

# EXHIBIT C



06.01.2025

## CITY OF BILLINGS FIRE STATION #2 BOILER REPLACEMENT PROJECT CONSTRUCTION DOCUMENTS

**OWNER**  
City of Billings  
210 N. 27th Street  
Billings, MT 59101

**ARCHITECT/ENGINEER**  
Cushing Terrell  
13 N. 23rd Street  
Billings, MT 59101  
406.403.7455

### SHEET INDEX

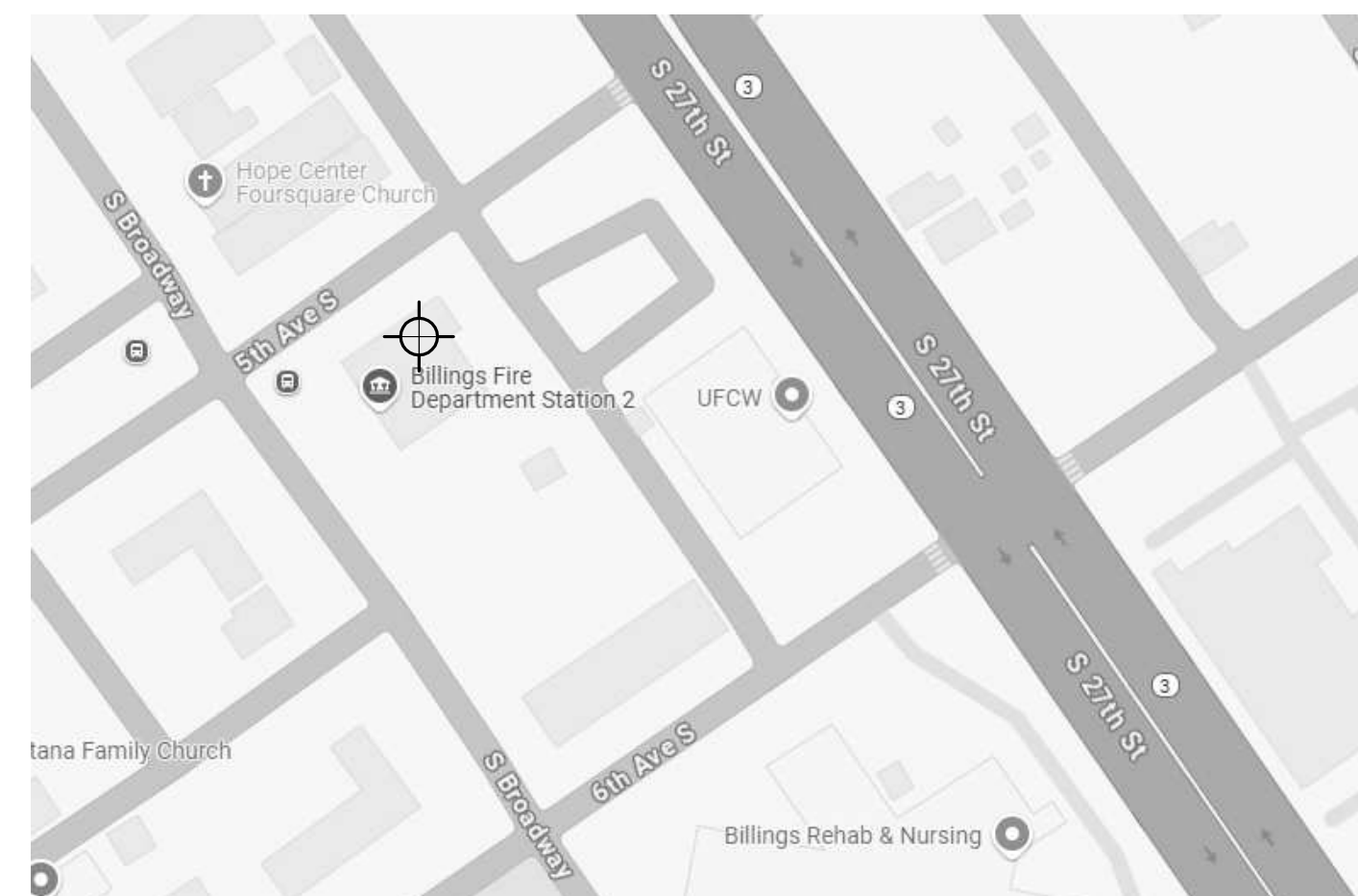
G001	COVER SHEET, GENERAL INFORMATION
M001	MECHANICAL SCHEDULES, LEGENDS, & FLOW DIAGRAM
M002	MECHANICAL SPECIFICATIONS
MD100	BASEMENT MECHANICAL DEMOLITION PLAN
M200	BASEMENT MECHANICAL REMODEL PLANS
M201	MAIN FLOOR MECHANICAL REMODEL PLAN

### ALTERNATE BID #1

PROVIDE A WEB-BASED DIRECT DIGITAL CONTROL SYSTEM WITH GRAPHICS FOR ZONE TEMPERATURES, FIN/TUBE RADIATION CONTROL, AND BOILER PLANT MONITORING AND CONTROL.

**PROJECT ADDRESS**  
501 S 28TH STREET  
BILLINGS, MT 59101

**VICINITY MAP:** *Locator*



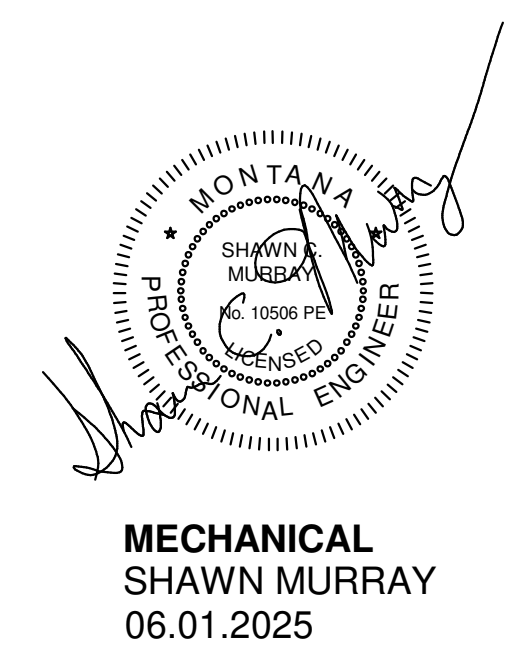
CITY OF BILLINGS  
FIRE STATION #2 BOILER REPLACEMENT PROJECT

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CONSTRUCTION DOCUMENTS

06.01.2025  
PROJECT | BILFR25 BLR  
DESIGNED BY | MURRAY  
DRAWN BY | HABECK

REVISIONS



MECHANICAL  
SHAWN MURRAY  
06.01.2025

COVER SHEET,  
GENERAL  
INFORMATION

G001

BOILER SCHEDULE																
PLAN CODE	MFGR	MODEL	TYPE	RATED INPUT (MBH)	RATED OUTPUT (MBH)	THERMAL EFFICIENCY	TURN DOWN RATIO	AIR INTAKE SIZE	FLUE VENT SIZE	FUEL	RELIEF VALVE	WATER VOL. (GAL.)	POWER	WTR. FLOW RATE (GPM)	MAX HEAD LOSS	WEIGHT (LBS)
B-1	LOCHINVAR	PBN0502	COPPER FIN	500	425	85%	5:1	5"	4"	NAT. GAS	50 PSI	12	120/1/60	25	2.0'	502
B-2	LOCHINVAR	PBN0502	COPPER FIN	500	425	85%	5:1	5"	4"	NAT. GAS	50 PSI	12	120/1/60	25	2.0'	502

NOTES:  
 1) BOILER CONTROLS AND SAFETIES TO BE ASME CSD-1 COMPLIANT.  
 2) PROVIDE WITH RELIEF VALVE, TEMP/PRESS GAUGE, HIGH LIMIT W/ MANUAL TEST SWITCH AND LOW WATER CUT-OFF W/ RESET AND TEST.  
 3) FURNISH WITH CONDENSATE NEUTRALIZATION KIT  
 4) PROVIDE WITH INTEGRAL GAS SHUT-OFF VALVE  
 5) PROVIDE FACTORY START UP AND CASCADING CONTROL WITH BUILDING LOOP SUPPLY WATER, RETURN WATER AND OUTDOOR AIR SENSORS.  
 6) PROVIDE WITH A BACNET IP COMMUNICATION GATEWAY.

PUMP SCHEDULE													
PLAN CODE	MFGR	MODEL	TYPE	GPM	HEAD (FT WC)	IMPELLER DIAMETER (IN)	EFFICIENCY	RPM	HP	POWER	WEIGHT (LBS)	SERVES	NOTES
BP-1	TACO	IL-0012	IN-LINE	25	9	2	-	3250	1/8	115V / 1PH	13	B-1	1
BP-2	TACO	IL-0012	IN-LINE	25	9	2	-	3250	1/8	115V / 1PH	13	B-2	1
HWP-1	TACO	1935	IN-LINE	48	23	5.1	56%	1760	1/2	115V/1PH	90.0	BUILDING	1,2
HWP-2	TACO	1935	IN-LINE	48	23	5.1	56%	1760	1/2	115V/1PH	90.0	BUILDING	1,2

NOTES:  
 1) 180 DEG F WATER  
 2) BUILDING PUMPS ARE REDUNDANT  
 3) PROVIDE TEKMAR PUMP SEQUENCER FOR PUMP START / STOP AND RUN TIME EQUALIZATION.

AIR SEPARATOR SCHEDULE						
PLAN CODE	MFGR	MODEL	GPM	PRESSURE DROP (FT WC)	PIPE SIZE	SERVES
AS-1	TACO	ACT025F-125	48	0.5"	2.5"	HEATING WATER

