

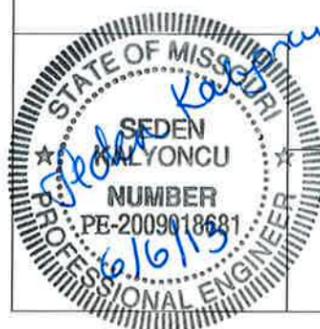
DRAWING CONVENTION SYMBOLS		ABBREVIATIONS		PIPING SYMBOLS LEGEND		HEATING AND AIR CONDITIONING SYMBOLS LEGEND	
	PLAN NORTH	AVE	AVERAGE		ISOLATION VALVE		TRANSITION PIECE
	GRAPHIC SCALE	DIA	DIAMETER		CHECK VALVE		RADIUS ELBOW
	REVISIONS CLOUD AND NUMBER	DO	DISTRICT OFFICE		GLOBE VALVE		RETURN/EXHAUST AIR DUCT
	DEMOLITION KEYNOTE	FLA	FULL LOAD AMPS		GLOBE ANGLE VALVE		SUPPLY AIR DUCT
	KEYNOTE	FT	FEET		BALL VALVE		INCLINED DROP IN THE DIRECTION OF AIR FLOW
	BREAK LINE	FTHD	FEET OF HEAD		STRAINER		INCLINED RISE IN THE DIRECTION OF AIR FLOW
	OUTLINE OF HIDDEN OBJECTS, NIC ITEMS, REMOVED MATERIALS	G	GALLONS		UNION		RECTANGULAR DUCT SIZE (1st FIGURE SIDE SHOWN.)
	CENTER LINE OR FLOOR LINE	GPM	GALLONS PER MINUTE		CALIBRATED BALANCING VALVE		ROUND DUCT DIAMETER
	ROOM NUMBER	HGT	HEIGHT		SOLENOID VALVE		NEW
	FLOOR	HP	HORSEPOWER		BUTTERFLY VALVE		EXISTING
	ROOM NUMBER	HWR	HOT WATER RETURN		TEMPERATURE AND PRESSURE RELIEF VALVE		DEMOLITION
	ROOM NUMBER	HWS	HOT WATER SUPPLY		PRESSURE GAUGE		
		IN	INCHES		THERMOMETER		
		INWC	INCHES OF WATER COLUMN		PRESSURE REDUCING VALVE		
		MFR	MANUFACTURER		DIRECTION OF FLOW		
		OPER	OPERATING		PIPE GUIDES		
		PH	PHASE		2-WAY MOTORIZED VALVE/AUTO FEED VALVE		
		PRESS	PRESSURE				
		PSI	POUNDS PER SQUARE INCH				
		RPM	REVOLUTIONS PER MINUTE				
		TEMP	TEMPERATURE				
		TYP	TYPICAL				

GENERAL NOTES

- THESE DRAWINGS INCLUDE SPECIFICATIONS. THE CONTRACTOR SHALL THOROUGHLY FAMILIARIZE HIMSELF WITH THE DRAWINGS AND SPECIFICATIONS PRIOR TO BIDDING.
- RENDER ANY PASSAGE OF DUCTWORK/PIPING THROUGH OUTSIDE WALLS AND ROOF PERMANENTLY WATERTIGHT.
- EXISTING CONDITIONS SHOWN ON DRAWINGS ARE BASED ON FIELD SURVEYS, RECORD DRAWINGS AND OTHER AVAILABLE DOCUMENTS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY EXISTING CONDITIONS PRIOR TO BIDDING AND THE START OF WORK.
- LOCATE MECHANICAL EQUIPMENT SO AS TO PROVIDE ADEQUATE FILTER REMOVAL AND MAINTENANCE ACCESS SPACE.
- ALL WORK SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER AND IN ACCORDANCE WITH CURRENT ACCEPTABLE INDUSTRY STANDARDS AND ALL APPLICABLE CODES, ORDINANCES AND REGULATIONS.
- COORDINATE WITH OTHER TRADES THE LOCATION OF ALL PIPING, DUCTWORK AND EQUIPMENT TO AVOID INTERFERENCES.
- LOUVERS ARE FURNISHED AND INSTALLED BY THE GENERAL CONTRACTOR. MECHANICAL CONTRACTOR SHALL ATTACH DUCT TO LOUVERS AND BLANK OFF LOUVER AREA EXCEPT FOR OPENING SIZE SHOWN ON THE DRAWINGS OR AS REQUIRED. PROVIDE 1 INCH THICK FIBERGLASS INSULATION ON INTERIOR SIDE OF GALVANIZED STEEL BLANK-OFF PLATES. ALL SEALS SHALL BE AIRTIGHT.
- EXHAUST OPENINGS SHALL BE PROTECTED AGAINST WEATHER AND ENTRY OF SNOW AND WATER.
- ALL DUCTWORK SHALL BE CONSTRUCTED AND INSTALLED IN ACCORDANCE WITH THE CURRENT SMACNA STANDARDS. ROUND DUCTWORK SHALL BE INSULATED AS NOTED IN THE SPECIFICATIONS. LOW PRESSURE RECTANGULAR DUCTWORK SHALL BE LINED AS NOTED IN THE SPECIFICATIONS.
- QUANTITIES NOTED ARE FOR REFERENCE ONLY. PLAN COUNT SHALL GOVERN.
- MANUFACTURER'S MODEL NUMBERS SHOWN ON THE DRAWINGS ARE SUBJECT TO CHANGE. EQUIPMENT OR COMPONENT SPECIFICATIONS AND DRAWING DESCRIPTIONS SHALL GOVERN.
- EQUIPMENT SUPPLIER SHALL FURNISH MOTORS, RELAYS, AND STARTERS FOR HVAC/PLUMBING EQUIPMENT. THESE COMPONENTS SHALL BE EITHER MOUNTED ON THE EQUIPMENT OR FURNISHED LOOSE BUT ATTACHED TO EQUIPMENT CONTAINERS. STARTERS SHALL BE MAGNETIC TYPE WITH DISCONNECT MEANS AND CONTAIN THERMAL OVERLOAD PROTECTION IN ACCORDANCE WITH THE SERVICE FACTOR (SF) NAMEPLATE RATING OF THE MOTOR AND EQUIPMENT MANUFACTURER'S RECOMMENDATIONS. EXCEPTION TO THIS REQUIREMENT IS FURNISHING OF STARTERS FOR EQUIPMENT FED BY MCC'S, AS SHOWN ON ELECTRICAL DRAWINGS.
- CONFORM TO APPLICABLE CODES FOR DEMOLITION WORK, SAFETY OF STRUCTURE, DUST CONTROL AND ENVIRONMENTAL COMPLIANCE.
- CONTACT MODOT WHEN DISCOVERING HAZARDOUS OR CONTAMINATED MATERIALS.
- DO NOT INTERFERE WITH THE USE OF ADJACENT BUILDINGS. MAINTAIN FREE AND SAFE PASSAGE AROUND ADJACENT BUILDINGS.
- DEMOLISH IN AN ORDERLY AND CAREFUL MANNER AS REQUIRED TO ACCOMMODATE NEW WORK USING EXISTING DOORS FOR REMOVAL. COORDINATE SCHEDULE AND ROUTE REQUIREMENTS WITH OWNER. PROTECT EXISTING ELEMENTS AND FINISHES WHICH ARE TO REMAIN. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING OF ALL DEMOLISHED EQUIPMENT AND MATERIALS FROM PROPERTY AND DISPOSING.
- REPAIR ALL DEMOLITION PERFORMED IN EXCESS OF THAT REQUIRED AT NO EXTRA COST TO THE OWNER.
- TAKE PRECAUTIONS TO MAINTAIN CLEANLINESS ON ROADWAYS AND OTHER PUBLIC AREAS USED BY EQUIPMENT. CONTRACTOR SHALL BE RESPONSIBLE FOR IMMEDIATE REMOVAL OF ALL SPILLAGE ON THESE PAVINGS.
- PROVIDE ALL NECESSARY OFFSETS IN DUCTWORK/PIPING TO AVOID STRUCTURE.
- CONTRACTOR SHALL COORDINATE ALL PIPING PENETRATIONS WITH OTHER CONTRACTORS TO AVOID INTERFERENCES.
- ALL VALVES SHALL BE ACCESSIBLE.
- EQUIPMENT SPECIFICATIONS AND DRAWING DESCRIPTIONS SHALL GOVERN.
- INSTALL NEW EQUIPMENT AS REQUIRED USING EXISTING DOORS. COORDINATE SCHEDULE AND ROUTE REQUIREMENTS WITH OWNER.

