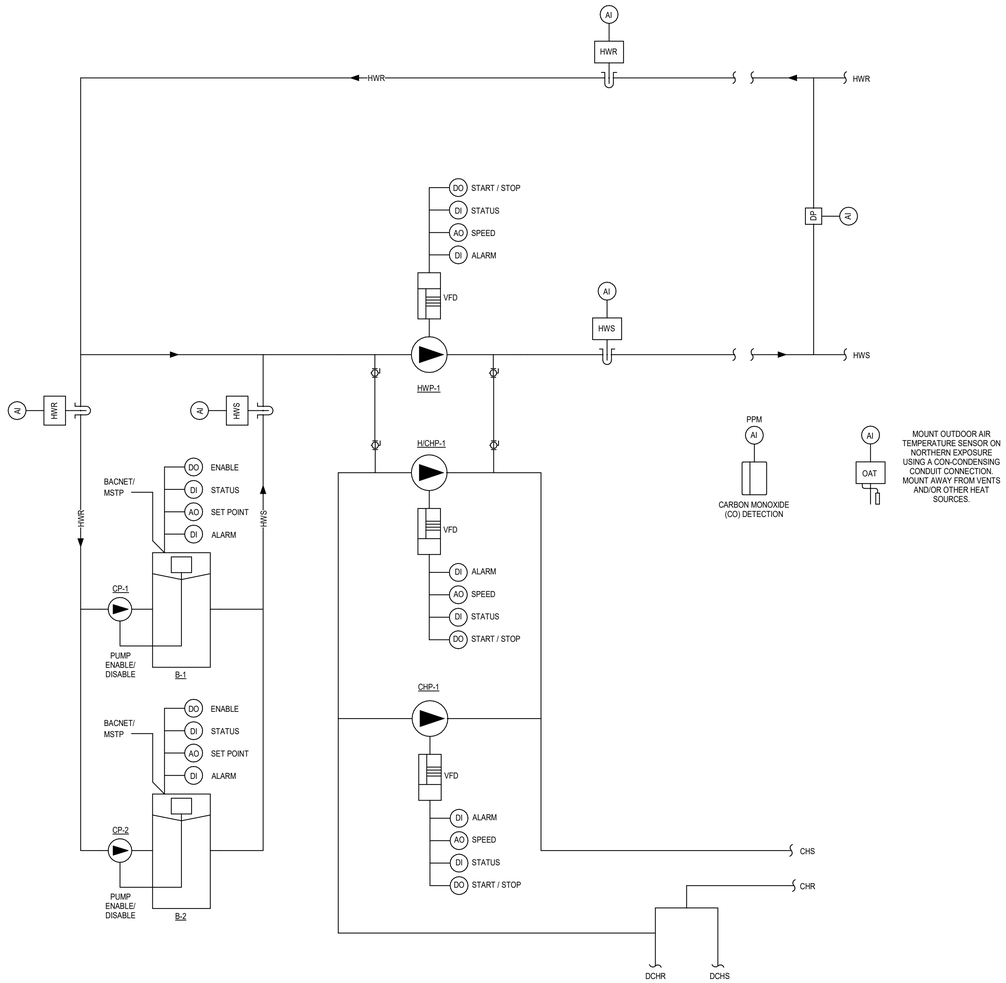

1 HOT WATER SYSTEM

NOT TO SCALE:

SEQUENCE OF OPERATION

HYDRONIC SYSTEM - SEQUENCE OF OPERATION:

GENERAL:
THE CHILLED WATER SYSTEM CONSISTS OF DUAL VARIABLE SPEED PUMPS CONNECTED TO A CONSTANT FLOW DISTRICT CHILLED WATER SYSTEM. THE HEATING WATER SYSTEM IS A SIGNLE VARIABLE PRIMARY PIMPING SYSTEM COUPLED WITH TWO CONDENSING STYLE BOILERS.

CHILLED WATER PUMPS:
BUILDING CHILLED WATER PUMPS ARE TO BE SEQUENCED AND CONTROLLED AS REQUIRED TO MAINTAIN THE REMOTE CHILLED WATER DIFFERENTIAL PRESSURE AT SETPOINT (ADJ.) TO BE DETERMINED BY TAB CONTRACTOR DURING BALANCING PROCEDURES. CHILLED WATER PUMPS SHALL BE SEQUENCED IN A LEAD-LAG ARRANGEMENT. LEAD AND LAG PUMPS SHALL BE ALTERNATED ON A REGULAR BASIS TO EQUALIZE WEAR. IN THE EVENT THAT ONE PUMP FAILS, THE OTHER SHALL BE MODULATED TO MAINTAIN THE PRESSURE SETPOINT.

BOILERS:
THE BOILER LEAD/LAG SEQUENCE SHALL BE BASED ON A WEEKLY SCHEDULE. FROM THE SYSTEM CONTROLLER OR A BAS WORKSTATION, AN OPERATOR SHALL BE ABLE TO MANUALLY CHANGE THE LEAD/LAG SEQUENCE.

