
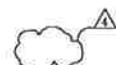

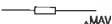



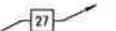










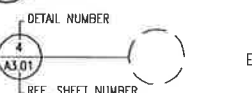





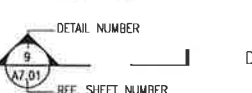







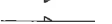


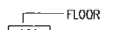

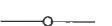



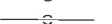



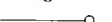



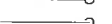

















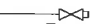



DRAWING CONVENTION SYMBOLS			ABBREVIATIONS		PIPING SYMBOLS LEGEND		HEATING AND AIR CONDITIONING SYMBOLS LEGEND						
	PLAN NORTH		REVISIONS CLOUD AND NUMBER	AVE DIA FLA FT FTHD G GAL GPM HGT HP HWR HWS IN INWC MFR OPER PH PRESS PSI RPM TEMP TMC TYP	AVERAGE DIAMETER FULL LOAD AMPS FEET FEET OF HEAD GAS GALLONS GALLONS PER MINUTE HEIGHT HORSEPOWER HOT WATER RETURN HOT WATER SUPPLY INCHES INCHES OF WATER COLUMN MANUFACTURER OPERATING PHASE PRESSURE POUNDS PER SQUARE INCH REVOLUTIONS PER MINUTE TEMPERATURE TRAFFIC MANAGEMENT CENTER TYPICAL		ISOLATION VALVE		FLEXIBLE PIPE CONNECTION		TRANSITION PIECE		DIRECTION OF SUPPLY AIR
	GRAPHIC SCALE		DEMOLITION KEYNOTE				CHECK VALVE		AIR VENT (MANUAL)		RADIUS ELBOW		DIRECTION OF RETURN/EXHAUST AIR
	DETAIL NUMBER 1 TITLE OF DETAIL SCALE:		KEYNOTE				GLOBE VALVE		AIR VENT (AUTOMATIC)		EXPANSION JOINT		CONDENSATE DRAIN LINE
	DETAIL NUMBER 4 A3.01 REF. SHEET NUMBER		BREAK LINE				GLOBE ANGLE VALVE		CONCENTRIC REDUCER		RETURN/EXHAUST AIR DUCT		GAS
	DETAIL NUMBER 9 A7.01 REF. SHEET NUMBER		OUTLINE OF HIDDEN OBJECTS, NIC ITEMS, REMOVED MATERIALS				BALL VALVE		ECCENTRIC REDUCER		SUPPLY AIR DUCT		HEATING HOT WATER SUPPLY
			CENTER LINE OR FLOOR LINE				UNION		TEE (SIDE OUTLET UP)		INCLINED DROP IN THE DIRECTION OF AIR FLOW		HEATING HOT WATER RETURN
			ROOM NUMBER				CALIBRATED BALANCING VALVE		TEE (SIDE OUTLET DOWN)		INCLINED RISE IN THE DIRECTION OF AIR FLOW		EQUIPMENT OR PLUMBING FIXTURE DESIGNATION
							SOLENOID VALVE		ELBOW (TURNED UP)		RECTANGULAR DUCT SIZE (1st FIGURE SIDE SHOWN.)		ACCESS AREA
							BUTTERFLY VALVE		ELBOW (TURNED DOWN)		ROUND DUCT DIAMETER		CONNECT NEW TO EXISTING
							TEMPERATURE AND PRESSURE RELIEF VALVE		CAP		NEW		AIR DEVICE DESIGNATION
							PRESSURE GAUGE		FLOW SWITCH		EXISTING		SCHEDULE TYPE (SEE AIR DEVICE SCHEDULE)
							THERMOMETER		HOSE END VALVE		DEMOLITION		AIR QUANTITY (CFM)
							PRESSURE REDUCING VALVE		3-WAY VALVE				FUTURE CFM
							DIRECTION OF FLOW		AIR SEPARATOR				NECK SIZE (INCHES)
							PIPE GUIDES		HYDRONIC PUMP				
							2-WAY MOTORIZED VALVE/AUTO FEED VALVE						

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	SUBSEQUENT SUBMITTAL		
					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-4			
OTHER GENERAL EQUIP AND SYSTEM COMP: IP=1.0								
DUCTILE PIPING ≤ 3", IP=1.0		X		X	SHEET ME-4			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		X	X			X		1
SEISMIC USE GROUP: III SEISMIC DESIGN CATEGORY: D SITE CLASS: D								
<p><u>NOTE:</u> 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><u>NOTE A:</u> 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><u>NOTES</u> 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>								

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 DOOR 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.