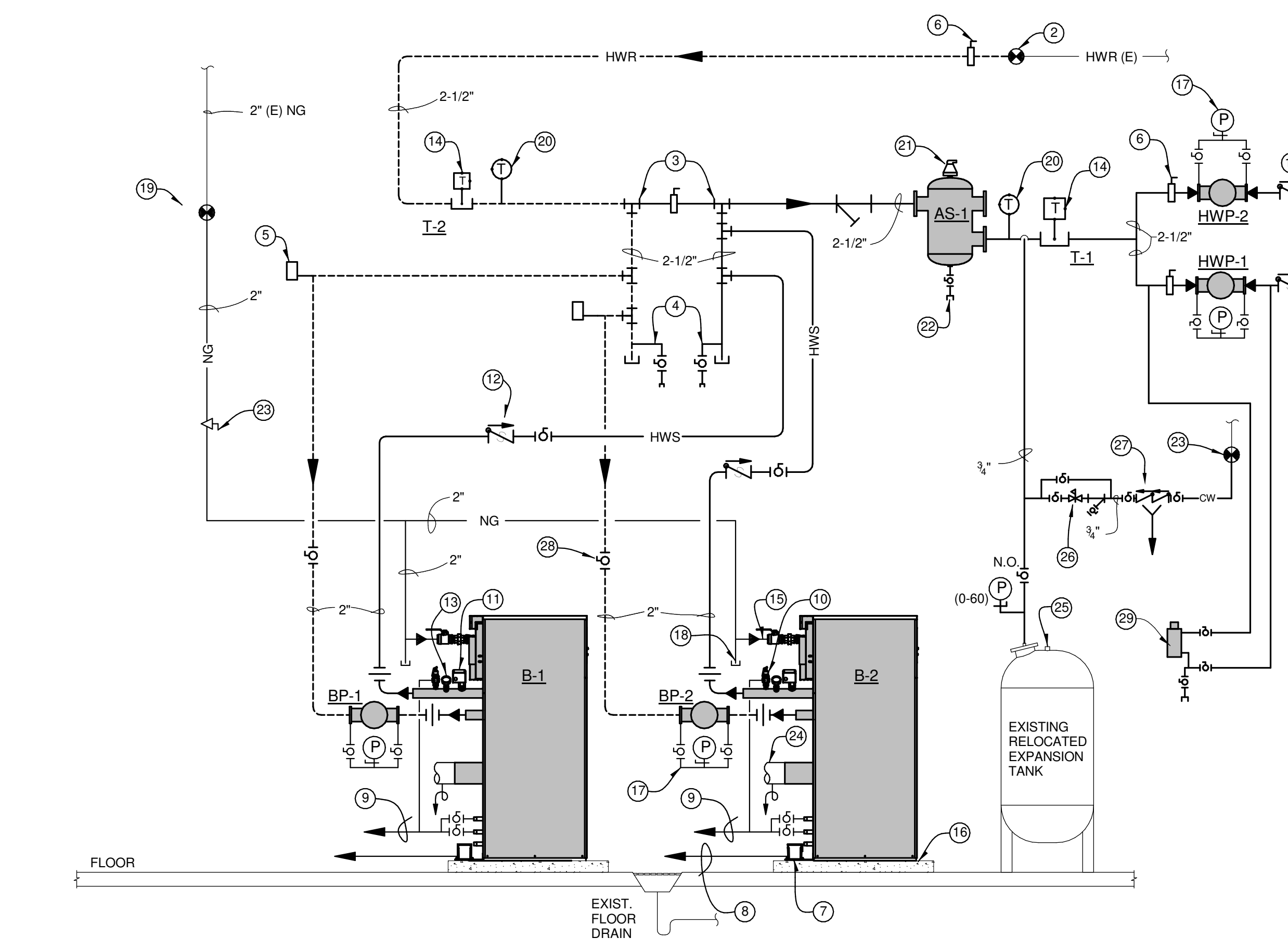
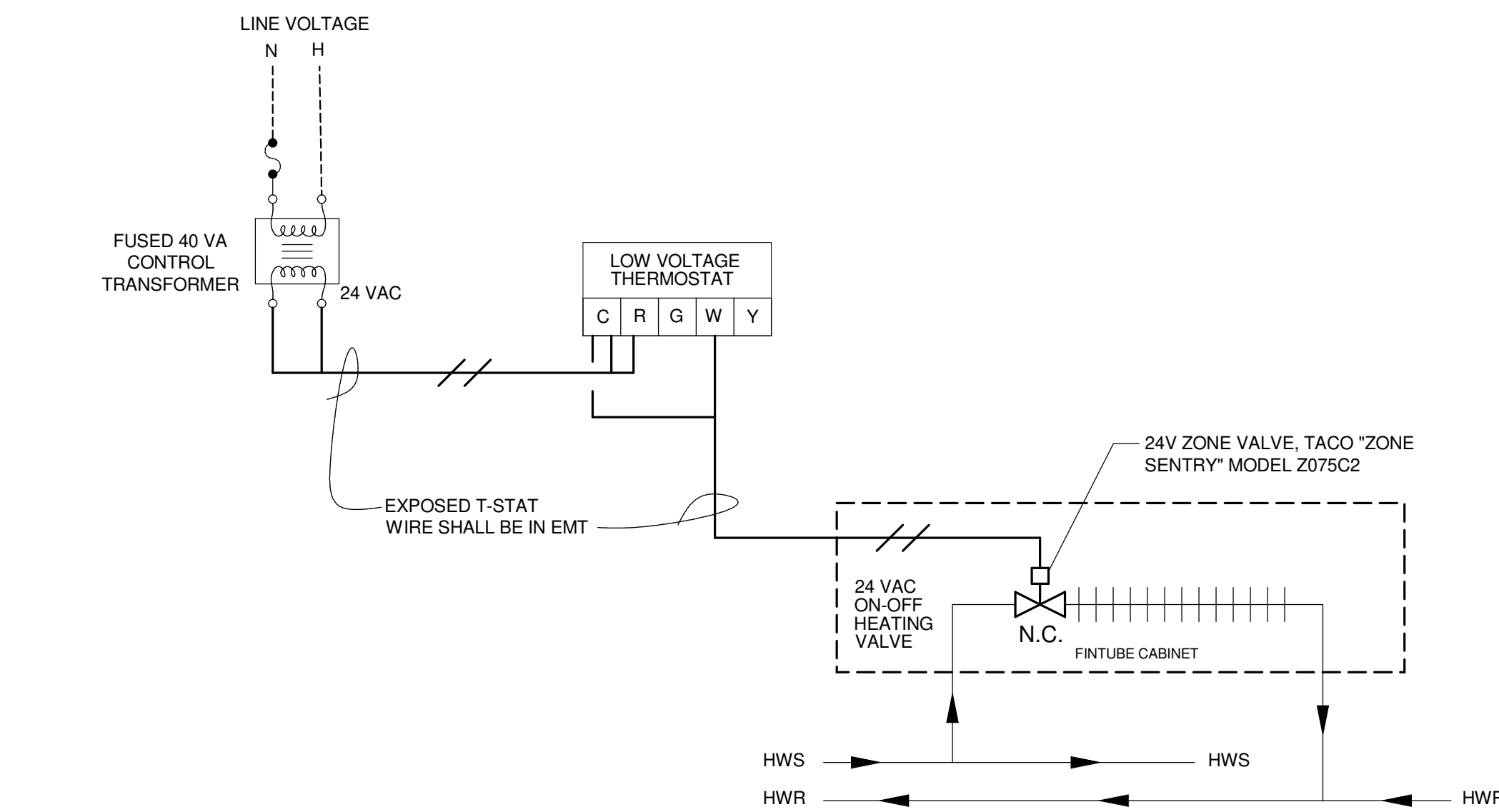
NOTES:  
 1) PROVIDE WITH AUTOMATIC AIR VENT TACO MODEL 409

HVAC ABBREVIATIONS

% PERCENT	MAX MAXIMUM	BTU PER HOUR (THOUSAND)
ACFM ACTUAL CFM	MC MECHANICAL CONTRACTOR	
AFF ABOVE FINISHED FLOOR	MIN MINIMUM	
AHU AIR HANDLING UNIT	N/A NOT APPLICABLE	
AMP AMPERE (AMP, AMPS)	NC NORMALLY CLOSED	
ANSI AMERICAN NATIONAL STANDARDS INSTITUTE	NIC NOT IN CONTRACT	
APD AIR PRESSURE DROP	NO NORMALLY OPEN	
APPROX APPROXIMATE	NO NUMBER	
BHP BRAKE HORSEPOWER, BOILER HORSEPOWER	NTS NOT TO SCALE	
BOD BOTTOM OF DUCT	OA OUTSIDE AIR	
BTU BRITISH THERMAL UNIT	OBDD OPPOSED BLADE DAMPER	
C COMMON	OD OUTSIDE DIAMETER	
CFM CUBIC FEET PER MINUTE	PD PRESSURE DROP	
COO CENTER OF DUCT	PH PHASE (ELECTRICAL)	
CU FT CUBIC FEET	PSI POUNDS PER SQUARE INCH	
CU IN CUBIC INCH	PSIA PSI ABSOLUTE	
DB DECIBEL	PSIG PSI GAUGE	
DBT DRY-BULB TEMPERATURE	R/O RUN OUT	
DIA DIAMETER	RA RETURN AIR	
EAT ENTERING AIR TEMPERATURE	RH RELATIVE HUMIDITY	
EC ELECTRICAL CONTRACTOR	RPM REVOLUTIONS PER MINUTE	
EDR EQUIVALENT DIRECT RADIATION	SA SUPPLY AIR	
EWT ENTERING WATER TEMPERATURE	SCFM CFM, STANDARD CONDITIONS	
EXP EXPANSION	SH SENSIBLE HEAT	
F FAHRENHEIT	SP VOL SPECIFIC VOLUME	
FPM FEET PER MINUTE	SPEC SPECIFICATION	
FPS FEET PER SECOND	STD STANDARD	
FT FOOT OR FEET	SUCT SUCTION	
GA GAGE OR GAUGE	T STAT THERMOSTAT	
GAL GALLONS	TC TEMPERATURE CONTROL	
GC GENERAL CONTRACTOR	TD TEMPERATURE DIFFERENCE	
GPD GALLONS PER DAY	TEMP TEMPERATURE	
GPH GALLONS PER HOUR	TD TOP OF DUCT	
GPM GALLONS PER MINUTE	TONS TONS OF REFRIGERATION	
HD HEAD	V VOLT	
HGT HEIGHT	VAC VACUUM	
HP HORSEPOWER	VAV VARIABLE AIR VOLUME	
HZ FREQUENCY	VEL VELOCITY	
ID INSIDE DIAMETER	VFD VARIABLE FREQUENCY DRIVE	
KW KILOWATT	VOL VOLUME	
KWH KILOWATT HOUR	W WITH	
LAT LEAVING AIR TEMPERATURE	WPD WATER PRESSURE DROP	
LBS POUNDS		
LF LINEAR FEET		
LWT LEAVING WATER TEMPERATURE		