IF THE HOT WATER DISTRIBUTION SYSTEM SUPPLY TEMPERATURE FALLS MORE THAN 25.0 DEG. F (ADJ.) BELOW SETPOINT FOR A PERIOD LONGER THAN 15 MINUTES (ADJ.), OR IF AN ACTIVE BOILER SIGNALS A FAILURE ALARM, THE SYSTEM CONTROLLER SHALL ENABLE THE LAG BOILER. IN ADDITION, THE SYSTEM CONTROLLER SHALL SIGNAL AN ALARM. WHEN A BOILER FAILURE EXISTS, LEAD/LAG AUTOMATION SHALL BE DISABLED AND THE CURRENTLY RUNNING BOILER SHALL BECOME THE LEAD BOILER. ONCE THE PROBLEM IS CORRECTED, THE OPERATOR SHALL BE ABLE TO CLEAR THE ALARM FAILURE FROM THE SYSTEM CONTROLLER OR BAS WORKSTATION. THIS SHALL RE-ENABLE THE LEAD/LAG SEQUENCE.

ONCE THE LEAD BOILER IS ENABLED, THE ADD SEQUENCE OF ADDITIONAL BOILERS SHALL BE DISABLED FOR A PERIOD OF 30 MINUTES (ADJ.). ADDITIONAL BOILERS ARE ADDED IF THE HOT WATER DISTRIBUTION SYSTEM SUPPLY TEMPERATURE FALLS 5.0 DEG. F (ADJ.) BELOW THE HOT WATER SETPOINT FOR A PERIOD OF 10 MINUTES (ADJ.) OR MORE.

THE LAST BOILER ENABLED SHALL BE DISABLED WHEN THE HOT WATER TEMPERATURE RISES 5.0 DEG. F (ADJ.) ABOVE THE HOT WATER SETPOINT FOR A PERIOD OF 10 MINUTES (ADJ.) OR MORE. ADDITIONAL BOILERS SHALL BE DISABLED FOLLOWING THE SAME SUBTRACTION SEQUENCE IF THE HOT WATER TEMPERATURE REMAINS 5.0 DEG. F (ADJ.) ABOVE THE HOT WATER SETPOINT FOR A PERIOD OF 10 MINUTES (ADJ.) OR MORE.

BOILER CIRCULATION PUMPS SHALL BE CONTROLLED BY THE BOILER AND SEQUENCE ON/OFF, AS REQUIRED.

HEATING WATER PUMP:
THE HEATING WATER PUMP'S SPEED SHALL BE MODULATED TO MAINTAIN THE DIFFERENTIAL PRESSURE (ADJ.) REQUIRED FRO ADAQUATE FLOW DETERMINED BY THE TAB CONTRACTOR.

BYPASS MODE:
IN THE EVENT OF THE HEATING WATER PUMP FAILURE, THE PUMP SHALL BE MANUALLY SHUT DOWN. THE HOT/CHILLED WATER PUMP, H/CHP-1, SHALL BE ISOLATED FROM THE CHILLED WATER SYSTEM (MANUALLY) AND OPENED TO THE HEATING WATER SYSTEM (MANUALLY). SEE SHEET M301 FOR LOCATION OF BYPASS VALVES. THE VFD OF THE HEATING/CHILLED WATER PUMP, H/CHP-1, WILL BE MANUALLY TURNED TO "BYPASS" AFTER PROPER VALVES HAVE BEEN ADJUSTED (OPENED AND CLOSED). THE HEATING WATER SYSTEM WILL OPERATE AS CONSTANT VOLUME WITH SOME ADJUSTMENT OF THE UNLOADING VALVE UNTIL THE HEATING WATER PUMP IS OPERATIONAL. THE CHILLED WATER PUMP, CHP-1, SPEED WILL BE MODULATED BY THE EMS TO MAINTAIN THE CHILLED WATER SYSTEM.

FREEZE PROTECTION:
WHEN THE OUTDOOR AIR TEMPERATURE FALLS BELOW 35.0 DEG. F (ADJ.), THE HOT WATER DISTRIBUTION PUMP SHALL OPERATE CONTINUOUSLY TO PROVIDE HOT WATER CIRCULATION TO ALL ASSOCIATED HOT WATER COILS. IF THE HOT WATER SUPPLY TEMPERATURE FALLS BELOW 130.0 DEG. F (ADJ.) DURING UNOCCUPIED PERIODS, THE BOILER SEQUENCE SHALL BE ENABLED TO SAFEGUARD AGAINST LOW WATER TEMPERATURE AND BOILER CONDENSATION.
IN THE EVENT THAT A HYDRONIC AIRSIDE TYPE EQUIPMENT INITIATES A LOW LIMIT ALARM, THE HEATING SYSTEM SHALL ENABLE, IF DISABLED, AND PROVIDE HEATING MEDIUM CIRCULATION TO THE EQUIPMENT.

CARBON MONOXIDE DETECTOR:
THE CARBON MONOXIDE DETECTOR SHALL MONITOR THE BOILER ROOM FOR HIGH LEVELS OF CO. IF THE CO LEVEL RISES ABOVE 50 PPM (ADJ), THEN AN ALARM SHALL BE SIGNALED TO THE HEATING SYSTEM CONTROLLER OR BAS WORKSTATION.

Insight ENGINEERING

UNIVERSITY of ARKANSAS AT PINE BLUFF 1873

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REVISIONS:

No.	Description	Date

CONSTRUCTION DOCUMENTS

ISSUE DATE: 03-18-25

PROJECT NUMBER: 24-113

SHEET TITLE:
CONTROLS - HVAC

SHEET NUMBER:
M501

STATE OF ARKANSAS REGISTERED PROFESSIONAL ENGINEER NO. 19764 FALLON A LEE 03-18-25

INSIGHT ENGINEERING, PLLC No. 3523 CERTIFICATE OF AUTHORIZATION ARKANSAS