ABBREVIATIONS, SYMBOLS, GENERAL NOTES
AND SEISMIC CODE BLOCK

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PREPARED FOR:

**MISSOURI DEPARTMENT
OF TRANSPORTATION**

DIVISION OF GENERAL SERVICES
FACILITIES MANAGEMENT

ST. LOUIS TRAFFIC MANAGEMENT CENTER
14301 SOUTH OUTER FORTY DR
CHESTERFIELD, MO 63017

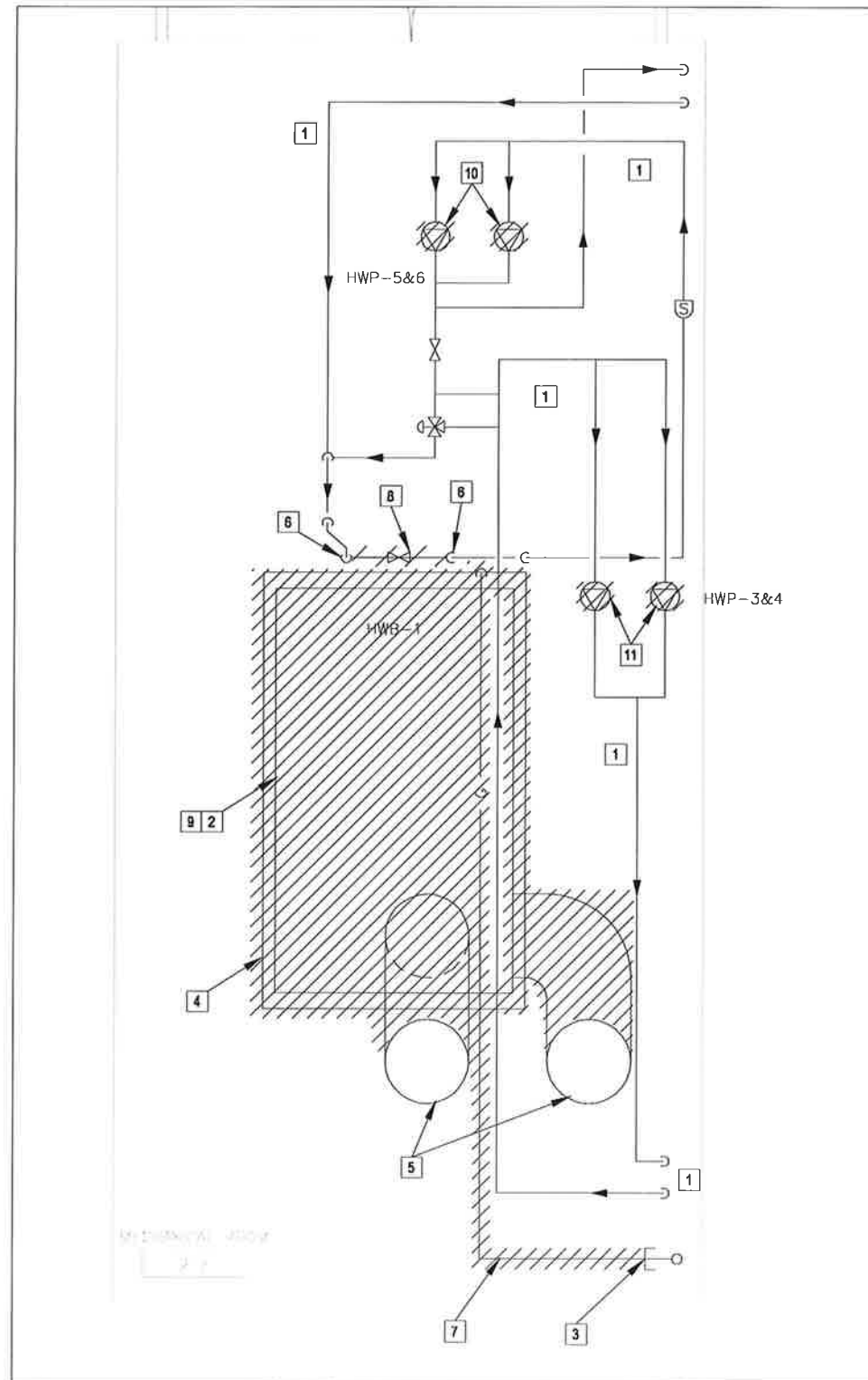
DESIGN BY: SEDEN LAMP

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 FLUE/COMBUSTION AIR DUCT UP TO 2'-0" BELOW CEILING. CAP DUCT TEMPORARILY.
- 6 REMOVE HWS AND HWR PIPES UP TO 2'-0" ABOVE BYPASS PIPING. CAP PIPES TEMPORARILY.
- 7 REMOVE GAS PIPING SHOWN HATCHED.
- 8 REMOVE BYPASS PIPING AND CIRCUIT SETTER, CLEAN AND STORE TO BE REINSTALLED.
- 9 EX. 120-VOLT, 1-PH GAS BOILER. REMOVE DISCONNECT. TAG "BOILER" AND PRESERVE CONDUIT & WIRE BACK TO CIRCUIT PANEL FOR RECONNECTION TO NEW BOILER.
- 10 EX. 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 PUMP.
- 11 EX. 480-VOLT, 3-PH, 1-1/2 HP HOT WATER PUMP. REMOVE DISCONNECT/STARTER. TAG "1-1/2 HP PUMP" AND PRESERVE CONDUIT & WIRE FOR RECONNECTION TO NEW 1-1/2 HP PUMP.

