BOILER SCHEDULE

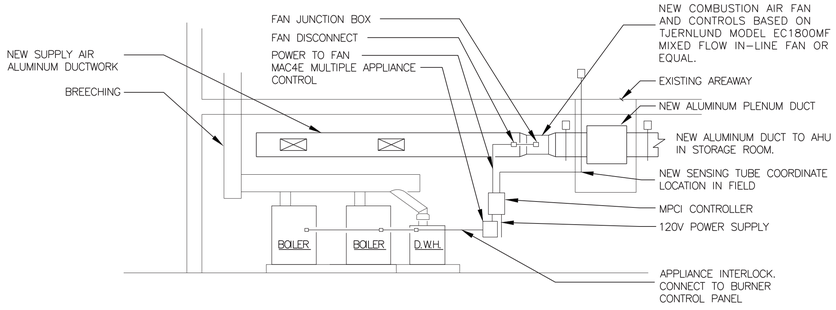
1. BOILER(**B-1 & B-2**) SHALL BE WEIL MCLAIN BG-588-S CAST IRON SECTIONAL OR APPROVED EQUAL. BOILER SHALL BE GAS FIRED, 33.6 BHP, ,1356INPUT / 1,1260UTPUT MBH WITH THERMAL EFFICIENCY OF 83.1%, FORCED DRAFT TYPE, WITH 10" FLUE OUTLET; 44-1/4"W x 65"H x 42-3/4" L; DRY WEIGHT OF 3210 LBS. BOILER CONNECTIONS:
2. BURNER SHALL BE POWER FLAME CR1-G-12 ATI OR EQUAL. BURNER INPUT SHALL BE 1356 MBH (845 MBH I=B=R RATING), 1/3HP BLOWER, 1-1/4" GAS TRAIN SIZE, 4" WC MIN, 14" WC MAX GAS INLET PRESSURE; 10-1 MODULATING; 115V/1/60.
3. PROVIDE INTERLOCKS FOR THE BREAK GLASS STATIONS, FRESH AIR DAMPERS, GAS DETECTION.
4. INCLUDE BURNER MOUNTED BURNER PANELS, AND FSG CONTROL.
5. INCLUDE GAS TRAIN – FIELD PIPED AND WIRED.
6. THE CONTRACTOR SHALL FURNISH AND INSTALL UL APPROVED POWER FLAME MODEL SYNC-MATIC HMI PROGRAMMABLE CONTROLLER BASED LEAD-LAG SYSTEM. SEE BOILER CONTROLS SYSTEM DETAILS ON THIS SHEET.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD ASSEMBLY OF BOILERS IN PLACE WITHIN THE BOILER ROOM.

BOILER FEED UNIT SCHEDULE

1. BOILER FEED UNIT SHALL BE BELL & GOSSETT DOMESTIC PUMP MODEL 61.5CM DUPLEX OR APPROVED EQUAL. UNIT SHALL INCORPORATE 2 PUMPS OPERATING AT ½ HP 115/1/60HZ & 7.9 FLA EACH @ 1750 RPM; 6 GPM @ 15PSI WITH 2" INLET, ¾" OUTLET, 6-3/16" IMPELLER; 632 LBS., 21"W x 13" H x 23" L AND 2" OVERFLOW AND VENT CONNECTIONS.
2. NEMA 2 TYPE CONTROL PANEL, UNIT MOUTNED & WIRED; LIQUID TIGHT CONDUIT; MAGNETIC STARTERS WITH FUSED DISCONNECT W/ FUSES; SELECTOR SWITCHES – BOILER/PUMP; POWER CONTROL SWITCHING RELAY; SINGLE POWER POINT CONNECTION; UL LISTING.
3. 3-VALVE BYPASS AROUND MAKEUP VALVE; AIR GAP FITTING ON MAKEUP ASSEMBLY; LOW LEVEL FLOAT AND LOW WATER CUTOFF – WIRED TO TERMINAL FOR REMOTE ANNUNCIATION; GAUGE GLASS; DIAL THERMOMETER; DISCHARGE PRESSURE GAUGE; LIFTING EYES; BUTTERFLY SUCTION VALVE; 1-CONTROL RELAY

