

# NORWOOD CITY SCHOOLS NORWOOD HS BOILER REPLACEMENT

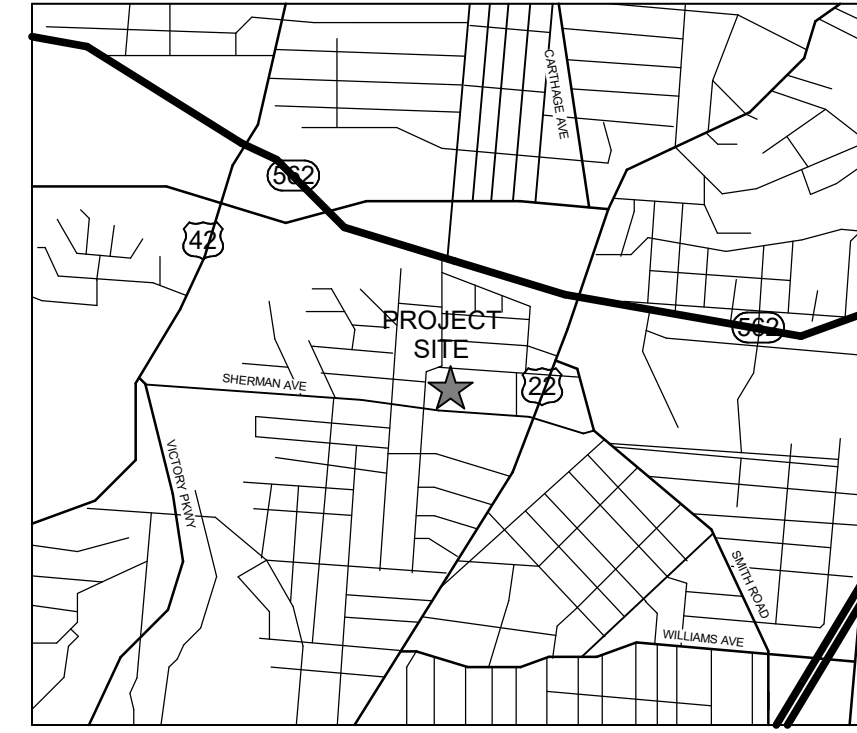
2020 SHERMAN AVE, NORWOOD, OH 45212

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VICINITY MAP HIGH SCHOOL  
2020 SHERMAN AVE, NORWOOD, OH 45212

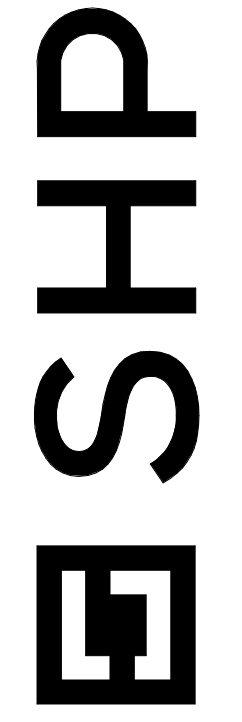
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#### GENERAL

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#### MECHANICAL

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M700 CONTROL SCHEMATIC - PIPING



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NORWOOD CITY SCHOOLS  
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#### ISSUANCES

04-21-23 BID DOCUMENTS

TITLE SHEET

COMM NO. 2022000.01

G000





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**NORWOOD SITE BEAUTIFICATION**  
 4400 Smith Avenue, Norwood, Ohio 45212  
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 2132 Williams Avenue, Norwood, Ohio 45212

