

# RE-BID

## Shady Grove State School Replace HVAC and Controls Poplar Bluff, Missouri

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OWNER: STATE OF MISSOURI  
MICHAEL L. PARSON,  
GOVERNOR  
  
DEPARTMENT OF  
ELEMENTARY AND  
SECONDARY EDUCATION  
  
PROJECT  
MANAGEMENT: OFFICE OF ADMINISTRATION  
DIVISION OF FACILITIES  
MANAGEMENT,  
DESIGN AND CONSTRUCTION

DESIGNER: IMEG Corporation  
#15 Sunnen Drive, Suite 104  
St. Louis, Missouri 63143  
  
PROJECT NUMBER: E2010-01  
  
SITE NUMBER: 2024  
FACILITY NUMBER: 5012024003

BID DOCUMENTS  
November 27, 2023





2400 HIGH ST.  
POPLAR BLUFF, MO 63901



2400 HIGH ST.  
POPLAR BLUFF, MO 63901



**CODE BLOCK:**

**APPLICABLE CODES:**

- 2021 INTERNATIONAL BUILDING CODE
- 2021 INTERNATIONAL EXISTING BUILDING CODE
- 2021 INTERNATIONAL MECHANICAL CODE
- 2020 NATIONAL ELECTRIC CODE
- 2021 INTERNATIONAL PLUMBING CODE
- 2021 INTERNATIONAL ENERGY CONSERVATION CODE

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- E-500 ELECTRICAL SCHEDULES



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OFFICE OF ADMINISTRATION  
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SHADY GROVE STATE  
SCHOOL

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SHADY GROVE STATE SCHOOL  
RE-BID REPLACE HVAC AND  
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DATE: \_\_\_\_\_  
REVISION: \_\_\_\_\_  
DATE: \_\_\_\_\_

ISSUE DATE: 11/27/23

CAD DWG FILE: G-002  
DRAWN BY: AARMEY  
CHECKED BY: IMEG  
DESIGNED BY: BRESAN

SHEET TITLE:  
PROJECT COVERSHEET

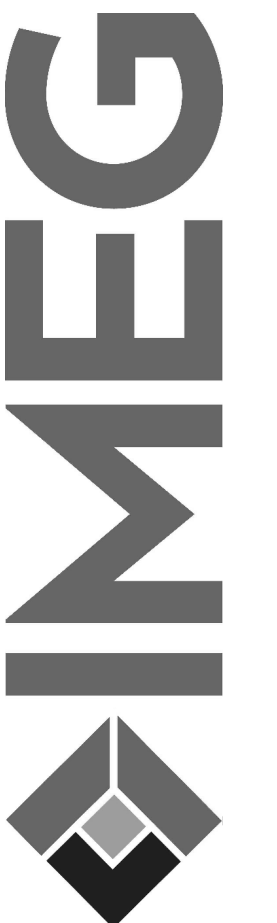
SHEET NUMBER:

**G-002**





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DATE: \_\_\_\_\_

ISSUE DATE: 11/27/23

CAD DWG FILE: M-000  
DRAWN BY: AARMNEY  
CHECKED BY: IMEG  
DESIGNED BY: BRESAN

SHEET TITLE:  
MECHANICAL  
COVERSHEET

SHEET NUMBER:

M-000

3 OF 21 SHEETS  
11/27/2023

**MECHANICAL GENERAL NOTES:**

THESE NOTES APPLY TO ALL MECHANICAL SHEETS AND TRADES, INCLUDING BUT NOT LIMITED TO VENTILATION, PIPING AND TEMPERATURE CONTROL.

- DRAWINGS SHOWING LOCATIONS OF EQUIPMENT, DUCTWORK, PIPING, ETC. ARE DIAGRAMMATIC AND MAY NOT ALWAYS REFLECT EXACT INSTALLATION CONDITIONS. DRAWINGS SHOW THE GENERAL ARRANGEMENT OF DUCTWORK, PIPING, EQUIPMENT, ETC., AND MAY NOT INCLUDE ALL OFFSETS AND FITTINGS REQUIRED FOR COMPLETE INSTALLATION. THE DRAWINGS SHALL BE FOLLOWED AS CLOSELY AS ACTUAL BUILDING CONSTRUCTION AND THE WORK OF OTHERS WILL PERMIT.
- DO NOT SCALE DRAWINGS. VERIFY ALL DIMENSIONS AND CLEARANCES FROM SUBMITTALS, AND OTHER APPROPRIATE DRAWINGS OR PHYSICALLY AT SITE. REVIEW ALL DRAWINGS, INCLUDING THOSE OF OTHER TRADES.
- COORDINATE ALL WORK WITH ALL OTHER TRADES PRIOR TO INSTALLATION TO PROVIDE CLEARANCES REQUIRED FOR OPERATION, MAINTENANCE, CODE COMPLIANCE, AND TO VERIFY NON-INTERFERENCE WITH OTHER WORK. DO NOT FABRICATE PRIOR TO VERIFICATION OF NECESSARY CLEARANCES FOR ALL TRADES. BRING ANY INTERFERENCES OR CONFLICTS TO THE ATTENTION OF THE ARCHITECT/ENGINEER BEFORE PROCEEDING WITH FABRICATION OR EQUIPMENT ORDERS.
- REVIEW SPACE REQUIREMENTS OF EQUIPMENT SPECIFIED OR SUBSTITUTED AND MAKE REASONABLE ACCOMMODATIONS IN LAYOUT AND POSITIONING TO PROVIDE PROPER ACCESS.
- ANY CHANGES REQUIRED TO ELIMINATE CONFLICTS OR THAT RESULT FROM A FAILURE TO COORDINATE SHALL BE MADE BY THE CONTRACTOR WITHOUT ADDITIONAL COST OR EXPENSE TO OTHERS.
- EACH CONTRACTOR IS RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH ELECTRICAL CHANGES REQUIRED FOR EQUIPMENT PROPOSED THAT DIFFERS FROM THE BASIS OF DESIGN.
- EACH CONTRACTOR IS RESPONSIBLE FOR DAMAGE CAUSED BY THEIR ACTIONS TO WALLS, FLOORS, AND CEILINGS. THE CONTRACTOR WHOSE WORK CAUSES DAMAGE IS RESPONSIBLE FOR PATCHING TO MATCH ORIGINAL CONSTRUCTION AND FINISH.
- IN AREAS WITH DRYWALL CEILINGS COORDINATE LOCATIONS OF ACCESS PANELS WITH THE GC FOR ACCESS TO VALVES, DUCTWORK ACCESSORIES, DAMPERS, ETC. COORDINATE PANEL TYPE AND COLOR WITH ARCHITECT. NOTIFY THE GC OF THE REQUIRED ACCESS PANELS PRIOR TO BIDDING.
- SEAL ALL FLOOR AND WALL PENETRATIONS AIRTIGHT WHERE CONDUITS, PIPING, AND DUCTS PENETRATE. PENETRATIONS THROUGH EXTERIOR WALLS SHALL BE SEALED AIRTIGHT WITH WATERPROOFING MATERIALS RECOMMENDED BY MANUFACTURER FOR OUTDOOR USE.
- CAULK ALL PIPE AND DUCT PENETRATIONS OF FULL HEIGHT NON-FIRE RATED WALL, PARTITION, AND FLOOR ASSEMBLIES. THIS IS ESSENTIAL TO PREVENT NOISE TRANSMISSION FROM ONE ROOM TO ANOTHER AND TO PROVIDE THE DESIRED NC LEVELS WITHIN ROOMS.
- WHERE PIPES AND DUCTS ARE SHOWN TO PENETRATE FLOORS, PROVIDE SLEEVED OPENINGS WITH THE TOP EDGE RAISED ABOVE FLOOR SURFACE IN ACCORDANCE WITH ALL RELEVANT SPEC SECTIONS. SEAL SLEEVE PERIMETER TO BE WATERTIGHT.
- EQUIPMENT SIZES AND SERVICE CLEARANCE REQUIREMENTS VARY AMONG DIFFERENT MANUFACTURERS. CONSULT APPROVED SHOP DRAWINGS FOR EQUIPMENT SIZES AND REQUIRED SERVICE CLEARANCES. COORDINATE WITH LAYOUT OF EQUIPMENT PADS, PIPING, DUCTWORK, ETC.
- DO NOT BLOCK TUBE PULL OR EQUIPMENT SERVICE CLEARANCES.
- MAINTAIN A MINIMUM WORKING CLEARANCE OF 3'-6" IN FRONT OF ALL ELECTRICAL EQUIPMENT REQUIRING MAINTENANCE, INSPECTION, AND TESTING INCLUDING BUT NOT LIMITED TO PANELS, DISTRIBUTION PANELS, SWITCHBOARDS, MOTOR CONTROL CENTERS, TRANSFORMERS, EQUIPMENT DISCONNECTS AND STARTERS.
- MAINTAIN THE DEDICATED ELECTRICAL EQUIPMENT SPACE DEFINED BY THE WIDTH / DEPTH OF ELECTRICAL EQUIPMENT MEASURED FROM THE FLOOR TO A HEIGHT 6'-0" ABOVE THE EQUIPMENT OR THE STRUCTURAL CEILING, WHICHEVER IS LOWER. SYSTEMS FOREIGN TO THE ELECTRICAL DISTRIBUTION SYSTEM ARE NOT ALLOWED IN THE DEDICATED ELECTRICAL SPACE INCLUDING; DUCTWORK, PIPING, ETC.
- PROVIDE CONCRETE EQUIPMENT PAD FOR ALL FLOOR MOUNTED EQUIPMENT. PAD SHALL EXTEND MINIMUM 6" BEYOND ALL SIDES OF EQUIPMENT. EXISTING PAD MAY BE UTILIZED OR EXTENDED TO MEET THIS REQUIREMENT.
- DO NOT SUPPORT EQUIPMENT, PIPING, OR DUCTWORK FROM METAL DECKING OR OTHER NON-STRUCTURAL BUILDING ELEMENTS. ANCHORS EMBEDDED IN CONCRETE SHALL BE CRACKED CONCRETE APPROVED IN ACCORDANCE WITH SPECIFICATIONS.
- E.C. SHALL COORDINATE WITH M.C. AND OWNER TO PHASE WORK TO MINIMIZE DOWN TIME. E.C. SHALL CONNECT REPLACED HEAT PUMPS, BOILERS, FLUID COOLERS, EXHAUST FANS, AND PUMPS TO EXISTING PANEL UNTIL NEW PANEL ARRIVES TO KEEP BUILDING OPERATIONAL. THE WORK WILL BE COORDINATED WITH THE OWNER TO ALLOW PARTIAL AREAS TO PERMIT CONSTRUCTION ACTIVITIES. WORK SHALL BE SUBSTANTIALLY COMPLETE WITHIN THE AREA TO ALLOW OWNER TO REOCCUPY BEFORE MOVING TO THE NEXT AREA. AREAS REQUIRING SHUTDOWN OF ESSENTIAL FUNCTIONS SUCH AS THE KITCHEN AND MAIN MECHANICAL ROOM SHALL BE TIGHTLY COORDINATED WITH THE OWNER AND SCHOOL SCHEDULE TO ALLOW FOR WORK TO NOT AFFECT BUILDING OCCUPANCY.

**MECHANICAL RENOVATION NOTES:**

THESE NOTES APPLY TO ALL MECHANICAL SHEETS AND TRADES, INCLUDING BUT NOT LIMITED TO VENTILATION, PIPING AND TEMPERATURE CONTROL.

- EXISTING CONDITIONS ARE SHOWN BASED ON INFORMATION OBTAINED FROM FIELD SURVEYS, EXISTING BUILDING DOCUMENTS, AND STAFF. VERIFY EXISTING CONDITIONS AND REPORT ANY CONFLICTS BEFORE PROCEEDING.
- NOT ALL EXISTING DUCTWORK AND PIPING IS SHOWN. VERIFY EXISTING CONDITIONS BEFORE STARTING WORK. NOTIFY ENGINEER OF ANY CONFLICTS WITH NEW WORK.
- FIELD VERIFY THE AVAILABLE CLEARANCES FOR DUCTWORK AND PIPING BEFORE FABRICATION. RISES AND DROPS MAY BE NECESSARY BECAUSE OF EXISTING FIELD CONDITIONS.
- EACH CONTRACTOR SHALL FIELD VERIFY ACCESSIBILITY TO THE AREA OF THEIR WORK AND SHALL NOTIFY THE GENERAL CONTRACTOR PRIOR TO BIDDING IF OTHER UTILITIES ARE REQUIRED TO BE REMOVED OR RELOCATED TO ALLOW ACCESS TO THEIR AREA OF WORK.
- EACH CONTRACTOR SHALL CUT AND PATCH WALLS AND FLOORS ASSOCIATED WITH THEIR WORK.
- THE GENERAL CONTRACTOR IS RESPONSIBLE FOR REMOVAL AND REPLACEMENT OF CEILINGS, CEILING TILES, AND CEILING GRIDS ASSOCIATED WITH AREAS OF WORK BY ALL CONTRACTORS. NOTIFY THE GENERAL CONTRACTOR OF AFFECTED AREAS PRIOR TO BIDDING.
- WHERE EXISTING MECHANICAL SYSTEMS ARE LOCATED IN AREAS THAT CONFLICT WITH NEW EQUIPMENT, PIPING, OR DUCTWORK TO BE INSTALLED, EACH CONTRACTOR SHALL EITHER ARRANGE NEW EQUIPMENT, PIPING, OR DUCTWORK IN SUCH A FASHION THAT IT DOES NOT CONFLICT WITH EXISTING SYSTEMS, OR REWORK EXISTING MECHANICAL SYSTEMS TO ALLOW FOR INSTALLATION OF NEW EQUIPMENT, PIPING, OR DUCTWORK.
- PROVIDE TEMPORARY CONNECTIONS TO MAINTAIN EXISTING SYSTEMS IN SERVICE DURING CONSTRUCTION. MAINTAIN ACCESS TO EXISTING MECHANICAL INSTALLATIONS THAT REMAIN ACTIVE.
- OBTAIN PERMISSION FROM OWNER BEFORE SHUTTING DOWN ANY SYSTEM FOR ANY REASON. MAINTAIN SERVICE TO ALL COMPONENTS THAT ARE TO REMAIN UNTIL NEW SYSTEMS ARE INSTALLED.
- MAINTAIN EXISTING SYSTEM IN SERVICE UNTIL NEW SYSTEM IS COMPLETE AND READY FOR TIE IN AND SWITCHOVER. DRAIN SYSTEM ONLY TO MAKE SWITCHOVERS AND CONNECTIONS. OBTAIN PERMISSION FROM OWNER BEFORE PARTIALLY OR COMPLETELY DRAINING SYSTEM. MAKE CHANGEOVER TO NEW SYSTEMS WITH MINIMUM OUTAGE.
- DISCONNECT AND REMOVE MECHANICAL DEVICES AND EQUIPMENT SERVING EQUIPMENT THAT HAS BEEN REMOVED.
- CONTRACTOR SHALL CLEAN AND FLUSH PIPING SYSTEM AFTER INSTALLATION IS COMPLETE. CONTRACTOR SHALL OBTAIN CLEANING CHEMICALS AND INSTRUCTIONS FROM WALTER LOUIS FLUID TECHNOLOGIES (WALTER LOUIS FLUID TECHNOLOGIES, 217-223-2017, ROGER SMITH, DENNIS GIER). CONTRACTOR SHALL INSPECT PIPING PRIOR TO CLEANING AND CLEAN ALL WATER SYSTEM STRAINERS AFTER CLEANING AND FLUSHING OPERATIONS. FOLLOWING CLEANING AND FLUSHING, INSPECT THE SYSTEM FOR CLEANLINESS AND THE INITIAL DOSAGE OF PROTECTIVE TREATMENT SHALL BE APPLIED. THE FINAL PROTECTIVE TREATMENT CHEMICALS ARE NOT A PART OF THIS CONTRACT AND SHALL BE PURCHASED BY THE OWNER.

**VENTILATION GENERAL NOTES:**

- UNLESS NOTED OTHERWISE, THE SIZE OF EACH BRANCH DUCT TO AN AIR TERMINAL SHALL MATCH THE INLET SIZE.
- ALIGN TEMPERATURE SENSORS WITH LIGHT SWITCHES AND WHEN IN CLOSE PROXIMITY TO EACH OTHER.
- PROVIDE ACCESS DOORS AT ALL DUCT MOUNTED EQUIPMENT.
- CONTRACTOR MAY REUSE PORTIONS OF EXISTING DUCT PROVIDED SIZES AND PRESSURE CLASSES ARE CORRECT, DUCT IS THOROUGHLY CLEANED AND FREE OF DEFECTS, AND ALL TRANSVERSE JOINTS, LONGITUDINAL SEAMS, AND DUCT WALL PENETRATIONS ARE SEALED AS SPECIFIED FOR NEW DUCTWORK.

**PIPING GENERAL NOTES:**

- THE SIZE OF BRANCH PIPING TO TERMINAL HEATING DEVICES AND COILS SHALL BE 3/4" UNLESS NOTED OTHERWISE.

**TAB POST-CONSTRUCTION NOTES:**

- AFTER CONSTRUCTION ACTIVITIES ARE COMPLETE, TESTING, ADJUSTING (TAB) AND BALANCING CONTRACTOR SHALL REBALANCE AIR HANDLING UNITS AND EXHAUST FANS AS REQUIRED TO ACHIEVE THE NEW AIRFLOW VALUES SHOWN ON THE CONSTRUCTION DRAWINGS.
- TAB CONTRACTOR SHALL COMPILER AND SUBMIT COPIES OF THE FINAL POST-CONSTRUCTION TAB REPORT AS REQUIRED BY SECTION 23 05 93.
- THE FINAL POST CONSTRUCTION REPORT SHALL INCLUDE ALL ITEMS REQUIRED IN THE SPECIFICATIONS.

**TEMPERATURE CONTROL GENERAL NOTES:**

- TEMPERATURE CONTROL CABLING, CONDUIT, BOXES, IDENTIFICATION: REFER TO THE SPECIFICATIONS FOR A COMPLETE LIST OF REQUIREMENTS. THE FOLLOWING SCHEDULE IS PROVIDED AS A CONVENIENCE. REFER TO SECTION 23 09 00 AND DIV 26 FOR ADDITIONAL DETAILED REQUIREMENTS.
  - A. CABLEWIRE JACKET COLOR: GREY
  - B. CONDUIT BOX COLOR ABOVE FINISHED CEILINGS AND UNFINISHED SPACES WITHOUT CEILINGS: GREY
  - C. CONDUIT BOX COLOR IN SPACES WITH EXPOSED FINISHED STRUCTURE: GREY
  - D. CABLEWIRE INSTALLATION: IN CONDUIT WHEN CONCEALED IN WALLS AND OTHER ASSEMBLIES. PLENUM-RATED CABLE SHALL BE USED ABOVE FINISHED ACCESSIBLE CEILINGS, INDEPENDENTLY SUPPORTED FROM OTHER SYSTEM CABLING/WIRE EVERY 4 FT WITH BRIDAL RINGS AND CABLE SADDLES. ALL CABLING SHALL BE IN CONDUIT IN SPACES WITH EXPOSED FINISHED STRUCTURE.
- T.C.C. SHALL COORDINATE WITH OTHER TRADES TO MAINTAIN EXISTING BUILDING AUTOMATION SYSTEM CAPABILITIES WHILE OTHER WORK IS ONGOING AND UNTIL THE NEW BUILDING AUTOMATION SYSTEM IS COMPLETELY OPERATIONAL.

MECHANICAL SYMBOL LIST	
NOT ALL SYMBOLS MAY APPLY.	
SYMBOL:	DESCRIPTION:
	STATIC SWITCH
	FLOW METER
	FLOW SWITCH
	FLOW SENSOR
	ALIGNMENT GUIDE
	METER
	DIRECTION OF AIR FLOW
	FLEXIBLE DUCT
	MANUAL VOLUME DAMPER
	RISE IN DIRECTION OF AIR FLOW
	DROP IN DIRECTION OF AIR FLOW
	DUCT CAP
	DUCT DOWN
	DUCT UP
	SUPPLY/OUTSIDE AIR DUCT SECTION
	RETURN AIR DUCT SECTION
	EXHAUST/RELIEF AIR DUCT SECTION
	4-WAY DIFFUSER WITH BLANKOFF IN ONE DIRECTION
	AIR TERMINAL PROPERTIES SYMBOL NECK SIZE/CFM
	HUMIDISTAT SENSOR
	HUMIDISTAT / SENSOR
	PRESSURE SENSOR/MONITOR
	PRESSURE SENSOR (DUCT MOUNTED)
	THERMOSTAT/SENSOR
	TEMPERATURE SENSOR
	TEMPERATURE SENSOR WITH WELL
	THERMOMETER WITH WELL (DIAL TYPE)
	THERMOMETER WITH WELL (FILLED TYPE)
	AIRFLOW MEASUREMENT SYMBOL XX - AHU SYMBOL Y - SEQUENTIAL NUMBER

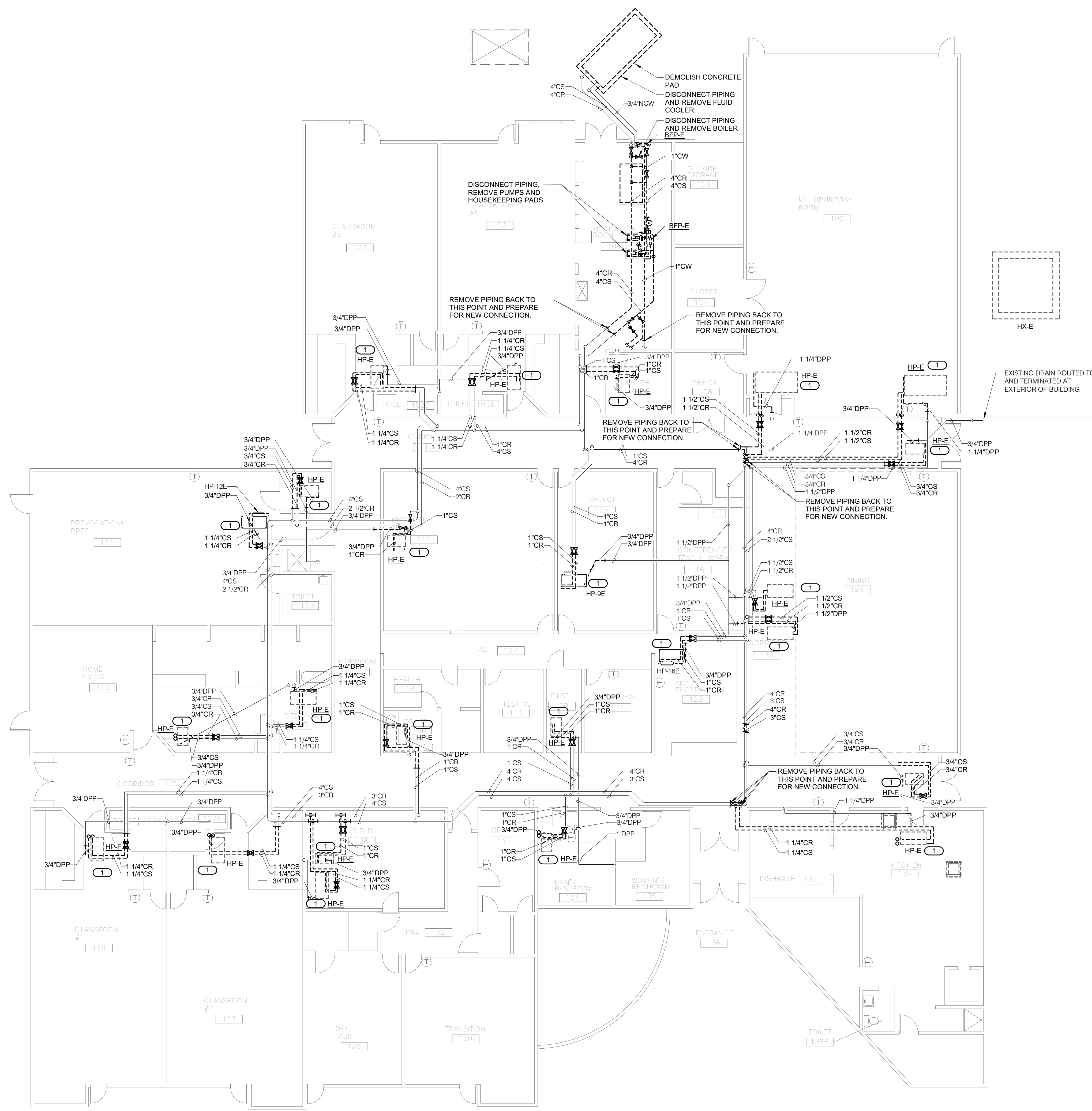
MECHANICAL SYMBOL LIST	
NOT ALL SYMBOLS MAY APPLY.	
SYMBOL:	DESCRIPTION:
	COLD WATER
	NON POTABLE COLD WATER
	CONDENSER WATER RETURN
	CONDENSER WATER SUPPLY
	DRAIN
	PIPE CAP
	PIPE DOWN
	PIPE UP OR UP/DOWN
	PITCH PIPE IN DIRECTION
	DIRECTION OF FLOW IN PIPE
	DIELECTRIC CONNECTION
	UNION/FLANGE
	SHUTOFF VALVE NORMALLY OPEN
	SHUTOFF VALVE NORMALLY CLOSED
	THROTTLING VALVE
	BALANCING VALVE (NUMBER INDICATES GPM)
	CONTROL VALVE (THREE-WAY)
	CONTROL VALVE (TWO-WAY)
	SOLENOID VALVE
	CHECK VALVE
	BACKFLOW PREVENTER
	SAFETY/RELIEF VALVE
	PRESSURE REDUCING VALVE (LIQUID/GAS)
	PUMP
	VACUUM BREAKER
	"WYE" - STRAINER
	"WYE" - STRAINER W/SHUTOFF VALVE AND HOSE CONNECTION WITH CAP
	BASKET STRAINER
	FLEXIBLE CONNECTION
	PRESSURE/TEMPERATURE TEST PLUG
	REDUCER - REFERENCE SPECIFICATION FOR CONCENTRIC/ECCENTRIC AND FOT/FOB
	SUCTION DIFFUSER WITH SUPPORT FOOT
	AUTOMATIC AIR VENT
	MANUAL AIR VENT
	DRAIN VALVE WITH HOSE CONNECTION AND CAP
	PRESSURE SENSOR (FURNISHED WITH BALL VALVE)
	PRESSURE GAUGE (FURNISHED WITH BALL VALVE)
	DIFFERENTIAL PRESSURE SENSOR

VIEW KEY	
	NAME
	LEVEL NAME
	HEIGHT ABOVE PROJECT 0'-0"
	INDICATES NOTE USED TO DESCRIBE ADDITIONAL INFORMATION ABOUT WORK REQUIRED, SPECIFIC TO THE SHEET AND/OR DETAIL
	INDICATES DIRECTION OF TRUE NORTH
	PLAN OR DETAIL NUMBER
	PLAN OR DETAIL NAME
	VIEW NAME
	1/8" = 1'-0"
	PLAN OR DETAIL SCALE
	INDICATES SIMILAR DETAIL REFERENCED IN MULTIPLE LOCATIONS
	DETAIL REFERRED TO BY SECTION CUT
	SHEET DETAIL IS LOCATED ON
<b>LINE TYPE AND TAG KEY:</b>	
	NEW WORK BY THIS CONTRACTOR (WIDE LINE)
	EXISTING TO BE REMOVED (SHORT DASHED PATTERN)
	NEW UNDERFLOOR OR UNDERGROUND (LONG DASHED PATTERN)
<b>EXISTING TO REMAIN OR WORK BY OTHERS (NARROW LINE)</b>	
	EXISTING
	EXISTING TO BE REMOVED BY OTHERS (SHORT DASHED PATTERN)
	EXISTING UNDERFLOOR OR UNDERGROUND (LONG DASHED PATTERN)
<b>HALFTONING DOES NOT MODIFY SCOPE.</b>	
	TAGS WITH DASH 'E' INDICATES THE REFERENCED OBJECT IS EXISTING
	UNDERLINED TAG INDICATES OBJECT IS IN-SCOPE. IF NEW, ADDITIONAL INFORMATION IS AVAILABLE IN A SCHEDULE, MATERIAL LIST, OR SYMBOL LIST
	INDICATES AN EXISTING SYSTEM'S POINT OF CONNECTION/REMOVAL

CONTRACTOR ABBREVIATION KEY	
ABBR:	DESCRIPTION:
C.C.	CIVIL CONTRACTOR
C.M.	CONSTRUCTION MANAGER
E.C.	ELECTRICAL CONTRACTOR
F.P.C.	FIRE PROTECTION CONTRACTOR
G.C.	GENERAL CONTRACTOR
M.C.	MECHANICAL CONTRACTOR
T.C.C.	TEMPERATURE CONTROLS CONTRACTOR

MECHANICAL ABBREVIATION KEY	
ABBR:	DESCRIPTION:
AD	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
BAS	BUILDING AUTOMATION SYSTEM
BFP	BACKFLOW PREVENTER
C	COMMON
CO	CLEANOUT
DPG (0-2")	DIFFERENTIAL PRESSURE GAUGE (RANGE)
EA	EXHAUST/RELIEF AIR
MA	MIXED AIR
MV	MIXING VALVE
NAC	NETWORK AREA CONTROLLER
N.C.	NORMALLY CLOSED
NIC	NOT IN CONTRACT
N.O.	NORMALLY OPEN
OA	OUTSIDE AIR
PS	PRESSURE SWITCH
RA	RETURN AIR
SA	SUPPLY AIR
SCCR	SHORT CIRCUIT CURRENT RATING
TYP	TYPICAL
UC-1	DOOR UNDERCUT BY OTHERS (1" TYPICAL)
UON	UNLESS OTHERWISE NOTES





**GENERAL NOTES:**

- CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL OF ANY GRID OR GYPSUM CEILING TO ACCOMPLISH EQUIPMENT REMOVAL. CONTRACTOR SHALL BE RESPONSIBLE FOR VISITING THE SITE DURING PROJECT BIDDING PERIOD TO IDENTIFY AREAS AND CEILINGS ASSOCIATED WITH EQUIPMENT REMOVAL AND INSTALLATION. COORDINATE CEILING MOUNTED EQUIPMENT SUCH AS LIGHTS WITH ELECTRICAL CONTRACTOR.