BOILER FEED UNIT CONTROL NOTES:

1. BOILER FEED UNIT CONTROL SHALL CONSIST OF THE FOLLOWING:
   - 2 COMBINATION MAGNETIC STARTERS (3 OVERLOAD RELAYS) WITH FUSED DISCONNECTS AND COVER INTERLOCKS.
   - 2 "OFF-HAND-LEAD-LAG" PUMP SELECTOR SWITCHES
   - 2 PUMP RUNNING PILOT LIGHTS.
   - 1 NUMBERED TERMINAL BLOCK
   - 1 FUSED CONTROL CIRCUIT TRANSFORMER WHEN THE MOTOR EXCEEDS 130 V
   - 1 CONTROL CIRCUIT RELAY
   - 1 CONTROL POWER RELAY.
2. CONTROL CABINET SHALL CONTAIN U.L. LISTED OR RECOGNIZED COMPONENTS.
3. CONTROL COMPONENTS SHALL BE PROVIDED BY THE UNIT MANUFACTURER, FOR OPERATION AS FOLLOWS:
   3.1. AS THE LEVEL IN THE BOILER RECEDES, THE PUMP CONTROL SWITCH WILL CLOSE OPENING THE FEED VALVE AND STARTING ONE PUMP (THROUGH THE END SWITCH). AS THE LEVEL IS RESTORED, THE SWITCH WILL OPEN, CLOSE THE VALVE, AND STOP THE PUMP. SHOULD THE LEVEL CONTINUE TO RISE, THE LOWER CONTACTS WILL CLOSE AND START THE REMAINING PUMP. EACH PUMP SELECTOR SWITCH SHALL PROVIDE "OFF-HAND-LEAD-LAG" POSITIONS.
4. MANUAL SEQUENCE CONTROL SHALL PROVIDE FOR MANUAL SELECTION OF THE ACTIVE OR LEAD PUMP, SIMULTANEOUS OPERATION OF BOTH PUMPS UNDER ABNORMAL LOAD CONDITIONS AND AUTOMATIC OPERATION OF THE LAG PUMP IF THE LEAD PUMP OR ITS CONTROL FAILS.
5. THE UNIT MANUFACTURER SHALL FURNISH (1) MCDONALD MILLER PUMP CONTROL: NO.150S RATED TO 150 PSI FOR BOILERS WITH SEPARATE WATER COLUMNS
6. THE INSTALLING CONTRACTOR, IN ADDITION TO THE ABOVE NOTED PUMP CONTROL, SHALL PROVIDE AND INSTALL A LOW WATER CUTOFF SWITCH, A LOW WATER BOILER ALARM SWITCH AND ASSOCIATED CIRCUITS IN ACCORDANCE WITH LOCAL CODES.
7. THE UNIT SHALL BE FACTORY TESTED AS A COMPLETE UNIT WITH A CERTIFIED TEST REPORT OF PUMP CHARACTERISTICS SHALL BE SUBMITTED PRIOR TO SHIPMENT. THE UNIT MANUFACTURER SHALL FURNISH COMPLETE ELEMENTARY AND CONNECTION WIRING DIAGRAMS (2dw408), PIPING DIAGRAMS (1 DPD08-A), INSTALLATION AND OPERATION INSTRUCTIONS.
8. MANUFACTURER SHALL BE BELL & GOSSETT DOMESTIC PUMP, MORTON GROVE, IL OR EQUAL.



COMBUSTION AIR INTAKE FAN DETAIL

SCALE: NONE

CONTRACTOR SHALL PROVIDE MPCI MODULATING PRESSURE CONTROLLER WITH UC1 BURNER CIRCUIT INTERLOCK BY TJERNLUND OR EQUAL FOR BOILER BURNER CONTROL AND COMBUSTION AIR FAN SPEED CONTROL.

PROGRAM OPTION	FACTORY PRESETS	ADJUSTMENT RANGE
EXHAUST PRESSURE	-0.10" W.C.	-0.01" TO -0.40" W.C.
SUPPLY PRESSURE	+.00" W.C.	+0.01" TO +0.40" W.C.
ALARM CIRCUIT TIME	10 SEC.	1 SEC. TP 15 MIN
ACCELERATION RATE	50	SCALEE OF 1 TO 999
POWER REQUIREMENTS	120 VAC, 7AMPS	

ELECTRICAL ENCLOSURE SHALL BE 18-GAUGE GALVANIZED STEEL WITH HINGED ACCESS DOOR.

