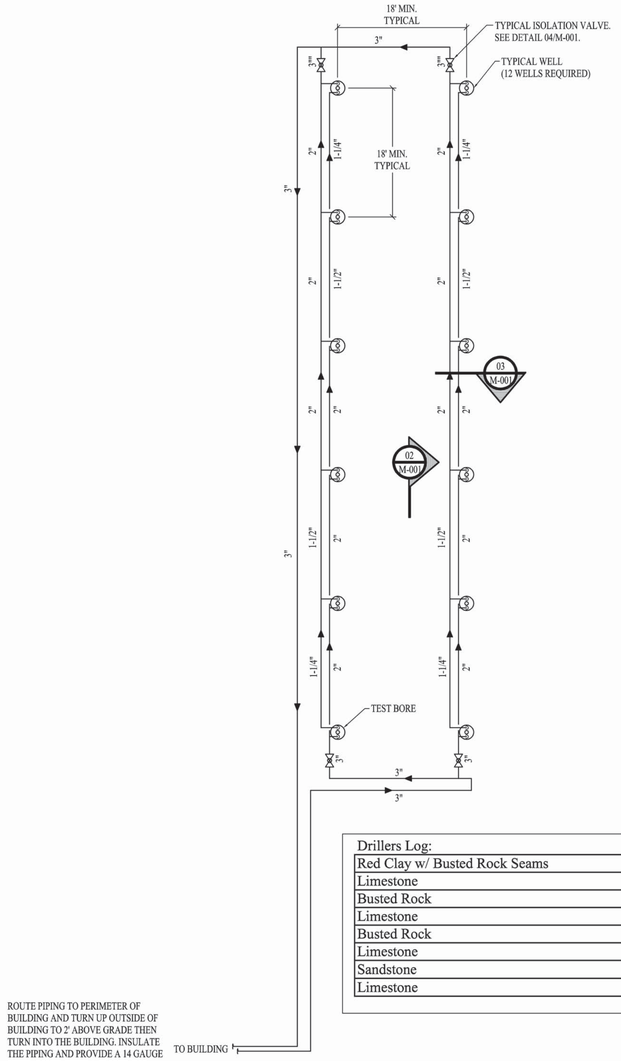
SCALE: NONE



05 PURGE VALVE PIT DETAIL

SCALE: NONE

Purge Circuits	1.00	
Calc Purge Volume	54.18	gpm
Purge Head	15.80	Ft
Purge Valve Size	1.50	
System Flow	80	GPM
Loopfield Design PD	21.4	FT
Well field volume	140	ft^3
Glycol Mat	197	Gallons



Drillers Log:	Ft.
Red Clay w/ Busted Rock Seams	0-14
Limestone	14-180
Busted Rock	180-184
Limestone	184-274
Busted Rock	274-276
Limestone	276-345
Sandstone	345-357
Limestone	357-400

01 BORE FIELD SITE LAYOUT

SCALE: 1"=10'-0"

STATE OF MISSOURI
MIKE KEHOE, GOVERNOR

STATE OF MISSOURI WAYNE A. STROPE NUMBER PE-2001018816 REGISTERED PROFESSIONAL ENGINEER

EXPIRES: 12-31-25

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OFFICE OF ADMINISTRATION DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

REPLACE HEAT PUMPS
EW THOMPSON STATE SCHOOL

1520 THOMPSON BLVD
SEDALIA, MISSOURI

PROJECT: E2328-01
SITE: 2034
ASSET: 5012034003

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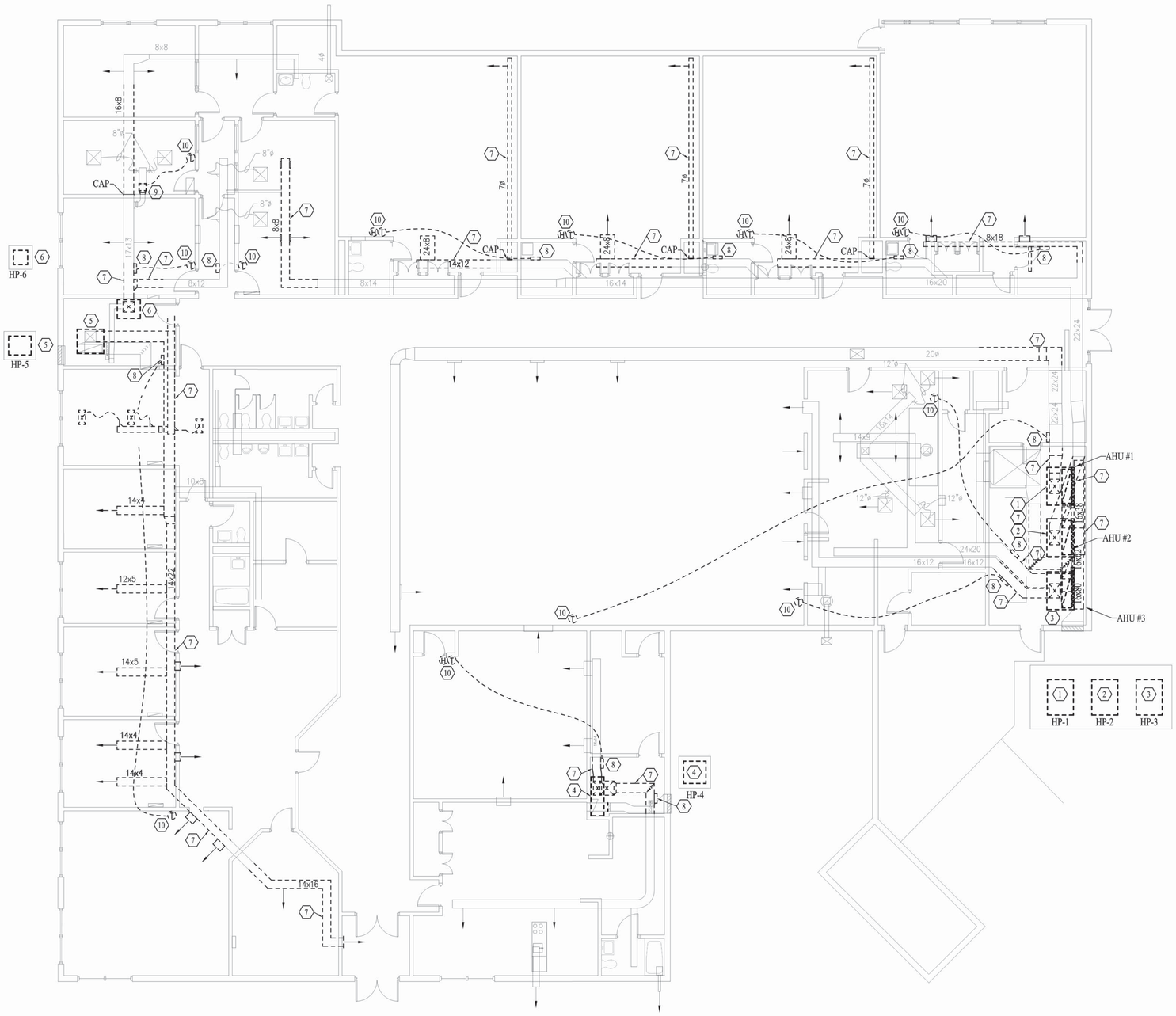
SHEET TITLE:
BORE FIELD LAYOUT

JOB# 23014 PLTD 6/24/2025

SHEET NUMBER:
M-001

SHEET 2 OF 11
ISSUE DATE: JUNE 17, 2025



01 HVAC DEMOLITION FLOOR PLAN

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

GENERAL NOTES:

1. DRAWINGS (PLANS, DETAILS AND SCHEMATICS ARE DIAGRAMMATIC IN NATURE AND INDICATE GENERAL LOCATION AND ARRANGEMENT OF NEW AND EXISTING MAJOR EQUIPMENT AND PIPING SYSTEMS. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING EXACT LOCATIONS AND DIMENSIONS OF ALL EQUIPMENT, PIPING AND PIPING COMPONENTS. CONTRACTOR IS ALSO RESPONSIBLE FOR FINAL TIE-IN POINT LOCATIONS BETWEEN NEW AND EXISTING PIPING SYSTEMS EQUIPMENT AND UTILITIES.

2. UNLESS OTHERWISE NOTED EXISTING SHOWN IN FADE-AWAY PEN. NEW, RELOCATED OR DEMOLITION ITEMS SHOWN IN DARK HEAVY PEN.

3. MATERIAL EXPOSED WITHIN THE RETURN AIR PLENUM SHALL BE NONCOMBUSTIBLE OR SHALL HAVE A FLAME SPREAD INDEX OF NOT MORE THAN 25 AND A SMOKE DEVELOPMENT INDEX OF NOT MORE THAN 50 WHEN TESTED IN ACCORDANCE WITH ASTM E84.

NOTES:

1. REMOVE EXISTING AHU-1 AND ASSOCIATED HP-1 ALONG WITH EXISTING REFRIGERANT PIPING. EXISTING DUCTWORK TO REMAIN FOR REUSE.
2. REMOVE EXISTING AHU-2 AND ASSOCIATED HP-2 ALONG WITH EXISTING REFRIGERANT PIPING. EXISTING DUCTWORK TO REMAIN FOR REUSE.
3. REMOVE EXISTING AHU-3 AND ASSOCIATED HP-3 ALONG WITH EXISTING REFRIGERANT PIPING. EXISTING DUCTWORK TO REMAIN FOR REUSE.
4. REMOVE EXISTING AHU-4 AND ASSOCIATED HP-4 ALONG WITH EXISTING REFRIGERANT PIPING. EXISTING DUCTWORK TO REMAIN FOR REUSE.
5. REMOVE EXISTING AHU-5 AND ASSOCIATED HP-5 ALONG WITH EXISTING REFRIGERANT PIPING. EXISTING DUCTWORK TO REMAIN FOR REUSE.
6. REMOVE EXISTING AHU-6 AND ASSOCIATED HP-6 ALONG WITH EXISTING REFRIGERANT PIPING. EXISTING DUCTWORK TO REMAIN FOR REUSE.
7. REMOVE SECTION OF DUCTWORK AND DIFFUSERS AS SHOWN.
8. REMOVE EXISTING ELECTRIC DUCT HEATER AND PATCH DUCTWORK WHERE DUCT NOT BEING REMOVED.
9. REMOVE EXISTING VAV BOX AND PATCH DUCTWORK.
10. REMOVE EXISTING TEMP / HUMID STAT. ROUGH-IN TO REMAIN FOR REUSE.

