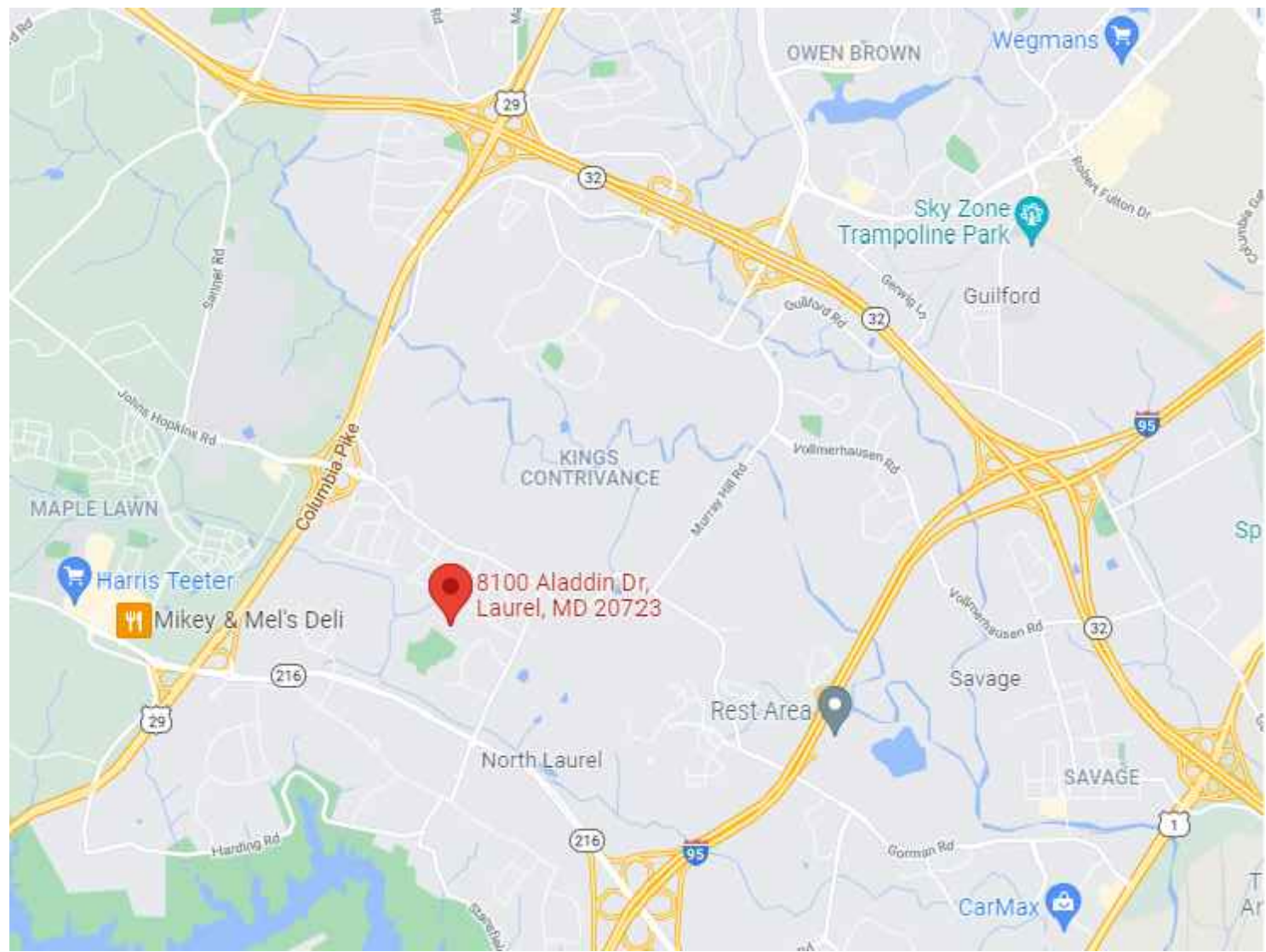


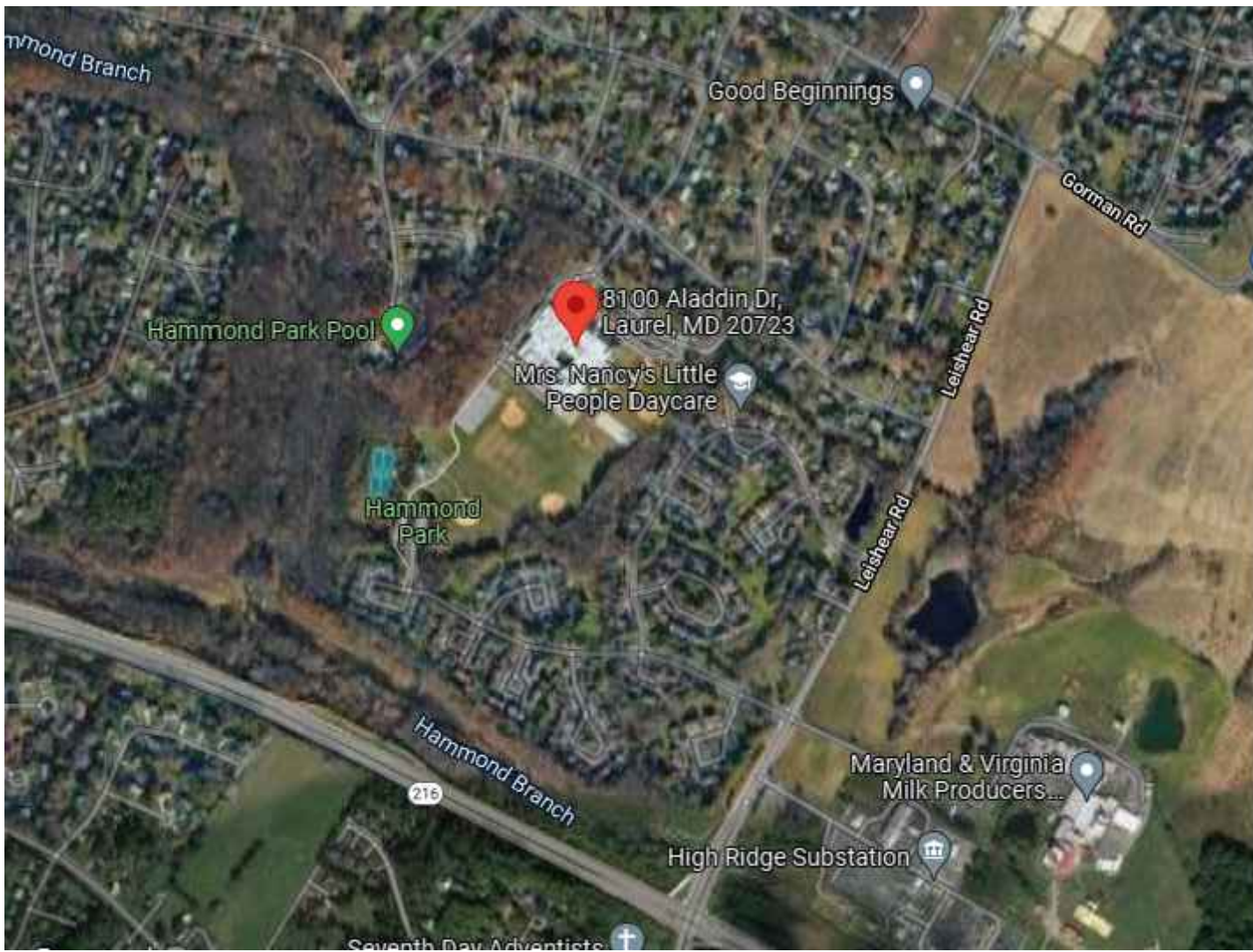
HAMMOND ELEMENTARY / MIDDLE SCHOOLS BOILER REPLACEMENT

8100 ALADDIN DRIVE
LAUREL, MD 20723

HCPSS BID #027.22.B3



VICINITY MAP



LOCATION MAP

ISSUED FOR 100% CD's
JANUARY 14, 2022

DRAWING LIST

<u>GENERAL</u>	
T0.1	TITLE SHEET
<u>MECHANICAL</u>	
M0.1	MECHANICAL ABBREVIATIONS, SYMBOLS & GENERAL NOTES
M1.1	BOILER ROOM - DEMOLITION & NEW WORK
M3.1	MECHANICAL DETAILS, DIAGRAMS & SCHEDULES
M5.1	CONTROLS & SEQUENCE OF OPERATIONS
<u>ELECTRICAL</u>	
E0.1	ELECTRICAL LEGEND AND SCHEDULES
E1.1	BOILER ROOM - DEMOLITION & NEW WORK
E3.1	ELECTRICAL SCHEDULES
<u>STRUCTURAL</u>	
S1.1	TYPICAL DETAILS



Howard County Public School System
9020 Mendenhall Court
Columbia, MD 21045

SEAL

Professional Certification, I certify that these documents were prepared or approved by me, and that I am a duly licensed engineer under the laws of the State of Maryland, License Number 44890, expiration date 01/08/2024.

CONSULTANTS

MECHANICAL ENGINEERS

BUILDING DYNAMICS, LLC
8600 FOUNDRY ST., SUITE 306
MILL BOX 2054
SAVAGE, MD 20763
building-dynamics.com

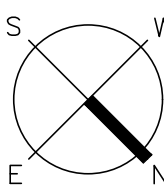
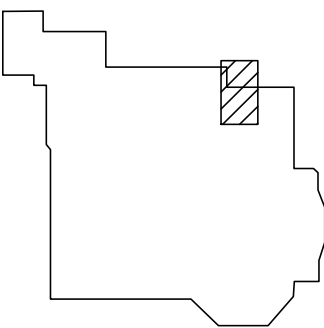
ELECTRICAL ENGINEERS

PAULCO ENGINEERING, INC.
14211 MEADOW LAKE DRIVE
GLENELG, MD 21737
p. 301.523.5012

PROJECT

HAMMOND ESMS
BOILER REPLACEMENT
8100 ALADDIN DRIVE
LAUREL, MD 20723

KEY PLAN



NO.	DESCRIPTION	DATE
1	100% CONSTRUCTION DOCUMENTS	01/14/2022

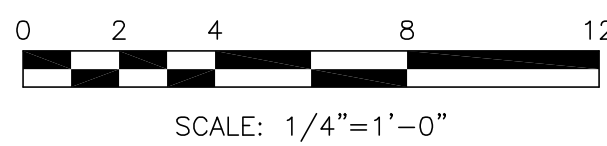
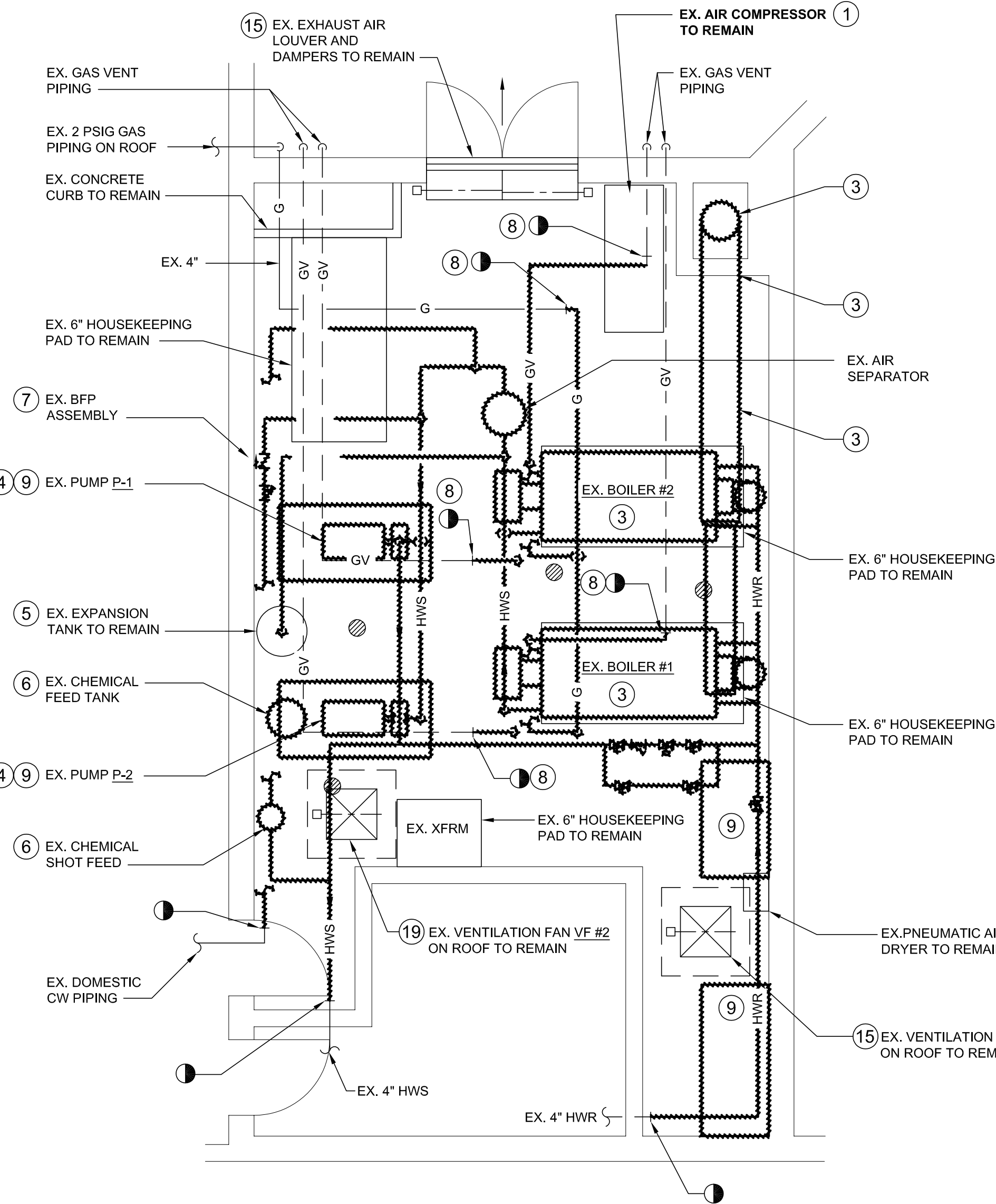
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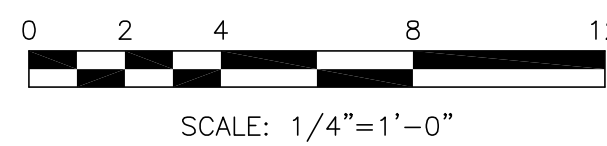
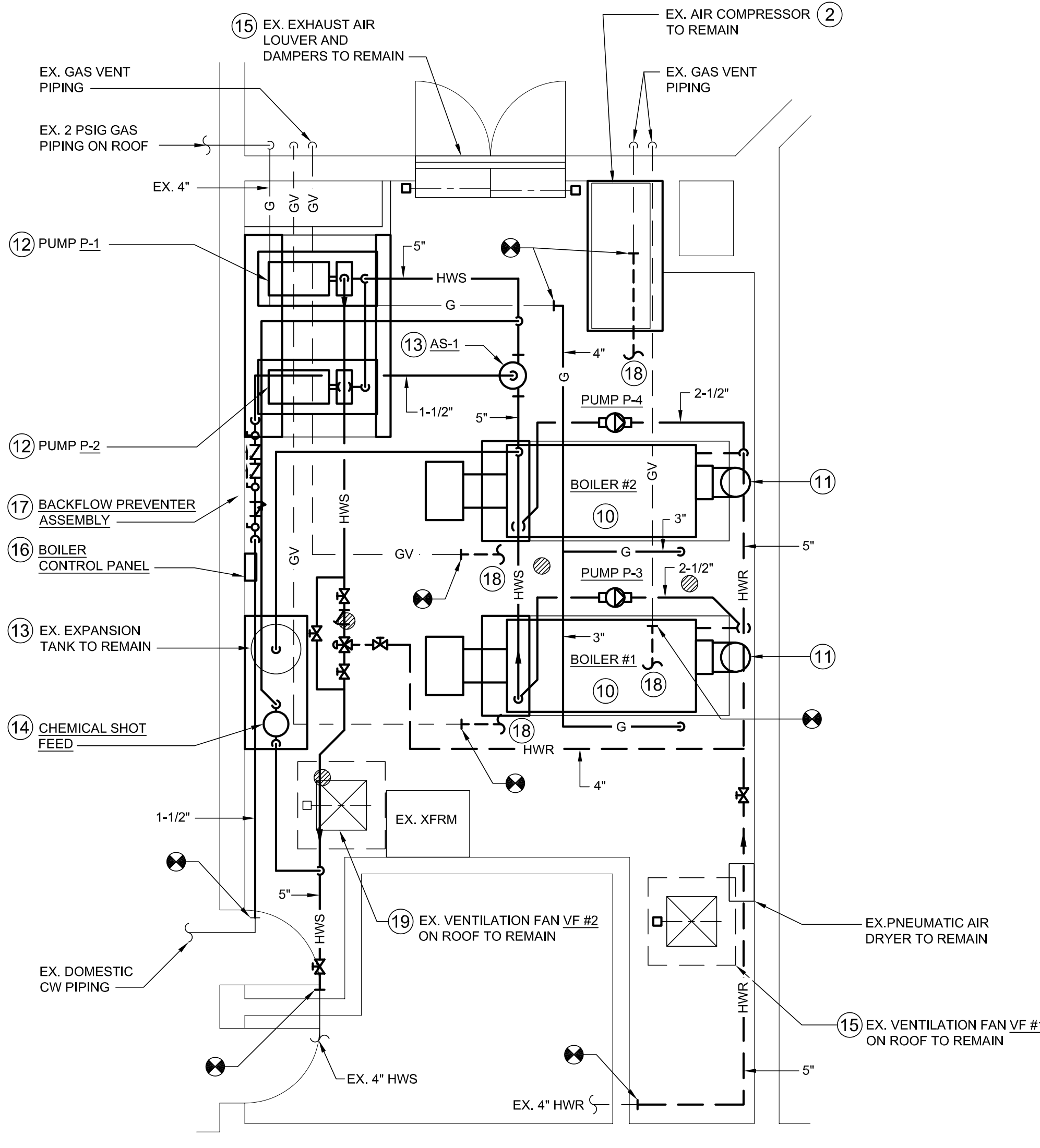
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BOILER ROOM - DEMOLITION