SEISMIC CODE BLOCK

LISTING OF EQUIPMENT AND SYSTEM COMPONENTS	ANCHORAGE TO FLOORS, ROOFS, ETC.		SWAY BRACING		LOCATION OF PROFESSIONALLY SEALED ANCHORAGE AND SWAY BRACING DETAILS			COMMENTS
	NOT PROVIDED	PROVIDED	NOT PROVIDED	PROVIDED	ON CONSTRUCTION DOCUMENTS			
					DRAWING NO. OR SPEC. SECTION	SHOP DRAWINGS	SEPARATE PERMIT & PLANS	
HAZARDOUS EQUIPMENT & SYSTEM COMPONENTS: IP=1.5 GAS PIPING > 1" (INTERIOR & EXTERIOR)		X		X	SHEET ME-5			
OTHER GENERAL EQUIP AND SYSTEM COMP: IP=1.0 DUCTILE PIPING ≤ 3", IP=1.0		X		X	SHEET ME-5			2, 3
HVAC DUCTWORK ≤ 6 SF CROSS SECTION	X		X					5
WALL MOUNTED/ANCHORED EQUIPMENT								
≤ 20 LBS FANS	X		X					4
> 20 LBS FANS, PUMPS, EXPANSION TANK		X	X			X		1
SEISMIC USE GROUP: II		SEISMIC DESIGN CATEGORY: D		SITE CLASS: D				
<p>NOTE: IT IS THE BASIC INTENT OF THIS CODE BLOCK TO DECLARE ANCHORS AND SWAY BRACING IS BEING PROVIDED ON THE PROJECT. IF SO, TO DECLARE WHETHER OR NOT THE DETAILS ARE SHOWN ON THE PLANS OR WILL BE SHOWN ON A SUBSEQUENT SUBMISSION. IF SEISMIC RESTRAINT IS NOT REQUIRED BY CODE, THIS CAN BE STATED IN COMMENTS. IP REFERS TO COMPONENT IMPORTANCE FACTOR OF MECHANICAL SYSTEM.</p> <p>NOTE A: SHOP DRAWINGS SHOULD BE SUBMITTED TO THE COUNTY A MINIMUM OF 2 WEEKS PRIOR TO PLANNED INSTALLATION TO ALLOW FOR PLAN REVIEW AND DISTRIBUTION TO INSPECTOR. ADDITIONAL TIME MAY BE NEEDED IF SUCH SUBMISSIONS ARE DEFICIENT.</p> <p>NOTES 1. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS TO THE ENGINEER OF RECORD FOR REVIEW AND APPROVAL PRIOR TO SUBMITTAL TO THE PLAN REVIEWER. 2. DUCTILE PIPING: STEEL, COPPER PIPING AND TUBING JOINED BY WELDING, BRAZING/SOLDERING OR FLANGES. REFER TO TABLE 700c. 3. TABLE 600, EXCEPTION 3c. 4. TABLE 500, EXCEPTION 5b. 5. TABLE 600, EXCEPTION b.</p>								



ABBREVIATIONS, SYMBOLS, GENERAL NOTES
AND SEISMIC CODE BLOCK

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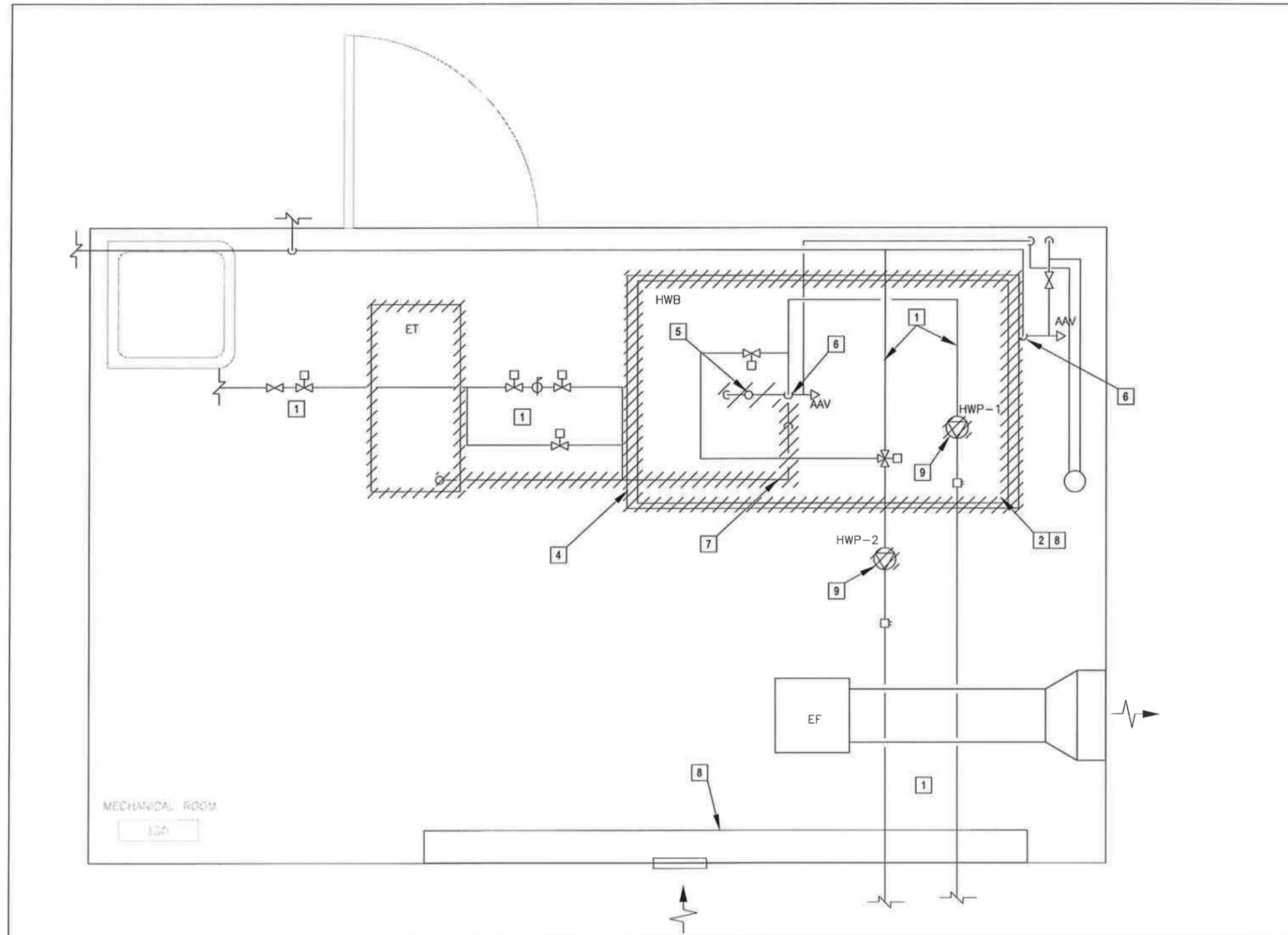
DIVISION OF GENERAL SERVICES
FACILITIES MANAGEMENT