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REPLACE HEAT PUMPS
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1520 THOMPSON BLVD
SEDALIA, MISSOURI

PROJECT: E2328-01
SITE: 2034
ASSET: 5012034003

REVISION	DATE

CAD DWG FILE: 23014
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HVAC DEMOLITION FLOOR PLAN

SHEET NUMBER:
M-101

SHEET 3 OF 11
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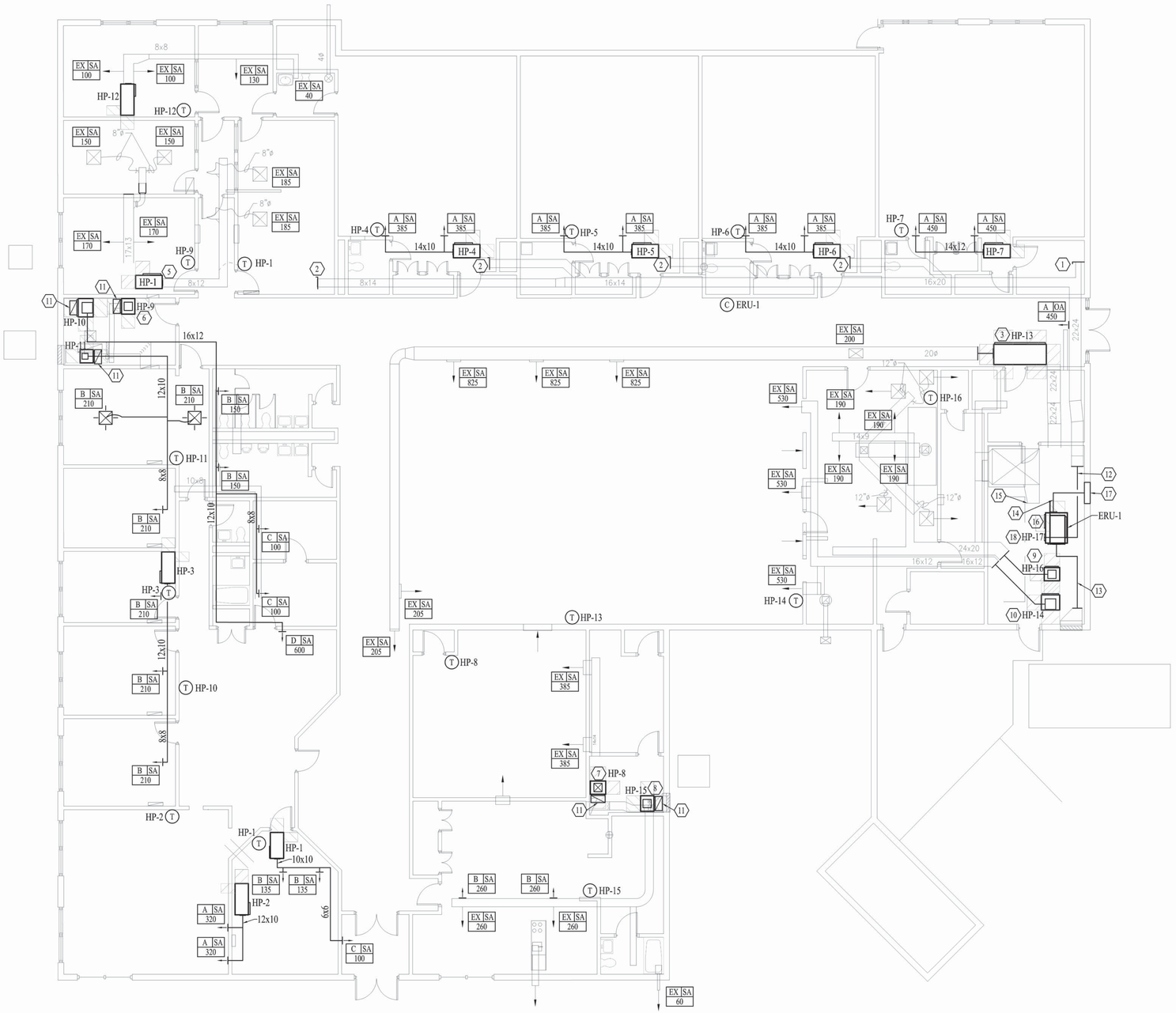

01 HVAC RENOVATION DUCTWORK FLOOR PLAN

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

GENERAL NOTES:

1. DRAWINGS (PLANS, DETAILS AND SCHEMATICS ARE DIAGRAMMATIC IN NATURE AND INDICATE GENERAL LOCATION AND ARRANGEMENT OF NEW AND EXISTING MAJOR EQUIPMENT AND PIPING SYSTEMS. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING EXACT LOCATIONS AND DIMENSIONS OF ALL EQUIPMENT, PIPING AND PIPING COMPONENTS. CONTRACTOR IS ALSO RESPONSIBLE FOR FINAL TIE-IN POINT LOCATIONS BETWEEN NEW AND EXISTING PIPING SYSTEMS EQUIPMENT AND UTILITIES.

2. UNLESS OTHERWISE NOTED EXISTING SHOWN IN FADE-AWAY PEN. NEW, RELOCATED OR DEMOLITION ITEMS SHOWN IN DARK HEAVY PEN.

3. MATERIAL EXPOSED WITHIN THE RETURN AIR PLENUM SHALL BE NONCOMBUSTIBLE OR SHALL HAVE A FLAME SPREAD INDEX OF NOT MORE THAN 25 AND A SMOKE DEVELOPMENT INDEX OF NOT MORE THAN 50 WHEN TESTED IN ACCORDANCE WITH ASTM E84.

NOTES:

1. INSTALL MANUAL VOLUME DAMPER (MVD) ON EXISTING DUCT AND BALANCE TO 250 CFM OA.
2. INSTALL MANUAL VOLUME DAMPER (MVD) ON EXISTING DUCT AND BALANCE TO 200 CFM OA.
3. CONNECT HP SA TO EXISTING 20"Ø SA DUCT.
4. CONNECT HP SA TO EXISTING 16x8 SA DUCT.
5. CONNECT HP SA TO EXISTING 8X12 SA DUCT.
6. CONNECT HP SA TO EXISTING 17X13 SA DUCT.
7. CONNECT HP SA TO EXISTING 14X14 SA DUCT.
8. CONNECT HP SA TO EXISTING SA DUCT. VERIFY SIZE.
9. CONNECT HP SA TO EXISTING 24X20 SA DUCT.
10. CONNECT HP SA TO EXISTING 16X12 SA DUCT.
11. 24"x12" RA BOOT. CONNECT 8"Ø OA DUCT FROM RA BOOT TO EXIST OA LOUVER AND BALANCE TO 150 CFM OA.
12. ERU 20x12 SA CONNECTED TO EXISTING 22x24 DUCT.
13. 12x20 OA DUCT FROM ERU TO EXISTING OA DUCT.
14. 20x12 EA DUCT TO NEW EA LOUVER.
15. EXISTING RA OPEN TO SPACE.
16. ERU RA OPEN TO SPACE.
17. 36x36 RUSKIN ELF375 LOUVER W/ BIRDSCREEN.
18. SEE OUTSIDE AIR HEATPUMP CONNECTION DETAIL 04/M-203

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REPLACE HEAT PUMPS
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1520 THOMPSON BLVD
SEDALIA, MISSOURI

PROJECT: E2328-01
SITE: 2034
ASSET: 5012034003

REVISION	DATE

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HVAC RENOVATION FLOOR PLAN

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SHEET 4 OF 11
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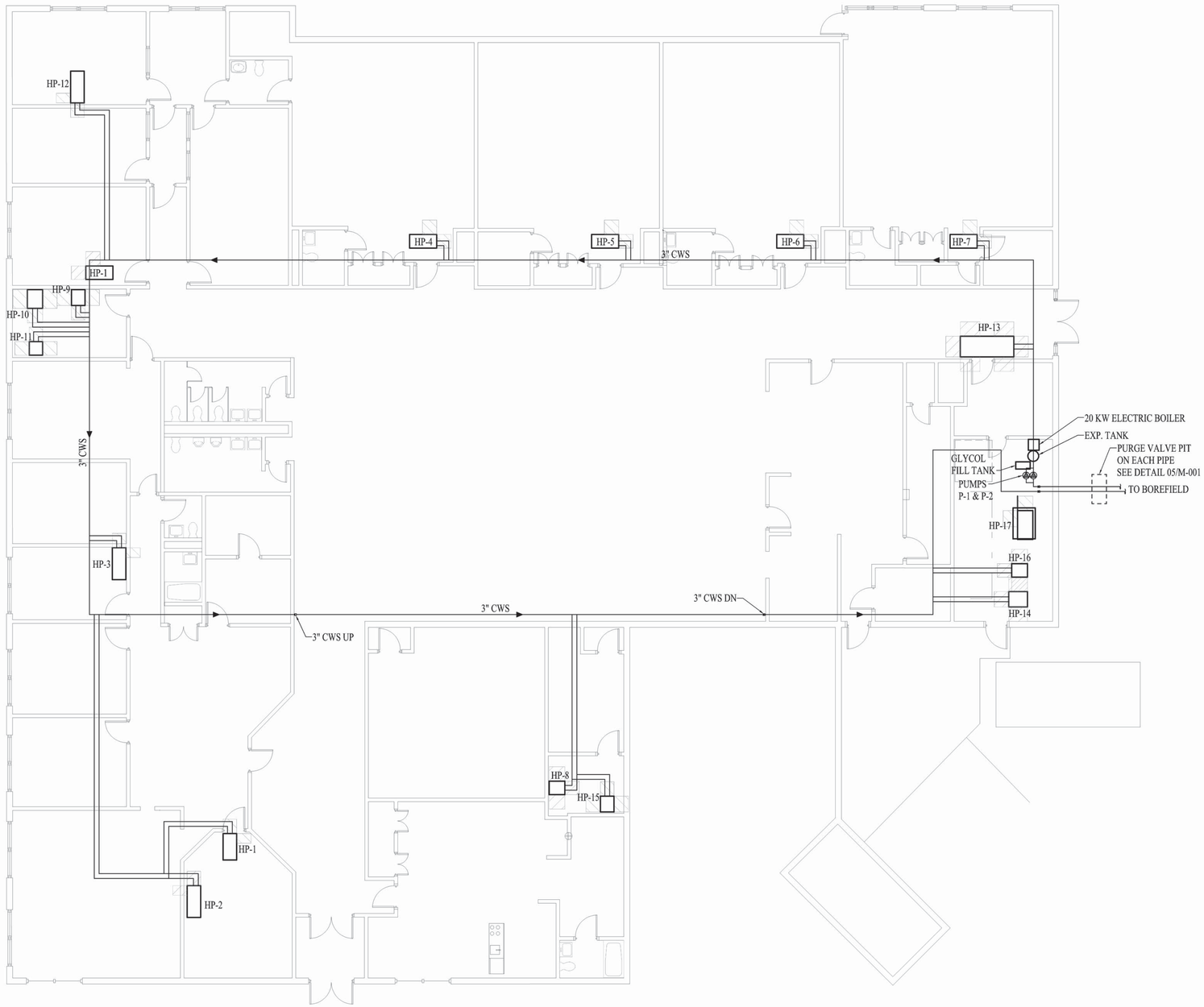

01 HVAC RENOVATION PIPING FLOOR PLAN

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

GENERAL NOTES:

1. DRAWINGS (PLANS, DETAILS AND SCHEMATICS ARE DIAGRAMMATIC IN NATURE AND INDICATE GENERAL LOCATION AND ARRANGEMENT OF NEW AND EXISTING MAJOR EQUIPMENT AND PIPING SYSTEMS. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING EXACT LOCATIONS AND DIMENSIONS OF ALL EQUIPMENT, PIPING AND PIPING COMPONENTS. CONTRACTOR IS ALSO RESPONSIBLE FOR FINAL TIE-IN POINT LOCATIONS BETWEEN NEW AND EXISTING PIPING SYSTEMS EQUIPMENT AND UTILITIES.