SCALE: 1/4" = 1' - 0"



BOILER ROOM - NEW WORK

SCALE: 1/4" = 1' - 0"

SHEET NOTES

- DISCONNECT ALL PIPING AND CONNECTIONS FROM EXISTING PNEUMATIC AIR COMPRESSOR AS REQUIRED AND TEMPORARILY RELOCATED AIR COMPRESSOR SO THAT EXISTING HOUSEKEEPING PAD CAN BE INSTALLED.
- PROVIDE 72"x36"x6" HIGH HOUSEKEEPING PAD UNDER EXISTING PNEUMATIC AIR COMPRESSOR. REINSTALL EXISTING PNEUMATIC AIR COMPRESSOR AND RECONNECT ALL PIPING AND CONNECTIONS AS REQUIRED.
- REMOVE EXISTING BOILER, BURNER AND ALL ASSOCIATED HEATING WATER, GAS AND FLUE PIPING IN THEIR ENTIRETY TO POINTS INDICATED. REMOVE ALL FLUE PIPING UP THROUGH EXISTING CHIMNEY, INCLUDING RAIN CAP. CAP TOP OF CHIMNEY WATER-TIGHT. PATCH CHIMNEY WITH MASONRY/BRICK AS REQUIRED TO MATCH EXISTING.
- REMOVE EXISTING HEATING WATER PUMPS, CONCRETE HOUSEKEEPING PAD AND ALL ASSOCIATED PIPING IN THEIR ENTIRETY TO POINTS INDICATED.
- EXISTING EXPANSION TANK TO BE RE-USED. REMOVE ALL ASSOCIATED PIPING IN ITS ENTIRETY TO POINTS INDICATED. TEMPORARILY RELOCATE EXPANSION TANK AND REINSTALL ON NEW 6" HOUSEKEEPING PAD SHOWN ON NEW WORK PLAN.
- REMOVE EXISTING CHEMICAL FEED TANK AND CHEMICAL SHOT FEEDER AND ALL ASSOCIATED PIPING IN THEIR ENTIRETY TO POINTS INDICATED.
- REMOVE EXISTING BACKFLOW PREVENTER ASSEMBLY AND ASSOCATED PIPING IN ITS ENTIRETY TO POINTS INDICATED.
- REMOVE EXISTING NATURAL GAS PIPING AND GAS VENT PIPING IN ITS ENTIRETY TO POINTS INDICATED.
- REMOVE EXISTING 6" HOUSEKEEPING PAD IN ITS ENTIRETY. GRIND DOWN ANY REBAR OR METAL WIRE MESH BELOW EXISTING FINISHED FLOOR LEVEL. PROVIDE FINISH COAT OF CONCRETE AS REQUIRED TO MATCH EXISTING FINISHED FLOOR.
- PROVIDE BOILER, BURNER, GAS TRAIN AND ALL ASSOCIATED TRIM AS REQUIRED FOR A COMPLETE INSTALLATION. EXTEND EXISTING HOUSEKEEPING PAD AS SHOWN. RECONNECT EMERGENCY GAS SHUNT-TRIP, REFER TO ELECTRICAL DRAWINGS. REFER TO DETAILS ON M3.1 AND M5.1 FOR ADDITIONAL REQUIREMENTS.
- PROVIDE 14" Ø FLUE PIPING UP THROUGH EXISTING ROOF OPENING. MODIFY EXISTING ROOF OPENING AS REQUIRED AND MAKE WATER-TIGHT. REFER TO DETAIL ON M3.1.
- PROVIDE HEATING WATER PUMP WITH INERTIA PAD AND ALL ASSOCIATED VALVES AND ACCESSORIES AS SCHEDULED AND DETAILED ON M3.1. EXTEND EXISTING HOUSEKEEPING PAD AS SHOWN.
- PROVIDE AIR SEPARATOR WITH ASSOCIATED VALVES AND ACCESSORIES AS SCHEDULED AND DETAILED. PROVIDE HOUSEKEEPING PAD AND RE-INSTALL EXISTING EXPANSION TANK ON TOP. REFER TO DETAIL ON M3.1 FOR ADDITIONAL PIPING DETAILS.
- PROVIDE CHEMICAL FEED SYSTEM AS DETAILED ON M3.1. PROVIDE HOUSEKEEPING PAD AS SHOWN TO INCORPORATE CHEMICAL FEED SYSTEM AND EXISTING EXPANSION TANK AS SHOWN.
- REMOVE EXISTING PNEUMATIC DAMPER ACTUATOR AND ALL ASSOCIATED BRANCH CONTROL PIPING. PROVIDE DDC DAMPER ACTUATOR. REFER TO DRAWING M5.1 FOR ADDITIONAL INFORMATION.
- PROVIDE BOILER CONTROL PANEL, MULTI-MOD PLATINUM OR AS APPROVED, 120-VOLT / 1 PHASE. REFER TO DRAWING M5.1 FOR ADDITIONAL INFORMATION.
- CONNECT TO EXISTING COLD WATER AND PROVIDE 1-1/2" LEAD-FREE REDUCED PRESSURE ZONE BACKFLOW PREVENTER ASSEMBLY FOR MAKE-UP WATER.
- CONNECT GAS VENT TO PRESSURE REDUCING VALVE AT BOILER GAS TRAIN.
- DISABLE EXISTING VENTILATION FAN VF #2 (OLD EMERGENCY GENERATOR COMBUSTION AIR SUPPLY FAN) AND LOCK DAMPER CLOSED TIGHT.



Howard County Public School System
9020 Mendenhall Court
Columbia, MD 21045

SEAL

2

Professional Certification. I certify that these documents were prepared or approved by me, and that I am a duly licensed engineer under the laws of the State of Maryland, License Number 44890, expiration date 01/08/2024.

CONSULTANTS

MECHANICAL ENGINEERS

3

BUILDING DYNAMICS, LLC
8600 FOUNDRY ST., SUITE 306
MILL BOX 2054
SAVAGE, MD 20763
building-dynamics.com

ELECTRICAL ENGINEERS

PAULCO ENGINEERING, INC.
14211 MEADOW LAKE DRIVE
GLENELG, MD 21737
p: 301.523.5012

PROJECT

4

HAMMOND ES/MS
BOILER REPLACEMENT
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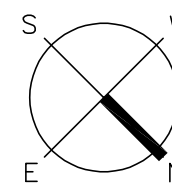
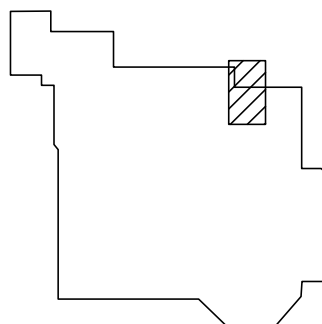
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KEY PLAN



NO.	DESCRIPTION	DATE
1	100% CONSTRUCTION DOCUMENTS	01/14/2022

DRAWING

BOILER ROOM -
DEMOLITION & NEW WORK

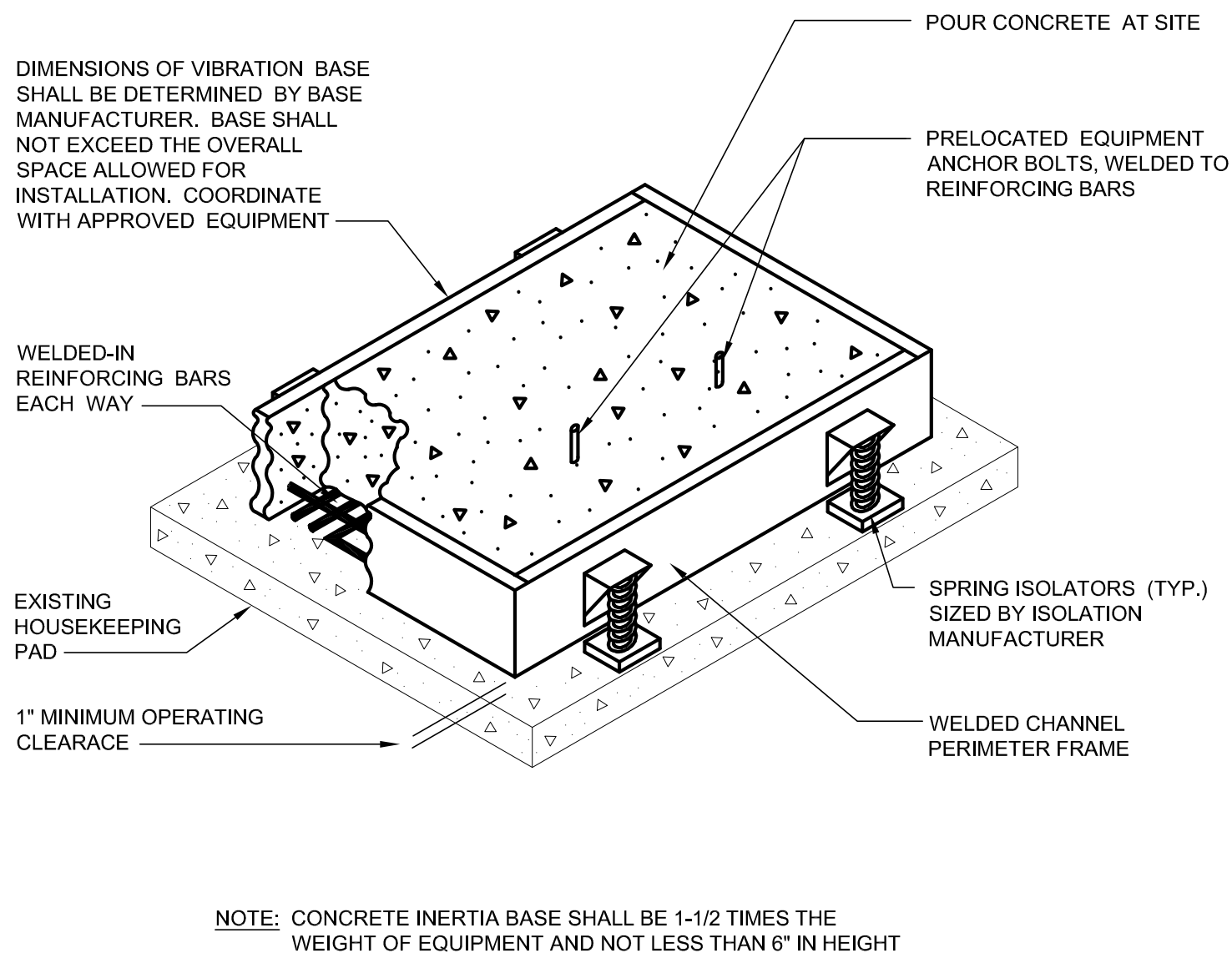
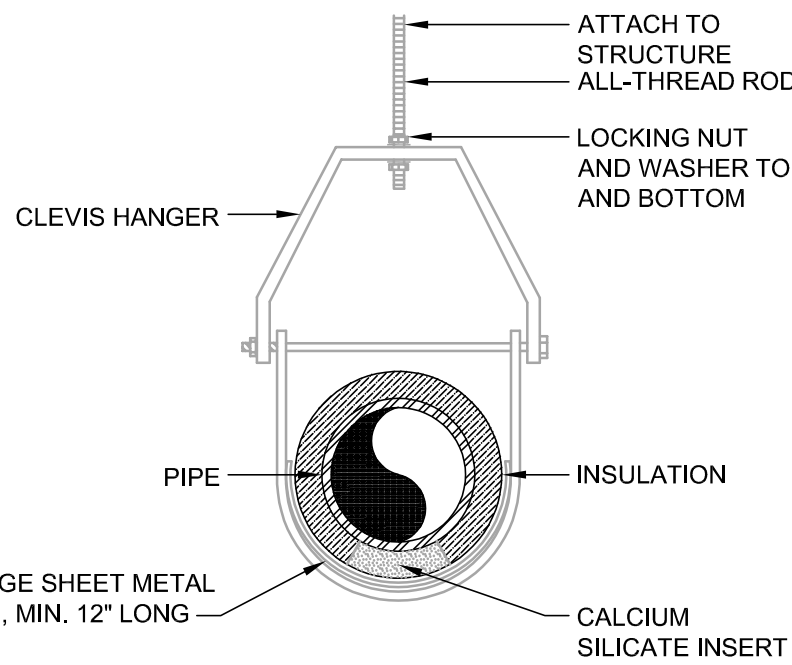
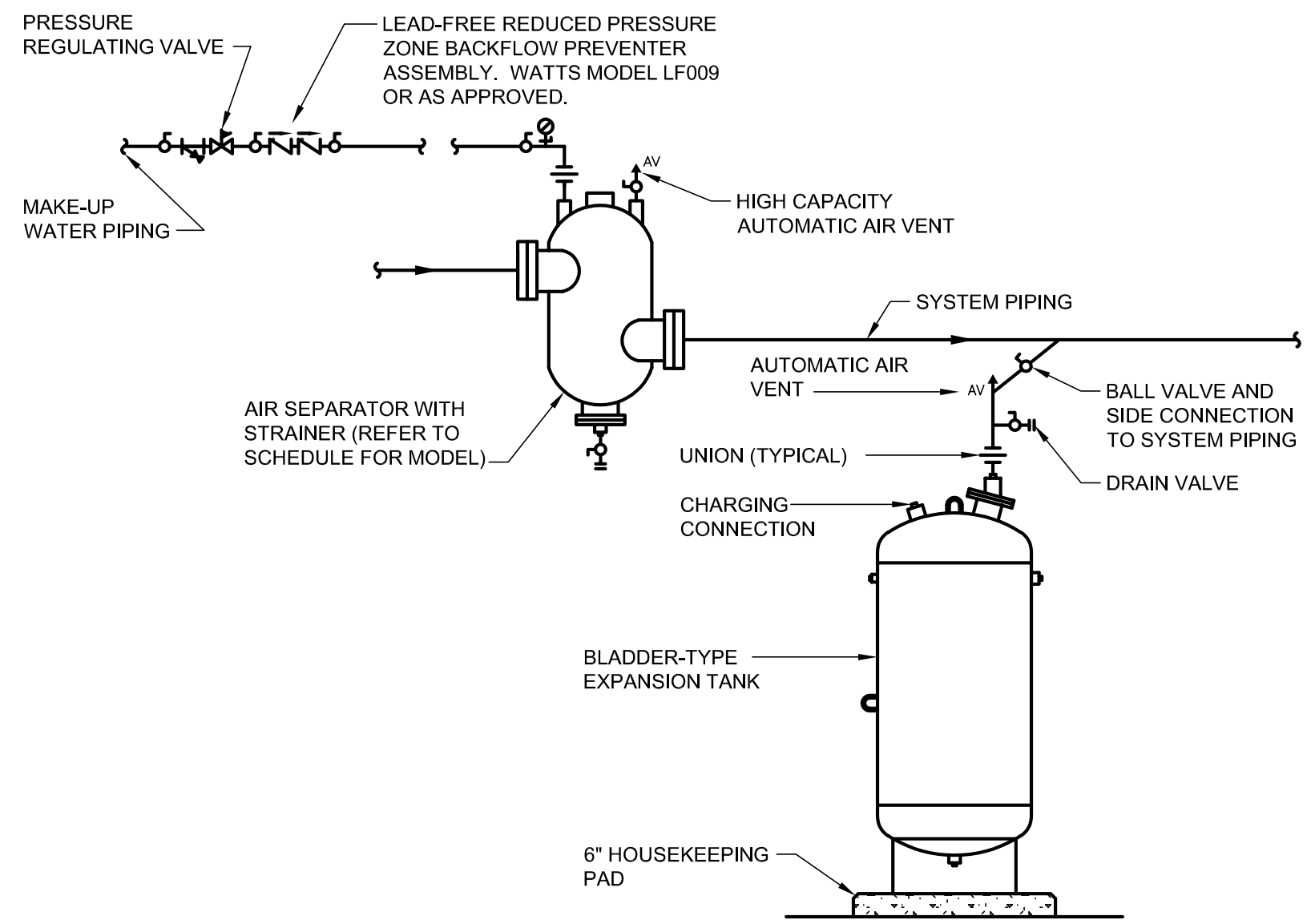
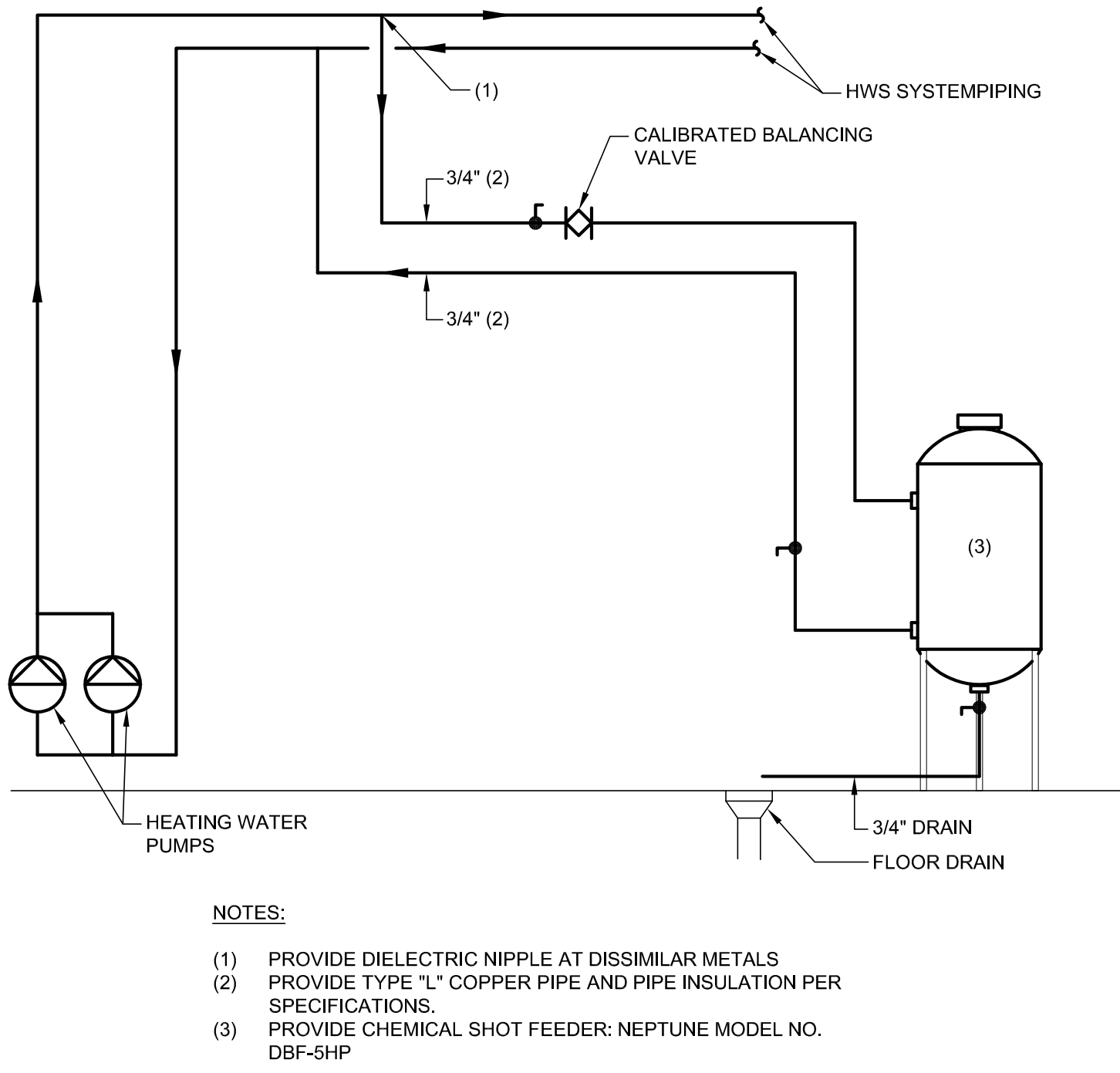
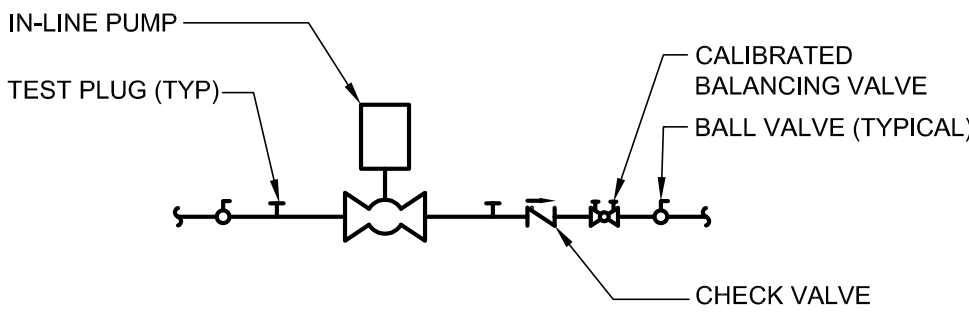
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PROJECT NO.	202115
SCALE	1/4"=1'-0"
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M1.1