**KEYNOTES: ( # )**

- DISCONNECT CONDENSATE AND CONDENSER WATER PIPING FROM UNIT. REMOVE PIPING AND ASSOCIATED BALANCING VALVE, STRAINER, AND SHUTOFF VALVES.

STATE OF MISSOURI  
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MISSOURI CERTIFICATE OF AUTHORITY #F001525536

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ISSUE DATE: 11/27/23

CAD DWG FILE: MPD-100  
DRAWN BY: AARMEY  
CHECKED BY: IMEG  
DESIGNED BY: BRESAN

SHEET TITLE:  
FIRST FLOOR PLAN -  
MECHANICAL PIPING  
DEMOLITION

SHEET NUMBER:

MPD-100

4 OF 21 SHEETS  
11/27/2023

1 **FIRST FLOOR PLAN - MECHANICAL PIPING DEMOLITION**  
1/8" = 1'-0"





PROFESSIONAL SEAL



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CAD DWG FILE: MVD-100  
DRAWN BY: AARMEY  
CHECKED BY: IMEG  
DESIGNED BY: BRESAN

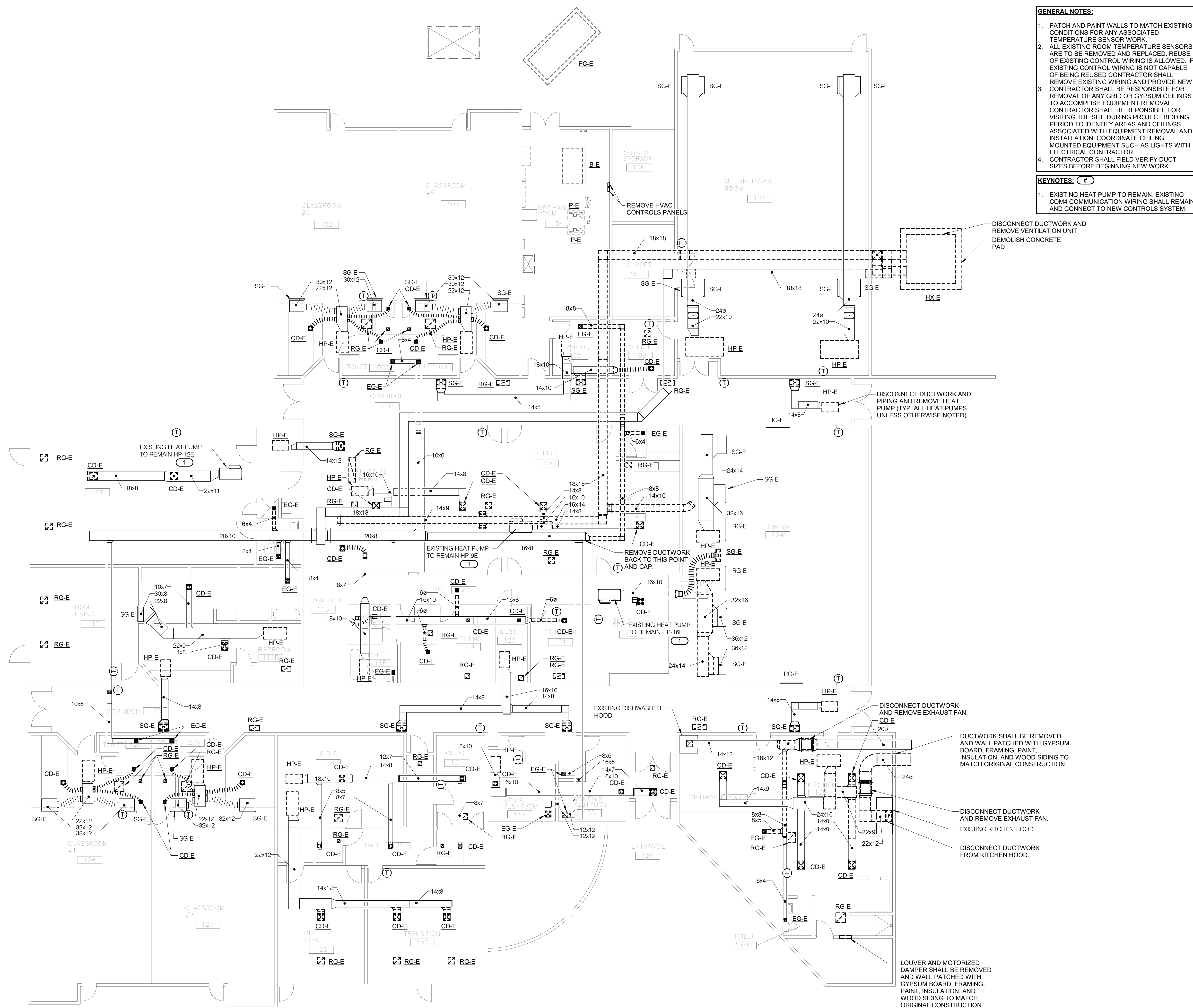
SHEET TITLE:  
FIRST FLOOR PLAN -  
VENTILATION  
DEMOLITION

SHEET NUMBER:

MVD-100

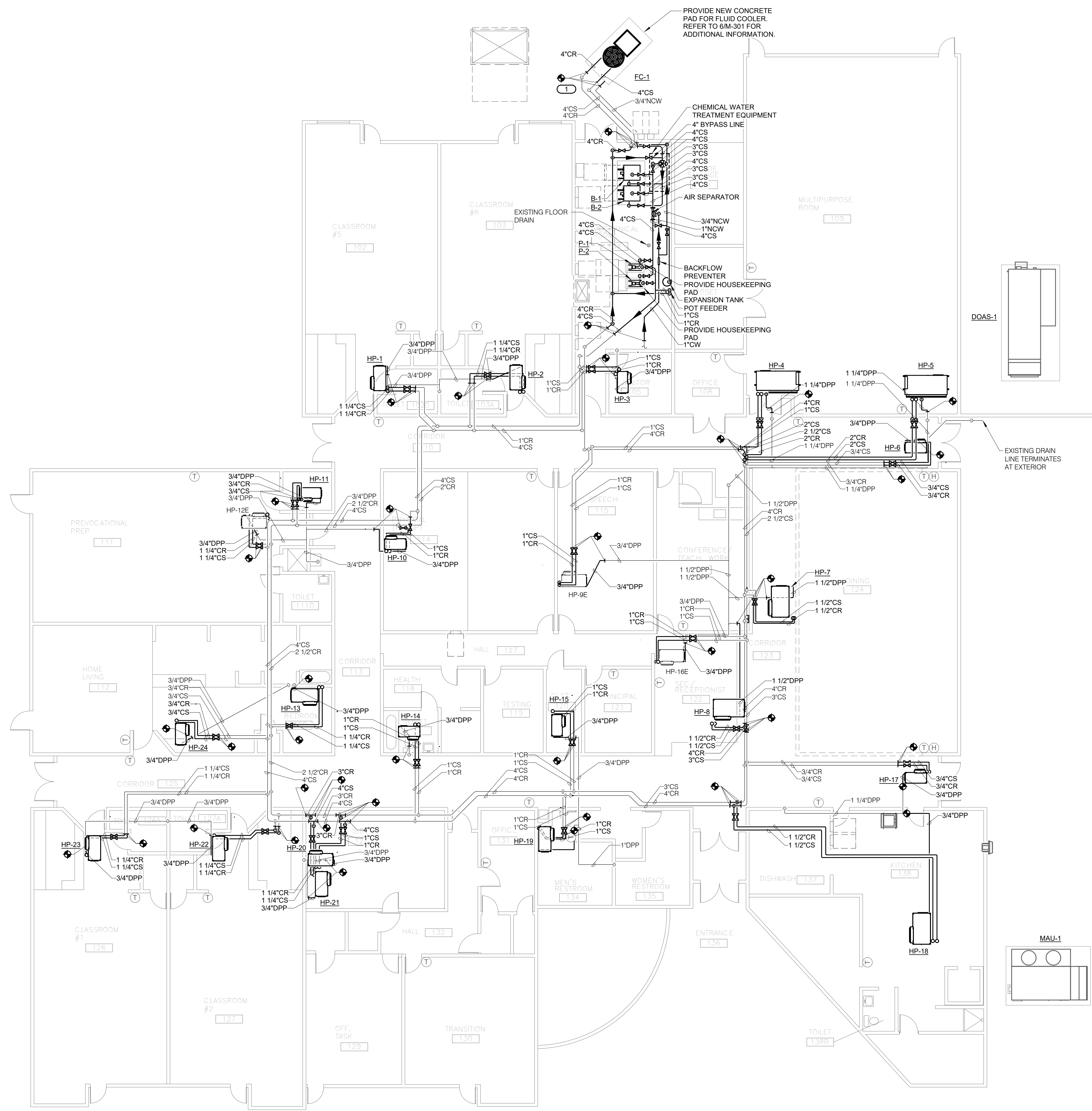
5 OF 21 SHEETS  
11/27/2023

- GENERAL NOTES:**
- PATCH AND PAINT WALLS TO MATCH EXISTING CONDITIONS FOR ANY ASSOCIATED TEMPERATURE SENSOR WORK.
  - ALL EXISTING ROOM TEMPERATURE SENSORS ARE TO BE REMOVED AND REPLACED. REUSE OF EXISTING CONTROL WIRING IS NOT CAPABLE OF BEING REUSED CONTRACTOR SHALL REMOVE EXISTING WIRING AND PROVIDE NEW. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL OF ANY GRID OR GYPSUM CEILINGS TO ACCOMPLISH EQUIPMENT REMOVAL. CONTRACTOR SHALL BE RESPONSIBLE FOR VISITING THE SITE DURING PROJECT BIDDING PERIOD TO IDENTIFY AREAS AND CEILINGS ASSOCIATED WITH EQUIPMENT REMOVAL AND INSTALLATION. COORDINATE CEILING MOUNTED EQUIPMENT SUCH AS LIGHTS WITH ELECTRICAL CONTRACTOR.
  - CONTRACTOR SHALL FIELD VERIFY DUCT SIZES BEFORE BEGINNING NEW WORK.
- KEYNOTES:** (T)
- EXISTING HEAT PUMP TO REMAIN. EXISTING COMMUNICATION WIRING SHALL REMAIN AND CONNECT TO NEW CONTROLS SYSTEM.



**1** FIRST FLOOR PLAN - VENTILATION DEMOLITION  
1/8" = 1'-0"





**GENERAL NOTES:**

1. MAIN PIPING SHALL BE PVC PIPE. PRIOR TO VALVE ASSEMBLY TO EACH HEAT PUMP PIPING SHALL BE COPPER. REFER TO 3M-300 FOR ADDITIONAL INFORMATION.
2. DESIGN INTENT IS TO MINIMIZE SYSTEM SWITCH OVER DOWN TIME. NEW CONDENSER SUPPLY PIPE ROUTE IS LOCATED ADJACENT TO EXISTING SUPPLY PIPE. CONDENSER RETURN PIPING IS LOCATED ADJACENT TO EXISTING RETURN PIPE. NEW PUMPS AND HEADERS CAN BE PLACED WEST OF EXISTING PUMPS. DOWN TIME FOR CROSSOVER IS ANTICIPATED TO HAPPEN AT CONNECTION BEFORE PIPING GOES UNDERGROUND TO FLUID COOLER. CONNECTION TO THE MAIN SYSTEM, AND REPLACEMENT OF THE EXISTING BOILER WITH THE NEW BOILER. CONTRACTOR TO COORDINATE WITH OWNER FOR ANTICIPATED DOWN TIME. COORDINATE EQUIPMENT SWITCH OVER WITH ELECTRICAL CONTRACTOR SCOPE.
3. CONTRACTOR SHALL BE RESPONSIBLE TO REINSTALL GRID OR GYPSUM CEILINGS UPON COMPLETION OF EQUIPMENT REPLACEMENT. FINISHED CEILINGS SHALL MATCH EXISTING CONDITIONS. COORDINATE CEILING MOUNTED EQUIPMENT SUCH AS LIGHTS WITH ELECTRICAL CONTRACTOR. PROVIDE AND COORDINATE LOCATIONS OF ACCESS PANELS WITH EQUIPMENT AND VALVES WHEN LOCATED ABOVE GYPSUM CEILINGS.

**KEYNOTES: ( # )**

1. MAINTAIN AND EXTEND EXISTING HEAT TRACE FOR NEW PIPING ABOVE GROUND ROUTED TO NEW FLUID COOLER. COORDINATE WITH ELECTRICAL CONTRACTOR.

1 **FIRST FLOOR PLAN - MECHANICAL PIPING**  
1/8" = 1'-0"





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SHADY GROVE STATE SCHOOL  
RE-BID REPLACE HVAC AND  
CONTROLS

POPLAR BLUFF, MISSOURI

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SITE # 2024  
FACILITY # 5012024003

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REVISION: \_\_\_\_\_  
DATE: \_\_\_\_\_  
ISSUE DATE: 11/27/23

CAD DWG FILE: MV-100  
DRAWN BY: AARMEY  
CHECKED BY: IMEG  
DESIGNED BY: BRESAN

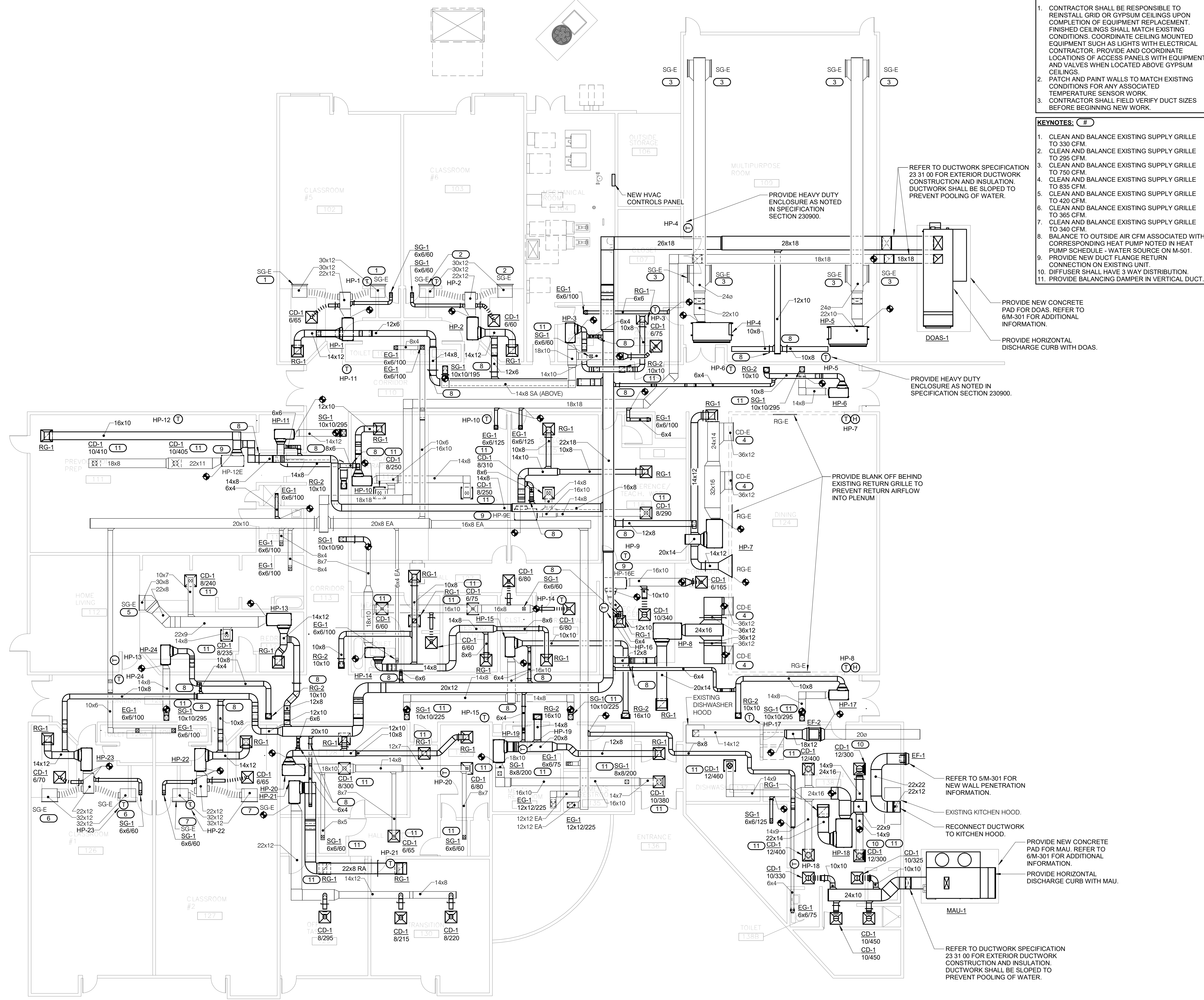
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VENTILATION

SHEET NUMBER:

MV-100

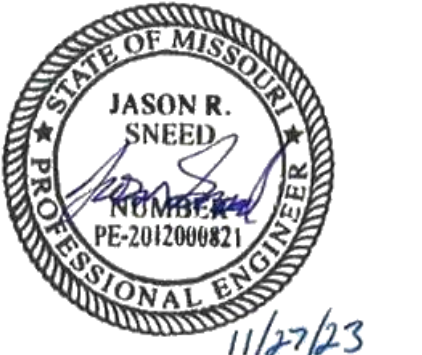
7 OF 21 SHEETS  
11/27/2023

- GENERAL NOTES:**
- CONTRACTOR SHALL BE RESPONSIBLE TO REINSTALL GRID OR GYPSUM CEILINGS UPON COMPLETION OF EQUIPMENT REPLACEMENT. FINISHED CEILINGS SHALL MATCH EXISTING CONDITIONS. COORDINATE CEILING MOUNTED EQUIPMENT SUCH AS LIGHTS WITH ELECTRICAL CONTRACTOR. PROVIDE AND COORDINATE LOCATIONS OF ACCESS PANELS WITH EQUIPMENT AND VALVES WHEN LOCATED ABOVE GYPSUM CEILINGS.
  - PATCH AND PAINT WALLS TO MATCH EXISTING CONDITIONS FOR ANY ASSOCIATED TEMPERATURE SENSOR WORK.
  - CONTRACTOR SHALL FIELD VERIFY DUCT SIZES BEFORE BEGINNING NEW WORK.
- KEYNOTES: ( # )**
- CLEAN AND BALANCE EXISTING SUPPLY GRILLE TO 330 CFM.
  - CLEAN AND BALANCE EXISTING SUPPLY GRILLE TO 295 CFM.
  - CLEAN AND BALANCE EXISTING SUPPLY GRILLE TO 750 CFM.
  - CLEAN AND BALANCE EXISTING SUPPLY GRILLE TO 835 CFM.
  - CLEAN AND BALANCE EXISTING SUPPLY GRILLE TO 420 CFM.
  - CLEAN AND BALANCE EXISTING SUPPLY GRILLE TO 365 CFM.
  - CLEAN AND BALANCE EXISTING SUPPLY GRILLE TO 340 CFM.
  - BALANCE TO OUTSIDE AIR CFM ASSOCIATED WITH CORRESPONDING HEAT PUMP NOTED IN HEAT PUMP SCHEDULE - WATER SOURCED ON M-501.
  - PROVIDE NEW DUCT FLANGE RETURN CONNECTION ON EXISTING UNIT.
  - DIFFUSER SHALL HAVE 3 WAY DISTRIBUTION.
  - PROVIDE BALANCING DAMPER IN VERTICAL DUCT.

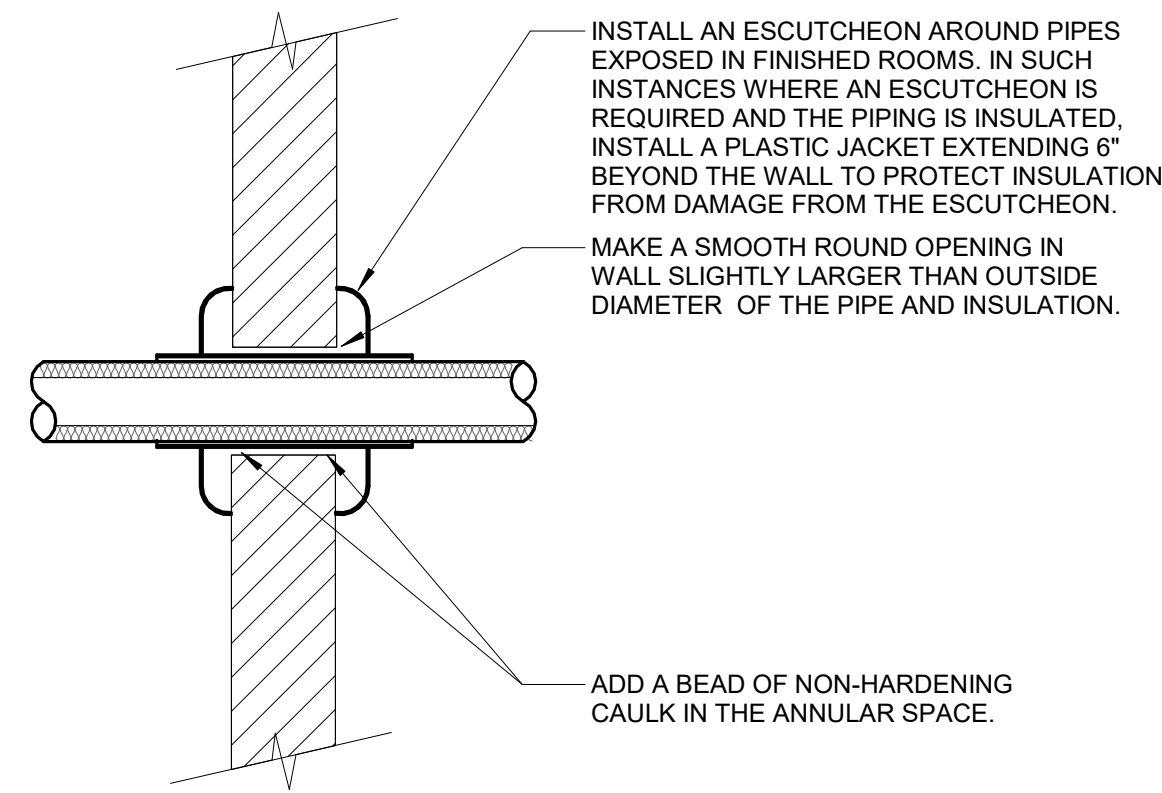


**1 FIRST FLOOR PLAN - VENTILATION**  
1/8" = 1'-0"  
NORTH





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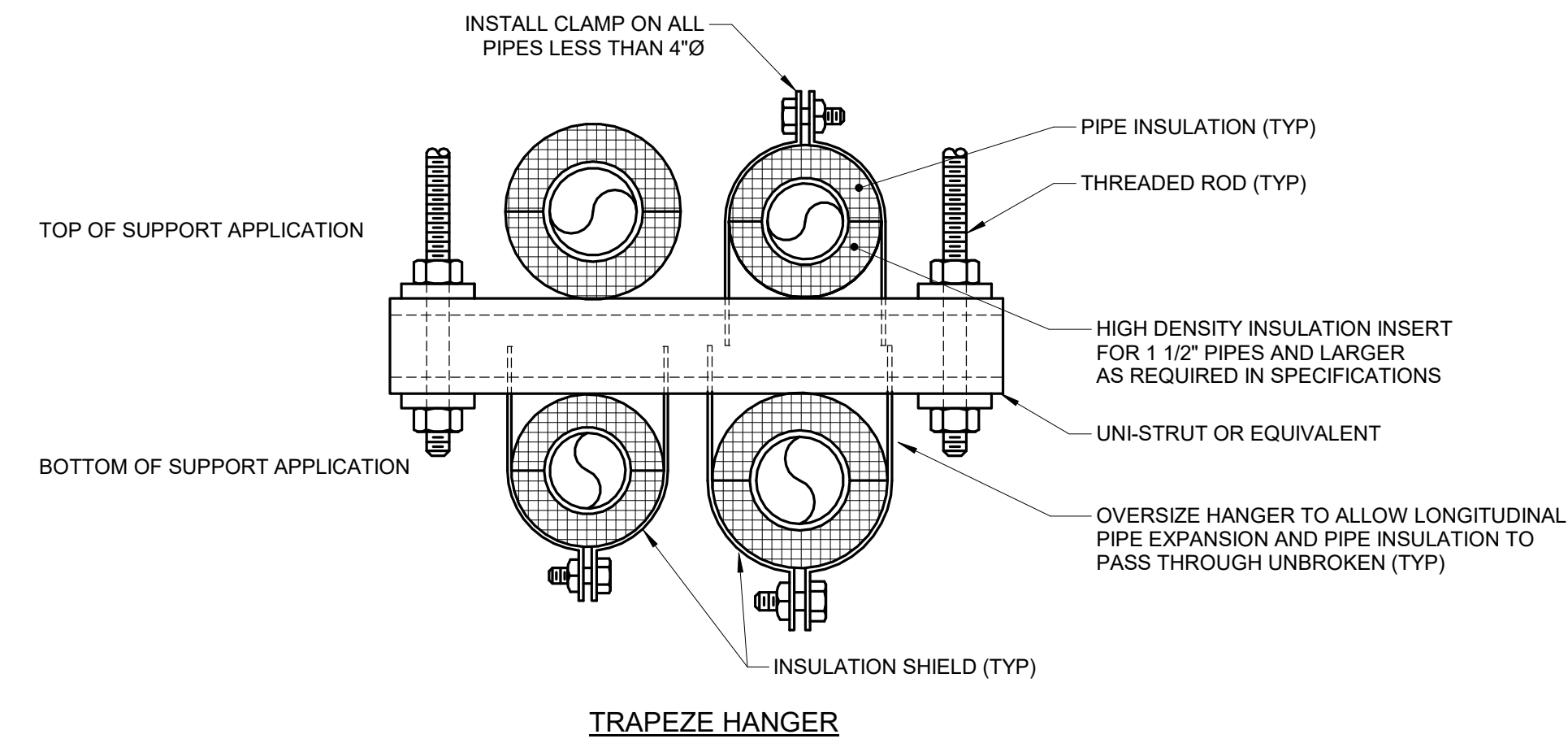
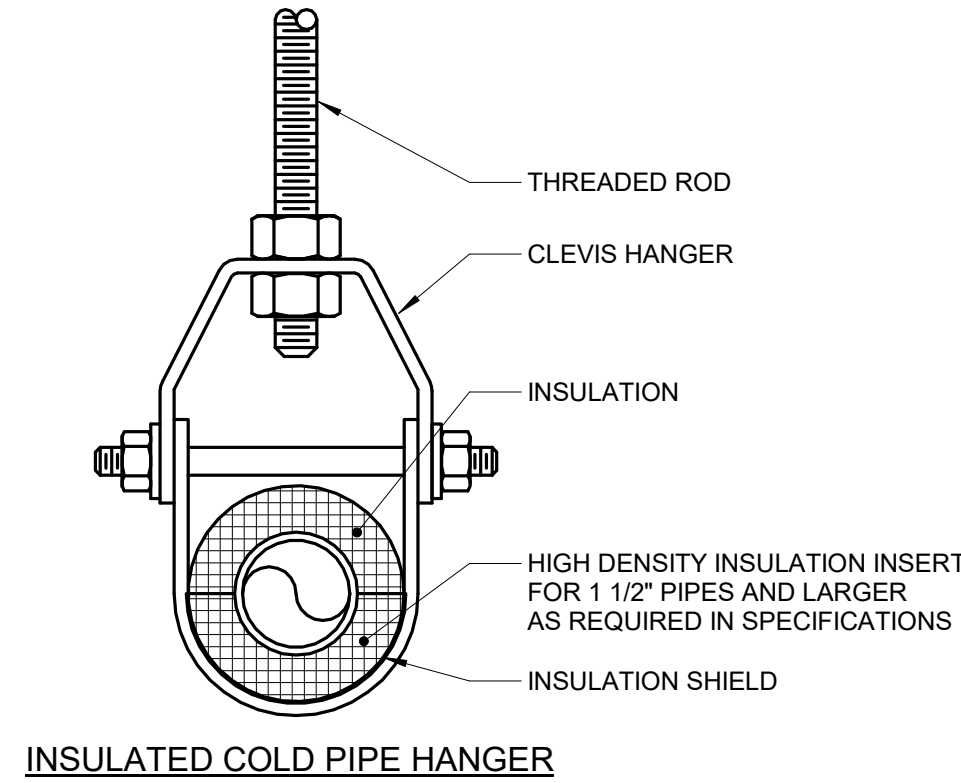