2. UNLESS OTHERWISE NOTED EXISTING SHOWN IN FADE-AWAY PEN. NEW, RELOCATED OR DEMOLITION ITEMS SHOWN IN DARK HEAVY PEN.

3. MATERIAL EXPOSED WITHIN THE RETURN AIR PLENUM SHALL BE NONCOMBUSTIBLE OR SHALL HAVE A FLAME SPREAD INDEX OF NOT MORE THAN 25 AND A SMOKE DEVELOPMENT INDEX OF NOT MORE THAN 50 WHEN TESTED IN ACCORDANCE WITH ASTM E84.

STATE OF MISSOURI
MIKE KEHOE, GOVERNOR

STATE OF MISSOURI
WAYNE A. STROPE
NUMBER
PE-2001018816
REGISTERED PROFESSIONAL ENGINEER

EXPIRES: 12-31-25

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OFFICE OF ADMINISTRATION DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

REPLACE HEAT PUMPS
EW THOMPSON STATE SCHOOL

1520 THOMPSON BLVD
SEDALIA, MISSOURI

PROJECT: E2328-01
SITE: 2034
ASSET: 5012034003

REVISION	DATE

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DRAWN BY: JS
CHECKED BY: WS
DESIGNED BY: WS

SHEET TITLE:
HVAC PIPING RENOVATION FLOOR PLAN

SHEET NUMBER:
M-103

SHEET 5 OF 11
ISSUE DATE: JUNE 17, 2025

JOB# 23014 PLTD 6/24/2025

GENERAL NOTES:

1. PIPE FLUSHING AND CLEANING PROCEDURE:
THE CLOSED LOOP SYSTEM WATER PIPING MUST BE THOROUGHLY CLEANED AND FLUSHED TO REMOVE DIRT, CHIPS, AND OTHER FOREIGN MATERIALS PRIOR TO CONNECTING THE HEAT PUMPS TO PIPING SYSTEM. COUPLE THE HEAT PUMP SUPPLY & RETURN PIPING CROSS CONNECTIONS AND FILL LOOP WITH A SOLUTION CONSISTING OF 1% TO 2% OF LIQUID TRISODIUM PHOSPHATE DETERGENT AND FRESH CLEAN WATER. REPAIR LEAKS AS REQUIRED. USE VALVES TO BYPASS HEAT REJECTOR AND SUPPLEMENTARY WATER HEATER (WHERE APPLICABLE). FLUSH SYSTEM FOR A MINIMUM OF TWO HOURS MONITORING SYSTEM BLOW DOWN UNTIL WATER RUNS CLEAR. ONCE CLEAN, STOP THE PUMP AND CLEAN ALL SYSTEM STRAINERS. REMOVE TEMPORARY CROSS CONNECTION AND CONNECT LOOP SUPPLY AND RETURN PIPING TO HEAT PUMP UNITS.

ANTI-FREEZE SOLUTION BY INTERIOR BUILDING CONTRACTOR (FOR INTERIOR & EXTERIOR PIPING):

2. AFTER COMPLETION OF THE PIPE FLUSHING AND CLEANING PROCEDURES SPECIFIED ABOVE, SYSTEM SHALL BE FILLED WITH A SOLUTION OF 15% PROPYLENE GLYCOL AND 85% WATER BY VOLUME. PROPYLENE GLYCOL SHALL BE DOWFROST HD PHOSPHATE-BASED INDUSTRIALLY INHIBITED HEAT TRANSFER FLUID OR APPROVED EQUAL. DESIGN FREEZING POINT OF MIXED SOLUTION SHALL BE APPROX. 19.0 DEG. F. USING A HAND HELD OPTIC REFRACTOMETER INSTRUMENT, THE CONTRACTOR SHALL TEST, ADJUST AND RECORD FINAL FREEZING POINT OF MIXED SOLUTION OF PROPYLENE GLYCOL. SUBMIT "FREEZING POINT OF SOLUTION" TEST RESULTS TO ENGINEER FOR REVIEW AND APPROVAL.

CHEMICAL TREATMENT:

3.
   a. GENERAL: CHEMICALS SHALL BE SPECIALLY FORMULATED TO PREVENT ACCUMULATION OF SCALE AND CORROSION IN CLOSED LOOP PIPING SYSTEMS AND CONNECTED EQUIPMENT. CHEMICAL FORMULATION DEVELOPED SHALL BE BASED ON A LABORATORY ANALYSIS OF THE SYSTEM MAKE-UP WATER SUPPLY CHEMISTRY.
   b. CORROSION INHIBITOR: PROVIDE SODIUM NITRITE/BORATE, MOLYBDATE-BASED INHIBITOR OR OTHER APPROVED PROPRIETARY FORMULATION SUITABLE FOR WATER MAKE-UP QUALITY AND QUANTITY REQUIRED. INHIBITOR FORMULATION SHALL INCLUDE ADEQUATE BUFFER TO MAINTAIN A SYSTEM pH RANGE OF 8.0 TO 10.5. INTRODUCE INHIBITOR COMPOUNDS INTO SYSTEM MANUALLY THROUGH THE BY-PASS TYPE SHOT FEEDER/FILTER ASSEMBLY PROVIDED IN THE SYSTEM.
   c. CORROSION INHIBITOR PERFORMANCE: INHIBITOR PROVIDED SHALL PROTECT VARIOUS WETTED MATERIALS OF CONSTRUCTION INCLUDING FERROUS, RED & YELLOW METALS & MAINTAIN THE SYSTEM ESSENTIALLY FREE OF SCALE, CORROSION AND FOULING. CORROSION RATES OF THE FOLLOWING METALS SHALL NOT EXCEED THE PENETRATION SPECIFIED IN MILS/YEAR; FERROUS, 0-2.0; BRASS, 0-1.0; COPPER, 0-1.0 INHIBITOR SHALL REMAIN STABLE THROUGH THE SYSTEM OPERATING TEMPERATURE RANGE. HEAT EXCHANGE FOULING AND CAPACITY REDUCTION SHALL NOT EXCEED THAT ALLOWED BY A FOULING FACTOR OF 0.0005.

SEQUENCE OF OPERATION

STAGE 1: THE ECM MOTORS ON PUMPS P-1 AND P-2 SHALL MODULATED TO CONTROL THE DIFFERENTIAL TEMPERATURE ACROSS THE BORE FIELD. THE LEAD PUMP SHALL OPERATE AT ALL TIMES AND SHALL SPEED UP OR SLOW DOWN AS REQUIRED TO MAINTAIN THE DIFFERENTIAL TEMPERATURE ACROSS THE BORE FIELD AT 12 DEG F IN THE SUMMER AND 6 DEG F IN THE WINTER. THE LEAD PUMP SHALL OPERATE AT A MINIMUM SPEED OF 30%. THE CONTROLLER SHALL ALTERNATE P-1 AND P-2 OPERATION EVERY 750 HOURS (ADJUSTABLE) TO PROVIDE EQUAL RUN TIME.

STAGE 2: WHEN THE LEAD PUMP IS OPERATING AT 100% AND CANNOT MAINTAIN THE SPECIFIED DIFFERENTIAL TEMPERATURE ACROSS THE BORE FIELD, THE SECOND PUMP SHALL BE ENERGIZED AND BOTH PUMPS SHALL OPERATE IN PARALLEL AT THE SAME SPEED TO MAINTAIN THE SPECIFIED TEMPERATURE DIFFERENTIAL ACROSS THE BORE FIELD. WITH BOTH PUMPS OPERATING AND IF THE OPERATING SPEED OF THE PUMPS DROPS TO 50%, THEN THE SECOND PUMP SHALL BE DE-ENERGIZED AND THE FIRST PUMP SHALL MODULATE AS DESCRIBED IN STAGE 1 ABOVE.

STAGE 3: WHEN THE LOOP TEMPERATURE RETURNING TO THE BORE FIELD DROPS TO 42F OR EXCEEDS 90F BOTH PUMPS SHALL BE PLACED IN OPERATION AT FULL SPEED UNTIL THE RETURN WATER TEMPERATURE RISES TO 47F OR DROPS TO 85F.

STAGE 4: IN HEATING MODE WITH BOTH PUMPS RUNNING AT FULL SPEED IF THE RETURN WATER TEMPERATURE DROPS TO 40 DEG F (ADJUSTABLE) THE ELECTRIC BOILER B-1 AND IT'S ASSOCIATED PUMP P-3 SHALL BE ENERGIZED AND SHALL RUN UNTIL THE LOOP RETURN WATER TEMPERATURE RISES TO 45 DEG F (ADJUSTABLE).

SAFETIES

PUMP FAILURE - IF THE LEAD PUMP FAILS, A PUMP FAILURE ALARM SHALL BE COMMUNICATED THROUGH THE BAS AND THE OTHER PUMP SHALL BE STARTED. IF BOTH PUMPS FAIL AN ADDITIONAL ALARM SHALL BE COMMUNICATED THROUGH THE BAS.

LOW SYSTEM PRESSURE - IF LOW SYSTEM PRESSURE IS DETECTED AN ALARM SHALL BE COMMUNICATED THROUGH THE BAS.

LOW TEMPERATURE ALARM - IF THE TEMPERATURE SENSOR COMING BACK FROM THE BORE FIELD INDICATES A TEMPERATURE LESS THAN 38 DEG F AN ALARM SHALL BE COMMUNICATED THROUGH THE BAS.

HIGH TEMPERATURE ALARM - IF THE TEMPERATURE SENSOR COMING BACK FROM THE BORE FIELD INDICATES A TEMPERATURE GREATER THAN 100 DEG F AN ALARM SHALL BE COMMUNICATED THROUGH THE BAS