ETL C/US TO UL508 AND CSA C22.2 LISTINGS

WARRANTY: 1 YEAR

REQUIRED OPTIONS: MAC4E MULTIPLE APPLIANCE CONTROL; IPS-1 INDOOR PRESSURE SENSOR WITH DECORATIVE COVER TO BE MOUNTED IN CORRIDOR.

MAINTAINS PRESSURE IN BOILER ROOM EQUAL TO PRESSURE IN REFERENCE SPACE.

COMBUSTION AIR FAN

CONTRACTOR SHALL PROVIDE EC1800MF MIXED FLOW IN-LINE FAN BY TJERNLUND OR EQUAL FOR COMBUSTION AIR VOLUME CONTROL. HOUSING SHALL BE GALVANIZED SHEET METAL WITH FOLDED SEEM AIR TIGHT CASING, 1" CONNECTION COLLAR, MIXED FLOW IMPELLER, EXTERNAL ROTOR EC-MOTOR. INPUT SIGNAL SHALL BE 0-10V DC FROM MPC-SERIES. FFP-1 FREEZE AND FIRE PROTECTION SWITCH.

WEIGHT: 39 LBS

MOTOR SHLL BE ECM 120/1/60 VAC, 366 WATTS

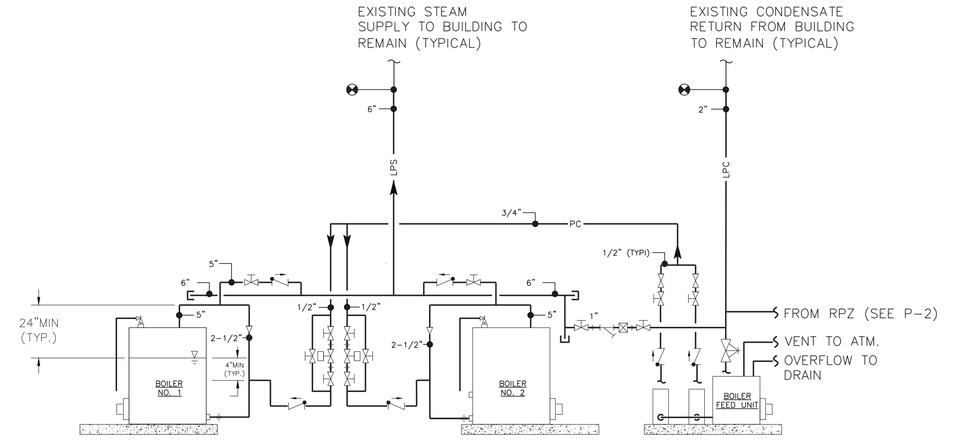
UL/ULC LISTINGS

1 HV-4 COMBUSTION AIR INTAKE SYSTEM

BOILER CONTROL SYSTEM DETAILS

THE CONTRACTOR SHALL FURNISH AND INSTALL A UL APPROVED POWER FLAME MODEL SYNC-MATIC HMI PROGRAMMABLE CONTROLLER BASED LEAD-LAG SYSTEM. THE LEAD-LAG FUNCTION SHALL BE BY THE PROGRAMMABLE CONTROLLER AND SHALL SERVICE 2 BOILER/BURNER UNITS. A 5.7"MINIMUM HMI OPERATOR TOUCH SCREEN SHALL BE STANDARD EQUIPMENT. THE HMI SHALL ALLOW THE OPERATOR TO INPUT SYSTEM OPERATING PARAMETERS AS WELL AS PROVIDE VISUAL INDICATION OF EACH BURNER'S OPERATION STATUS, FIRING RATE, OPERATING SET POINT, AS WELL AS THE PRESSURE OF THE COMMON HEADER. MODBUS COMMUNICATIONS SHALL BE STANDARD.