GAS-FIRED HOT WATER BOILER SCHEDULE												
DES.	LOCATION	AHRI BURNER CAP (MBH)	BOILER H.P.	GROSS AHRI OUTPUT (MBH)	NET AHRI RATING (MBH)	GAS PRESS. (IN. WC)	ELECTRICAL (BURNER)			OPER. WEIGHT (LBS)	MANUFACTURER & MODEL NO.	NOTES
							VOLTS-PH-HZ	HP	RPM			
B-1	BOILER ROOM	3,428	85.1	2,873	2,477	5.4-14	460-3-60	1.5	3,450	8,950	WEIL McLAIN MODEL BG-1188-WF	1
B-2	BOILER ROOM	3,428	85.1	2,873	2,477	5.4-14	460-3-60	1.5	3,450	8,950	WEIL McLAIN MODEL BG-1188-WF	1
NOTES: 1. PROVIDE WITH POWER FLAME MODEL WCR3-G-20 GAS BURNER.												

PUMP SCHEDULE							
DES.	SERVICE	GPM	TOTAL HEAD (FT. H ₂ O)	HP	RPM	ELEC. SERVICE	NOTES
						VOLTS-PH.-HZ.	
P-1	HEATING WATER	350	95	15	1,800	460-3-60	1
P-2	HEATING WATER	350	95	15	1,800	460-3-60	1
P-3	BOILER B-1	44	10	1/3	2,962	115-1-60	1
P-4	BOILER B-2	44	10	1/3	2,962	115-1-60	1
NOTES: 1. REFER TO PUMP PIPING DETAIL ON THIS DRAWING FOR ADDITIONAL REQUIREMENTS.							

AIR SEPARATOR SCHEDULE					
DES.	CAPACITY (GPM)	PRESSURE DROP (PSI)	APPROXIMATE PHYSICAL SIZE	DRY WEIGHT (LBS)	NOTES
AS-1	350	X	13"Ø x 28"H	175	1
NOTES: 1. PROVIDE WITH 5" FLANGED PIPE CONNECTIONS AND STRAINER. 2. AIR SEPARATORS SHALL BE DESIGNED AND CONSTRUCTED PER ASME CODE SECTION VII, DIVISION 1 AND HAVE A MAXIMUM DESIGN PRESSURE OF 125 PSIG AT 375° F.					



Professional Certification. I certify that these documents were prepared or approved by me, and that I am a duly licensed engineer under the laws of the State of Maryland, License Number 44890, expiration date 01/08/2024.

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IN-LINE PUMP PIPING DETAIL

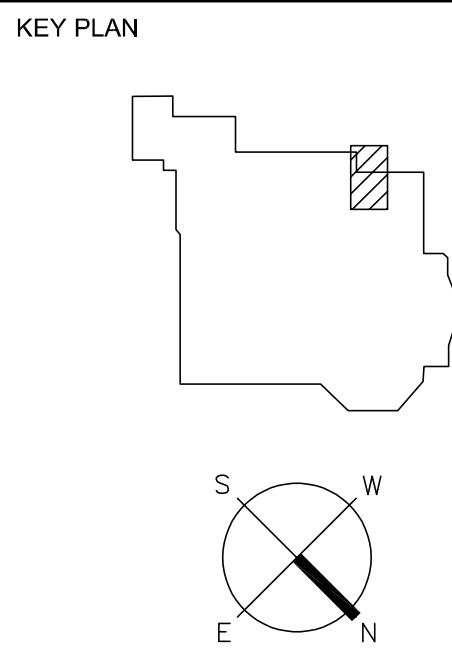
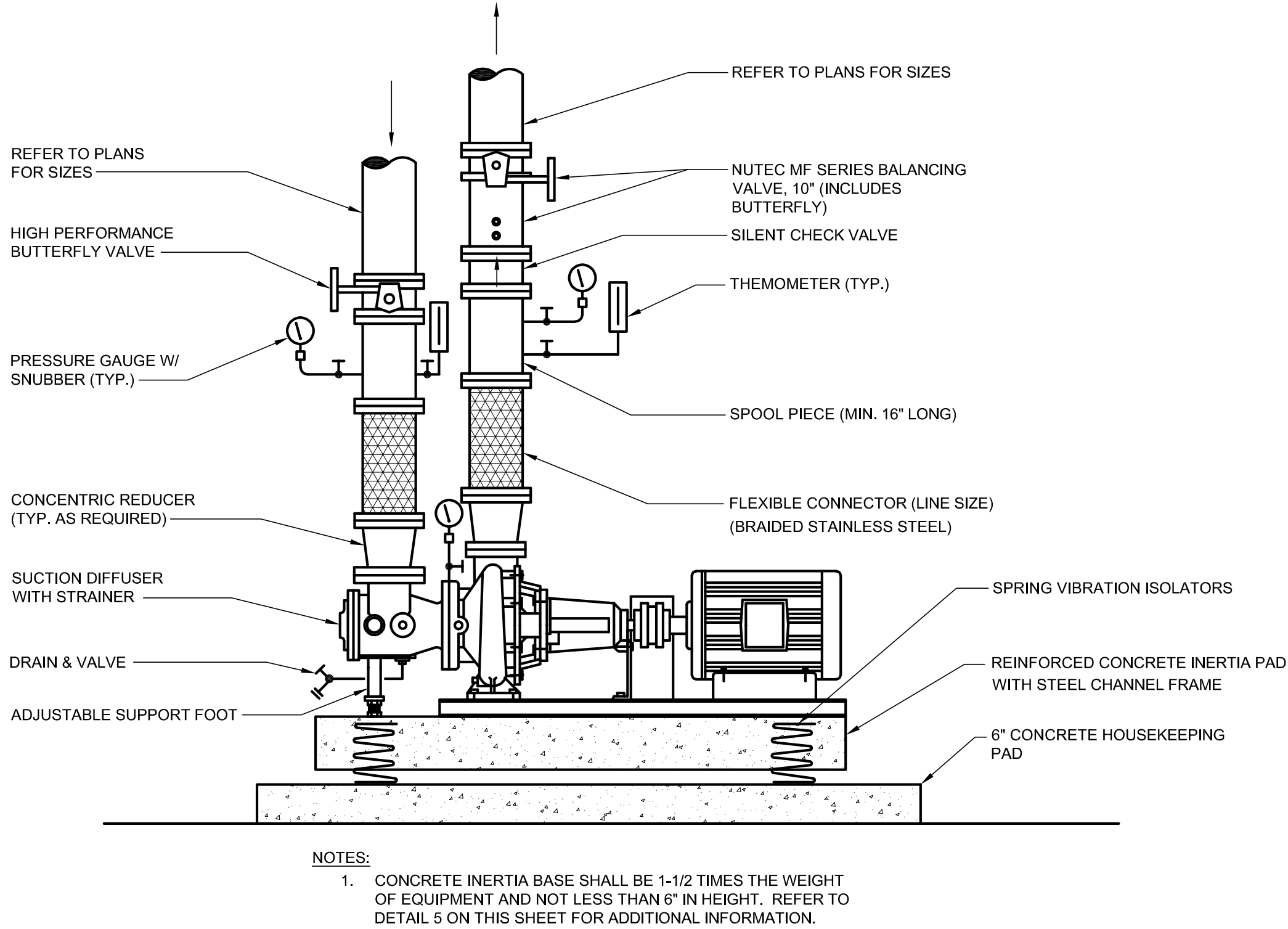
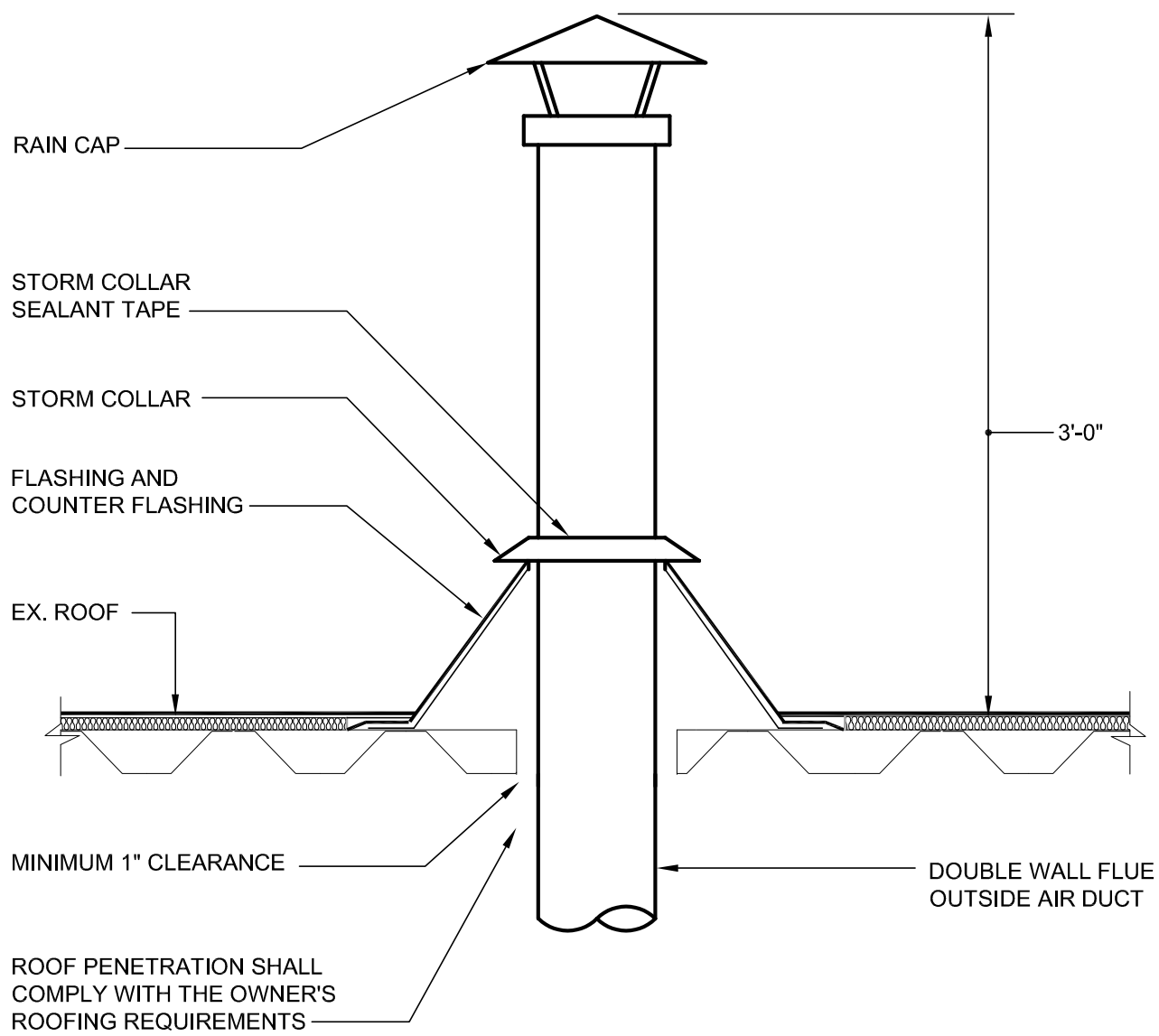
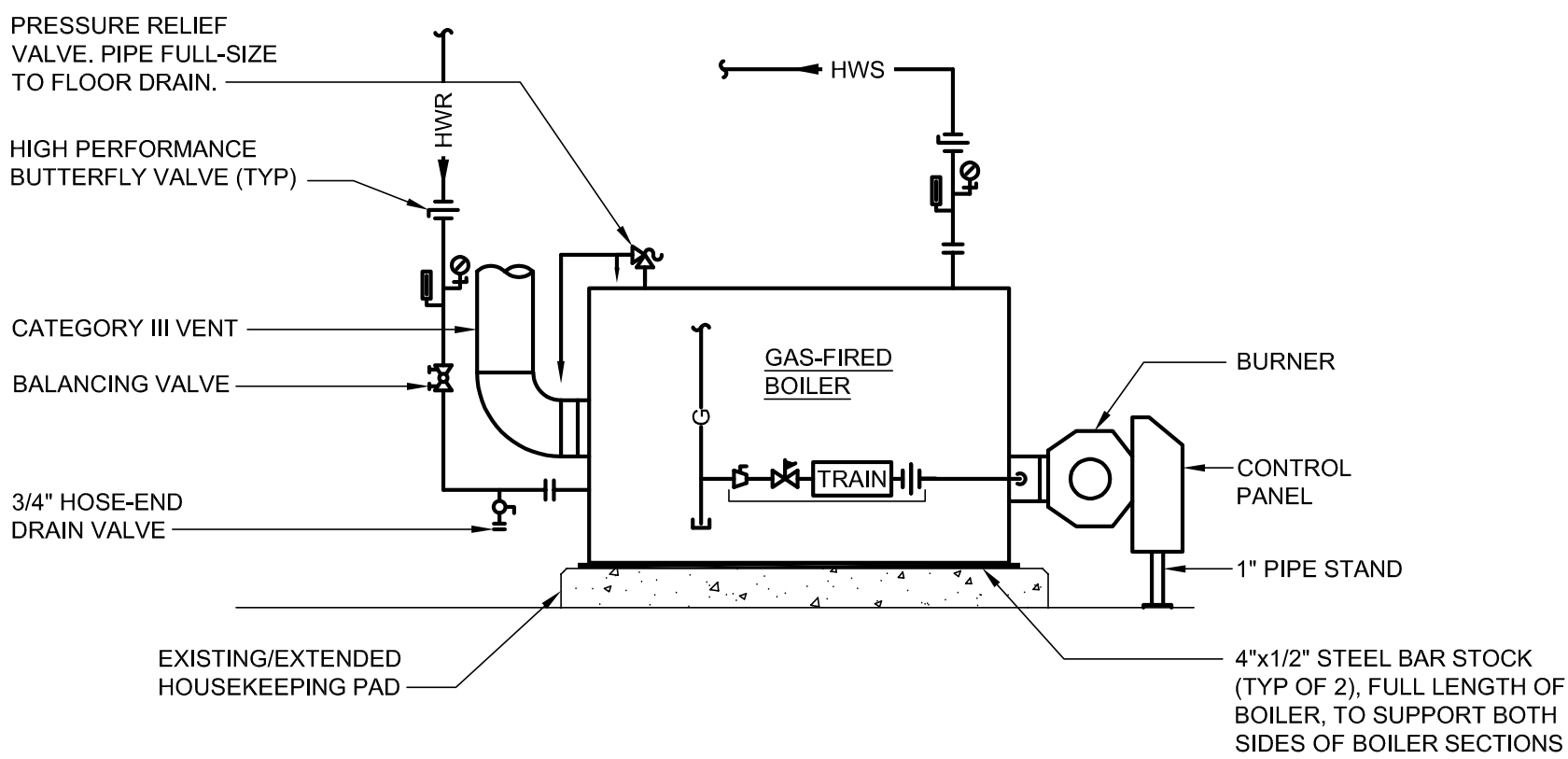
SCALE: NONE

