PROJECT: MODOT DISTRICT 8 BOILER REPLACEMENT

PROJ. NO: C8X15036

DATE: MAY 23, 2011

SET NO.

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DWG	REV	DRAWING DESCRIPTION
M0	0	OVERALL FACILITY – MECHANICAL – NOTES AND LEGENDS
M1–DEMO	0	MAIN FACILITY – BASEMENT – MECHANICAL – DEMOLITION PLAN
M1	0	MAIN FACILITY – BASEMENT – MECHANICAL – NEW EQUIPMENT LAYOUT
M2	0	MAIN FACILITY – BASEMENT – MECHANICAL – SECTIONS AND DETAILS
M3	0	MAIN FACILITY – MECHANICAL – BOILER SYSTEM P&ID
M4	0	MAIN FACILITY – MECHANICAL – BOILER SYSTEM P&ID SCHEDULE
M5	0	OVERALL FACILITY – MECHANICAL – GENERAL MECHANICAL SPECIFICATIONS
M6	0	OVERALL FACILITY – MECHANICAL – GENERAL MECHANICAL SPECIFICATIONS
E0	0	OVERALL FACILITY – ELECTRICAL – SYMBOLS AND ABBREVIATIONS
E1	0	MAIN FACILITY – BASEMENT – ELECTRICAL – BASEMENT POWER PLAN
E2	0	MAIN FACILITY – BASEMENT – ELECTRICAL – PANEL MSB ONE–LINE DIAGRAM
E3	0	MAIN FACILITY – BASEMENT – ELECTRICAL – PANELBOARD SCHEDULES
E4	0	MAIN FACILITY – BASEMENT – ELECTRICAL – DETAILS

PROJECT ADDRESS: 3025 E. KEARNEY STREET SPRINGFIELD, MO 65801

ELECTRICAL CONTROLS SYMBOLS

SYMBOL	DESCRIPTION
	CONTACT NORMALLY OPEN (RELAY, CONTACTOR, INSTANTANEOUS, ETC)
	CONTACT NORMALLY CLOSED (RELAY, CONTACTOR, INSTANTANEOUS, ETC)
OL'S	OVERLOAD RELAY CONTACTS
	PUSHBUTTON NORMALLY OPEN
	PUSHBUTTON NORMALLY CLOSED
	MUSHROOM HEAD BUTTON (PUSH–PULL)
OFF ON OFF ON	TWO POSITION SELECTOR SWITCH
XXXX	3 OR 4 POSITION SELECTOR SWITCH CONTACT TABLE 1 2 3 4 SWITCH POSITION XXXX = X= CLOSED, O= OPEN
	PHOTOEYE NORMALLY OPEN/CLOSED
	PROXIMITY SWITCH NORMALLY OPEN
	PROXIMITY SWITCH NORMALLY CLOSED
	SWITCH SPST (SINGLE POLE SINGLE THROW)
	SWITCH SPDT (SINGLE POLE DOUBLE THROW)
	TEMPERATURE SWITCH/CLOSES ON TEMPERATURE RISE AND OPENS ON TEMPERATURE DROP
	TEMPERATURE SWITCH/OPENS ON TEMPERATURE RISE AND CLOSES ON TEMPERATURE DROP
T=XX	NORMALLY OPEN CONTACT, DELAYED CLOSING AFTER ENERGIZATION XX= TIME DELAY SETTING
T=XX	NORMALLY CLOSED CONTACT, DELAYED OPENING AFTER ENERGIZATION XX= TIME DELAY SETTING
T=XX	NORMALLY OPEN CONTACT, DELAYED OPENING AFTER DE–ENERGIZATION XX= TIME DELAY SETTING
T=XX	NORMALLY CLOSED CONTACT, DELAYED OPENING AFTER DE–ENERGIZATION XX= TIME DELAY SETTING
	FOOT SWITCH NORMALLY OPEN
	FOOT SWITCH NORMALLY CLOSED
	LIMIT SWITCH NORMALLY OPEN
	LIMIT SWITCH NORMALLY CLOSED
	FLOW SWITCH NORMALLY OPEN
	FLOW SWITCH NORMALLY CLOSED
	VACUUM/PRESSURE SWITCH NORMALLY OPEN
	VACUUM/PRESSURE SWITCH NORMALLY CLOSED
	LIQUID LEVEL (FLOAT) SWITCH NORMALLY OPEN
	LIQUID LEVEL (FLOAT) SWITCH NORMALLY CLOSED
XXX Ω XXX Ω	POTENTIOMETER
XXX Ω XW	RESISTOR
	AMMETER (CURRENT) SWITCH/TRANSMITTER
	WEIGH ELEMENT (LOAD CELL)
	SWITCH POSITION INDICATED BY SHADED AREA

SYMBOL	DESCRIPTION
	GROUND
	SHIELDED CABLE
	SHIELD TO GROUND
	3 LINE POWER WIRING W/SIZE AS INDICATED
#10AWG X	FUSED TERMINAL BLOCK (X = AMP RATING)
	CIRCUIT BREAKER
	RECEPTACLE
	HORN
	BELL
	SOLENOID
MCR	MASTER CONTROL RELAY COIL
SC	SAFETY CONTACTOR
M	MOTOR
CR	CONTROL RELAY COIL
MS	MOTOR STARTER COIL
SSR	SOLID STATE RELAY COIL
TDR	TIME DELAY RELAY COIL
DEV	EXTERNAL SURGE SUPPRESSOR
DEV	INTEGRAL SURGE SUPPRESSOR
X	PILOT LIGHT NON PUSH–TO–TEST R–RED B–BLUE Y–YELLOW G–GREEN
X	PILOT LIGHT PUSH–TO–TEST R–RED B–BLUE Y–YELLOW G–GREEN
	DIODE
	CAPACITOR
1	TERMINAL POINT ON ELECTRICAL COMPONENT
	TERMINAL BLOCK
	CONDUCTORS CONNECTED, WIRE NODE
	CONDUCTORS NOT CONNECTED
(####) (####)	LINE CONTINUATION
	POWER OR CONTROL CONDUCTOR
——XXXX——	CNET–CONTROLNET ENET–ETHERNET DNET–DEVICENET DH485–DATA HIGHWAY 485 DH+–DATA HIGHWAY PLUS PB–PROFIBUS DP–PROFIBUS DP RIO–REMOTE I/O RS232–RS–232 RS422–RS–422 RS485–RS–485
*	UNKNOWN OR OUT OF SCOPE ITEM

COMMERCIAL CABLE SCHEDULE

MK	SIZE	CONDUIT (MIN)	CONDUCTORS (THHN/THWN)	GROUND
1	20A, 2W	1/2"	2–#12	1–#12
2	20A, 3W	1/2"	3–#12	1–#12
	20A, 4W	1/2"	4–#12	1–#12
3	30A, 2W	3/4"	2–#10	1–#10
4	30A, 3W	3/4"	3–#10	1–#10
	30A, 4W	3/4"	4–#10	1–#10
5	40A, 3W	3/4"	3–#8	1–#10
	40A, 4W	3/4"	4–#8	1–#10
6	50A, 3W	1"	3–#6	1–#10
	50A, 4W	1"	4–#6	1–#10
7	60A, 3W	1"	3–#4	1–#10
	60A, 4W	1"	4–#4	1–#10
8	70A, 80A, 3W	1"	3–#4	1–#8
	70A, 80A, 4W	1"	4–#4	1–#8
9	90A, 3W	1 1/4"	3–#2	1–#8
	90A, 4W	1 1/4"	4–#2	1–#8
10	100A, 3W	1 1/4"	3–#2	1–#8
	100A, 4W	1 1/4"	4–#2	1–#8
11	125A, 3W	1 1/2"	3–#1	1–#6
	125A, 4W	1 1/2"	4–#1	1–#6
12	150A, 3W	1 1/2"	3–#1/0	1–#6
	150A, 4W	2"	4–#1/0	1–#6
13	175A, 3W	2"	3–#2/0	1–#6
	175A, 4W	2"	4–#2/0	1–#6
14	200A, 3W	2"	3–#3/0	1–#6
	200A, 4W	2"	4–#3/0	1–#6
15	225A, 3W	2 1/2"	3–#4/0	1–#4
	225A, 4W	2 1/2"	4–#4/0	1–#4
16	250A, 3W	2 1/2"	3–250KCMIL	1–#4
	250A, 4W	2 1/2"	4–250KCMIL	1–#4
17	400A, 3W	2–2" OR 4"	6–#3/0	2–#3
	400A, 4W	2–2" OR 4"	8–#3/0	2–#3
18	600A, 3W	2–3"	6–350KCMIL	2–#1
	600A, 4W	2–3"	8–350KCMIL	2–#1
19	800A, 3W	3–3"	9–350KCMIL	3–#1/0
	800A, 4W	3–3"	12–350KCMIL	3–#1/0
20	1200A, 3W	4–3"	12–350KCMIL	4–#3/0
	1200A, 4W	4–3"	16–350KCMIL	4–#3/0
21	1600A, 3W	5–4"	15–500KCMIL	5–#4/0
	1600A, 4W	5–4"	20–500KCMIL	5–#4/0
22	2000A, 3W	6–4"	18–500KCMIL	6–250KCMIL
	2000A, 4W	6–4"	24–500KCMIL	6–250KCMIL

* INDICATES UNKNOWN CONDUIT AND WIRE SIZE.

REVISED 11/10

ELECTRICAL POWER SYMBOLS

SYMBOL	DESCRIPTION
	INDICATES HOME RUN OF CONDUIT AND WIRING. ALL SHORT LINES INDICATE PHASE WIRES. LONG LINES INDICATE NEUTRAL AND CURVED LINE INDICATES GROUND WIRE. ALL CONDUIT AND WIRE SIZES SHALL BE 3/4" AND #12 THHN/THWN UNLESS OTHERWISE INDICATED
—OHE—	OVERHEAD ELECTRIC
– –UGE– –	UNDERGROUND ELECTRIC
A	FLUORESCENT LIGHT FIXTURE
A OR A	INCANDESCENT OR HID LIGHT FIXTURE
EX	EXIT SIGN
EX	DIRECTIONAL EXIT SIGN
EM/EX	COMBINATION EMERGENCY FIXTURE AND EXIT SIGN
EM	EMERGENCY FIXTURE
—FW—	FIXTURE WIRING
M	MOTOR, SIZE AS INDICATED
M EF	EXHAUST FAN
FS	FLOW SWITCH
SD	SMOKE DETECTOR
F	FIRE ALARM MANUAL PULL STATION
R	DEVICE CONTROL RELAY (SPECIAL)
H	HEAT DETECTOR (FIXED OR ADJUSTABLE)
RTS	DUCT DETECTOR REMOTE TEST SWITCH
D	FIRE ALARM DUCT DETECTOR
	FIRE ALARM STROBE (VISUAL ONLY)
	FIRE ALARM A/V DEVICE (HORN/STROBE)
MH	FIRE ALARM A/V DEVICE (MINI–HORN/STROBE)
	FIRE ALARM A/V DEVICE (BELL/STROBE)
M	MAGNETIC DOOR HOLDER
FACP	FIRE ALARM CONTROL PANEL
ELO	END OF LINE RESISTOR
	120/208V OR 120/240V, 1PH, 3W PANEL
	120/208V, 3PH, 4W PANEL
	120/240V, 3PH, 4W PANEL
	208V, 240V OR 480V, 3PH, 3W PANEL
	480/277V, 3PH, 4W PANEL
MDP	MAIN SERVICE PANEL
UP	UPS POWERED PANEL
GP	GENERATOR PROTECTED PANEL
	BUS DUCT
TR	TRANSFORMER
	CABLE TRENCH OR TRAY
1 2 3 4 5 6	MOTOR CONTROL CENTER
HOA ON R OFF G	HAND–OFF–AUTO SELECTOR SWITCH WITH INDICATING LIGHTS
START STOP	REMOTE STOP–START STATION
	3/4"x10'–0" COPPER GROUND ROD