1. THE LEAD-LAG CONTROL PANEL SHALL INCLUDE THE FOLLOWING FEATURES:
   - DIRECT ENTRY OF SYSTEM SET POINT THROUGH THE HMI.
   - PID CONTROLLED AUTOMATIC MODULATION WITH BASELOAD OR PARALLEL MODULATION RESPONSE 4-20 mA SIGNAL).
   - MANUAL MODULATION INPUT FOR SYSTEM TESTING AND ADJUSTMENTS.
   - INDICATING LAMPS TO INDICATE BURNER ONLINE OR BURNER FAILED.
   - LEAD LAG/ BACKUP SELECTOR SWITCH TO ALLOW CONTROL FUNCTION TO BE SWITCHED TO
     - THE PROGRAMMABLE CONTROLLER;
     - THE INDIVIDUAL BOILER-MOUNTED OPERATING AND MODULATION CONTROLLERS.
   - ADJUSTABLE LEAD AND LAG BURNER ON AND OFF DELAY TIMERS, ACCESSIBLE THROUGH THE HMI.
   - BOILER CYCLE AND BOILER HOUR COUNTERS.
   - MULTIPLE LEAD SELECTION MODES: MANUAL, TIME ALTERNATE, TIME EQUALIZE, CYCLE ALTERNATE, CYCLE EQUALIZE, AND DAY OF WEEK.
   - NIGHT AND/OR WEEKEND SETBACK SETTINGS ALLOW FOR REDUCED SET POINTS AT NON- PEAK TIMES TO REDUCE FUEL USAGE.
   - FAILURE TRANSFER AUTOMATICALLY TRANSFERS FAILED BURNER'S SETTINGS TO THE NEXT AVAILABLE BURNER.
2. THE SEQUENCE OF OPERATION SHALL BE AS FOLLOWS:
   - UPON START UP, BURNERS SHALL ALWAYS START IN THE LOW FIRE POSITION. UPON RELEASE OF THE COMBUSTION CONTROL SYSTEM, THE BURNERS SHALL MODULATE VIA THE PROGRAMMABLE CONTROLLER.
   - AS THE PRESSURE/TEMPERATURE INCREASES, THE HEADER MOUNTED TRANSDUCER WILL SIGNAL THE PROGRAMMABLE CONTROLLER. IN TURN, THE CONTROLLER SHALL SEQUENCE THE PID FIRING RATE CIRCUITS OF EACH ACTIVE MODULATING BURNER IN AN APPROPRIATE LEAD-LAG SEQUENCE.
   - UPON STILL FURTHER INCREASE IN PRESSURE/TEMPERATURE, THE PROGRAMMABLE CONTROLLER WILL DE-ENERGIZE THE LAG BURNER(S) THEN THE LEAD BURNER IN THE APPROPRIATE SEQUENCE. THIS FUNCTION WILL EITHER TAKE PLACE IMMEDIATELY OR AFTER A TIME DELAY BASED ON THE VARIANCE FROM SETPOINT. THE BURNERS WILL BE IN THE LOW FIRE POSITION BEFORE DE-ENERGIZING.
   - WITH A DROP IN PRESSURE/TEMPERATURE, THE PROGRAMMABLE CONTROLLER WILL REVERSE THE SEQUENCE TO CALL THE BURNERS TO FIRE AND TO MODULATE THE BURNERS IN AN APPROPRIATE LEAD-LAG SEQUENCE.
   - IN THE EVENT THAT ANY BURNER FAILS TO OPERATE, THE PROGRAMMABLE CONTROLLER SHALL AUTOMATICALLY TRANSFER CONTROL TO THE NEXT AVAILABLE BURNER.
   - AN APPROPRIATE PRESSURE/TEMPERATURE TRANSDUCER SHALL BE SUPPLIED WITH EACH SYSTEM. THE TRANSDUCER SHALL BE INSTALLED IN THE MAIN STEAM/WATER HEADER.
3. OPTIONS:
   - OUTDOOR RESET: RAISES THE STEAM PRESSURE SET POINT AS OUTSIDE TEMPERATURE INCREASES.