PIPE HANGER DETAIL

SCALE: NONE

INERTIA PAD DETAIL

SCALE: NONE

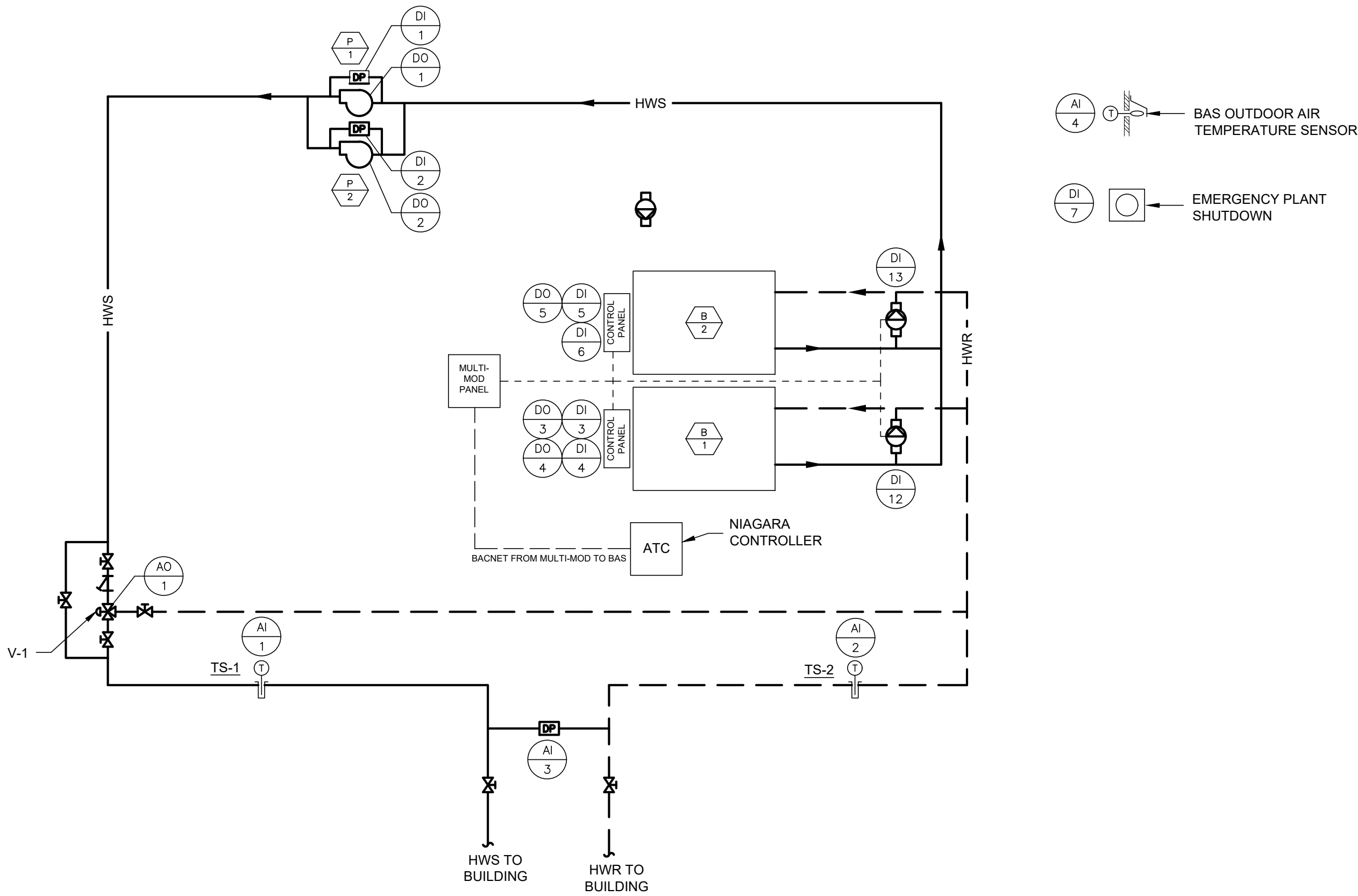


NO.	DESCRIPTION	DATE
1	100% CONSTRUCTION DOCUMENTS	01/14/2022

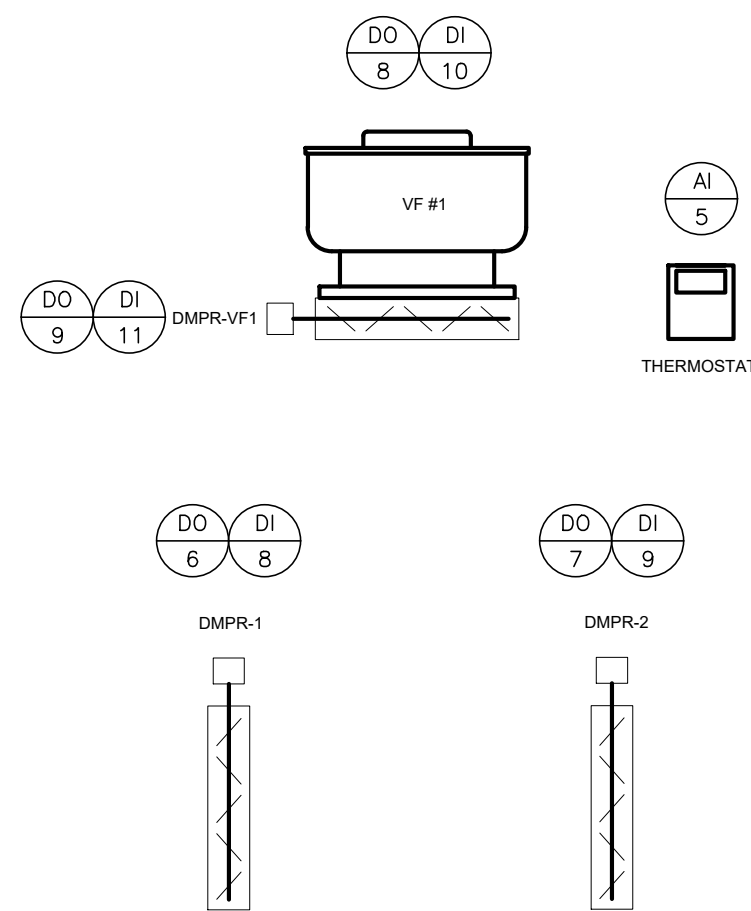
**MECHANICAL DETAILS,
DIAGRAMS & SCHEDULES**

DRAWN BY	RML
CHECKED BY	JRB
PROJECT NO.	202115
SCALE	1/4"=1'-0"

M3.1



2 HEATING WATER SYSTEM CONTROL DIAGRAM
M5.1 SCALE: NONE



GENERAL:

THE EXISTING EXHAUST FAN VF #1 FOR THE BOILER ROOM AND THE TWO EXISTING VENTILATION / COMBUSTION DAMPERS OVER THE ENTRANCE DOOR AS WELL AS THE BACKDRAFT DAMPER FOR THE FAN ARE PNEUMATICALLY CONTROLLED. CONVERT DAMPER ACTUATORS TO 24VDC DDC STYLE. ADD IN A THERMOSTAT TO BE USED TO CONTROL FAN VF-1. CONVERT FAN BACKDRAFT DAMPER ACTUATOR TO 24VDC DDC STYLE. PROVIDE SPLIT-CORE CURRENT TRANSFORMER ON EXISTING VENTILATION FAN VF #1 FOR STATUS. PROVIDE SEALED MERCURY-STYLE END SWITCHES FOR DAMPER STATUS MOUNTED TO BLADES.

DISABLE EXISTING SUPPLY FAN VF #2 AND LOCK EXISTING DAMPER CLOSED.

SEQUENCE OF OPERATION:

SUMMER (BOILERS DE-ENERGIZED):

EXISTING VF #1 SHALL BE USED FOR COMFORT VENTILATION OF THE BOILER ROOM. PROVIDE THERMOSTAT AND CONTROL BY TEMPERATURE (80° F, ADJUSTABLE). WHENEVER VF #1 IS ENERGIZED BOTH DAMPERS IN THE LOUVER OVER THE DOOR AND THE DAMPER AT VF #1 SHALL OPEN. WHEN VF #1 IS DE-ENERGIZED, DAMPERS SHALL CLOSE.

WINTER (BOILERS ENERGIZED):

WHEN BOILER #1 IS ENERGIZED, OPEN DAMPER DMPR-1 IN THE LOUVER OVER THE DOOR. WHEN BOILER #2 IS ENERGIZED, OPEN DAMPER DMPR-2. WHEN BOILER IS DE-ENERGIZED, ASSOCIATED DAMPER SHALL CLOSE.

VENTILATION FAN VF #1 SHALL REMAIN DE-ENERGIZED IN WINTER OR WHENEVER EITHER BOILER IS ENERGIZED.

SAFETIES:

IF AFTER 5 MINUTES, END SWITCH STATUS DOES NOT MATCH COMMAND, ISSUE AN ALARM VIA THE BAS. ADDITIONALLY, IF THE CURRENT TRANSFORMER FOR THE EXHAUST FAN VF #1 INDICATES A RUNNING STATUS, ENERGIZE BOTH VENTILATION DAMPERS TO OPEN. IF AFTER 5 MINUTES, END SWITCH STATUS DOES NOT MATCH COMMAND, ISSUE AN ALARM VIA THE BAS.

3 EXHAUST / VENTILATION CONTROL DIAGRAM AND SEQUENCE
M5.1 SCALE: NONE

ATC GENERAL NOTES

- ALL AUTOMATIC TEMPERATURE CONTROLS SHALL BE TRIDIUM NIAGARA DDC CONTROLS AND SHALL BE CONNECTED TO THE EXISTING TRIDIUM NIAGARA M BUILDING AUTOMATION SYSTEM (BAS). THE CONTRACTOR SHALL COORDINATE WITH HCPS IT DEPARTMENT TO OBTAIN A NETWORK DROP NEARBY EACH NEW CONTROLLER AND INTEGRATE THE CONTROLLERS INTO THE EXISTING DATABASE.
- ALL FACTORY INTERLOCK WIRING AND CONNECTIONS SHALL BE PROVIDED TO ALLOW FOR THE BOILERS TO OPERATE. THE BOILERS SHALL BE CONTROLLED BY A MULTIMODBACNET MULTIPLE BOILER CONTROL PANEL. THIS SHALL INTERLOCK TO PROVIDE BURNER, CIRCULATION PUMP, AND OTHER NECESSARY CONTROLS TO ALLOW THE BOILERS TO OPERATE, STAGE, AND LEAD/LAG. THE BOILER THAT RECEIVES BACKUP GENERATOR POWER SHALL BE DESIGNATED THE LEAD BOILER IN INTERNAL PROGRAMMING. THE MULTI-MOD SHALL RECEIVE AN OCCUPIED/OCCUPIED COMMAND FROM THE BAS. THE BOILERS SHALL OPERATE AT THEIR SETPOINT, WHICH SHALL BE ABLE TO BE OVERRIDDEN BY THE OPERATOR ON THE BAS VIA THE BACNET INTERFACE. THE BOILER CIRCULATION PUMPS SHALL RUN WHENEVER THE BOILER PLANT IS IN OCCUPIED MODE, AS PER MANUFACTURER RECOMMENDATIONS.
- ENSURE OCCUPIED SCHEDULE IS INTEGRATED WITH EXISTING TO REMAIN CONTROLS FOR RTUS AND OTHER HVAC EQUIPMENT THAT IS CONTROLLED BY SYSTEMS OTHER THAN TRIDIUM NIAGARA.
- DEMO ANY EXISTING PNEUMATICS CONTROLS LINES TO DEVICES BEING REPLACED BY DDC BACK TO THE MAIN CONTROL AIR SUPPLY LINE. CAP LINES WHERE DEMO-ED AND ENSURE THERE ARE NO LEAKS.
- THE BAS SHALL COMMUNICATE WITH THE MULTI-MOD BOILER CONTROL SYSTEM FURNISHED BY THE BOILER MANUFACTURER VIA BACNET. THE CONTROL SYSTEM SHALL PROVIDE BURNER STATUS, FAULT, AND OTHER INFORMATION TO THE BAS IN TEXT FORMAT VIA BACNET/IP OR BACNET MS/TP. REFER TO SECTION 230900 - INSTRUMENTATION AND CONTROL OF HVAC FOR SPECIFIC INPUT/OUTPUT PARAMETERS.
- ALL INPUT/OUTPUT POINTS SHOWN ON THE DDC POINTS LIST SHALL BE HARDWIRED TO THE BAS. THE BAS SHALL ALSO RECEIVE ALL AVAILABLE BACNET INFORMATION FROM THE BOILER CONTROL SYSTEM AS DESCRIBED ABOVE. BACNET POINTS SHALL NOT BE A SUBSTITUTE FOR THE HARDWIRED POINTS SHOWN ON THE DDC POINTS LIST.
- PROVIDE ALL CONTROLLERS, CONTROL DEVICES, CONTROL PANELS, CONTROLLER PROGRAMMING, CONTROLLER PROGRAMMING SOFTWARE, CONTROLLER INPUT/OUTPUT AND POWER WIRING, AND CONTROLLER NETWORK WIRING REQUIRED TO ACCOMPLISH THE SEQUENCES OF OPERATION.
- DDC CONTROLS POWER SHALL BE CONNECTED TO THE EMERGENCY BACKUP POWER CIRCUIT AND A UPS SHALL BE PROVIDED. THIS APPLIES TO THE NIAGARA CONTROLLER, THE MULTIMOD AND BURNER CONTROLS ON THE LEAD BOILER, THE CIRCULATION PUMP ON THE LEAD BOILER, AS WELL AS ANY OTHER DEVICES NECESSARY FOR OPERATION OF THE LEAD BOILER. THIS WILL ALLOW FOR THE HEATING PLANT TO RUN ON BACKUP GENERATOR POWER IN THE CASE OF AN OUTAGE.
- EXISTING DDC WIRING AND CONDUIT MAY BE REUSED TO THE EXTENT THAT IT IS SUITABLE FOR THE NEW INSTALLATION.
- UPDATE THE GRAPHICS ON THE EXISTING BAS TO FULLY INCORPORATE THE CONTROLLED SYSTEMS INTO THE BAS AT THE SCHOOL AND AT THE CENTRAL MAINTENANCE FACILITY ON MENDENHALL COURT.
- GRAPHICS SHALL BE PROVIDED IN THE BAS FOR ALL COMPONENTS OF THE SYSTEMS, IDENTIFYING THE CURRENT MODE OF OPERATION, SETPOINTS, AND CURRENT VALUES OF ALL POINTS.
- ALL ATC WORK SHALL BE PERFORMED BY AN AUTHORIZED TRIDIUM CONTROLS INSTALLER.