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1590 WOODLAKE DRIVE
CHESTERFIELD, MO 63017

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DRAWN BY: SEDEN LAMP
DATE: 05/15/2013
CHECK BY: KEN TELLA
SHEET M-1

SHEET KEYNOTES

- 1 EXISTING TO REMAIN.
- 2 REMOVE BOILER, RELATED CONTROLS, RELATED PIPING SHOWN HATCHED.
- 3 CAP PIPE TEMPORARILY.
- 4 REMOVE EQUIPMENT PAD.
- 5 REMOVE PUMP LOW FLOW CUTOFF AND RELATED PIPING.
- 6 REMOVE HW PIPING IN VERTICAL UP TO 1'-0" BELOW TEE. LEAVE AAV IN PLACE. CAP PIPE TEMPORARILY.
- 7 REMOVE PIPING SHOWN HATCHED.
- 8 EXISTING 480-VOLT, 3-PH ELECTRIC BOILER. REMOVE DISCONNECT, CONDUIT, AND WIRE BACK TO CIRCUIT PANEL. MARK CIRCUIT AS 'SPARE.' RECORD AND REPORT SPARE CIRCUIT BREAKER TO THE OWNER.
- 9 EXISTING 480-VOLT, 3-PH, 2 HP HOT WATER PUMP. REMOVE DISCONNECT/STARTER. TAG "2 HP PUMP" AND PRESERVE CONDUIT & WIRE FOR RECONNECTION TO NEW 2 HP PUMPS.



1 MECHANICAL DEMOLITION PLAN
SCALE: 1"= 1'-0"



MECHANICAL DEMOLITION PLAN

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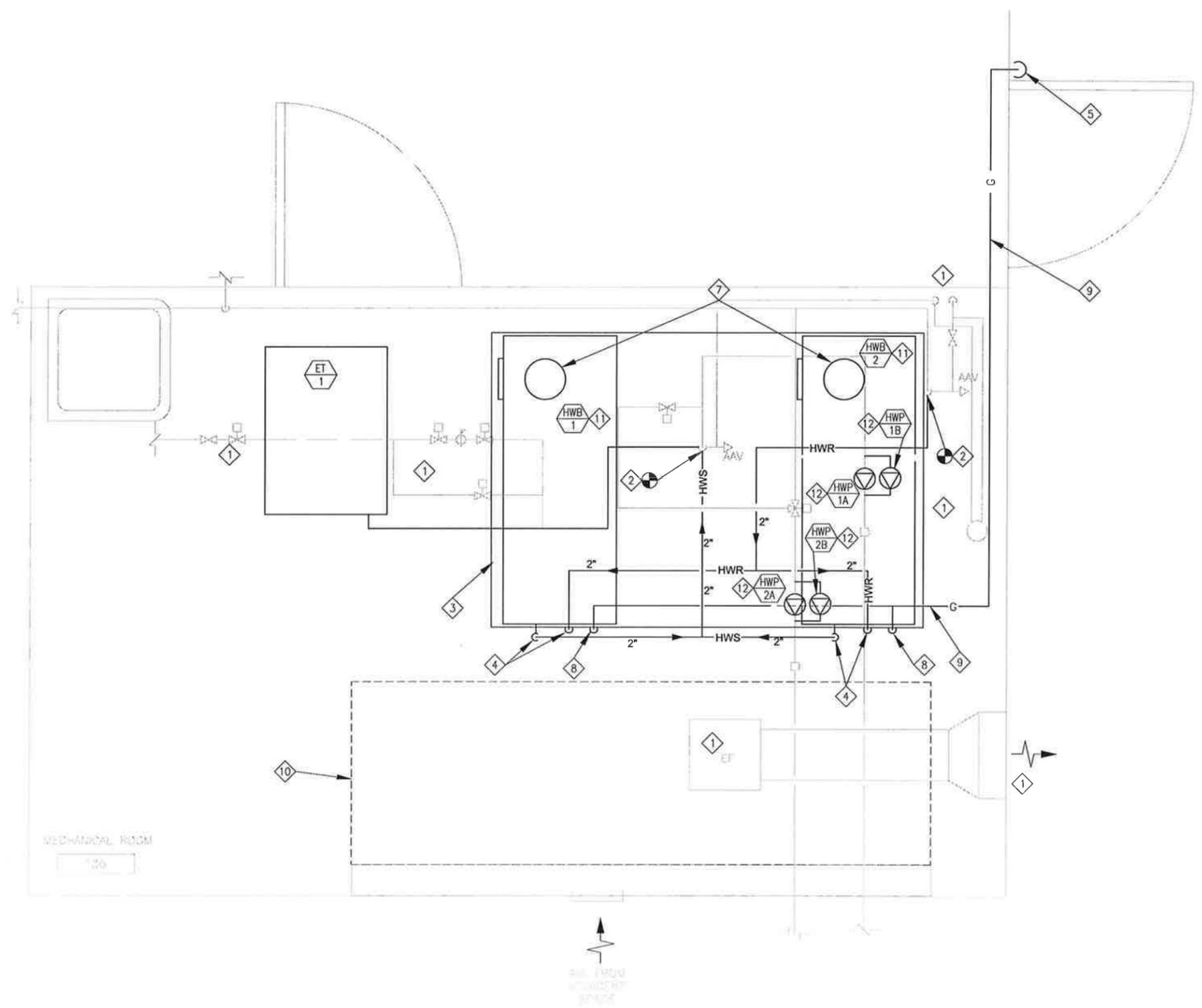
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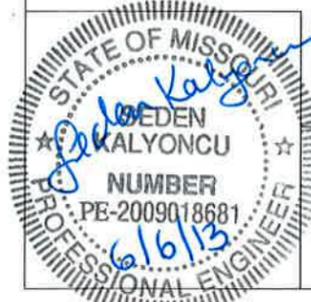
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SHEET ME-2