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



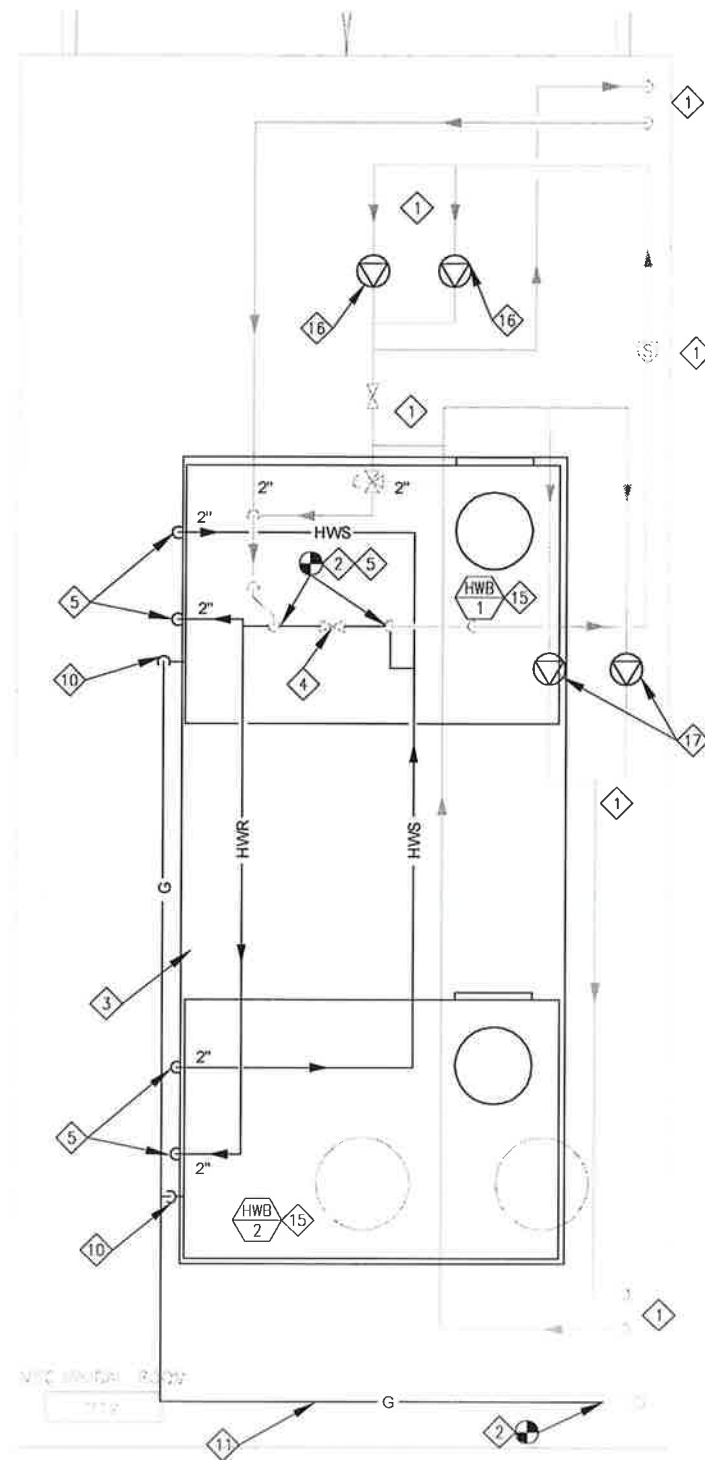
MECHANICAL DEMOLITION PLAN