SEQUENCE OF OPERATION:

GENERAL

BOILERS B-1 AND B-2 SHALL BE CONTROLLED BY THEIR BOILER CONTROLS FURNISHED BY THE BOILER MANUFACTURER.

PROVIDE ALL WIRING, DEVICES, AND ACCESSORIES REQUIRED TO CONNECT THE POINTS SHOWN ON THE CONTROL DIAGRAM AND DESCRIBED IN THE POINT LIST TO THE NEW TRIDIUM NIAGARA M DIRECT DIGITAL CONTROL (DDC) BUILDING AUTOMATION SYSTEM (BAS). PROVIDE ALL INTERLOCK WIRING BETWEEN BOILER FACTORY CONTROLS AND ASSOCIATED DEVICES SUCH AS CIRCULATION PUMPS, TEMPERATURE SENSORS, LOCAL CONTROLLER NETWORK WIRING, AND ANY OTHER WIRING NECESSARY FOR OPERATION.

THE BAS SHALL ALSO COMMUNICATE WITH THE MULTIPLE BOILER CONTROL SYSTEM THROUGH A BACNET INTERFACE AND SHALL RECEIVE THE INPUT/OUTPUT PARAMETERS LISTED IN SECTION 230900 - INSTRUMENTATION AND CONTROL OF HVAC.

COORDINATE THE CONNECTION OF THE EMERGENCY POWER OFF SWITCHES FOR BOILERS WITH THE ELECTRICAL CONTRACTOR.

HEATING WATER SYSTEM - SEQUENCE OF OPERATION

THE BAS SHALL MONITOR THE STATUS OF THE EXISTING HVAC ZONES. WHENEVER ONE OR MORE OF THE ZONES ARE IN OCCUPIED MODE, OR THE OUTDOOR AIR TEMPERATURE IS BELOW 40°F, THE HEATING WATER PLANT SHALL OPERATE IN OCCUPIED MODE. THE LEAD PUMP SHALL BE ENERGIZED. IF AFTER A 10 SECOND DELAY THE LEAD PUMP DOES NOT SHOW STATUS THROUGH THE DIFFERENTIAL PRESSURE SWITCH, THE LAG PUMP SHALL BE ENERGIZED. AN ALARM SHALL BE SIGNED AT THE BAS, AND THE LAG PUMP SHALL CONTINUE TO RUN UNTIL THE STATUS IS PROVEN ON THE LEAD PUMP. PUMP RUNTIME SHALL BE TOTALIZED, AND THE LEAD/LAG PUMP SHALL BE COMMANDED TO THE PUMP WITH THE LOWEST TOTAL RUNTIME DURING THE FIRST UNOCCUPIED CYCLE OF EVERY MONTH. THIS SHALL PREVENT PUMPS FROM SWITCHING WHILE RUNNING, AND ALLOW FOR THE LEAD/LAG SWITCH TO OCCUR ON STARTUP.

BOILERS B-1 AND B-2 SHALL OPERATE UNDER CONTROL OF THE MULTIPLE BOILER CONTROL SYSTEM FURNISHED BY THE BOILER MANUFACTURER TO MAINTAIN THE REQUIRED HEATING WATER SUPPLY TEMPERATURE OF 180°F. THE 3-WAY BYPASS VALVE (V-1) SHALL MODULATE VIA A CONTROL LOOP TO MAINTAIN THE HEATING WATER SUPPLY TEMPERATURE AS SENSED BY THE SENSOR AFTER THE BYPASS BASED ON THE FOLLOWING OUTDOOR AIR RESET SCHEDULE:

OUTDOOR AIR TEMPERATURE	HEATING WATER SUPPLY TEMPERATURE
10°F AND BELOW	180°F
60°F AND ABOVE	140°F

BOILERS SEQUENCING AND FIRING RATE SHALL BE DETERMINED BY THE MULTIPLE BOILER CONTROL SYSTEM. THE CIRCULATION PUMPS SHALL BE INTERLOCKED WITH THE INDIVIDUAL BOILER CONTROLLERS, AND SHALL BOTH BE ENERGIZED WHENEVER THE PLANT IS IN OCCUPIED MODE.

ALARMS

ALARMS SHALL SIGNAL AT THE BAS FOR ANY OF THE FOLLOWING CONDITIONS:

- THE LEAD PUMP FAILS TO START.
- THE LEAD BOILER FAILS TO START.
- FAULT FOR ANY BOILER.
- THE HEATING WATER SUPPLY TEMPERATURE AS SENSED BY TEMPERATURE SENSOR TS-1 DROPS MORE THAN 5°F BELOW SETPOINT FOR MORE THAN 30 MINUTES.

HEATING WATER SYSTEM SEQUENCE, NOTES AND POINTS LIST

1 M5.1 SCALE: NONE

DDC POINT LIST (HEATING WATER SYSTEM)						
POINT TYPE	POINT #	DESCRIPTION	ALARM	FUNCTIONS	GRAPHIC	NOTE
ANALOG INPUT	AI-1	HEATING WATER SUPPLY TEMPERATURE	YES	TREND	YES	1
	AI-2	HEATING WATER RETURN TEMPERATURE		TREND	YES	
	AI-3	DIFFERENTIAL PRESSURE SENSOR		TREND	YES	
	AI-4	OUTDOOR AIR TEMPERATURE		TREND	YES	
	AI-5	BOILER ROOM TEMPERATURE		TREND	YES	
DIGITAL INPUT	DI-1	PUMP P-1 STATUS	YES	TREND	YES	2
	DI-2	PUMP P-2 STATUS	YES	TREND	YES	2
	DI-3	BOILER B-1 STATUS	YES	TREND	YES	2
	DI-4	BOILER B-1 FAULT	YES	TREND	YES	
	DI-5	BOILER B-2 STATUS	YES	TREND	YES	2
	DI-6	BOILER B-2 FAULT	YES	TREND	YES	
	DI-7	EMERGENCY SHUTDOWN BUTTON	YES	TREND	YES	4
	DI-8	COMBUSTIONVENT DAMPER 1 END SWITCH	YES	TREND	YES	6
	DI-9	COMBUSTIONVENT DAMPER 2 END SWITCH	YES	TREND	YES	6
	DI-10	VENTILATION FAN STATUS	YES	TREND	YES	5
	DI-11	VF-1 DAMPER STATUS	YES	TREND	YES	6
	DI-12	BOILER 1 CIRCULATION PUMP STATUS	YES	TREND	YES	5
	DI-13	BOILER 2 CIRCULATION PUMP STATUS	YES	TREND	YES	5
DIGITAL OUTPUT	DO-1	PUMP P-1 START/STOP		TREND	YES	2
	DO-2	PUMP P-2 START/STOP		TREND	YES	2
	DO-3	BOILER SYSTEM OCCUPIED COMMAND		TREND	YES	
	DO-4	BOILER B-1 ENABLE/DISABLE		TREND	YES	
	DO-5	BOILER B-2 ENABLE/DISABLE		TREND	YES	
	DO-6	DAMPER 1 COMMAND		TREND	YES	
	DO-7	DAMPER 2 COMMAND		TREND	YES	
	DO-8	VF-1 COMMAND		TREND	YES	
	DO-9	VF-1 DAMPER COMMAND		TREND	YES	

NOTE 1: ISSUE VIRTUAL ALARM IF HOT WATER SUPPLY TEMP IS 5°F OR MORE BELOW SETPOINT FOR 30 MINUTES.

NOTE 2: ISSUE VIRTUAL ALARM IF STATUS DOES NOT MATCH COMMAND STATE AFTER 10 SECONDS.

NOTE 3: ISSUE VIRTUAL ALARM IF STATUS DOES NOT MATCH COMMAND STATE AFTER 5 MINUTES.

NOTE 4: EMERGENCY SHUTDOWN BUTTON SHALL BE WIRED DIRECTLY TO BOILERS AS PER CODE. THE BAS SHALL ALSO MONITOR STATUS AND SHALL ISSUE AN ALARM IF THE SAFETY SHUTDOWN IS ACTIVATED.

NOTE 5: USE SPLIT CORE CURRENT TRANSDUCER TO PROVIDE RUNTIME STATUS.

NOTE 6: USE MERCURY STYLE END SWITCH MOUNTED TO DAMPER BLADES.



Howard County Public School System
9020 Mendenhall Court
Columbia, MD 21045

SEAL

Professional Certification, I certify that these documents were prepared or approved by me, and that I am a duly licensed engineer under the laws of the State of Maryland, License Number 44890, expiration date 01/08/2024.

CONSULTANTS

MECHANICAL ENGINEERS

BUILDING DYNAMICS, LLC
8600 FOUNDRY ST., SUITE 306
MILL BOX 2054
SAVAGE, MD 20763
building-dynamics.com

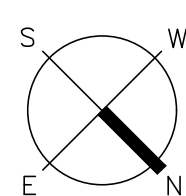
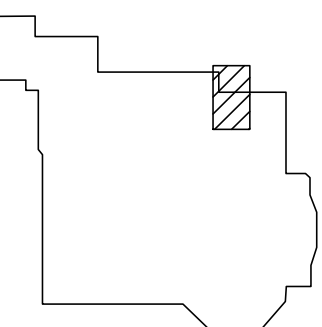
ELECTRICAL ENGINEERS

PAULCO ENGINEERING, INC.
14211 MEADOW LAKE DRIVE
GLENELG, MD 21737
p. 301.523.5012

PROJECT

HAMMOND ESMS
BOILER REPLACEMENT
8100 ALADDIN DRIVE
LAUREL, MD 20723

KEY PLAN



NO.	DESCRIPTION	DATE
1	100% CONSTRUCTION DOCUMENTS	01/14/2022

DRAWING

CONTROLS & SEQUENCE OF OPERATIONS

DRAWN BY	RML
CHECKED BY	JRB
PROJECT NO.	202115
SCALE	NONE
SHEET	

M5.1

NOT ALL SYMBOLS INDICATED HERE MAY APPEAR ON THE CONTRACT DRAWINGS			
SYMBOL		DESCRIPTION	
	SINGLE POLE SWITCH		208 VOLT PANELBOARD
	THREE WAY SWITCH		480 VOLT PANELBOARD
	MANUAL MOTOR STARTER WITH THERMAL OVERLOAD AND HOA SWITCH		BELL
	KEY SWITCH		SPEAKER, WALL MOUNTED
	4 WAY SWITCH		SPEAKER, CEILING MOUNTED
	MOTION SENSOR		PAGING SYSTEM SPEAKER, WALL MOUNTED
	DUPLEX RECEPTACLE		PAGING SYSTEM CALL SWITCH
	DUPLEX RECEPTACLE MOUNTED ABOVE COUNTER ABOVE BACKSPASH		THERMOSTAT
	DOUBLE DUPLEX RECEPTACLE		PHOTOCELL
	SPECIAL RECEPTACLE, SIZE AND TYPE AS NOTED		H-O-A SWITCH
	WP RECEPTACLE		PUSH BUTTON
	GFCI DUPLEX RECEPTACLE		FAN COIL UNIT
	FLOOR RECEPTACLE, FLUSH WITH FLOOR		SOLENOID VALVE
	RECEPTACLE ABOVE CEILING		CABINET UNIT HEATER
	DUPLEX RECEPTACLE FOR ELECTRIC WATER COOLER		EMERGENCY BYPASS CONTROL RELAY
	CLOCK OUTLET		ELECTRIC DOOR LOCK
	LIGHTING FIXTURE WITH DOUBLE BALLAST		DOOR CONTACT
	LIGHTING FIXTURE		FUSE
	LIGHTING FIXTURE ON EMERGENCY CIRCUIT		FUSED SWITCH
	WALL MOUNTED FIXTURE		SWITCH AND FUSE
	INDUSTRIAL TYPE FIXTURE		CIRCUIT BREAKER
	CEILING MOUNTED DOWN LIGHT		JUNCTION BOX
	WALL MOUNTED LIGHTING FIXTURE		GENERATOR
	WALL WASH/DOWN LIGHT, CEILING MOUNTED		MOTOR CONNECTION
	WALL SCONCE		UNIT HEATER CONNECTION
	COVE FIXTURE, LENGTH AS SHOWN ON DRAWINGS		SAFETY SWITCH NON-FUSED, SIZE AS INDICATED
	TRACK LIGHT WITH FIXTURE		SAFETY SWITCH FUSED, SIZE AS INDICATED
	POLE MOUNTED LIGHTING LUMINAIRE (S), LANDSCAPE FIXTURE		ELECTRICAL DEVICE AS INDICATED
	EXIT LIGHT BACK MOUNTED & w/ DIRECTIONAL CHEVRONS AS INDICATED		COMBINATION TYPE MOTOR STARTER, SIZE AS INDICATED
	EXIT LIGHT TOP OR PENDANT MOUNTED, SINGLE FACE WITH DIRECTIONAL CHEVRONS AS INDICATED		TRANSFORMER, SIZE AS INDICATED
	EXIT LIGHT TOP OR PENDANT MOUNTED, DOUBLE FACE WITH DIRECTIONAL CHEVRONS AS INDICATED		TIME CLOCK
	GROUND ROD		RELAY
	AIR TERMINAL		SURFACE MOUNTED RACEWAY
	FIRE ALARM SYSTEM MANUAL PULL STATION		UNDERGROUND ELECTRICAL LINES, AS NOTED
	FIRE ALARM SYSTEM HEAT DETECTOR		UNDERGROUND COMMUNICATION LINES, AS NOTED
	FIRE ALARM SYSTEM, VISUAL LIGHT/STROBE		CONDUIT, CONCEALED IN CEILING OR WALL OR CHASE
	FIRE ALARM SYSTEM COMBINATION HORN AND LIGHT		CONDUIT CONCEALED IN FLOOR OR UNDER FLOOR UNDERGROUND
	FIRE ALARM SYSTEM HORN		CARD READER
	FIRE ALARM SYSTEM SMOKE DETECTOR		KEY PAD
	FIRE ALARM SYSTEM DUCT SMOKE DETECTOR		WATER HEATER
	FIRE ALARM SYSTEM MAGNETIC DOOR HOLDER		
	FIRE ALARM SYSTEM FLOW SWITCH		
	FIRE ALARM SWITCH TAMPER SWITCH		
	FIRE ALARM CONTROL PANEL		
	FIRE ALARM ANNUNCIATOR PANEL		
	RACEWAY UP		
	RACEWAY DOWN		
	EMERGENCY MUSHROOM PUSH BUTTON (E-STOP)		

SPECIAL NOTE

- 1** IF ANY SUFFIX ADDED: G INDICATES GFCL, D INDICATES DEDICATED WP INDICATES WEATHERPROOF, R INDICATES RECESSED, S INDICATES SURFACE MOUNTED, AND XP INDICATES EXPLOSION PROOF