SHEET KEYNOTES

- 1 EXISTING TO REMAIN.
- 2 CONNECT NEW TO EXISTING. VERIFY SIZE AND LOCATION IN FIELD.
- 3 INSTALL 7'1"x4'10"x8" CONCRETE PAD WITH 6X6 - W2.1XW2.1 WELDED WIRE FABRIC (WWF) 4" INTO GRADE. CONCRETE WORK SHALL BE EXECUTED IN STRICT COMPLIANCE WITH THE LATEST EDITION OF THE AMERICAN CONCRETE INSTITUTE (ACI) MANUAL OF CONCRETE PRACTICE.
- 4 SEE DETAIL #5 ON SHEET M-5 FOR BOILER INLET/OUTLET PIPING DETAILS.
- 5 2" GAS PIPING DOWN TO NEW GAS METER INSTALLED BY UTILITY COMPANY.
- 6 BOILER FLUE. LOCATED MINIMUM 10'-0" FROM COMBUSTION AIR INTAKE. USE LOCHINVAR HDK3032 POWERED VENT CAP KIT OR EQUAL.
- 7 8" FLUE. SEE SHEET M-4 FOR FLUE PLAN.
- 8 1-1/4" GAS PIPE TO MANUFACTURER'S GAS TRAIN.
- 9 2" GAS PIPE.
- 10 LEAVE 3'-0" CLEARANCE IN FRONT OF EXISTING ELECTRICAL PANELS FOR ACCESS.
- 11 120-VOLT, 1-PH, GAS BOILER. DISCONNECT: 277-VOLT, 20-AMP SINGLE-POLE SWITCH TOGGLE IN GALVANIZED CAST METAL BOX AND GALVANIZED COVER. PROVIDE NEW SINGLE-POLE 20-AMP CIRCUIT BREAKER IN UNUSED SPACE ON DISTRICT OFFICE PANEL 5A AND CIRCUIT TO PUMP WITH (2) #12 AWG & #12 GND IN 3/4" IMC. AMEND PANEL SCHEDULE AND REPORT NEW CIRCUIT TO THE OWNER.
- 12 TWO 480-VOLT, 3-PH, 2 HP, HOT WATER PUMPS. PROVIDE EACH WITH NEMA SIZE 1 HEAVY-DUTY COMBINATION STARTER. EXTEND ONE PUMP CIRCUIT PRESERVED FROM DEMOLITION TO FEED BOTH PUMPS. PROVIDE ELECTRICAL CONTROL INTERLOCK SO THAT ONLY ONE PUMP OF TWO MAY OPERATE AT A TIME. AMEND PANEL SCHEDULE TO READ "DUPLEX PUMP" FOR BREAKER SERVING THESE TWO PUMPS.