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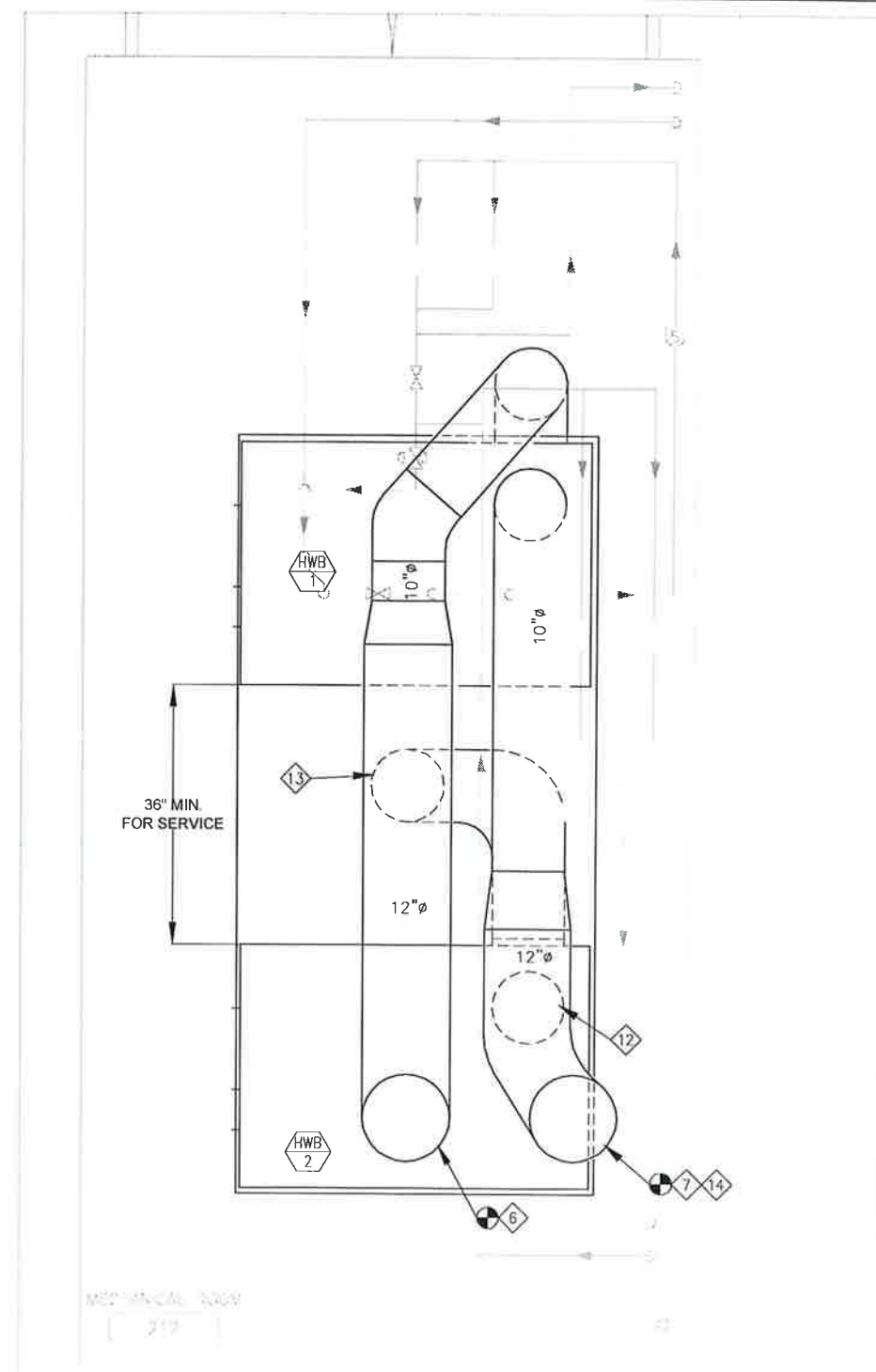
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SHEET ME-2