SYMBOL	DESCRIPTION
Ø	POWER POLE
30	NON–FUSED DISCONNECT SWITCH, SIZE AND RATING AS INDICATED
30/30	FUSED DISCONNECT SWITCH, SIZE AND RATING AS INDICATED
	COMBINATION MOTOR STARTER WITH DISCONNECT SWITCH, SIZE AS INDICATED
1	MOTOR STARTER, SIZE AS INDICATED
1	SOLID STATE OVERLOADS
	MOTOR STARTER, SIZE AS INDICATED
30A 20A	FUSED SWITCH, SIZE AS INDICATED
20AT 30AF	CIRCUIT BREAKER, SIZE AS INDICATED
PB	EMERGENCY STOP PUSHBUTTON
HOA	HAND–OFF–AUTO SELECTOR SWITCH
T	MOTOR THERMALS
JB OR JB	JUNCTION BOX
$	SINGLE POLE SWITCH
$3	THREE WAY SWITCH
$4	FOUR WAY SWITCH
$D	DIMMER SWITCH
$H	FUSED HVAC FURNACE SWITCH
$P	PILOT LIGHT SWITCH
$M	MOTOR STARTING SWITCH
	DUPLEX RECEPTACLE
	CEILING MOUNTED RECEPTACLE
	FLOOR MOUNTED RECEPTACLE
	DEDICATED DUPLEX RECEPTACLE
	QUADPLEX RECEPTACLE
	QUADPLEX DEDICATED RECEPTACLE
TV	DUPLEX RECEPTACLE 1'–0" BELOW CEILING
AFI	ARC FAULT INTERRUPTING RECEPTACLE
GFI	GROUND FAULT INTERRUPTING RECEPTACLE
AC	DUPLEX RECEPTACLE MOUNTED ABOVE COUNTER
3R	NEMA 3R RECEPTACLE
3R GFI	NEMA 3R GFI RECEPTACLE
4X	NEMA 4X RECEPTACLE
XP	HAZARDOUS LOCATION RECEPTACLE
GP	GENERATOR PROTECTED RECEPTACLE
	WELDING RECEPTACLE
C	CLOCK RECEPTACLE 1'–0" BELOW CEILING
	SPECIAL RECEPTACLE AS INDICATED
▲	TELEPHONE OUTLET
▲D	DATA OUTLET
▲V/D	COMBINATION VOICE/DATA OUTLET
VOICE	VOICE SYSTEM PANEL
DATA	DATA SYSTEM PANEL
TV	TELEVISION/VIDEO OUTLET
S	INTERCOM SPEAKER
S $	INTERCOM CALL–IN SWITCH AND SPEAKER
PA	PUBLIC ADDRESS SPEAKER
C	SECURITY CAMERA
CA	SECURITY ACCESS CARD JB
TR	TIMER
PEC	PHOTOCELL

ABBREVIATIONS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
A	AMPS	MDP	MAIN DISTRIBUTION PANEL
AD	AMMONIA DETECTOR	MOV	METAL OXIDE VARISTOR
ADS	AUXILIARY DISCONNECT SWITCH	MS	MOTOR STARTER
AE	AMMONIA ELEMENT	NC	NORMALLY CLOSED
AOB	AIR OUTLET BOX	NO	NORMALLY OPEN
AFI	ARC FLASH INTERRUPTER	OL	OVERLOAD CONTACT
AS	AMMETER (CURRENT) SWITCH	PB	PUSHBUTTON
ATS	AUTOMATIC TRANSFER SWITCH	PBL	PUSHBUTTON WITH INDICATOR
AUX	AUXILIARY CONTACT	PBS	PUSHBUTTON STATION
B	BELL	PC	POWER CONDITIONER
BAT	BATTERY	PDB	POWER DISTRIBUTION BLOCK
BDS	MCC BUCKET DISCONNECT SWITCH	PI	PRESS INDICATOR
BKR	BREAKER	PIC	PRESS INDICATOR CONTROLLER
C	CONDUIT OR CONTACTOR	PE	PHOTOEYE
CAP	CAPACITOR	PH	PHASE
CB	CIRCUIT BREAKER	PJB	PROXIMITY JUNCTION BOX
CC	CONTROL CABINET (UP TO 120VAC)	PLC	PROGRAMMABLE LOGIC CONTROLLER
CHR	CHART RECORDER	PLS	PROGRAMMABLE LIMIT SWITCH
CKT	CIRCUIT	PLT	PILOT LIGHT
CR	CONTROL RELAY	PNL	PANEL
CS	CONTROL STATION	POT	POTENTIOMETER
CT	CURRENT SWITCH/TRANSMITTER,TRANSFORMER	PP	POWER PANEL
DIO	DIODE	PS	PRESSURE SWITCH
DM	DAMPER MOTOR	PT	PRESSURE TRANSMITTER
DPDT	DOUBLE POLE, DOUBLE THROW	PVC	POLYVINYL CHLORIDE
DPI	DIFFERENTIAL PRESSURE INDICATOR	PWR	POWER SUPPLY
DPS	DIFFERENTIAL PRESSURE SWITCH	R	RESISTOR
DPST	DOUBLE POLE, SINGLE THROW	RB	ROTATING BEACON
DPT	DIFFERENTIAL PRESSURE TRANSMITTER	RC	RESISTIVE, CAPACITIVE NETWORK
DS	DISCONNECT SWITCH	RECPT	RECEPTACLE
EC	ELECTRICAL CABINET (OVER 120VAC)	RPT	REPEATOR
ELM	END OF LINE MODULE	RGS	RIGID GALVANIZED STEEL
ENC	ENCLOSURE	S	SWITCH
EPB	EMERGENCY STOP PUSHBUTTON	SBLT	STROBE LIGHT
F	FAN	SD	SMOKE DETECTOR
FA	FIRE ALARM	SLT	STACK LIGHT
FDR	FEEDER	SP	SETPOINT
FE	FLOW ELEMENT (IN LINE)	SPDT	SINGLE POLE, DOUBLE THROW
FI	FLOW INDICATOR	SPST	SINGLE POLE, SINGLE THROW
FIC	FLOW INDICATOR CONTROLLER	SR	SAFETY RELAY
FIT	FLOW INDICATING TRANSMITTER	SS	SELECTOR SWITCH
FM	FLOW METER	SSL	SELECTOR SWITCH ILLUMINATED
FS	FLOW SWITCH	SSR	SOLID STATE RELAY
FT	FLOW TRANSMITTER	ST	SHUNT TRIP
FTS	FOOT SWITCH	SUP	SURGE SUPPRESSOR
FU	FUSED TERMINAL	SV	SOLENOID VALVE
FZS	FREEZE STAT/LOW LIMIT SWITCH	SVP	SOLENOID VALVE PANEL
GB	GROUND BAR	SWD	SWITCH DUTY RATED
GEN	GENERATOR	T	TIMER SETTING
GND	GROUND	TB	TERMINAL BLOCK
HH	HAND HOLE	TCP	TOUCH CONTROL PANEL
HMI	HUMAN TO MACHINE INTERFACE	TDR	TIME DELAY RELAY
HN	HORN	TE	TEMPERATURE ELEMENT (T/C, RTD)
HOA	HAND–OFF–AUTO SWITCH	TI	TEMPERATURE INDICATOR
II	CURRENT INDICATOR	TIC	TEMPERATURE INDICATOR CONTROLLER
IM	INTERFACE MODULE	TR	TIMER
IP	CURRENT TO PNEUMATIC TRANSDUCER	TS	TEMPERATURE SWITCH
IT	CURRENT TRANSMITTER	TT	TEMPERATURE TRANSMITTER
J	JUMPER	UPS	UNINTERRUPTIBLE POWER SYSTEM
JB	JUNCTION BOX	V	VOLTS
KS	KEY SWITCH	VAC	VOLTS AC
L	INDUCTIVE FILTER	VCS	VACUUM SWITCH
LC	LEVEL CONTROLLER	VDC	VOLTS DC
LDS	LOCAL DISCONNECT SWITCH	VFD	VARIABLE FREQUENCY DRIVE
LE	LEVEL ELEMENT/PROBE	VM	VOLTAGE MONITOR
LI	LEVEL INDICATOR	VS	VOLTAGE SWITCH
LIC	LEVEL INDICATOR CONTROLLER	W	WIRE
LP	LIGHTING PANEL	WIC	WEIGH INDICATING CONTROLLER (SCALE)
LPC	LOOP CONTROLLER	WE	WEIGH ELEMENT (LOAD CELL)
LS	LEVEL SWITCH	XDCR	TRANSDUCER
LSH	LEVEL SWITCH HIGH LEVEL	XFMR	TRANSFORMER
LSL	LEVEL SWITCH LOW LEVEL	ZS	POSITION SWITCH (LIMIT, PROXIMITY)
LT	LEVEL TRANSMITTER	12	NEMA 12 RATING
LTC	LIGHTING CONTACTOR	3R	NEMA 3R RATING
M	MOTOR	4X	NEMA 4X RATING
MCC	MOTOR CONTROL CENTER	XP	HAZARDOUS LOCATION RATING
MCR	MASTER CONTROL RELAY		

SPECIAL NOTICE

IN THE EVENT THE CLIENT CONSENTS TO, ALLOWS, AUTHORIZES OR APPROVES OF CHANGES TO ANY PLANS, SPECIFICATIONS OR OTHER CONSTRUCTION DOCUMENTS, AND THESE CHANGES ARE NOT APPROVED IN WRITING BY THE DESIGN PROFESSIONAL, THE CLIENT RECOGNIZES THAT SUCH CHANGES AND THE RESULTS THEREOF ARE NOT THE RESPONSIBILITY OF THE DESIGN PROFESSIONAL. THEREFORE, THE CLIENT AGREES TO RELEASE THE DESIGN PROFESSIONAL FROM ANY LIABILITY ARISING FROM THE CONSTRUCTION, USE OR RESULT OF SUCH CHANGES. IN ADDITION, THE CLIENT AGREES TO THE FULLEST EXTENT PERMITTED BY LAW, TO INDEMNIFY AND HOLD THE DESIGN PROFESSIONAL HARMLESS FROM ANY DAMAGE, LIABILITY OR COST (INCLUDING REASONABLE ATTORNEY'S FEES AND COSTS OF DEFENSE) ARISING FROM SUCH CHANGES.

THE PERSONAL SEAL OF THE REGISTERED ENGINEER SHALL BE THE LEGAL EQUIVALENT OF HIS SIGNATURE WHENEVER AND WHEREVER USED, AND THE OWNER OF THE SEAL SHALL AUTHENTICATE THE SHEET AND THE SPECIFICATION SECTIONS PERTAINING TO THE SHEET. RESPONSIBILITY SHALL BE DISCLAIMED FOR ALL OTHER PLAN, SPECIFICATIONS, ESTIMATES, REPORTS OR OTHER DOCUMENTS OR INSTRUMENTS RELATING TO OR INTENDED TO BE USED FOR ANY PART OR PARTS OF THE PROJECT.

SYMBOLS LEGEND

SYMBOL	DESCRIPTION
A / E5	DETAIL SYMBOL: UPPER LETTER INDICATES VIEW DESIGNATION, LOWER NUMBER INDICATES DRAWING NUMBER.
A / E5	SECTION SYMBOL: UPPER LETTER INDICATES VIEW DESIGNATION, LOWER NUMBER INDICATES DRAWING NUMBER, ARROW INDICATES DIRECTION OF SECTION VIEW.
A / E5	ELEVATION SYMBOL: UPPER LETTER INDICATES ELEVATION DESIGNATION, LOWER NUMBER INDICATES DRAWING NUMBER, FILLED ARROW INDICATES DIRECTION OF ELEVATION VIEW.
1	DEMOLITION NOTE.
1	PLAN NOTE.
1	DETAIL NOTE.

GENERAL NOTES:

A. THE ELECTRICAL CONTRACTOR SHALL VISIT THE SITE AND BECOME FULLY FAMILIAR WITH ALL OF THE CONDITIONS THAT PERTAIN TO THE WORK DESCRIBED HEREIN. THE FAILURE TO UNDERSTAND OR HAVE KNOWLEDGE OF ISSUES THAT COULD HAVE BEEN DETERMINED PRIOR TO BIDDING WILL NOT CONSTITUTE GROUNDS FOR ASKING FOR WORK CHANGE ORDERS OR EXTRA WORK.

B. ALL OWNER SITE SAFETY RULES, REGULATIONS, AND REQUIREMENTS SHALL BE REVIEWED, STUDIED, AND STRICTLY ADHERED TO. THE ELECTRICAL CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR COMMUNICATING THE SAME INFORMATION TO HIS EMPLOYEES.

C. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR BECOMING FAMILIAR WITH LOCAL GOVERNING AUTHORITIES, CODES, AND STATUTES AND, IF REQUIRED, SHALL OBTAIN REQUIRED PERMITS, PAY ALL RELATED FEES INCLUDING INSPECTION FEES, AND OBTAIN INSPECTIONS AS REQUIRED TO COMPLETE AND FINISH HIS WORK. THE FOLLOWING CODES SHALL STRICTLY BE ADHERED TO:
   - OSHA
   - 2006 INTERNATIONAL BUILDING CODE
   - 2006 INTERNATIONAL MECHANICAL CODE
   - 2006 INTERNATIONAL PLUMBING CODE
   - 2008 NATIONAL ELECTRICAL CODE (2005 NEC, WHERE APPLICABLE)
   - NFPA STANDARDS
   - LIFE SAFETY CODES AND STANDARDS
   - AMERICANS WITH DISABILITIES ACT

D. SPECIAL PART OF WORK: THE ELECTRICAL CONTRACTOR SHALL STRICTLY COMPLY WITH ALL OSHA SAFETY RULES AND REGULATIONS AND USE ONLY APPROVED EQUIPMENT REQUIRED FOR THE PERFORMANCE OF THE WORK. THE CONTRACTOR SHALL ALSO STRICTLY COMPLY WITH ALL OSHA SAFETY RULES AND REGULATIONS AND USE ONLY APPROVED METHODS OF EXCAVATION, TRENCHING, AND SHORING METHODS AS DESCRIBED IN OSHA 29 CFR, 1926.650. THE ELECTRICAL CONTRACTOR SHALL MAINTAIN AND CLOSELY SUPERVISE ALL SAFETY PRACTICES AND CODES. EXTREME CARE SHALL BE TAKEN TO SAFEGUARD THE SAFETY OF THE PUBLIC, EMPLOYEES OF THE OWNER, AND THE EMPLOYEES OF THE ELECTRICAL CONTRACTOR.

E. THE ELECTRICAL CONTRACTOR SHALL NOT SCALE ANY PORTION OF THE DRAWINGS. SOME PORTIONS OF THE DRAWINGS ARE NOT DRAWN TO SCALE AND ARE DIAGRAMMATIC IN NATURE. ALL DIMENSIONS SHALL BE VERIFIED IN THE FIELD.

F. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR COMMUNICATION, COORDINATION, AND COOPERATION WITH ALL OTHER CONTRACTORS, SUPPLIERS, AND TRADES IN THE EXECUTION OF THE CONTRACTOR'S WORK AND WORK BY OTHERS.

G. THE ELECTRICAL CONTRACTOR SHALL NOT PERFORM ANY CUTTING, BORING, SAWING, NOTCHING, ETC OF STRUCTURES WHICH IN ANY WAY WILL WEAKEN OR ALTER THE STRENGTH, MODIFY THE FUNCTIONALITY, OR CHANGE IT'S APPEARANCE WITHOUT WRITTEN PERMISSION TO DO SO FROM THE ENGINEER OR ARCHITECT.

H. THE ELECTRICAL CONTRACTOR SHALL FILL ALL VOIDS IN WALLS AROUND THE CONDUIT PENETRATIONS WITH MATERIALS APPROVED BY THE ENGINEER. OPENINGS AROUND CONDUITS IN WALLS AND FLOORS SHALL BE FILLED WITH MATERIALS APPROVED FOR SUCH USE.

I. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE PLANNING AND INSTALLATION OF ALL CONDUIT RUNS AS NECESSARY TO PROVIDE A COMPLETE SYSTEM AS DETAILED IN THE DRAWINGS, SPECIFICATIONS, AND AS REQUIRED BY THE OWNER. THE ELECTRICAL CONTRACTOR SHALL BECOME FAMILIAR WITH SITE DETAILS IN ORDER TO PROPERLY ASSESS LENGTHS OF RUNS, ELEVATIONS, AND OTHER CRITICAL INFORMATION. ALL ELECTRICAL CONNECTIONS ARE TO BE COMPLETED AND MADE OPERATIONAL BY THE ELECTRICAL CONTRACTOR. WIRE SHALL BE ROUTED IN SEPARATE CONDUITS BY THE FOLLOWING GROUPS:
   - POWER AC
   - CONTROL AC
   - CONTROL DC
   - COMMUNICATION (ANALOG)
   - COMMUNICATION (VOICE & DATA)
   - INTRINSICALLY SAFE

J. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR LABELING CLEARLY AND DURABLY ALL WIRES AND ELECTRICAL DEVICES TO INCLUDE, BUT NOT BE LIMITED TO, TERMINAL BLOCKS, FUSE BLOCKS, RELAYS, PANELS, SWITCHES, PUSH BUTTONS, INDICATING LIGHTS, AND ALL ELECTRICAL DEVICES LISTED WITH TAG NAMES IN THE DRAWINGS. ALL WIRES SHALL BE LABELED AT BOTH TERMINATION ENDS WITH AN APPROVED WIRE LABEL.

K. THE ELECTRICAL CONTRACTOR SHALL GROUND ALL ELECTRICAL EQUIPMENT IN ACCORDANCE WITH THE LATEST EDITION OF THE NEC, PROJECT SPECIFICATIONS AND THE DRAWINGS.

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REV	DESCRIPTION	DATE	BY
0	ISSUE FOR BID	05/23/11	LJC

STATE OF MISSOURI
LAWRENCE JAMES CLARK
NUMBER E-25723
REGISTERED PROFESSIONAL ENGINEER
LAWRENCE JAMES CLARK
ELECTRICAL ENGINEER – E–25723

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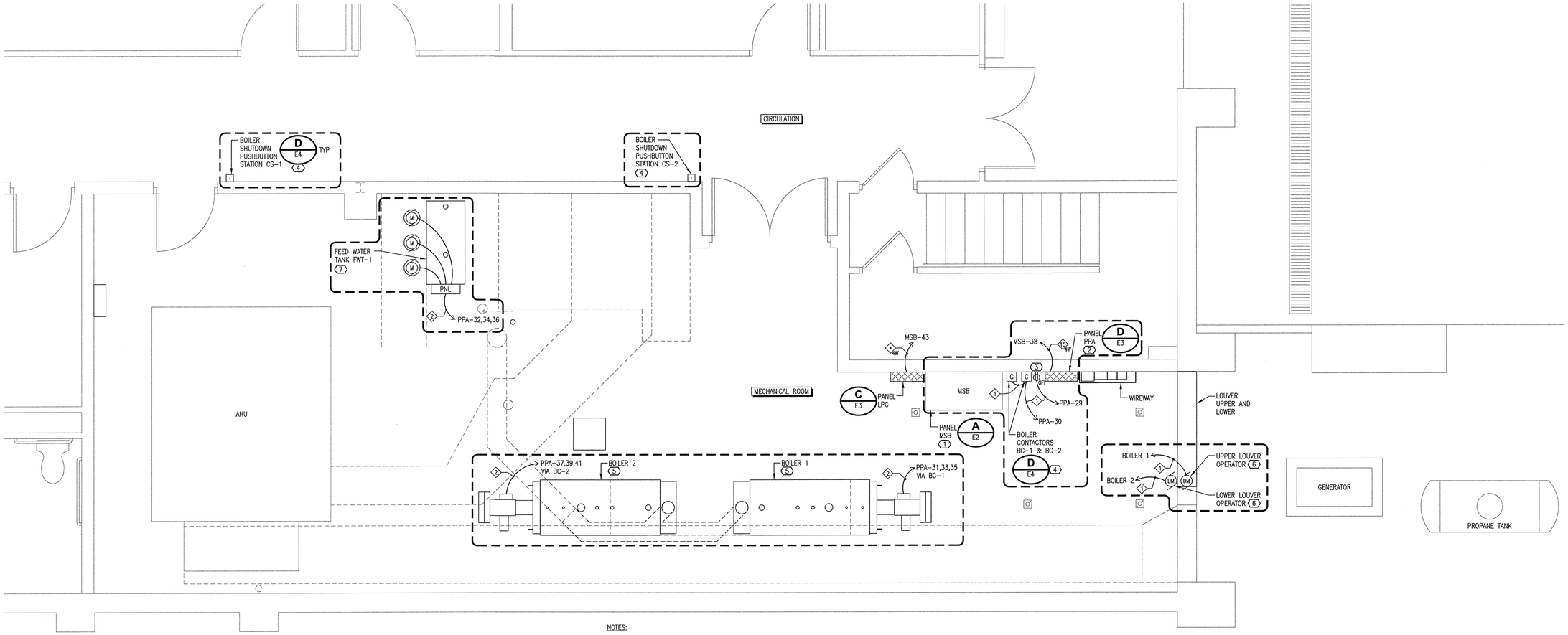
MO Engineering Corporation 001251

MoDOT
DISTRICT 8

PROJECT NAME: BOILER REPLACEMENT
PROJECT LOCATION: SPRINGFIELD, MO — ESC, Inc. PROJ No 11087
DRAWING TITLE: OVERALL FACILITY ELECTRICAL SYMBOLS AND ABBREVIATIONS
DESIGN BY: L.J. CLARK | CHECKED BY: LLC DATE 05/23/11 | APPROVED BY: LJC DATE 05/23/11 | DRAWN BY: PJH/WSS
HORIZ. SCALE: NONE | VERT. SCALE: | SHEET ___ OF ___ SHEETS | DRAWING No E0 | REV 0



NOTES:

1. MODIFY THE EXISTING PANELBOARD AS INDICATED.
2. REMOVE THE EXISTING 30 CIRCUIT PANELBOARD AND POWER FEED. FURNISH AND INSTALL A NEW 42 CIRCUIT PANELBOARD AND POWER FEED AS INDICATED. RECONNECT THE EXISTING CIRCUITS AND FURNISH AND INSTALL THE NEW CIRCUITS. THE NEW PANELBOARD SHALL NOT BE MOUNTED MORE THAN 78" A.F.F TO THE TOP OF THE PANEL.
3. FURNISH AND INSTALL A NEW PANELBOARD RECEPTACLE, REMOVE THE EXISTING RECEPTACLE.
4. FURNISH AND INSTALL A BOILER SHUTDOWN CIRCUIT AND CONTACTORS.
5. WIRE THE NEW BOILER PER THE MANUFACTURER'S INSTRUCTIONS AND AS INDICATED.
6. WIRE THE NEW LOUVER OPERATOR TO THE BOILER CONTROLS SO THAT THE LOUVER OPENS WHEN THE BOILER IS ON AND THE LOUVER CLOSES WHEN THE BOILER IS OFF.
7. WIRE THE NEW FEED WATER TANK SYSTEM PER THE MANUFACTURER'S INSTRUCTIONS AND AS INDICATED. FURNISH AND INSTALL CONTROL WIRING BETWEEN THE BOILERS AND THE FEED WATER SYSTEM TO PROVIDE A COMPLETE AND OPERATIONAL SYSTEM.

A / E1 BASEMENT PARTIAL POWER PLAN

SCALE: 3/8" = 1'-0"

4 0 4

SCALE IN FEET

N

INDICATES AREA OF WORK.

COMMERCIAL CABLE SCHEDULE

MK	SIZE	CONDUIT (MIN)	CONDUCTORS (THHN/THWN)	GROUND
◇1	20A, 2W	1/2"	2–#12	1–#12
◇2	20A, 3W	1/2"	3–#12	1–#12
◇3	20A, 4W	1/2"	4–#12	1–#12
◇4	30A, 2W	3/4"	2–#10	1–#10
◇5	30A, 3W	3/4"	3–#10	1–#10
◇6	30A, 4W	3/4"	4–#10	1–#10
◇7	40A, 3W	3/4"	3–#8	1–#10
◇8	40A, 4W	3/4"	4–#8	1–#10
◇9	50A, 3W	1"	3–#6	1–#10
◇10	50A, 4W	1"	4–#6	1–#10
◇11	60A, 3W	1"	3–#4	1–#10
◇12	60A, 4W	1"	4–#4	1–#10
◇13	70A, 80A, 3W	1"	3–#4	1–#8
◇14	70A, 80A, 4W	1"	4–#4	1–#8
◇15	90A, 3W	1 1/4"	3–#2	1–#8
◇16	90A, 4W	1 1/4"	4–#2	1–#8
◇17	100A, 3W	1 1/4"	3–#2	1–#8
◇18	100A, 4W	1 1/4"	4–#2	1–#8
◇19	125A, 3W	1 1/2"	3–#1	1–#6
◇20	125A, 4W	1 1/2"	4–#1	1–#6
◇21	150A, 3W	1 1/2"	3–#1/0	1–#6
◇22	150A, 4W	2"	4–#1/0	1–#6
◇23	175A, 3W	2"	3–#2/0	1–#6
◇24	175A, 4W	2"	4–#2/0	1–#6
◇25	200A, 3W	2"	3–#3/0	1–#6
◇26	200A, 4W	2"	4–#3/0	1–#6
◇27	225A, 3W	2 1/2"	3–#4/0	1–#4
◇28	225A, 4W	2 1/2"	4–#4/0	1–#4
◇29	250A, 3W	2 1/2"	3–250KCMIL	1–#4
◇30	250A, 4W	2 1/2"	4–250KCMIL	1–#4
◇31	400A, 3W	2–2" OR 4"	6–#3/0	2–#3
◇32	400A, 4W	2–2" OR 4"	8–#3/0	2–#3
◇33	600A, 3W	2–3"	6–350KCMIL	2–#1
◇34	600A, 4W	2–3"	8–350KCMIL	2–#1
◇35	800A, 3W	3–3"	9–350KCMIL	3–#1/0
◇36	800A, 4W	3–3"	12–350KCMIL	3–#1/0
◇37	1200A, 3W	4–3"	12–350KCMIL	4–#3/0
◇38	1200A, 4W	4–3"	16–350KCMIL	4–#3/0
◇39	1600A, 3W	5–4"	15–500KCMIL	5–#4/0
◇40	1600A, 4W	5–4"	20–500KCMIL	5–#4/0
◇41	2000A, 3W	6–4"	18–500KCMIL	6–250KCMIL
◇42	2000A, 4W	6–4"	24–500KCMIL	6–250KCMIL

◇ INDICATES UNKNOWN CONDUIT AND WIRE SIZE.