1 NEW PIPING PLAN
SCALE: 1"=1'-0"



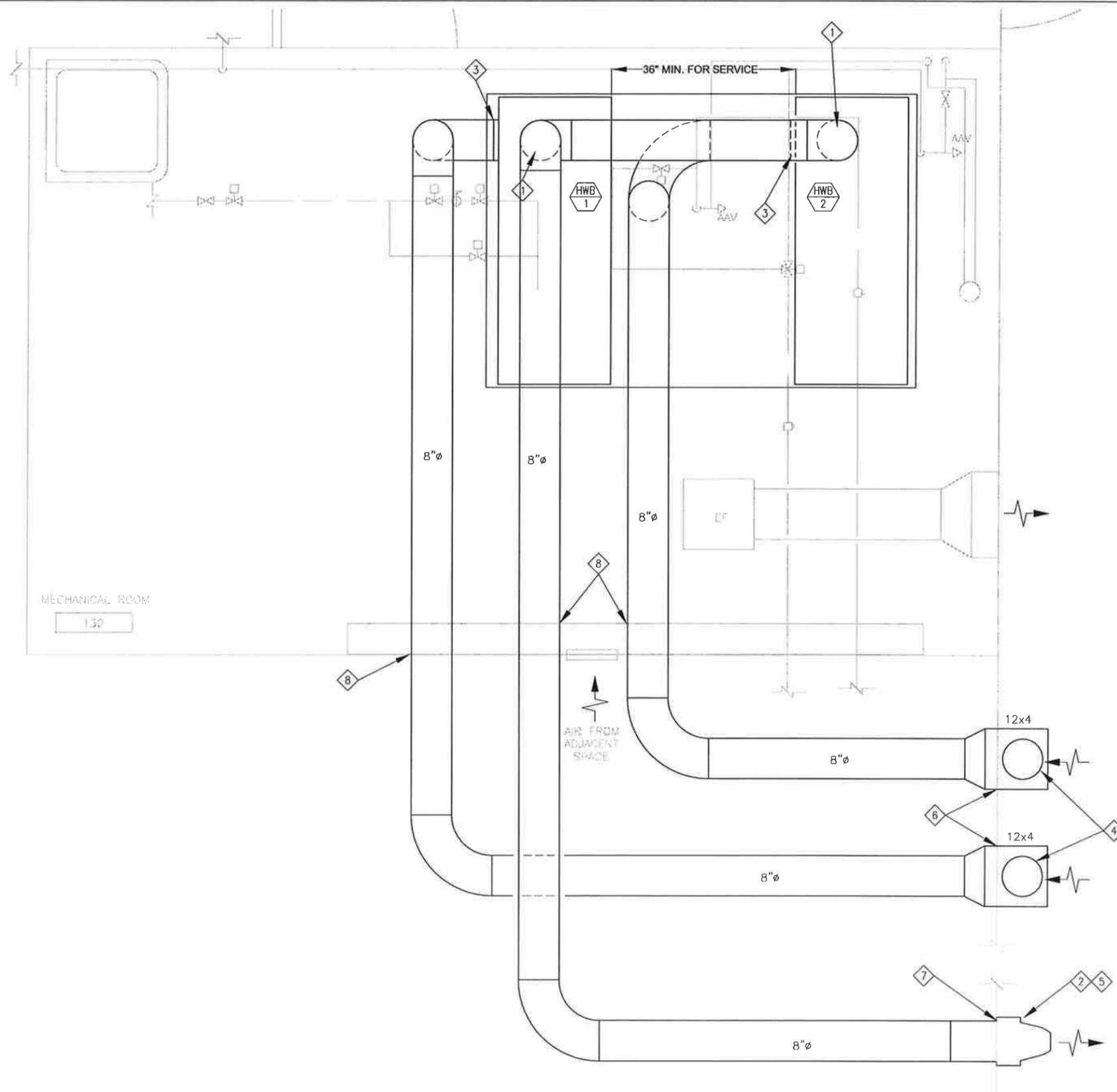
NEW PIPING PLAN

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SHEET ME-3



SHEET KEYNOTES

- 1 8"Ø GALVANIZED DUAL WALL "B" LABELED VENT.
- 2 BOILER FLUE. LOCATE APPROXIMATELY 38'-6" FROM EAST DOOR. USE LOCHINVAR HDK3032 POWERED VENT CAP KIT OR EQUAL.
- 3 8"Ø COMBUSTION AIR INTAKE.
- 4 COMBUSTION AIR INLET. PROVIDE 12" HIGH 8"Ø DUCT WITH RAIN CAP.
- 5 120-VOLT, 1-PH, 4.4-AMP, POWERED VENT CAP DISCONNECT: 277-VOLT, 20-AMP SINGLE-POLE SWITCH TOGGLE IN GALVANIZED CAST METAL BOX AND GALVANIZED COVER. PROVIDE NEW SINGLE-POLE 15-AMP CIRCUIT BREAKER IN UNUSED SPACE ON DISTRICT OFFICE PANEL 5A AND CIRCUIT TO EXHAUSTER WITH (2) #12 AWG & #12 GND IN 3/4" IMC. AMEND PANEL SCHEDULE AND REPORT NEW CIRCUIT TO THE OWNER.
- 6 PROVIDE A 12" WIDE X 4" HIGH DUCT PENETRATION THRU THE BRICK. PROVIDE A 4" HIGH SOLDIER COURSE AT THE HEAD OF THE MASONRY OPENING TO ALIGN BRICK COURSING, SIMILAR TO BRICKWORK AT ADJACENT EXISTING LOUVER. PROVIDE A 1/4" THICK X 4" DEEP GALVANIZED STEEL PLATE LOOSE LINTEL AT TOP OF MASONRY OPENING WITH 4" BEARING AT EACH SIDE OF DUCT PENETRATION. PROVIDE 3 OZ. ASPHALT COATED COPPER FLASHING, EXTEND FLASHING A MINIMUM OF 4", (AND TO NEXT HEAD JOINT), TO EACH SIDE OF DUCT PENETRATION AND FORM FLASHING END DAMS. EXTEND FLASHING UP SHEATHING A MINIMUM OF 8" ABOVE TOP OF MASONRY OPENING. SECURE TOP OF FLASHING WITH A TERMINATION BAR AND SEAL. RUN FLASHING OVER THE TOP OF THE LOOSE LINTEL AND EXTEND TO THE FACE OF THE BRICK AND CUT FLASHING FLUSH WITH THE BRICK. PROVIDE (2) COTTON WEEPS IMMEDIATELY ABOVE FLASHING. PROVIDE ADHERED FLASHING COMPLETELY AROUND OPENING IN METAL STUD WALL AND LAP THE FLASHING 4" OVER THE METAL DUCT AND 4" OVER THE EXTERIOR SHEATHING AT TOP, BOTTOM AND SIDES. PROVIDE SEALANT AND BACKER ROD AT THE FACE OF THE EXTERIOR MASONRY (BETWEEN DUCT AND BRICK AND BETWEEN THE DUCT AND THE BOTTOM OF THE STEEL LINTEL). PROVIDE FOR REMOVAL OF EXISTING BRICK AS REQUIRED FOR THE INSTALLATION OF THE ITEMS ABOVE.
- 7 PROVIDE A 10" WIDE X 10" HIGH DUCT PENETRATION THRU THE BRICK. PROVIDE A 4" HIGH SOLDIER COURSE AT THE HEAD OF THE MASONRY OPENING TO ALIGN BRICK COURSING, SIMILAR TO BRICKWORK AT ADJACENT EXISTING LOUVER. PROVIDE A 1/4" THICK X 4" DEEP GALVANIZED STEEL PLATE LOOSE LINTEL AT TOP OF MASONRY OPENING WITH 4" BEARING AT EACH SIDE OF DUCT PENETRATION. PROVIDE 3 OZ. ASPHALT COATED COPPER FLASHING, EXTEND FLASHING A MINIMUM OF 4", (AND TO NEXT HEAD JOINT), TO EACH SIDE OF DUCT PENETRATION AND FORM FLASHING END DAMS. EXTEND FLASHING UP SHEATHING A MINIMUM OF 8" ABOVE TOP OF MASONRY OPENING. SECURE TOP OF FLASHING WITH A TERMINATION BAR AND SEAL. RUN FLASHING OVER THE TOP OF THE LOOSE LINTEL AND EXTEND TO THE FACE OF THE BRICK AND CUT FLASHING FLUSH WITH THE BRICK. PROVIDE (2) COTTON WEEPS IMMEDIATELY ABOVE FLASHING. PROVIDE ADHERED FLASHING COMPLETELY AROUND OPENING IN METAL STUD WALL AND LAP THE FLASHING 4" OVER THE METAL DUCT AND 4" OVER THE EXTERIOR SHEATHING AT TOP, BOTTOM AND SIDES. PROVIDE SEALANT AND BACKER ROD AT THE FACE OF THE EXTERIOR MASONRY (BETWEEN DUCT AND BRICK AND BETWEEN THE DUCT AND THE BOTTOM OF THE STEEL LINTEL). PROVIDE FOR REMOVAL OF EXISTING BRICK AS REQUIRED FOR THE INSTALLATION OF THE ITEMS ABOVE.
- 8 MAINTAIN FIRE RATING OF WALL BY FIRESTOPPING. SEE FIRESTOPPING SPECIFICATION ON SHEET M-6.

1 **NEW DUCTWORK PLAN**
SCALE: 1"= 1'-0"



NEW DUCTWORK PLAN

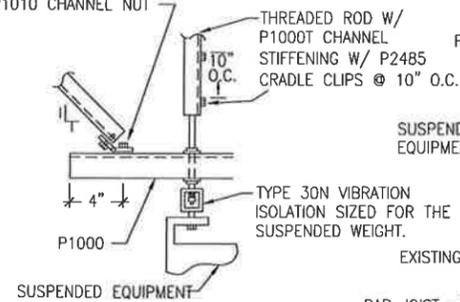
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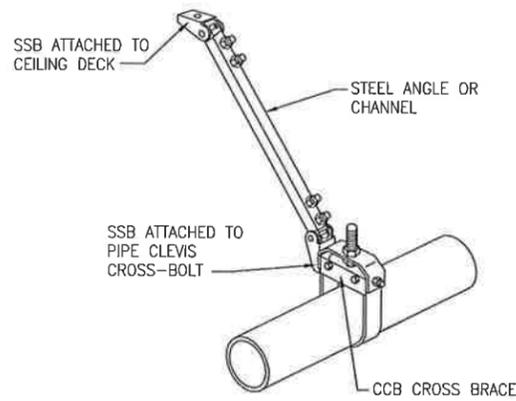
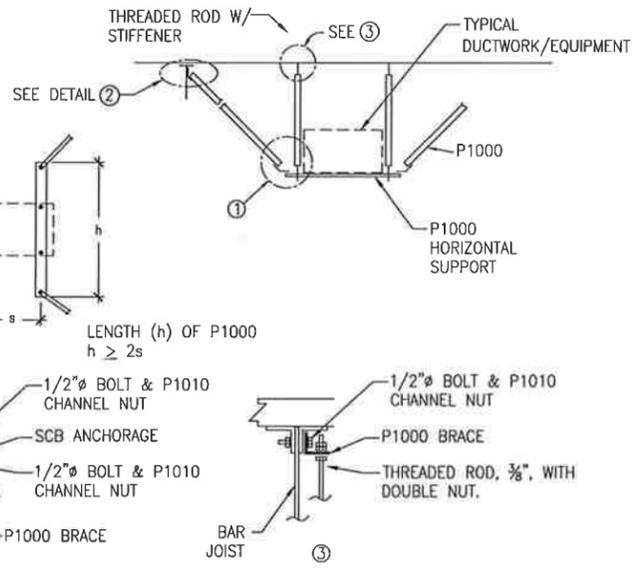
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SHEET ME-4

P1843 ADJUSTABLE HINGE W/ 1/2" Ø BOLTS W/ P1010 CHANNEL NUT



GENERAL NOTES

1. ALL MODEL NUMBERS ARE BASED ON MASON INDUSTRIES INC. ALL COMPONENTS TO BE SIZED AND APPROVED BY A REGISTERED ENGINEER.



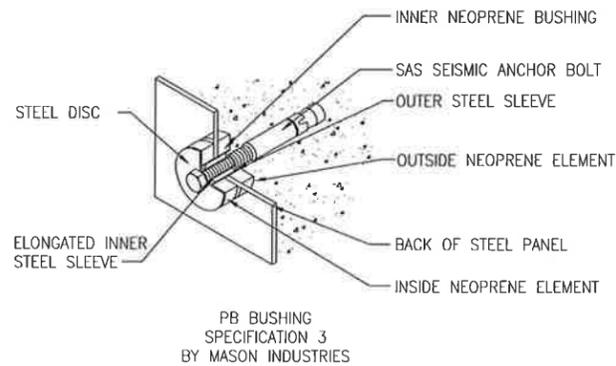
SEISMIC SOLID BRACE OSHPD PRE-APPROVAL NO. OPA-349 SPECIFICATION 13 BY MASON INDUSTRIES