**ISSUANCES**

DATE	DESCRIPTION
04-21-23	BID DOCUMENTS

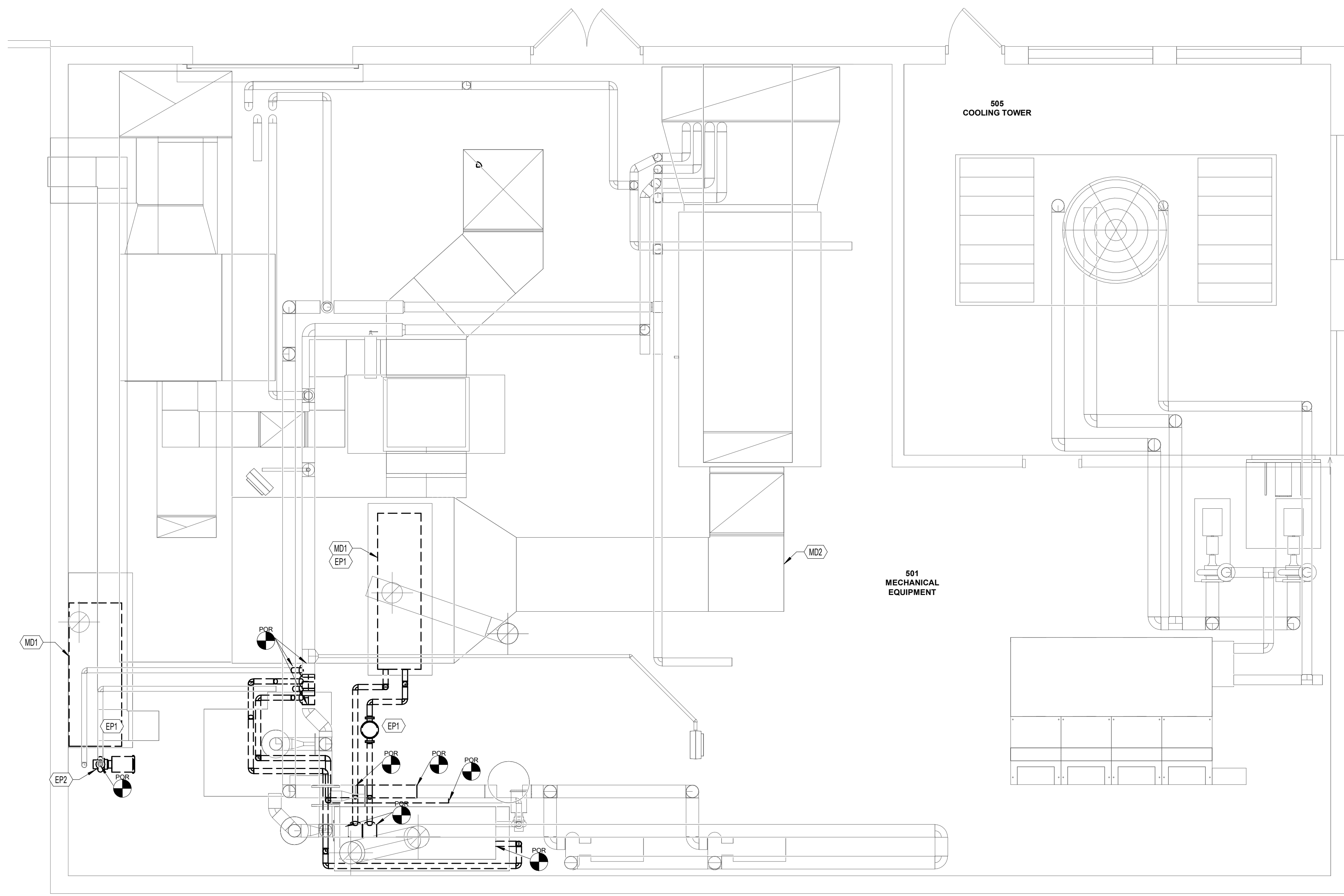
**PENTHOUSE 501**

COMM NO. 2022101.01

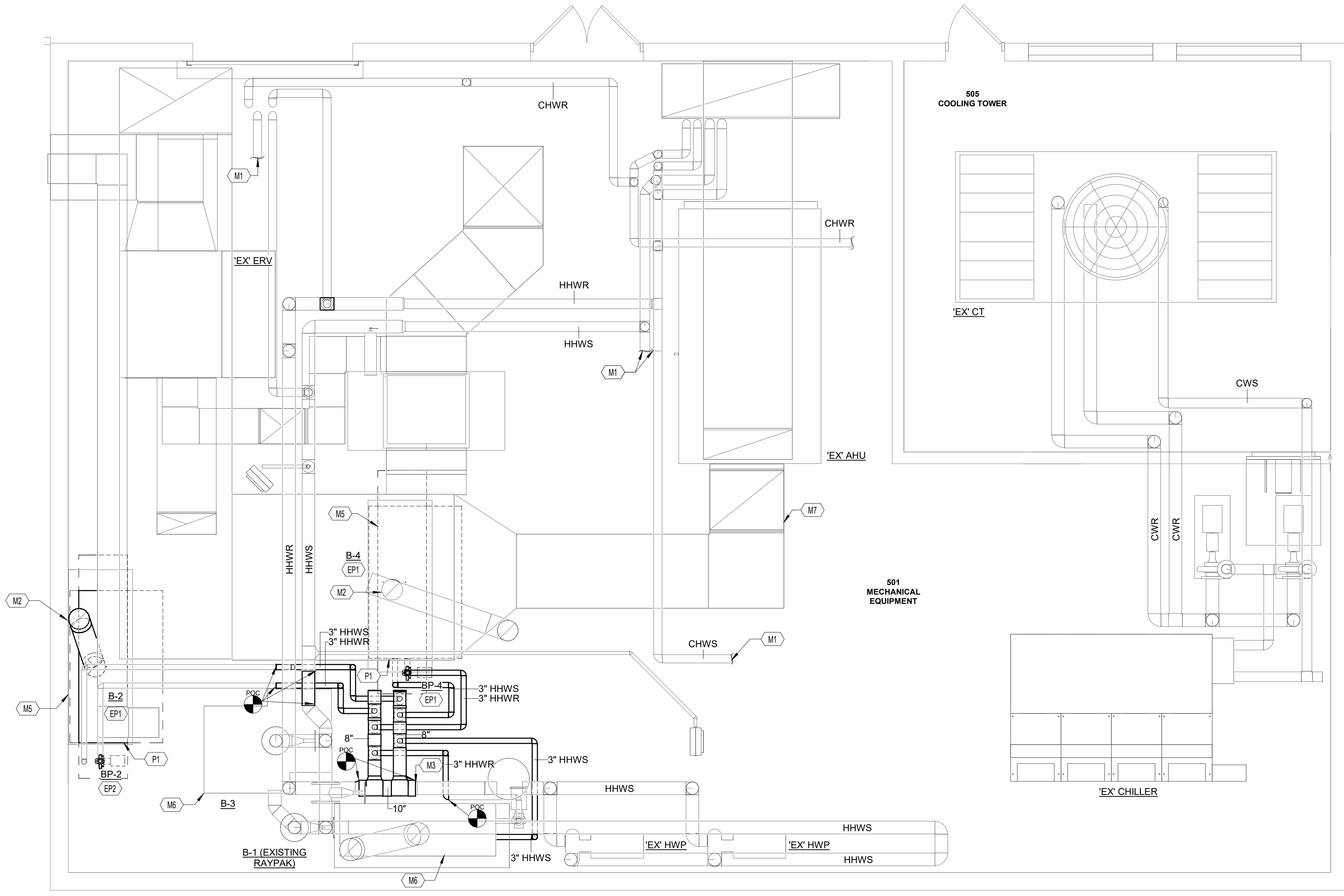
**MEP300**

**KEYNOTES**

- EP1 DISCONNECT EXISTING BRANCH CIRCUIT TO ALLOW FOR INSTALLATION OF NEW MECHANICAL EQUIPMENT. ONCE NEW EQUIPMENT IS INSTALLED, RECONNECT EXISTING BRANCH CIRCUIT AS REQUIRED. VERIFY EXACT LOCATION AND REQUIREMENTS IN FIELD AND WITH EQUIPMENT SUPPLIER.
- EP2 DISCONNECT AND REMOVE EXISTING BRANCH CIRCUIT TO ALLOW FOR INSTALLATION OF NEW MECHANICAL EQUIPMENT. CONNECT NEW MECHANICAL