MECHANICAL LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
—HWS—	HEATING WATER SUPPLY	[Symbol]	ACOUSTICALLY LINED SHEET METAL DUCT
---HWR---	HEATING WATER RETURN	[Symbol]	MANUAL BALANCING DAMPER
—CWS—	CONDENSER WATER SUPPLY	[Symbol]	FLEX CONNECTOR
---CWR---	CONDENSER WATER RETURN	[Symbol]	ACCESS DOORS
—CHWS—	CHILLED WATER SUPPLY	[Symbol]	FIRE DAMPER
---CHWR---	CHILLED WATER RETURN	[Symbol]	FIRE/SMOKE DAMPER
—RS—	REFRIGERANT SUCTION LINE	[Symbol]	MOTORIZED DAMPERS
—RL—	REFRIGERANT LIQUID LINE	[Symbol]	TURNING VANE ELBOW
—HG—	REFRIGERANT HOT GAS LINE	[Symbol]	CONDENSATE DRAIN
—HPS—	HEAT PUMP SUPPLY	[Symbol]	GATE VALVE
---HPR---	HEAT PUMP RETURN	[Symbol]	BALL VALVE
—LPS—	LOW PRESS. STEAM SUPPLY	[Symbol]	BUTTERFLY VALVE
---LPR---	LOW PRESS. CONDENSATE RETURN	[Symbol]	GLOBE VALVE
—MPS—	MEDIUM PRESS. STEAM SUPPLY	[Symbol]	TRIPLE DUTY VALVE
---MPR---	MEDIUM PRESS. CONDENSATE RETURN	[Symbol]	SWING CHECK VALVE
—CD—	CONDENSATE DRAIN	[Symbol]	STRAINER
[Symbol]	GATE VALVE	[Symbol]	FLEX CONNECTOR
[Symbol]	BALL VALVE	[Symbol]	HOSE END DRAIN VALVE
[Symbol]	BUTTERFLY VALVE	[Symbol]	PRESSURE REDUCING VALVE
[Symbol]	GLOBE VALVE	[Symbol]	SAFETY RELIEF VALVE
[Symbol]	TRIPLE DUTY VALVE	[Symbol]	UNION
[Symbol]	SWING CHECK VALVE	[Symbol]	MOTORIZED TC VALVE / 2-WAY
[Symbol]	STRAINER	[Symbol]	MOTORIZED TC VALVE / 3-WAY
[Symbol]	FLEX CONNECTOR	[Symbol]	ECCENTRIC PLUG BALANCING VALVE
[Symbol]	HOSE END DRAIN VALVE	[Symbol]	VALVE IN RISER
[Symbol]	PRESSURE REDUCING VALVE	[Symbol]	TEE UP
[Symbol]	SAFETY RELIEF VALVE	[Symbol]	TEE DOWN
[Symbol]	UNION	[Symbol]	ELBOW UP
[Symbol]	MOTORIZED TC VALVE / 2-WAY	[Symbol]	ELBOW DOWN
[Symbol]	MOTORIZED TC VALVE / 3-WAY	[Symbol]	PIPE SIZE CHANGE
[Symbol]	ECCENTRIC PLUG BALANCING VALVE	[Symbol]	DIRECTION OF FLOW
[Symbol]	VALVE IN RISER	[Symbol]	MANUAL FLOW BALANCING VALVE (CIRCUIT SETTER)
[Symbol]	TEE UP	[Symbol]	AUTOMATIC FLOW BALANCING VALVE
[Symbol]	TEE DOWN	[Symbol]	PIPE GUIDE
[Symbol]	ELBOW UP	[Symbol]	PIPE ANCHOR
[Symbol]	ELBOW DOWN	[Symbol]	PRESSURE / TEMP. TEST PLUG
[Symbol]	PIPE SIZE CHANGE	[Symbol]	DIAL THERMOMETER
[Symbol]	DIRECTION OF FLOW	[Symbol]	PRESSURE GAUGE W/ SNUBBER
[Symbol]	MANUAL FLOW BALANCING VALVE (CIRCUIT SETTER)	[Symbol]	CONNECT NEW WORK TO EXISTING
[Symbol]	AUTOMATIC FLOW BALANCING VALVE	[Symbol]	POINT OF DISCONNECT
[Symbol]	PIPE GUIDE	[Symbol]	EXISTING
[Symbol]	PIPE ANCHOR	[Symbol]	RELOCATE / RELOCATED
[Symbol]	PRESSURE / TEMP. TEST PLUG	[Symbol]	THERMOSTAT/TEMPERATURE SENSOR
[Symbol]	DIAL THERMOMETER	[Symbol]	REVERSE ACTING THERMOSTAT
[Symbol]	PRESSURE GAUGE W/ SNUBBER	[Symbol]	THERMOSTAT/TEMPERATURE SENSOR W/ GUARD
		[Symbol]	HUMIDISTAT
		[Symbol]	CARBON MONOXIDE SENSOR
		[Symbol]	CARBON DIOXIDE SENSOR
		[Symbol]	NITROGEN DIOXIDE SENSOR



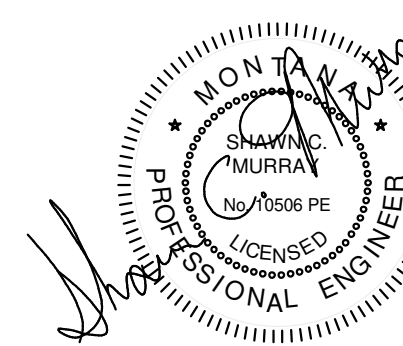
HEATING WATER FLOW DIAGRAM NOTES

- CONNECT NEW HWS TO EXISTING HWS.
- CONNECT NEW 2-1/2" HWR TO EXISTING 3" HWR.
- 2-1/2" COMMON PIPE. SPACE 2-1/2" SUPPLY MANIFOLD 18" FROM 2-1/2" RETURN MANIFOLD. INSTALL 2-1/2" BUTTERFLY VALVE IN COMMON PIPE FOR SYSTEM FILLING PROCEDURES.
- 3/4" HOSE END BALL VALVE FOR SYSTEM FILLING / VENTING.
- LOW WATER CUT-OFF W/ MANUAL RESET AND TEST FURNISHED LOOSE WITH BOILER INSTALLED BY M.C., TYPICAL OF TWO.
- BUTTERFLY VALVE TYPICAL.
- CONDENSATE TRAP FURNISHED LOOSE WITH EACH BOILER. INSTALL PER MANUFACTURERS INSTALLATION INSTRUCTIONS.
- EXTEND 3/4" SCHEDULE 40 PVC PIPE FROM CONDENSATE TRAP TO FLOOR DRAIN.
- EXTEND 3/4" COPPER DRAIN FROM BOILER DRAIN PORTS TO FLOOR DRAIN.
- 50 PSI ASME RELIEF VALVE FURNISHED WITH EACH BOILER INSTALLED BY M.C. PIPE OUTLET IN COPPER FULL SIZE TO EXISTING FLOOR DRAIN.
- FLOW SWITCH FURNISHED WITH EACH BOILER INSTALLED BY M.C.
- SWING CHECK VALVE INSTALLED IN HORIZONTAL, TYPICAL.
- TEMPERATURE / PRESSURE GAUGE FURNISHED WITH EACH BOILER, TYPICAL.
- SYSTEM SUPPLY AND RETURN SENSORS FOR BOILER SEQUENCING / CASCADING CONTROL FURNISHED W/ BOILER INSTALLED BY M.C.
- CONNECT NEW 2" NAT. GAS TO 1" BOILER GAS INLET CONNECTION. SHUT-OFF VALVE IS FURNISHED WITH BOILER.
- SET NEW BOILER LEVEL ON NEW 4" CONCRETE PAD, TYPICAL.
- 1/4" COPPER TUBES CONNECTED TO PUMP GAGE PORTS. INSTALL 1/4" BALL COCK IN EACH CONNECTED TO A COMMON PIPE WITH A LIQUID-FILLED PRESSURE GAUGE WITH SNUBBER, (0-60 PSIG) RANGE.
- 6" DEEP SEDIMENT TRAP ON NATURAL GAS.
- CONNECT NEW 2" NATURAL GAS TO EXISTING 2".
- SOLAR DIGITAL THERMOMETER, TERTRIC MODEL SX-9 OR EQUAL.
- NEW 2-1/2" AIR SEPARATOR WITH INTEGRAL AIR VENT.
- 3/4" BALL VALVE WITH HOSE END CONNECTION.
- CONNECT NEW 1/2" CW FILL TO EXISTING CW FILL CONNECTION.
- IN-LINE DRAIN SECTION AND DRAIN TUBE KIT TO BE FURNISHED WITH FLUE VENTING SYSTEM. RUN 1/2" DIAMETER CONDENSATE TUBE TO FLOOR DRAIN, TYPICAL OF 2.
- SET AIR PRESSURE IN EXISTING EXPANSION TANK TO 20 PSI PRIOR TO FILLING SYSTEM WITH WATER.
- CARTRIDGE STYLE PRESSURE REDUCING VALVE, EQUAL TO TACO MODEL 3350, SET SYSTEM FILL PRESSURE TO 15 PSI.
- REDUCED PRESSURE BACKFLOW PREVENTOR EQUAL TO WATTS 009-QT-FS 1/2 WITH AIR GAP FUNNEL, PIPE DISCHARGE OF FUNNEL FULL SIZE TO NEAREST FLOOR DRAIN.
- BALL VALVE TYPICAL.
- 2.5 GALLON CHEMICAL FEEDER WITH FILL CAP, INSTALL IN ACCESSIBLE LOCATION TO ALLOW CHEMICAL TREATMENT.

MECHANICAL SHEET INDEX

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CITY OF BILLINGS  
**FIRE STATION #2 BOILER REPLACEMENT PROJECT**



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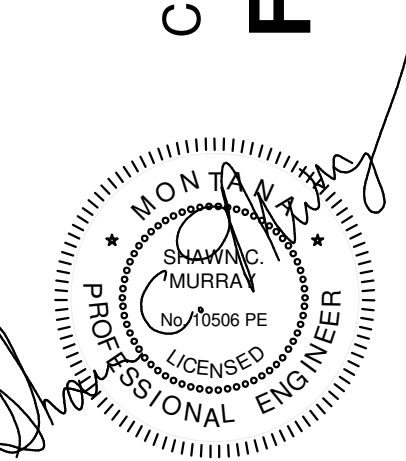
CONSTRUCTION DOCUMENTS

06.01.2025  
 PROJ# | BLFR25\_BLR  
 DESIGNED BY | MURRAY  
 DRAWN BY | HABECK

REVISIONS

MECHANICAL SCHEDULES, LEGENDS, & FLOW DIAGRAM

M001



**BASIC MECHANICAL REQUIREMENTS**

A. Codes: All work shall comply with the current International Mechanical Code, Uniform Plumbing Code and all applicable codes of the local jurisdiction.

B. Warranty: The contractor shall guarantee that all materials furnished be free of any defects and shall replace defective materials and installation at no additional cost. All material and workmanship shall be guaranteed for one (1) year from the date of substantial completion.

C. Equipment: Mechanical equipment listed within the equipment schedules are provided as a basis of design. Alternate manufacturers providing like performance characteristics and accessories will be considered for approval. Provide a written request for all substitutions to the engineer. It is the responsibility of the manufacturer's supplier to ensure that the supplied equipment meets the listed requirements and that the equipment size and service clearances fit within the provided equipment areas. Shop drawing submittals not showing compliance will be rejected.

D. Submittals: Provide relevant product data details of construction, performance data, electrical data and shipping weights on the following equipment and mechanical specialties: BOILERS, PUMPS, AIR SEPARATORS, AND TEMPERATURE CONTROLS.

E. Steel support welding shall be in compliance with AWS D1.1 "Structural Steel Welding Code" - Steel

F. Steel pipe welding shall be in compliance with ASME boiler and pressure vessel code, section IX, "Welding and Brazing Qualifications". Comply with ASME B 31.1 for all pressure piping and certify that each welder has passed the AWS qualification tests for welding processes involved and that his/her welding certification is current.

G. Electrical Characteristics for Mechanical Equipment: Equipment of higher electrical characteristics may be furnished provided such protected equipment is approved in writing by the engineer and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified without added cost to Project.

H. Fees and Permits: Contractor shall apply and pay for all permits, inspections, reviews, etc. required by the authorities having jurisdiction.

I. Maintenance Manuals: At project conclusion provide O&M manuals on all mechanical equipment.

J. Interferences: The project design took into account potential interferences between trades and existing piping and equipment, however due to the complex nature of the project the contractor is expected to field coordinate and find best routing utilizing offsets as necessary to install equipment, piping and boiler flues. The cost associated with interferences shall be included in the Base Bid.