SCB, SCBH, AND SCBV CABLE RESTRAINTS OSHPD PRE-APPROVAL NO. OPA-349 SPECIFICATION 12 BY MASON INDUSTRIES

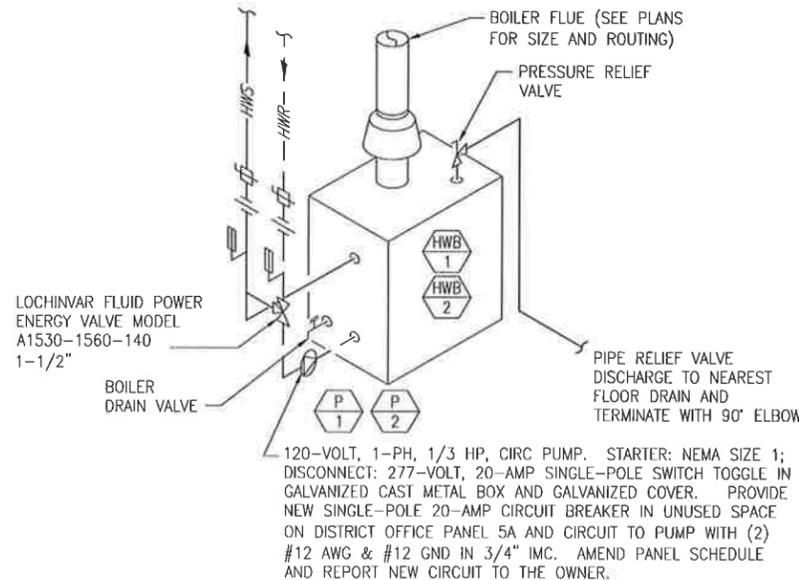
1 SEISMIC DETAIL FOR SUSPENDED EQUIPMENT
SCALE: NONE

2 SEISMIC SOLID BRACE DETAIL
SCALE: NONE

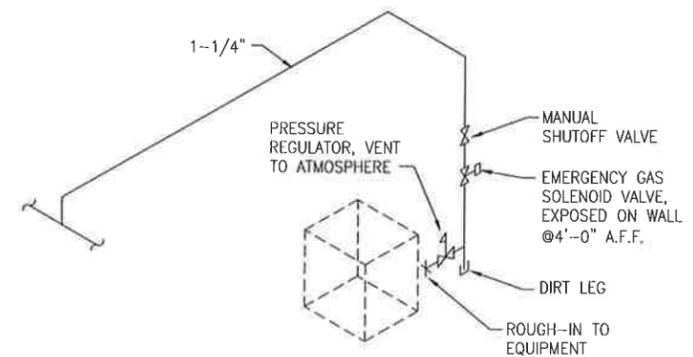
3 SEISMIC CABLE RESTRAINTS DETAIL
SCALE: NONE



4 SEISMIC MOUNTING DETAIL
SCALE: NONE



5 HOT WATER BOILER PIPING DETAIL
SCALE: NONE



6 GAS PIPING DETAIL
SCALE: NONE



DETAILS

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SHEET ME-5

EXISTING UTILITIES AND EQUIPMENT

REMOVE, CAP AND/OR RELOCATE EQUIPMENT/DUCTWORK/PIPING AS SHOWN AND SPECIFIED ON DRAWINGS.

EXAMINE ALL EXISTING STRUCTURES DESIGNATED FOR REMOVAL TO DETERMINE THE UTILITY LINES PERTINENT TO THE WORK REQUIRING CAPPING, PLUGGING AND/OR REMOVAL AND/OR RELOCATION TO MAINTAIN SERVICES OF OTHER FIXTURES OR EQUIPMENT, WHETHER ON DRAWINGS OR NOT.

CONTINUITY OF SERVICES SUCH AS GAS, PLUMBING, DRAINAGE, FIRE PROTECTION, ETC. WITHIN, TO AND FROM FACILITIES IN EXISTING BUILDING SHALL BE MAINTAINED WITHOUT INTERRUPTION, EXCEPT FOR SUCH PERIODS OF TIME AS OWNER DESIGNATES.

ARRANGE AND EXECUTE WORK SO THAT ANY CONNECTIONS - BOTH TEMPORARY AND PERMANENT - TO PRESENT EQUIPMENT, DUCTWORK, PIPING SHALL BE MADE TO ASSURE FULL RESUMPTION OF SERVICE AT TIME OF DESIGNATED BY OWNER.

CONTRACTOR SHALL FURNISH ANY TEMPORARY VALVES, CROSS CONNECTIONS, FITTINGS, PIPING NECESSARY TO ASSURE CONTINUITY OF SERVICES. TEMPORARY VALVES, CROSS CONNECTIONS, FITTINGS, PIPING SHALL BE REMOVED IF INTERFERE WITH FUNCTION OF PERMANENT SYSTEM.

HANGERS & SUPPORTS

SUPPORTS, HANGERS AND STRUCTURAL ATTACHMENTS SHALL BE FACTORY FABRICATED COMPLETE WITH NUTS, BOLTS, AND WASHERS IF ANY. WHERE TYPE AND SIZE ARE NOT INCLUDED, PROPER SELECTION SHALL BE DETERMINED BY THE CONTRACTOR. SUPPORT PIPING IN ACCORDANCE WITH MSS-SP69 AND MSS-SP89.

PIPE INSULATION

INSULATE ALL HOT WATER SUPPLY AND RETURN PIPING WITH 1" THICK ARMSTRONG SELF-SEAL ARMAFLEX 2000 OR EQUIVALENT, K: 0.27. SEAL SEAMS AND BUTT JOINTS WITH 3M#471 TAPE OR ARMSTRONG 520 ADHESIVE. FITTING COVERS: FABRICATE AND INSTALL PER MANUFACTURER'S RECOMMENDATIONS. EXTERIOR APPLICATIONS: FINISH ENTIRE SURFACE WITH (2) COATS OF ARMAFLEX FINISH.

TESTING, ADJUSTING AND BALANCING

ALL MOTORS SHALL BE PROPERLY LUBRICATED AND ADJUSTED.

TEST EACH MOTOR FOR AMPERAGE AND VOLTAGE.

THERMOSTATS AND CONTROLS SHALL BE CALIBRATED AND TESTED.

SUBMIT MINIMUM OF FOUR (4) COPIES OF TESTING AND BALANCING REPORT TO THE ENGINEER FOR APPROVAL. THIS APPROVAL MUST BE GIVEN BEFORE FINAL ACCEPTANCE OF THE HVAC WORK.

EXPANSION TANK

MANUFACTURERS:
1. AMTROL

PROVIDE WITH CARBON STEEL SHELL, HEAVY DUTY BUTYL/EPDM DIAPHRAGM AND RED OXIDE PRIMER COATING. TANK SHALL BE RATED FOR A MINIMUM OF 240°F OPERATING TEMPERATURE AND 125 PSIG WORKING PRESSURE. TANK SHALL BE FACTORY TESTED WITH TAPS FABRICATED AND LABELED ACCORDING TO ASME BOILER AND PRESSURE VESSEL CODE: SECTION VIII, DIVISION 1.

HOT WATER BOILER SCHEDULE

MARK	SERVING	MFR.	MODEL	BOILER HP	CAPACITY MBH		EWT (°F)	LWT (°F)	MAX. WPD (FT. HD.)	FUEL			FLEET.	NOTES			
					INPUT	OUTPUT				GAS		RELIEF VALVE			FLECT.		
										MIN. PRESS. (IN.W.C.)	MAX. PRESS. (IN.W.C.)					DIAMETER (IN.)	(PSIG)
HWB-1	DO BLDG	LOCHINVAR	CHN0652	20	650	552.5	180	220	3	NAT	4.5	10.5	8	30	120/1	8.8	(1)
HWB-2	DO BLDG	LOCHINVAR	CHN0652	20	650	552.5	180	220	3	NAT	4.5	10.5	8	30	120/1	8.8	(1)

- ① PROVIDE WITH HDK3032 POWER DIRECTAIRE HORIZONTAL VENT KIT. THE KIT SHALL INCLUDE POWERED VENT CAP, PROVING SWITCH, AIR INLET CAP AND AIR INLET CONNECTION TO JACKET, 120 VAC, 4.37 AMP VENT CAP.
- ② PROVIDE A BOILER LISTED FOR DUCTED COMBUSTION AIR INTAKE.