REV	DESCRIPTION	DATE	BY
0	ISSUE FOR BID	05/23/11	LJC

SEAL APPLIES TO AREA OF WORK ONLY

STATE OF MISSOURI — LAWRENCE JAMES CLARK — NUMBER E-25723 — REGISTERED PROFESSIONAL ENGINEER

LAWRENCE JAMES CLARK
ELECTRICAL ENGINEER – E-25723

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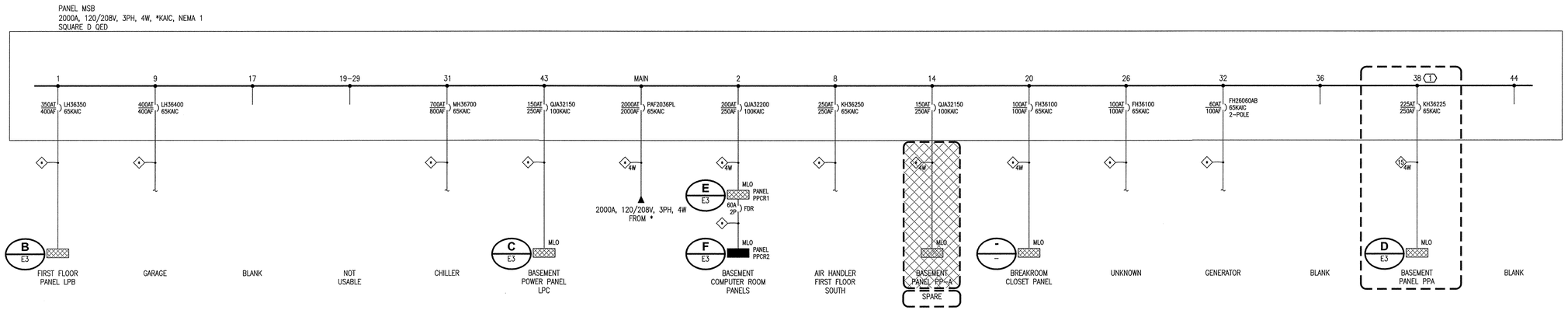
www.escfirm.com
1922 N. Broadway Avenue
Springfield, MO 65803
Phone: 417-831-5500
MO Engineering Corporation 001251

MoDOT DISTRICT 8

PROJECT NAME	BOILER REPLACEMENT
PROJECT LOCATION	SPRINGFIELD, MO
ESC, Inc. PROJ No	11087
DRAWING TITLE	MAIN FACILITY – BASEMENT ELECTRICAL PARTIAL POWER PLAN

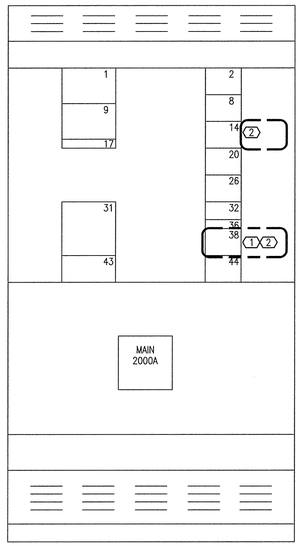
DESIGN BY	CHECKED BY	DATE	APPROVED BY	DATE	DRAWN BY
LJ. CLARK	LLC	05/23/11	LJC	05/23/11	PJH/WSS

HORIZ. SCALE: AS NOTED
VERT. SCALE: _____
SHEET _____ OF _____ SHEETS
DRAWING No E1
REV 0



A / E2 PANEL MSB ONE-LINE DIAGRAM

SCALE: NONE



B / E2 PANEL MSB ELEVATION

SCALE: NONE

NOTES:

(T) FURNISH AND INSTALL A NEW CIRCUIT BREAKER, SIZED AS INDICATED.

(2) FURNISH AND INSTALL A NEW NAMEPLATE.

COMMERCIAL CABLE SCHEDULE

MK	SIZE	CONDUIT (MIN)	CONDUCTORS (THHN/THWN)	GROUND
◇	20A, 2W	1/2"	2-#12	1-#12
◇	20A, 3W	1/2"	3-#12	1-#12
◇	20A, 4W	1/2"	4-#12	1-#12
◇	30A, 2W	3/4"	2-#10	1-#10
◇	30A, 3W	3/4"	3-#10	1-#10
◇	30A, 4W	3/4"	4-#10	1-#10
◇	40A, 3W	3/4"	3-#8	1-#10
◇	40A, 4W	3/4"	4-#8	1-#10
◇	50A, 3W	1"	3-#6	1-#10
◇	50A, 4W	1"	4-#6	1-#10
◇	60A, 3W	1"	3-#4	1-#10
◇	60A, 4W	1"	4-#4	1-#10
◇	70A, 80A, 3W	1"	3-#4	1-#8
◇	70A, 80A, 4W	1"	4-#4	1-#8
◇	90A, 3W	1 1/4"	3-#2	1-#8
◇	90A, 4W	1 1/4"	4-#2	1-#8
◇	100A, 3W	1 1/4"	3-#2	1-#8
◇	100A, 4W	1 1/4"	4-#2	1-#8
◇	125A, 3W	1 1/2"	3-#1	1-#6
◇	125A, 4W	1 1/2"	4-#1	1-#6

MK	SIZE	CONDUIT (MIN)	CONDUCTORS (THHN/THWN)	GROUND
◇	150A, 3W	1 1/2"	3-#1/0	1-#6
◇	150A, 4W	2"	4-#1/0	1-#6
◇	175A, 3W	2"	3-#2/0	1-#6
◇	175A, 4W	2"	4-#2/0	1-#6
◇	200A, 3W	2"	3-#3/0	1-#6
◇	200A, 4W	2"	4-#3/0	1-#6
◇	225A, 3W	2 1/2"	3-#4/0	1-#4
◇	225A, 4W	2 1/2"	4-#4/0	1-#4
◇	250A, 3W	2 1/2"	3-250KCMIL	1-#4
◇	250A, 4W	2 1/2"	4-250KCMIL	1-#4
◇	400A, 3W	2-2" OR 4"	6-#3/0	2-#3
◇	400A, 4W	2-2" OR 4"	8-#3/0	2-#3
◇	600A, 3W	2-3"	6-350KCMIL	2-#1
◇	600A, 4W	2-3"	8-350KCMIL	2-#1
◇	800A, 3W	3-3"	9-350KCMIL	3-#1/0
◇	800A, 4W	3-3"	12-350KCMIL	3-#1/0
◇	1200A, 3W	4-3"	12-350KCMIL	4-#3/0
◇	1200A, 4W	4-3"	16-350KCMIL	4-#3/0
◇	1600A, 3W	5-4"	15-500KCMIL	5-#4/0
◇	1600A, 4W	5-4"	20-500KCMIL	5-#4/0
◇	2000A, 3W	6-4"	18-500KCMIL	6-250KCMIL
◇	2000A, 4W	6-4"	24-500KCMIL	6-250KCMIL

◇ INDICATES UNKNOWN CONDUIT AND WIRE SIZE.

REVISED 11/10

INDICATES LABELING, EQUIPMENT AND/OR WIRING TO BE REMOVED.

INDICATES AREA OF WORK.

REV	DESCRIPTION	DATE	BY
0	ISSUE FOR BID	05/23/11	LJC

SEAL APPLIES TO AREA OF WORK ONLY

STATE OF MISSOURI LAWRENCE JAMES CLARK NUMBER E-25723 REGISTERED PROFESSIONAL ENGINEER

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Springfield, MO 65803
Phone: 417-831-5500
MO Engineering Corporation 001251

MoDOT
DISTRICT 8

PROJECT NAME: BOILER REPLACEMENT
PROJECT LOCATION: SPRINGFIELD, MO
ESC, Inc. PROJ No: 11087
DRAWING TITLE: MAIN FACILITY - BASEMENT ELECTRICAL PANEL MSB ONE-LINE DIAGRAM

DESIGN BY	CHECKED BY	DATE	APPROVED BY	DATE	DRAWN BY
L.J. CLARK	LLC	05/23/11	LJC	05/23/11	PJH/WSS

HORIZ. SCALE: AS NOTED
VERT. SCALE:
SHEET ____ OF ____ SHEETS
DRAWING No: E2
REV: 0

THIS AREA RESERVED FOR LPA

A E3 LPA PANEL SCHEDULE

SCALE: NONE

THIS AREA RESERVED FOR LPB

B E3 LPB PANEL SCHEDULE

SCALE: NONE

PANELBOARD SCHEDULE

PANEL LPC
LOCATION MECHANICAL ROOM

PANELBOARD RATING 225A
PANEL FEED RATING 150A

VOLTS 120/208V, 3PH, 4W
FED FROM MSB-43

CKT NO	DESCRIPTION	LOAD AMPS	BKR AMP	ABC / MLO	BKR AMP	LOAD AMPS	DESCRIPTION	CKT NO
1	LIGHTING – HALLWAY	*	20		20	*	RECEPTACLES – ROOM 9 SOUTH	2
3	LIGHTING – ROOMS 13,14,15,16	*	20		20	*	RECEPTACLES – ROOM 9 NORTH	4
5	LIGHTING – ROOM 10 EAST	*	20		20	*	RECEPTACLES – HOWARDS PLUG	6
7	LIGHTING – ROOM 10 WEST	*	20		20	*	RECEPTACLES – RANGE	8
9	LIGHTING – ROOM 9 SOUTH 18	*	20		20	*	RECEPTACLES – ROOM 8 NORTH	10
11	LIGHTING – ROOM 9 WEST	*	20		20	*	RECEPTACLES – ROOMS 6,7 WEST	12
13	LIGHTING – ROOM 6 EAST (CREDIT ROOM)	*	20		20	*	RECEPTACLES – ROOM 5 & OH DOOR	14
15	LIGHTING – ROOM 6 WEST	*	20		20	*	RECEPTACLES – ROOMS 3,4	16
17	LIGHTING – ROOMS 3,4,5	*	20		20	*	RECEPTACLES – ROOMS 14,15,17	18
19	LIGHTING – ROOM 1, EXIT EAST	*	20		20	*	RECEPTACLES – ROOMS 10,16	20
21	RECEPTACLES – 8 SOUTH	*	20		60	*	LIGHTING – ROOM 9 SOUTH	22
23	LIGHTING – ROOM 9 NORTH	*	20			*		24
25	UNKNOWN	*	20		20	*	RECEPTACLES – WEST OFFICE	26
27	220 SERVICE FOR EAST WALL MATT 'S LAB	*	20		20	*	RECEPTACLES – WEST OFFICE	28
29		*			20	*	PLOTTER	30
31	RECEPTACLES – WEST OFFICE	*	20		100	*	SPARE	32
33	RECEPTACLES – WEST OFFICE	*	20			*		34
35	CU EAST WALL 6 COPIER	*	20		20	*	CU WEST WALL MODEM	36
37	BLANK	–	–		–	–	BLANK	38
39	BLANK	–	–		–	–	BLANK	40
41	BLANK	–	–		–	–	BLANK	42

CONNECTED LOAD: PH A: *A, PH B: *A, PH C: *A
MANUFACTURER: SQUARE D NQO
AIC RATING: *KAIC
NEMA RATING: 1
NOTE: –
FAULT: –KA
ENERGY: –CAL/CM2
ARC CAT: –
POWER PLAN DWG: E1