### 1 WALL PENETRATION - NON-FIRE RATED

NO SCALE

**NOTES:**

1. THIS DETAIL APPLIES TO ALL PIPES. THE INTENTION IS TO CONTINUE THE INSULATION AND VAPOR BARRIER THROUGH ALL PENETRATIONS. PERMIT THERMAL EXPANSION WITHOUT DAMAGING INSULATION, AND TO SEAL AIRTIGHT AROUND INSULATED AND UNINSULATED PIPES FOR NOISE TRANSMISSION CONTROL.
2. SEE SPECIFICATION SECTIONS (SECTION 23 05 29 - HVAC) FOR ADDITIONAL INFORMATION.

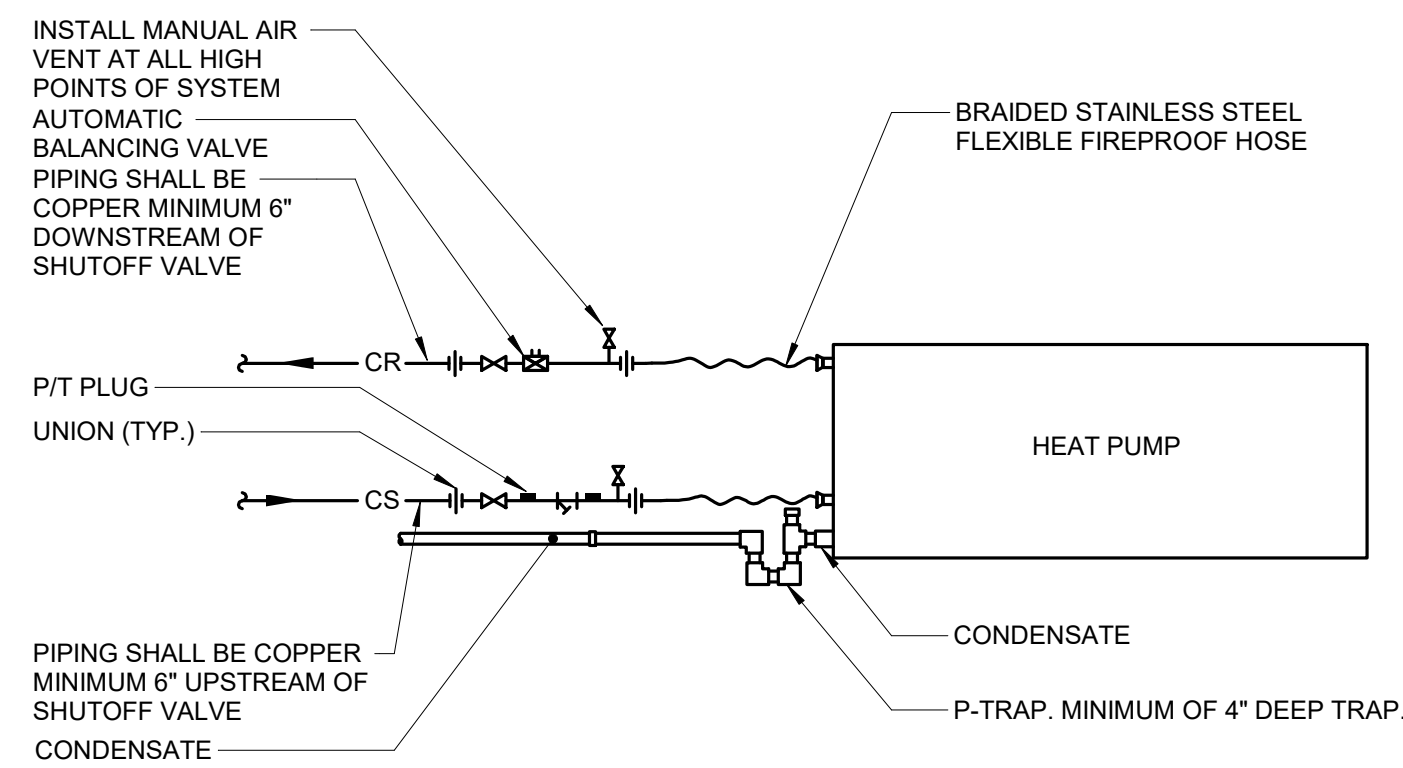


### 2 PIPE - HANGERS AND SUPPORTS

NO SCALE

**NOTES:**

1. REFER TO SPECIFICATION SECTIONS (SECTION 23 05 29-HVAC) & (SECTION 23 07 19-HVAC).



### 3 HEAT PUMP PIPING

NO SCALE

**NOTES:**

1. INSTALL PIPING PER MANUFACTURER'S RECOMMENDATIONS.

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DRAWN BY: AARMEY  
CHECKED BY: IMEG  
DESIGNED BY: BRESAN

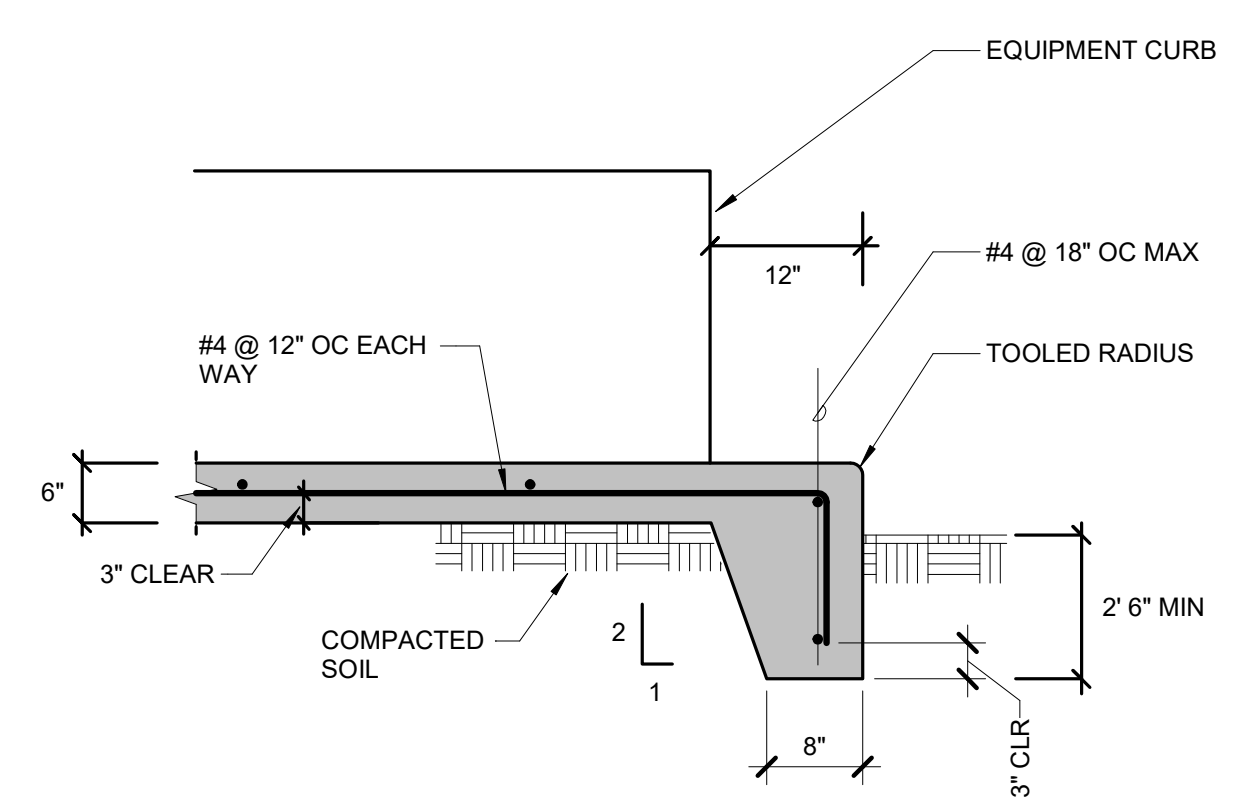
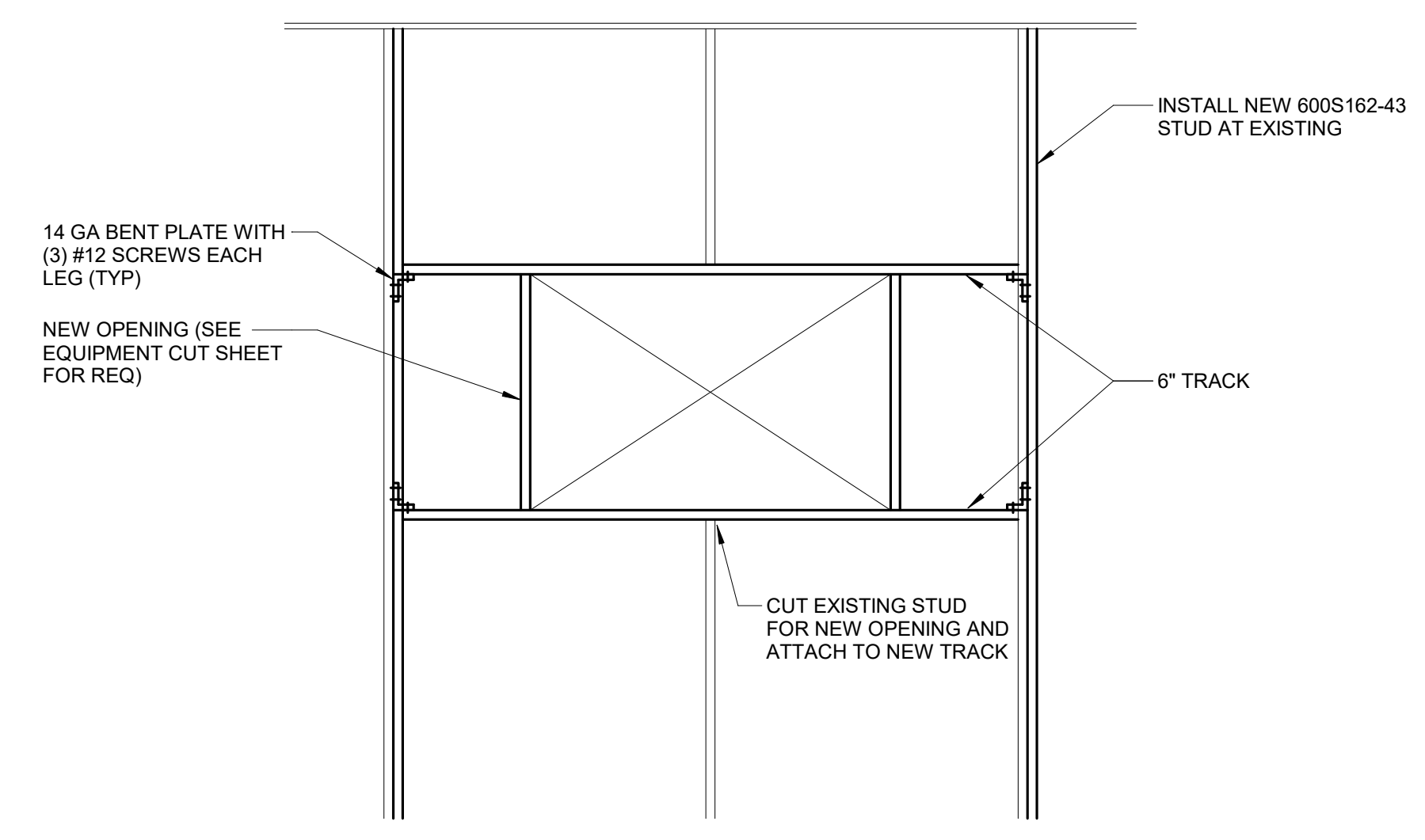
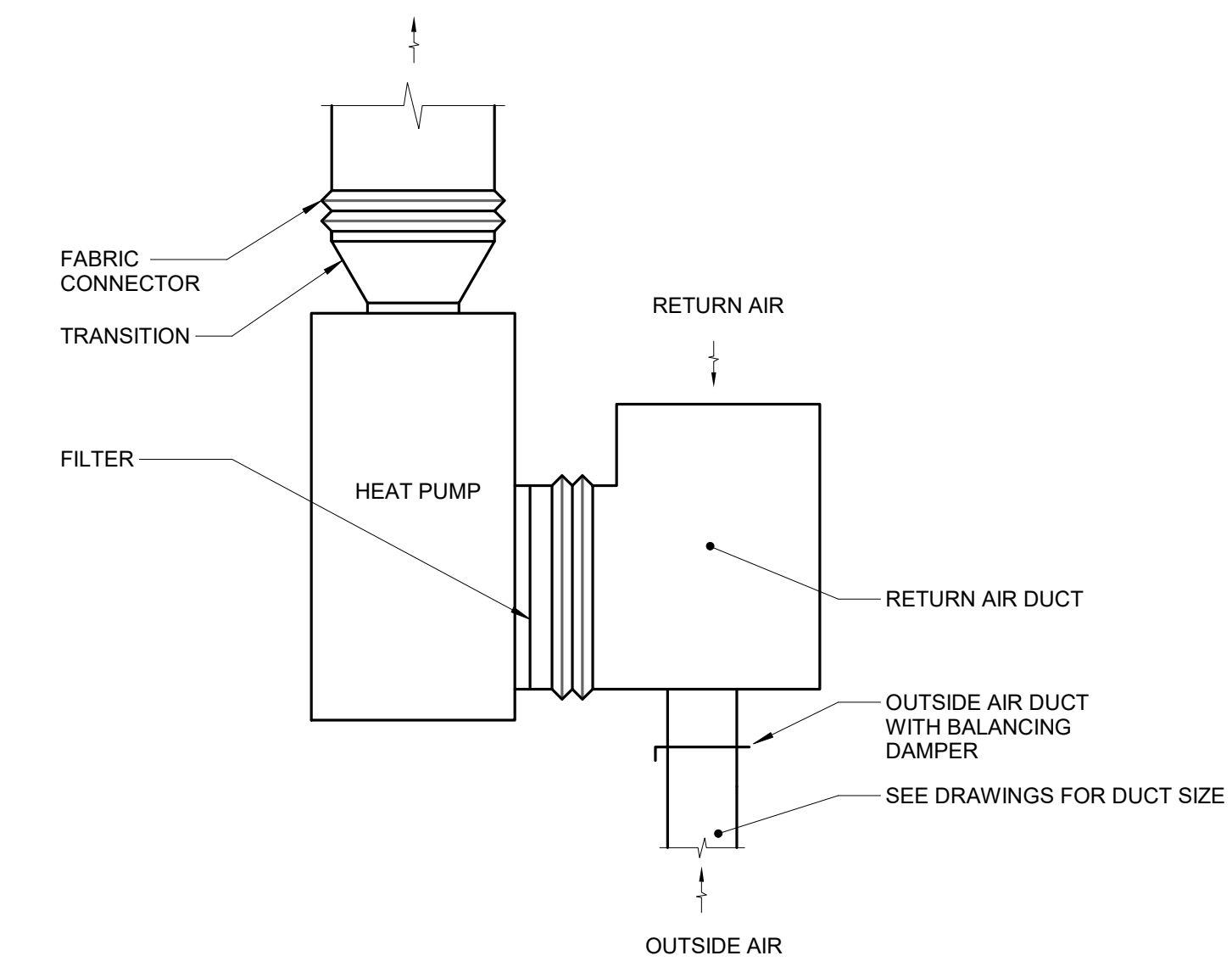
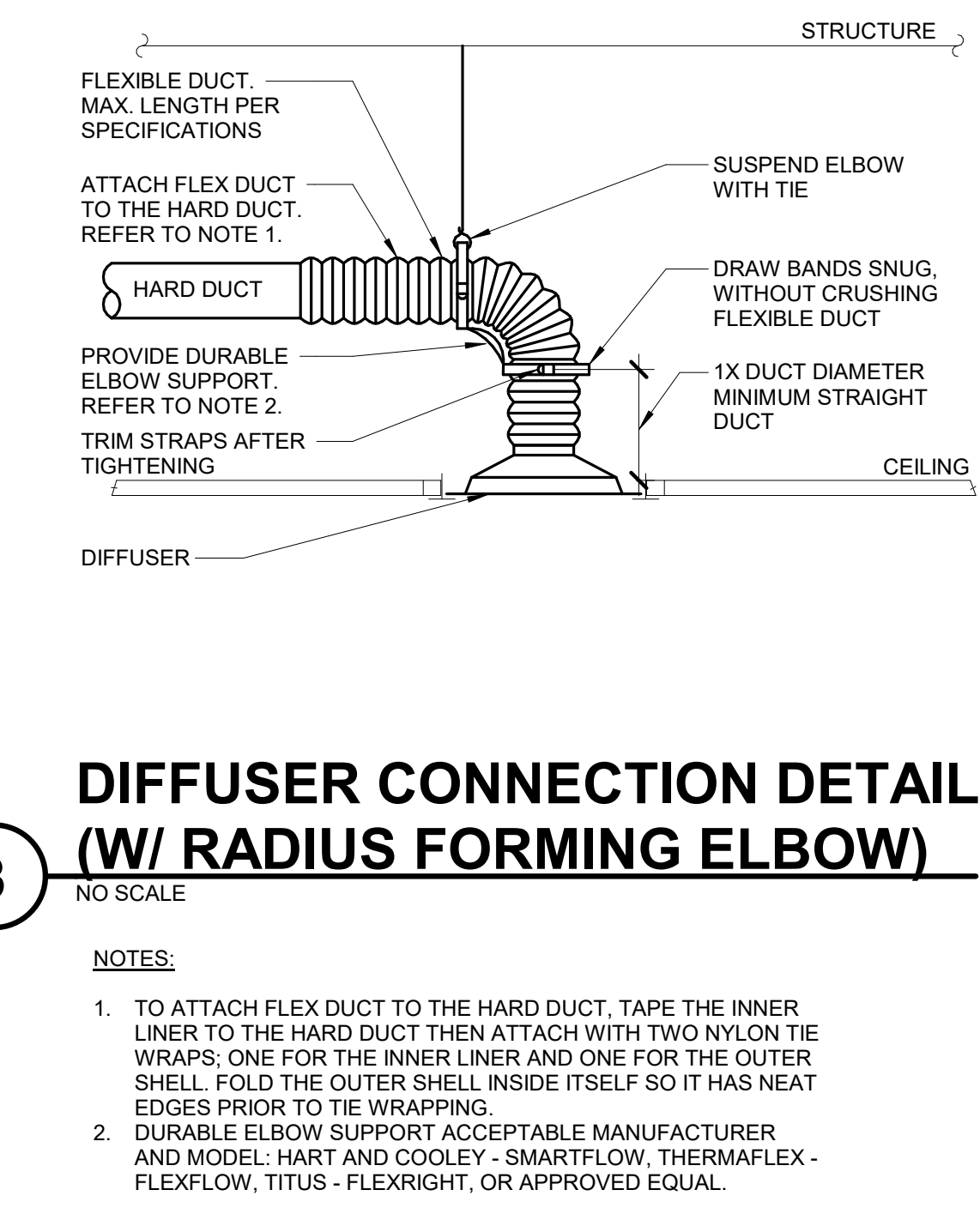
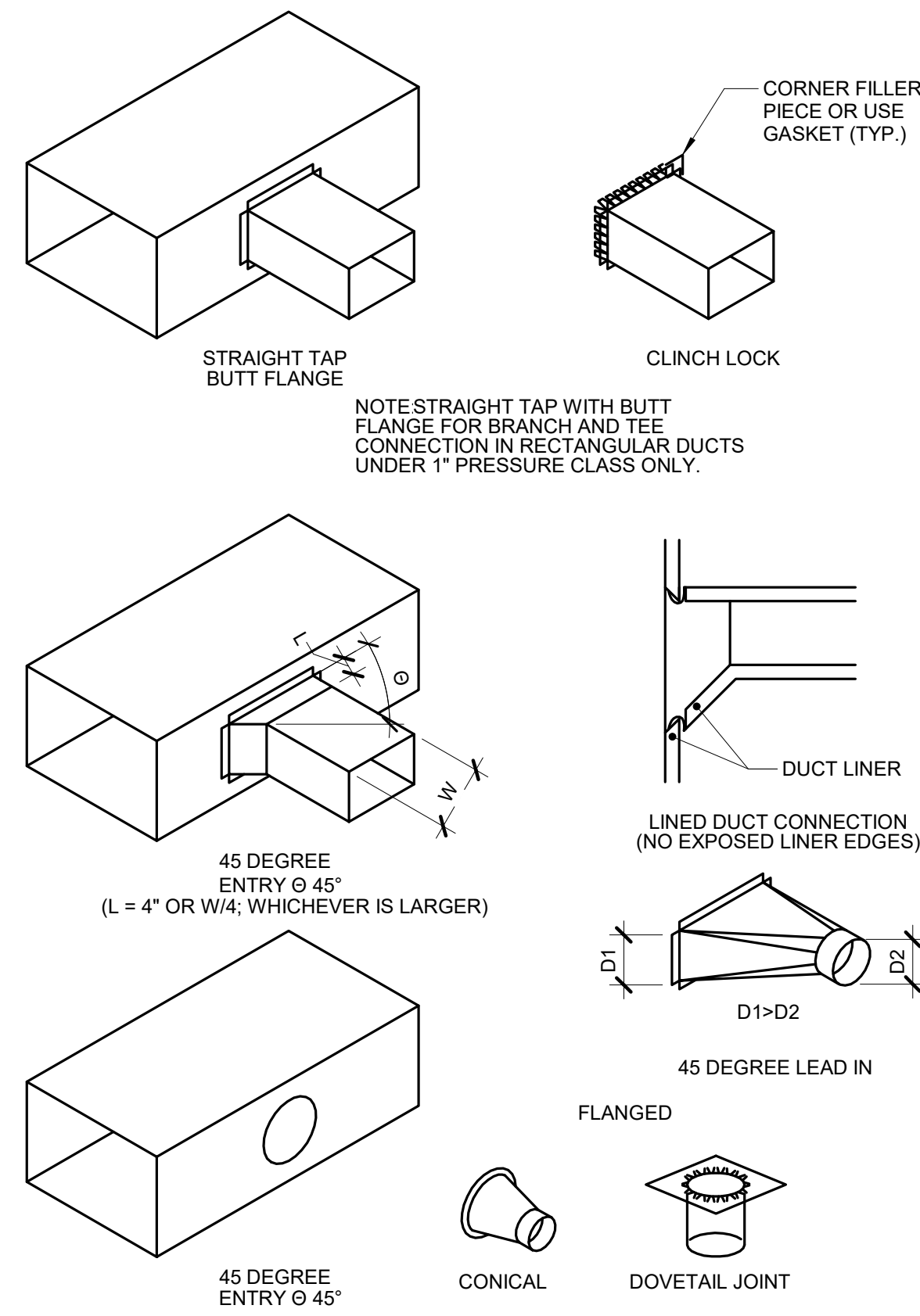
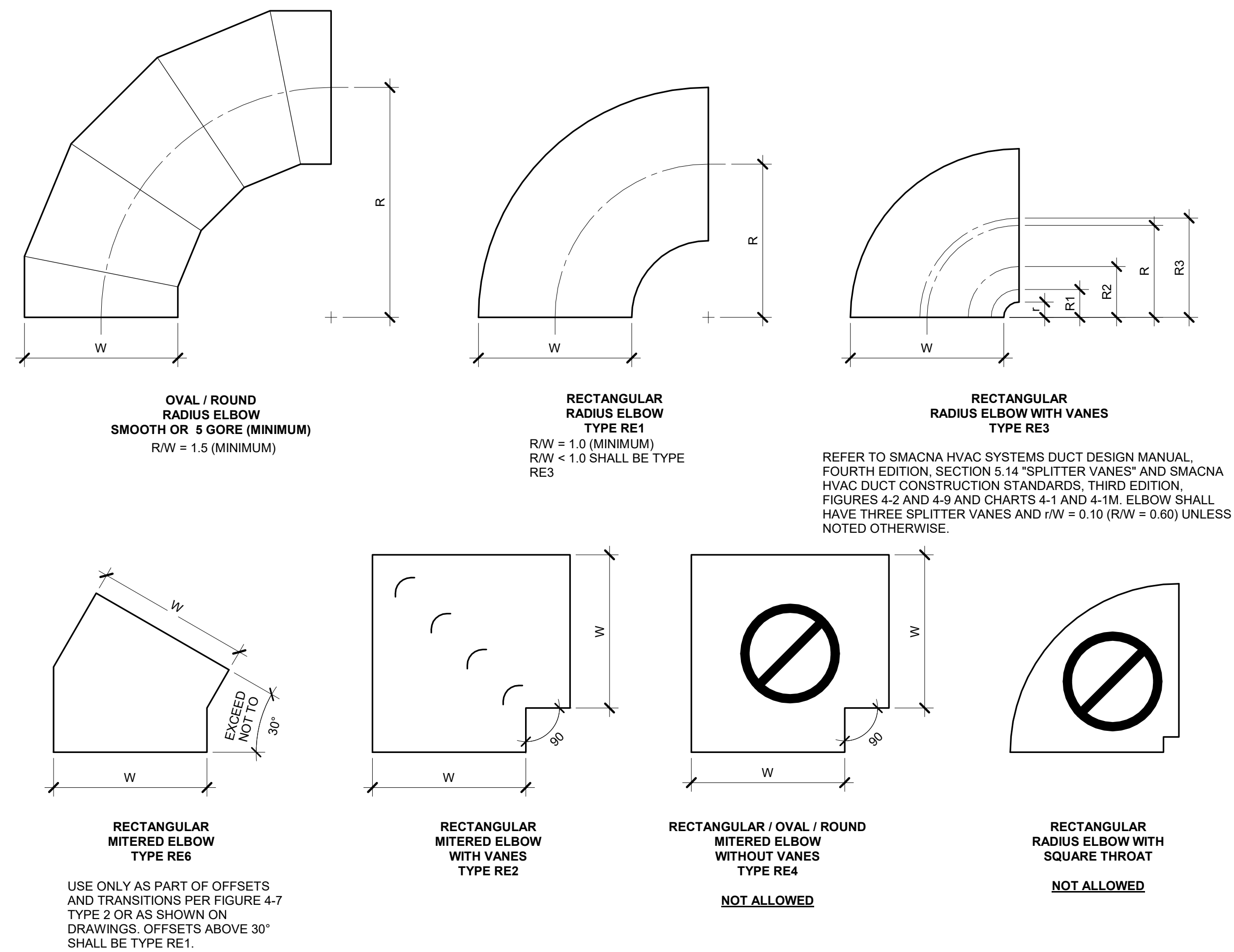
SHEET TITLE:  
MECHANICAL  
DETAILS