K. Drawings: Because of the scale of the drawings and diagrammatic nature, certain basic items/material and quantities thereof, (e.g. fittings, connectors, flanges, unions, pipe wells, couplings, hangers, sleeves, clamps, hardware, hooks, inserts - sensors, etc) may not be shown but where such items are required for proper installation of work, such items shall be furnished and installed and cost thereof reflected in the original bid.

**VALVES:**

A. Ball Valves: Valves 2-1/2" and smaller: Valves shall be rated 150 psi SWP, 600 psi non-shock WOG and will have 2-pc. cast bronze bodies TFE seals, standard port, separate packnut with adjustable stem packing, anti blowout stems and stainless steel ball with vent. Provide full port valves where specifically indicated. Valve ends to be full depth ANSI threads or extended solder connections and be manufactured to comply MSS SP-110. Vinyl-covered steel lever handle with stem extension in insulated piping..

B. Butterfly Valves: MSS SP-67, 200 psi CWP, ASTM A 126 cast-iron body and bonnet, extended neck, stainless-steel stem, EPDM sleeve and stem seals, water, lug or grooved style:

1. Disc Type: Nickel-plated ductile iron for HVAC and Plumbing.
2. Operators: Lever handle with latch locks
3. Valves shall be capable of bubble-tight dead-end shut-off at full rated pressure without the need for a downstream blind flange.

C. Swing Check Valves 2-1/2" and smaller: Shall be Y-pattern swing type manufactured in accordance with MSS SP-80, Class 150, bronze ASTM B-62 body with TFE seat disc. Valve ends to be threaded or soldered.

D. Swing Check Valve 2-1/2" and Larger: Swing type manufactured in accordance with MSS SP-71, Class 125, flanged, ASTM A-126 Class B, cast iron body with bronze trim, non asbestos gasket. Swing Checks shall be installed in the horizontal position and shall be equal to NIBCO F918-B or equal. If horizontal position is not possible install Silent Check valves as specified below.

E. Acceptable Valve Manufacturers: Use one of the follow for all valves:

1. Conbraco Industries (Apollo)
2. Milwaukee Valve Company
3. Hammond Valve
4. Kitz Corporation of America
5. Victaulic Company of America
6. NIBCO, Inc.
7. Watts Industries

**HANGERS AND SUPPORTS**

A. PIPE HANGERS AND SUPPORTS:

1. Carbon-Steel: MSS SP-58, Types 1 through 58, factory-fabricated components with continuous threaded rod, nuts and washers made of carbon steel.
2. Copper Pipe Hangers: MSS SP-58, Types 1 through 58, copper coated steel, factory fabricated components. Continuous thread rod, nuts and washer made of copper-coated steel.

B. EQUIPMENT SUPPORTS: Welded, shop or field fabricated equipment support made from structural carbon steel shapes.

C. HANGER AND SUPPORT INSTALLATION

1. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
2. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts washers and other accessories.
3. Install hangers and supports to allow controlled thermal and seismic movement of piping systems to permit freedom of movement between pipe anchors and to facilitate action of expansion bends.
4. Install lateral bracing as required for seismic requirements and to prevent swaying.
5. Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
6. Insulated piping: On steam and hot water piping the piping clamp may project through the insulation. On cold or ambient temperature piping, use thermal-hanger shield inserts for pipe sizes 2" and larger. Run insulation continuously through hanger and install a galvanized Type 40 shield between hanger and insulation for pipes smaller than 2 inches.
7. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in this section.
8. Use copper plated pipe hangers and copper attachments for copper piping and tubing.

D. HANGER SCHEDULE

1. Bare Steel 1/2" to 4": Type 1, ANVIL Fig. 65
2. Insulated or Bare Copper 1/2" to 4": Type 9, ANVIL Fig. CT-99 or CT-65
3. Insulated Steel (HOT): Type 1, ANVIL Fig. 300 with shield (Hanger may contact pipe)
4. Insulated Steel & Copper 1/2" to 1-1/2" (COLD): Type 1, ANVIL Fig. 300 with shield (No pipe contact)
5. Insulated Steel & Copper 2" to 12" (COLD): Type 1, ANVIL Fig. 300 with thermal insert and shield (No pipe contact).

E. Hanger-Rod Attachments: Comply with MSS standards. The contractor shall use any of the following: Steel turnbuckles, Steel Clevis, Swivel Turnbuckles, Malleable Iron Sockets.

F. Building Attachments: Comply with MSS standards. The contractor shall use any of the following: Steel or Malleable Concrete Inserts, Top-Beam or Side Beam C-Clamps, Center Beam Clamps, C-Clamps, Steel beam clamps with eye nuts, linked steel clamps with eyes, Malleable beam clamps with extension pieces, welded steel brackets.

**HYDRONIC PUMPS**

A. Close Coupled, Horizontal, In-Line Centrifugal Pumps: Factory-assembled and tested, centrifugal, overhung-impeller, close coupled, in-line pump; designed for installation with pump and motor shafts mounted horizontally. Rate pump for 175-psig minimum working pressure and continuous water temperature of 250 deg. F.

1. Pump Construction: Radially split, cast iron, with threaded gage tappings at inlet and outlet, and threaded companion flange connections. Cast Bronze Impeller statically and dynamically balanced and keyed to shaft. Trim impeller to match specified performance. Shaft to be steel with copper-alloy shaft sleeve.
2. Mechanical Seal: Carbon rotating ring against a ceramic seal held by a stainless-steel spring, and EPT bellows and gasket. Include water slinger on shaft between motor and seal.
3. Pump Bearings: Permanently lubricated ball bearings.
4. Shaft Coupling: Molded rubber insert with interlocking spider capable of absorbing vibration.
5. Motor: Single speed, with permanently lubricated ball bearings and resiliently mounted to pump casing.
6. Acceptable Manufacturers: Taco, Bell and Gossett, Armstrong, Grundfos.

A. Wet Rotor Pumps: Pump and motor forming an integral unit without shaft seal for in-line mounting. Wet Rotor design with bearing lubricated by pumped liquid. Designed for 140 psi maximum working pressure at 230 deg. F. maximum water temperature. Field replaceable cartridge that contains all moving parts.

- 1.1. Casing: Cast Iron, Stainless Steel or Bronze for Application, see schedules.
- 1.2. Impeller: Non-metallic, Noryl, PES Composite or Stainless Steel.
- 1.3. Shaft: Ceramic or Stainless steel.
- 1.4. Rotor Can and Bearing Plate or Cartridge: Stainless Steel
- 1.5. Motor: Impedance protected, single speed
- 1.6. Acceptable Manufacturers: Taco, Bell and Gossett, Armstrong, Grundfos, Wilo

**MECHANICAL IDENTIFICATION**

A. QUALITY ASSURANCE

1. ASME Compliance: Comply with ASME A13.1 "Scheme for the Identification of Piping Systems" for letter size, length of color field, colors, and viewing angles of identification devices for piping.

B. EQUIPMENT MARKERS: Engraved, color-coded laminated plastic. Include contact-type, permanent adhesive. Size shall be 4.5" x 6" engraved with the plan code tag. This shall include boilers, pumps, expansion tanks and air separators.

C. PIPE MARKERS:

1. Manufactured Pipe Markers: Preprinted, color coded, with lettering indicating service, and showing direction of flow.
2. Pipes with OD Including insulation less than 6": Use Pre-tensioned / pre-coiled semi-rigid plastic pipe markers to cover the full circumference of the pipe without adhesive.
3. Pipe Markers shall be applied in mechanical rooms near each valve and branch connection and where flow direction is not obvious. They shall be spaced at a maximum of 25 feet along each run.
4. Label the following piping: Domestic Cold Water piping (CW), Natural Gas (NG), Hot Water Supply (HWS), Hot Water Return (HWR). Provide flow arrows for direction of flow in each system.

**MECHANICAL INSULATION**

A. MANUFACTURERS

1. Glass Fiber Insulation: CertainTeed Corp., Knauf Fiberglass, Manville Schuller, Owens Corning, USG Interiors Inc.

B. GLASS FIBER INSULATION:

1. Material: Inorganic glass fibers, bonded with a thermosetting resin.
2. Preformed Pipe Insulation: ASTM C 547, Class 1, rigid pipe insulation, factory applied all-service jacket with self seal lap. Insulation shall have a thermal conductivity of 0.26 average at 75 deg. F mean temperature with an average density of 5 lbs/cu. ft.
3. Blanket: 0.75 lbs/cu.ft density, ASTM C 553 Type I, Class B-2, jacketed flexible blankets. Thermal Conductivity of .27 at compressed thickness at 75 deg. F mean temperature.
4. Lagging Adhesive: Class 1, Grade A for sealing edges of glass fiber insulation.
5. PVC Fitting Covers: Factory fabricated fitting covers manufactured from 30-mil thick, high-impact, ultra-violet resistant PVC.

C. INSTALLATION

1. Install vapor barriers on insulated pipes, ducts, and equipment having surface operating temperatures below 60 deg. F.
2. Seal joints and seams to maintain vapor barrier on insulation requiring a vapor barrier.
3. Apply insulation continuously over flanges, fittings, valves and specialties.
4. Seal exposed ends with lagging adhesive.

D. INSULATION SCHEDULE

1. HWS & HWR, (1/2" to 1" Size): 1" Thick Glass Fiber
2. HWS & HWR, (1-1/4" to 2" Size): 1-1/2" Thick Glass Fiber.

**HYDRONIC PIPING:**

A. Pipe Materials:

1. Drawn-Temper Copper Tubing, ASTM B, Type L (ASTM B 88M, Type B)
2. Steel Pipe: ASTM A53, black steel with plain ends.

B. Wrought-Copper Fittings: ASME B16.22

C. Wrought Cast and Forged Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts and gaskets.

D. Grooved Couplings: Victaulic Style 107V. No other manufacturers allowed.

F. Y-Pattern Strainers: 125-psig working pressure; bronze body, threaded connections for 2-inch NPS and smaller; flanged ends for 2-1/2" and larger bolted cover; perforated type 304 stainless steel basket with 50% free area and bottom drain connection.

G. Venturi Flow Meters / Indicators: Differential-pressure design for installation in piping, with calibrated flow measuring element, fittings, and conversion chart compatible with flow measuring element and system fluid. Bronze, brass or factory-primed steel; with brass fittings and attached tag with flow conversion data rated for 200 psig and 250 deg. F. Size 2" and smaller shall include an integral shut off valve and have threaded ends. Sizes 2-1/2" and larger shall have welded or grooved connections as indicated. Manufacturers: Taco, Gerard, Flow Design, Bell&Gossett & NEXUS.

H. Pressure / Temperature Test Plugs: Corrosion-resistant brass or stainless steel body with core inserts and gasketed and threaded cap, with extended stem for insulated pipe. Self sealing rubber core inserts rated at 20 to 200 deg. F. at 500 psig.

I. Air Separators: Carbon Steel, Red oxide primer. ASME Section VIII Division 1, rated for 125 psi at 375 deg. F, equal to that scheduled.

I.A. Acceptable Air Separator Manufacturers: Taco, Armstrong, Bell and Gossett, Spiro-Vent.