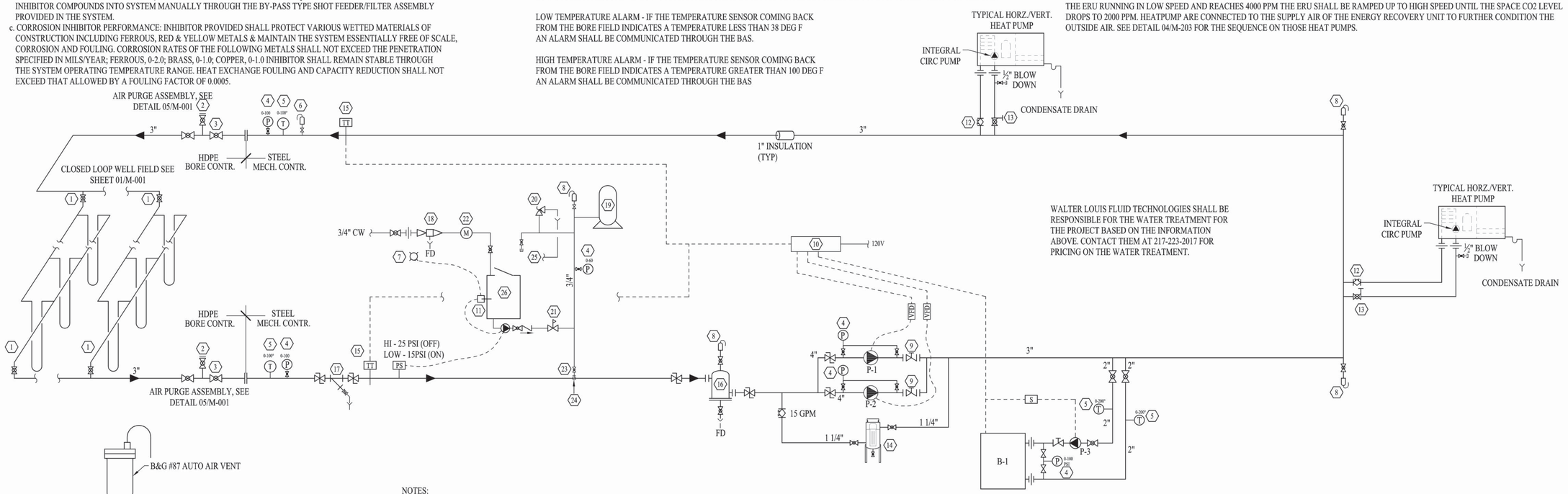
WATER TO AIR HEAT PUMP OPERATION

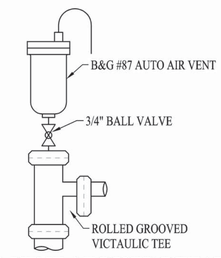
THE WATER TO AIR HEAT PUMP UNITS SHALL OPERATE BASED ON A LOCAL TEMPERATURE/HUMIDITY SENSOR AND BACNET CONTROLS IN THE HEAT PUMP TO MAINTAIN THE SPACE TEMPERATURE AND HUMIDITY SETPOINT. THE TEMPERATURE SENSOR SHALL BE CONNECTED TO A BAS SYSTEM INSTALLED BY ALPHA CONTROLS. THE HEAT PUMP UNIT FAN SHALL RUN WHEN THE UNIT CALLS FOR HEATING, COOLING, OR DEHUMIDIFICATION. THE CONTROLS SHALL MODULATE THE REVERSING VALVE TO HEATING OR COOLING AS REQUIRED, AND SHALL ENERGIZE THE INDIVIDUAL UNIT CIRCULATING PUMP WHENEVER THE COMPRESSOR IS COMMANDED ON. THE HEAT PUMP UNITS ARE PROVIDED WITH HOT GAS REHEAT COILS TO MAINTAIN SPACE RELATIVE HUMIDITY AT 65% (ADJUSTABLE) BASED ON THE SPACE HUMIDISTAT. UNIT OCCUPIED/UNOCCUPIED MODE SHALL BE DETERMINED BY THE BAS SYSTEM. IN UNOCCUPIED MODE THE UNIT SHALL BE SET BACK A MAXIMUM OF TWO DEGREES FROM SETPOINT. AS INDICATED ON THE PLANS, SOME UNITS WILL BE EQUIPPED WITH MOTORIZED OUTSIDE AIR DAMPERS THAT SHALL BE CONTROLLED BY THE A SPACE CO2 SENSOR. UNITS EQUIPPED WITH MOTORIZED OUTSIDE AIR DAMPERS SHALL OPEN THE DAMPER IF SPACE CO2 LEVEL REACHES 3000 PPM AND SHALL CLOSE THE DAMPER WHEN SPACE CO2 LEVEL DROPS TO 1500 PPM IN OCCUPIED MODE. WHEN THE UNIT IS IN UNOCCUPIED MODE THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED.

ENERGY RECOVERY UNIT OPERATION

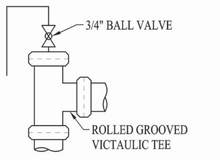
THE ENERGY RECOVERY UNITS SHALL OPERATE TO PULL EXHAUST FROM THE SPACE TO PRETREAT THE REQUIRED OUTSIDE VENTILATION AIR FOR THE SPACES. THE BAS SHALL ENABLE THE ENERGY RECOVERY UNIT TO RUN DURING OCCUPIED TIMES AND BE SHUTOFF DURING UNOCCUPIED TIMES. FACTORY INSTALLED CONTROLS SHALL CONTROL THE ERU OPERATION INCLUDING THE WHEEL ROTATION, ECONOMIZER FUNCTION AND STOP/JOG DEFROST. THE ENERGY RECOVERY UNITS ARE PROVIDED WITH A VFD TO CONTROL THE SUPPLY AND EXHAUST FAN AIRFLOW BASED ON OCCUPANCY DETERMINED BY THE BAS. IN THE OCCUPIED MODE THE UNIT SHALL RUN AT LOW SPEED (30 HZ ON THE VFD) UNLESS THE SPACE CO2 LEVEL REACHES 3000 PPM AT WHICH TIME THE UNIT SHALL BE RAMPED UP TO FULL SPEED (60 HZ ON VFD) UNTIL THE SPACE CO2 LEVEL DROPS TO 1500 PPM. IN UNOCCUPIED MODE THE ERU SHALL REMAIN OFF UNLESS THE SPACE CO2 LEVEL REACHES 3000 PPM AT WHICH TIME IT SHALL RUN AT LOW SPEED AND SHALL TURN OFF WHEN THE SPACE C02 LEVEL DROPS TO 1500 PPM. IF IN UNOCCUPIED MODE THE SPACE CO2 LEVEL CONTINUES TO RISE WITH THE ERU RUNNING IN LOW SPEED AND REACHES 4000 PPM THE ERU SHALL BE RAMPED UP TO HIGH SPEED UNTIL THE SPACE CO2 LEVEL DROPS TO 2000 PPM. HEATPUMP ARE CONNECTED TO THE SUPPLY AIR OF THE ENERGY RECOVERY UNIT TO FURTHER CONDITION THE OUTSIDE AIR. SEE DETAIL 04/M-203 FOR THE SEQUENCE ON THOSE HEAT PUMPS.

WALTER LOUIS FLUID TECHNOLOGIES SHALL BE RESPONSIBLE FOR THE WATER TREATMENT FOR THE PROJECT BASED ON THE INFORMATION ABOVE. CONTACT THEM AT 217-223-2017 FOR PRICING ON THE WATER TREATMENT.





02 AIR VENT AT RISER DETAIL
NO SCALE



03 MANUAL VENT AT RISER DETAIL
NO SCALE

NOTES:

1. WELL FIELD ISOLATION VALVE. SEE 04/M-001.
2. DURING STARTUP, CONTRACTOR TO TEMPORARILY INSTALL B&G MODEL 107A AIR VENT ON RISE TO ASSURE ALL AIR IS REMOVED FROM SYSTEM.
3. CONTRACTOR TO PURGE BUILDING AND WELL FIELD PIPING SYSTEMS WITH EXTERNAL PUMP AND SEPARATION TANK ASSEMBLY PRIOR TO SYSTEM OPERATION. SEE PURGE AND FILL INSTRUCTIONS ABOVE.
4. 4 - ½" DIAL PRESSURE GAUGE WITH ¼" BALL GAUGE VALVE. PROVIDE PSI DIAL RANGE AS INDICATED BY PRESSURE GAUGE SYMBOL IN DIAGRAM. TRERICE MODEL NO. 620B345FSL250, OR EQUAL. (TYP.)
5. 4 - ½" DIAL TYPE "UNIVERSAL ANGLE" THERMOMETER WITH SEPARATE WELL. PROVIDE °F TEMPERATURE DIAL RANGE AS INDICATED BY THERMOMETER SYMBOL IN DIAGRAM. TRERICE MODEL NO. V80742B31, OR EQUAL. (TYP.)
6. B&G AUTOMATIC AIR VENT MODEL NO. 87 OR APPROVED EQUAL. SEE DETAIL 02/M3.1. INSTALL AT HIGH POINTS IN SYSTEM.
7. LOW SYSTEM VOLUME ALARM LIGHT.
8. B&G AUTOMATIC AIR VENT MODEL NO. 87 OR APPROVED EQUAL.
9. LINE SIZE, TRI DUTY VALVE. SET FLOW WITH BOTH PUMPS RUNNING IN PARALLEL AT 60 HZ. SEE PUMP SCHEDULE FOR FLOW REQUIREMENTS.
10. ELECTRONIC LOOP WATER CONTROLLER. SEE THIS DRAWING FOR SEQUENCE OF OPERATION.
11. LOW LEVEL FLOAT SWITCH. INTERLOCK WITH SYSTEM FILL PUMP TO SHUT PUMP OFF AS WELL AS ACTIVATING ALARM LIGHT.
12. LINE SIZE, B&G CIRCUIT SETTERS, OR EQUAL BY ARMSTRONG. SEE PLANS FOR LINE SIZES AND BALANCING INFORMATION.
13. BALL VALVE WITH "PETES PLUG" PRESSURE & TEMPERATURE TEST PORT WITH ⅛"Ø SIZE PROBE ACCEPTANCE PORT.
14. FIVE (5) GALLON CHEMICAL BYPASS FEEDER AND FILTER ASSEMBLY. NEPTUNE DBFC-5 OR EQUAL.
15. ELECTRONIC TEMP TRANSDUCER IN WELL, 0-110F, CONNECTED TO BUILDING AUTOMATION SYSTEM.
16. B&G ROLAIRTROL MODEL #RL-3 OR APPROVED EQUAL AIR SEPARATOR WITH STRAINER WITH BALL VALVE BLOW DOWN VALVE.
17. LINED SIZED STEAM STRAINER (30 MESH OR LESS) REMOVE STRAINER SCREEN AFTER SYSTEM IS UP AND RUNNING FOR ONE MONTH.
18. ¾" REDUCED PRESSURE ZONE (RPZ) BACKFLOW PREVENTER ASSEMBLY. WATTS NO. 009-QT, OR EQUAL.
19. AMTROL 1000-L VERTICAL EXPANSION TANK.
20. PRESSURE RELIEF VALVE SET @ 80 PSI.
21. ¾" PRESSURE REDUCING VALVE, B&G MODEL NO. B7-12 S ET @ 30 PSIG.
22. BADGER "RECORDALL" RCDL-25, LOW FLOW, ODOMETER TYPE, METER.
23. ¾" BALL VALVE. NOTE: TAG VALVES WITH THE FOLLOWING INSTRUCTIONS "THIS VALVE SHALL REMAIN IN THE OPEN POSITION WHENEVER SYSTEM IS OPERATING".
24. CONNECT TO SIDE OF 3" HORIZONTAL MAIN. (TYPICAL OF ALL CONNECTIONS TO THE MAINS.)
25. ROUTE FULL SIZE PRESSURE RELIEF PIPING TO NEAREST FLOOR DRAIN.
26. ARMSTRONG GLA-S-LP-1 AUTO-FILL UNIT. 53 GALLON STORAGE CAPACITY. FILL WITH 15% PROP GLYCOL AND DE-IONIZED WATER.