SHEET NUMBER:

**M-300**

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DATE: \_\_\_\_\_  
ISSUE DATE: 11/27/23

CAD DWG FILE: M-301  
DRAWN BY: AARMEY  
CHECKED BY: IMEG  
DESIGNED BY: BRESAN

SHEET TITLE:  
MECHANICAL  
DETAILS

SHEET NUMBER:

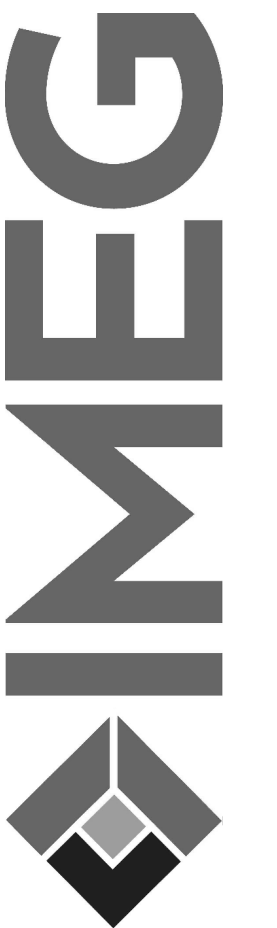
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REVISION: \_\_\_\_\_  
DATE: \_\_\_\_\_  
ISSUE DATE: 11/27/23

CAD DWG FILE: M-400  
DRAWN BY: AARMEY  
CHECKED BY: IMEG  
DESIGNED BY: BRESAN

SHEET TITLE:  
MECHANICAL  
DIAGRAMS

SHEET NUMBER:

M-400

10 OF 21 SHEETS  
11/27/2023

<p><b>DOAS REPORT GENERATION:</b> DDC BAS SHALL MONITOR THE FOLLOWING POINTS ON 10 MINUTE (ADJ.) INTERVALS WITHIN A SINGLE TREND. THE TREND SHALL RUN FOR A 365-DAY (ADJ.) DURATION AT WHICH POINT THE NEWEST VALUES SHALL AUTOMATICALLY OVERWRITE THE OLDEST VALUES:</p>	
<p><b>PROVIDED BY PACKAGED MANUFACTURER THROUGH GATEWAY TO BAS:</b></p> <ul style="list-style-type: none"> <li>SUPPLY AIR TEMP SETPOINT [°F]</li> <li>SUPPLY AIR TEMP (SAT) [°F]</li> <li>EXHAUST FILTER LOADING [STATUS]</li> <li>SUPPLY FILTER LOADING [STATUS]</li> <li>SUPPLY FAN VFD OUTPUT [% FULL SPEED]</li> <li>EXHAUST FAN VFD OUTPUT [% FULL SPEED]</li> <li>OUTSIDE AIR DAMPER POSITION [OPEN/CLOSE]</li> <li>EXHAUST AIR DAMPER POSITION [OPEN/CLOSE]</li> <li>ENERGY RECOVERY WHEEL [ON/OFF]</li> <li>GENERAL ALARM</li> <li>OUTSIDE AIR TEMPERATURE</li> <li>OUTSIDE AIR HUMIDITY</li> </ul>	<p><b>POINTS PROVIDED BY BAS AND SYSTEM:</b></p> <ul style="list-style-type: none"> <li>DATE</li> <li>TIME</li> <li>GLOBAL OUTSIDE AIR TEMP [°F]</li> <li>GLOBAL OUTSIDE AIR HUMIDITY [%RH]</li> <li>EXHAUST AIRFLOW [CFM]</li> <li>EXHAUST AIR TEMP ENTERING UNIT (EAT) [°F]</li> <li>EXHAUST AIR RELATIVE HUMIDITY ENTERING UNIT [%]</li> <li>OUTSIDE AIRFLOW [CFM]</li> <li>DOAS ENABLE/DISABLE</li> <li>DISCHARGE AIR TEMPERATURE SETPOINT ADJUST</li> <li>OUTSIDE AIR CFM SETPOINT</li> <li>SUPPLY AIR HUMIDITY</li> <li>FIRE ALARM</li> </ul>
<p>THIS INFORMATION SHALL BE ACCESSIBLE TO VIEW IN GRAPHICAL FORM ON THE BAS OPERATOR WORKSTATION. ONCE PER MONTH THE DDC BAS SHALL RECORD THE LARGEST DOAS AIRFLOW WHICH OCCURRED DURING THAT MONTH. THE DATE, TIME, OUTSIDE AIR TEMPERATURE (AND ALL OTHER VALUES LISTED ABOVE) THAT COINCIDED WITH THAT EVENT SHALL ALSO BE RECORDED. THIS INFORMATION SHALL BE STORED TO A MEMORY LOCATION ON THE BAS OPERATOR WORKSTATION THAT IS MAINTAINED (NOT AUTOMATICALLY OVERWRITTEN).</p>	

**DOAS REPORT GENERATION**  
TYPICAL FOR DOAS-1

DOAS EXHAUST FAN AIRFLOW SCHEDULE			
SYSTEM	SUPPLY CFM	PRESSURIZATION CFM	REMARKS
DOAS-1	3,810	1,960	NOTES 1, 2

- NOTES:
- DOAS EXHAUST FAN AIRFLOW SETPOINT SHALL BE THE SUPPLY FAN AIRFLOW MINUS THE PRESSURIZATION CFM.
  - EXHAUST FAN AIRFLOWS SHALL NOT BE THE CFM INDICATED ON THE FAN SCHEDULE, BUT SHALL BE THE AIRFLOW INDICATED IN THE FINAL TAB REPORT.

**CONTROL SYMBOL LIST**

NOT ALL SYMBOLS MAY APPLY.

SYMBOL:	DESCRIPTION:
CR	CONDENSER WATER RETURN
CS	CONDENSER WATER SUPPLY
AI	ANALOG INPUT
AO	ANALOG OUTPUT
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
F	FLOW SWITCH
H	HUMIDITY SENSOR (DUCT MOUNTED)
DSD	DUCT SMOKE DETECTOR
FAN	FAN
PUMP	PUMP
CV3	CONTROL VALVE (THREE-WAY)
CV2	CONTROL VALVE (TWO-WAY)
SV	SOLENOID VALVE
CHK	CHECK VALVE
HUM	HUMIDITY SENSOR
THR	THERMOSTAT
THR/SEN	THERMOSTAT/SENSOR WITH HEAVY DUTY ENCLOSURE
T/SEN	TEMPERATURE SENSOR (DUCT MOUNTED)
T/SEN	TEMPERATURE SENSOR WITH WELL
THR/SEN	THERMOMETER WITH WELL (DIAL TYPE)
THR/SEN	THERMOMETER WITH WELL (FILLED TYPE)
T/SEN	AVERAGING TEMPERATURE SENSOR
P	PRESSURE SENSOR (DUCT MOUNTED)
SP	STATIC SWITCH

- GENERAL CONTROL NOTES:**
- EACH D.I., D.O., A.I. AND A.O. POINT SHOWN FOR ALL CONTROL DIAGRAMS SHALL BE DISCRETE FROM ALL OTHER POINTS EXCEPT AS SPECIFICALLY NOTED.
  - ALL WIRING, CONTROL COMPONENTS, DEVICES AND PROGRAMMING SHOWN ON THESE CONTROL DRAWINGS SHALL BE PROVIDED BY THE TCC UNLESS SPECIFICALLY NOTED OTHERWISE.
  - ALL ACTUATORS SHALL BE OF THE ELECTRICAL TYPE FOR THIS PROJECT UNLESS AN ACTUATOR IS SPECIFICALLY INDICATED ON THE DRAWINGS OR SPECIFICATIONS TO BE PNEUMATIC.
  - ALL MODULATING DAMPER AND VALVE ACTUATORS SHOWN WITH POSITION FEEDBACK SHALL HAVE THE VALVE POSITION DISPLAYED ON GRAPHICAL SCREEN ADJACENT TO THE DAMPER/VALVE COMMAND SIGNAL. DISPLAYED VALVE POSITION SHALL BE FROM THE FEEDBACK DEVICE/CIRCUIT (OUTPUT SIGNAL FROM THE BAS TO THE ACTUATOR IS NOT ACCEPTABLE).
  - ALL CONTROL COMPONENTS SUCH AS RELAYS, SWITCHES, DDC CONTROLLERS, ETC. SHALL BE MOUNTED IN STEEL ENCLOSURES WITH STEEL MOUNTING BACKPLATES PER SPECIFICATION 23 09 00.
  - EACH CONTROL PANEL SHALL HAVE A LAMINATED COPY OF THE APPLICABLE SEQUENCE OF OPERATION AND CONTROL DIAGRAM INDICATING THE POINTS, COMPONENTS AND OPERATION OF EQUIPMENT ASSOCIATED WITH EACH PANEL. REFER TO SECTION 23 09 00 FOR ADDITIONAL REQUIREMENTS.
  - TCC SHALL WIRE THE CONTROL SIGNAL FROM THE ASSOCIATED AIR HANDLING UNIT CONTROL PANEL TO CONTROL THE OPERATION OF DAMPERS IN ACCORDANCE WITH SEQUENCE OF OPERATION. TCC SHALL PROVIDE ALL WIRING, CONDUIT, TRANSFORMERS, FUSING AND ALL OTHER ELECTRICAL COMPONENTS REQUIRED FOR COMPLETE INSTALLATION.
  - TCC SHALL EXTEND CONTROL SIGNAL FROM ADDRESSABLE RELAY DEVICE SERVING EACH AIR HANDLING UNIT. REFER TO ELECTRICAL DRAWINGS FOR LOCATIONS. TCC SHALL EXTEND AND TERMINATE WIRING AS REQUIRED FOR EQUIPMENT SHUTDOWN.
  - TCC SHALL PROVIDE CONDUIT RUNS AS REQUIRED FOR OUTDOOR EQUIPMENT AND FOR EQUIPMENT INSTALLED REMOTELY FROM THE MAIN BUILDING THAT IS BEING MONITORED OR CONTROLLED BY THE BAS.
  - TCC SHALL PROVIDE THERMOSTATS FOR AUTOMATIC CONTROL OF EQUIPMENT AS REQUIRED BY THESE CONTROL DRAWINGS. THERMOSTAT CONTACT AMP RATING SHALL BE MINIMUM 125% OF THE MAX. CURRENT DRAW FOR THE EQUIPMENT BEING SERVED. WHERE THERMOSTATS CONTROL THE STARTING OF MOTORS (I.E. FANS), THERMOSTATS SHALL BE RATED FOR MOTOR STARTING APPLICATIONS.
  - CONTROL DIAGRAMS ARE SCHEMATIC IN NATURE AND DO NOT SHOW ALL REQUIRED CONTROL DEVICES AND COMPONENTS. REFER TO FLOOR PLANS, FLOW DIAGRAMS AND DETAILS FOR ADDITIONAL CONTROL DEVICES, COMPONENTS AND REQUIREMENTS NOT SHOWN ON THESE CONTROL DRAWINGS.
  - TCC SHALL PROVIDE ALL CONTROL COMPONENTS AND ACCESSORIES AS REQUIRED FOR EQUIPMENT TO BE CONTROLLED AS DESCRIBED IN THE SEQUENCE OF OPERATION REGARDLESS OF WHETHER ALL CONTROL COMPONENTS OR POINTS ARE SHOWN IN THE ASSOCIATED CONTROL DIAGRAM.

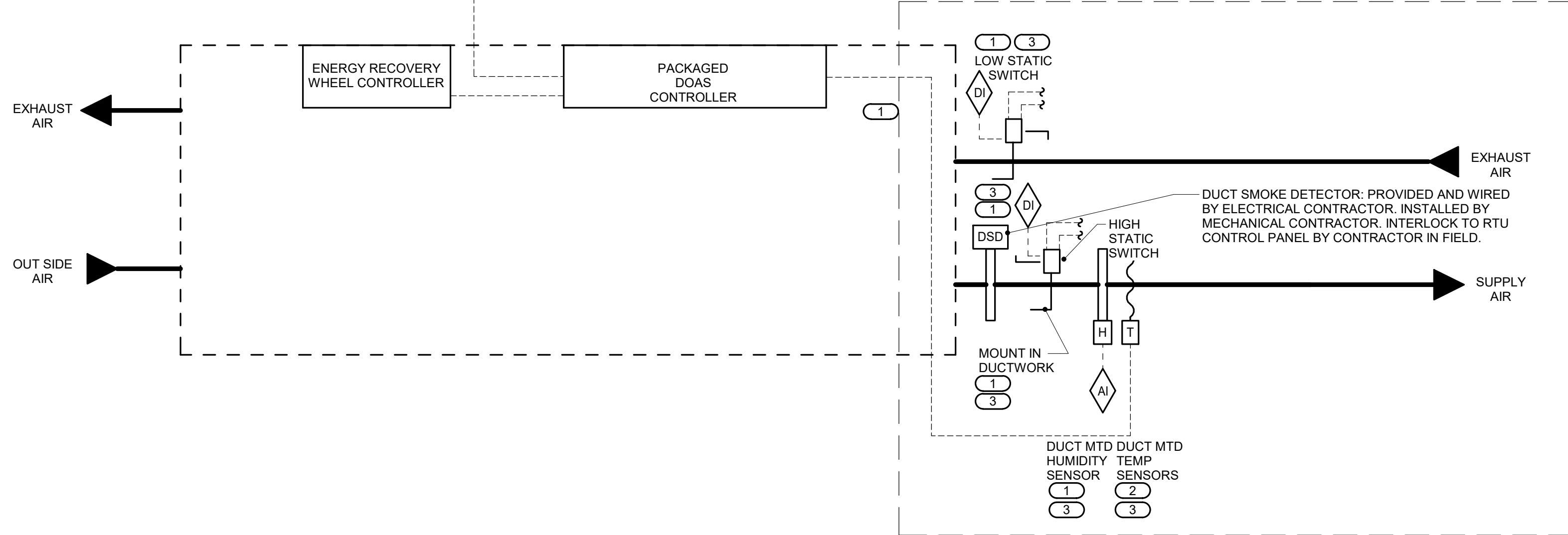
**TEMPERATURE CONTROLS ABBREVIATION KEY**

ABBR:	DESCRIPTION:
CS	CURRENT SENSING RELAY
EA	EXHAUST/RELIEF AIR
MA	MIXED AIR
MV	MIXING VALVE
N.C.	NORMALLY CLOSED
NIC	NOT IN CONTRACT
N.O.	NORMALLY OPEN
OA	OUTSIDE AIR
TYP	TYPICAL
RA	RETURN AIR
SA	SUPPLY AIR
UON	UNLESS OTHERWISE NOTED

TO/FROM BAS THROUGH RTU BACNET GATEWAY:

- DO DOAS ENABLE/DISABLE
- AO DISCHARGE AIR TEMPERATURE SETPOINT ADJUST
- AI SUPPLY FAN VFD OUTPUT
- AI EXHAUST FAN VFD OUTPUT
- AI ENERGY RECOVERY WHEEL START/STOP
- AI OUTSIDE AIR CFM SETPOINT
- DI GENERAL ALARM
- DI DIRTY FILTER
- DI ENERGY RECOVERY WHEEL DIRTY FILTER
- AI EXHAUST AIR TEMPERATURE
- AI EXHAUST AIR HUMIDITY
- AI ENERGY RECOVERY WHEEL LEAVING EXHAUST AIR TEMPERATURE
- AI ENERGY RECOVERY WHEEL LEAVING EXHAUST AIR HUMIDITY
- AI OUTSIDE AIR TEMPERATURE
- AI OUTSIDE AIR HUMIDITY
- AI ENERGY RECOVERY WHEEL LEAVING OUTSIDE AIR TEMPERATURE
- AI ENERGY RECOVERY WHEEL LEAVING OUTSIDE AIR HUMIDITY

- KEYNOTES:
- POINT, SENSOR AND FEEDER/RACEWAY PROVIDED BY TCC.
  - FACTORY PROVIDED, FIELD INSTALLED
  - SENSORS SHALL BE PLACED INSIDE BUILDING ENVELOPE.



**CONTROLS PROVIDED BY CONTRACTOR IN THE FIELD:**  
THE TCC SHALL EXTEND THE BAS NETWORK TO THE RTU UNITARY CONTROLLER PER THE PROTOCOL SPECIFIED IN SECTION 23 09 00.

**BUILDING OCCUPANCY SCHEDULING:**  
ENABLE RTU TO RUN BASED ON THE FOLLOWING OCCUPANCY SCHEDULE:

- MORNING START-UP MODE: MONDAY THROUGH FRIDAY 5:00AM-6:00AM (ADJ.)
- OCCUPIED MODE: MONDAY THROUGH FRIDAY 6:00AM-5:00PM (ADJ.)
- UNOCCUPIED MODE: MONDAY THROUGH FRIDAY 5:00PM-5:00AM (ADJ.)  
SATURDAY THROUGH SUNDAY ALL DAY

**CONTRACTOR SHALL FIELD INSTALL THE FOLLOWING MANUFACTURER PROVIDED EXTERNAL SENSORS AND WIRE BACK TO RTU CONTROLLER:**

- SUPPLY AIR TEMPERATURE IN SUPPLY DUCT.

**EXTERNAL CONTROLS PROVIDED BY TCC:**

- SUPPLY HUMIDITY SENSOR
- ALL REQUIRED POINTS FROM DOAS CONTROLLER TO BAS
- ALL REQUIRED POINTS FROM BAS TO DOAS CONTROLLER

**ALARMS, INTERLOCKS AND SAFETIES:**  
WHEN FIRE ALARM CONTROL PANEL INDICATES AN ALARM CONDITION, BAS SHALL SEND A SIGNAL TO DOAS TO SHUTDOWN UNIT.

THE FOLLOWING SAFETIES SHALL BE INSTALLED AND WIRED IN THE FIELD AND SHALL DISABLE DOAS.

- HIGH STATIC SWITCH (WIRED TO UNIT/DISABLE TO TURN FANS OFF)
- LOW STATIC SWITCH (WIRED TO UNIT/DISABLE TO TURN FANS OFF)
- FIRE ALARM RELAY (WIRED TO UNIT/DISABLE TO TURN FANS OFF)

**CONTROLS PROVIDED BY PACKAGED EQUIPMENT MANUFACTURER:**

**PACKAGED UNIT SYSTEM DESCRIPTION:**  
REFER TO SECTION 23 74 16.15 FOR A DESCRIPTION OF THE DOAS AND THE CONTROLS PROVIDED BY THE DOAS MANUFACTURER.

**DOAS CONTROL PANEL SEQUENCE OF OPERATION:**  
THE BAS SHALL SEND A SIGNAL TO START THE DOAS  
BAS SHALL PROVIDE TIME OF DAY SCHEDULE TO ALLOW DOAS TO ENTER OCCUPIED OR UNOCCUPIED MODE PER SCHEDULE.

**TEMPERATURE CONTROL:**

- WHEN THE OUTDOOR AIR TEMPERATURE RISES ABOVE 60°F (ADJ.) AND 2 (ADJ.) OR LESS HEAT PUMPS ARE CALLING FOR HEATING THE UNIT SHALL MAINTAIN DISCHARGE AIR TEMPERATURE OF 55°F (ADJ.)
- WHEN THE OUTDOOR AIR TEMPERATURE RISES ABOVE 60°F (ADJ.) AND 3 (ADJ.) OR MORE HEAT PUMPS ARE CALLING FOR HEATING THE UNIT SHALL MAINTAIN DISCHARGE AIR TEMPERATURE OF 70°F (ADJ.)
- WHEN THE OUTDOOR AIR TEMPERATURE DROPS BELOW 50°F (ADJ.) THE UNIT SHALL MAINTAIN DISCHARGE AIR TEMPERATURE OF 70°F (ADJ.)

**DEHUMIDIFICATION CONTROL:**  
BAS SHALL HAVE TWO SEPARATE DEHUMIDIFICATION SEQUENCES THAT SHALL BE GRAPHICALLY SELECTABLE AT USER INTERFACE.

- WHEN THE OUTDOOR AIR DEW POINT IS ABOVE 55°F (ADJ.) THE COOLING COIL SHALL MAINTAIN COOLING COIL DISCHARGE AIR TEMPERATURE 55°F (ADJ.). THE UNIT SHALL UTILIZE HOT GAS REHEAT AS NEEDED TO MAINTAIN DISCHARGE AIR TEMPERATURE NOTED IN TEMPERATURE CONTROL SEQUENCE ABOVE.
- WHEN THE OUTDOOR AIR TEMPERATURE IS ABOVE 60°F (ADJ.) THE COOLING COIL SHALL MAINTAIN COOLING COIL DISCHARGE AIR TEMPERATURE 55°F (ADJ.). THE UNIT SHALL UTILIZE HOT GAS REHEAT AS NEEDED TO MAINTAIN DISCHARGE AIR TEMPERATURE NOTED IN TEMPERATURE CONTROL SEQUENCE ABOVE.

**ALARMS, INTERLOCKS AND SAFETIES:**  
SEND AN ALARM TO THE CONTROLLER INTERFACE BAS FOR THE FOLLOWING:

- SUPPLY FAN FAULT (AIRFLOW, CURRENT OR VFD)
- EXHAUST FAN FAULT (AIRFLOW, CURRENT OR VFD)
- ENERGY RECOVERY WHEEL FAULT
- DIFFERENTIAL PRESSURE SWITCH ACROSS ANY FILTER (30%) BANK EXCEEDS 0.6 INCHES W.G. (ADJ.)
- IF DISCHARGE AIR TEMPERATURE IS MORE THAN 10°F (ADJ.) ABOVE OR BELOW SETPOINT.
- EMERGENCY STOP
- DIRTY FILTERS (WHEN FILTER PRESSURE DROP EXCEEDS 0.6" W.C. (ADJ.))
- PROVIDE A WATER LEVEL DETECTION DEVICE CONFORMING TO UL 508 WITH DOAS. WHEN THE WATER LEVEL DETECTION DEVICE INDICATES THE PRIMARY DRAIN LINE IS BLOCKED THE DOAS SHALL BE SHUT DOWN.

**PACKAGED DOAS UNIT WITH  
ENERGY RECOVERY WHEEL  
CONTROL - DOAS-1**

1 NO SCALE

- NOTES:
- EQUIPMENT AND CONTROLS MANUFACTURERS CANNOT BE THE SAME.





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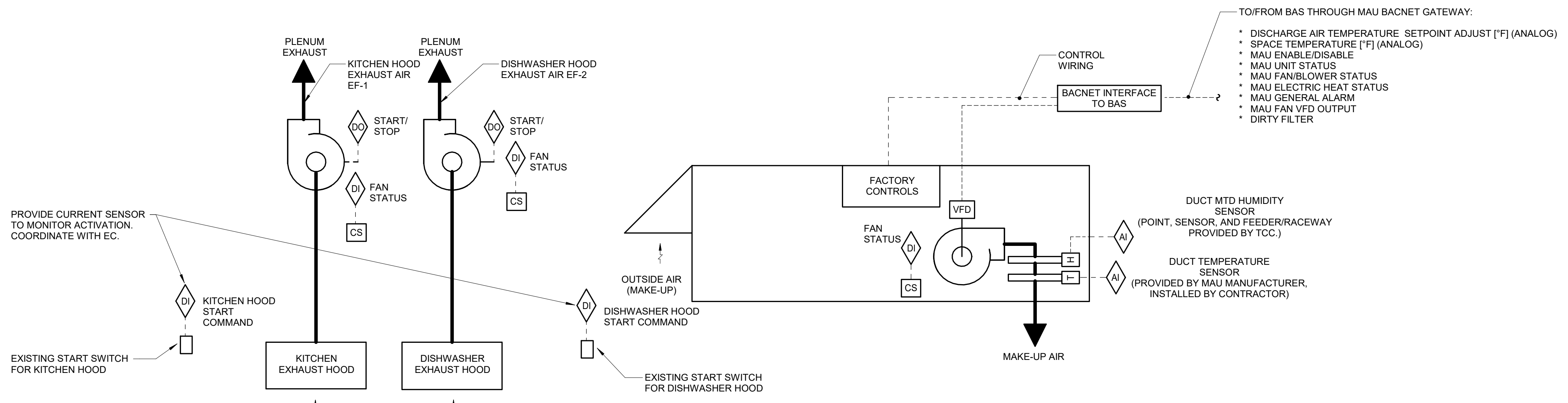
CAD DWG FILE: M-401  
DRAWN BY: AARMEY  
CHECKED BY: IMEG  
DESIGNED BY: BRESAN

SHEET TITLE:  
MECHANICAL  
DIAGRAMS

SHEET NUMBER:

M-401

11 OF 21 SHEETS  
11/27/2023



**KITCHEN HOOD EXHAUST FAN OPERATION:**  
KITCHEN HOOD EXHAUST FAN SHALL START FROM THE FOLLOWING INPUT:  
• SWITCH ON KITCHEN HOOD TURNED TO ON POSITION.  
• ONCE A KITCHEN HOOD EXHAUST FAN IS ENERGIZED THE EXHAUST FAN SHALL CONTINUE TO OPERATE FOR A MIN. 5 MINUTE (ADJ.) TIME DURATION TO PREVENT SHORT CYCLING.