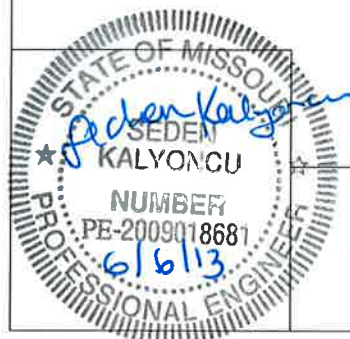
1 NEW PIPING PLAN
SCALE: 1"=1'-0"



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

SHEET KEYNOTES

- 1 EXISTING TO REMAIN.
- 2 CONNECT NEW TO EXISTING, VERIFY SIZE AND LOCATION IN FIELD.
- 3 INSTALL 8'9"x4'2"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 REINSTALL EXISTING BYPASS PIPING AND THREE-WAY VALVE ABOVE HWR AND HWS PIPES FROM BOILERS.
- 5 SEE DETAIL #5 ON SHEET M-4 FOR BOILER INLET/OUTLET PIPING DETAILS.
- 6 CONNECT NEW 12"Ø COMBUSTION AIR DUCT TO EXISTING IN THE VERTICAL.
- 7 CONNECT NEW 12"Ø GALVANIZED DUAL WALL "B" LABELED VENT TO EXISTING IN THE VERTICAL. INSTALL THE FOLLOWING ROOF EXHAUSTER OR EQUAL ON ROOF AT THE FLUE TERMINATION:
TJERLUND RT1500 (12"Ø)
120 VAC, 1550 RPM
5.8 AMPS, 1/2 HP, 47 LBS.
- 8 NOT USED.
- 9 NOT USED.
- 10 1-1/4" GAS PIPE TO MANUFACTURER'S GAS TRAIN.
- 11 2" GAS PIPE.
- 12 CONNECT 10"Ø GALVANIZED DUAL WALL "B" LABELED VENT FROM HWB-2 TO NEW 12"Ø FLUE DUCT ABOVE.
- 13 CONNECT 10"Ø COMBUSTION AIR DUCT FROM HWB-2 TO NEW 12"Ø COMBUSTION AIR DUCT ABOVE.
- 14 120-VOLT, 1-PH, 4.4-AMP, EXHAUSTER 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 TMC PANEL RP2A AND CIRCUIT TO EXHAUSTER WITH (2) #12 AWG & #12 GND IN 3/4" IMC. AMEND PANEL SCHEDULE AND REPORT NEW CIRCUIT TO THE OWNER. COORDINATE WIRING ROUTING TO ROOF WITH OWNER.
- 15 120-VOLT, 1-PH, GAS BOILER. DISCONNECT: 277-VOLT, 20-AMP SINGLE-POLE SWITCH TOGGLE IN GALVANIZED CAST METAL BOX AND GALVANIZED COVER. EXTEND EXISTING BOILER CIRCUIT PRESERVED FROM DEMOLITION TO NEW BOILER.
- 16 480-VOLT, 3-PH, 2 HP, HOT WATER PUMP. PROVIDE EACH WITH NEMA SIZE 1 HEAVY-DUTY COMBINATION STARTER. EXTEND EXISTING 2-HP PUMP CIRCUIT PRESERVED FROM DEMOLITION TO NEW 2-HP PUMP.
- 17 480-VOLT, 3-PH, 1-1/2 HP, HOT WATER PUMP. PROVIDE EACH WITH NEMA SIZE 1 HEAVY-DUTY COMBINATION STARTER. EXTEND EXISTING 1-1/2 HP PUMP CIRCUIT PRESERVED FROM DEMOLITION TO NEW 1-1/2 HP PUMP.