01 CLOSED WELL / SINGLE PIPE LOOP - SCHEMATIC DIAGRAM
NO SCALE

STATE OF MISSOURI
MIKE KEHOE, GOVERNOR

REGISTERED PROFESSIONAL ENGINEER
WAYNE A. STROPE
NUMBER 2001018816
STATE OF MISSOURI
EXPIRES: 12-31-25

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OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

REPLACE HEAT PUMPS
EW THOMPSON STATE SCHOOL

1520 THOMPSON BLVD
SEDALIA, MISSOURI

PROJECT: E2328-01
SITE: 2034
ASSET: 5012034003

REVISION	DATE

CAD DWG FILE: 23014
DRAWN BY: JS
CHECKED BY: WS
DESIGNED BY: WS

SHEET TITLE:
SYSTEM LOOP DAIGRAM

SHEET NUMBER:
M-201

SHEET 6 OF 11
ISSUE DATE: JUNE 17, 2025

JOB# 23014 PLTD 6/24/2025

HEAT PUMP SCHEDULE

MARK	MANUFACTURER	MODEL NUMBER	CONFIGURATION POS. / ORIN.	S.A. (CFM)	ESP (IN W.C.)	PLENUM DISCHARGE	COOLING CAPACITY (MBH) TOTAL	COOLING CAPACITY (MBH) SENSIBLE	COOLING EWT (° F)	COOLING EER	HEATING CAP. TOTAL (BTH)	HEATING EWT (°F)	HEATING COP	WATER FLOW (GPM)	H.P. WPD (FT)	PUMP HEAD (FT)	GRUNDFOS PUMP MODEL	WATER PIPING SIZE	FILTER QTY	FILTER SIZE	ELECTRICAL VOLTS	ELECTRICAL Ø	ELECTRICAL MCA (AMPS)	ELECTRICAL MAX FUSE	MARK	NOTES
HP-1	WATER FURNACE	V5AH012	HORIZONTAL	370	0.5	NA	11.92	8.9	85	15.5	10.3	45	4.0	3.0	3.8	11.8	UPS 15-58FC	3/4	1	16x18	265	1	12.0	15	HP-1	1,2,3,4,5,6,9,10,11,12,13
HP-2	WATER FURNACE	V5AH018	HORIZONTAL	640	0.5	NA	17.81	14.6	85	14.8	16.3	45	4.4	5.0	12.0	20	UPS 26-99FC	1	1	18x16/18x14	265	1	12.7	20	HP-2	1,2,3,4,5,6,9,10,11,12,13
HP-3	WATER FURNACE	V5AH018	HORIZONTAL	640	0.5	NA	17.81	14.6	85	14.8	16.3	45	4.4	5.0	12.0	20	UPS 26-99FC	1	1	18x16/18x14	265	1	12.7	20	HP-3	1,2,3,4,5,6,9,10,11,12,13
HP-4	WATER FURNACE	V5AH024	HORIZONTAL	770	0.5	NA	22.64	15.9	85	13.9	19.8	45	3.9	6.0	8.8	16.8	UPS 26-99FC	1	1	18x18/18x14	460	3	6.9	15	HP-4	1,2,3,4,5,6,7,8,9,10,11,12,13
HP-5	WATER FURNACE	V5AH024	HORIZONTAL	770	0.5	NA	22.64	15.9	85	13.9	19.8	45	3.9	6.0	8.8	16.8	UPS 26-99FC	1	1	18x18/18x14	460	3	6.9	15	HP-5	1,2,3,4,5,6,7,8,9,10,11,12,13
HP-6	WATER FURNACE	V5AH024	HORIZONTAL	770	0.5	NA	22.64	15.9	85	13.9	19.8	45	3.9	6.0	8.8	16.8	UPS 26-99FC	1	1	18x18/18x14	460	3	6.9	15	HP-6	1,2,3,4,5,6,7,8,9,10,11,12,13
HP-7	WATER FURNACE	V5AH030	HORIZONTAL	900	0.5	NA	28.75	20.8	85	15.0	27.5	45	4.2	7.0	9.4	17.4	UPS 26-99FC	1	1	18x18/18x14	460	3	7.7	15	HP-7	1,2,3,4,5,6,7,8,9,10,11,12,13
HP-8	WATER FURNACE	V5AV024	VERTICAL	770	0.5	NA	22.64	15.9	85	13.9	19.8	45	3.9	6.0	8.8	16.8	UPS 26-99FC	1	1	18x18/18x14	460	3	6.9	15	HP-8	1,2,3,4,5,6,7,8,9,10,11,12,13
HP-9	WATER FURNACE	V5AV018	VERTICAL	640	0.5	NA	17.81	14.6	85	14.8	16.3	45	4.4	5.0	12.0	20	UPS 26-99FC	1	1	18x16/18x14	265	1	12.7	20	HP-9	1,2,3,4,5,6,9,10,11,12,13
HP-10	WATER FURNACE	V5AV036	VERTICAL	1120	0.50	NA	34	25.6	85	14.8	32.2	45	4.4	9.0	10.5	18.5	UPS 26-99FC	1/1/4	2	18x20	460	3	8.7	15	HP-10	1,2,3,4,5,6,7,8,9,10,11,12,13
HP-11	WATER FURNACE	V5AV024	VERTICAL	770	0.5	NA	22.64	15.9	85	13.9	19.8	45	3.9	6.0	8.8	16.8	UPS 26-99FC	1	1	18x18/18x14	460	3	6.9	15	HP-11	1,2,3,4,5,6,7,8,9,10,11,12,13
HP-12	WATER FURNACE	V5AH036	HORIZONTAL	1120	0.50	NA	34	25.6	85	14.8	32.2	45	4.4	9.0	10.5	18.5	UPS 26-99FC	1/1/4	2	18x20	460	3	8.7	15	HP-12	1,2,3,4,5,6,7,8,9,10,11,12,13
HP-13	WATER FURNACE	V5AH084	HORIZONTAL	3085	0.50	NA	76.58	67.3	85	11.2	77.1	45	4.1	22.0	18.1	26.1	UPS 43-100FC	1-1/2	1	40x32	460	3	16.3	25	HP-13	1,2,3,4,5,6,7,8,9,10,11,12,13
HP-14	WATER FURNACE	V5AH048	HORIZONTAL	1600	0.50	NA	43.51	34.6	85	13.8	43.7	45	4.6	12.0	11.2	19.2	UPS 26-99FC	1-1/2	1	20x20/20x22	460	3	12.5	15	HP-14	1,2,3,4,5,6,7,8,9,10,11,12,13
HP-15	WATER FURNACE	V5AV036	VERTICAL	1120	0.50	NA	34	25.6	85	14.8	32.2	45	4.4	9.0	10.5	18.5	UPS 26-99FC	1/1/4	2	18x20	460	3	8.7	15	HP-15	1,2,3,4,5,6,7,8,9,10,11,12,13
HP-16	WATER FURNACE	V5AV036	VERTICAL	1120	0.50	NA	34	25.6	85	14.8	32.2	45	4.4	9.0	10.5	18.5	UPS 26-99FC	1/1/4	2	18x20	460	3	8.7	15	HP-16	1,2,3,4,5,6,7,8,9,10,11,12,13
HP-17	WATER FURNACE	V5AH036	HORIZONTAL	1120	0.50	NA	34	25.6	85	14.8	32.2	45	4.4	9.0	10.5	18.5	UPS 26-99FC	1/1/4	2	18x20	460	3	8.7	15	HP-17	1,2,3,4,5,6,7,8,9,10,11,12,13

NOTES:

1. RATINGS ARE BASED ON (COOLING) 80/67; (HEATING) 68.
2. HEATPUMPS TO BE PROVIDED WITH FACTORY WIRED AND INSTALLED CIRCULATORS.
3. WET ROTOR CIRCULATORS CAN BE INSTALLED IN BORTH VERTICAL AND HORIZONTAL LINES. THE PUMP SHALL BE INSTALLED WITH MOTOR SHAFT POSITIONED HORIZONTALLY. UNDER NO CIRCUMSTANCES SHOULD THE PUMP BE INSTALLED WITH THE SHAFT VERTICAL OR WHERE THE SHAFT FALLS BELOW THE HORIZONTAL PLANE. FOR FURTHER INFORMATION ON THE WET ROTOR CIRCULATORS, SEE INSTRUCTIONS THAT CAME WITH THEM
4. PROVIDE ALL UNITS WITH 2" MERV 8 FILTERS.
5. INSTALLING CONTRACTOR SHALL PROVIDE 5 YEAR LABOR WARRANTY FOR UNIT COMPRESSOR AND REFRIGERANT SYSTEM.
6. PROVIDE FACTORY INSTALLED DISCONNECT SWITCH
7. ECM MOTOR
8. PROVIDE AS TWO SPEED HEAT PUMPS
9. PROVIDE WITH 2-STAGE BACNET THERMOSTAT WITH TEMPERATURE CONTROL AND HUMIDITY CONTROL.
10. PROVIDE WITH HOT GAS REHEAT DEHUMIDIFICATION CONTROLLED BY SPACE HUMIDISTAT.
11. BALL VALVES SHALL BE FULL PORT AND INSTALLED SO THAT HEATPUMP CAN BE REMOVED WHEN VALVES ARE SHUT.
12. BALANCE VALVES SHALL BE SELECTED FOR A MAX PRESSURE DROP OF 5' AT INDICATED OPERATING FLOW RATES.
13. PROVIDE WITH GLOBAL PLASMA SOLUTIONS MODEL GPS-FC-3-BAS IONIZATION DEVICE OR EQUAL. INSTALL PER MANUFACTURER'S INSTRUCTIONS.
14. WATERFURNACE IS THE BASIS OF DESIGN. CLIMATEMASTER AND DAIKIN ARE ADDITIONAL APPROVED SUPPLIERS.

BOILER SCHEDULE

MARK	MANUFACTURER	MODEL	KW	P (FT)	FLOW GPM	ELECTRICAL VOLTS	ELECTRICAL Ø	ELECTRICAL MCA
B-1	THERMO 2000	BTH ULTRA	30	5	28	480	3	45

NOTES:

1. PROVIDE WITH 30 PSI PRESSURE RELIEF VALVE AND DRAIN VALVE.
2. THERMO 2000 BTH ULTRA IS THE BASIS OF DESIGN. LOCHINVAR LECTRUS OR PRECISION BOILER PCW ARE APPROVED AS EQUALS.

PUMP SCHEDULE

MARK	MANUFACTURER	MODEL	GPM	HEAD FT. H2O	EFF. %	MOTOR HP	MOTOR RPM	ELECTRICAL VOLTS	ELECTRICAL Ø	ELECTRICAL MCA	REMARKS
P-1	BELL & GOSSETT	ECOCIRC XL 65-130	45	35	47	1.0	2711	480	3	1.5	
P-2	BELL & GOSSETT	ECOCIRC XL 65-130	45	35	47	1.0	2711	480	3	1.5	
P-3	BELL & GOSSETT	PL-50	28	10	-	1/6	3300	277	1	1.3	

NOTES:

1. PUMPS P-1 AND P-2 ARE SELECTED TO PROVIDE 90 GPM @ 35' HEAD WHEN OPERATING IN PARALLEL.
2. BELL & GOSSETT IS BASIS OF DESIGN. GRUNDFOS AND TACO ARE APPROVED SUPPLIERS.