**DISHWASHER HOOD EXHAUST FAN OPERATION:**  
DISHWASHER HOOD EXHAUST FAN SHALL START FROM THE FOLLOWING INPUT:  
• SWITCH ON DISHWASHER HOOD TURNED TO ON POSITION.  
• ONCE DISHWASHER HOOD EXHAUST FAN IS ENERGIZED THE EXHAUST FAN SHALL CONTINUE TO OPERATE FOR A MIN. 5 MINUTE (ADJ.) TIME DURATION TO PREVENT SHORT CYCLING.

BAS SHALL ENABLE THE INTERLOCKED MAU WHEN EITHER FAN IS ENABLED. THE BAS SHALL MODULATE MAU FAN TO EF-1 OR EF-2 SETPOINTS DETERMINED BY COORDINATION WITH TEST AND BALANCE CONTRACTOR TO MEET SCHEDULED SUPPLY AIRFLOW VALUES FROM EXHAUST FAN AIRFLOW SCHEDULE.

**TEMPERATURE CONTROL:**  
• WHEN THE OUTDOOR AIR TEMPERATURE RISES ABOVE 60°F (ADJ.) AND HP-18 IS CALLING FOR COOLING THE UNIT SHALL MAINTAIN DISCHARGE AIR TEMPERATURE OF 55°F (ADJ.)  
• WHEN THE OUTDOOR AIR TEMPERATURE RISES ABOVE 60°F (ADJ.) AND HP-18 IS NOT CALLING FOR COOLING THE UNIT SHALL MAINTAIN DISCHARGE AIR TEMPERATURE OF 72°F (ADJ.)  
• WHEN THE OUTDOOR AIR TEMPERATURE DROPS BELOW 50°F (ADJ.) THE UNIT SHALL MAINTAIN DISCHARGE AIR TEMPERATURE OF 72°F (ADJ.)

**DEHUMIDIFICATION CONTROL:**  
BAS SHALL HAVE TWO SEPARATE DEHUMIDIFICATION SEQUENCES THAT SHALL BE GRAPHICALLY SELECTABLE AT USER INTERFACE.

- WHEN THE OUTDOOR AIR DEW POINT IS ABOVE 55°F (ADJ.) THE COOLING COIL SHALL MAINTAIN COOLING COIL DISCHARGE AIR TEMPERATURE 55°F (ADJ.). THE UNIT SHALL UTILIZE HOT GAS REHEAT AS NEEDED TO MAINTAIN DISCHARGE AIR TEMPERATURE NOTED IN TEMPERATURE CONTROL SEQUENCE ABOVE.
- WHEN THE OUTDOOR AIR TEMPERATURE IS ABOVE 60°F (ADJ.) THE COOLING COIL SHALL MAINTAIN COOLING COIL DISCHARGE AIR TEMPERATURE 55°F (ADJ.). THE UNIT SHALL UTILIZE HOT GAS REHEAT AS NEEDED TO MAINTAIN DISCHARGE AIR TEMPERATURE NOTED IN TEMPERATURE CONTROL SEQUENCE ABOVE.

**ALARMS, INTERLOCKS AND SAFETIES:**  
AN ALARM SHALL BE GENERATED AT THE BAS OPERATOR WORKSTATION IN THE EVENT OF THE FOLLOWING:  
• THE BAS COMMANDS EITHER EXHAUST FAN TO OPERATE AND THE CURRENT SENSING RELAY DETECTS INSUFFICIENT CURRENT DRAW.  
• AN ALARM SHALL BE SENT TO THE BAS WHEN THE MAU IS COMMANDED TO RUN AND THE CURRENT STATUS SWITCH INDICATES INSUFFICIENT CURRENT.  
• WHEN THE FIRE ALARM CONTROL PANEL INDICATES AN ALARM CONDITION THE EXHAUST FAN SHALL BE SHUT DOWN.  
• THE MAU SHALL PROVIDE A GENERAL ALARM TO THE BAS OPERATOR WORKSTATION.  
• PROVIDE A WATER LEVEL DETECTION DEVICE CONFORMING TO UL 508 WITH MAU. WHEN THE WATER LEVEL DETECTION DEVICE INDICATES THE PRIMARY DRAIN LINE IS BLOCKED THE MAU SHALL BE SHUT DOWN.  
• DIRTY FILTERS (WHEN FILTER PRESSURE DROP EXCEEDS 0.6" W.C. (ADJ.))

**SHUTDOWN:**  
• WHEN THE EXHAUST FANS ARE SHUTDOWN THE INTERLOCKED MAU SHALL BE SHUTDOWN.  
• MAU PACKAGE CONTROLS SHALL CLOSE THE UNIT DAMPERS.

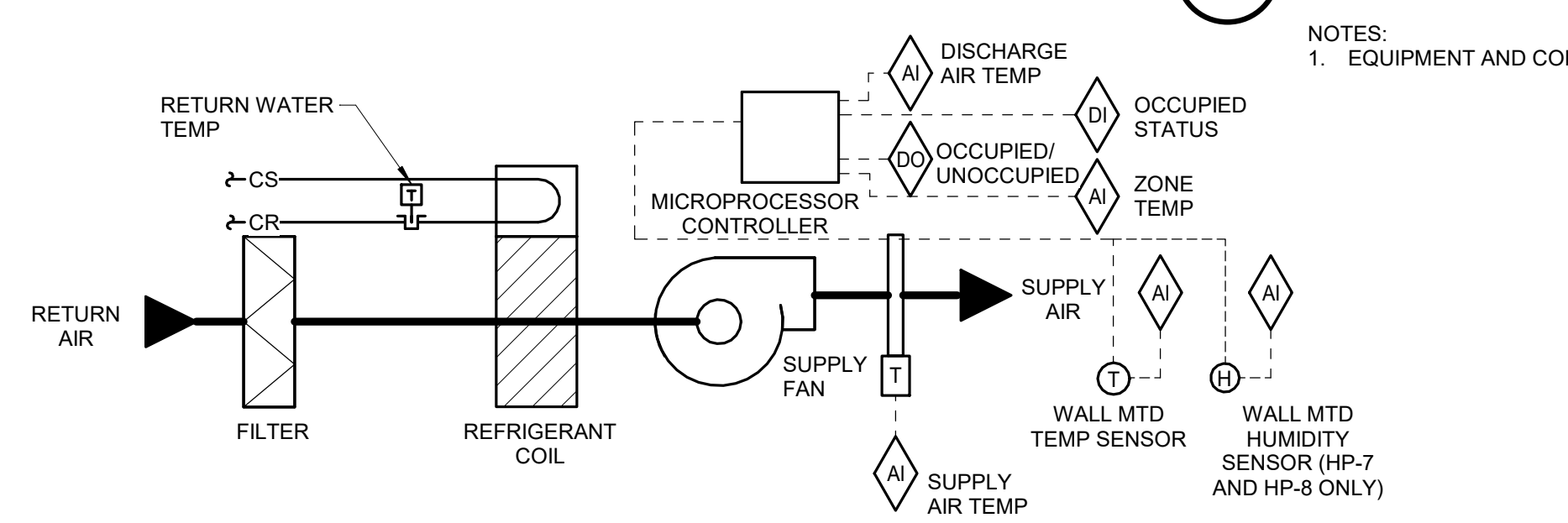
**EXHAUST FAN AIRFLOW SCHEDULE**

SYSTEM	EXHAUST CFM	MAU	MAU CFM	REMARKS
EF-1	3,000	MAU-1	1,555	NOTES 1,2
EF-2	1,200	MAU-1	1,000	NOTES 1,2

**NOTES:**  
1. CORRESPONDING MAU SHALL BE INTERLOCKED TO OPERATE WHENEVER THE EXHAUST FAN IS TURNED ON.  
2. EXHAUST EXCEEDS MAKE-UP TO MAINTAIN SPACE SLIGHTLY NEGATIVE.

**MAU REPORT GENERATION:**  
DDC BAS SHALL MONITOR THE FOLLOWING POINTS ON 10 MINUTE (ADJ.) INTERVALS WITHIN A SINGLE TREND. THE TREND SHALL RUN FOR A 14-DAY (ADJ.) DURATION AT WHICH POINT THE NEWEST VALUES SHALL AUTOMATICALLY OVERWRITE THE OLDEST VALUES:  
• DATE  
• TIME  
• GLOBAL OUTSIDE AIR TEMPERATURE (°F)  
• DISCHARGE AIR TEMP (DAT) (°F)  
• DAT SETPOINT (°F)  
• BLOWER STATUS (ON/OFF)  
• ELECTRIC HEAT (ON/OFF)  
• COMPRESSORS (ON/OFF)

**1 KITCHEN EXHAUST FAN AND MAKE-UP AIR UNIT CONTROL DIAGRAM**



**SEQUENCE OF OPERATION:**  
THE BAS SYSTEM SHALL COMMUNICATE OCCUPIED/UNOCCUPIED MODE TO ALL HEAT PUMPS.

HEAT PUMP IS CONTROLLED BY A MICROPROCESSOR CONTROLLER PROVIDED WITH THE HEAT PUMP. THE TCC SHALL COMMUNICATE ALL AVAILABLE POINTS BACK TO THE OPERATOR WORKSTATION. PROVIDE GRAPHICS FOR HEAT PUMPS BASED ON COMMUNICATED POINTS.

PROVIDE A TEMPERATURE SENSOR WITH EACH HEAT PUMP. TEMPERATURE SENSOR SHALL BE AN INPUT TO THE HEAT PUMP MICROPROCESSOR CONTROLLER. CONTROLLER SHALL CYCLE HEATING/COOLING STAGES AS REQUIRED TO MAINTAIN SPACE TEMPERATURE SETPOINT.

PROVIDE A HUMIDITY SENSOR WITH HP-7 AND HP-8 ONLY. HUMIDITY SENSOR SHALL BE AN INPUT TO THE HEAT PUMP MICROPROCESSOR CONTROLLER. WHEN THE SPACE IS NOT CALLING FOR COOLING AND THE RELATIVE HUMIDITY IS ABOVE 50% THE CONTROLLER SHALL CYCLE HEATING/COOLING STAGES AS REQUIRED TO MAINTAIN SPACE TEMPERATURE SETPOINT AND ENABLE HOT GAS REHEAT TO MAINTAIN RELATIVE HUMIDITY OF 50%.

PROVIDE A WATER LEVEL DETECTION DEVICE CONFORMING TO UL 508 WITH EACH NEW AND EXISTING HEAT PUMP. WHEN THE WATER LEVEL DETECTION DEVICE INDICATES THE PRIMARY DRAIN LINE IS BLOCKED THE HEAT PUMP SHALL BE SHUT DOWN.

REFER TO DOAS-1 CONTROL FOR BUILDING OCCUPANCY SCHEDULE

FAN SHALL RUN CONTINUOUSLY DURING OCCUPIED MODE. HEATING AND COOLING SHALL CYCLE AS NEEDED TO MAINTAIN SPACE TEMPERATURE SETPOINT.

DURING UNOCCUPIED MODE, FAN AND HEATING/COOLING STAGES SHALL CYCLE AS REQUIRED TO MAINTAIN SPACE TEMPERATURE SETPOINT.

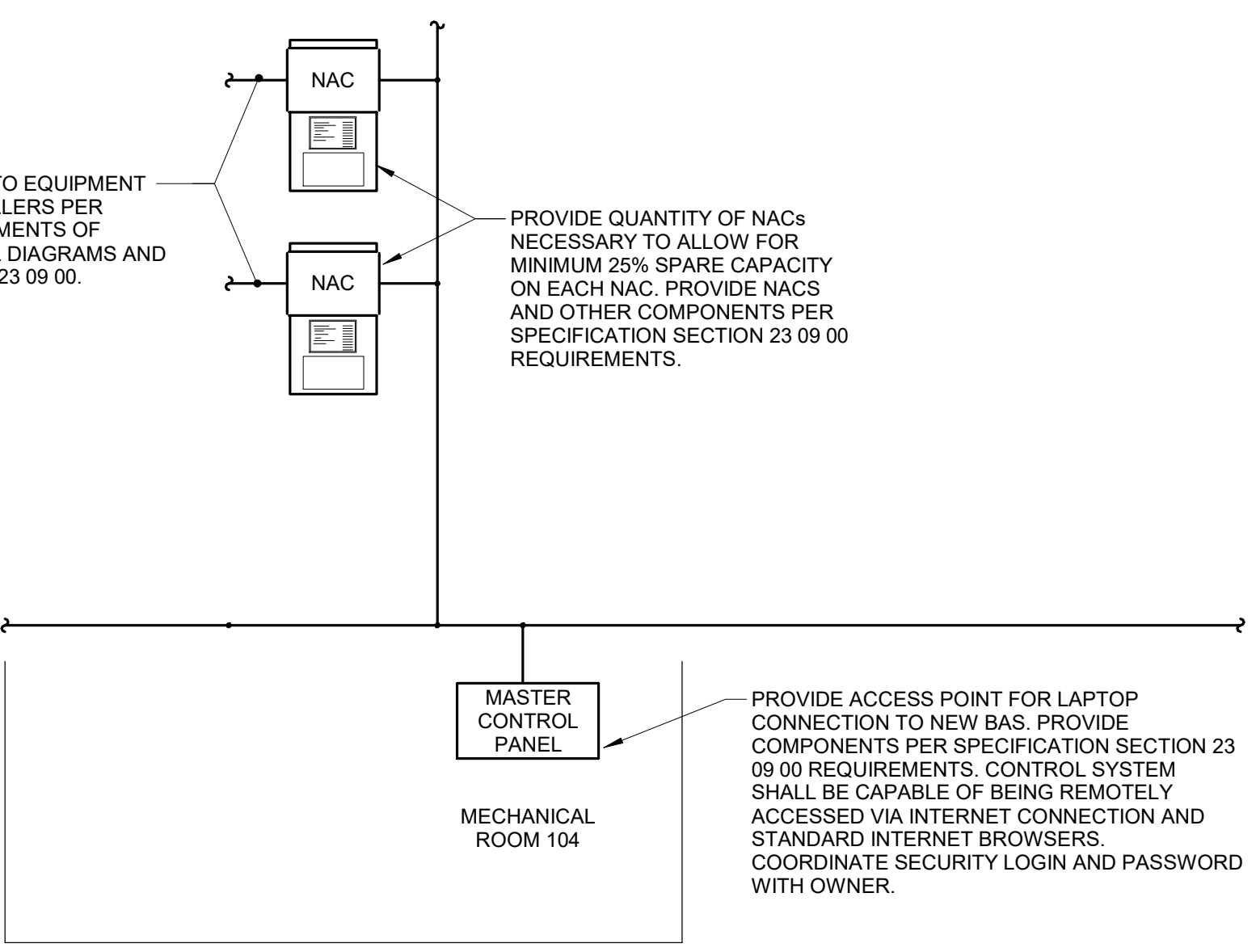
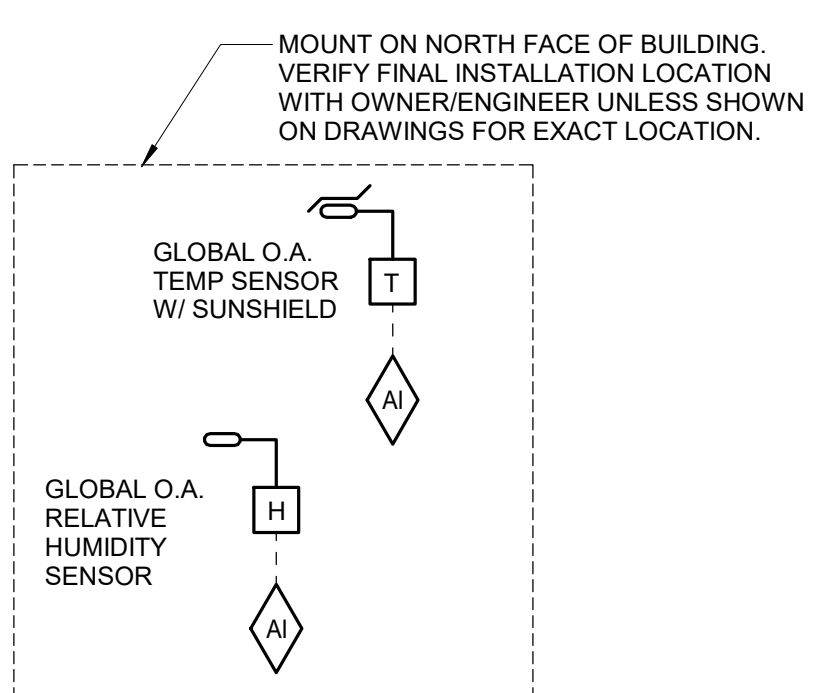
THE BAS SYSTEM SHALL COMMUNICATE THE FOLLOWING TEMPERATURE SETPOINTS TO THE HEAT PUMP CONTROLLER:  
A. OCCUPIED COOLING: 75°F(ADJ.)  
B. OCCUPIED HEATING: 70°F(ADJ.)  
C. UNOCCUPIED COOLING: 80°F(ADJ.)  
D. UNOCCUPIED HEATING: 60°F(ADJ.)

**2 HEAT PUMP CONTROL - HP-A**

NO SCALE  
NOTES:  
1. EQUIPMENT AND CONTROLS MANUFACTURERS CANNOT BE THE SAME.

**3 GLOBAL REFERENCE POINTS**

NO SCALE  
SEQUENCE OF OPERATION:  
PROVIDE GLOBAL O.A. DRY-BULB TEMPERATURE AND RELATIVE HUMIDITY TRANSMITTERS.  
GLOBAL SENSORS SHALL CONTINUOUSLY UPDATE BAS FOR USE IN CONTROLLING MECHANICAL EQUIPMENT AS REQUIRED IN SEQUENCES OF OPERATION.



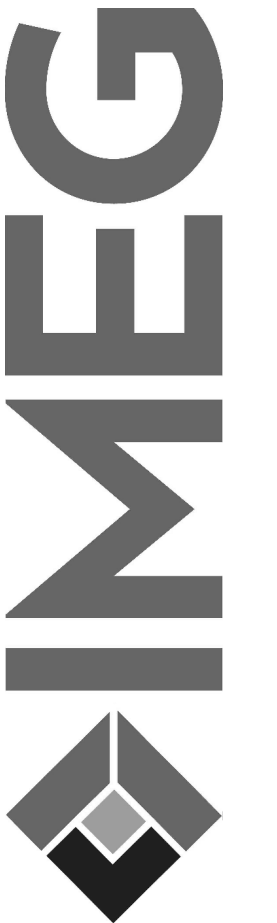
**4 BAS NETWORK REQUIREMENTS**

NO SCALE  
NOTES:  
1. HEAT PUMPS HP-9, HP-12, AND HP-16 ARE EXISTING TO REMAIN WITH EXISTING COM4 COMMUNICATION WIRING TO REMAIN. CONTRACTOR TO PROVIDE ALL EQUIPMENT REQUIRED TO CONNECT TO NEW CONTROLS SYSTEM





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DESIGN AND CONSTRUCTION

SHADY GROVE STATE  
SCHOOL

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POPLAR BLUFF, MO 63901

SHADY GROVE STATE SCHOOL  
RE-BID REPLACE HVAC AND  
CONTROLS

POPLAR BLUFF, MISSOURI

PROJECT # E2010-01  
SITE # 2024  
FACILITY # 5012024003

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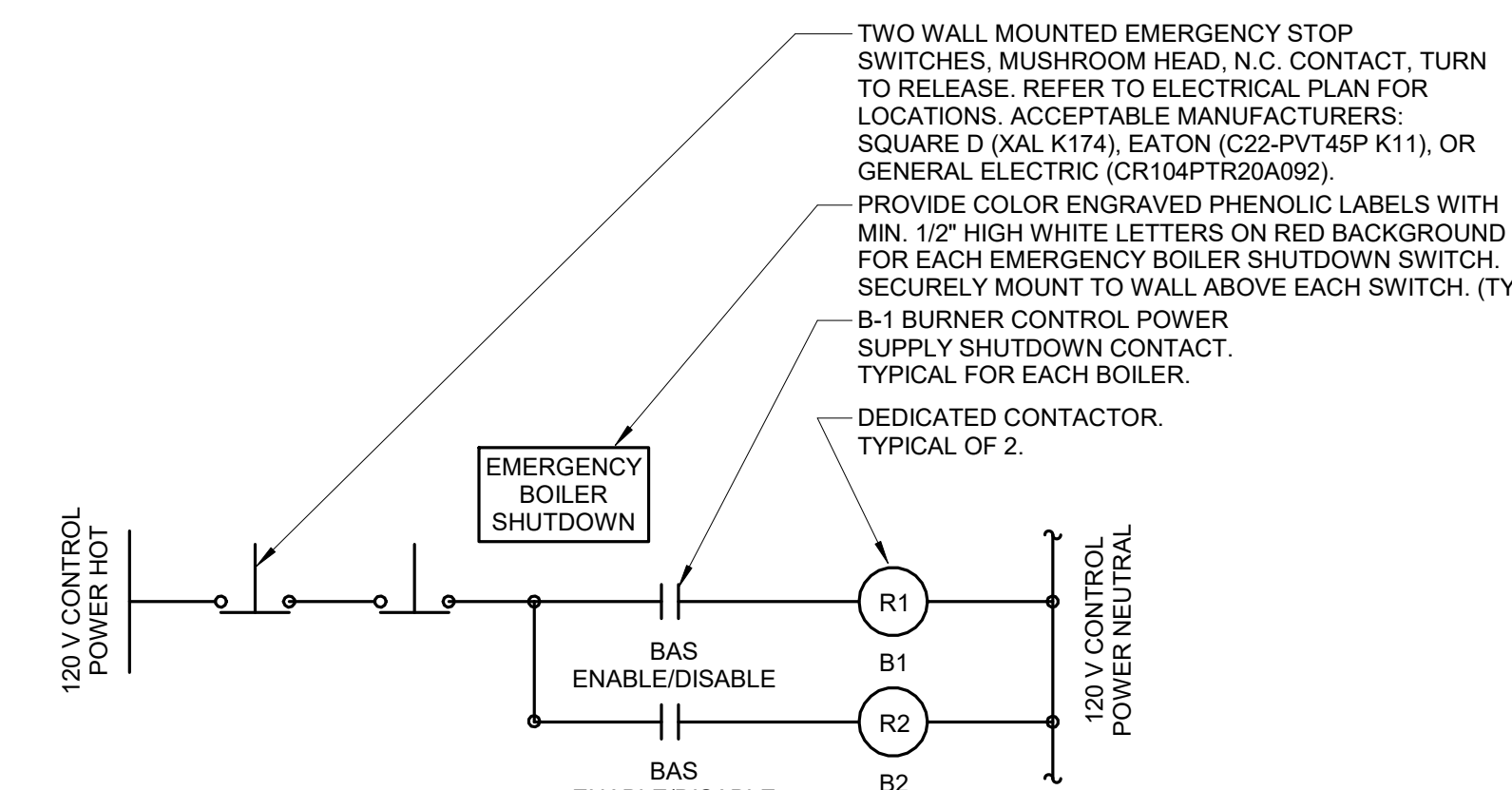
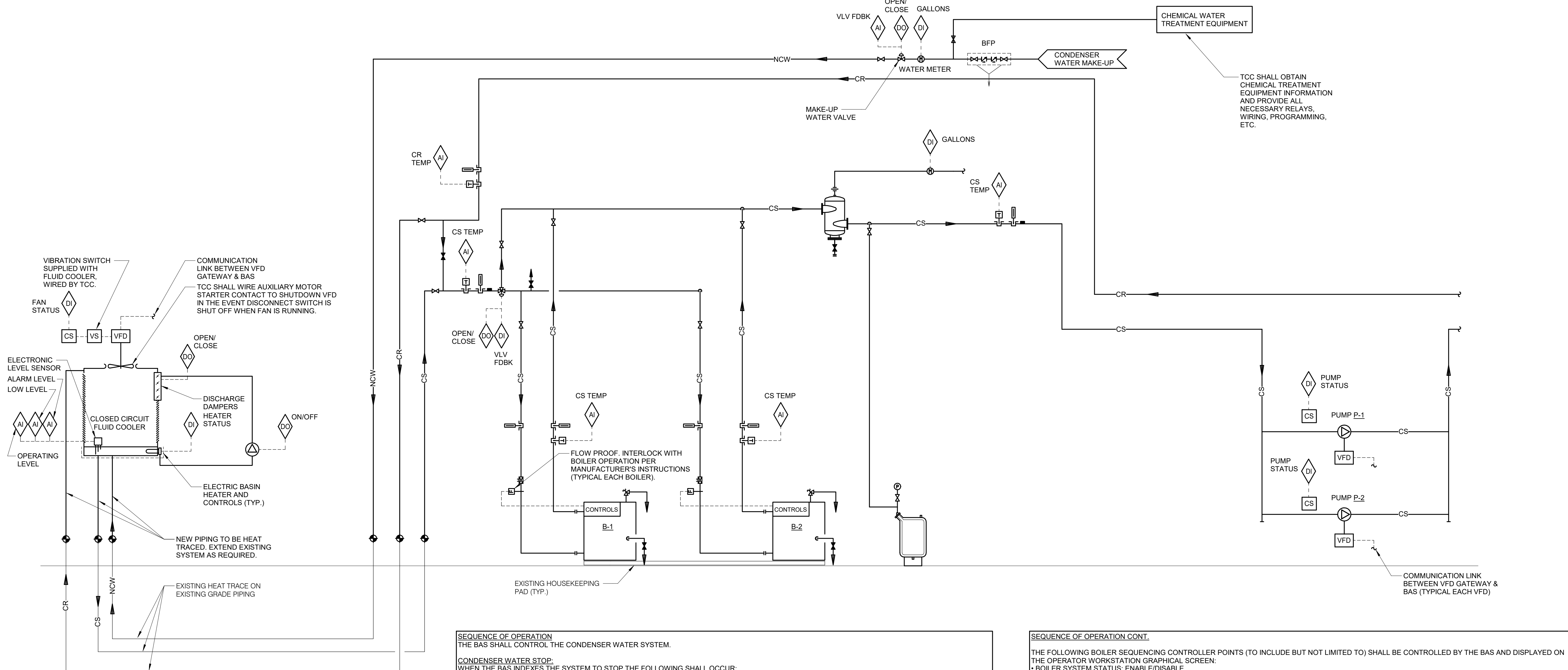
CAD DWG FILE: M-402  
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DESIGNED BY: BRESAN

SHEET TITLE:  
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11/27/2023



**ALARMS, INTERLOCKS, AND SAFETIES:**  
TCC SHALL PROVIDE EMERGENCY BOILER SHUTDOWN SWITCH AT EACH BOILER ROOM EXIT MEETING CSD-1 REQUIREMENTS. ACTIVATION OF ANY SWITCH SHALL INTERRUPT POWER TO ALL BOILER CONTROLS VIA BOILER SAFETY SHUTDOWN CONTACTS.