C E3 LPC PANEL SCHEDULE

SCALE: NONE

PANELBOARD SCHEDULE

PANEL PPA
LOCATION MECHANICAL ROOM

PANELBOARD RATING 225A
PANEL FEED RATING 225A

VOLTS 120/208V, 3PH, 4W
FED FROM MSB-38

CKT NO	DESCRIPTION	LOAD AMPS	BKR AMP	ABC / MLO	BKR AMP	LOAD AMPS	DESCRIPTION	CKT NO
1		*				–		2
3	BASEMENT AIR HANDLER	*	80		20	–	BOILER (X) SPARE	4
5		*				–		6
7		*				*		8
9	CHILL WATER PUMP	*	60		20	*	VAV COILS	10
11		*				*		12
13		*				–		14
15	GREASE PUMP	*	20		30	–	CONDENSATE PUMP (X) SPARE	16
17		*				–		18
19	CHILLER CONTROL	*	20		20	*	AIR HANDLER LIGHTS	20
21	CONTROL PANEL	*	20		20	*	UNKNOWN	22
23	AIR HANDLER LIGHTS	*	20		20	*	UNKNOWN	24
25	UNKNOWN	*	30		20	*	UNKNOWN	26
27	UNKNOWN	*	20		20	*	UNKNOWN	28
29	PANEL RECEPTACLE	1.5	20		20	*	BOILER CONTACTORS BC-1 AND BC-2	30
31		*				*		32
33	BOILER 1 VIA BC-1	*	20		20	*	FEED WATER TANK FWT-1	34
35		*				*		36
37		*			20	–	SPARE	38
39	BOILER 2 VIA BC-2	*	20		20	–	SPARE	40
41		*			20	–	SPARE	42

CONNECTED LOAD: PH A: *A, PH B: *A, PH C: *A
MANUFACTURER: SQUARE D NQOD
AIC RATING: 22KAIC
NEMA RATING: 1
NOTE: –
FAULT: –KA
ENERGY: –CAL/CM2
ARC CAT: –
POWER PLAN DWG: E1

D E3 PPA PANEL SCHEDULE

SCALE: NONE

PANELBOARD SCHEDULE

PANEL PPCR1
LOCATION COMPUTER ROOM CLOSET

PANELBOARD RATING 225A
PANEL FEED RATING 200A

VOLTS 120/208V, 3PH, 4W
FED FROM MSB-2

CKT NO	DESCRIPTION	LOAD AMPS	BKR AMP	ABC / MLO	BKR AMP	LOAD AMPS	DESCRIPTION	CKT NO
1	UNKNOWN	*	15			*		2
3	UNKNOWN	*	20		60	*	PANEL PPCR2	4
5		*				*		6
7	UNKNOWN	*	30		15	*	UNKNOWN	8
9	UNKNOWN	*	20		20	*	UNKNOWN	10
11		*			15	*	UNKNOWN	12
13	UNKNOWN	*	15		20	*	UNKNOWN	14
15	UNKNOWN	*	20		–	–	BLANK	16
17		*			–	–	BLANK	18
19	UNKNOWN	*	30		–	–	BLANK	20
21	UNKNOWN	*	30		20	*	UNKNOWN	22
23	UNKNOWN	*	20		20	*	UNKNOWN	24
25	UNKNOWN	*	20		20	*	UNKNOWN	26
27	SPARE	15.0	30		20	*	UNKNOWN	28
29	SPARE	1.0	20		20	*	UNKNOWN	30
31	BLANK	–	–		–	–	BLANK	32
33	BLANK	–	–		20	*	UNKNOWN	34
35	BLANK	–	–		20	*	UNKNOWN	36
37	BLANK	–	–		20	*	UNKNOWN	38
39	BLANK	–	–		–	–	BLANK	40
41	BLANK	–	–		–	–	BLANK	42

CONNECTED LOAD: PH A: *A, PH B: *A, PH C: *A
MANUFACTURER: SQUARE D NQO
AIC RATING: *KAIC
NEMA RATING: 1
NOTE: –
FAULT: –KA
ENERGY: –CAL/CM2
ARC CAT: –
POWER PLAN DWG: –

E E3 PPCR1 PANEL SCHEDULE

SCALE: NONE

PANELBOARD SCHEDULE

PANEL PPCR2
LOCATION HOWARDS OFFICE

PANELBOARD RATING 100A
PANEL FEED RATING 60A

VOLTS 120/208V, 1PH, 3W
FED FROM PPCR1-2,4,6

CKT NO	DESCRIPTION	LOAD AMPS	BKR AMP	XNY / MLO	BKR AMP	LOAD AMPS	DESCRIPTION	CKT NO
1	GARY BASS	*	20		30	*	ORANGE OUTLET LISA ROOM	2
3	LIGHTING – COMPUTER ROOM	*	20		20	*	WEST LIGHT LISA ROOM	4
5	LIGHTING – LISA	*	20		20	*	OUTLET IN BASS OFFICE	6
7	UNKNOWN	–	50		20	*	STORAGE ROOM MICROFILM	8
9		–			–	–	BLANK	10
11	BLANK	–	–		–	–	BLANK	12
13	BLANK	–	–		–	–	BLANK	14
15	BLANK	–	–		–	–	BLANK	16

CONNECTED LOAD: PH X: *A, PH Y: *A
MANUFACTURER: SQUARE D NQO
AIC RATING: *KAIC
NEMA RATING: 1
NOTE: –
FAULT: –KA
ENERGY: –CAL/CM2
ARC CAT: –
POWER PLAN DWG: –

F E3 PPCR2 PANEL SCHEDULE

SCALE: NONE

NOTES:

1. RELOCATE THE EXISTING CIRCUIT BREAKER TO THE NEW PANELBOARD. RECONNECT THE EXISTING CIRCUIT.
2. RELOCATE THE EXISTING CIRCUIT BREAKER TO THE NEW PANELBOARD. LABEL THE CIRCUIT AS SPARE.
3. FURNISH AND INSTALL A NEW CIRCUIT BREAKER SIZED AS INDICATED.
4. IDENTIFY THE UNKNOWN CIRCUIT AND RECORD ITS FUNCTION ON THE PANEL SCHEDULE AND THE FIELD MARK-UP DRAWINGS.

INDICATES LABELING, EQUIPMENT AND/OR WIRING TO BE REMOVED.

INDICATES AREA OF WORK.

REV	DESCRIPTION	DATE	BY
0	ISSUE FOR BID	05/23/11	LJC

SEAL APPLIES TO AREA OF WORK ONLY

STATE OF MISSOURI – LAWRENCE JAMES CLARK – NUMBER E-25723 – PROFESSIONAL ENGINEER

LAWRENCE JAMES CLARK
ELECTRICAL ENGINEER – E-25723

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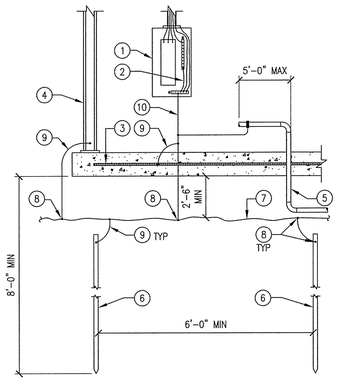
1922 N. Broadway Avenue
Springfield, MO 65803
Phone: 417-831-5500
MO Engineering Corporation 001251

MoDOT DISTRICT 8

PROJECT NAME: BOILER REPLACEMENT
PROJECT LOCATION: SPRINGFIELD, MO
ESC, Inc. PROJ No: 11087
DRAWING TITLE: MAIN FACILITY – BASEMENT ELECTRICAL PANELBOARD SCHEDULES

DESIGN BY	CHECKED BY	DATE	APPROVED BY	DATE	DRAWN BY
L.J. CLARK	LLC	05/23/11	LJC	05/23/11	PJH/WSS

HORIZ. SCALE: AS NOTED
VERT. SCALE:
SHEET ____ OF ____ SHEETS
DRAWING No: E3
REV: 0



NEC TABLE 250.66 GROUNDING ELECTRODE CONDUCTOR FOR ALTERNATING-CURRENT SYSTEMS	
SIZE OF LARGEST UNGROUNDED SERVICE-ENTRANCE CONDUCTOR OR EQUIVALENT AREA FOR PARALLEL CONDUCTORS (AWG/KCMIL)	SIZE OF GROUNDING ELECTRODE CONDUCTOR (AWG/KCMIL)
COPPER	COPPER
2 OR SMALLER	8
1 OR 1/0	6
2/0 OR 3/0	4
OVER 3/0-350	2
OVER 350-600	1/0
OVER 600-1100	2/0
OVER 1100	3/0

NOTES:
1. WHERE MULTIPLE SETS OF SERVICE-ENTRANCE CONDUCTORS ARE USED AS PERMITTED IN 230.40, EXCEPTION NO 2, THE EQUIVALENT SIZE OF THE LARGEST SERVICE-ENTRANCE CONDUCTOR SHALL BE DETERMINED BY THE LARGEST SUM OF THE AREAS OF THE CORRESPONDING CONDUCTORS OF EACH SET.
2. WHERE THERE ARE NO SERVICE-ENTRANCE CONDUCTORS, THE GROUNDING ELECTRODE CONDUCTOR SIZE SHALL BE DETERMINED BY THE EQUIVALENT SIZE OF THE LARGEST SERVICE-ENTRANCE CONDUCTOR REQUIRED FOR THE LOAD TO BE SERVED.

GENERAL NOTES:

A. THE DETAIL IS TYPICAL. ALL GROUNDING METHODS MAY NOT BE EMPLOYED. ALL GROUNDING SHALL BE DONE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC) ARTICLE 250.

B. THE BONDING JUMPERS USED TO CONNECT THE GROUNDING ELECTRODES TOGETHER TO FORM THE GROUNDING ELECTRODE SYSTEM SHALL BE SIZED IN ACCORDANCE WITH NEC TABLE 250.66.

NOTES:

(1) SERVICE EQUIPMENT.

(2) MAIN BONDING JUMPER.

(3) CONCRETE-ENCASED ELECTRODE SHALL BE 4AWG OR LARGER BARE COPPER CONDUCTOR OR 1/2" MINIMUM STEEL REINFORCING BAR OR ROD AT LEAST 20'-0" LONG. THE ELECTRODE SHALL BE ENCASED IN AT LEAST 2" OF CONCRETE, LOCATED WITHIN AND NEAR THE BOTTOM OF THE CONCRETE FOUNDATION OR FOOTING THAT IS IN DIRECT CONTACT WITH THE EARTH. REINFORCING BARS SHALL BE BONDED TOGETHER BY STEEL TIE WIRES.

(4) METAL FRAME OF THE BUILDING OR STRUCTURE, WHERE EFFECTIVELY GROUNDED, CAN BE USED AS A GROUNDING ELECTRODE.

(5) METAL UNDERGROUND WATER PIPE THAT IS IN DIRECT CONTACT WITH THE EARTH FOR 10'-0" OR MORE, INCLUDING ANY METAL WELL CASING EFFECTIVELY BONDED TO THE PIPE, CAN BE USED AS A GROUNDING ELECTRODE. CONNECTIONS SHALL BE MADE WITHIN 5'-0" OF THE POINT OF ENTRANCE OF THE PIPE.

(6) 3/4"x10'-0" CU GROUND ROD.

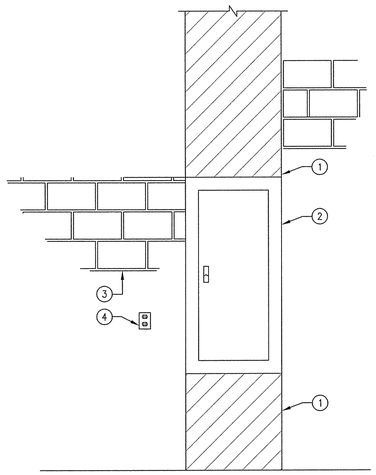
(7) GROUND RING SHALL CONSIST OF AT LEAST 20'-0" OF 2AWG OR LARGER BARE COPPER CONDUCTOR INSTALLED IN DIRECT CONTACT WITH THE EARTH ENCIRCLING THE BUILDING OR STRUCTURE.

(8) ALL BELOW GRADE CONNECTIONS SHALL BE EXOTHERMIC WELD.

(9) BONDING JUMPER.

(10) GROUNDING ELECTRODE CONDUCTOR.

A E4 TYPICAL GROUNDING ELECTRODE SYSTEM
SCALE: NONE



NOTES:

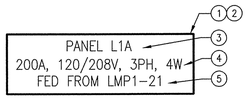
(1) CLEAR SPACE ABOVE, BELOW, AND IN FRONT OF PANELBOARD IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. THE ELECTRICAL CONTRACTOR SHALL INSTALL YELLOW PAINT STRIPING 3'-0" IN FRONT OF THE PANELBOARD TO DESIGNATE MANDATORY WORK ZONE.