ENERGY RECOVERY UNIT SCHEDULE

MARK	MANUFACTURER	MODEL NO.	SUPPLY FAN CFM	SUPPLY FAN E.S.P. "H2O	SUPPLY FAN HP	EXHAUST FAN CFM	EXHAUST FAN E.S.P. "H2O	EXHAUST FAN HP	EFFECTIVENESS %	ELECTRICAL VOLTS	ELECTRICAL Ø	ELECTRICAL MCA AMPS
ERU-1	SEMCO	FV-2000H	1500	0.5	1.5	1,500	1	1.50	70	480	3	8.0

NOTES:

1. PROVIDE WITH A GRAVITY BACKDRAFT DAMPER ON EXHAUST AND MOTORIZED OA DAMPER.
2. PROVIDE WITH FACTORY INSTALLED DISCONNECT SWITCH.
3. PROVIDE WITH STOP/JOG ECONOMIZER AND FROST PROTECTION.
4. PROVIDE WITH INDOOR UNIT FILTER RACK.
5. PROVIDE WITH A FACTORY INSTALLED VFD AND CO2 SENSOR SHIPPED LOOSE FOR FIELD INSTALLATION.

AIR OUTLET/INLET DEVICE SCHEDULE

FLEX DUCT SIZE

CFM RANGE	FLEXIBLE DUCT SIZE
0-100	6"Ø
101-200	8"Ø
201-400	10"Ø
401-600	12"Ø
601-900	14"Ø

SYMBOL LEGEND

A - MARK
10 - NECK Ø"

A10	SA
250	

250 - AIR FLOW RATE (CFM)

DUTY:
SA - SUPPLY AIR
RA - RETURN AIR
EA - EXHAUST AIR
TA - TRANSFER AIR

MARK	MANUFACTURER	MODEL #	SLOTS #	SLOTS SIZE	FACE SIZE	THROW	NECK SIZE	DUTY	REMARKS
A	PRICE	520	-	-	14X10	2-WAY	12X8	SA	NOTE 1
B	PRICE	520	-	-	12X8	2-WAY	10X6	SA	NOTE 1
C	PRICE	520	-	-	8X8	2-WAY	6X6	RA/EA	NOTE 1
D	PRICE	520	-	-	14X12	2-WAY	12X10	RA/EA	NOTE 1
E	PRICE	520	-	-	50X26	2-WAY	48X24	RA/EA	NOTE 1, 2

NOTES:

1. 22.5 DEGREE BLADES WITH OB DAMPER.
2. PROVIDE HINGED ACCESS TO UTILIZE GRILLE FOR SERVICE ACESS TO HEATPUMPS.

PIPING MATERIAL SCHEDULE

SYSTEM	PIPING SIZE	PIPING MATERIAL	PIPING SCH	PIPING ASTM	PIPING JOINTS	FITTINGS MAT.	FITTINGS SCH	FITTINGS JOINTS	OPERATING PRESS (PSI)	OPERATING TEMP (*F)	FIELD TEST PRESS (PSI)	FIELD TEST TYPE	FIELD TEST TIME	INSULATION THICKNESS	INSULATION JACKET	INSULATION TYPE
MAKE-UP WATER	ALL	CP	L	B 88	SJ	CP	L	SJ	65	45-65	150	AIR	1 HR	1"	--	FG
HEAT PUMP LOOP INTERIOR	<=2"	CP	L	B 88	SJ	CP	L	SJ	65	50-120	150	AIR	1 HR	1"	--	FG
HEAT PUMP LOOP INTERIOR	>2"	CP	L	B 88	PP	CP	L	PP	65	45-65	150	AIR	1 HR	1"	--	FG
HEAT PUMP LOOP EXTERIOR	ALL	HDPE	SDR 11	D 3350	F	HDPE	SDR 11	F	65	40-180	150	AIR	1 HR	--	--	--
HVAC CONDENSATE DRAIN PIPING	ALL	CP	L	B 88	SJ	CP	L	SJ	N/A	N/A	150	AIR	1 HR	1"	--	FG

PIPING MATERIAL LEGEND

ACR - COPPER (CLEAN AND CAPPED)
BLK - BLACK STEEL PIPE
CI - CAST IRON
CP - COPPER
ERW - ELECTRIC RESISTANCE WELD BLACK STEEL
GLV - GALVANIZED
HDPE - HIGH DENSITY POLYETHELENE
PVC - POLYVINYL CHLORIDE
SL - SEAMLESS STEEL
SS - STAINLESS STEEL

FITTING MATERIAL LEGEND

CI - CAST IRON
CS - CARBON STEEL
DI - DUCTILE IRON
FS - 2000 # FORGED STEEL
STD - STANDARD CS WELD
XS - EXTRA STRONG

JOINING METHOD LEGEND

BS - BELL & SPIGOT
CW - CONTINUOUS WELD
F - FUSED
LC- LEAD CAULKING
MJ - MECHANICAL JOINT
NH - NO-HUB
S - BRAZED JOINT - SILVER BRAZING ALLOY
SJ - SOLDER JOINT 95-5 TIN-ANTIMONY
SW - SOLVENT WELD
VIC-VICTAULIC WITH ROLLED GROOVE
THRD - THREADED
WELD - WELDED
PP -PROPRESS

INSULATION TYPE LEGEND

FG - FIBERGLASS
ARM - ARMAFLEX

ASJ - ALL SERVICE JACKET
PVC - PVC JACKET
A - ALUMINUM JACKET

STATE OF MISSOURI
MIKE KEHOE,
GOVERNOR

REGISTERED STATE OF MISSOURI WAYNE A. STROPE NUMBER 2001018816 PROFESSIONAL ENGINEER

EXPIRES: 12-31-25

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OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

REPLACE HEAT PUMPS
EW THOMPSON STATE SCHOOL

1520 THOMPSON BLVD
SEDALIA, MISSOURI

PROJECT: E2328-01
SITE: 2034
ASSET: 5012034003

REVISION	DATE

CAD DWG FILE: 23014
DRAWN BY: JS
CHECKED BY: WS
DESIGNED BY: WS

SHEET TITLE:
MECHANICAL SCHEDULES

SHEET NUMBER:
M-202

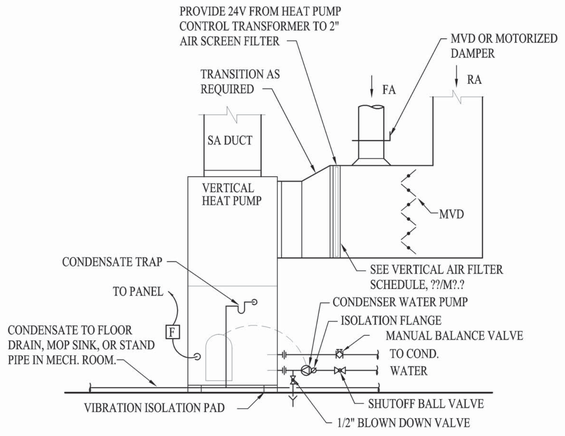
SHEET 7 OF 11
ISSUE DATE: JUNE 17, 2025

JOB# 23014 PLTD 6/24/2025

MECHANICAL SYMBOL SCHEDULE

ALL SYMBOLS SHOWN ARE NOT NECESSARILY USED ON THE DRAWINGS

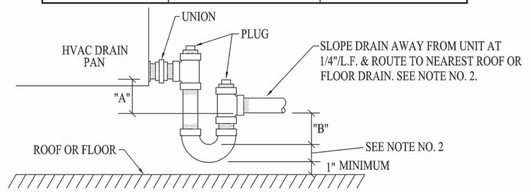
	TIE TO EXISTING (CONNECTION POINT)
	WASTE PIPING
	VENT PIPING
	DOMESTIC COLD WATER PIPING
	DOMESTIC HOT WATER SUPPLY PIPING
	DOMESTIC HOT WATER RETURN
G	NATURAL GAS
CHS	CHILLED WATER SUPPLY
CHR	CHILLED WATER RETURN
HWS	HOT WATER SUPPLY
HWR	HOT WATER RETURN
CWS	CONDENSER WATER SUPPLY
CWR	CONDENSER WATER RETURN
HCS	HOT/CHILLED SUPPLY
HCR	HOT/CHILLED RETURN
RS	REFRIGERANT SUCTION
RL	REFRIGERANT LIQUID
RD	REFRIGERANT DISCHARGE (HOT GAS)
RDB	REFRIGERANT DISCHARGE (HOT GAS) BYPASS
LPS	LOW PRESSURE STEAM
LPR	LOW PRESSURE STEAM CONDENSATE
MPS	MEDIUM PRESSURE STEAM
MPR	MEDIUM PRESSURE STEAM CONDENSATE
HPS	HIGH PRESSURE STEAM
HPR	HIGH PRESSURE STEAM CONDENSATE
FOS	FUEL OIL SUPPLY
FOR	FUEL OIL RETURN
D	DRAIN LINE
	UNION - FLANGE - STRAINER
	GATE VALVE - CHECK VALVE
	BALL VALVE - PLUG COCK
	CALIBRATED BALANCING VALVE W/ PORTS
	TRIPLE DUTY VALVE - PRESSURE REDUCING REGULATING VALVE
	BUTTERFLY VALVE - THREE WAY CONTROL VALVE
	PRESSURE RELIEF VALVE
	SOLENOID VALVE - GAUGE VALVE
	PRESSURE GAUGE
	THERMOMETER (BULB OR DIAL TYPE)
	PUMP
	STEAM TRAP
	TEST PORT - PETES PLUG
	MANUAL VOLUME DAMPER (VD)
M	MOTORIZED DAMPER
	FIRE DAMPER (FD)
	SMOKE DAMPER (SD)
	SMOKE FIRE DAMPER (SFD)
T 3 H 3	THERMOSTAT - HUMIDISTAT (ZONE SUBSCRIPT)
C	CO_2 SENSOR
TC	TEMPERATURE CONTROL
T	TEMPERATURE SENSOR
BDD	BACK DRAFT DAMPER (BDD)



02 VERTICAL HEAT PUMP DETAIL

NO SCALE

	DIM. "A"	DIM. "B"
BLOW THRU COIL	1"	FAN DISCHARGE STATIC PRESSURE + 1"
DRAW THRU COIL	FAN SUCTION STATIC PRESSURE + 1"	2 1/2"



NOTES:
1. "A" OR "B" DIMENSION SHALL NOT BE LESS THAN 1".
2. DRAIN PIPING SHALL BE SIZED PER MFR'S INSTRUCTIONS.
3. INSTALL TRAP & DRAIN AT ALL CONDENSATE DRAIN PAN CONNECTIONS PROVIDED WITH UNIT.
4. ELEVATE HVAC UNIT AS NECESSARY TO PROVIDE REQUIRED TRAP SEAL DEPTH, DRAIN LINE SLOPE & TRAP CLEARANCE ABOVE ROOF OR FLOOR.
5. VERIFY MAXIMUM ESTIMATED FAN SUCTION (NEGATIVE) STATIC PRESSURE CONDITION WITH UNIT MANUFACTURER PRIOR TO UNIT INSTALLATION. COORDINATE UNIT INSTALLATION ELEVATION AS REQUIRED FOR PROPER TRAP SEAL DEPTH AND DRAIN LINE INSTALLATION.