2 HV-4 BOILER ROOM MECHANICAL SCHEMATIC

SCALE: NONE

BOILER CONTROL SEQUENCE OF OPERATION

1. BUILDING LOAD CONTROL SHALL SEND A SIGNAL TO SYNCMATIC, IN RESPONSE TO SPACE TEMPERATURE, TO RUN THE BOILERS. THE SYNCMATIC LEAD-LAG BOILER CONTROLLER SHALL CYCLE AND MODULATE BOILERS AS REQUIRED TO MAINTAIN STEAM PRESSURE FOR AS LONG AS THE BUILDING IS CALLING FOR HEAT.
2. DOMESTIC WATER HEATER SHALL CYCLE ON TO MAINTAIN HOT WATER TEMPERATURE AT SETPOINT.
3. APPLIANCE BURNER INTERLOCK: ALL GAS BURNING APPLIANCES IN THE ROOM SHALL BE INTERLOCKED WITH THE OPERATION OF THE COMBUSTION AIR FAN CAF-1.
   - WHEN THE SYNCMATIC CONTROLLER SENDS A SIGNAL TO A BOILER BURNER TO ENERGIZE (OR THE DOMESTIC WATER HEATER BURNER IS CALLED TO ENERGIZE) THE COMBUSTION AIR SYSTEM WILL RECEIVE A SIGNAL TO INITIATE FROM A LIMIT SWITCH ON THE BURNER.
   - THE COMBUSTION AIR SYSTEM MODULATING DAMPER WILL MODULATE OPEN AND THE LIMIT SWITCH WILL ENERGIZE THE FAN.
   - WHEN THE COMBUSTION AIR SYSTEM FAN RUNS, AND PROVES AIRFLOW, THE "MAC4E" MULTIPLE APPLIANCE CONTROL WILL ALLOW ANY APPLIANCE BURNER TO FIRE.
4. SELECTING LEAD BOILER: THE BOILER WITH THE LOWER QUANTITY OF OPERATING HOURS WILL BE SELECTED BY THE SYNCMATIC CONTROLLER TO BE THE LEAD BOILER.
5. INITIATING THE LAG BOILER: THE REMAINING BOILER WILL INITIATE ONLY AFTER THE LEAD BOILER MODULATES TO ITS FULL CAPACITY AND CANNOT MAINTAIN SYSTEM STEAM PRESSURE.
6. CONTROLLING THE C.A.F.: THE COMBUSTION AIR FAN WILL CYCLE ON AND MODULATE SPEED TO MAINTAIN ROOM PRESSURIZATION AT A CONSTANT RELATIVE TO A REFERENCE PRESSURE SENSOR LOCATED IN AN ADJACENT ROOM.
7. OUTDOOR TEMPERATURE RESET: BOILER CONTROLLER SHALL ADJUST THE SETPOINT PRESSURE TO BE MAINTAINED IN RESPONSE TO OUTDOOR TEMPERATURE SUCH THAT A DECREASE IN OUTDOOR TEMPERATURE SHALL DECREASE SYSTEM STEAM PRESSURE THEREBY INCREASING THE HEAT DELIVERABLE BY 1 POUND OF STEAM.

REVISION NUMBER	DATE	MADE BY	APP'D BY	REVISION
1	6-22-2021	VJL	VJL	ADDENDUM #1: REPLACED SHEET

RECORD DRAWING CERTIFICATION

☐ AS BUILT – CHANGES AS NOTED
☐ AS BUILT – NO CHANGES

CONTRACTOR
NAME
SIGNATURE
TITLE DATE

PROJECT COORDINATOR
NAME
SIGNATURE
TITLE DATE

IN CHARGE OF JAI PUNNOOSE, P.E.
CHECKED BY
MADE BY VINCENT LEONE, P.E.

WESTCHESTER COUNTY, NEW YORK
DEPARTMENT OF PUBLIC WORKS
DIVISION OF ENGINEERING

CONTRACT NUMBER 21-514
SHEET NUMBER HV-4
SHEET NO. 8 OF 9

BOILER REPLACEMENT AND ASSOCIATED WORK
VERNON PLAZA FAMILY CENTER
17 SOUTH SECOND AVENUE, MOUNT VERNON, NEW YORK
SCHEDULE AND SCHEMATICS

SCALE: AS SHOWN
DATE: 06/04/21
DPW FILE NO. 54-29-HV-54
REV. NO. 0