(2) PANELBOARD WITH TOP MOUNTED 6'-6" ABOVE FINISH FLOOR. CONDUIT NOT SHOWN FOR CLARITY.

(3) BUILDING WALL. SEE PLANS FOR EXACT TYPE OF CONSTRUCTION.

(4) GFI RECEPTACLE MOUNTED NEXT TO THE PANEL.

B E4 TYPICAL PANEL MOUNTING
SCALE: NONE



NOTES:

(1) NAMEPLATES SHALL BE ENGRAVED, THREE LAYER LAMINATED PLASTIC, 1/4" BLACK LETTERS ON A WHITE BACKGROUND WITH BEVELED EDGES AND 1/16" MINIMUM, ADHESIVE BACKED.

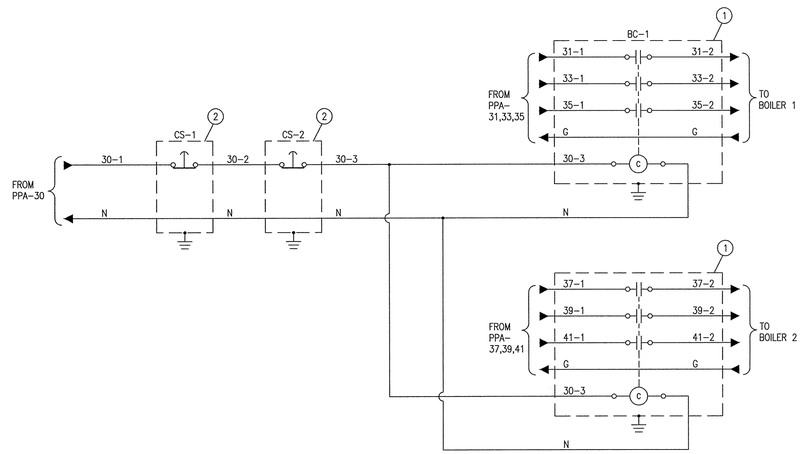
(2) NAMEPLATES SHALL BE INSTALLED ON ALL DISCONNECT SWITCHES, POWER PANELS, LIGHTING PANELS, CONTROL PANELS, CONTROL CABINETS, AND ELECTRICAL ENCLOSURES.

(3) LINE 1 OF THE NAMEPLATE SHALL LIST THE DEVICE DESCRIPTION.

(4) LINE 2 OF THE NAMEPLATE SHALL LIST THE AMPACITY, VOLTAGE, AND NUMBER OF PHASES AND WIRES.

(5) LINE 3 OF THE NAMEPLATE SHALL LIST THE SOURCE DESIGNATION WITH CIRCUIT NUMBER(S).

C E4 TYPICAL PANEL IDENTIFICATION
SCALE: NONE



NOTES:

(1) 3 POLE 27A, SIZE 1 CONTACTOR, 120VAC COIL, NEMA 1, SQUARE D CLASS 8502 TYPE S.

(2) PUSHBUTTON CONTROL STATION CONSISTING OF:
- PUSHBUTTON ENCLOSURE, 1-HOLE, 30.5 MM, NEMA 12.
- PUSHBUTTON, 30.5 MM, RED MUSHROOM HEAD, NON-ILLUMINATED, 2 POSITION, MAINTAINED, 1-NO AND 1-NC CONTACTS, SQUARE D CLASS 9001.
- LEGEND PLATE, 30.5 MM, RED ENGRAVED "BOILER SHUTDOWN".
- BUTTON SAFETY COVER, 30.5 MM, CLEAR LEXAN HINGED COVER, BRADY 104602.

D E4 CONTACTORS BC-1 AND BC-2 WIRING
SCALE: NONE

REV	DESCRIPTION	DATE	BY
0	ISSUE FOR BID	05/23/11	LJC

STATE OF MISSOURI
LAWRENCE JAMES CLARK
NUMBER E-25723
REGISTERED PROFESSIONAL ENGINEER
LAWRENCE JAMES CLARK
ELECTRICAL ENGINEER - E-25723

ESC consulting engineers
www.escfirm.com
1922 N. Broadway Avenue
Springfield, MO 65803
Phone: 417-831-5500
MO Engineering Corporation 001251

MoDOT
DISTRICT 8

PROJECT NAME	BOILER REPLACEMENT
PROJECT LOCATION	SPRINGFIELD, MO
ESC, Inc. PROJ No	11087
DRAWING TITLE	MAIN FACILITY - BASEMENT ELECTRICAL DETAILS

DESIGN BY	CHECKED BY	DATE	APPROVED BY	DATE	DRAWN BY
L.J. CLARK	LLC	05/23/11	LJC	05/23/11	PJH/WSS

HORIZ. SCALE: AS NOTED
VERT. SCALE: _____
SHEET _____ OF _____ SHEETS
DRAWING No E4
REV 0

INSTRUMENTATION PIPING SYMBOLS

VALVE ACTUATOR { S – SOLENOID; M – MOTORIZED; P – PNEUMATIC

OPERATIONAL / NORMAL
- 2 WAY SOLENOID, 2 POSITION VALVE, 2 PORTS
- 3 WAY SOLENOID, 2 POSITION VALVE, 3 PORTS
- 4 WAY SOLENOID, 2 POSITION VALVE, 4 PORTS
- 5 WAY SOLENOID, 2 POSITION VALVE, 5 PORTS

GAS COCK

CHECK VALVE, FLOWS LEFT TO RIGHT

AIR OPERATED DIAPHRAGM CONTROL VALVE

AIR OPERATED PISTON CONTROL VALVE

PRESSURE REDUCING REGULATOR WITH INTEGRAL GAUGE

SITE FLOW INDICATOR

FLOW ORIFICE

UNION

WATER TRAP

BACKFLOW PREVENTER

QUICK DISCONNECTS

REDUCER WITH FLEXIBLE HOSE SLIPPED OVER WITH SS CLAMP

PIPING TRANSITION POINT FOR: NEW/EXISTING, IS/OS (INSIDE/OUTSIDE), ROOM NAMES, MATERIAL TRANSITION

PIPE PENETRATION:
AAA ROOM NAME/LOCATION
BBB ROOM NAME/LOCATION
CCC CEILING/FLOOR/WALL

GLOBE VALVE

BUTTERFLY VALVE

BALL VALVE

GATE VALVE

NEEDLE VALVE

PLUG VALVE

PINCH VALVE

KNIFE VALVE

4 WAY SOLENOID

DIAPHRAGM VALVE

STRAINER

CONCENTRIC REDUCER

ECCENTRIC REDUCER

THRU

DRAIN

LINE SYMBOLS

- NEW PRODUCT LINES
- EXISTING PRODUCT LINES
- DEDICATED CIP LINE
- ELECTRICAL SIGNAL
- CAPILLARY (FILLED) SYSTEM
- HYDRAULIC SYSTEM
- PNEUMATIC–VARYING SIGNAL
- PRODUCT FLEXIBLE HOSE
- HEAT TRACED AND INSULATED (BY OTHERS)
- OUTPUT TO MESSAGE DISPLAY
- LINE NUMBER DESIGNATION (CIP CIRCUITS)
- PRODUCT FLOW
- CIP FLOW
- MANUAL CIP FLOW
- PIPE SLOPE, DRAINAGE DIRECTION

INSTRUMENTATION SYMBOLS

- LOCAL MOUNTED INSTRUMENT (ORIENTATION AS DIRECTED BY OWNER)
- PANEL MOUNTED INSTRUMENT (PNL–XXX)
- PLC/INTERLOCK/OUTPUT
- SKID MOUNTED PANEL INSTRUMENT
- PANELVIEW TERMINAL/LOOP ACCESS
- MCC/VFD MOUNTED INSTRUMENT
- PLC NAME / I/O ADDRESS
- AIR OUTLET BOX ID / SOLENOID VALVE ID
- AIRBLOW SOLENOID BOX (DET 4 STD2)

HVAC SYMBOLS

- REGISTER/GRILL/DIFFUSER SYMBOL
- SUPPLY REGISTER, DIFFUSER OR GRILL DIRECTION OF THROW INDICATED (TOTAL CFM SHOWN)
- SLOT/LINEAR REGISTER/DIFFUSER
- EXHAUST OR RETURN REGISTER, DIFFUSER OR GRILL
- AIR SUPPLY (OUTSIDE AIR DUCT UP, DOWN)
- AIR RETURN (EXHAUST, RELIEF DUCT UP, DOWN)
- INSTRUMENT AIR
- DUCT INTERNAL TURNING VANES
- MANUAL (BALANCE) DAMPER CONTROL
- 45° BRANCH OR BELL MOUTH INLET
- FIRE DAMPER (FD) / FIRE AND SMOKE DAMPER (FSD)
- VENT DAMPER (VD)
- DUCT–DIMENSIONS CLEAR INSIDE
- DUCT TRANSITION
- FLEXIBLE DUCT–INSULATED
- MC, ML, MT
- OUTDOOR AIR THERMOSTAT
- PC, PI, PS, PT (PRESSURE)
- SMOKE DETECTOR
- SPACE THERMOSTAT
- TC, TS, TT (TEMPERATURE)
- TI (THERMOMETER)
- DUCT TEMPERATURE SENSOR
- DRAFT INDUCER
- CONTROL/ZONE DAMPER

LEGENDS AND ABBREVIATIONS

ABBREVIATIONS

AB	AIR BLENDER
AD	ACCESS DOOR
AP	ACCESS PANEL
CFM	CUBIC FEET PER MINUTE
EXH	EXHAUST
FLEX	FLEXIBLE CONNECTION
MA	MIXED AIR
MAX	MAXIMUM
MIN	MINIMUM
MS	MOTOR STARTER
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
OA	OUTSIDE AIR
OAH	OUTSIDE AIR HUMIDITY
PI	PRESSURE INDICATOR
PRD	PRESSURE RELIEF DOOR (PANEL)
RA	RETURN AIR
RAH	RETURN AIR HUMIDITY
SA	SUPPLY AIR
SAF	SUPPLY AIR FAN

FILTERS

PF	PRE FILTERS
FF	FINAL FILTERS

DAMPERS

BAL	BALANCE DAMPER
BD	BACKDRAFT DAMPER
BRD	BAROMETRIC DAMPER
CD/ZD	CONTROL OR ZONE DAMPER
FD	FIRE DAMPER
FSD	FIRE AND SMOKE DAMPER
MAD	MIXED AIR DAMPER
SD	SMOKE DAMPER
UD	BACKDRAFT DAMPER

THE LETTER "M" MAY BE ADDED TO DESIGNATE MOTOR OPERATOR.