J. By-Pass Chemical Feeders: Welded steel, 125 psig working pressure; 2.5 gallon capacity with fill funnel and inlet, outlet and drain valves.

J.A. Provide chemicals formulated based on analysis of makeup water to prevent accumulation of scale and corrosion in piping an connected equipment.

J.B. Manufacturers: Culligan, J.L. Wingert, John Wood, Vector Industries, Claypool Pump and Machinery.

K. Heating Piping 2" and smaller: Type "L" drawn-temper copper tubing with soldered joints.

L. Heating Water 2-1/2" and Larger: Contractors option: Schedule 40 steel pipe, wrought steel fittings and wrought cast iron or forged steel flanges and flanged fittings with welded and flanged joints. Type "L" drawn-temper copper tubing with soldered joints or Victaulic grooved mechanical joint fittings.

M. Cleaning / System Fill: Flush new piping systems with clean water and air pressure test with 100 psi air pressure prior to connection to the existing system. Coordinate with owner prior to final connection and shut down of existing system. After connection re-fill system and purge air from high points of system.

N. Hangers and Supports: Adjustable clevis or swivel type band hangers suitable for pipe material specified. Insulate continuously through hangers on cold piping with galvanized shield. Hanger may contact pipe on hot water piping. Maximum Hanger spacing shall be as follows:

1. Up to 1-1/4" Size: 6 feet with 1/4" min. rod size.
2. 1-1/2" to 2" Size: 8 feet with 3/8" min rod size.
3. 2-1/2", 3" Size: 12 feet with 3/8" min rod size.
4. 4" Size: 14 feet with 1/2" min. rod size.
5. 6" Size: 17 feet with 1/2" min. rod size.

O. Hydronic System Flushing: Flush system a minimum of 8 hours, during this time, open one control valve at a time forcing water through each terminal branch, after cycling through each branch, pull all system strainer screens, clean, replace and continue flushing system with all heating control valves open. System shall be drained through a drain valve located at the lowest point in the system. Clean water shall be added at a point where it can circulate through the entire system and not short circuited through the draining point. Inspect Strainers after 8 hours of flush if any debris is still present in the system repeat this procedure, use whatever materials and methods necessary to ensure complete removal of debris from the system.

P. Hydronic System Cleaning & Final Fill: Fill system with fresh water and add liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products from piping. Circulate solution for a minimum of 24 hours, drain, clean strainers and refill with fresh water.

Q. Utilize a water-treatment specialist with a minimum of 5-years of experience in water chemical treatment to perform an analysis of make-up water to determine type and quantities of chemical treatment needed to keep system free of scale, corrosion and fouling, and sustain the following water characteristics: (PH: 9-10.5) / (Alkalinity: 100 -500 PPM) / (Boron 100 to 200 PPM) / (Oxygen Demand 100 PPM). Add corrosion inhibitor as recommended by supplier.

**METERS AND GAUGES:**

A. Solar Digital Thermometers: High Impact ABS plastic case with 0.10 deg F. between -50 deg. F. to 199.9 deg. F. resolution. Internal potentiometer for recalibration and LCD display. Adjustable type connector for 180 degree movement in vertical plane and 360 deg. rotation in horizontal plane. Aluminum steam with glass passivated thermistor.

1. Accuracy: Greater of 1 deg. F. or 1% of reading.
2. Acceptable Manufacturers: Ashcroft, Ternce, MILJOCO, Weiss Instruments, Wexsler.

B. Thermowells: Pressure-tight, socket type metal fitting made for insertion into piping and of type, diameter, and length required to hold thermometer.

C. Pressure Gauges: Direct-Mounting, Dial type pressure gages: Indicating-dial type complying with ASME B40.100, 4-1/2" Liquid filled case made of drawn steel or cast aluminum. Provide bourdon tube pressure-element assembly with 1/4" NPS brass bottom outlet and glass window. Pointer to be red or dark color with satin faced, nonreflective aluminum dial with permanently etched scale markings.

1. Accuracy: Grade A, plus or minus 1 percent of middle half scale.
2. Range: As indicated on flow diagram or 2 times operating pressure if not indicated.
3. Acceptable Manufacturers: Ashcroft, Marsh, MILJOCO, Ternce, Weiss, Wexsler.

D. Pressure / Temperature Test Plugs: Corrosion resistant brass or stainless steel body with core inserts and gasketed and threaded cap, with extended stem for units to be installed in insulated piping. Rated for 500 psig at 200 deg. F. EPDM Core inserts to be one or two self sealing rubber valves rated from minus 30 deg. F. to plus 275 deg. F.

E. Install Meters and Gauges according to the manufacturer's verified installation instructions.

**BREECHINGS, CHIMNEYS AND STACKS:**

A. Condensing Boiler Vents: Manufactured double wall one inch air space AL 29-4C stainless steel special gas vent equal to Heatbat model "Saf-T Vent CI Plus" or approved equal.

**TESTING, ADJUSTING AND BALANCING**

ACCEPTABLE TESTING AND BALANCING AGENCIES:

A. Subject to compliance with requirements, the following agencies are approved to Bid:

1. Big Horn Corp., Barry Robinson; Billings, MT.
2. Slatara Test & Balance, LLC; Billings, MT.

GENERAL

A. Submittals: After testing and balancing is complete submit a report bearing the signature of the test and balance engineer or technician. The reports shall be certified proof that the systems have been tested, adjusted and balanced in accordance with NEBB and ASHRAE standards. Submit two copies of the report to the engineer for approval.

B. Report Contents: Provide test and balancing agency, contractor, owner and contractor addresses. Include listing of instrumentation used for procedures along with proof of calibration. The remainder of the report shall contain the appropriate forms containing as a minimum the information indicated on the standard report forms prepared by the NEBB, for each respective system.

C. Procedure: Balance all air systems to the air flow values indicated on the plans using procedures recommended by ASHRAE and NEBB.

D. Test and Balance Schedule:

1. Water Balancing: Measure new pump flow rates based on pressure readings and pump curves.

TEMPERATURE CONTROLS

**ACCEPTABLE TEMPERATURE CONTROL CONTRACTOR**

TEMPERATURE CONTROLS: A RELIABLE CONTROLS AUTHORIZED DEALER

**BASE BID (BASIC ELECTRIC CONTROLS)**

**BOILERS:** SET UP THE BOILER MANUFACTURER'S ONBOARD MICRO PROCESSOR CONTROLLER FOR LEAD / LAG CONTROL OF BOTH BOILERS TO MAINTAIN THE BUILDING HOT WATER SET POINT. THE LEAD BOILER SHALL ENERGIZE WHEN THE OUTDOOR AIR TEMPERATURE DROPS BELOW 60 DEG F. INSTALL & WIRE THE TWO FACTORY SYSTEM SENSORS IN THE BUILDING HOT WATER SUPPLY AND RETURN AS INDICATED ON THE FLOW DIAGRAM. INSTALL AND WIRE THE OUTDOOR AIR SENSOR ON THE NORTH SIDE OF THE BUILDING TO ALLOW RESET OF THE BUILDING HOT WATER SUPPLY TEMPERATURE FROM 180 DEG. F. WHEN THE OUTDOOR AIR TEMPERATURE IS 10 DEG. F. TO 145 DEG. F. WHEN THE OUTDOOR AIR TEMPERATURE IS 60 DEG. F. PROVIDE COMMUNICATION WIRE CONNECTION BETWEEN THE TWO BOILERS TO ALLOW THE FACTORY CASCADING OPERATION. (FOLLOW ALL FACTORY INSTALLATION INSTRUCTIONS).

**PUMPS (BP-1 & BP-2):** WIRE THE BOILER PUMPS BP-1 &2 TO ENERGIZE WHEN THEIR RESPECTIVE BOILER IS ENERGIZED THROUGH CONTACTS IN THE BOILER CONTROL PANEL.

**PUMPS (HWP-1 AND HWP-2):** PROVIDE AND WIRE A TEKMAR 132 PUMP SEQUENCER TO CONTROL START / STOP AND ROTATION OF PRIMARY AND STANDBY SYSTEM PUMPS. UPON PUMP DEMAND SIGNAL FROM THE MASTER BOILER CONTROLLER, START THE PRIMARY PUMP. USE THE SEQUENCER TO ROTATE THE PRIMARY PUMP WITH THE STANDBY PUMP ON AN ADJUSTABLE TIME SCHEDULE TO EQUALIZE RUNTIME.

**FINTUBE RADIATION CONTROL:** PROVIDE A LOW VOLTAGE TWO-WAY ZONE VALVE, TRANSFORMER AND THERMOSTAT AS INDICATED ON THE PLANS. RUN WIRING IN EMT CONDUIT EXPOSED UNLESS ABLE TO CONCEAL WIRING IN THE EXISTING BLOCK WALLS. VALVE SHALL OPEN ON THE CALL FOR HEAT AND CLOSE WHEN THERMOSTAT IS SATISFIED. INSTALL THERMOSTATS WHERE PNEUMATIC STATS ARE REMOVED WITH A 4 SQUARE BOX AND RING. ON SOUTH PORTION OF BUILDING WITH BASEMENT FLOOR WIRING IN BASEMENT CEILING. ON NORTH SIDE OF THE BUILDING THAT IS SLAB ON GRADE THE WIRING WILL NEED TO RUN IN / ON THE CEILING AND EXPOSED EMT CONDUIT RUN DOWN THE WALLS. ALL THERMOSTAT AND POWER WIRING SHALL BE RUN IN CONDUIT WHERE EXPOSED IN OCCUPIED SPACES.

**ALTERNATE BID #1 (WEB-BASED DIGITAL TEMPERATURE CONTROLS)**

GENERAL: INSTALL WEB-BASED DIGITAL CONTROLS IN THE BUILDING FOR MONITORING AND CONTROL AS DESCRIBED HEREIN. THE CONTROLS SHALL BE AN EXTENSION OF THE EXISTING RELIABLE CONTROLS SYSTEM CURRENTLY SETUP FOR THE CITY OF BILLINGS. PROVIDE GRAPHICS OF THE BUILDING ZONE TEMPERATURES, FINNED TUBE RADIATION AND BOILER PLANT.

**BOILERS:** BOILERS MAY USE THE SAME ON-BOARD FACTORY CASCADING CONTROL AS DESCRIBED IN THE BASE BID, EXCEPT USE THE FACTORY BACNET IP GATEWAY TO MONITOR STATUS, TEMPERATURES, ALARMS AND SEND A SYSTEM SET POINT TO THE CONTROLLER. THE BUILDING DIGITAL CONTROL SYSTEM SHALL INCLUDE A BOILER PLANT START/STOP COMMAND AND CONTROL THE OUTDOOR RESET SCHEDULE VIA A BUILDING OUTSIDE AIR SENSOR.

**PUMPS (BP-1 & BP-2):** WIRE THE BOILER PUMPS BP-1 &2 TO ENERGIZE WHEN THEIR RESPECTIVE BOILER IS ENERGIZED THROUGH CONTACTS IN THE BOILER CONTROL PANEL. PROVIDE A CURRENT SENSOR ON EACH PUMP FOR STATUS TO THE BUILDING CONTROL SYSTEM.