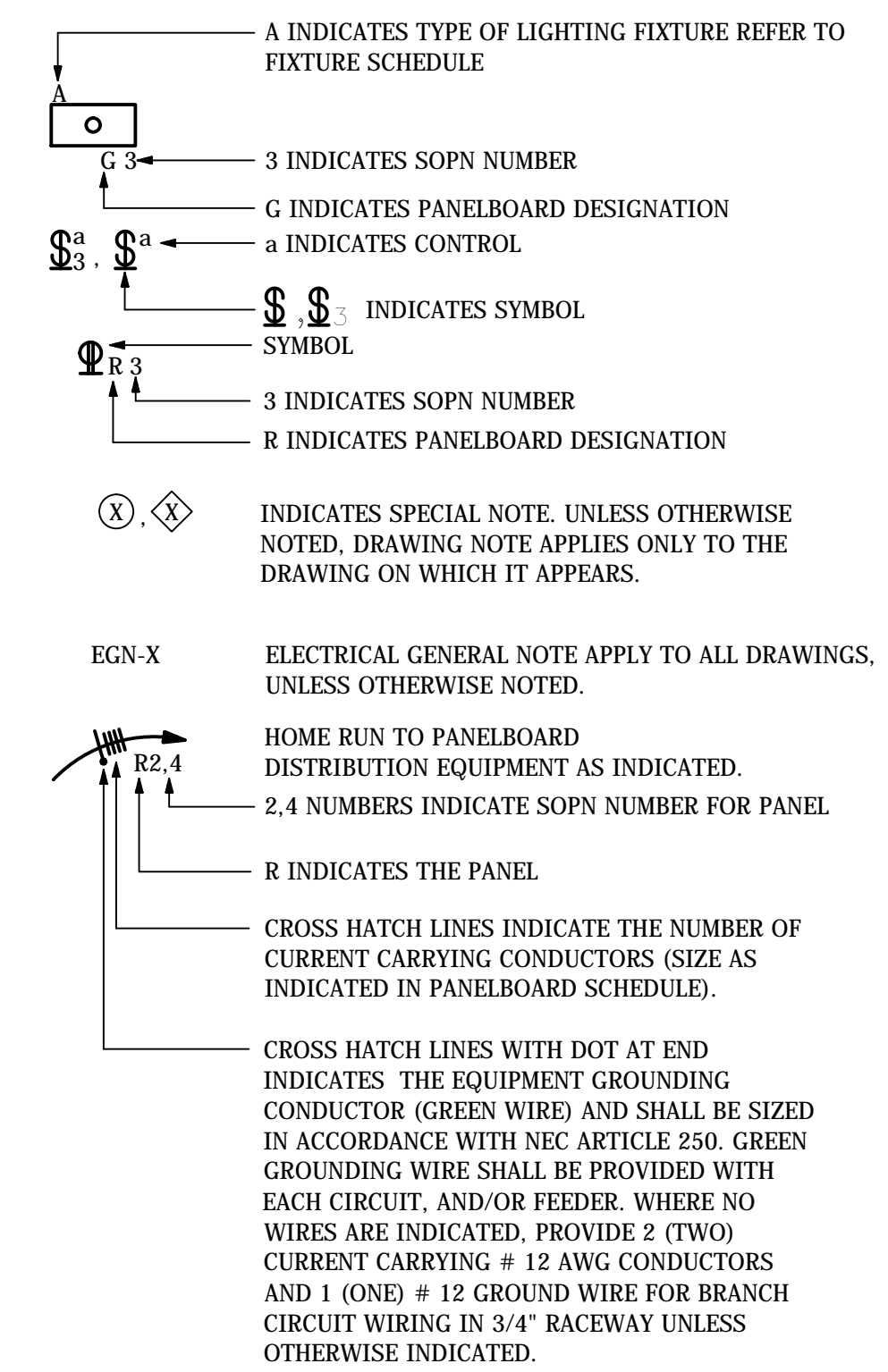
NOT ALL ABBREVIATIONS INDICATED HERE MAY APPEAR ON THE CONTRACT DRAWINGS			
ABBREV	DESCRIPTION	ABBREV	DESCRIPTION
A	AMP	JB	JUNCTION BOX
ABBREV	ABBREVIATIONS	KV	KILOVOLT
AC	ALTERNATING CURRENT	KVA	KILOVOLT-AMPERE
ACU	AIR CONDITIONING UNIT	KW	KILOWATT
AF	AMPERE FRAME	KWH	KILOWATT-HOUR
AFB	ABOVE FINISHED FLOOR	LS	LIMIT SWITCH
AFG	ABOVE FINISHED GRADE	LTG	LIGHTING
AHU	AIR HANDLING UNIT	LV	LOW VOLTAGE
AIC	AMPERE INTERRUPTING CAPACITY	MAX	MAXIMUM
ATC	AUTOMATIC TEMPERATURE CONTROL	MCB	MAIN CIRCUIT BREAKER
ATS	AUTOMATIC TRANSFER SWITCH	MCC	MOTOR CONTROL CENTER
AUX	AUXILIARY	MCP	MOTOR CIRCUIT PROTECTOR
AWG	AMERICAN WIRE GAUGE	MH	MOUNTING HEIGHT
BBS	BUILDING ELECTRICAL SYSTEM	MIN	MINIMUM
BL	BASIC IMPULSE LEVEL	MDP	MAIN DISTRIBUTION PANEL
BLDG	BUILDING	MCM	THOUSAND CIRCULAR MILLS
BKBD	BACKBOARD	MTD	MOUNTED
BRKR	BREAKER	MLO	MAIN LUGS ONLY
C	CONDUIT	MTG	MOUNTING
C	CIRCUIT BREAKER	N	NEUTRAL
CCTV	CLOSED CIRCUIT TELEVISION	NC	NORMALLY CLOSED
CKT	CIRCUIT	NEC	NATIONAL ELECTRICAL CODE
CR	CARD READER	NIC	NOT IN CONTRACT
CL	CURRENT LIMITING	NL	NIGHT LIGHT
CIG	CEILING	NO	NORMALLY OPEN
CPT	CONTROL POWER TRANSFORMER	NTS	NOT TO SCALE
CT	CURRENT TRANSFORMER	NFSS	NF-705 SAFETY SWITCH
CUH	CABINET UNIT HEATER	ON	ON CIRCUIT
CW	COOL WHITE	OH	OVERHEAD
DGS	DIESEL GENERATOR SET	OL	OVERLOAD
DIA	DIAMETER	P	POLE OR POLES
DISC	DISCONNECT	PF	POWER FACTOR
DIST	DISTRIBUTION	PH	PHASE
DN	DOWN	PT	POTENTIAL TRANSFORMER
DP	DISTRIBUTION PANEL	PNL	PANELBOARD
DS	DISCONNECT SWITCH	PVC	POLYVINYL CHLORIDE
DWG	DRAWING	R	RETURN AIR FAN
E	EMERGENCY	RAF	RECEPTACLE
EBH	ELECTRIC BASEBOARD HEATER	RECEPT	RECEPTACLE
EC	EMPTY CONDUIT	REQD	REQUIRED
ECS	ENCLOSED CIRCUIT BREAKER	RGS	RIGID GALVANIZED STEEL
EE	EXHAUST FAN	RMS	ROOT MEAN SQUARE
EGB	ELECTRIC GENERATOR SET	RS	RAPID START
EH	ELECTRIC HEATER	RVAT	REDUCED VOLTAGE
ELECT	ELECTRICAL		AUTOTRANSFORMER
EMT	ELECTRICAL METALLIC TUBING	S/N	SOLID NEUTRAL
ENCL	ENCLOSURE	SD	SMOKE DETECTOR
EQUIP	EQUIPMENT	SEC	SECONDARY
ER	EXISTING RELOCATED	SFA	SPRINKLER FLOW ALARM
EX	EXISTING TO REMAIN	SFR	SURFACE MOUNTED RACEWAY
EWC	ELECTRIC WATER COOLER	SPEC	SPECIFICATION
EWI	ELECTRIC WATER HEATER	ST	SHUNT TRIP
EXH	EXISTING	SS	SUB STATION
EXH	EXHAUST	STR	STARTER
F	FUSED OR FUSIBLE	SW	SWITCH
FA	FRAME AMPERE	SWBD	SWITCHBOARD
FAAP	FIRE ALARM ANNUNCIATOR PANEL	SWGR	SWITCHGEAR
FACP	FIRE ALARM CONTROL PANEL	SYS	SYSTEM
FAD	FIRE ALARM AND DETECTION SYSTEM	SYM	SYMMETRICAL
FBO	FURNISHED BY OTHERS	SOPN	SPACE OR POLE NUMBER
FCU	FAN COIL UNIT	TA	TRIP AMPERE
FDR	FEEDER	TB	TERMINAL BOARD
FL	FLOOR	TC	TIME CLOCK
FLUOR	FLUORESCENT	TD	TIME DELAY
FSS	FUSED SAFETY SWITCH	TTB	TELEPHONE TERMINAL BOARD
FT	FOOT OR FEET	TTT	TELEPHONE TERMINAL CLOSURE
GFI	GROUND FAULT CIRCUIT INTERRUPTER	TYP	TYPICAL
GN	GENERAL NOTE	TV	TELEVISION
GND	GROUND	UC	UNDER COUNTER
GWS	GALVANIZED RIGID STEEL	UG	UNDERGROUND
GRB	GYPSON WALL BOARD	UH	UNIT HEATER
GW	GROUND WIRE	UI	UNLESS OTHERWISE INDICATED
HC	HANDICAP	UON	UNLESS OTHERWISE NOTED
HD	HEAVY DUTY		UNDERWRITER'S LABORATORY
HID	HIGH INTENSITY DISCHARGE	V	VOLT (S) OR VOLTAGE
HOA	HAND-OFF-AUTOMATIC	VA	VOLT AMPERE
HP	HORSE POWER	W	WIRE
HTR	HEATER	W	WITH
HV	HIGH VOLTAGE	WP	WEATHER PROOF
HVAC	HEATING, VENTILATING AND AIR CONDITIONING	WW	WIREWAY
HZ	HERTZ	W/O	WITHOUT
IE	THAT IS	XFR	TRANSFORMER

NOTE: UNLESS OTHERWISE INDICATED, STANDARD MOUNTING HEIGHTS FOR OUTLET BOXES FOR THE FOLLOWING EQUIPMENT/DEVICE SHALL BE ABOVE FINISHED FLOOR AND SHALL BE TO THE CENTER LINE OF EQUIPMENT

EQUIPMENT/DEVICE	MOUNTING HEIGHT
SWITCHES	48 INCH
RECEPTACLE-GENERAL	18 INCH
RECEPTACLE SPECIAL	18 INCH
RECEPTACLE SINGLE	18 INCH
RECEPTACLE REST ROOM	9 INCH ABOVE BASIN
RECEPTACLE COUNTER	9 INCH ABOVE COUNTER
RECEPTACLE-EXTERIOR	30 INCH
TELEPHONE-GENERAL	18 INCH
TELEPHONE- WALL TYPE	54 INCH, (48 INCH FOR HANDICAPPED)
FIRE ALARM PULL STATION	48 INCH
FIRE ALARM AUDIO/VISUAL DEVICE	96 INCH
CARD READER	42 INCH
THERMOSTAT	60 INCH
EXIT LIGHT WALL MOUNTED	MAX 90 INCH
SAFETY SWITCH	72 INCH TO HANDLE
PANELBOARD	72 INCH TO TOP CB
MANUAL MOTOR STARTER	48 INCH
PUSH BUTTON	48 INCH

NOT ALL CONVENTIONS INDICATED HERE MAY APPEAR ON
THE CONTRACT DRAWINGS

CONVENTIONS



ELECTRICAL GENERAL NOTES

EGN-1 REFER TO MECHANICAL DRAWINGS FOR EXACT LOCATIONS MECHANICAL EQUIPMENT AND DEVICES.

EGN-2 ELECTRICAL EQUIPMENT IS SPECIFIED BY MAKE AND MODEL NUMBER TO ESTABLISH A LEVEL OF QUALITY, DIMENSIONAL LIMITATIONS, AND PERFORMANCE CHARACTERISTICS UNLESS OTHERWISE NOTED. PRODUCTS OF OTHER MANUFACTURERS MAY BE FURNISHED. HOWEVER THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE SAME OR BETTER LEVEL OF QUALITY, DIMENSIONAL LIMITATIONS, AND PERFORMANCE CHARACTERISTICS.

EGN-3 UNLESS OTHERWISE NOTED, ALL WORK IN FINISHED OCCUPIED AREAS SHALL BE CONCEALED ABOVE CEILING, IN WALL AND/OR IN CHASIS. ALL RACEWAYS IN BOILER ROOM AND PENTHOUSE SHALL BE EXPOSED.

EGN-4 ALL MATERIAL AND EQUIPMENT SHALL BE U.L. LISTED AS SUITABLE FOR THE LOCATION AND ENVIRONMENT FOR WHICH IT IS USED AND SHALL MEET MCPs REQUIREMENTS.

EGN-5 ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE LATEST EDITION OF NEC AND ALL OTHER APPLICABLE CODES.

EGN-6 ALL EQUIPMENT AND WIRING THAT MAY REQUIRE SERVICING SHALL BE COMPLETELY ACCESSIBLE UPON COMPLETION OF PROJECT. JUNCTION BOXES AND PULL BOXES SHALL BE INSTALLED WHEREVER REQUIRED FOR A COMPLETE INSTALLATION OF BUILDING ELECTRICAL SYSTEMS. SIZE IN ACCORDANCE WITH NEC.

EGN-7 THE CONTRACTOR SHALL COORDINATE WITH ALL OTHER TRADES/CONTRACTORS FOR A COMPLETE INSTALLATION OF WORK.

EGN-8 THE CONTRACTOR SHALL THOROUGHLY EXAMINE THE PREMISES AND OBSERVE ALL FIELD CONDITIONS UNDER WHICH THE WORK SHALL BE PERFORMED. CONTRACTOR SHALL VERIFY LOCATION OF ALL EQUIPMENT WITH OTHER TRADES AND OWNER. REQUIRE ELECTRICAL CONNECTIONS, BEFORE ANY ROUGH-IN. ANY DIFFICULTIES IN COMPLYING WITH THE DRAWINGS AND SPECIFICATIONS SHALL BE BROUGHT TO THE ATTENTION OF OWNER BEFORE BIDDING.

EGN-9 PROVIDE GROUNDING CONNECTIONS FOR ALL ENCLOSURES, DEVICES AND EQUIPMENT PERMANENTLY AND EFFECTIVELY IN ACCORDANCE WITH NEC AND PROJECT SPECIFICATIONS. PROVIDE GROUNDING CONDUCTOR WITH EACH BRANCH CIRCUIT.

EGN-10 EACH PENETRATION THROUGH WALLS, CEILINGS AND FLOORS SHALL BE SEALED IN ACCORDANCE WITH ALL APPLICABLE CODES, AND PROJECT SPECIFICATIONS. SEALANT SHALL BE COMPATIBLE WITH WALL, FLOOR AND ROOF CONSTRUCTION AND/OR THEIR ASSOCIATED FIRE RATINGS IN ACCORDANCE WITH IBC AND NFPA.

EGN-11 UNLESS OTHERWISE NOTED, ALL WIRING CONDUCTORS SHALL BE COPPER, TYPE THWN/THHN INSULATION, RATED FOR 90 DEGREE C. AND IN METALLIC RACEWAYS.

EGN-12 DRAWINGS ARE DIAGRAMMATIC AND ARE INTENDED TO INDICATE THE GENERAL ARRANGEMENT. THEY ARE NOT INTENDED TO SHOW ALL DETAILS OF CONSTRUCTION OR EXACT LOCATIONS OF THE WORK.

EGN-13 ALL OVERCURRENT PROTECTION DEVICES USED FOR MECHANICAL EQUIPMENT PROTECTION SHALL BE HACR RATED. CONTRACTOR SHALL VERIFY WIRE TYPES, C/B AND FUSE RATINGS FOR ALL HVAC EQUIPMENT, AND BRING TO THE ATTENTION OF THE ARCHITECT ANY DISCREPANCIES AFFECTING THE WORK PRIOR TO PROCEEDING.

EGN-14 THE CORRECT NUMBER OF WIRES MAY NOT BE INDICATED FOR ALL CIRCUITS. ONLY THOSE WHERE CLARIFICATION IS NECESSARY. PROVIDE ALL WIRES NECESSARY FOR THE PROPER FUNCTION OF THE SYSTEM WHETHER INDICATED ON DRAWINGS OR NOT.

EGN-15 CONDUCTORS SHALL BE INSTALLED CONTINUOUS BETWEEN DEVICES, WITH SPLICES LOCATED ONLY IN JUNCTION BOXES OR IN CABINETS. CONDUCTORS SHALL BE OF SUFFICIENT LENGTH TO REACH THE FARTHEST TERMINAL IN PANELS. A MINIMUM OF 6" LOOPS SHALL REMAIN WHERE CONNECTIONS OR TAPS ARE TO BE MADE IN BRANCH CIRCUIT WIRING.

DEMOLITION NOTES

- DE1. DEVICES BEYOND REMOVED AREAS OF THIS CONTRACT THAT ARE WIRED THROUGH OR FROM OUTLETS TO BE REMOVED OR ABANDONED SHALL REMAIN AND REMAIN OPERABLE.
- DE2. CONDUIT CONCEALED MAY BE LEFT IN PLACE AND ABANDONED IF NOT INTERFERING WITH NEW WORK. WHERE CONDUIT IS RUN ABOVE CEILING, REMOVE WIRE AND CAP. WHERE CONDUIT IS RUN UP THROUGH CEILING, CUT OFF ABOVE CEILING, REMOVE WIRE AND CAP.
- DE3. THE CONTRACTOR SHALL REMOVE ALL EXISTING WIRE AND CABLE NOT BEING USED.
- DE4. WHERE EXISTING ELECTRICAL DEVICES ARE SHOWN BEING REMOVED AND JUNCTION BOXES ARE NOT BEING RE-USED, THE ELECTRICAL CONTRACTOR SHALL REMOVE EXISTING WIRE AND CABLE, PROVIDE BLANK COVER PLATE AND PAINT TO MATCH EXISTING.
- DE5. CONTRACTOR SHALL SUBMIT A TYPED/WRITTEN INVENTORY TO OWNER INCLUDING ALL ELECTRICAL DEVICES BEING REMOVED - I.E., SWITCHES, DISCONNECT SWITCH ETC. DEVICES BEING DISCARDED SHALL THEN BECOMES THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE PROJECT SITE.