HEATERS

ERH	ELECTRIC DUCT HEATER
EUH	ELECTRIC UNIT HEATER
SUH	STEAM UNIT HEATER

COILS

CW	CHILL WATER COIL
HW	HOT WATER COIL
GCW	GLYCOL–COOLING COIL
GHW	GLYCOL–HEATING COIL

CONTROL DEVICES

CV	CONTROL VALVE
FS	FLOW SWITCH
FT	FLOW TRANSMITTER
FZ	FREEZE STAT
HMS	HUMIDISTAT
PC	PRESSURE CONTROLLER
PI	PRESSURE INDICATOR
PS	PRESSURE SWITCH
PT	PRESSURE TRANSMITTER
SD	SMOKE DETECTOR
STE/ZTE	SPACE/ZONE TEMPERATURE ELEMENT
TC	TEMPERATURE CONTROLLER
TE	TEMPERATURE ELEMENT
TI	TEMPERATURE INDICATOR
TS	TEMPERATURE SWITCH
TT	TEMPERATURE TRANSMITTER

MAJOR EQUIPMENT

AHU	AIR HANDLING UNIT
CHR	WATER CHILLER
EF	EXHAUST FAN
FCU	FAN COIL UNIT
IFU	INSIDE PACKAGE UNIT
OCU	OUTSIDE CONDENSING UNIT
PU	WATER PUMP
TCPL	TEMPERATURE CONTROL PANEL

PLUMBING AND PIPING SYMBOLS

- DOMESTIC COLD WATER
- DOMESTIC HOT WATER
- HOT WATER RECIRCULATION
- VENT LINE
- A — COMPRESSED AIR SUPPLY
- CD — CONDENSATE DRAIN
- R — REFRIGERANT SUPPLY/RETURN
- CHWR — CHILLED WATER RETURN
- CHWS — CHILLED WATER SUPPLY
- CSW — COLD SOFT WATER
- HSW — HOT SOFT WATER
- CW — CITY/SITE SERVICE WATER
- D — DRAIN LINE
- FD — FOUNDATION DRAIN LINE
- FIRE MAIN–BURIED
- FM — FIRE MAIN –ABOVE GRD
- FOR — FUEL OIL RETURN
- FOS — FUEL OIL SUPPLY
- HPC — HIGH PRESSURE CONDENSATE
- HPS — HIGH PRESSURE STEAM
- HR — HYDRONIC RETURN
- HS — HYDRONIC SUPPLY
- HWR — HOT WATER RETURN
- HWS — HOT WATER SUPPLY
- LPC — LOW PRESSURE CONDENSATE
- LPS — LOW PRESSURE STEAM
- NG — NATURAL GAS LINE
- PC — PUMPED CONDENSATE
- PG — PROPANE GAS
- PL — PROPANE LIQUID
- PSS — PROCESS SANITARY SEWER
- SD — STORM DRAIN
- SS — SANITARY SEWER–BURIED
- STS — STORM SEWER
- VAC — HOUSE VACUUM
- THREADED/FLANGE/GROOVE/BUTTERFLY (BFV)
- THREADED/FLANGE/TRIPLE DUTY VALVE
- CIRCUIT SETTER
- NEEDLE VALVE
- BACKFLOW PREVENTER
- THD/FLG BALANCING VALVE
- THD/FLG BALL VALVE (BV)
- THD/FLG CHECK VALVE (CK)
- THD/FLG EXCESS FLOW VALVE
- THD/FLG GATE VALVE (GV)
- THD/FLG GLOBE VALVE (GLV)
- THD/FLG PLUG VALVE
- THD/FLG 3 PORT, 2 POS PLUG VLE
- HB WALL HYD/HOSE BIBB
- PI — PRESSURE GAGE (PI)
- TI — TEMPERATURE GAUGE
- UNION OR DIELECTRIC
- CO — CLEAN OUT
- ELBOW TURNED DOWN
- ELBOW TURNED UP
- FD — FD — FLOOR DRAIN
- HD — HUB DRAIN
- LV — LOOP VENT
- ST — MAIN STACK
- RD — ROOF DRAIN
- TEE TURNED DOWN
- TEE TURNED UP
- VTR — VENT TO ROOF
- GLASS IN GLASS MERCURY THERMAOMETER
- HOSE STATION
- PRESS RELIEF VALVE
- STAT — THERMOSTAT
- WHA — WATER HAMMER ARRESTER
- M — METER
- FLEXIBLE CONNECTOR (FC)

FIXTURE LEGEND

AHU	AIR HANDLING UNIT
DF	DRINKING FOUNTAIN
DR	CLOTHES DRYER
DW	DISHWASHER
EF	EXHAUST FAN
EUH	ELECTRIC UNIT HEATER
GWH/EWH	HOT WATER HEATER
HLAV	ADA LAVATORY
HWC	ADA WATER CLOSET
IDW	INDIRECT WASTE
LAV	LAVATORY
MS	MOP SINK
RCP	RECIRCULATING PUMP
REF	REFRIGERATOR
SF	SUPPLY FAN
SK	SINK
SUH	STEAM UNIT HEATER
T/S	TUB AND SHOWER
U	URINAL
UH	DIRECT FIRED UNIT HEATER
WC	WATER CLOSET
WSR	CLOTHES WASHER
W/T	WHIRLPOOL TUB

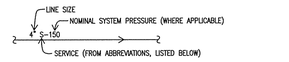
NOTES:
1. THE CONTRACTOR SHALL CONFIRM ALL ELEVATIONS, FLOW LINES, AND POINTS OF CONNECTION OF ALL NEW LINES PRIOR TO BEGINNING WORK.
2. ALL BURIED LINES MUST BE DOCUMENTED AS TO THE EXACT DEPTH IN ORDER TO PROVIDE ACCURATE INFORMATION THAT MAY BE NEEDED FOR FUTURE CONSTRUCTION ACTIVITY OR REPAIR WORK.
3. [N] DESIGNATES NEW WORK (RENOVATION WORK). [E] DESIGNATES EXISTING ITEM (RENOVATION WORK).

SPECIAL NOTICE

IN THE EVENT THE CLIENT CONSENTS TO, ALLOWS, AUTHORIZES OR APPROVES OF CHANGES TO ANY PLANS, SPECIFICATIONS OR OTHER CONSTRUCTION DOCUMENTS, AND THESE CHANGES ARE NOT APPROVED IN WRITING BY THE DESIGN PROFESSIONAL, THE CLIENT RECOGNIZES THAT SUCH CHANGES AND THE RESULTS THEREOF ARE NOT THE RESPONSIBILITY OF THE DESIGN PROFESSIONAL. THEREFORE, THE CLIENT AGREES TO RELEASE THE DESIGN PROFESSIONAL FROM ANY LIABILITY ARISING FROM THE CONSTRUCTION, USE OR RESULT OF SUCH CHANGES. IN ADDITION, THE CLIENT AGREES TO THE FULLEST EXTENT PERMITTED BY LAW, TO INDEMNIFY AND HOLD THE DESIGN PROFESSIONAL HARMLESS FROM ANY DAMAGE, LIABILITY OR COST (INCLUDING REASONABLE ATTORNEY'S FEES AND COSTS OF DEFENSE) ARISING FROM SUCH CHANGES.

THE PERSONAL SEAL OF THE REGISTERED ENGINEER SHALL BE THE LEGAL EQUIVALENT OF HIS SIGNATURE WHENEVER AND WHEREVER USED, AND THE OWNER OF THE SEAL SHALL AUTHENTICATE THE SHEET AND THE SPECIFICATION SECTIONS PERTAINING TO THE SHEET. RESPONSIBILITY SHALL BE DISCLAIMED FOR ALL OTHER PLAN, SPECIFICATIONS, ESTIMATES, REPORTS OR OTHER DOCUMENTS OR INSTRUMENTS RELATING TO OR INTENDED TO BE USED FOR ANY PART OR PARTS OF THE PROJECT.

PIPE LINE IDENTIFICATION



A	COMPRESSED AIR	LPC	LOW PRESSURE CONDENSATE
BFW	BOILER FEED WATER	LPS	LOW PRESSURE STEAM
C	CONDENSATE	IA	INSTRUMENT AIR
CHL	CALCIUM CHLORIDE BRINE	NG	NATURAL GAS
CHWR	CHILLED WATER RETURN	PD	PROCESS DRAIN
CHWS	CHILLED WATER SUPPLY	S	STEAM
CLW	CHLORINATED WATER	SD	STORM DRAIN
CTW	COOLING TOWER WATER	SW	SOFT (TREATED) WATER
D	DRAIN	V	VENT
FO	FUEL OIL	VAC	VACUUM–PROCESS
FW	FIRE WATER	VC	VACUUM–CLEANING
GW	GLYCOL	W	WATER–ABOVE GROUND
HP	HIGH PRESSURE	WU	WATER–UNDERGROUND
HPC	HIGH PRESSURE CONDENSATE	XXS	SUPPLY
HPS	HIGH PRESSURE STEAM	XXR	RETURN
HW	HOT WATER		

LEGEND ABBREVIATIONS

ARL	ABOVE ROOF LINE
BRL	BELOW ROOF LINE
FBO	FURNISHED BY OWNER
IBC	INSTALLED BY CONTRACTOR
MSA	MAIN PLANT SUPPLY AIR
SD	SLOPE DOWN

IS | OS — BUILDING WALL { IS – INSIDE BLDG; OS – OUTSIDE BLDG

SYMBOLS LEGEND

- A / M5 — DETAIL SYMBOL: UPPER LETTER INDICATES VIEW DESIGNATION, LOWER NUMBER INDICATES DRAWING NUMBER.
- 1 A / M5 — SECTION SYMBOL: UPPER LETTER INDICATES VIEW DESIGNATION, LOWER NUMBER INDICATES DRAWING NUMBER, ARROW INDICATES DIRECTION OF SECTION VIEW.
- A / M5 — ELEVATION SYMBOL: UPPER LETTER INDICATES ELEVATION DESIGNATION, LOWER NUMBER INDICATES DRAWING NUMBER, FILLED ARROW INDICATES DIRECTION OF ELEVATION VIEW.
- (1) DEMOLITION NOTE.
- 1 PLAN NOTE.
- (1) DETAIL NOTE.

LAYOUT AND UNDERGROUND UTILITY DISCLAIMER:

LAYOUT AND/OR FLOOR PLAN INFORMATION, ELEVATIONS, ELECTRIC LINES, WATER LINES, SEWERS, AND BURIED STRUCTURES ON AND IN THE VICINITY OF THE SUBJECT PROPERTY ARE INDICATED HEREON ONLY TO THE EXTENT SUCH INFORMATION HAS BEEN MADE AVAILABLE TO OR DISCOVERED BY THE ENGINEER IN PREPARING THIS DRAWING. THERE IS NO GUARANTEE AS TO THE ACCURACY OR COMPLETENESS OF SUCH INFORMATION, AND ALL RESPONSIBILITY FOR ACCURACY AND COMPLETENESS THEREOF IS EXPRESSLY DISCLAIMED.

SPECIAL NOTE (ASBESTOS AND LEAD PAINT):

THE CONTRACTOR(S) IS RESPONSIBLE FOR THE DAILY INSPECTION OF THE PROJECT WORK SITE FOR THE PRESENCE OF ASBESTOS MATERIALS OR FOR MATERIALS THAT MAY HAVE ASBESTOS CONTAMINATION OR LEAD COATINGS. THE CONTRACTOR SHALL NOT ALLOW ANYONE TO BE EXPOSED IN ANY FASHION TO ANY POTENTIALLY CONTAMINATED AREAS. EXPOSURE TO THE MATERIALS IN QUESTION SHALL BE IMMEDIATELY AND COMPLETELY AVOIDED. THE CONTRACTOR(S) SHALL ISOLATE THE AREA WITH "SAFETY TAPE" AND POST WARNINGS TO LIMIT THE EXPOSURE TO OTHERS UNTIL THE POTENTIAL RISKS CAN BE IDENTIFIED AND REMOVED, IF NECESSARY. THE OWNER SHALL BE NOTIFIED IMMEDIATELY OF THE POTENTIAL CONTAMINATION. THE OWNER SHALL MAKE THE APPROPRIATE ARRANGEMENTS FOR THE INSPECTION OF THE MATERIALS IN QUESTION AND, IF NECESSARY, FOR REMOVAL. THE ENGINEER HAS NO SPECIFIC KNOWLEDGE OF THE PRESENCE, OR ABSENCE, OF SUCH MATERIALS.

GENERAL NOTES:

A. THE CONTRACTOR(S) SHALL VISIT THE SITE AND BECOME FULLY FAMILIAR WITH ALL OF THE CONDITIONS THAT PERTAIN TO THE WORK DESCRIBED HEREIN. THE FAILURE TO UNDERSTAND OR HAVE KNOWLEDGE OF ISSUES THAT COULD HAVE BEEN DETERMINED PRIOR TO BIDDING WILL NOT CONSTITUTE GROUNDS FOR ASKING FOR WORK CHANGE ORDERS OR EXTRA WORK.

B. ALL OWNER SITE SAFETY RULES, REGULATIONS, AND REQUIREMENTS SHALL BE REVIEWED, STUDIED, AND STRICTLY ADHERED TO. THE CONTRACTOR(S) SHALL ALSO BE RESPONSIBLE FOR COMMUNICATING THE SAME INFORMATION TO HIS EMPLOYEES.

C. THE CONTRACTOR(S) SHALL BE RESPONSIBLE FOR BECOMING FAMILIAR WITH LOCAL GOVERNING AUTHORITIES, CODES, AND STATUTES AND, IF REQUIRED, SHALL OBTAIN REQUIRED PERMITS, PAY ALL RELATED FEES INCLUDING INSPECTION FEES, AND OBTAIN INSPECTIONS AS REQUIRED TO COMPLETE AND FINISH HIS WORK. THE FOLLOWING CODES SHALL STRICTLY BE ADHERED TO:

OSHA
2006 INTERNATIONAL BUILDING CODE
2006 INTERNATIONAL MECHANICAL CODE
2006 INTERNATIONAL PLUMBING CODE
2008 NATIONAL ELECTRICAL CODE (2005 NEC, WHERE APPLICABLE)
NFPA STANDARDS
LIFE SAFETY CODES AND STANDARDS
AMERICANS WITH DISABILITIES ACT

D. SPECIAL PART OF WORK: THE MECHANICAL/PLUMBING CONTRACTOR SHALL STRICTLY COMPLY WITH ALL OSHA SAFETY RULES AND REGULATIONS AND USE ONLY APPROVED EQUIPMENT REQUIRED FOR THE PERFORMANCE OF THE WORK. THE CONTRACTOR(S) SHALL ALSO STRICTLY COMPLY WITH ALL OSHA SAFETY RULES AND REGULATIONS AND USE ONLY APPROVED METHODS OF EXCAVATION, TRENCHING, AND SHORING METHODS AS DESCRIBED IN OSHA 29 CFR, 1926.650. THE CONTRACTOR(S) SHALL MAINTAIN AND CLOSELY SUPERVISE ALL SAFETY PRACTICES AND CODES. EXTREME CARE SHALL BE TAKEN TO SAFEGUARD THE SAFETY OF THE PUBLIC, EMPLOYEES OF THE OWNER, AND THE EMPLOYEES OF THE CONTRACTOR(S).