01 HVAC CONDENSATE DRAIN / TRAP DETAIL

NO SCALE

ELECTRIC BOILER SPECIFICATION

1. GENERAL FURNISH AND INSTALL AS SHOWN ON THE PLANS ONE ELECTRIC HOT WATER BOILER(S), FABRICATED PER THESE SPECIFICATIONS, INCLUDING ALL ACCESSORIES AND CONSTRUCTION FEATURES AS DESCRIBED HEREIN. BOILERS SHALL BE COMPLETELY FACTORY ASSEMBLED AND PRE-TESTED PRIOR TO SHIPMENT. BOILERS SHALL BE UL LABELED AND COMPLY WITH CSD-1. BOILER SHALL INCLUDE AN ASME SECTION IV PRESSURE VESSEL WHICH HAS BEEN FABRICATED UNDER INSPECTION BY AN AUTHORIZED INSPECTOR HOLDING A NATIONAL BOARD COMMISSION AND SUBSEQUENTLY STAMPED AND NATIONAL BOARD REGISTERED.

2. RATINGS BOILERS SHALL EACH BE THERMO 2000 MODEL BTH ULTA RATED 30 KW, DESIGNED AND FABRICATED FOR A BALANCED 3-PHASE, 3-WIRE, DELTA LOAD AT 480 VOLTS, 3-PHASE, 60 HERTZ. THE BOILERS SHALL BE DESIGNED FOR A DISCHARGE TEMPERATURE OF 51 °F WITH ENTERING WATER AT 45°F.

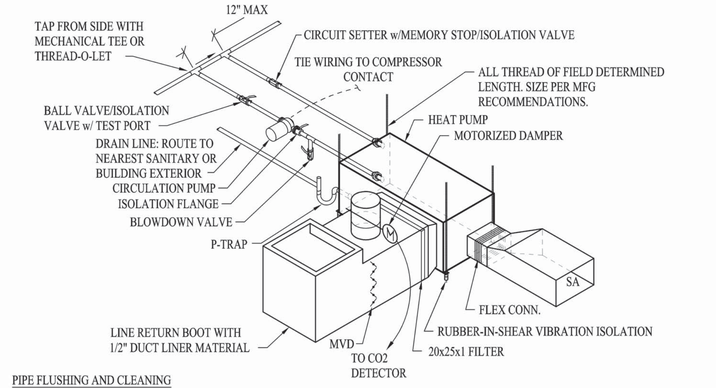
3. PRESSURE VESSEL GPM WITH THE PRESSURE VESSEL AND ALL TRIM SHALL BE AS SET FORTH IN THE ASME CODE, INCLUDING ASME "HV" STAMPED SAFETY RELIEF VALVE SIZED AS REQUIRED. THE VESSEL SHALL BE PROVIDED WITH A THREADED 1-1/4" INLET AND A THREADED 1-1/4" OUTLET, PLUS SAFETY VALVE AND DRAIN NOZZLE AS REQUIRED. THE PRESSURE VESSEL SHALL BE HOUSED IN A 16-GAUGE STEEL ENCLOSURE ALLOWING 4 INCHES OF INSULATION SPACE AROUND THE VESSEL AND FILLED WITH 4 INCHES OF 3/4 POUND-DENSITY FIBERGLASS INSULATION. THE ELECTRIC PANEL AND VESSEL SHALL BE MOUNTED ON A COMMON, STRUCTURAL STEEL BASE

4. INTERNAL POWER DISTRIBUTION THE POWER DISTRIBUTION SHALL BE THROUGH CABLE CONNECTION TO MECHANICAL LUGS. POWER SHALL BE FED THROUGH CURRENT LIMITING FUSES TO MAGNETIC CONTACTORS, AND THEN TO THE HEATING ELEMENT CIRCUITS. CONTACTORS SHALL BE 3-POLE MAGNETIC CONTACTORS TESTED BY UL FOR 500,000 CYCLES AT FULL LOAD. THE COIL VOLTAGE SHALL BE 120-VOLTS. INTERNAL WIRING SHALL BE IN ACCORDANCE WITH NEC/NFPA ARTICLE 424-G AND UL SUBJECT 834.

5. HEATING ELEMENTS ELEMENTS SHALL BE INDIVIDUALLY MOUNTED IN STEEL FLANGES. THE FLANGE SIZE SHALL NOT EXCEED 2-1/2 INCHES SQUARE, WITH A MAXIMUM OF THREE SINGLE- BEND U-SHAPED ELEMENT BLADES PER FLANGE. ELEMENT SHEATH MATERIAL SHALL BE INCOLOY; ELEMENT WATT DENSITY SHALL BE 75 WSI.

6. CONTROLS THE CONTROL CIRCUIT SHALL BE 120-VOLT SINGLE-PHASE, ONE SIDE GROUNDED. CONTROL VOLTAGE SHALL BE PROVIDED BY AN INTEGRAL CONTROL CIRCUIT TRANSFORMER, FUSED ON BOTH LEGS OF THE PRIMARY, WITH A CONTROL CIRCUIT FUSE ON THE UNGROUNDED LEG OF THE SECONDARY. THE CONTROLS SHALL INCLUDE AN ON/OFF SWITCH, TEMPERATURE CONTROLLER, SOLID STATE STEP CONTROL WITH STEPS, INDICATOR LIGHTS AND MANUAL LIMITING SWITCHES FOR EACH STAGE OF HEATING, A LOW WATER CUT-OFF WITH TEST/RESET BUTTONS, AND ONE AUTO RESET AND ONE MANUAL RESET HIGH LIMIT TEMPERATURE SWITCH. CONTROLS SHALL BE ABLE TO INTEGRATE WITH THE ALERTON BUILDING AUTOMATION SYSTEM.

7. MANUFACTURER BASIS OF DESIGN IS THERMO 2000 BTH ULTA. THE LOCHINVAR LECTRUS OR PRECISION BOILER PCW ARE APPROVED EQUALS.

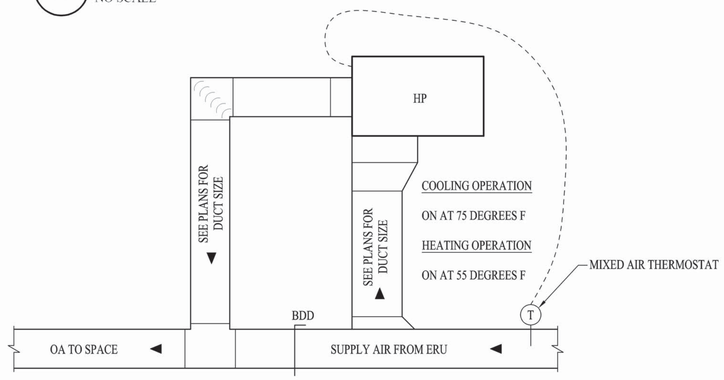


PIPE FLUSHING AND CLEANING

THE CLOSED LOOP SYSTEM WATER PIPING MUST BE THOROUGHLY CLEANED AND FLUSHED TO REMOVE DIRT, CHIPS, AND OTHER FOREIGN MATERIALS PRIOR TO CONNECTING THE HEAT PUMP TO PIPING SYSTEM. COUPLE THE HEAT PUMP SUPPLY & RETURN PIPING CROSS CONNECTIONS AND FILL LOOP WITH FRESH CLEAN WATER. REPAIR LEAKS AS REQUIRED. USE VALVES TO BYPASS HEAT REJECTOR AND SUPPLEMENTARY WATER HEATER (WHERE APPLICABLE). FLUSH SYSTEM FOR A MINIMUM OF TWO HOURS MONITORING SYSTEM BLOW DOWN UNITL WATER RUNS CLEAR. ONCE CLEAN, STOP THE PUMP AND CLEAN ALL SYSTEM STRAINERS. REMOVE TEMPORARY CROSS CONNECTION AND CONNECT LOOP SUPPLY AND RETURN PIPING TO HEAT PUMP UNITS.

03 HORIZONTAL HEAT PUMP CONNECTION DETAIL

NO SCALE



04 OUTSIDE AIR HORIZONTAL HEAT PUMP DETAIL

NO SCALE

STATE OF MISSOURI
MIKE KEHOE, GOVERNOR

STATE OF MISSOURI WAYNE A. STROPE NUMBER 2001018816 REGISTERED PROFESSIONAL ENGINEER

EXPIRES: 12-31-25

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OFFICE OF ADMINISTRATION DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

REPLACE HEAT PUMPS
EW THOMPSON STATE SCHOOL

1520 THOMPSON BLVD
SEDALIA, MISSOURI

PROJECT: E2328-01
SITE: 2034
ASSET: 5012034003

REVISION	DATE

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DRAWN BY: JS
CHECKED BY: WS
DESIGNED BY: WS

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MECHANICAL DETAILS

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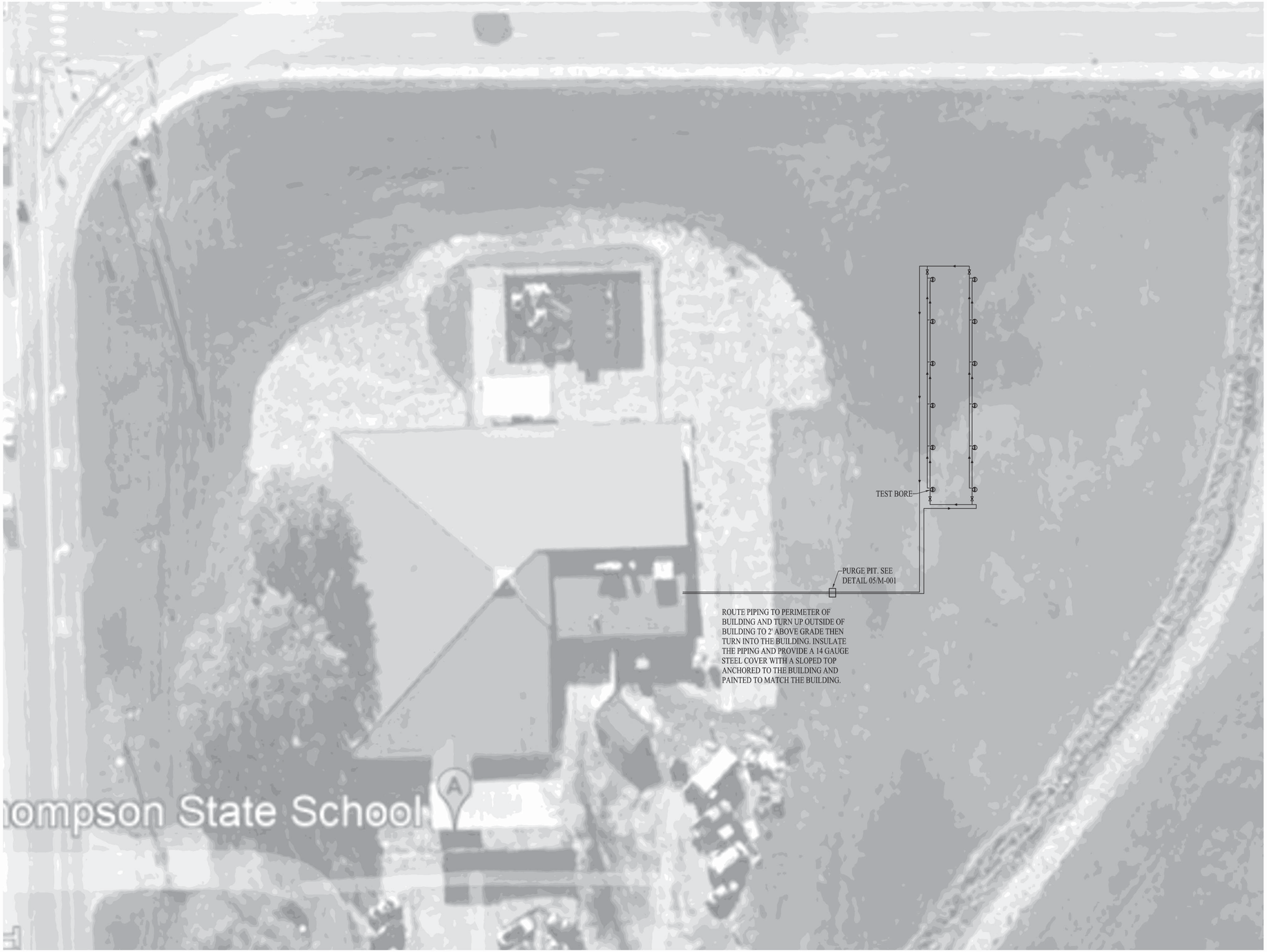