EQUIPMENT TO EXISTING 30A SWITCH IN SWITCHBOARD 'MSP-1'. EXISTING SWITCH TO BE FUSED PER MANUFACTURER'S RECOMMENDATIONS. VERIFY EXACT LOCATION AND REQUIREMENTS IN FIELD AND WITH EQUIPMENT SUPPLIER.
- M1 EXISTING PIPE MAIN CONTINUES. NOT SHOWN FOR CLARITY.
- M2 REUSE AND CONNECT EXISTING BOILER FLUES TO NEW BOILERS B2 AND B4.
- M3 CONNECT NEW 10" HHWR PIPING WITH TEES TO EXISTING 8" HHWR PIPING AS SHOWN.
- M5 INSTALL NEW BOILER ON EXISTING CONCRETE PAD. REWORK AND RECONNECT GAS, FLUE, AND BAS CONNECTIONS.
- M6 EXISTING BOILER TO REMAIN.
- M7 ALL PIPING, DUCTWORK, AND EQUIPMENT SHOWN AS GREY IS EXISTING TO REMAIN. TYPICAL.
- MD1 REMOVE EXISTING BOILER. DISCONNECT GAS, GAS, AND FLUE CONNECTIONS AND CAP FOR RECONNECTION TO NEW.
- MD2 ALL PIPING, DUCTWORK, AND EQUIPMENT SHOWN AS GREY IS EXISTING TO REMAIN. TYPICAL.
- P1 GAS PIPING CONNECTION TO NEW BOILER. REFER TO DETAIL 3M000.

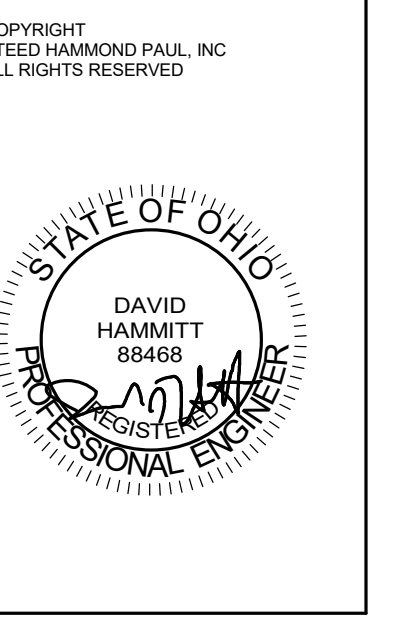


**2 ENLARGED DEMOLITION PLAN - PENTHOUSE 501**  
 MEP300 1/4" = 1'-0"



**1 ENLARGED PLAN - PENTHOUSE 501**  
 MEP300 1/4" = 1'-0"





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DATE	DESCRIPTION
04-21-23	BID DOCUMENTS