GAS PIPING

REFERENCES - NFPA 54, NATIONAL FUEL GAS CODE.

GAS PIPING - UP TO 2 PSI

STEEL PIPE: ASTM A53, SCHEDULE 40, SEAMLESS, BLACK STEEL PIPE, BEVELED ENDS.

FITTINGS - MALLEABLE IRON THREADED: ANSI B16.3, CLASS 150, STANDARD PATTERN, FOR THREADED JOINTS. THREADS SHALL CONFORM TO ANSI B1.20.1 FOR TAPERED THREADS.

STEEL FITTINGS: SEAMLESS OR WELDED, FOR WELDED JOINTS.

GAS VALVES, 2" AND SMALLER

THREADED ENDS ACCORDING TO B1.20.1 FOR PIPE THREADS.

ASME B16.33 AND IAS-LISTED BRONZE BODY AND 125 PSIG PRESSURE RATING.

QUALITY ASSURANCE

WELDING MATERIALS AND PROCEDURES: CONFORM TO ASME SECTION IX AND APPLICABLE STATE LABOR REGULATIONS.

WELDERS CERTIFICATION: IN ACCORDANCE WITH ASME SECTION IX NCPWB STANDARD PROCEDURE SPECIFICATIONS.

DELIVERY, STORAGE AND PROTECTION

ACCEPT VALVES ON SITE IN SHIPPING CONTAINERS WITH LABELLING IN PLACE. INSPECT FOR DAMAGE.

PROVIDE TEMPORARY END CAPS AND CLOSURES ON PIPING AND FITTINGS UNTIL INSTALLATION.

INSTALLATION

EXTEND NATURAL GAS PIPING AND CONNECT TO GAS DISTRIBUTION SYSTEM PIPING IN LOCATION AND SIZE SHOWN ON DRAWINGS.

INSTALL GAS PIPING AT UNIFORM GRADE OF 1/4" PER 15 FEET, UPWARD FROM RISER TO EQUIPMENT.

MAKE SIZE REDUCTIONS IN PIPE SIZES WITH ECCENTRIC REDUCER FITTINGS INSTALLED WITH LEVEL SIDE DOWN.

CONNECT BRANCH PIPING FROM TOP OR SIDE OF HORIZONTAL PIPING.

INSTALL UNIONS IN PIPES 2" AND SMALLER AT EQUIPMENT CONNECTIONS, DOWNSTREAM OF SHUT-OFF VALVE.

INSTALL STRAINERS ON SUPPLY SIDE OF EACH GAS PRESSURE REGULATOR.

INSTALL DRIP LEG WITH CAPPED BOTTOM OUTLET AS CLOSE AS PRACTICAL TO GAS EQUIPMENT INLET.

PUMP

MANUFACTURERS:

- 1. TACO
- 2. BELL & GOSSETT
- 3. GRUNDFOSS
- 4. ARMSTRONG

INLINE BOILER PUMP

BODY: CAST IRON WITH FLANGED IN-LINE CONNECTIONS.
IMPELLER: CAST BRONZE, CLOSED, DYNAMICALLY BALANCES.
SHAFT: ALLOW STEEL WITH CUPRO-NICKEL SLEEVE.
FRAME: BALL BEARING TYPE, PERMANENTLY LUBRICATED.

SYSTEM PUMP

PROVIDE WITH REPLACEABLE CARTRIDGE BALL BEARINGS, TAPPED SUCTION AND DISCHARGE PORTS, CASING SHALL BE CAST IRON. IMPELLER SHALL BE CAST BRONZE. PROVIDE WITH HARDENED ALLOY STEEL SHAFT AND CUPRO-NICKEL SHAFT SLEEVE.

SEQUENCE OF CONTROL

THE CONTROL OF BOILERS SHALL BE ACTIVATED UPON PROOF OF FLOW THROUGH THE BOILERS VIA A FLOW SWITCH IN THE COMMON RETURN PIPING. CONTROLS INTEGRAL WITH THE BOILERS SHALL MAINTAIN THE SET LEAVING WATER TEMPERATURE. ANY BOILER SHALL BE CAPABLE OF BEING ENABLED OR DISABLED FROM THE INTEGRAL BOILER CONTROLS. ALTERNATE LEAD LAG BOILER ON TIME CLOCK ONCE EACH DAY. IN THE DISABLED (OFF) MODE THE BOILER SHALL BE OPERATED SUBJECT TO LOCAL CONTROLS. CONTROL CONTRACTOR SHALL COORDINATE ALL WIRING REQUIRING TIE-IN WITH THE WIRING IN THE BOILER CONTROL PANEL WITH THE BOILER MANUFACTURER. WHEN BOILER IS ENABLED, ENERGIZE ASSOCIATED PUMP. WHEN THE LEAD BOILER REACHES HIGH FIRE WITH ALL STAGES ON, THE INTERNAL SEQUENCER IN THE DESIGNATED LEADER WILL START THE LAG BOILER WHEN ADDITIONAL CAPACITY IS REQUIRED AND STAGE THAT BOILER TO HIGHER FIRE AS DETERMINED BY THE INTERNAL PID ROUTINE. AS LOAD DECREASES, THE LAG BOILER WILL FIRST BE STAGED DOWN AND TURNED OFF AND THEN THE LEAD BOILER STAGES WILL BE SEQUENCED OFF. THE DIFFERENTIAL TEMPERATURES ABOVE SETPOINT TO TURN OFF THE LEAD BOILER AND BELOW SETPOINT TO TURN ON THE LEAD BOILER ARE PROGRAMMABLE INDEPENDENTLY OF THE OPERATING SETPOINT TO ALLOW STABLE OPERATION OF THE COMPLETE BOILER SYSTEM WITHOUT SHORT-CYCLING BETWEEN ON AND OFF. BOILER SHALL CYCLE TO MAINTAIN VARIABLE HOT WATER SUPPLY TEMPERATURE RESET AS OUTDOOR AIR TEMPERATURE CHANGES:

OUTDOOR AIR=-10°F; LEAVING WATER=220°F
OUTDOOR AIR=70°F; LEAVING WATER=90°F

PROVIDE ASSURED LOW FIRE SHUT OFF.
PROVIDE INTERLOCK OF NEW BOILERS WITH NEW PUMPS IN ACCORDANCE WITH EXISTING SEQUENCES. CONTROL NEW THREE-WAY VALVES TO BYPASS OFF BOILER.

FIRESTOPPING

PENETRATIONS IN FIRE RATED PARTITIONS SHALL BE PROTECTED BY AN APPROVED PENETRATION FIRESTOP SYSTEM INSTALLED AS TESTED IN ACCORDANCE WITH ASTM 814 OR UL 1479 WITH A MINIMUM POSITIVE PRESSURE DIFFERENTIAL OF 0.01 INCH OF WATER AND SHALL HAVE AN F RATING OF NOT LESS THAN THE REQUIRED FIRE RATING OF THE WALL PENETRATED.

CONTRACTOR SHALL SUBMIT PROPOSED FIRESTOPPING SYSTEM PRIOR TO START OF FIRESTOPPING WORK.