Howard County Public School System
9020 Mendenhall Court
Columbia, MD 21045

SEAL

Professional Certification. I certify that these documents were prepared or approved by me and that I am a duly licensed engineer under the laws of the State of Maryland, License Number 18652, expiration date 04/04/2022.

CONSULTANTS

MECHANICAL ENGINEERS

BUILDING DYNAMICS, LLC
8600 FOUNDRY ST., SUITE 306
MILL BOX 2054
SAVAGE, MD 20763
building-dynamics.com

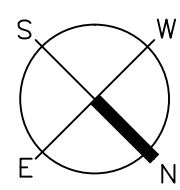
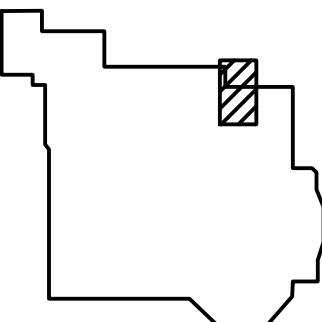
ELECTRICAL ENGINEER:

PAULCO ENGINEERING, INC
14211 MEADOW LAKE DRIVE
GLENELG, MD 21737
p: 301.523.5012

PROJECT

**HAMMOND ES/MS
BOILER REPLACEMENT**
8100 ALADDIN DRIVE
LAUREL, MD 20723

KEY PLAN



1	100% CONSTRUCTION DOCUMENTS	01/14/2022
NO.	DESCRIPTION	DATE

DRAWING

ELECTRICAL LEGEND AND GENERAL NOTES

DRAWN BY	V.H.
CHECKED BY	P.G.
PROJECT NO.	202115
SCALE	NONE
SHEET	

E1.0

FILE NAME: \\Building Dynamics\Jim.Babb\31-018-Howard\31-018-Howard E1.01.dwg PLOTTED: 05/14/2022 11:45:00 AM 1/4"=1'-0" 314mm

BOILER ROOM - DEMOLITION

SCALE: 1/4" = 1' - 0"

① SPECIAL NOTES - DEMOLITION:

- UNLESS OTHERWISE ANY BRANCH CIRCUIT WIRING AND RACEWAY REMOVED, EXISTING EQUIPMENT AND ASSOCIATED BRANCH CIRCUIT WIRING AND RACEWAY SHALL REMAIN.
- EXISTING RECEPTACLE AND ASSOCIATED WIRING/RACEWAYS SHALL REMAIN.
- DISCONNECT AND REMOVE THE BRANCH CIRCUIT WIRING AND RACEWAY FOR BOILER IN ITS ENTIRETY TO THE SOURCE OF POWER.
- DISCONNECT AND REMOVE EXISTING STARTER AND ALL ASSOCIATED WIRING AND RACEWAY TO PUMP AND TO ASSOCIATED PANEL. SALVAGE THE STARTER FOR REUSE.
- DISCONNECT AND REMOVE EXISTING SWITCH (EMERGENCY SHUT-OFF) FOR BOILERS AND ALL ASSOCIATED WIRING AND RACEWAYS.
- EXISTING DISCONNECT SWITCH AND ASSOCIATED (LINE SIDE) BRANCH WIRING AND RACEWAY SHALL REMAIN.
- EXISTING MECHANICAL EQUIPMENT SHALL REMAIN.
- DISCONNECT AND RELOCATE EX RECEPTACLE TO NEW LOCATION AS SHOWN IN NEW WORK. PROVIDE ADDITIONAL WIRING AND RACEWAY TO MAKE IT FULLY OPERATIONAL.
- DISCONNECT THE BRANCH CIRCUIT WIRING AND RACEWAY TO DISCONNECT SWITCH (TO ALLOW TO PROVIDE CONCRETE PAD). PROTECT THE WIRING AND RACEWAY DURING CONSTRUCTION FOR RECONNECTIONS

BOILER ROOM - NEW WORK

SCALE: 1/4" = 1' - 0"

② SPECIAL NOTES - NEW WORK:

- EXISTING ELECTRICAL EQUIPMENT AND ASSOCIATED BRANCH CIRCUIT WIRING AND RACEWAY SHALL REMAIN. FOR MORE WORK, REFER TO SCHEDULES.
- EXISTING RECEPTACLE AND ASSOCIATED WIRING/RACEWAYS SHALL REMAIN.
- PROVIDE LOCKABLE 30 AMP, 480 VOLT, 3 POLE FUSED DISCONNECT SWITCH IN NEMA 1 ENCLOSURE AND MOUNT ON KINDORF CHANNEL SUPPORTS NEAR THE BOILER. COORDINATE WITH REQUIRED ACCESS TO THE BOILERS. PROVIDE BRANCH CIRCUIT WIRING IN LIQUID TIGHT FLEXIBLE METAL CONDUIT AND MAKE CONNECTIONS TO BOILER. PROVIDE BRANCH CIRCUIT WIRING AND RACEWAY AS INDICATED.
- PROVIDE NEW (E-STOP) MUSHROOM HEAD EMERGENCY SHUT OFF SWITCH (ONE SWITCH FOR ALL BOILERS. PROVIDE ALL WIRING IN MINIMUM 3/4" RACEWAY FOR CONTROLS. WHENEVER EITHER EMERGENCY SHUT OFF SWITCH IS ACTIVATED, THE POWER TO ALL BOILERS SHALL BE SHUT OFF.
- PROVIDE A PLACARD TO READ "EMERGENCY SHUT OFF SWITCH FOR ALL BOILERS".
- CLEAN, TEST AND INSTALL THE STARTER ON WALL NEAR PUMP. PROVIDE BRANCH CIRCUIT WIRING AND RACEWAY AS INDICATED TO PANEL AND TO PUMP.
- RECONNECT THE WIRING AND RACEWAY TO ASSOCIATED DISCONNECT SWITCH. PROVIDE ADDITIONAL WIRING AND RACEWAY AS REQUIRED FOR COMPLETE WORKING SYSTEM.
- EXISTING MECHANICAL EQUIPMENT SHALL REMAIN.
- NEW BOILER CONTROL PANEL. FOR EXACT LOCATION, COORDINATE IN THE FIELD. PROVIDE ALL CONTROL WIRING IN RACEWAYS TO ALL E-STOP (EMERGENCY PUSH BUTTONS) TO SHUT DOWN THE BOILERS WHEN ANY E-STOP IS ACTIVATED.
- PROVIDE 120 VOLT, 1 POLE FRACTIONAL HORSE POWER RATED MANUAL MOTOR STARTER WITH HOA SWITCH AND THERMAL OVERLOAD PROTECTION. MOUNT NEAR CIRCULATING PUMP. PROVIDE BRANCH CIRCUIT WIRING AND RACEWAY AS INDICATED.
- RELOCATE RECEPTACLE WITH BRANCH CIRCUIT WIRING AND RACEWAY. COORDINATE EXACT LOCATION AND MOUNTING HEIGHT WITH EQUIPMENT IN THE FIELD. EXTEND THE WIRING AND RACEWAYS FOR COMPLETE WORKING SYSTEM.
- EXISTING DISCONNECT SWITCH AND ASSOCIATED FEEDER WIRING AND RACEWAY SHALL REMAIN.

DRAWING NOTES:

- FOR LEGEND AND GENERAL NOTES, REFER TO DRAWING E1.0
- FOR PANEL SCHEDULES, REFER TO DRAWING E3.1
- EXISTING CIRCUITING FOR MECHANICAL EQUIPMENT AS SHOWN IS BASED ON THE INFORMATION PAULCO HAS RECEIVED FROM HOWARD COUNTY PUBLIC SCHOOL. AS AS-BUILT DRAWINGS AND COULD NOT BE FIELD VERIFIED DURING SCHOOL HOURS. THE CONTRACTOR IS STRONGLY RECOMMENDED TO FIELD VERIFY THE BRANCH CIRCUITING FOR MECHANICAL EQUIPMENT BEFORE WORKING ON THEM.
- WHERE THE RACEWAYS ARE RUN CONCEALED IN THE WALLS AND/OR FLOORS AND ARE NOT BEING REUSED, ABANDONED THE RACEWAYS. CUT AND CAP ON BOTH SIDES.
- ALL RACEWAYS USED IN BOILER ROOM (UP TO 8 FEET ABOVE FINISHED FLOOR) SHALL BE GALVANIZED RIGID STEEL RACEWAYS. RACEWAYS MOUNTED ABOVE 8 FEET ABOVE FINISHED FLOOR CAN BE EMT.
- SEAL ANY OPENINGS LEFT IN BOILER ROOM WHICH WERE CREATED BY REMOVAL OF EQUIPMENT AND/OR CONDUITS IN ACCORDANCE WITH NEC.
- EACH E-STOP MUSHROOM EMERGENCY SHUT-OFF SWITCH SHALL TURN OFF ALL THE POWERS TO BOILERS IN CASE OF EMERGENCY. CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE ALL WIRING, RACEWAYS AND OTHER ACCESSORIES TO BOILER CONTROL PANEL AS REQUIRED FOR COMPLETE WORKING SYSTEM. SUBMIT THE CONTROL WIRING DIAGRAM AND SEQUENCE OF OPERATION TO THE ENGINEER OF RECORD FOR THEIR REVIEW.



Howard County Public School System
9020 Mendenhall Court
Columbia, MD 21045

SEAL

Professional Certification. I certify that these documents were prepared or approved by me, and that I am a duly licensed engineer under the laws of the State of Maryland, License Number 16652, expiration date 04/04/2022.

CONSULTANTS

MECHANICAL ENGINEERS

BUILDING DYNAMICS, LLC
8600 FOUNDRY ST., SUITE 306
MILL BOX 2054
SAVAGE, MD 20763
building-dynamics.com

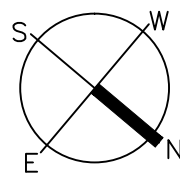
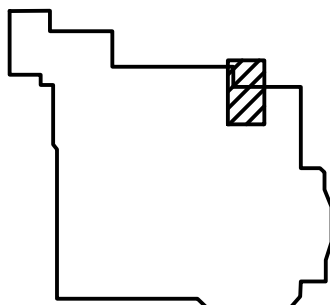
ELECTRICAL ENGINEERS

PAULCO ENGINEERING, INC.
14211 MEADOW LAKE DRIVE
GLENELG, MD 21737
p: 301.523.5012

PROJECT

HAMMOND ESIMS
BOILER REPLACEMENT
8100 ALADDIN DRIVE
LAUREL, MD 20723

KEY PLAN



NO.	DESCRIPTION	DATE
1	100% CONSTRUCTION DOCUMENTS	01/14/2022

DRAWING

BOILER ROOM -
DEMOLITION & NEW WORK

DRAWN BY	PG
CHECKED BY	PG
PROJECT NO.	202115
SCALE	1/4"=1'-0"
SHEET	

1

E1.1

FILE NAME: \\Building Dynamics (Jim.Bobby)\31-018 Internal E3.01 Drawing\04a Legend and Scheduling\04a E3.01.dwg, Jun 11, 2022 @ 3:15pm

PANELBOARD:	EM1	BUS RATING:	225 AMP	MAIN O.C. DEVICE OR MLO:	MCB
MINIMUM AIC:	-	VOLTS:	480Y/277	PHASE (S):	3
ENCL. NEMA:	1	MOUNTING:	SURFACE	BRANCH CIRCUIT DEVICE:	CIRCUIT BREAKER
LOCATION:	BOILER ROOM	NOTES:	EX GE MAKE, A SERIES PANEL		

ITEM DESCRIPTION	WIRES	GND	C	CB	CT	BUS	CT	CB	WIRES	GND	C	ITEM DESCRIPTION
EX TRANSFORMER	-	-	-	3	50	1	-	2	3	40	-	NEW SPARE
	-	-	-		3	-	-	4	-	-	-	
↓	-	-	-	↓	5	-	-	6	↓	-	-	↓
EX SPARE	-	-	-	3	20	7	-	8	3	20	-	NEW SPARE
	-	-	-		9	-	-	10	-	-	-	
↓	-	-	-	↓	11	-	-	12	↓	-	-	↓
EX LIGHTING	-	-	-	1	20	13	-	14	1	20	-	EX LIGHTING
EX LIGHTING	-	-	-	1	20	15	-	16	1	20	-	EX LIGHTING
EX SPACE	-	-	-	1	-	17	-	18	1	20	-	EX LIGHTING
EX SPACE	-	-	-	1	-	19	-	20	3	50	3#10 1#10 3/4"	PUMP P-1 (15 HP)
EX SPACE	-	-	-	1	-	21	-	22	-	-	-	
EX SPACE	-	-	-	1	-	23	-	24	↓	-	-	↓
EX SPACE	-	-	-	1	-	25	-	26	3	20	3#12 1#12 3/4"	BOILER #1 (B-1)
EX SPACE	-	-	-	1	-	27	-	28	-	-	-	
EX SPACE	-	-	-	1	-	29	-	30	-	-	-	
EX SPACE	-	-	-	1	-	31	-	32	↓	↓	-	SPACE FOR SHUNT TRIP
EX SPACE	-	-	-	1	-	33	-	34	1	-	-	EX SPACE
EX SPACE	-	-	-	1	-	35	-	36	1	-	-	EX SPACE
EX SPACE	-	-	-	1	-	37	-	38	1	-	-	EX SPACE
EX SPACE	-	-	-	1	-	39	-	40	1	-	-	EX SPACE
EX SPACE	-	-	-	1	-	41	-	42	1	-	-	EX SPACE

1 2

4 2

PANELBOARD:	EMR	BUS RATING:	100	MAIN O.C. DEVICE OR MLO:	MCB 100 AMP
MINIMUM AIC:	-	VOLTS:	208Y/120	PHASE (S):	3
ENCL. NEMA:	1	MOUNTING:	SURFACE	BRANCH CIRCUIT DEVICE:	CIRCUIT BREAKER
LOCATION:	BOILER ROOM	NOTES:	EX GE MAKE, A SERIES PANEL		

ITEM DESCRIPTION	WIRES	GND	C	CB	CT	BUS	CT	CB	WIRES	GND	C	ITEM DESCRIPTION
EX SPARE	-	-	-	1	20	1	-	2	1	20	-	EX TEL
EX SPARE	-	-	-	1	20	3	-	4	1	20	-	EX SPARE
EX SPARE	-	-	-	1	20	5	-	6	1	20	-	EX SECIRITY SYSTEM
EX SPARE	-	-	-	1	20	7	-	8	1	20	-	EX ATC CONTROLS
EX SPARE	-	-	-	1	20	9	-	10	1	20	-	EX SPARE
EX SPARE	-	-	-	1	20	11	-	12	1	20	-	EX SPARE
EX SPARE	-	-	-	1	20	13	-	14	1	20	2#12 1#12 3/4"	BOILER CONTROL PANEL
EX SPARE	-	-	-	1	20	15	-	16	1	20	2#12 1#12 3/4"	PUMP P-3
EX SPARE	-	-	-	1	20	17	-	18	1	20	-	EX SPARE
EX SPARE	-	-	-	1	20	19	-	20	1	20	-	EX SPARE
EX SPARE	-	-	-	1	20	21	-	22	1	20	-	EX SPARE
EX SPARE	-	-	-	1	20	23	-	24	1	20	-	EX SPARE
EX SPARE	-	-	-	1	20	25	-	26	1	20	-	EX SPARE
EX SPARE	-	-	-	1	20	27	-	28	1	20	-	EX SPARE
EX SPARE	-	-	-	1	20	29	-	30	1	20	-	EX SPARE
EX SPARE	-	-	-	1	20	31	-	32	1	20	-	EX SPARE
EX SPARE	-	-	-	1	20	33	-	34	1	20	-	EX SPARE
EX SPARE	-	-	-	1	20	35	-	36	1	20	-	EX SPARE
EX SPARE	-	-	-	1	20	37	-	38	1	20	-	EX SPARE
EX SPARE	-	-	-	1	20	39	-	40	1	20	-	EX SPARE
EX SPARE	-	-	-	1	20	41	-	42	1	20	-	EX SPARE

SPECIAL NOTES:

- PROVIDE A NEW 50 AMP, 480 VOLT, 3 POLE BREAKER IN EXISTING SPACES
- NEW BREAKER SHALL HAVE AIC EQUAL OR GREATER THAN THE AIC OF EXISTING BREAKERS IN THE PANEL.
- UP DATE PANELBOARD DIRECTORY TO REFLECT THE CHANGES MADE UNDER THIS CONTRACT.
- PROVIDE A NEW 20 AMP, 480 VOLT, 3 POLE BREAKER WITH SHUNT TRIP IN THE SPACES.
- DISCONNECT AND REMOVE EXISTING 30 AMP, 3P BREAKER IN SOPN 8.10.12 AND DISCONNECT AND REMOVE EXISTING 20 AMP, 3 POLE BREAKER IN SOPN 14.16.18.
- PROVIDE A NEW 20 AMP, 480 VOLT, 3 POLE BREAKER WITH SHUNT TRIP.
- PROVIDE A NEW 20 AMP, 277 VOLT, 1 POLE BREAKER IN EXISTING SOPN.