**CONTROL SCHEMATIC - PIPING**

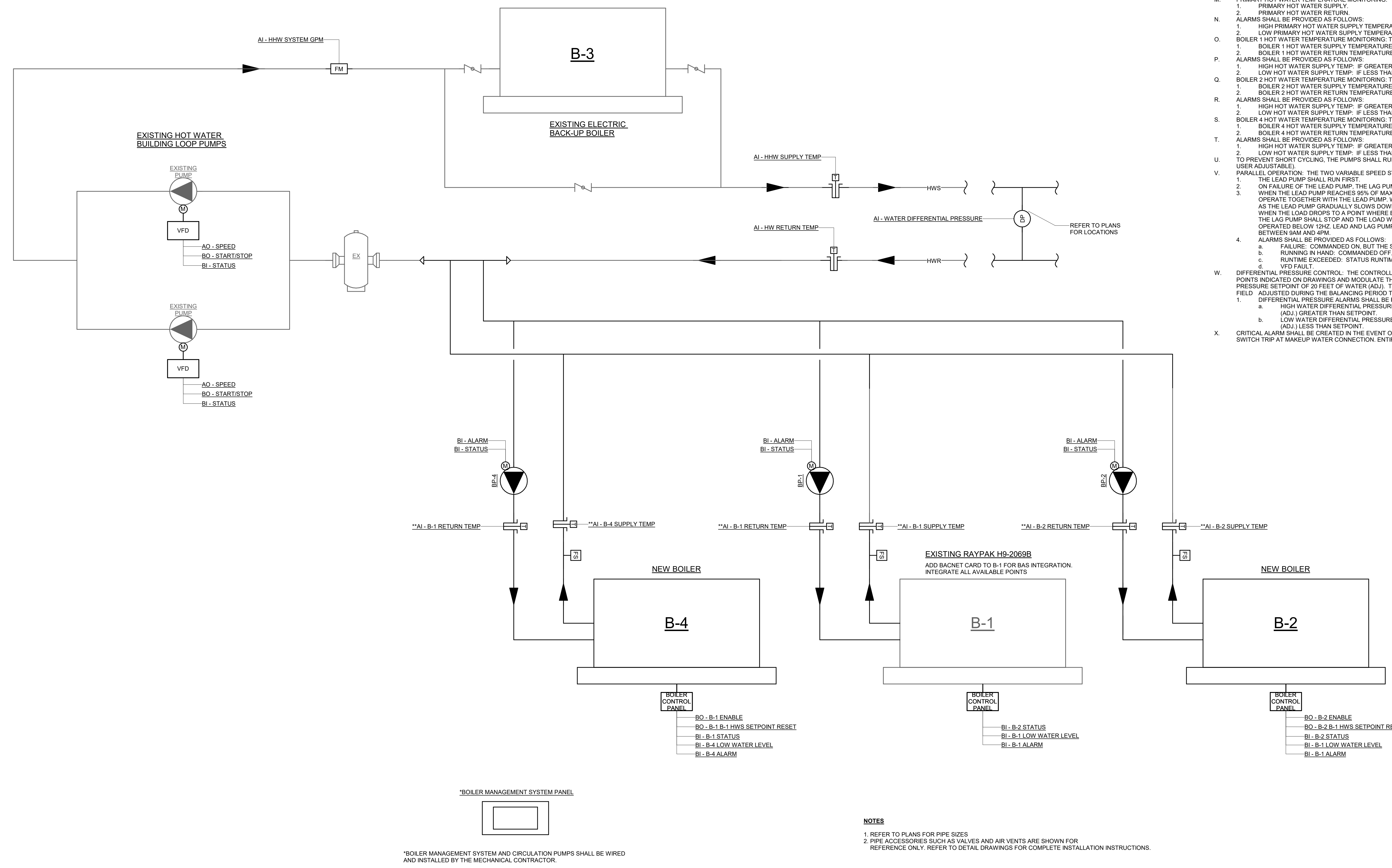
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**M700**