01 BORE FIELD SITE LAYOUT

SCALE: 1"=20'-0"

STATE OF MISSOURI
MIKE KEHOE, GOVERNOR

REGISTERED STATE OF MISSOURI
WAYNE A. STROPE
NUMBER
2001018816
REGISTERED PROFESSIONAL ENGINEER

EXPIRES: 12-31-25

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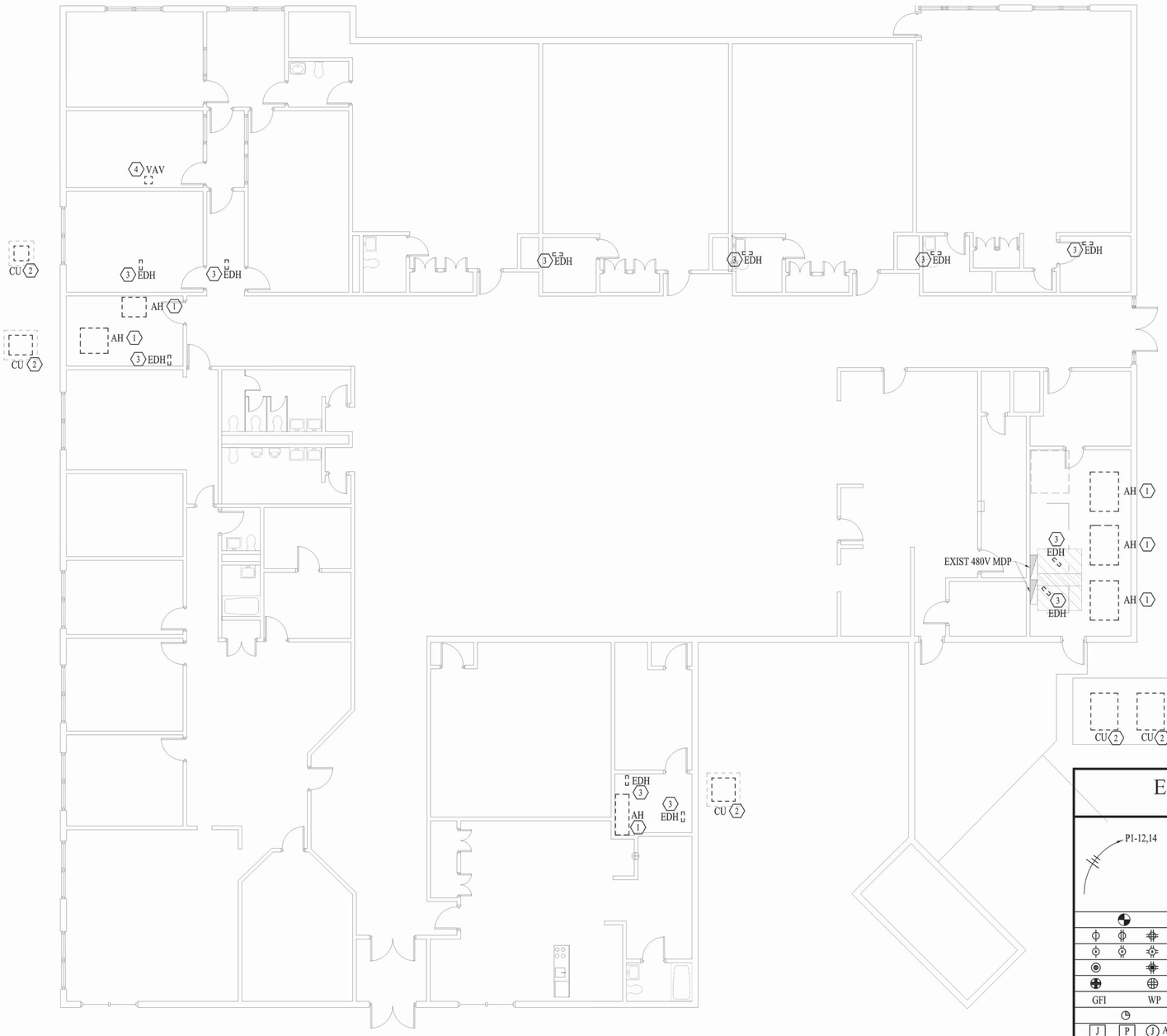

01 POWER DEMOLITION FLOOR PLAN
SCALE: 1/8"=1'-0"

GENERAL NOTES:

1. DRAWINGS (PLANS, DETAILS AND SCHEMATICS ARE DIAGRAMMATIC IN NATURE AND INDICATE GENERAL LOCATION AND ARRANGEMENT OF NEW AND EXISTING MAJOR EQUIPMENT AND PIPING SYSTEMS. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING EXACT LOCATIONS AND DIMENSIONS OF ALL EQUIPMENT, PIPING AND PIPING COMPONENTS. CONTRACTOR IS ALSO RESPONSIBLE FOR FINAL TIE-IN POINT LOCATIONS BETWEEN NEW AND EXISTING PIPING SYSTEMS EQUIPMENT AND UTILITIES.

2. UNLESS OTHERWISE NOTED EXISTING SHOWN IN FADE-AWAY PEN. NEW, RELOCATED OR DEMOLITION ITEMS SHOWN IN DARK HEAVY PEN.

3. MATERIAL EXPOSED WITHIN THE RETURN AIR PLENUM SHALL BE NONCOMBUSTIBLE OR SHALL HAVE A FLAME SPREAD INDEX OF NOT MORE THAN 25 AND A SMOKE DEVELOPMENT INDEX OF NOT MORE THAN 50 WHEN TESTED IN ACCORDANCE WITH ASTM E84.

NOTES:

1. REMOVE POWER FOR EXISTING AH BACK TO PANEL.
2. REMOVE POWER FOR EXISTING CU BACK TO PANEL.
3. REMOVE POWER FOR EXISTING EDH BACK TO PANEL.
4. REMOVE POWER FOR EXISTING VAV BACK TO PANEL.

ELECTRICAL SYMBOL SCHEDULE

ALL SYMBOLS SHOWN ARE NOT NECESSARILY USED ON THE DRAWINGS

P1-12,14	HOME RUN CIRCUIT TO PANEL P1, BREAKER SPACES 12,14
	EACH ARROW INDICATES ONE CIRCUIT
	SHORT HATCH MARKS INDICATE # OF PHASE CONDUCTORS
	LONG HATCH MARKS INDICATE # OF NEUTRAL CONDUCTORS
	NO HATCH MARKS INDICATE TWO CONDUCTORS
	ADDITIONALLY, EVERY CIRCUIT TO INCLUDE CODE SIZED GROUND
	TIE TO EXISTING
	RECEPTACLE OUTLET (SINGLEPLEX - DUPLEX - QUADRUPLEX)
	CRITICAL RECEPTACLE OUTLET (SINGLEPLEX - DUPLEX - QUADRUPLEX)
	FLOOR DUPLEX RECEPTACLE - FLOOR QUADRUPLEX RECEPTACLE
	FLOOR SPECIAL POWER - SPECIAL POWER
GFI WP	GROUND FAULT CIRCUIT INTERRUPT - WEATHER PROOF
	*HARD-WIRED WALL MOUNTED CLOCK
J P JA	JUNCTION BOX - PULL BOX - JUNCTION BOX ABOVE CEILING
C D S F	CONTACTOR - DISCONNECT - STARTER - FUSED DISCONNECT
	ELECTRIC MOTOR
	ELECTRIC PANEL
TS	TAMPER SWITCH
D HD SD	DUCT MOUNTED SMOKE DETECTOR - HEAT DETECTOR - SMOKE DETECTOR
R	INTERLOCK RELAY

* MINIMUM 3/4" CONDUIT WITH JUNCTION BOX AND PULL STRING.

STATE OF MISSOURI
MIKE KEHOE, GOVERNOR

REGISTERED STATE OF MISSOURI WAYNE A. STROPE NUMBER 2001018816 REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 12-31-25

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REPLACE HEAT PUMPS
EW THOMPSON STATE SCHOOL

1520 THOMPSON BLVD
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PROJECT: E2328-01
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01 POWER RENOVATION FLOOR PLAN

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

GENERAL NOTES:

1. DRAWINGS (PLANS, DETAILS AND SCHEMATICS ARE DIAGRAMMATIC IN NATURE AND INDICATE GENERAL LOCATION AND ARRANGEMENT OF NEW AND EXISTING MAJOR EQUIPMENT AND PIPING SYSTEMS. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING EXACT LOCATIONS AND DIMENSIONS OF ALL EQUIPMENT, PIPING AND PIPING COMPONENTS. CONTRACTOR IS ALSO RESPONSIBLE FOR FINAL TIE-IN POINT LOCATIONS BETWEEN NEW AND EXISTING PIPING SYSTEMS EQUIPMENT AND UTILITIES.

2. UNLESS OTHERWISE NOTED EXISTING SHOWN IN FADE-AWAY PEN. NEW, RELOCATED OR DEMOLITION ITEMS SHOWN IN DARK HEAVY PEN.

3. MATERIAL EXPOSED WITHIN THE RETURN AIR PLENUM SHALL BE NONCOMBUSTIBLE OR SHALL HAVE A FLAME SPREAD INDEX OF NOT MORE THAN 25 AND A SMOKE DEVELOPMENT INDEX OF NOT MORE THAN 50 WHEN TESTED IN ACCORDANCE WITH ASTM E84.

NOTES:

1. 3 #6 THHN, #10 CU GRD, ¾"C TO A NEW 50A, 3P BRKR IN MDP.
2. 3 #12 THHN, #12 CU GRD, ¾"C TO A NEW 15A, 3P BRKR IN MDP.
3. 3 #10 THHN, #10 CU GRD, ¾"C TO A NEW 25A, 3P BRKR IN MDP.
4. 2 #12 THHN, #12 CU GRD, ¾"C TO A NEW 15A, 2P BRKR IN MDP.
5. 2 #12 THHN, #12 CU GRD, ¾"C TO A NEW 20A, 2P BRKR IN MDP.
6. 2 #12 THHN, #12 CU GRD, ¾"C TO A NEW 20A, 1P BRKR IN NEAREST 208/120V PANEL.

STATE OF MISSOURI
MIKE KEHOE, GOVERNOR

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