Howard County Public School System
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SEAL

Professional Certification. I certify that these documents were prepared or approved by me, and that I am a duly licensed engineer under the laws of the State of Maryland, License Number 18652, expiration date 04/04/2022.

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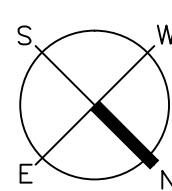
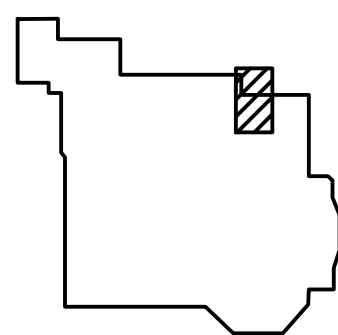
ELECTRICAL ENGINEERS

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p: 301.523.5012

PROJECT

HAMMOND ESIMS
BOILER REPLACEMENT
8100 ALADDIN DRIVE
LAUREL, MD 20723

KEY PLAN



1 100% CONSTRUCTION DOCUMENTS 01/14/2022

NO. DESCRIPTION DATE

DRAWING

ELECTRICAL
SCHEDULES

DRAWN BY VR

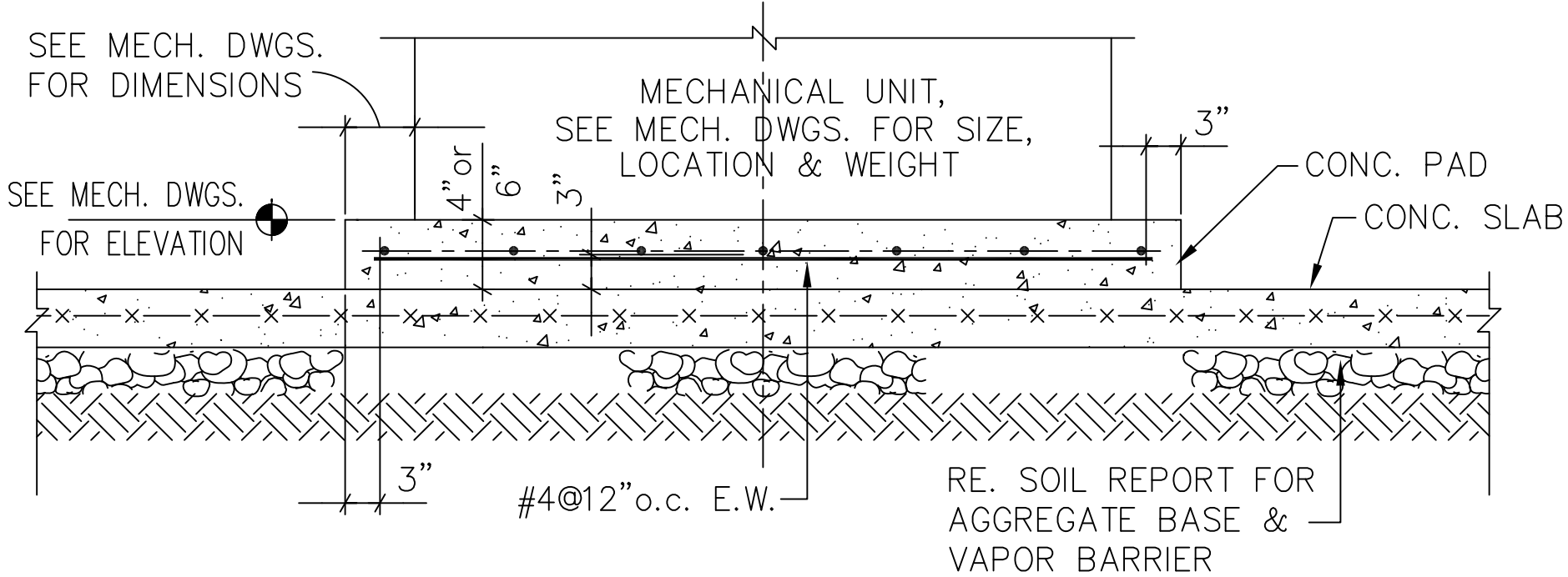
CHECKED BY PG

PROJECT NO. 202115

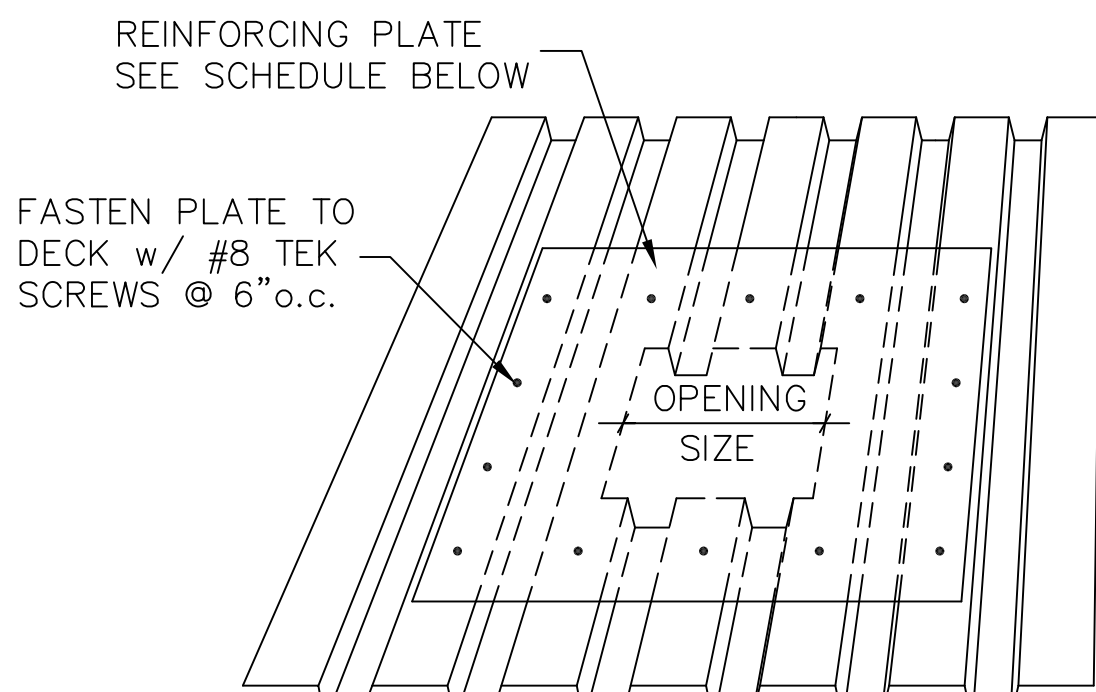
SCALE NONE

SHEET

E3.1



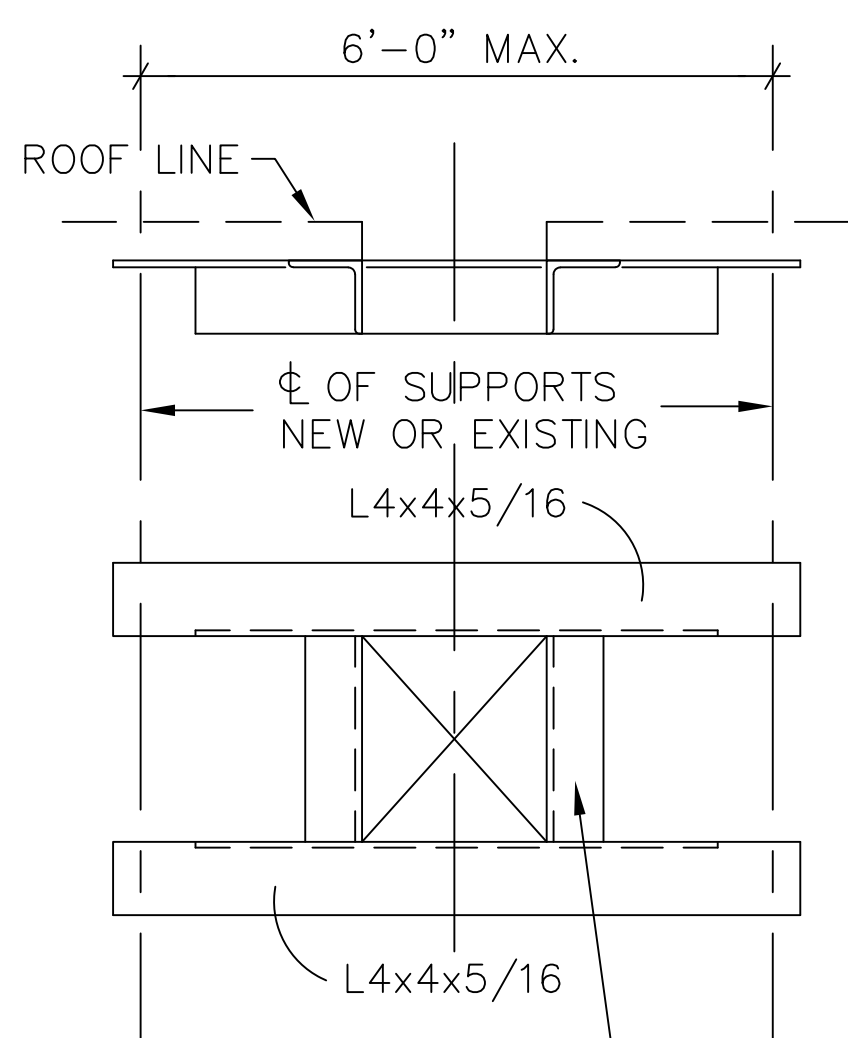
TYPICAL CONCRETE PAD FOR INTERIOR EQUIPMENT UNDER 1000#
INTERIOR EQUIPMENT PAD DETAIL



MAX OPENING DIM.	REQ. REINFORCING
4" OR LESS	NONE
4" TO 8"	18 ga PLATE
8" TO 11 3/4"	16 ga PLATE
OVER 12"	SEE FRAME DETAIL

APPLIES TO OPENINGS IN 1 1/2" TYPE B
ROOF DECK OF 20ga OR LIGHTER.

METAL ROOF DECK REINFORCING
FOR OPENINGS LESS THAN 11 3/4"

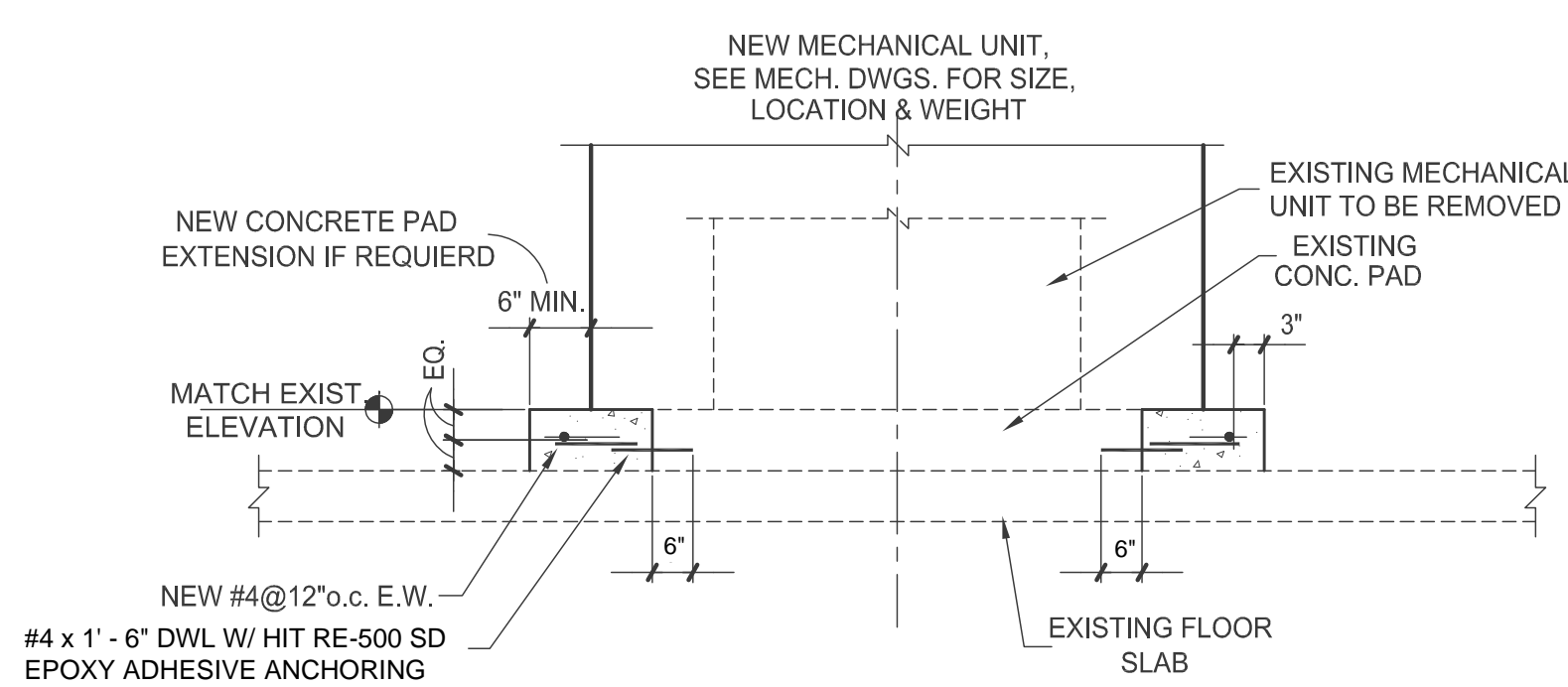


ANGLE FRAME SCHEDULE

L3x3x1/4 UP TO 3'-0"
L4x4x1/4 3'-1" TO 6'-0"

TYPICAL ROOF OPENING FRAMING
FOR OPENING GREATER THAN 12"

NOTE: SEE ARCH. OR MECH. DWGS. FOR SIZE & LOCATION



INTERIOR EQUIPMENT PAD DETAIL

Notes:

1. All structural steel shall be detailed, fabricated and erected in accordance with the latest Manual of Standard Practice and edition of the American Institute of Steel Construction (AISC) "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings". Structural steel, of domestic origin, shall conform to ASTM A36, unless otherwise noted. All wide flange beams shall conform to ASTM A 992 grade 50 steel. All round steel pipe columns shall be ASTM Grade B or A501. All square and rectangular steel tube columns shall be ASTM A500 Grade B. All shop and field connections shall be made with ASTM A325 high strength bolts or welding.
2. All steels exposed to weather shall be galvanized.
3. Concrete shall be mixed and placed in accordance with the current "American Concrete Institute (ACI 318) Building Code Requirements for Structural Concrete". All concrete to have a compressive strength (f'c) of 3000 psi at 28 days., unless otherwise noted. All concrete exposed to the weather to have a compressive strength of f'c = 4500 psi (6% air entrained, w/c ratio not to exceed .45, minimum cement 564 pounds per cu yd).

SEAL

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT
THESE DOCUMENTS WERE PREPARED OR APPROVED BY
ME, AND I AM A DULY LICENSED ENGINEER UNDER THE
LAWS OF THE STATE OF MARYLAND. LICENSE NUMBER
8998, EXPIRATION DATE 02/03/23.

CONSULTANTS

MECHANICAL ENGINEERS

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SAVAGE, MD 20763
building-dynamics.com

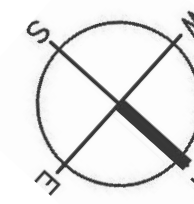
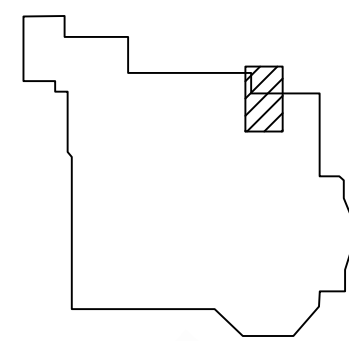
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NO.	DESCRIPTION	DATE
1	100% CONSTRUCTION DOCUMENT	01/14/2022

DRAWING

TYPICAL DETAILS

DRAWN BY	S. J.
CHECKED BY	S. J.
PROJECT NO.	22181
SCALE	SEE DETAIL