**HOT WATER SYSTEM CONTROL SEQUENCE**

- A. RUN CONDITIONS: THE BOILER SYSTEM SHALL BE ENABLED TO RUN WHENEVER:
  1. A DEFINABLE NUMBER OF COILS (10%) NEED HEATING (ADJ.).
  2. AND OUTSIDE AIR TEMPERATURE IS LESS THAN 60°F (ADJ.).
- B. TO PREVENT SHORT CYCLING, THE BOILER SYSTEM SHALL RUN FOR AND BE OFF FOR MINIMUM ADJUSTABLE TIMES (BOTH USER DEFINABLE), UNLESS SHUTDOWN ON SAFETIES OR OUTSIDE AIR CONDITIONS.
- C. THE BOILERS SHALL RUN SUBJECT TO THEIR OWN INTERNAL SAFETIES AND CONTROLS.
- D. THE BOILER SYSTEM SHALL ENABLE WHENEVER THE OUTSIDE AIR TEMPERATURE IS LESS THAN 40° F (ADJ.).
- E. BOILER SAFETIES: THE FOLLOWING SAFETIES SHALL BE MONITORED:
  1. BOILER ALARM
  2. LOW WATER LEVEL
- F. ALARMS SHALL BE PROVIDED AS FOLLOWS:
  1. BOILER ALARM
  2. LOW WATER LEVEL ALARM
- G. BOILER OPERATION: THE THREE BOILERS SHALL OPERATE TO MEET BUILDING DEMAND, EACH OPERATING AT ITS LOWEST AND MOST EFFICIENT FIRING RATE.
  1. IF THE HOT WATER RETURN TEMPERATURE FALLS BELOW 110 F FOR 10 MINS (ADJ.), ADDITIONAL BOILERS SHALL BE SEQUENCED ON TO MAINTAIN HOT WATER RETURN AT OR ABOVE 110 F.
- H. BOILER CIRCULATION PUMP CONTROL: THE BOILERS SHALL OPERATE UNDER THE CONTROL OF THE BOILER MANAGEMENT SYSTEM, WHICH SHALL CONTROL THE ASSOCIATED BOILER CIRCULATION PUMPS.
  1. THE BOILER CIRCULATION PUMPS SHALL INDICATE AN OFF STATUS AND PROHIBIT THE BOILER FROM FIRING.
  2. THE BOILER CIRCULATION PUMPS SHALL INDICATE AN ON STATUS AND ALLOW THE BOILER TO FIRE.
- I. EXISTING B-1 BOILER
  1. IS NOT CAPABLE OF RECEIVING SIGNALS FROM THE BAS.
  2. WILL BE A BACKUP ONLY TO OPERATE AS NEEDED.
  3. SHALL NOT BE A PART OF THE HOT WATER PLANT'S LEAD-LAG CYCLING.
- J. SWITCH LEAD BOILER BETWEEN B-2 AND B-4 EVERY TWO WEEKS ON A TUESDAY MORNING AT 10 AM.
- K. HOT WATER SUPPLY TEMPERATURE SETPOINT RESET: THE HOT WATER SUPPLY TEMPERATURE SETPOINT SHALL BE RESET INVERSELY WITH OUTDOOR AIR TEMPERATURE ACCORDING TO THE FOLLOWING SCHEDULE:
  1. AT 0°F (ADJ.) OUTDOOR AIR TEMPERATURE, 160°F HOT WATER SUPPLY TEMPERATURE (ADJ.).
  2. AT 60°F (ADJ.) OUTDOOR AIR TEMPERATURE, 130°F HOT WATER SUPPLY TEMPERATURE (ADJ.).
- L. ALARMS SHALL BE PROVIDED AS FOLLOWS:
  1. BOILER 1
    - A. FAILURE: COMMANDED ON BUT THE STATUS IS OFF.
    - B. RUNNING IN HAND: COMMANDED OFF BUT THE STATUS IS ON.
  2. BOILER 2
    - A. FAILURE: COMMANDED ON BUT THE STATUS IS OFF.
    - B. RUNNING IN HAND: COMMANDED OFF BUT THE STATUS IS ON.
  3. BOILER 4
    - A. FAILURE: COMMANDED ON BUT THE STATUS IS OFF.
    - B. RUNNING IN HAND: COMMANDED OFF BUT THE STATUS IS ON.
- M. PRIMARY HOT WATER TEMPERATURE MONITORING: THE FOLLOWING TEMPERATURES SHALL BE MONITORED:
  1. PRIMARY HOT WATER SUPPLY.
  2. PRIMARY HOT WATER RETURN.
- N. ALARMS SHALL BE PROVIDED AS FOLLOWS:
  1. HIGH PRIMARY HOT WATER SUPPLY TEMPERATURE: IF GREATER THAN 180°F (ADJ.).
  2. LOW PRIMARY HOT WATER SUPPLY TEMPERATURE: IF LESS THAN 105°F (ADJ.).
- O. BOILER 1 HOT WATER TEMPERATURE MONITORING: THE FOLLOWING TEMPERATURES SHALL BE MONITORED:
  1. BOILER 1 HOT WATER SUPPLY TEMPERATURE.