INSTALLER SHALL EMPLOY AT LEAST ONE DESIGNATED RESPONSIBLE INDIVIDUAL (DRI) PER FM 4991 OR UNDERWRITERS LABORATORIES QFC PROGRAM.
ACCEPTABLE FIRESTOPPING SYSTEM MANUFACTURERS:

- 1. DOW CORNING CORP.
- 2. HILTI CORP.
- 3. 3M FIRE PROTECTION PRODUCTS.
- 4. SPECIFIED TECHNOLOGIES INC.
- 5. TREMCO INC.
- 6. UNITED STATES GYPSUM CO.
- 7. SUBSTITUTIONS: NOT PERMITTED.

ATTACH FIRESTOPPING LABELS WITHIN SIX INCHES OF INSTALLATION. INCLUDE THE FOLLOWING INFORMATION ON THE LABELS:

- 1. THE WORDS "WARNING - THROUGH PENETRATION FIRESTOPPING SYSTEM - DO NOT DISTURB. NOTIFY FACILITIES DEPARTMENT OF ANY DAMAGE."
- 2. DATE OF INSTALLATION.
- 3. FIRESTOPPING SYSTEM MANUFACTURER NAME.
- 4. INSTALLING CONTRACTOR NAME.
- 5. UL OR FM TESTED ASSEMBLY DESIGNATION.
- 6. NAME OF INSTALLING TECHNICIAN.

PROCEED WITH ENCLOSING FIRESTOPPING SYSTEMS WITH OTHER CONSTRUCTION ONLY AFTER ACCEPTANCE BY BUILDING OFFICIAL (A/HJ) AND INSPECTION REPORTS (IF ANY) ARE ISSUED AND FIRESTOPPING INSTALLATIONS COMPLY 100 PERCENT WITH REQUIREMENTS.

HOT WATER BOILER

MANUFACTURERS:

- 1. LOCHINVAR
- 2. PRECISION
- 3. WEIL-MCLAIN
- 4. BRYANT
- 5. LAARS

THE WATER CONTAINING SECTION SHALL BE OF A "FIN TUBE" DESIGN, WITH STRAIGHT COPPER TUBES HAVING EXTRUDED INTEGRAL FINS. THE TUBES SHALL TERMINATE INTO A ONE PIECE, GLASS LINED, CAST IRON HEADER. THERE SHALL BE NO BOLTS, GASKETS OR "O" RINGS IN THE HEAD CONFIGURATION. THERE SHALL BE ACCESS TO THE FRONT HEADER OF THE HEAT EXCHANGER FOR THE PURPOSES OF INSPECTION, CLEANING OR REPAIR. THE BOILER SHALL BEAR THE ASME "H" STAMP FOR 160 PSI WORKING PRESSURE AND SHALL BE NATIONAL BOARD LISTED. THE COMPLETE HEAT EXCHANGER ASSEMBLY SHALL CARRY A TEN (10) YEAR LIMITED WARRANTY.

THE BOILER SHALL HAVE AN INTEGRAL VARIABLE SPEED COMBUSTION AIR BLOWER TO PRECISELY CONTROL THE FUEL/AIR MIXTURE FOR MAXIMUM EFFICIENCY. THE BOILER SHALL BE CONSTRUCTED WITH A HEAVY GAUGE GALVANIZED STEEL JACKET ASSEMBLY, PRIMED AND PRE-PAINTED ON BOTH SIDES WITH A MINIMUM DRY FILM THICKNESS OF 0.70 MILS. THE JACKET DESIGN SHALL ALLOW SINGLE UNIT VENTING CONNECTION WITHOUT THE USE OF EXTERNAL DRAFT HOOD DEVICES.

THE BOILER SHALL BE CERTIFIED AND LISTED BY C.S.A. INTERNATIONAL UNDER THE LATEST EDITION OF THE HARMONIZED ANSI Z21.13 TEST STANDARD FOR THE US AND CANADA. THE BOILER SHALL COMPLY WITH THE ENERGY EFFICIENCY REQUIREMENTS OF THE LATEST EDITION OF THE ASHRAE 90.1 STANDARD. THE BOILER SHALL OPERATE AT A MINIMUM 84% THERMAL EFFICIENCY.

THE STANDARD OPERATING CONTROL SYSTEM SHALL INCLUDE A PROVEN ELECTRONIC HOT SURFACE IGNITION SYSTEM WITH FULL FLAME MONITORING CAPABILITY. THE IGNITION MODULE SHALL GO INTO A HARD LOCKOUT ON FLAME FAILURE WHICH REQUIRES PUSHING A SEPARATE MANUAL RESET BUTTON TO ALLOW THE IGNITION MODULE TO BEGIN A NEW TRIAL FOR IGNITION SEQUENCE. THE IGNITION MODULE SHALL GO INTO A SOFT LOCKOUT ON CONDITIONS OF LOW AIR, LOW VOLTAGE OR LOW IGNITER CURRENT. AT A SOFT LOCKOUT, THE MODULE WILL PAUSE FOR A TIMED PERIOD BASED ON THE FAULT AND THEN BEGIN A NEW TRIAL FOR IGNITION SEQUENCE. IF THE SOFT LOCKOUT FAULT HAS NOT BEEN CORRECTED, THE MODULE WILL CONTINUE IN THE SOFT LOCKOUT CONDITION. THE IGNITION SYSTEM SHALL PROVIDE REMOTE INDICATION OF A FULL DIAGNOSTIC SEQUENCE VIA A FLASHING IGNITION MODULE STATUS LIGHT ON THE CONTROL PANEL.

A 24 VAC CONTROL CIRCUIT AND COMPONENTS SHALL BE USED. ALL COMPONENTS SHALL BE EASILY ACCESSED AND SERVICEABLE.

THE BOILER FACTORY CONTROLS MUST BE CAPABLE OF INTERFACE WITH MODBUS OR BACNET.

THE BOILER SHALL BE APPROVED FOR SIDEWALL VENTING AND DUCTED COMBUSTION AIR INTAKE. PROVIDE VENT LISTED FOR INSTALLATION OF BOILER AND FAN.

FABRICATE MOUNTING BASE AND ATTACHMENT TO BOILER, ACCESSORIES, AND COMPONENTS WITH REINFORCEMENT STRONG ENOUGH TO WITHSTAND SEISMIC FORCES.

HYDRONIC PUMP SCHEDULE

MARK	SERVING	MFR.	MODEL	GPM	HEAD (FT.)	MOTOR		ELECTRICAL	NOTES
						HP	RPM		
P-1	HWB-1	TACO	1911	37	13	1/3	1750	120/1	(1)
P-2	HWB-2	TACO	1911	37	13	1/3	1750	120/1	(1)
HWP-1A	1ST FLOOR	B&G	619T 2X2X7	70	45	2	1750	480/3	
HWP-1B	1ST FLOOR	B&G	619T 2X2X7	70	45	2	1750	480/3	
HWP-2A	1ST,2ND,3RD	TACO	1619C	50	65	2	1750	480/3	
HWP-2B	1ST,2ND,3RD	TACO	1619C	50	65	2	1750	480/3	

① BOILER CIRCULATOR PUMP. SEE SHEET ME-5.

EXPANSION TANK SCHEDULE

MARK	SYSTEM SERVING	MFR.	MODEL	LOCATION	SIZE		TANK VOLUME (GAL)	AVE. OPER. TEMP (°F)	FILL. PRESS. (PSI)	NOTES
					DIA. (IN)	HGT. (IN)				
ET-1	BOILERS	AMTROL	AX-100-150R	130-MECH ROOM	24	33	55.7	180	150	(1)

① HORIZONTAL TANK. PROVIDE WITH RESTRAINTS.



SCHEDULES AND SPECIFICATIONS

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SHEET M-6