TYPICAL FOR B-1, B-2

**EMERGENCY BOILER SHUTDOWN**

# 1 CONDENSER WATER CONTROLS

NO SCALE

**NOTE:**

- EQUIPMENT AND CONTROLS MANUFACTURERS CANNOT BE THE SAME.

## SEQUENCE OF OPERATION

THE BAS SHALL CONTROL THE CONDENSER WATER SYSTEM.

**CONDENSER WATER STOP:**  
WHEN THE BAS INDEXES THE SYSTEM TO STOP THE FOLLOWING SHALL OCCUR:  
• BAS SHALL INDEX FLUID COOLER TO STOP  
• BAS SHALL INDEX BOILERS TO STOP  
• AFTER A TIME DELAY OF 5 MIN. (ADJ.) BAS SHALL SHUTDOWN PUMPS.

**COOLING MODE:**  
WHEN THE CONDENSER SUPPLY WATER IS ABOVE 75°F (ADJ.) THE FOLLOWING SHALL OCCUR:  
• THE FLUID COOLER DISCHARGE DAMPERS SHALL OPEN.  
• THE THREE WAY CONTROL VALVE SHALL MODULATE TO BYPASS THE BOILERS.  
• THE FLUID COOLER DISCHARGE DAMPERS SHALL REMAIN OPEN UNTIL THE SUPPLY WATER TEMPERATURE IS 5°F (ADJ.) BELOW SETPOINT 75°F (ADJ.) FOR 10 MINUTES (ADJ.)

WHEN THE CONDENSER SUPPLY WATER IS ABOVE 80°F (ADJ.) THE FOLLOWING SHALL OCCUR:  
• THE CIRCULATING PUMP SHALL TURN ON.  
• THE CIRCULATING PUMP SHALL REMAIN ON UNTIL THE SUPPLY WATER TEMPERATURE IS 5°F BELOW SETPOINT 80°F (ADJ.) FOR 10 MINUTES

WHEN THE CONDENSER SUPPLY WATER IS ABOVE 85°F (ADJ.) THE FOLLOWING SHALL OCCUR:  
• THE BAS SYSTEM SHALL START THE FLUID COOLER FAN ON LOW SPEED VIA THE VFD. THE BAS SHALL CONTROL THE FLUID COLLER FAN VFD USING A 4-20MA OUTPUT. THE VFD SHALL MODULATE TO MAINTAIN SUPPLY WATER TEMPERATURE OF 85°F (ADJ.).  
• THE FAN SHALL MODULATE DOWN UNTIL THE SUPPLY WATER TEMPERATURE IS 5°F BELOW SETPOINT 85°F (ADJ.) FOR 10 MINUTES.

**MAKEUP WATER CONTROL:**  
• WHEN THE WATER LEVEL IS AT THE "OPERATING LEVEL", THE MAKE-UP WATER CONTROL VALVE SHALL BE CLOSED. AS THE WATER LEVEL DROPS TO "LOW LEVEL", THE LEVEL SENSOR SHALL SEND A SIGNAL TO THE BAS SYSTEM TO OPEN THE MAKE-UP WATER CONTROL VALVE. IF THE WATER LEVEL DROPS TO THE "ALARM LEVEL", THE BAS SYSTEM SHALL SEND AN ALARM TO THE OPERATOR INTERFACE.

• INSTALL A VIBRATION SWITCH TO STOP OPERATION OF THE FLUID COOLER FAN IF THE SWITCH IS ACTIVATED AND SEND AN ALARM TO THE BAS.

**FREEZE PROTECTION OF OUTDOOR PIPING:**  
• WHEN OUTSIDE AIR TEMP DROPS BELOW 36°F, BAS SHALL CLOSE CONTACTOR TO ALLOW HEAT TRACING OF OUTDOOR PIPING AND COOLING TOWER BASIN TO BE ENERGIZED. WHEN OUTSIDE AIR TEMP RISES ABOVE 38°F (ADJ.), BAS SHALL OPEN CONTACTOR TO PREVENT HEAT TRACING OF OUTDOOR PIPING AND COOLING TOWER BASIN FROM BEING ENERGIZED.

**HEATING MODE:**  
WHEN THE CONDENSER RETURN WATER IS BELOW 68°F (ADJ.) THE FOLLOWING SHALL OCCUR:  
• THE BOILERS SHALL BE INDEXED TO RUN.  
• THE THREE WAY CONTROL VALVE SHALL OPEN TO ALLOW FLOW THROUGH THE BOILERS.  
• THE BOILERS SHALL CONTINUE TO OPERATE UNTIL THE RETURN WATER TEMPERATURE IS 5°F (ADJ.) ABOVE SETPOINT FOR 10 MINUTES (ADJ.)  
• THE THREE WAY CONTROL VALVE SHALL CLOSE FOR WATER TO BYPASS THE BOILERS 10 MINUTES (ADJ.) AFTER BOILERS ARE SHUT DOWN.

• CONDENSER WATER SHALL FLOW THROUGH THE FLUID COOLER AT ALL TIMES.

• HEATING WATER BOILERS SHALL HAVE UNIT MOUNTED CONTROLS AND A BOILER MANAGEMENT CONTROL PANEL PROVIDED BY THE BOILER MANUFACTURER.

**BOILER CONTROL PANEL SEQUENCE OF OPERATION:**  
• WHEN THE BAS ENABLES THE BOILER PARENT CONTROLLER TO RUN, THE BOILER PARENT CONTROLLER SHALL ENABLE THE LEAD BOILER.

• THE ON BOARD BOILER SEQUENCING CONTROLLER SHALL MODULATE THE BOILER PARENT TO MAINTAIN THE HIGHEST PLANT EFFICIENCY THAT WILL PROVIDE THE REQUIRED SUPPLY WATER TEMPERATURE OF 68°F (ADJ.). THE ON BOARD BOILER SEQUENCING CONTROLLER SHALL VERIFY PROOF OF WATER FLOW BEFORE FIRING BOILERS. THE BOILER SEQUENCING CONTROLLER CAN STAGE ON MULTIPLE BOILERS AT PART LOAD TO INCREASE THE EFFICIENCY OF THE PLANT. BOILER SEQUENCING CONTROLLER PANEL SHALL START/STOP BOILERS ON A FIRST ON/FIRST OFF BASIS TO EQUALIZE RUN TIME BETWEEN BOILERS.

## SEQUENCE OF OPERATION CONT.

THE FOLLOWING BOILER SEQUENCING CONTROLLER POINTS (TO INCLUDE BUT NOT LIMITED TO) SHALL BE CONTROLLED BY THE BAS AND DISPLAYED ON THE OPERATOR WORKSTATION GRAPHICAL SCREEN:  
• BOILER SYSTEM STATUS: ENABLE/DISABLE  
• BOILER OUTLET WATER TEMPERATURE SETPOINT: [°F]

THE FOLLOWING BOILER SEQUENCING CONTROLLER POINTS (TO INCLUDE BUT NOT LIMITED TO) SHALL BE MONITORED BY THE BAS AND DISPLAYED ON THE OPERATOR WORKSTATION GRAPHICAL SCREEN:  
• BOILER STATUS: DISABLED/STANDBY/MANUAL OPERATION/REMOTE OPERATION/AUTO/FAULT  
• STEPS @ KW  
• ACTIVE SETPOINT: [°F]  
• SYSTEM CR TEMP: [°F]  
• SYSTEM CS TEMP: [°F]  
• FAULT MESSAGE DISPLAY CODE: [NUMERICAL]  
• RUN CYCLES: [NUMERICAL]  
• RUN HOURS: [NUMERICAL]

ALL CONTROLLED AND MONITORED POINTS LISTED IN THE BOILER CONTROL PANEL SEQUENCE ABOVE SHALL BE DISPLAYED ON THE OPERATOR WORKSTATION GRAPHICAL SCREEN.

**CONDENSER WATER PUMP CONTROL:**  
• THE BAS SHALL CONTROL VFD SETPOINT (ADJ.). COORDINATE WITH TEST AND BALANCE CONTRACTOR FOR SYSTEM FLOW VFD SETPOINT.

• THE PUMP SHALL CONTINUOUSLY RUN AT CONSTANT FLOW AT ALL TIMES. ONLY ONE PUMP SHALL RUN AT A TIME. THE SECOND PUMP IS FULLY REDUNDANT. THE BAS SHALL LEAD/LAG THE PUMPS BASED ON RUN TIME. SWITCH EVERY 400 HOURS (ADJ.). INCLUDE GRAPHIC TOGGLE ON OPERATOR WORKSTATION GRAPHICAL SCREEN TO ALLOW OPERATOR TO MANUALLY SELECT WHICH PUMP IS LEAD AND WHICH IS LAG.

**ALARMS, INTERLOCKS AND SAFETIES:**  
TCC SHALL COORDINATE ALL SAFETY AND INTERLOCK REQUIREMENTS WITH BOILER MANUFACTURER. TCC SHALL COORDINATE AND PROVIDE THE INSTALLATION AND WIRING OF BOILER WATER DIFFERENTIAL PRESSURE/FLOW SWITCHES AND OTHER COMPONENTS PROVIDED WITH THE BOILER AS REQUIRED FOR PROPER OPERATION. TCC SHALL PROVIDE AND TERMINATE ALL SAFETY AND INTERLOCK WIRING WITH BOILER CONTROL PANELS AS REQUIRED.

TCC SHALL VERIFY THE ACCEPTABLE TEMPERATURE RANGES THE BOILERS ARE APPROVED TO OPERATE AT AS PUBLISHED IN THE BOILER MANUFACTURER'S LITERATURE. IF THE TEMPERATURE RANGES LISTED IN THE MANUFACTURER'S LITERATURE DIFFER FROM THOSE IN THIS SEQUENCE OF OPERATION, CONTACT PROJECT ARCHITECT/ENGINEER FOR DIRECTION.

AN ALARM SHALL BE INDICATED AT THE BAS WHEN THE FOLLOWING OCCUR:  
• IF CONDENSER WATER SUPPLY TEMPERATURE IS MORE THAN 5°F (ADJ.) ABOVE 91.5°F (ADJ.) OR BELOW 68°F (ADJ.) FOR MORE THAN 10 MINUTES (ADJ.).

• SHOULD THE BAS COMMAND THE LEAD PUMP TO OPERATE AND THE PUMP FAILS TO DO SO AS DETERMINED BY THE VFD STATUS, AN ALARM SHALL BE INDICATED AT THE BAS OPERATOR WORKSTATION AND THE LAG PUMP SHALL AUTOMATICALLY START.

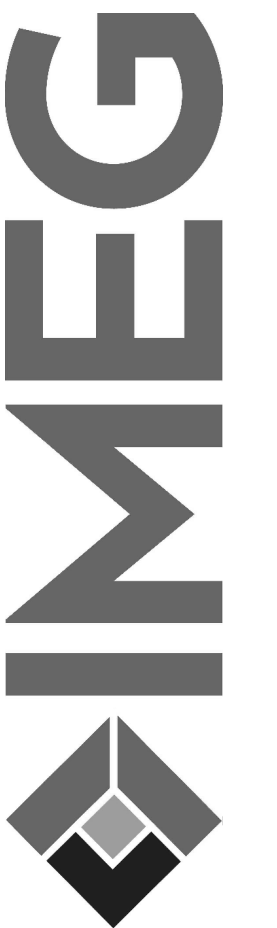
• AN ALARM CONDITION OCCUR AT ANY VFD.  
• IF SYSTEM FLOW IS NOT MAINTAINED FOR MORE THAN 15 MINUTES (ADJ.).  
• CONDENSER WATER MAKEUP - WHEN 2 GALLONS (ADJ.) OF WATER FLOWS THROUGH METER AFTER THE LAST ACKNOWLEDGEMENT.

WHEN ALARM IS MANUALLY ACKNOWLEDGED, THE BAS SHALL RE-ZERO THE COUNTER.  
• AN ALARM IS INDICATED IF THE HEAT TRACE SYSTEM OR BASIN HEATER FAILS.  
• BOILER CONTROLS SHALL BE PROGRAMMED TO MAINTAIN CONSTANT SETPOINT (LAST KNOWN VALUE) IN THE EVENT THE BAS NETWORK COMMUNICATION SIGNAL IS LOST.  
• AN ALARM IS INDICATED AT ANY BOILER ALARM PANEL.  
• IF FLUID COOLER FAN FAILS TO OPERATE.





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RE-BID REPLACE HVAC AND  
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POPLAR BLUFF, MISSOURI

PROJECT # E2010-01  
SITE # 2024  
FACILITY # 5012024003

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REVISION: \_\_\_\_\_  
DATE: \_\_\_\_\_

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CHECKED BY: IMEG  
DESIGNED BY: BRESAN

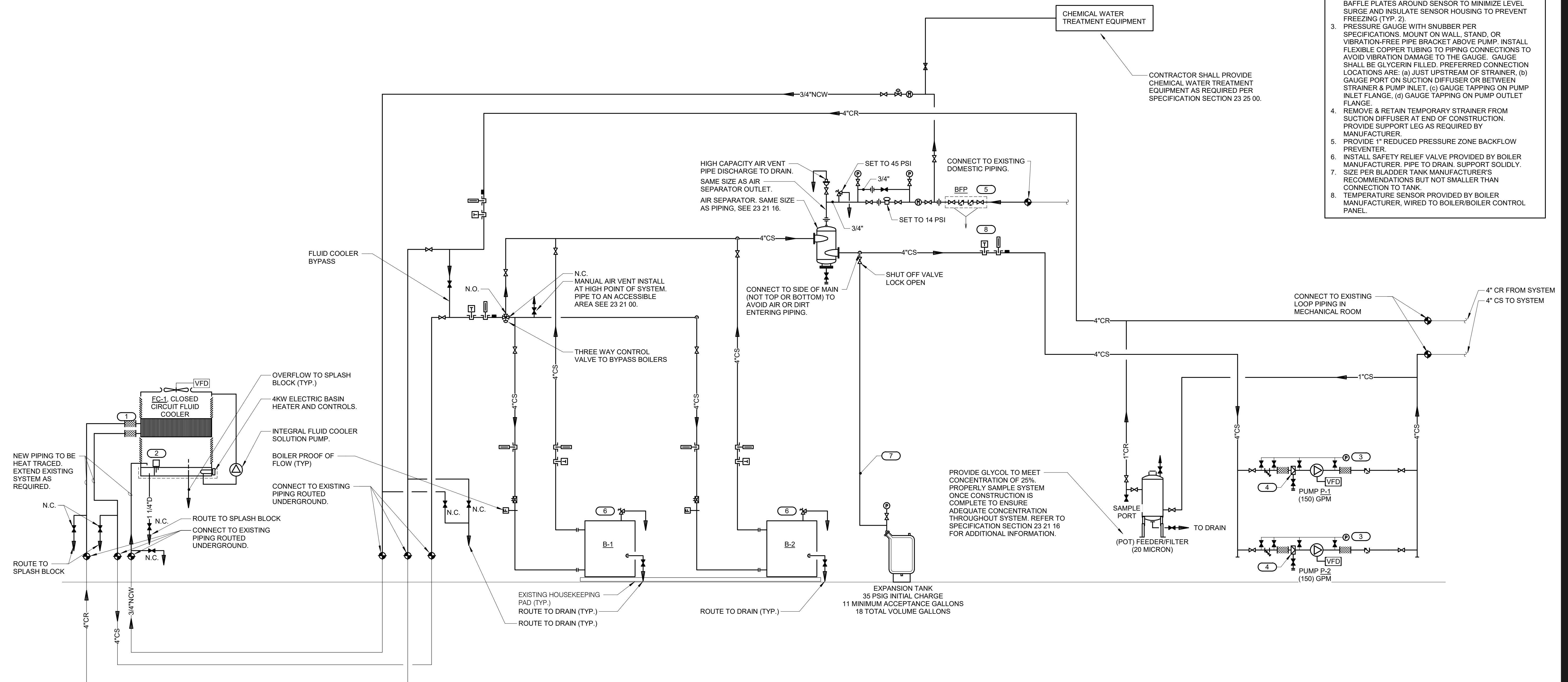
SHEET TITLE:  
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SHEET NUMBER:

M-403

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11/27/2023

- KEYNOTES**
1. FLEXIBLE CONNECTOR FC-1 WITH UV RESISTANT EPDM OR HYPALON CONSTRUCTION.
  2. ELECTRONIC LEVEL SENSOR BY BUILDING AUTOMATION SYSTEM CONTRACTOR. PROVIDE NON-CORRODING BAFFLE PLATES AROUND SENSOR TO MINIMIZE LEVEL SURGE AND INSULATE SENSOR HOUSING TO PREVENT FREEZING (TYP. 2).
  3. PRESSURE GAUGE WITH SNUBBER PER SPECIFICATIONS. MOUNT ON WALL, STAND, OR VIBRATION-FREE PIPE BRACKET ABOVE PUMP. INSTALL FLEXIBLE COPPER TUBING TO PIPING CONNECTIONS TO AVOID VIBRATION DAMAGE TO THE GAUGE. GAUGE SHALL BE GLYCERIN FILLED. PREFERRED CONNECTION LOCATIONS ARE: (a) JUST UPSTREAM OF STRAINER, (b) GAUGE PORT ON SUCTION DIFFUSER OR BETWEEN STRAINER & PUMP INLET, (c) GAUGE TAPPING ON PUMP INLET FLANGE, (d) GAUGE TAPPING ON PUMP OUTLET FLANGE.
  4. REMOVE & RETAIN TEMPORARY STRAINER FROM SUCTION DIFFUSER AT END OF CONSTRUCTION. PROVIDE SUPPORT LEG AS REQUIRED BY MANUFACTURER.
  5. PROVIDE 1" REDUCED PRESSURE ZONE BACKFLOW PREVENTER.
  6. INSTALL SAFETY RELIEF VALVE PROVIDED BY BOILER MANUFACTURER. PIPE TO DRAIN. SUPPORT SOLIDLY.
  7. SIZE PER BLADDER TANK MANUFACTURER'S RECOMMENDATIONS BUT NOT SMALLER THAN CONNECTION TO TANK.
  8. TEMPERATURE SENSOR PROVIDED BY BOILER MANUFACTURER, WIRED TO BOILER/BOILER CONTROL PANEL.



**1 FLOW DIAGRAM**  
NO SCALE









11/27/23

PROFESSIONAL SEAL

PUMP SCHEDULE

NOTES:  
1. PROVIDE SHAFT GROUNDING AS REQUIRED IN THE MOTOR SPECIFICATION 23 05 13.  
2. SELECTION IS BASED ON 25% ETHYLENE GLYCOL.

Table with 14 columns: TAG NAME, GPM, PUMP FT. HEAD AT DESIGN, MINIMUM PUMP EFFICIENCY, INLET SIZE, IMPELLER SIZE, HP (NOTE E), RPM, VOLTAGE, PHASES, DISCONNECT BY (NOTE A), CONTROLLER/STARTER TYPE (NOTE C), MANUFACTURER, MODEL, NOTES. Rows for P-1 and P-2.

BOILER SCHEDULE - ELECTRIC

NOTES:  
1. SELECTION IS BASED ON 25% ETHYLENE GLYCOL.

Table with 18 columns: TAG NAME, CAPACITY MBH, GPM, LWT °F, NUMBER OF STAGES, HEATING ELEMENT TOTAL KW (QTY \* KW), KW, VOLTAGE, PHASES, FLA, DISCONNECT BY (NOTE A), TYPE (NOTE B), CONTROLLER/STARTER BY (NOTE A), SCRR, MANUFACTURER, MODEL, NOTES. Rows for B-1 and B-2.

HEAT PUMP SCHEDULE - WATER SOURCE

NOTES:  
1. EXTERNAL STATIC PRESSURE ACCOUNTS FOR FILTER PRESSURE DROP.  
2. PROVIDE A WATER LEVEL DETECTION DEVICE CONFORMING TO UL 508 WITH UNIT.  
3. REFER TO Z/M-401 FOR HEAT PUMP CONTROLS.  
4. BTU LISTED IS BASED ON ROOM LOADS AND IS THE MINIMUM BTU CAPACITY FOR HEAT PUMP.  
5. LAT IS AT THE DISCHARGE FROM THE UNIT AND IS BASED ON BASIS OF DESIGN HEAT PUMP CAPACITY LAT.  
6. SELECTION IS BASED ON 25% ETHYLENE GLYCOL.  
7. UNIT SHALL BE PROVIDED WITH HOT GAS REHEAT.

Large table with columns for TAG NAME, AREA SERVED, CONFIGURATION, NOMINAL TONNAGE, CFM, OA CFM, EXT. S.P. IN. W.C. (NOTE 1), and various cooling/ heating performance metrics (EAT, LAT, BTU, SEN, EER @ AHRI, COND. GPM, W.P.D. FT. HEAD, CASING RADIATED, etc.).

EVAPORATIVE FLUID COOLER SCHEDULE

NOTES:  
1. PROVIDE SHAFT GROUNDING AS REQUIRED IN THE MOTOR SPECIFICATION 23 05 13.  
2. PROVIDE STAINLESS STEEL COLD WATER BASIN AND STAINLESS STEEL COIL.  
3. SELECTION IS BASED ON 25% ETHYLENE GLYCOL.  
4. PROVIDE FAN MOTOR SPACE HEATERS AND POWER HEATERS SEPARATELY.  
5. PROVIDE DISCHARGE HOOD WITH DAMPERS.  
6. PROVIDE INSULATION ON COIL CASING, FAN SECTION, AND HOOD.  
7. MANUFACTURER SHALL PROVIDE CONTACT WITH TRANSFORMER AND DISCONNECT FOR HEATER PACKAGE.

Table with columns: TAG NAME, GPM, CONDENSING WATER (EWT °F, LWT °F), AMBIENT CONDITIONS (DB °F, WB °F), FAN DATA (NUMBER OF FANS, HP EACH, DRIVE TYPE, DISCONNECT BY (NOTE A)), CONTROLLER/STARTER BY (NOTE A), TYPE (NOTE C), NUMBER OF PUMPS, PUMP HP, PUMP DATA (DISCONNECT BY (NOTE A), CONTROLLER/STARTER BY (NOTE A), TYPE (NOTE C)), KW, IMERSION HEATER (DISCONNECT BY (NOTE A), TYPE (NOTE B), CONTROLLER/STARTER BY (NOTE A), TYPE (NOTE C)), VOLTAGE, PHASES, CONTROLLER/STARTER BY (NOTE A), TYPE (NOTE B), SCRR, MANUFACTURER, MODEL, NOTES.

EXISTING HEAT PUMP SCHEDULE - WATER SOURCE

NOTES:  
1. UNIT IS EXISTING TO REMAIN. REBALANCE UNIT TO VALUES INDICATED ON SCHEDULE.  
2. EXTERNAL STATIC PRESSURE ACCOUNTS FOR FILTER PRESSURE DROP.  
3. VERIFY THAT EXISTING UNITS DO NOT HAVE UL 508 WATER LEVEL DETECTION DEVICE. IF UNITS DO NOT HAVE UL 508 CONFORMING WATER LEVEL DETECTION DEVICE PROVIDE A WATER LEVEL DETECTION DEVICE CONFORMING TO UL 508 WITH UNIT.  
4. REFER TO Z/M-401 FOR HEAT PUMP CONTROLS.  
5. BTU LISTED IS BASED ON ROOM LOADS AND IS THE MINIMUM BTU CAPACITY FOR HEAT PUMP.  
6. LAT IS AT THE DISCHARGE FROM THE UNIT AND IS BASED ON BASIS OF DESIGN HEAT PUMP CAPACITY LAT.  
7. SELECTION IS BASED ON 25% ETHYLENE GLYCOL.

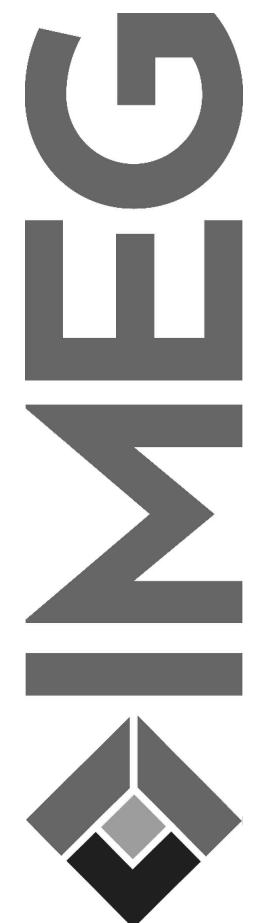
Table with columns: TAG NAME, AREA SERVED, CONFIGURATION, NOMINAL TONNAGE, CFM, OA CFM, EXT. S.P. IN. W.C. (NOTE 2), and various cooling/ heating performance metrics (EAT, LAT, BTU, SEN, EER @ AHRI, COND. GPM, W.P.D. FT. HEAD, CASING RADIATED, etc.).