**PUMPS (HWP-1 AND HWP-2):** THE LEAD PUMP SHALL BE ENERGIZED WHEN THE BOILER PLANT IS COMMANDED ON BELOW 60 DEG. F. OUTDOORS. ROTATE THE PRIMARY PUMP WITH THE STANDBY PUMP ON A WEEKLY BASIS TO EQUALIZE RUNTIME. PROVIDE CURRENT SENSOR AND IF THE PRIMARY PUMP FAILS SEND AND ALARM AND ENERGIZE THE LAG PUMP.

**FINTUBE RADIATION CONTROL:** PROVIDE A LOW VOLTAGE TWO-WAY ZONE VALVE, AND NETWORK SENSOR OR NETWORKED THERMOSTAT IN LOCATIONS INDICATED ON THE PLANS. RUN WIRING IN EMT CONDUIT EXPOSED UNLESS ABLE TO CONCEAL IN BLOCK WALLS. VALVE SHALL OPEN ON THE CALL FOR HEAT AND CLOSE WHEN THERMOSTAT IS SATISFIED.

**GENERAL DEMOLITION NOTES**

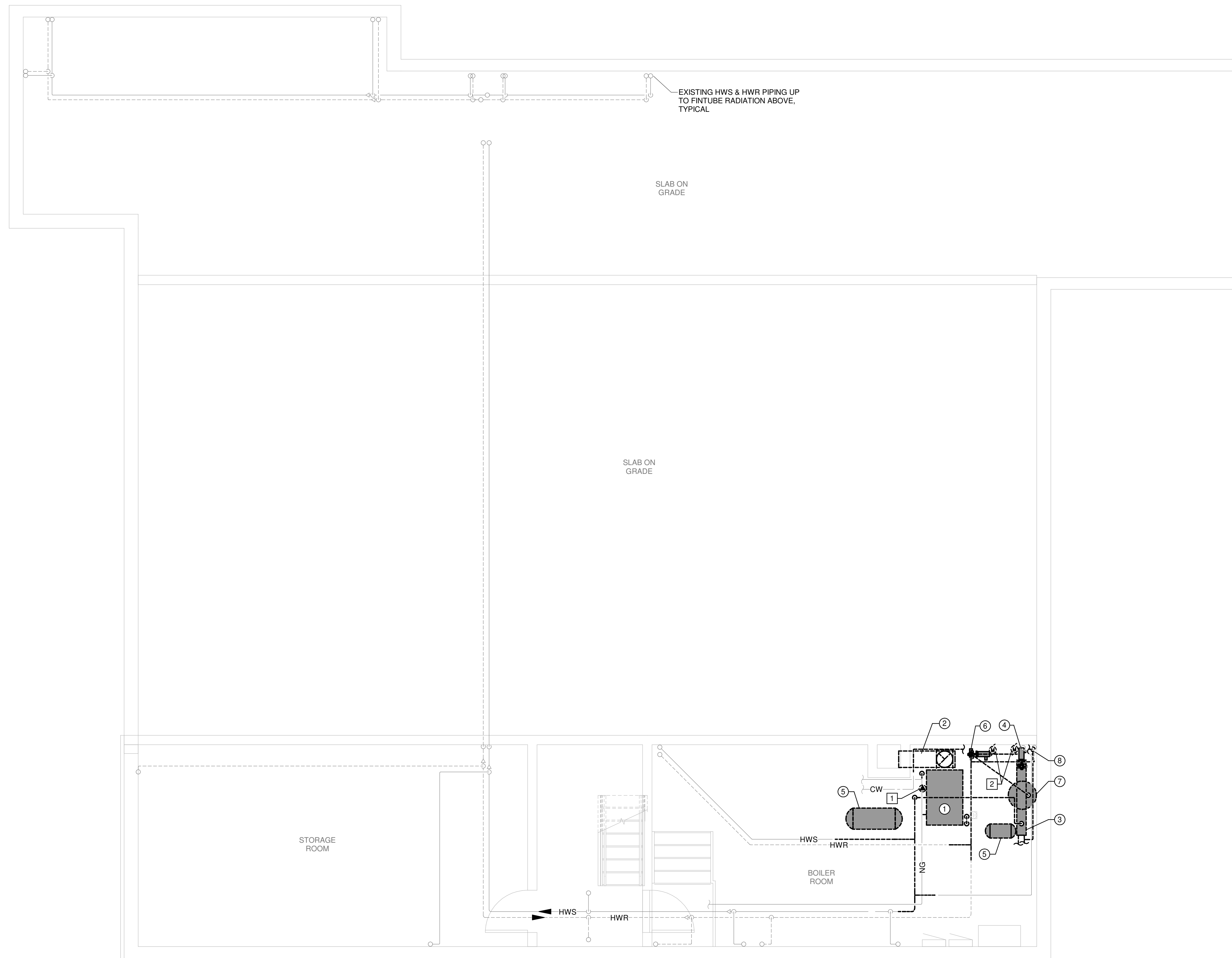
- A. THE REMOVAL / DEMOLITION NOTES LISTED ON THESE SHEETS ARE INTENDED TO CONVEY A GENERAL DESCRIPTION OF THE REMOVAL / DEMOLITION WORK THROUGHOUT THE PROJECT. HOWEVER, THESE NOTES MAY NOT ADDRESS EVERY DEMOLITION CONDITION NECESSARY FOR THE SUCCESSFUL COMPLETION OF THE NEW CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO REMOVE AND / OR DEMOLISH ANY EXISTING CONDITIONS REQUIRED FOR THE SUCCESSFUL INSTALLATION AND ERECTION OF ANY NEW CONSTRUCTION IDENTIFIED IN THESE DOCUMENTS.
- B. PROMPTLY REPAIR DAMAGES CAUSED TO ADJACENT AREAS OR FINISHES BY DEMOLITION OR CONSTRUCTION WORK AT NO ADDITIONAL COST TO THE OWNER.
- C. CONTRACTOR TO VISIT SITE AND VERIFY EXISTING CONDITIONS PRIOR TO BIDDING. CONTRACTOR IS RESPONSIBLE TO CORRELATE HIS OBSERVATIONS WITH THESE CONTRACT DOCUMENTS. IF INCONSISTENCIES EXIST, THE CONTRACTOR SHALL INFORM THE ENGINEER BEFORE BIDDING. ALL EXISTING SERVICES ARE SHOWN DIAGRAMMATIC ONLY AND FOR CLARITY.
- D. WHERE EXISTING EQUIPMENT, PIPING, DUCTS, ETC. ARE TO BE REMOVED, SUCH REMOVAL SHALL INCLUDE ALL ANCHORS, HANGERS, FRAMING, ETC.
- E. MECHANICAL EQUIPMENT AND PIPING SHOWN IN DARK BOLD DASHED LINES IS TO BE REMOVED FROM SITE AND SHALL BECOME THE PROPERTY OF THE CONTRACTOR FOR SALVAGE OR LEGALLY DISPOSED OF AT THE CONTRACTOR'S OPTION.

**MECHANICAL KEYNOTES**

- 1. REMOVE EXISTING GAS-FIRED CAST IRON BOILER; DISCONNECT ALL CONNECTED PIPING, FLUE VENTING, TRIM, CONTROLS, AND MISCELLANEOUS ACCESSORIES. REMOVE BOILER FROM SITE AND LEGALLY DISPOSE.
- 2. REMOVE EXISTING 14" FLUE VENT FROM BOILER TO EXISTING CHIMNEY. CAP AND SEAL FLUE AT CHIMNEY WALL.
- 3. REMOVE EXISTING SUSPENDED SHELL AND TUBE HEAT EXCHANGER AND ALL CONNECTED HEATING WATER AND ABANDONED SNOWMELT SYSTEM PIPING.
- 4. REMOVE EXISTING SNOW MELT PUMP, POWER WIRING, AND CONTROLS.
- 5. REMOVE EXISTING ABANDONED EXPANSION TANK AT CEILING AND CONNECTED PIPING.
- 6. REMOVE EXISTING IN-LINE BOILER PUMP, POWER WIRING, AND CONTROLS.
- 7. DISCONNECT PIPING AND RELOCATE EXISTING BLADDER TYPE EXPANSION TANK.
- 8. REMOVE CW FILL CONNECT TO EXISTING BOILER SYSTEM. REPLACE EXISTING BACKFLOW PREVENTER AND PRESSURE REDUCING VALVE PER FLOW DIAGRAM.

**ELECTRICAL KEYNOTES**

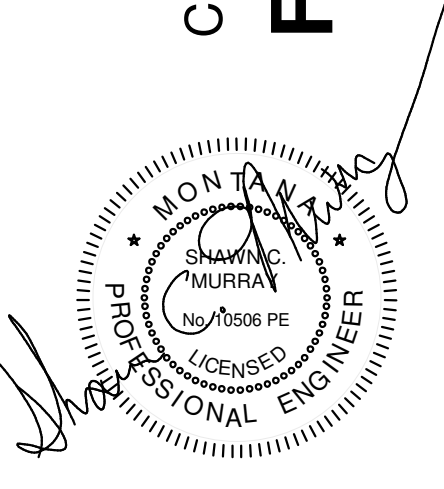
- 1. DISCONNECT EXISTING BOILER FOR REPLACEMENT. CAP OFF CIRCUIT FOR RE-USE AND LABEL.
- 2. DISCONNECT EXISTING PUMP FOR REMOVAL. CAP OFF CIRCUIT FOR RE-USE AND LABEL.