  2. BOILER 1 HOT WATER RETURN TEMPERATURE.
- P. ALARMS SHALL BE PROVIDED AS FOLLOWS:
  1. HIGH HOT WATER SUPPLY TEMP: IF GREATER THAN 180°F (ADJ.).
  2. LOW HOT WATER SUPPLY TEMP: IF LESS THAN 105°F (ADJ.).
- Q. BOILER 2 HOT WATER TEMPERATURE MONITORING: THE FOLLOWING TEMPERATURES SHALL BE MONITORED:
  1. BOILER 2 HOT WATER SUPPLY TEMPERATURE.
  2. BOILER 2 HOT WATER RETURN TEMPERATURE.
- R. ALARMS SHALL BE PROVIDED AS FOLLOWS:
  1. HIGH HOT WATER SUPPLY TEMP: IF GREATER THAN 180°F (ADJ.).
  2. LOW HOT WATER SUPPLY TEMP: IF LESS THAN 105°F (ADJ.).
- S. BOILER 4 HOT WATER TEMPERATURE MONITORING: THE FOLLOWING TEMPERATURES SHALL BE MONITORED:
  1. BOILER 4 HOT WATER SUPPLY TEMPERATURE.
  2. BOILER 4 HOT WATER RETURN TEMPERATURE.
- T. ALARMS SHALL BE PROVIDED AS FOLLOWS:
  1. HIGH HOT WATER SUPPLY TEMP: IF GREATER THAN 180°F (ADJ.).
  2. LOW HOT WATER SUPPLY TEMP: IF LESS THAN 105°F (ADJ.).
- U. TO PREVENT SHORT CYCLING, THE PUMPS SHALL RUN FOR AND BE OFF FOR A MINIMUM OF 5 MINUTES (BOTH USER ADJUSTABLE).
- V. PARALLEL OPERATION: THE TWO VARIABLE SPEED SYSTEM PUMPS SHALL OPERATE IN A PARALLEL FASHION.
  1. THE LEAD PUMP SHALL RUN FIRST.
  2. ON FAILURE OF THE LEAD PUMP, THE LAG PUMP SHALL RUN AND THE LEAD PUMP SHALL TURN OFF.
  3. WHEN THE LEAD PUMP REACHES 95% OF MAXIMUM VFD SPEED THE LAG PUMP SHALL BE STARTED AND OPERATE TOGETHER WITH THE LEAD PUMP. WHEN THE LAG PUMP STARTS IT SHALL SLOWLY RAMP UP AS THE LEAD PUMP GRADUALLY SLOWS DOWN UNTIL BOTH PUMPS ARE RUNNING AT THE SAME SPEED. WHEN THE LOAD DROPS TO A POINT WHERE BOTH PUMPS ARE OPERATING AT 45% OF MAXIMUM (ADJ.) THE LAG PUMP SHALL STOP AND THE LOAD WILL BE CARRIED BY A SINGLE PUMP. NO PUMP SHALL BE OPERATED BELOW 12½% LEAD AND LAG PUMPS SHALL ALTERNATE EVERY 28 DAYS ON A WEEKDAY BETWEEN 9AM AND 4PM.
- W. DIFFERENTIAL PRESSURE CONTROL: THE CONTROLLER SHALL MONITOR DIFFERENTIAL PRESSURES AT THE POINTS INDICATED ON DRAWINGS AND MODULATE THE PUMP VFD(S) TO MAINTAIN A DIFFERENTIAL PRESSURE SETPOINT OF 20 FEET OF WATER (ADJ.). THIS IS A RECOMMENDED VALUE. ALL SETPOINTS SHALL BE FIELD ADJUSTED DURING THE BALANCING PERIOD TO MEET THE REQUIREMENTS OF ACTUAL FIELD CONDITIONS.
  1. DIFFERENTIAL PRESSURE ALARMS SHALL BE PROVIDED AS FOLLOWS:
    - a. HIGH WATER DIFFERENTIAL PRESSURE: IF THE WATER DIFFERENTIAL PRESSURE IS 25% (ADJ.) GREATER THAN SETPOINT.
    - b. LOW WATER DIFFERENTIAL PRESSURE: IF THE WATER DIFFERENTIAL PRESSURE IS 25% (ADJ.) LESS THAN SETPOINT.
- X. CRITICAL ALARM SHALL BE CREATED IN THE EVENT OF LOW SYSTEM PRESSURE READING (10 PSIG ADJ.) OR FLOW SWITCH TRIP AT MAKEUP WATER CONNECTION. ENTIRE SYSTEM INCLUDING PUMPS SHALL BE SHUT DOWN.

**NOTE: ALL BOILER PLANT CONTROLS SHALL BE INTEGRATED INTO EXISTING BUILDING AUTOMATION SYSTEM EXISTING BAS IS A NIAGARA BAS PROVIDED BY ASA.**



- NOTES**
1. REFER TO PLANS FOR PIPE SIZES
  2. PIPE ACCESSORIES SUCH AS VALVES AND AIR VENTS ARE SHOWN FOR REFERENCE ONLY. REFER TO DETAIL DRAWINGS FOR COMPLETE INSTALLATION INSTRUCTIONS.

**1 BOILER CONTROL SCHEMATIC**  
 M700