SCHEDULE GENERAL NOTES:

- A. DISCONNECT AND CONTROLLER STARTER FURNISHED AND INSTALLED BY: MFR = MANUFACTURER, EC = ELECTRICAL CONTRACTOR.
- B. DISCONNECT TYPE: F = FUSED, NF = NON-FUSED
- C. CONTROLLER STARTER TYPE: ECM = ELECTRONICALLY COMMUTATED MOTOR, FV = FULL VOLTAGE, VFD = VARIABLE FREQUENCY DRIVE
- D. FAN RPM SHALL NOT EXCEED 110% OF SCHEDULED VALUE, WITH THE SCHEDULED WHEEL TYPE. SUBSTITUTION OF B1 OR B1A FANS FOR FC IS ACCEPTABLE IF EFFICIENCY IS NOT LOWER.
- E. NO EQUIPMENT SHALL BE SELECTED ABOVE 90% OF MOTOR NAME PLATE RATING.
- F. MUST BE WITHIN +/- 10% OF SCHEDULED RPM.
- G. CURB TYPE: MFR = STANDARD CURB BY MANUFACTURER

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SCHOOL

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POPLAR BLUFF, MO 63901

SHADY GROVE STATE SCHOOL  
RE-BID REPLACE HVAC AND  
CONTROLS

POPLAR BLUFF, MISSOURI

PROJECT # E2010-01  
SITE # 2024  
FACILITY # 5012024003

REVISION: \_\_\_\_\_  
DATE: \_\_\_\_\_  
REVISION: \_\_\_\_\_  
DATE: \_\_\_\_\_  
REVISION: \_\_\_\_\_  
DATE: \_\_\_\_\_

ISSUE DATE: 11/27/23

CAD DWG FILE: M-501  
DRAWN BY: A ARMEY  
CHECKED BY: IMEG  
DESIGNED BY: BRESAN

SHEET TITLE:  
MECHANICAL  
SCHEDULES

SHEET NUMBER:

M-501



CONDUIT INSTALLATION SCHEDULE			
THE FOLLOWING SCHEDULE SHALL BE ADHERED TO UNLESS THEY CONSTITUTE A VIOLATION OF APPLICABLE CODES OR ARE NOTED OTHERWISE ON THE DRAWINGS. THE INSTALLATION OF RMC CONDUIT WILL BE PERMITTED IN PLACE OF ALL CONDUIT SPECIFIED IN THIS SCHEDULE. REFER TO CONDUIT AND BOXES SPECIFICATION 26 05 33 FOR ADDITIONAL INFORMATION.			
INSTALLATION TYPE	RMC	EMT	PVC
FEEDERS: SWITCHBOARDS, DISTRIBUTION PANELS, PANELBOARDS, MOTOR CONTROL CENTERS, ETC.		X	
MECHANICAL EQUIPMENT FEEDERS: PUMPS, CHILLERS, AIR HANDLING UNITS, ETC.		X	
FLOOR MOUNTED EQUIPMENT FEEDERS: PUMPS, ETC. (INCLUDE NO MORE THAN 6 FEET OF LFMC TO PUMP)		X	
FINISHED SPACES / CONCEALED		X	
WET AND DAMP LOCATIONS: (CONDUIT, BOXES, FITTINGS, INSTALLED AND EQUIPPED TO PREVENT WATER ENTRY)	X		
INTERIOR LOCATIONS: CONCEALED		X	
INTERIOR LOCATIONS: EXPOSED		X	
INTERIOR LOCATIONS: EXISTING WALLS AND EXPOSED INSTALLATION (FINISHED SPACES)		X	
UNDERGROUND SITE CONDUITS:			
WITHIN 5' FROM THE PERIMETER OF A BUILDING FOUNDATION	X		
5' OR GREATER FROM THE PERIMETER OF A BUILDING FOUNDATION	X		X

ELECTRICAL SYMBOL LIST			
SYMBOL:	TAG:	SPEC SECTION:	DESCRIPTION:
	ECONN	26 05 33	ELECTRICAL CONNECTION
	PANEL '###'	EXISTING	PANELBOARD - RECESS MOUNT
	PANEL '###'	26 24 16	PANELBOARD - SURFACE MOUNT
	TR-#DTR-#	26 22 00	TRANSFORMER. REFER TO TRANSFORMER SCHEDULE
	MC-#	EXISTING	UTILITY METER HEAD
	MX-#MS-#	26 24 19	MANUAL SWITCH/STARTER. REFER TO DISC/STA SCHEDULE
	EPO	26 09 16	EMERGENCY STOP/POWER OFF. (N.C. AND N.O CONTACT)

ELECTRICAL EQUIPMENT TAGS		
TAG:	DESCRIPTION:	RELATED SPECIFICATION
DP-#	DISTRIBUTION PANEL	26 24 16
VFD-#	VARIABLE FREQUENCY DRIVE - REFER TO VFD SCHEDULE	26 29 23

ELECTRICAL ABBREVIATION KEY	
ABBR:	DESCRIPTION:
C	CONDUIT
NIC	NOT IN CONTRACT
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED

VIEW KEY	
	INDICATES DIRECTION OF TRUE NORTH
	NAME - LEVEL NAME
	10'-0" - HEIGHT ABOVE PROJECT 0'-0"
	INDICATES NOTE USED TO DESCRIBE ADDITIONAL INFORMATION ABOUT WORK REQUIRED, SPECIFIC TO THE SHEET AND/OR DETAIL
	INDICATES DIRECTION OF TRUE NORTH PLAN OR DETAIL NUMBER PLAN OR DETAIL NAME VIEW NAME 1/8" = 1'-0" PLAN OR DETAIL SCALE
	INDICATES SIMILAR DETAIL REFERENCED IN MULTIPLE LOCATIONS DETAIL REFERRED TO BY SECTION CUT SHEET DETAIL IS LOCATED ON
<b>LINE TYPE AND TAG KEY:</b> NEW WORK BY THIS CONTRACTOR (WIDE LINE) ----- EXISTING TO BE REMOVED (SHORT DASHED PATTERN) - - - - - NEW UNDERFLOOR OR UNDERGROUND (LONG DASHED PATTERN) EXISTING TO REMAIN OR WORK BY OTHERS (NARROW LINE) ----- EXISTING ----- EXISTING TO BE REMOVED BY OTHERS (SHORT DASHED PATTERN) - - - - - EXISTING UNDERFLOOR OR UNDERGROUND (LONG DASHED PATTERN) HALFTONING DOES NOT MODIFY SCOPE. 'TAG-E TAGS WITH DASH 'E' INDICATES THE REFERENCED OBJECT IS EXISTING TAG-1 UNDERLINED TAG INDICATES OBJECT IS IN-SCOPE. IF NEW, ADDITIONAL INFORMATION IS AVAILABLE IN A SCHEDULE, MATERIAL LIST, OR SYMBOL LIST INDICATES AN EXISTING SYSTEM'S POINT OF CONNECTION/REMOVAL	

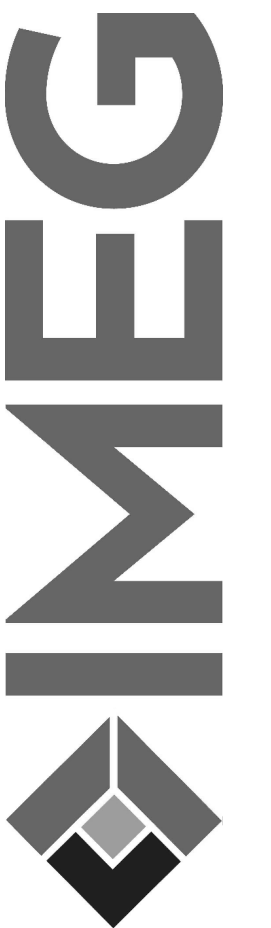
- ELECTRICAL GENERAL NOTES:**
- ###-### INDICATES ELECTRICAL EQUIPMENT DEFINED IN ELECTRICAL SCHEDULES OR SPECIFICATION. REFER TO DRAWINGS CONTAINING ELECTRICAL SCHEDULES. PERMANENT NAMEPLATE SHALL MATCH FINAL EQUIPMENT NOMENCLATURE, NOT ELECTRICAL EQUIPMENT TAG NAME. REFER TO SPECIFICATIONS.
- DEVICE KEY:  
1 = CIRCUIT NUMBER
- IF LABEL IS ORIENTED HORIZONTALLY A SLASH WILL SEPARATE THIS INFORMATION. EX: A / 1

- ELECTRICAL INSTALLATION NOTES:**
- THE COMPLETE INSTALLATION SHALL BE IN ACCORDANCE WITH THE ADA STANDARDS FOR ACCESSIBLE DESIGN. REFER TO THE ADA GUIDELINES FOR ALL CONFIGURATION DETAILS ON THIS PAGE FOR ADDITIONAL INFORMATION.
  - CIRCUIT NUMBERS ARE SHOWN FOR CIRCUIT IDENTIFICATION. CIRCUITING SHALL AGREE WITH NUMBERING ON THE PANEL PROVIDED. COMMON NEUTRALS MAY NOT BE USED FOR BRANCH CIRCUITS. BALANCE THE LOAD ON PANEL AS EVENLY AS POSSIBLE BETWEEN EACH PHASE.
  - ELECTRICAL EQUIPMENT SHALL BE MOUNTED TO AVOID IMPEDANCE OF OPERATION OF, AND/OR ACCESS TO ELECTRICAL AND MECHANICAL EQUIPMENT. ALL MOUNTING OF ELECTRICAL EQUIPMENT ON EQUIPMENT SUPPLIED BY ANOTHER CONTRACTOR, SHALL BE APPROVED IN ADVANCE BY THE OTHER CONTRACTOR.
  - CONTRACTOR SHALL BE RESPONSIBLE FOR ALL OPENINGS REQUIRED IN WALLS. ALL OPENINGS SHALL BE REPAIRED TO MATCH EXISTING BY A QUALIFIED CONTRACTOR AT THE EXPENSE OF THIS CONTRACTOR. ALL CONDUITS THROUGH WALLS SHALL BE GROUDED OR SEALED INTO OPENINGS.
  - EACH CONTRACTOR IS RESPONSIBLE FOR DAMAGE CAUSED BY THEIR ACTIONS TO THE WALLS, FLOORS, CEILINGS, AND ROOFS. THE CONTRACTOR WHOSE WORK CAUSES DAMAGE IS RESPONSIBLE FOR PATCHING TO MATCH ORIGINAL CONSTRUCTION, FIRE RATING, AND FINISH.
  - ELECTRICAL IDENTIFICATION. REFER TO SPECIFICATION SECTION 26 05 53 FOR COLOR/LABEL REQUIREMENTS FOR CONDUIT, BOX, CABLEWIRE, AND EQUIPMENT.

- ELECTRICAL RENOVATION NOTES:**
- THESE NOTES APPLY TO ALL ELECTRICAL SHEETS AND TRADES, INCLUDING BUT NOT LIMITED TO, POWER, AND SYSTEMS.
- EXISTING CONDITIONS ARE SHOWN BASED ON INFORMATION OBTAINED FROM FIELD SURVEYS, EXISTING BUILDING DOCUMENTS, AND STAFF. VERIFY EXISTING CONDITIONS AND REPORT ANY CONFLICTS BEFORE PROCEEDING.
  - NOT ALL EXISTING EQUIPMENT, LUMINAIRES, AND CONDUIT ARE SHOWN. VERIFY EXISTING CONDITIONS AND REPORT ANY CONFLICTS WITH NEW WORK BEFORE STARTING WORK.
  - THE GENERAL CONTRACTOR IS RESPONSIBLE FOR REMOVAL AND REPLACEMENT OF CEILINGS, CEILING TILES, AND CEILING GRIDS ASSOCIATED WITH AREAS OF WORK BY ALL CONTRACTORS. NOTIFY THE GENERAL CONTRACTOR OF AFFECTED AREAS PRIOR TO BIDDING.
  - WHERE EXISTING ELECTRICAL SYSTEMS ARE LOCATED IN AREAS THAT CONFLICT WITH NEW EQUIPMENT, PIPING, OR DUCTWORK TO BE INSTALLED, EACH CONTRACTOR SHALL EITHER ARRANGE NEW EQUIPMENT, CONDUIT, OR DUCTWORK IN SUCH A FASHION THAT IT DOES NOT CONFLICT WITH EXISTING SYSTEMS, OR REWORK EXISTING ELECTRICAL SYSTEMS TO ALLOW FOR INSTALLATION OF NEW EQUIPMENT, PIPING, OR DUCTWORK.
  - COORDINATE DEMOLITION WORK, OUTAGES, ETC. WITH AFFECTED ADJACENT AREAS.
  - PROVIDE TEMPORARY LIGHTING, POWER, SYSTEMS, ETC. AS NEEDED TO MAINTAIN SERVICE TO ALL AREAS DURING ALL PHASES OF PROJECT.
  - INSTALL TEMPORARY LIGHTING, CIRCUITS, ETC. AS NECESSARY TO KEEP ALL OCCUPIED SPACES OPERATIONAL THROUGHOUT ALL PHASES OF THE PROJECT.
  - E.C. SHALL COORDINATE WITH M.C. AND OWNER TO PHASE WORK TO MINIMIZE DOWN TIME. E.C. SHALL CONNECT REPLACED HEAT PUMPS, BOILERS, FLUID COOLERS, EXHAUST FANS, AND PUMPS TO EXISTING PANEL UNTIL NEW PANEL ARRIVES TO KEEP BUILDING OPERATIONAL.
  - THE WORK WILL BE COORDINATED WITH THE OWNER TO ALLOW PARTIAL AREAS TO PERMIT CONSTRUCTION ACTIVITIES. WORK SHALL BE SUBSTANTIALLY COMPLETE WITHIN THE AREA TO ALLOW OWNER TO REOCCUPY BEFORE MOVING TO THE NEXT AREA. AREAS REQUIRING SHUTDOWN OF ESSENTIAL FUNCTIONS SUCH AS THE KITCHEN AND MAIN MECHANICAL ROOM SHALL BE TIGHTLY COORDINATED WITH THE OWNER AND SCHOOL SCHEDULE TO ALLOW FOR WORK TO NOT AFFECT BUILDING OCCUPANCY.



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SITE # 2024  
FACILITY # 5012024003

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REVISION: \_\_\_\_\_  
DATE: \_\_\_\_\_

ISSUE DATE: 11/27/23

CAD DWG FILE: E-000  
DRAWN BY: CLAFAL  
CHECKED BY: IMEG  
DESIGNED BY: MASRYA/CLAFAL

SHEET TITLE:  
ELECTRICAL  
COVERSHEET

SHEET NUMBER:

E-000





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REVISION: \_\_\_\_\_  
DATE: \_\_\_\_\_  
ISSUE DATE: 11/27/23

CAD DWG FILE: ED-100  
DRAWN BY: CLAFAI  
CHECKED BY: IMEG  
DESIGNED BY: MASRYA/CLAFAI

SHEET TITLE:  
FIRST FLOOR PLAN -  
ELECTRICAL  
DEMOLITION

SHEET NUMBER:

ED-100

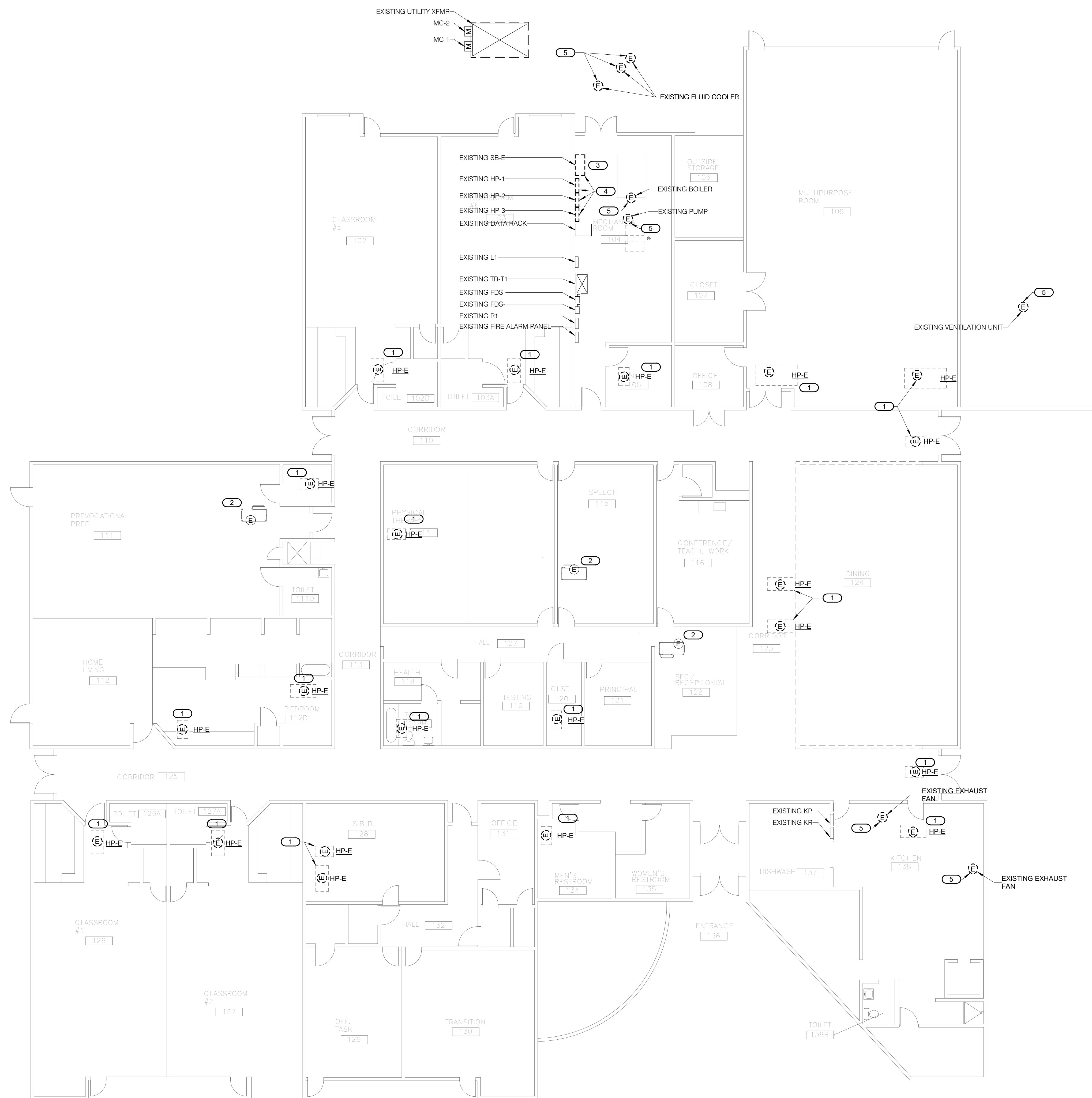
17 OF 21 SHEETS  
11/27/2023

**SHEET NOTES:**

- COORDINATE CEILING MOUNTED EQUIPMENT REMOVAL WITH MECHANICAL CONTRACTOR. CONTRACTOR RESPONSIBLE FOR REMOVAL AND REINSTALLATION OF ANY ELECTRICAL EQUIPMENT, SUCH AS LIGHT FIXTURES, TO ACCOMPLISH EQUIPMENT REMOVAL REQUIRED.
- E.C. SHALL COORDINATE WITH M.C. AND OWNER TO PHASE WORK TO MINIMIZE DOWN TIME. E.C. SHALL CONNECT REPLACED HEAT PUMPS TO EXISTING PANEL UNTIL NEW PANEL ARRIVES TO KEEP BUILDING OPERATIONAL.

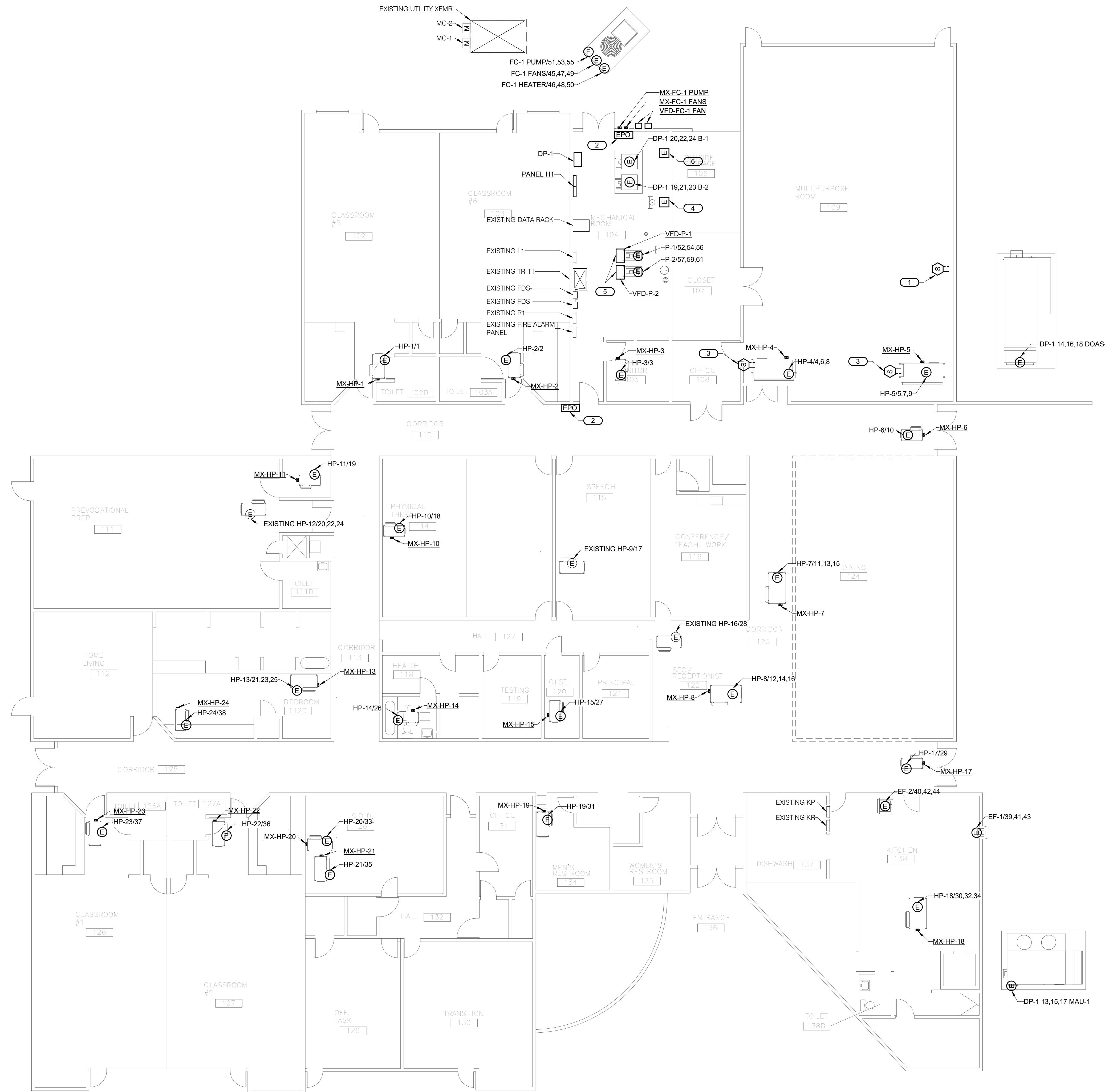
**KEYNOTES:** (#)

- EXISTING HEAT PUMP. DISCONNECT AND REMOVE CONDUIT AND CABLE BACK TO SOURCE.
- EXISTING HEAT PUMP TO REMAIN.
- EXISTING WALL MOUNTED TECHNOLOGY EQUIPMENT ABOVE SB-E. CONTRACTOR TO EXTEND EXISTING EQUIPMENT TO RELOCATE PLAN NORTH ROUGHLY THREE (3) FEET TO MAINTAIN CLEARANCES. CONTRACTOR TO FIELD VERIFY EXACT DISTANCE REQUIRED TO MAINTAIN CLEARANCES. CONTRACTOR TO COORDINATE NETWORK INTERRUPTIONS WITH OWNER AT LEAST 48 HOURS IN ADVANCE.
- CONTRACTOR TO REMOVE EXISTING CONDUIT, WIRE BACK TO THE SOURCE AND PROVIDE NEW CONDUIT AS INDICATED ON THE SHEET E-400. IF CONTRACTOR DETERMINES EXISTING CONDUIT IS FIT FOR REUSE CONTRACTOR SHALL PROVIDE DOCUMENTATION TO OWNER AND ENGINEER FOR APPROVAL. DOCUMENTATION SHALL INCLUDE CREDIT THAT WILL BE PROVIDED TO OWNER.
- EXISTING MECHANICAL EQUIPMENT. DISCONNECT AND REMOVE CONDUIT AND CABLE BACK TO SOURCE.



**1 FIRST FLOOR PLAN - ELECTRICAL DEMOLITION**  
1/8" = 1'-0"





**GENERAL SHEET NOTES:**

1. ALL CIRCUITS SHOWN ARE FED FROM PANEL H1 UNLESS OTHERWISE NOTED.
2. COORDINATE CEILING MOUNTED EQUIPMENT, SUCH AS LIGHTING, REINSTALL WITH MECHANICAL CONTRACTOR. CONTRACTOR RESPONSIBLE FOR REINSTALL OF ANY ELECTRICAL EQUIPMENT REMOVED TO ACCOMPLISH EQUIPMENT REMOVAL AND NOT DESIGNATED AS DEMOLITION ON SHEET ED-100.
3. E.C SHALL COORDINATE WITH M.C. AND OWNER TO PHASE WORK TO MINIMIZE DOWN TIME. E.C SHALL CONNECT REPLACED HEAT PUMPS TO EXISTING PANEL UNTIL NEW PANEL ARRIVES TO KEEP BUILDING OPERATIONAL.

**KEYNOTES: (#)**

1. MOUNT DUCT SMOKE DETECTOR ON THE SUPPLY SIDE OF DOAS-1. CONTRACTOR TO COORDINATE WITH FIRE ALARM VENDOR TO CONFIRM COMPATIBILITY WITH EXISTING FIRE ALARM SYSTEM. DETECTION OF SMOKE SHALL TRIGGER A SUPERVISORY INDICATION AND MECHANICAL FAN SHUTDOWN.
2. EMERGENCY POWER OFF FOR B-1 AND B-2. PROVIDE ONE (1) 120V CIRCUIT FROM PANEL R1. CONTRACTOR TO UTILIZE A SPARE 20A BREAKER ON PANEL R1. REFER TO EMERGENCY BOILER SHUTDOWN DIAGRAM ON SHEET M-402 MECHANICAL DIAGRAMS FOR MORE INFORMATION.
3. MOUNT DUCT SMOKE DETECTOR ON THE RETURN SIDE OF THE UNIT. CONTRACTOR TO COORDINATE WITH FIRE ALARM VENDOR TO CONFIRM COMPATIBILITY WITH EXISTING FIRE ALARM SYSTEM. DETECTION OF SMOKE SHALL TRIGGER A SUPERVISORY INDICATION AND MECHANICAL FAN SHUTDOWN.
4. POWER FOR HVAC CONTROL PANEL. PROVIDE (1) 120V CIRCUIT FROM PANEL R1. CONTRACTOR TO UTILIZE A SPARE 20A BREAKER ON PANEL R1. COORDINATE EXACT LOCATION AND REQUIREMENTS WITH MECHANICAL CONTRACTOR.
5. MOUNT VFD AT +36" ON UNISTRUT.
6. POWER FOR SOLUTION PUMP. PROVIDE (1) 120V CIRCUIT FROM PANEL R1. CONTRACTOR TO UTILIZE A SPARE 20A BREAKER ON PANEL R1. COORDINATE EXACT LOCATION AND REQUIREMENTS WITH MECHANICAL CONTRACTOR. CONTRACTOR SHALL CONFIRM BRANCH CIRCUIT REQUIREMENTS WITH PUMP MANUFACTURER.