**1** BASEMENT MECHANICAL DEMOLITION PLAN  
MD100 1/4" = 1'-0"



CITY OF BILLINGS  
FIRE STATION #2 BOILER REPLACEMENT PROJECT



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CONSTRUCTION DOCUMENTS

06.01.2025  
PROJ# | BL-FR25-BLR  
DESIGNED BY | MURRAY  
DRAWN BY | HABECK

REVISIONS

BASEMENT MECHANICAL DEMOLITION PLAN

MD100

**GENERAL NOTES**

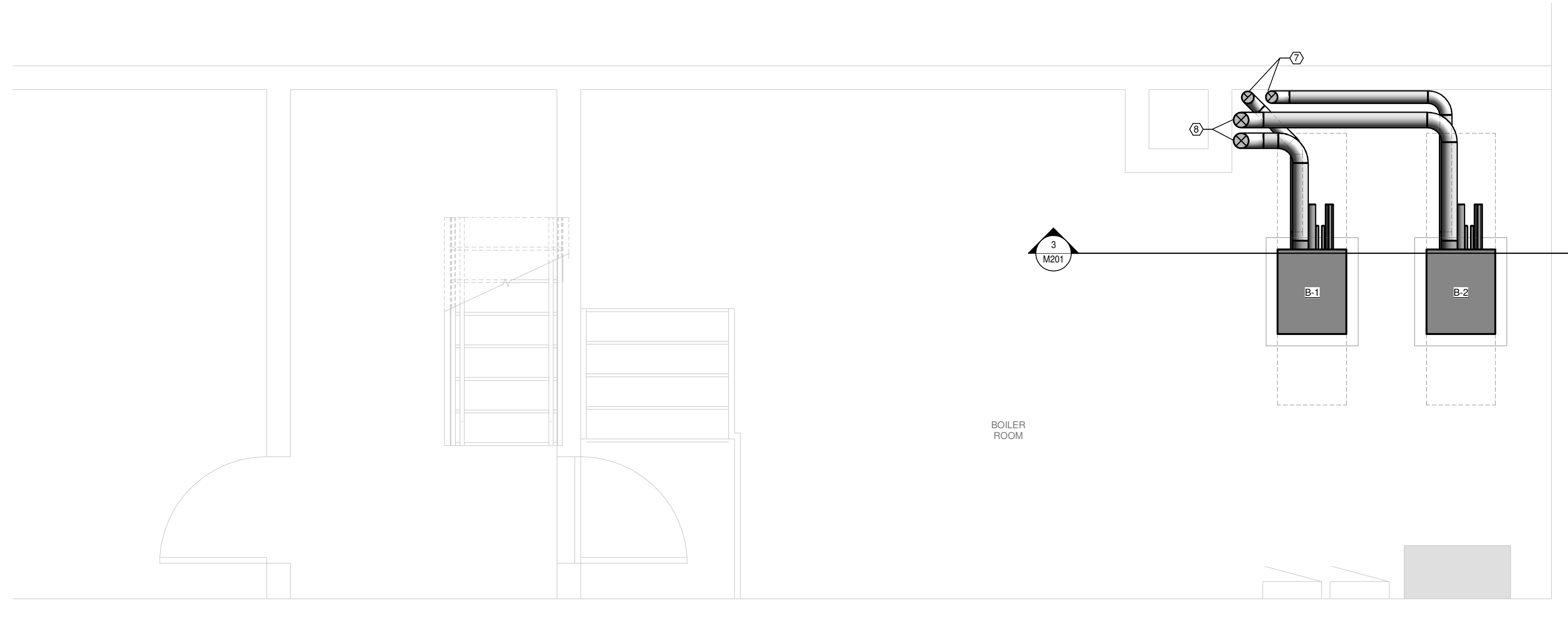
- A. COMPLY WITH 2020 NEC.
- B. ALL CIRCUITS SHALL BE MINIMUM #12 AWG, THHN COPPER IN EMT OR MC CABLE. ALL CIRCUITS SHALL HAVE AN EQUIPMENT GROUND.

**MECHANICAL KEYNOTES**

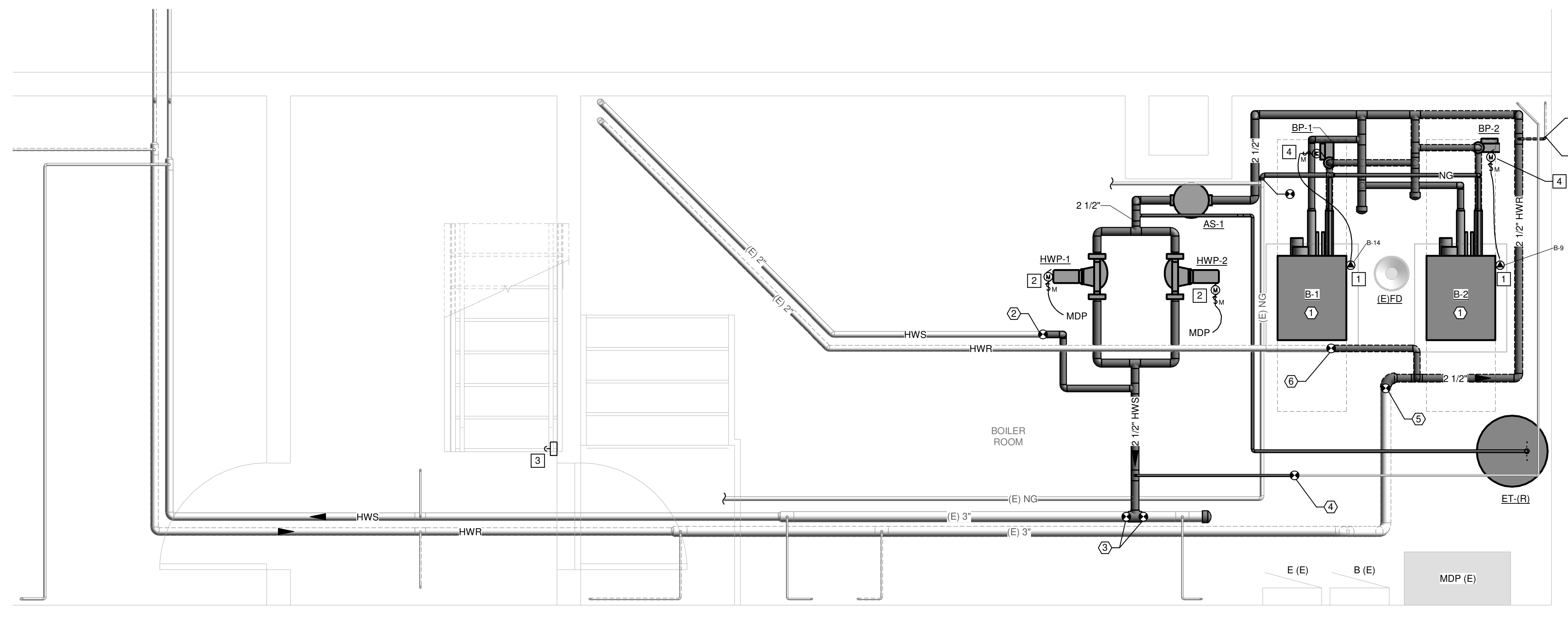
1. SET NEW BOILERS ON 4" THICK CONCRETE HOUSEKEEPING PADS.
2. CONNECT NEW 2" HWS TO EXISTING 2" HWS.
3. CONNECT NEW 2-1/2" HWS TO EXISTING 3" HWS.
4. CONNECT NEW HWS / HWR TO EXISTING.
5. CONNECT NEW 2-1/2" HWR TO EXISTING 3" HWR.
6. CONNECT NEW 2" HWR TO EXISTING 2" HWR.
7. 4" CATEGORY IV STAINLESS STEEL AL29-4C DOUBLE WALL VENT UP THROUGH FLOOR ABOVE. SEE 1/M201 FOR CONTINUATION.
8. 5" SCHEDULE 40 PVC COMBUSTION AIR INLET PIPE UP THROUGH FLOOR ABOVE.
9. SEE DRAWING 1/M001 FOR FURTHER DETAILED PIPING REQUIREMENTS IN BOILER ROOM.

**ELECTRICAL KEYNOTES**

1. PROVIDE CONNECTION TO BOILER. DISCONNECT IS SUPPLIED INTEGRAL TO THE UNIT. PROVIDE DEDICATED 20A CIRCUIT TO PANEL B SPARE BREAKER AS NOTED.
2. PROVIDE TOGGLE STARTER WITH OVERLOADS AND CONNECTION TO NEW HWP PUMP. PROVIDE NEW DEDICATED 20A IP CIRCUIT TO THE MDP EXISTING FUSIBLE SWITCH. PROVIDE 15A RK-5 FUSE.
3. PROVIDE EPO WITH LABEL "BOILER EMERGENCY POWER OFF". EPO SHALL BE WIRED TO INTERRUPT BOILER CONTROLS FOR SHUTDOWN OF BOILERS UPON ACTIVATION. INSTALL OUTSIDE BOILER ROOM DOOR.
4. PROVIDE TOGGLE STARTER WITH OVERLOADS AND CONNECTION TO PUMP. CONNECT TO ASSOCIATED BOILER CIRCUIT.



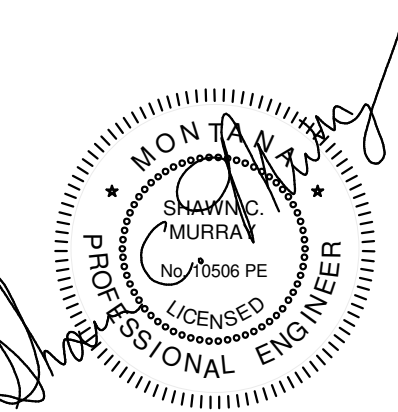
1 ENLARGED BOILER ROOM VENTING PLAN  
M200 1/2" = 1'-0"



2 ENLARGED BOILER ROOM PIPING PLAN  
M200 1/2" = 1'-0"



CITY OF BILLINGS  
FIRE STATION #2 BOILER REPLACEMENT PROJECT



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06.01.2025  
PROJ# | BLFR25\_BLR  
DESIGNED BY | MURRAY  
DRAWN BY | HABECK