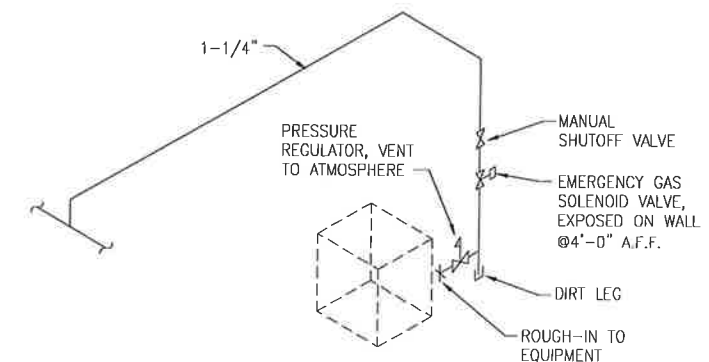
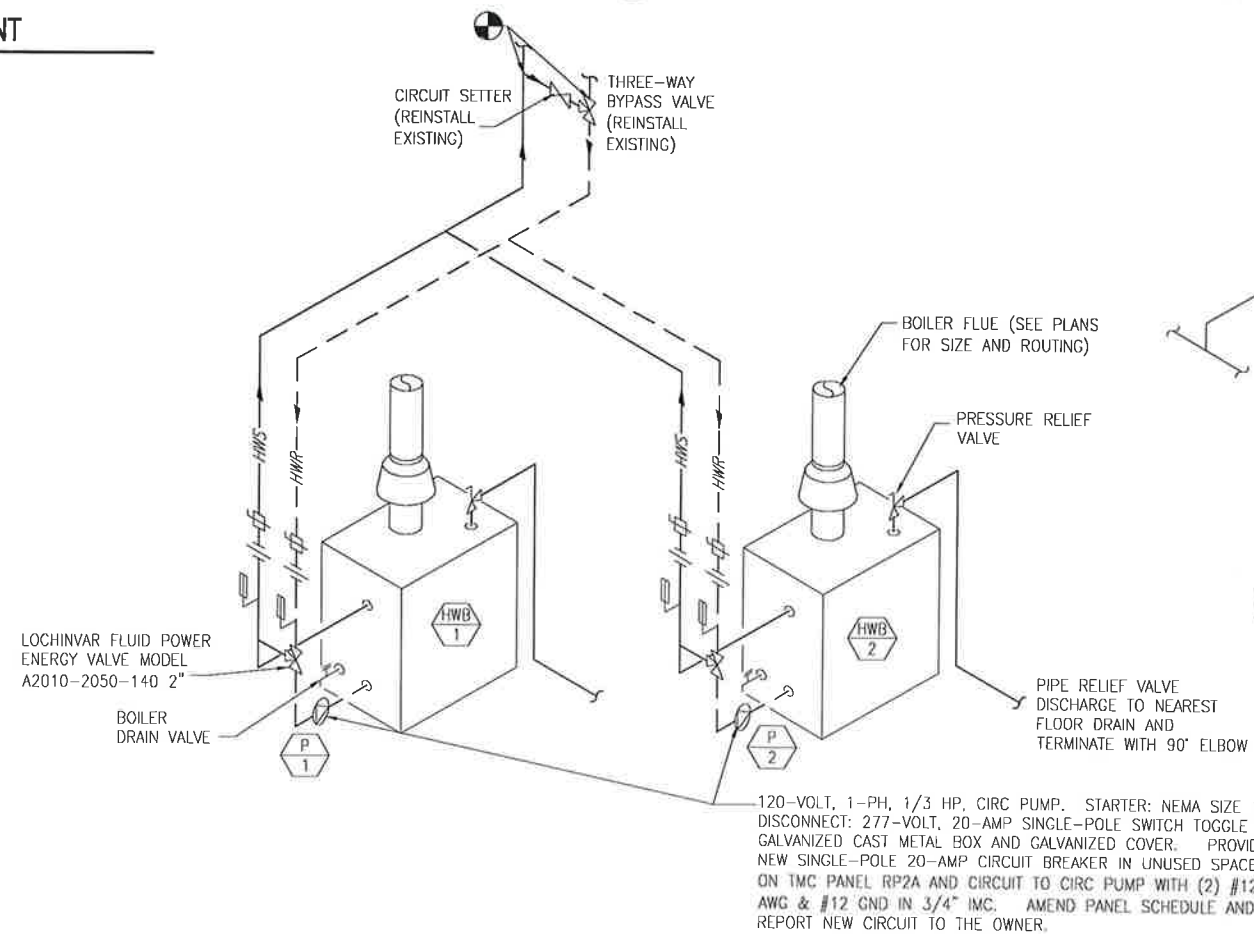
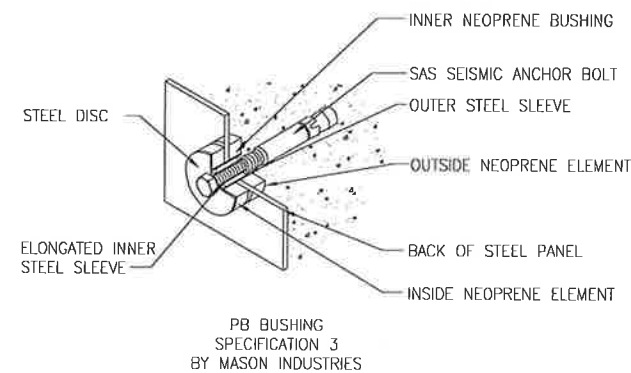