STATE OF MISSOURI  
MICHAEL L PARSON,  
GOVERNOR



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DATE: \_\_\_\_\_  
ISSUE DATE: 11/27/23

CAD DWG FILE: E-100  
DRAWN BY: CLAFAI  
CHECKED BY: IMEG  
DESIGNED BY: MASRYA/CLAFAI

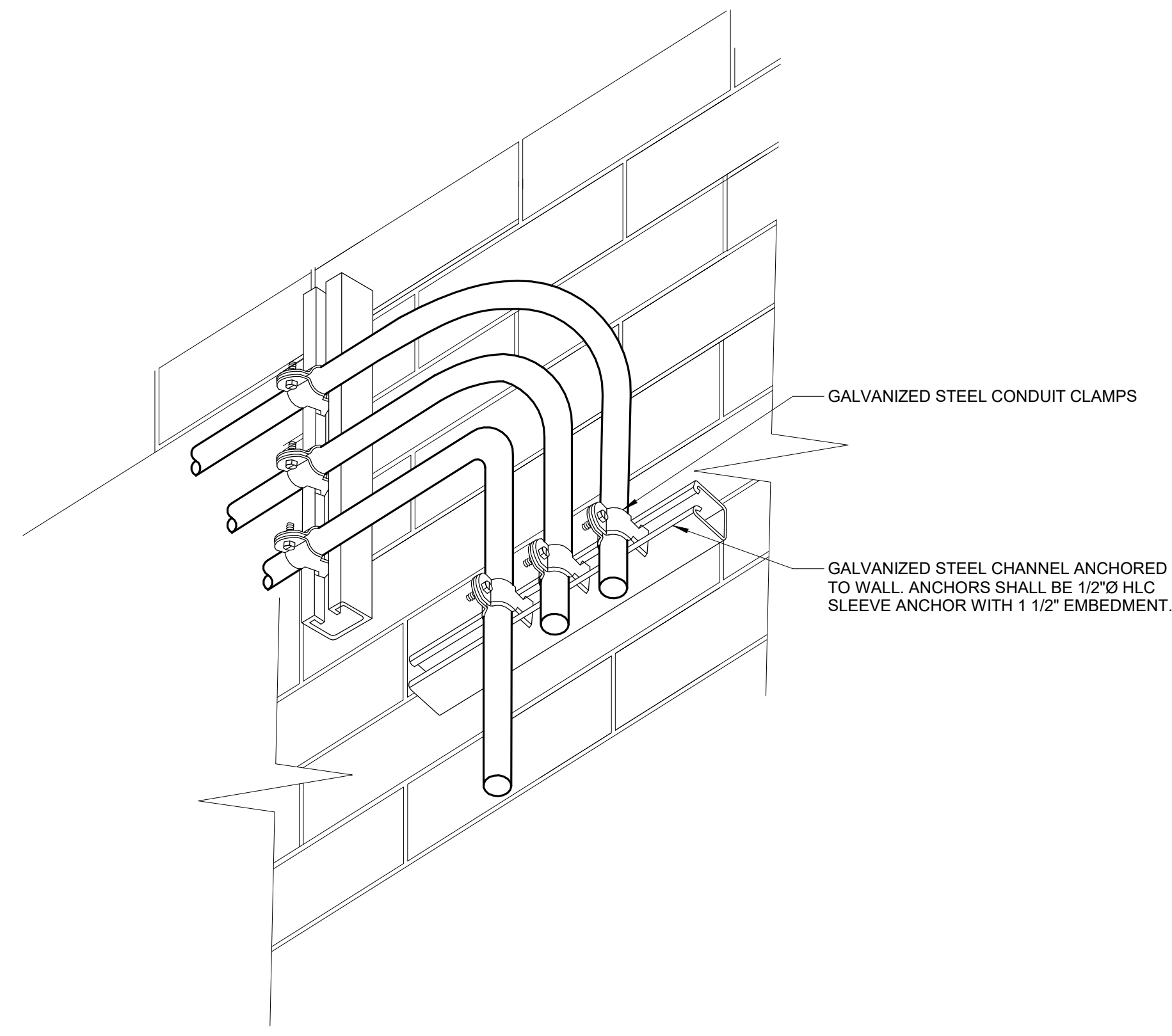
SHEET TITLE:  
FIRST FLOOR PLAN -  
ELECTRICAL

SHEET NUMBER:

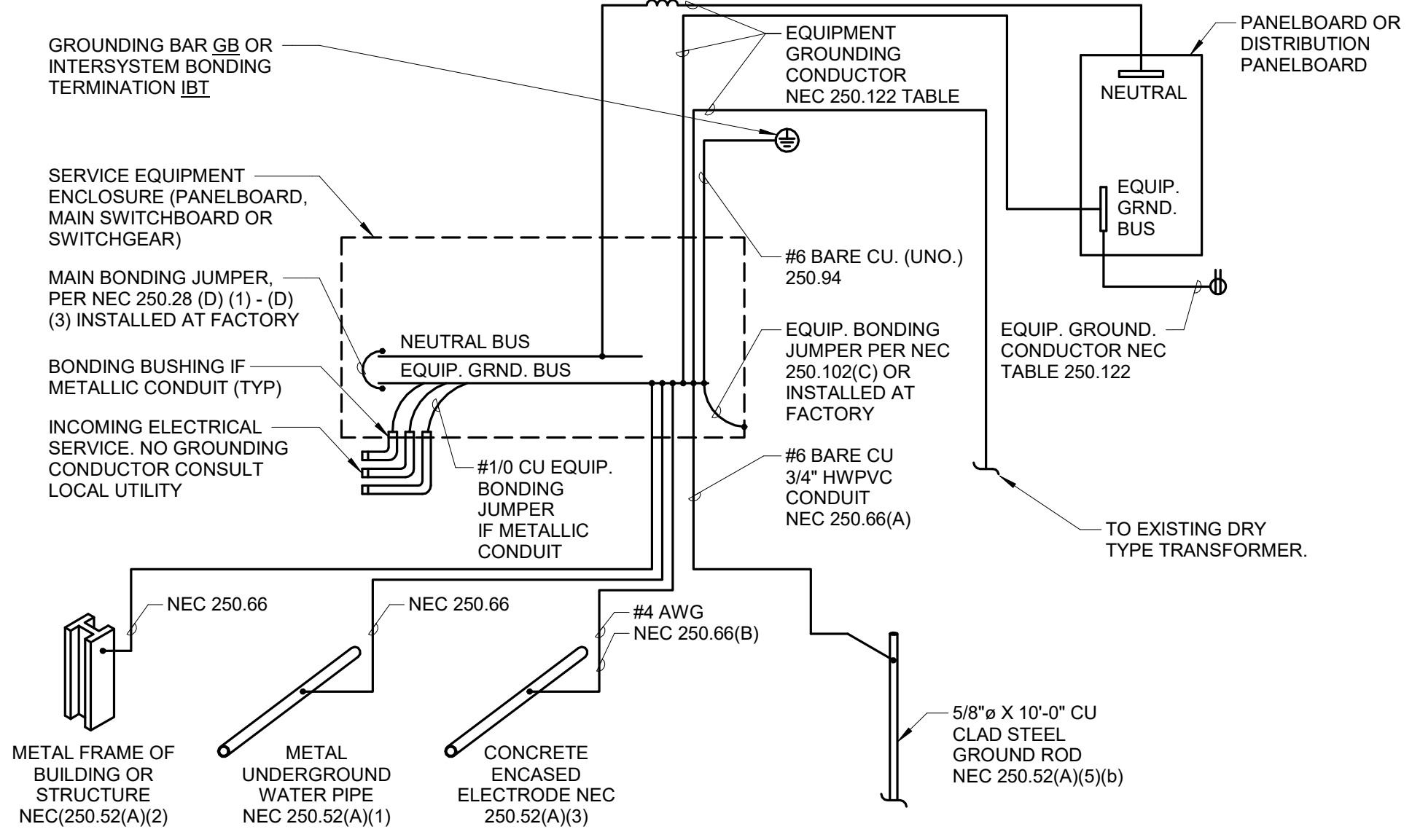
E-100

18 OF 21 SHEETS  
11/27/2023





**1 CONDUIT WALL SUPPORT**  
NO SCALE



**2 ELECTRICAL SYSTEM GROUNDING DETAIL**  
NO SCALE

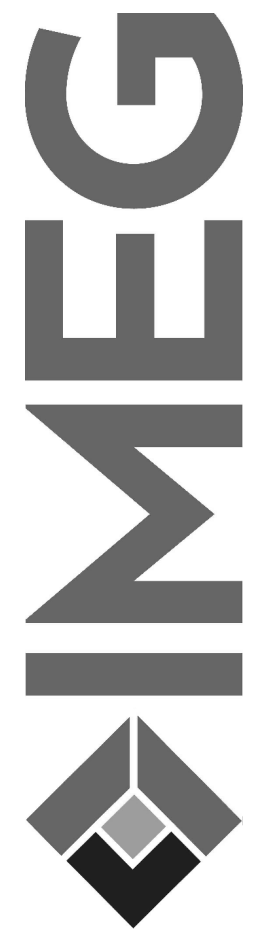
- NOTES:
1. CONNECT TO EXISTING SYSTEM GROUNDING WHERE APPLICABLE.



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ISSUE DATE: 11/27/23

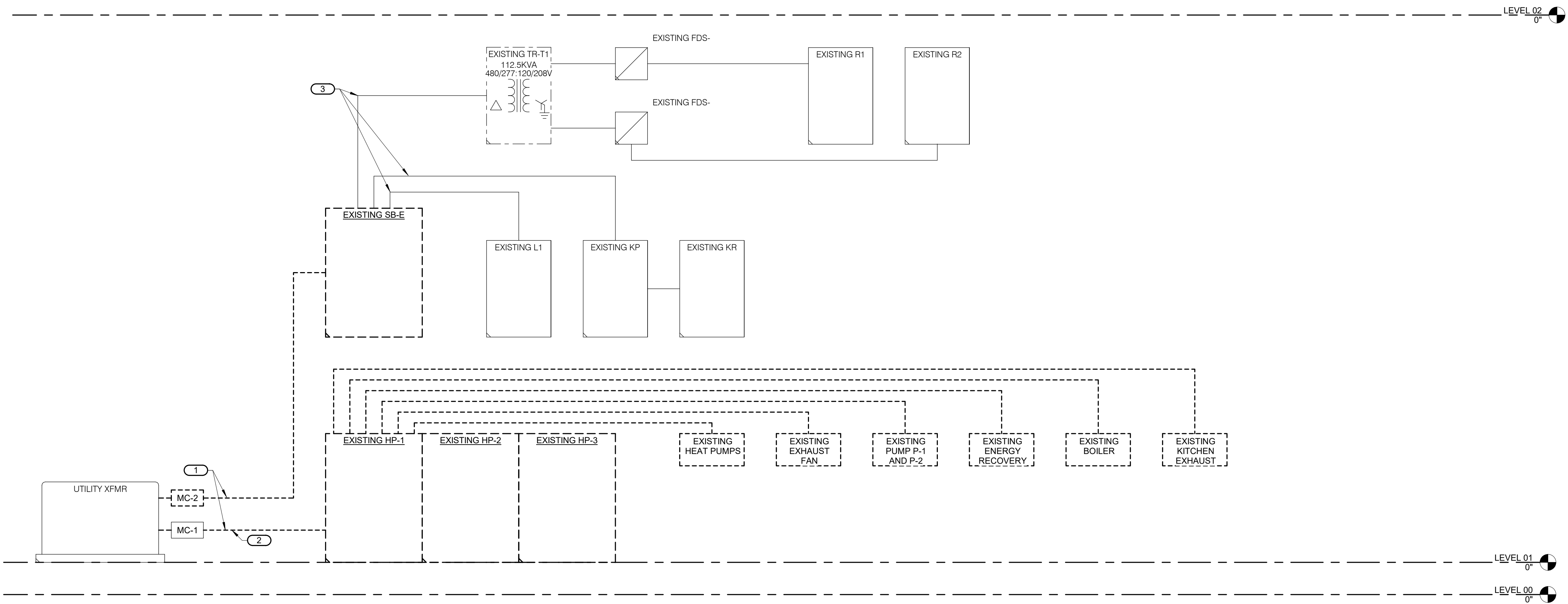
CAD DWG FILE: E-300  
DRAWN BY: CLAFAI  
CHECKED BY: IMEG  
DESIGNED BY: MASRYA/CLAFAI

SHEET TITLE:  
ELECTRICAL DETAILS

SHEET NUMBER:

**E-300**





- KEYNOTES:** #
- COORDINATE ANY WORK INVOLVING THE LOCAL UTILITY COMPANY WITH LYNDELL COLEMAN AT (573) 686-8667.
  - CONTRACTOR TO REMOVE EXISTING CONDUIT, WIRE BACK TO THE SOURCE AND PROVIDE NEW CONDUIT AS INDICATED ON THE DRAWINGS. IF CONTRACTOR DETERMINES EXISTING CONDUIT IS FIT FOR REUSE CONTRACTOR SHALL PROVIDE DOCUMENTATION TO OWNER AND ENGINEER FOR APPROVAL. DOCUMENTATION SHALL INCLUDE CREDIT THAT WILL BE PROVIDED TO OWNER.
  - PROTECT CIRCUITS IN PLACE FOR RECONNECTION TO NEW PANEL DP-1 AS SHOWN ON NEW WORK RISER DIAGRAM.



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 ISSUE DATE: 11/27/23

CAD DWG FILE: E-400  
 DRAWN BY: CLAFAI  
 CHECKED BY: IMEG  
 DESIGNED BY: MASRYA/CLAFAI

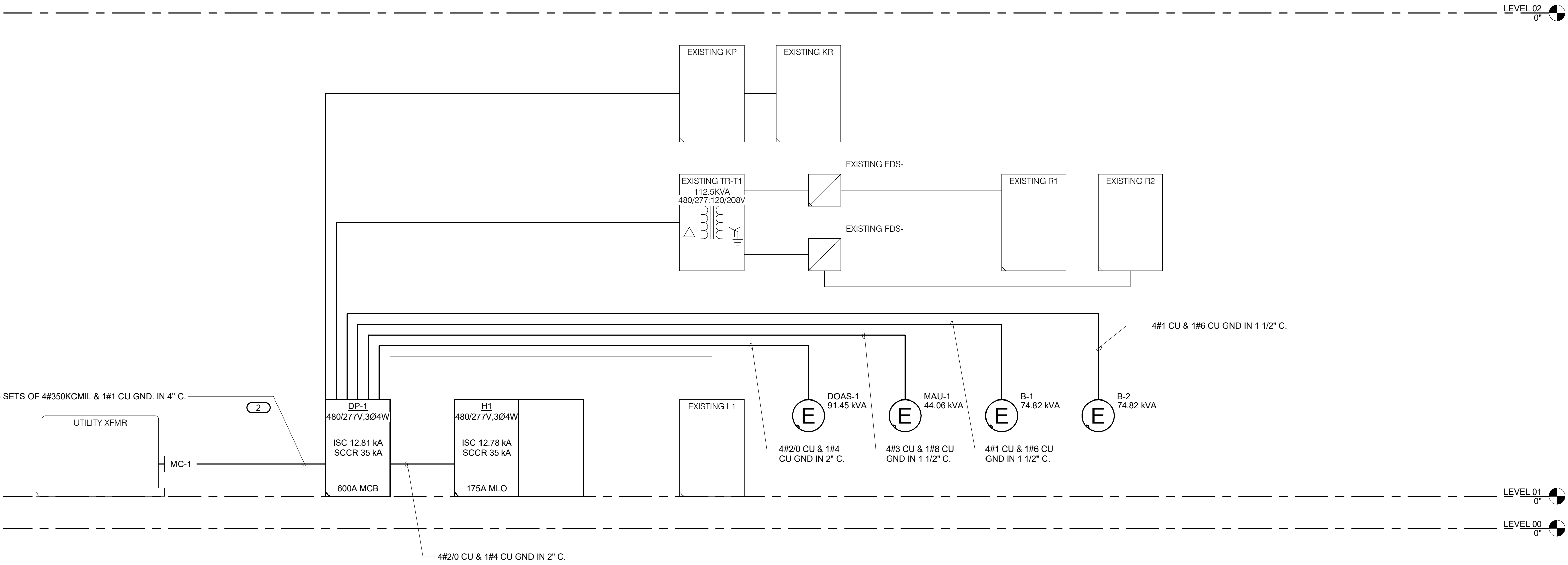
SHEET TITLE:  
**ELECTRICAL  
 DIAGRAMS**

SHEET NUMBER:

**E-400**

20 OF 21 SHEETS  
 11/27/2023

**1 ELECTRICAL RISER DIAGRAM - DEMO**  
 NO SCALE



**2 ELECTRICAL RISER DIAGRAM - NEW**  
 NO SCALE



### VARIABLE FREQUENCY DRIVE SCHEDULE

STARTER TYPE:		ACCESSORIES & OPTIONS:	
PWM - PULSE WIDTH MODULATED		SA - STANDARD ACCESSORIES	
		(INCLUDES * ITEMS)	
LINE DISCONNECT:		*SHZ - SKIP FREQUENCY CAPABILITY	
DS - DISCONNECT SWITCH		*MA - MANUAL SPEED ADJUSTMENT	
		*ET - ELECTRONIC THERMAL OVERLOADS	
		*HA - HAND-OFF-AUTO DOOR SWITCH	
		*CT - CONTROL TRANSFORMER, FUSED, 120V	

ITEM	LINE DISC.	DRIVE BYPASS CONTACT	CIRCUIT VOLTAGE	POLES	DRIVE			ENCLOSURE	REQUIRED ACCESSORIES & OPTIONS	APPROVED MANUFACTURERS
					HP RATING	TORQUE TYPE	VARIABLE			
VFD-FC-1 FAN	DS	3 CONTACT	460 V	3	2	PWM	VARIABLE	NEMA 3R	SA	DANFOSS YAKASAWA Q9 SERIES ABB ACH 580 SERIES
VFD-FC-1 FAN	DS	3 CONTACT	460 V	3	2	PWM	VARIABLE	NEMA 3R	SA	DANFOSS YAKASAWA Q9 SERIES ABB ACH 580 SERIES
VFD-P-1	DS	3 CONTACT	460 V	3	7.5	PWM	VARIABLE	NEMA 1	SA	DANFOSS YAKASAWA Q9 SERIES ABB ACH 580 SERIES
VFD-P-2	DS	3 CONTACT	460 V	3	7.5	PWM	VARIABLE	NEMA 1	SA	DANFOSS YAKASAWA Q9 SERIES ABB ACH 580 SERIES

### DISCONNECT AND STARTER SCHEDULE

NOTE: ALL DISCONNECTS (EXCEPT MANUAL STARTERS) SHALL BE HEAVY DUTY TYPE.

STARTER TYPE:		DISCONNECT TYPE & RATING		CIRCUIT VOLTAGE	POLES	STARTER		ENCLOSURE	APPROVED MANUFACTURERS	COMMENTS
MX - MANUAL SWITCH		TYPE	RATING			NEMA SIZE	TYPE			
MX-FC-1 FANS			30 A	480 V	3	0	MX	NEMA 4	SQUARE D 2510 OR EQUAL	
MX-FC-1 PUMP			30 A	480 V	3	0	MX	NEMA 4	SQUARE D 2510 OR EQUAL	
MX-HP-1			30 A	277 V	2	0	MX	NEMA 1	SQUARE D 2510 OR EQUAL	
MX-HP-2			30 A	277 V	2	0	MX	NEMA 1	SQUARE D 2510 OR EQUAL	
MX-HP-3			30 A	277 V	2	0	MX	NEMA 1	SQUARE D 2510 OR EQUAL	
MX-HP-4			30 A	480 V	3	0	MX	NEMA 1	SQUARE D 2510 OR EQUAL	
MX-HP-5			30 A	480 V	3	0	MX	NEMA 1	SQUARE D 2510 OR EQUAL	
MX-HP-6			30 A	277 V	2	0	MX	NEMA 1	SQUARE D 2510 OR EQUAL	
MX-HP-7			30 A	480 V	3	0	MX	NEMA 1	SQUARE D 2510 OR EQUAL	
MX-HP-8			30 A	480 V	3	0	MX	NEMA 1	SQUARE D 2510 OR EQUAL	
MX-HP-10			30 A	277 V	2	0	MX	NEMA 1	SQUARE D 2510 OR EQUAL	
MX-HP-11			30 A	277 V	2	0	MX	NEMA 1	SQUARE D 2510 OR EQUAL	
MX-HP-13			30 A	480 V	3	0	MX	NEMA 1	SQUARE D 2510 OR EQUAL	
MX-HP-14			30 A	277 V	2	0	MX	NEMA 1	SQUARE D 2510 OR EQUAL	
MX-HP-15			30 A	277 V	2	0	MX	NEMA 1	SQUARE D 2510 OR EQUAL	
MX-HP-17			30 A	277 V	2	0	MX	NEMA 1	SQUARE D 2510 OR EQUAL	
MX-HP-18			30 A	277 V	2	0	MX	NEMA 1	SQUARE D 2510 OR EQUAL	
MX-HP-19			30 A	277 V	2	0	MX	NEMA 1	SQUARE D 2510 OR EQUAL	
MX-HP-20			30 A	277 V	2	0	MX	NEMA 1	SQUARE D 2510 OR EQUAL	
MX-HP-21			30 A	277 V	2	0	MX	NEMA 1	SQUARE D 2510 OR EQUAL	
MX-HP-22			30 A	277 V	2	0	MX	NEMA 1	SQUARE D 2510 OR EQUAL	
MX-HP-23			30 A	277 V	2	0	MX	NEMA 1	SQUARE D 2510 OR EQUAL	
MX-HP-24			30 A	277 V	2	0	MX	NEMA 1	SQUARE D 2510 OR EQUAL	

### DISTRIBUTION PANEL DP-1

MOUNTING: SURFACE  
 ENCLOSURE: NEMA PB 1  
 FED FROM: 600 A/3P @ EXISTING UTILITY XFMR  
 LOCATION:

SOLID NEUTRAL GROUND BUS

**MAIN:** 600 A MCB  
**VOLTS:** 480/277 Wye  
**PHASE:** 3  
**WIRE:** 4  
**SCCR:** 35 kA  
**ISC:** 12.81 kA

NOTES:

KEY	CKT NO.	LOAD DESCRIPTION	OCPD AMPS	P	WIRE SIZE			A	B	C	WIRE SIZE			OCPD AMPS	LOAD DESCRIPTION	CKT NO.	KEY		
					G	N	H				G	N	H						
R	1	EXISTING PANEL KP	200 A	3	--	--	--	5.77	39.92			4	2/0	2/0	3	175 A	PANEL H1	2	
--	3	--	--	--	--	--	--	5.77	33.89			--	--	--	--	--	--	4	--
--	5	--	--	--	--	--	--	--	--	5.77	35.99	--	--	--	--	--	--	6	--
R	7	EXISTING PANEL L1	100 A	3	--	--	--	5.77	5.77			--	--	--	3	150 A	EXISTING TR-T1	8	R
--	9	--	--	--	--	--	--	--	--			--	--	--	--	--	--	10	--
--	11	--	--	--	--	--	--	--	--	5.77	5.77	--	--	--	--	--	--	12	--
--	13	MAU-1	70 A	3	3	3	8	14.69	30.48			4	2/0	2/0	3	175 A	DOAS-1	14	--
--	15	--	--	--	--	--	--	--	--	14.69	30.48	--	--	--	--	--	--	16	--
--	17	--	--	--	--	--	--	--	--	14.69	30.48	--	--	--	--	--	--	18	--
--	19	BOILER B-2	125 A	3	1	--	6	24.94	24.94			6	--	--	1	125 A	BOILER B-1	20	--
--	21	--	--	--	--	--	--	--	--	24.94	24.94	--	--	--	--	--	--	22	--
--	23	--	--	--	--	--	--	--	--	24.94	24.94	--	--	--	--	--	--	24	--
--	25	SPACE	--	1	--	--	--	--	--	--	--	--	--	1	--	--	--	26	--
--	27	SPACE	--	1	--	--	--	--	--	--	--	--	--	1	--	--	--	28	--
--	29	SPACE	--	1	--	--	--	--	--	--	--	--	--	1	--	--	--	30	--
			<b>Total Load:</b>			152.29 kVA			146.26 kVA			148.36 kVA							
			<b>Total Amps:</b>			550.96			528.03			536.76							

LOAD SUMMARY				TOTALS*	
LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND		
HVAC	394.957 kVA	80.00%	315.966 kVA		
Power	51.96 kVA	100.00%	51.96 kVA		
				<b>TOTAL CONNECTED LOAD:</b>	446.92 kVA
				<b>TOTAL ESTIMATED DEMAND LOAD:</b>	367.926 kVA
				<b>TOTAL CONNECTED AMPS:</b>	537.56 A
				<b>TOTAL ESTIMATED DEMAND AMPS:</b>	442.5 A

\*TOTAL DEMAND CALCS SUBTRACT ANY REDUNDANT LOAD AND THE SMALLER OF ANY NONCOINCIDENT HVAC LOADS. THIS CALC IS DONE AT EACH PANEL.

CIRCUIT KEY NOTES: R = RECONNECT EXISTING FEEDERS TO EXISTING DISTRIBUTION EQUIPMENT.

### PANEL H1

MOUNTING: SURFACE  
 ENCLOSURE: NEMA PB 1  
 FED FROM: 175 A/3P @ DP-1  
 LOCATION:

SOLID NEUTRAL GROUND BUS

**MAIN:** 175 A MLO  
**VOLTS:** 480/277 Wye  
**PHASE:** 3  
**WIRE:** 4  
**SCCR:** 35 kA  
**ISC:** 12.78 kA

NOTES: 2 SECTION PANEL AS SHOWN ON DRAWINGS.

KEY	CKT NO.	LOAD DESCRIPTION	OCPD AMPS	P	WIRE SIZE			A	B	C	WIRE SIZE			OCPD AMPS	LOAD DESCRIPTION	CKT NO.	KEY		
					G	N	H				G	N	H						
	1	HP-1	20 A	1	12	12	12	2.22	2.3			12	12	12	1	20 A	HP-2	2	
	3	HP-3	15 A	1	12	12	12		0.9	2.72		12	12	12	3	20 A	HP-4	4	
	5	HP-5	20 A	3	12	12	12				2.72	2.72	--	--	--	--	--	6	--
--	7	--	--	--	--	--	--	2.72	2.72			--	--	--	--	--	--	8	--
--	9	--	--	--	--	--	--		2.72	0.9		12	12	12	1	15 A	HP-6	10	
	11	HP-7	20 A	3	12	12	12			1.88	1.88	12	12	12	3	20 A	HP-8	12	
--	13	--	--	--	--	--	--	1.88	1.88			--	--	--	--	--	--	14	--
--	15	--	--	--	--	--	--		1.88	1.88		--	--	--	--	--	--	16	--
	17	HP-9	15 A	1	12	12	12			1.73	1.36	12	12	12	1	15 A	HP-10	18	
	19	HP-11	15 A	1	12	12	12	0.9	1.1			12	12	12	3	15 A	HP-12	20	
	21	HP-13	15 A	3	--	--	--			1.1	1.1	--	--	--	--	--	--	22	
--	23	--	--	--	--	--	--			1.1	1.1	--	--	--	--	--	--	24	--
--	25	--	--	--	--	--	--	1.1	1.36			12	12	12	1	15 A	HP-14	26	
	27	HP-15	15 A	1	12	12	12		1.11	1.73		12	12	12	1	15 A	HP-16	28	
	29	HP-17	15 A	1	12	12	12			0.9	1.88	12	12	12	3	20 A	HP-18	30	
	31	HP-19	20 A	1	12	12	12	2.22	1.88			--	--	--	--	--	--	32	--
	33	HP-20	15 A	1	12	12	12			1.73	1.88	--	--	--	--	--	--	34	--
	35	HP-21	20 A	1	12	12	12			2.26	2.22	12	12	12	1	20 A	HP-22	36	
	37	HP-23	20 A	1	12	12	12	2.22	1.18			12	12	12	1	15 A	HP-24	38	
	39	EF-1	20 A	3	12	12	12			1.33	2.72	12	12	12	3	20 A	EF-2	40	
--	41	--	--	--	--	--	--			1.33	2.72	--	--	--	--	--	--	42	--
--	43	--	--	--	--	--	--	1.33	2.72			--	--	--	--	--	--	44	--
	45	FC-1 FANS	20 A	3	12	12	12		2.03	1.5		12	12	12	3	20 A	FC-1 HEATER	46	
--	47	--	--	--	--	--	--			2.03	1.5	--	--	--	--	--	--	48	--
--	49	--	--	--	--	--	--	2.03	1.5			--	--	--	--	--	--	50	--
	51	FC-1 PUMP	20 A	3	12	12	12		0.57	3.05		12	12	12	3	20 A	PUMP P-1	52	
--	53	--	--	--	--	--	--			0.57	3.05	--	--	--	--	--	--	54	--
--	55	--	--	--	--	--	--	0.57	3.05			--	--	--	--	--	--	56	--
	57	PUMP P-2	20 A	3	12	12	12			3.05	0	--	--	--	1	20 A	SPARE	58	
--	59	--	--	--	--	--	--			3.05	0	--	--	--	1	20 A	SPARE	60	
--	61	--	--	--	--	--	--	3.05	0			--	--	--	1	20 A	SPARE	62	
--	63	SPACE	--	1	--	--	--			--	--	--	--	--	1	--	--	64	--
--	65	SPACE	--	1	--	--	--			--	--	--	--	--	1	--	--	66	--
--	67	SPACE	--	1	--	--	--			--	--	--	--	--	1	--	--	68	--