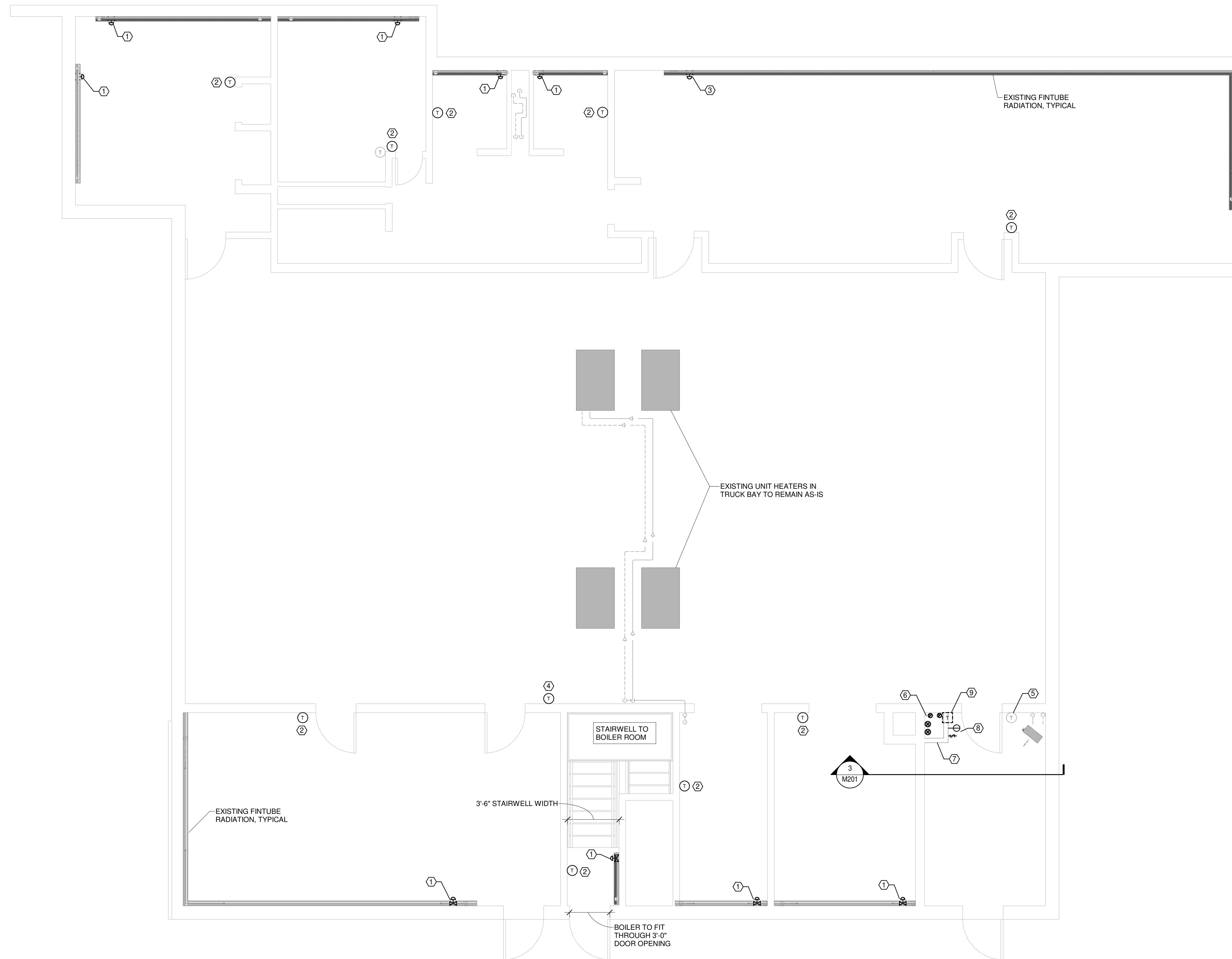
REVISIONS

BASEMENT  
MECHANICAL  
REMODEL PLANS

M200

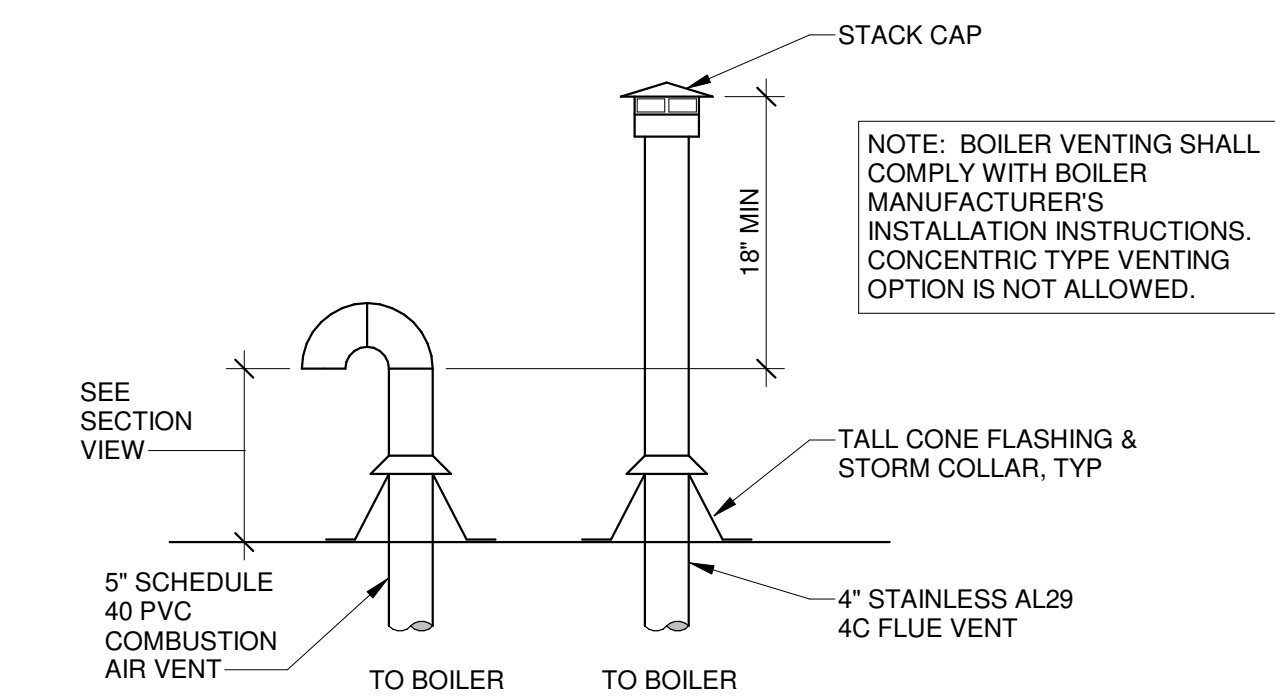
KEYNOTES

1. REMOVE EXISTING PNEUMATIC TWO-WAY CONTROL VALVE UNDER FINITUBE RADIATION COVER AND REPLACE WITH NEW 3/4" TWO-WAY ZONE VALVE. SEE DETAIL 2/M201.
2. REMOVE EXISTING PNEUMATIC THERMOSTAT AND REPLACE WITH NEW 24 VOLT THERMOSTAT TO CONTROL THE TWO-WAY ZONE VALVE. CONTRACTOR IS RESPONSIBLE FOR 120V WIRING FOR POWER TO TRANSFORMER, THERMOSTAT, AND ZONE VALVE. SEE DETAIL 2/M201.
3. REMOVE EXISTING PNEUMATIC TWO-WAY CONTROL VALVE UNDER FINITUBE COVER AND REPLACE WITH NEW 1" TWO-WAY ZONE VALVE.
4. EXISTING ELECTRIC THERMOSTAT FOR CABINET HEATERS IN FIRE VEHICLE ROOM TO REMAIN AS IS.
5. EXISTING ELECTRIC THERMOSTAT FOR UNIT HEATER TO REMAIN AS IS.
6. (2) 4" STAINLESS STEEL BOILER FLUE VENTS AND (2) 5" PVC COMBUSTION AIR INTAKES UP FROM BOILER ROOM IN NEW FIRE RATED CHASE. EXTEND THROUGH ROOF AND TERMINATE PER DETAIL 2/M201 AND SECTION 3/M201.
7. CONSTRUCT 2-HOUR FIRE RATED CHASE FROM FLOOR TO ROOF DECK WITH 2-1/2" 10# CHANNEL METAL STUDS. PROVIDE 1" GYP BOARD SHAFT LINER ON INSIDE OF CHASE AND FINISH W/ 1/2" GYP BOARD ON OUTSIDE; TAPE, FINISH, AND PAINT WHITE.
8. RELOCATE EXISTING LIGHT SWITCH / OUTLET AND EXPOSED CONDUIT POWER FEED TO OUTSIDE OF NEW CHASE WALL.
9. REMOVE EXISTING ABANDONED PNEUMATIC THERMOSTAT.

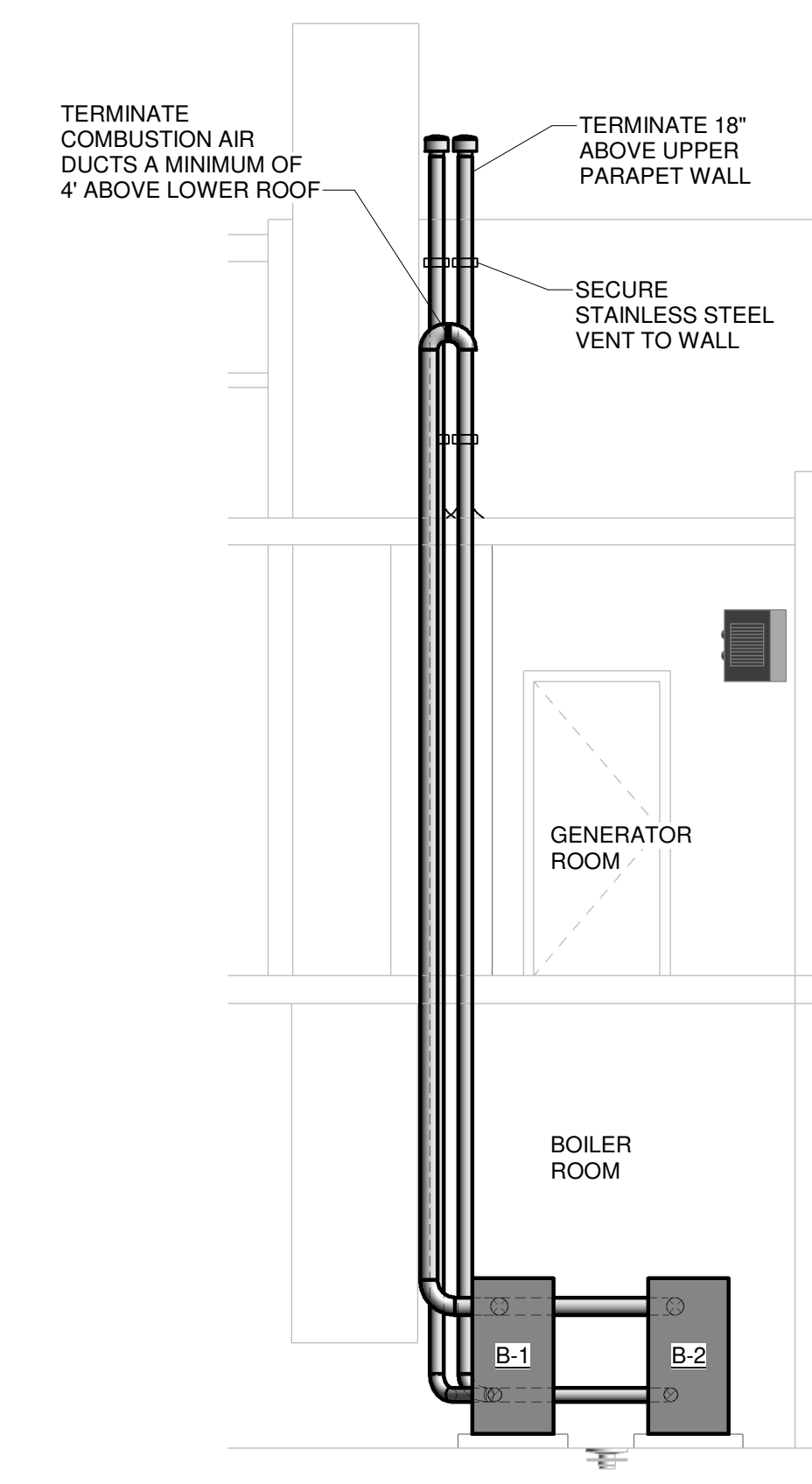


1 MAIN FLOOR MECHANICAL REMODEL PLAN  
M201 1/4" = 1'-0"

NORTH REF

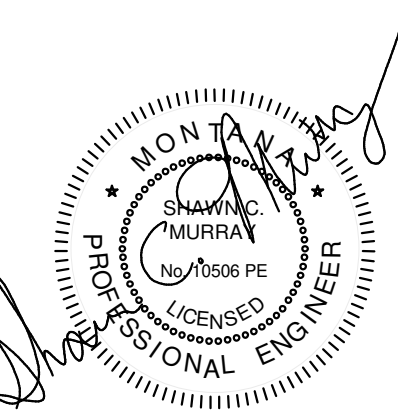


2 BOILER VENTING DETAIL  
M201 NOT TO SCALE



3 BOILER VENTING SECTION  
M201 1/4" = 1'-0"

CITY OF BILLINGS  
FIRE STATION #2 BOILER REPLACEMENT PROJECT



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06.01.2025  
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DESIGNED BY | MURRAY  
DRAWN BY | HABECK

REVISIONS

MAIN FLOOR MECHANICAL REMODEL PLAN

M201