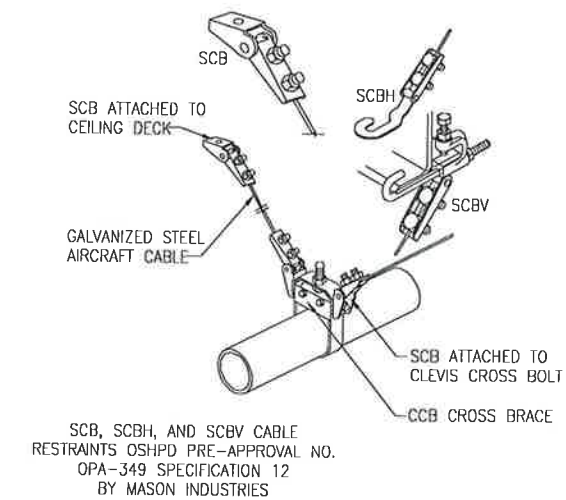
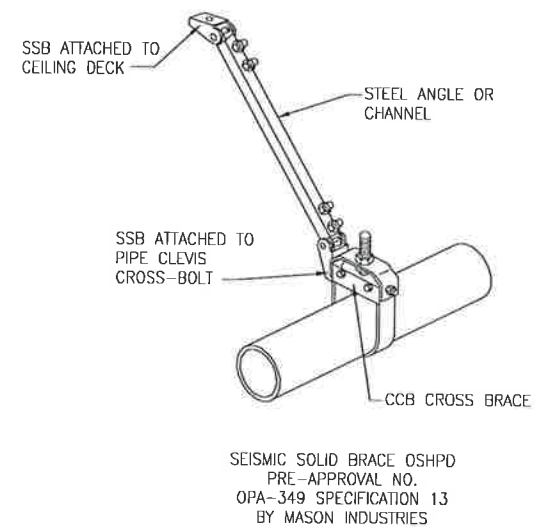
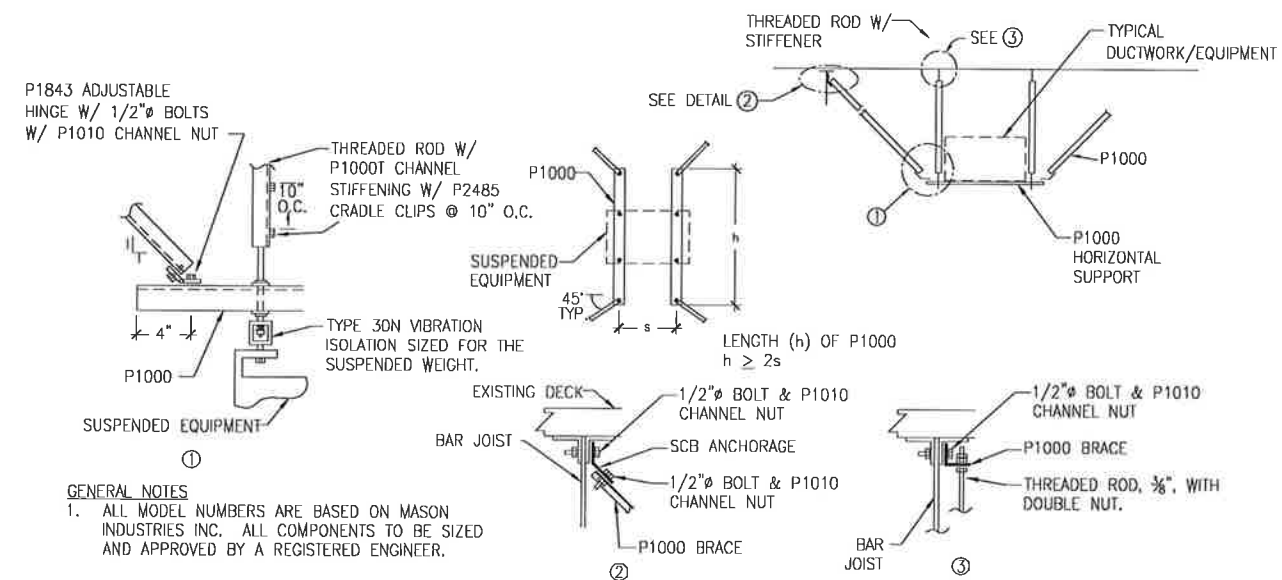
NEW PIPING AND DUCTWORK PLANS

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DRAWN BY: SEDEN LAMP
DATE: 05/15/2013
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SHEET ME-3



DETAILS

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SHEET ME-4

EXISTING UTILITES 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 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.

DAMPERS SHALL BE LOCKED IN PLACE.

TEST EACH EXHAUST FAN FOR PROPER CFM.

TEST EACH MOTOR FOR AMPERAGE AND VOLTAGE.

THERMOSTATS AND CONTROLS SHALL BE REGULATED 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.

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 SHALL BE CAPABLE OF INTERFACE WITH MODBUS OR BACNET.

THE BOILER SHALL BE APPROVED FOR 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.

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.

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

PUMP CASING SHALL BE CAST IRON, SUITABLE FOR 175 PSIG WORKING PRESSURE AT 140°F. THE CASING SHALL BE HYDROSTATICALLY TESTED TO 150% MAXIMUM WORKING PRESSURE. THE CASING SHALL BE RADially SPLIT TO ALLOW FOR REMOVAL OF THE ROTATING ELEMENT WITHOUT DISTURBING THE PIPE CONNECTIONS. THE CASING SUCTION AND DISCHARGE CONNECTIONS SHALL BE THE SAME SIZE AND SHALL BE PROVIDED WITH DRILLED AND TAPPED SEAL VENT AND PRESSURE GAUGE CONNECTIONS. MECHANICAL SEAL SHALL BE SINGLE SPRING INSIDE TYPE WITH CARBON AGAINST SILICONE CARBIDE FACES. EPDM ELASTOMER WITH STAINLESS STEEL SPRING AND HARDWARE SHALL BE PROVIDED. IMPELLERS MUST BE MADE OF BRONZE, TRIMMED AND THEN BALANCED TO THE DESIGN CONDITIONS SPECIFIED. A BRONZE SHAFT SLEEVE, EXTENDING THE FULL LENGTH OF THE MECHANICAL SEAL AREA, SHALL BE PROVIDED.

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.

HOT WATER BOILER SCHEDULE																	
MARK	SERVING	MFR.	MODEL	BOILER HP	CAPACITY MBH		EWT (°F)	LWT (°F)	MAX. WPD (FT.HD.)	FUEL			FLUE DIAMETER (IN.)	RELIEF VALVE (PSIG)	ELECT.		NOTES
					INPUT	OUTPUT				TYPE	GAS				VOLTS/PH	FLA	
											MIN. PRESS. (IN.W.C.)	MAX. PRESS. (IN.W.C.)					
HWB-1	TMC BLDG	LOCHINVAR	CHN0992	30	990	842	180	220	3	NAT	5	10.5	10	30	120/1	10.5	
HWB-2	TMC BLDG	LOCHINVAR	CHN0992	30	990	842	180	220	3	NAT	5	10.5	10	30	120/1	10.5	

HYDRONIC PUMP SCHEDULE									
MARK	SERVING	MFR.	MODEL	GPM	HEAD (FT.)	MOTOR		ELECTRICAL	NOTES
						HP	RPM	VOLTS/PH	
P-1	HWB-1	TACO	1911	55	15	1/2	1750	120/1	①
P-2	HWB-2	TACO	1911	55	15	1/2	1750	120/1	①
HWP-3	HW SUPPLY	ARMSTRONG	4380 1.5X1.5X8	40	45	1.5	1500	480/3	
HWP-4	HW SUPPLY	ARMSTRONG	4380 1.5X1.5X8	40	45	1.5	1500	480/3	
HWP-5	HW RETURN	ARMSTRONG	4380 2X2X8	70	40	2	1500	480/3	
HWP-6	HW RETURN	ARMSTRONG	4380 2X2X8	70	40	2	1500	480/3	
① HOW WATER BOILER CIRCULATOR PUMP. SEE SHEET ME-4.									



SCHEDULES AND SPECIFICATIONS

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OF TRANSPORTATION

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FACILITIES MANAGEMENT

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SHEET M-5