E. THE CONTRACTOR(S) SHALL NOT SCALE ANY PORTION OF THE DRAWINGS. SOME PORTIONS OF THE DRAWINGS ARE NOT DRAWN TO SCALE AND ARE DIAGRAMMATIC IN NATURE. ALL DIMENSIONS SHALL BE VERIFIED IN THE FIELD.

F. THE CONTRACTOR(S) SHALL BE RESPONSIBLE FOR COMMUNICATION, COORDINATION, AND COOPERATION WITH ALL OTHER CONTRACTORS, SUPPLIERS, AND TRADES IN THE EXECUTION OF THE CONTRACTOR'S WORK AND WORK BY OTHERS.

G. THE CONTRACTOR(S) SHALL NOT PERFORM ANY CUTTING, BORING, SAWING, NOTCHING, ETC OF STRUCTURES WHICH IN ANY WAY WILL WEAKEN OR ALTER THE STRENGTH, MODIFY THE FUNCTIONALITY, OR CHANGE IT'S APPEARANCE WITHOUT THE WRITTEN PERMISSION TO DO SO FROM THE OWNER AND THE ENGINEER.

H. THE CONTRACTOR(S) SHALL FILL ALL VOIDS IN WALLS AROUND ALL PENETRATIONS WITH MATERIALS APPROVED BY THE ENGINEER. OPENINGS AROUND PIPING, ETC IN WALLS AND FLOORS SHALL BE FILLED WITH MATERIALS APPROVED FOR SUCH USE.

I. THE CONTRACTOR(S) SHALL BE RESPONSIBLE FOR THE PLANNING AND INSTALLATION OF ALL PIPING RUNS AS NECESSARY TO PROVIDE A COMPLETE SYSTEM AS DETAILED IN THE DRAWINGS, SPECIFICATIONS, AND AS REQUIRED BY THE OWNER. THE CONTRACTOR SHALL BECOME FAMILIAR WITH SITE DETAILS IN ORDER TO PROPERLY ASSESS LENGTHS OF RUNS, ELEVATIONS, AND OTHER CRITICAL INFORMATION. ALL MECHANICAL CONNECTIONS ARE TO BE COMPLETED AND MADE OPERATIONAL BY THE CONTRACTOR(S).

J. THE CONTRACTOR(S) SHALL BE RESPONSIBLE FOR THE DURABLE AND CLEAR LABELING OF ALL VALVES, LINES AND SERVICES, AND EQUIPMENT.

K. THE CONTRACTOR(S) SHALL REVIEW THE PROPOSED INSTALLATION WORK AS SHOWN AND, AFTER REVIEWING FIELD CONDITIONS, CLEARANCES, AND NEEDS FOR ACCESS, OBTAIN APPROVAL OF FINAL LAYOUT AND INSTALLATION PRIOR TO PERFORMING WORK.

SYSTEM INSTALLATION NOTES:

A. ALL LINES SHALL BE FULLY SUPPORTED TO PROTECT PERSONNEL AND EQUIPMENT.

B. ALL LINES SHALL BE INSTALLED WITH SLOPE AND DRAINAGE CAPABILITIES AS NEEDED TO PROVIDE AN INSTALLATION THAT CAN BE DRAINED AND THE HIGH POINTS VENTED. LOW POINTS OR TRAPS SHALL BE EQUIPPED WITH PLUGGED DRAIN VALVES.

C. ALL QUESTIONS REGARDING INSTALLATION TECHNIQUES, METHODS, MATERIALS, AND FINISHES SHALL BE CLARIFIED WITH THE OWNER BY THE CONTRACTOR PRIOR TO BIDDING WORK.

D. INSTALL THERMOMETERS, PRESSURE GAUGES, VALVE HANDLES, ETC TO PROVIDE VISUAL AND PHYSICAL ACCESS FROM THE FLOOR IF AT ALL POSSIBLE. CONFIRM AND COORDINATE THIS ACTIVITY WITH THE OWNER'S PERSONNEL DURING INSTALLATION WORK.

E. ALL OSHA REQUIREMENTS, OWNER SITE WORKING CONDITIONS, GMP REQUIREMENTS, SAFETY PROCEDURES, ETC SHALL BE STRICTLY COMPLIED WITH.

F. ALL PIPING SHALL BE PERMANENTLY MARKED WITH AN OWNER APPROVED MARKING SYSTEM. BRIEF DESCRIPTION AND FLOW DIRECTION SHALL BE IDENTIFIED WITH THE MARKINGS.

G. ALL NEW EQUIPMENT, PIPING, AND VALVES SHALL BE IDENTIFIED. EQUIPMENT SHALL BE LABELED WITH ITS ITEM NOMENCLATURE PER THE DESIGN DRAWINGS. ALL PIPING AND VALVES ASSOCIATED WITH THE INDIVIDUAL PIECES OF EQUIPMENT SHALL BE IDENTIFIED WITH THE SAME ITEM NOMENCLATURE. FOR EXAMPLE: THE PIECE OF EQUIPMENT NOTED AS CHILLER 1 (CH–1) SHALL BE LABELED AS CH–1. VALVES AND OTHER SPECIALTIES SHALL ALSO BE MARKED CH–1. PIPE BRANCH RUNS ASSOCIATED WITH CH–1 SHALL BE LABELED EVERY 10'–0" WITH THE CH–1 MARKING BACK TO THE MAIN PIPE HEADER.

REV	DESCRIPTION	DATE	BY
0	ISSUE FOR BID	05/23/11	TMM

STATE OF MISSOURI — THOMAS M. McKINNIS — NUMBER E-18233 — REGISTERED PROFESSIONAL ENGINEER
MECHANICAL ENGINEER – E–18233

ESC consulting engineers
www.escfirm.com
1922 N. Broadway Avenue
Springfield, MO 65803
Phone: 417-831-5500
MO Engineering Corporation 001251

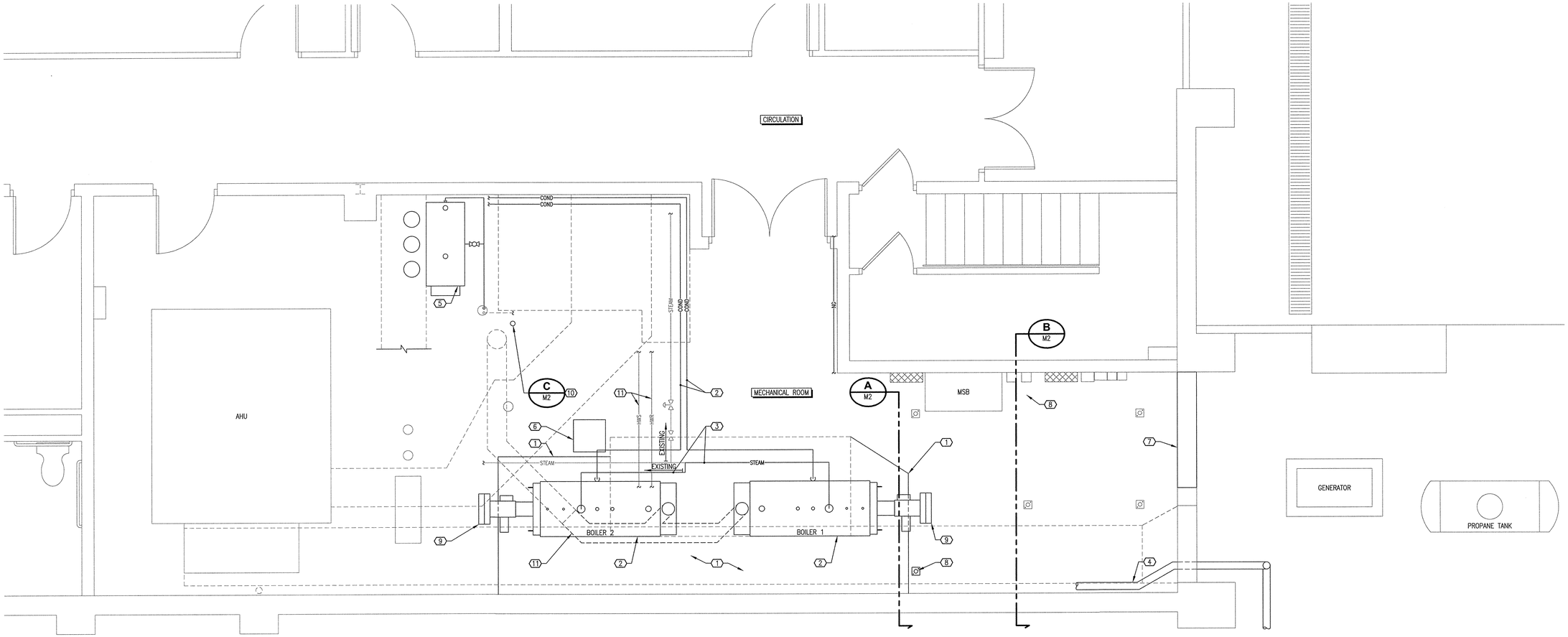
MoDOT DISTRICT 8

PROJECT NAME: BOILER REPLACEMENT
PROJECT LOCATION: SPRINGFIELD, MO
ESC, Inc. PROJ No 11087
DRAWING TITLE: OVERALL FACILITY MECHANICAL NOTES AND LEGENDS

DESIGN BY	CHECKED BY	DATE	APPROVED BY	DATE	DRAWN BY
M. McKINNIS	ARS	05/23/11	TMM	05/23/11	KJK

HORIZ. SCALE: NONE
VERT. SCALE:
SHEET ____ OF ____ SHEETS
DRAWING No MO
REV 0

M:\APROJ\11087\Dwg\Pkg_A\Working_dwgs\M0.dwg, Layout1, 1:1



GENERAL NOTES:

A. COORDINATE ALL WORK WITH THE OWNER'S OPERATIONAL SCHEDULE. FURNISH AND INSTALL TEMPORARY BARRIERS, SIGNS, CAUTION TAPE, ETC TO DIRECT PERSONNEL TRAFFIC AROUND, OR AWAY FROM, THE WORK ACTIVITY.

B. THE WORK AREA SHALL BE RESTRICTED TO THE MECHANICAL ROOM AND THE ADJACENT CORRIDOR.

C. MAINTAIN BUILDING SECURITY AT ALL TIMES. DO NOT BLOCK DOORS, OR LEAVE THEM UNATTENDED, WHILE MOVING MATERIALS INTO, OR OUT OF, THE WORK AREA.

D. PROTECT AND MAINTAIN ALL EXISTING FINISHES IN THE MECHANICAL ROOM, CORRIDOR, AND EXTERIOR AREAS.

E. SEE THE P&ID FOR THE PIPING ARRANGEMENT.

NOTES:

(1) FURNISH AND INSTALL ADDITIONAL HOUSEKEEPING PAD AS INDICATED. THE HEIGHT OF THE ADDITIONAL AREA SHALL MATCH THE EXISTING PAD.

(2) FURNISH AND INSTALL THE NEW BOILERS. FURNISH AND INSTALL THE FEEDWATER PIPING, STEAM PIPING AND VALVES, BLOWDOWN PIPING, NATURAL GAS PIPING, VENTING, A SAFETY RELIEF DISCHARGE, AND THE WIRING AND CONTROLS NEEDED FOR A FULLY FUNCTIONING SYSTEM. INSULATE THE NEW PIPING AND VALVES ON THE STEAM, CONDENSATE, AND BOILER WATER MAKEUP PIPING.

(3) CONNECT TO THE EXISTING STEAM DISTRIBUTION PIPE THAT REMAINS.

(4) VERIFY THE EXISTING NATURAL GAS PRESSURE PRIOR TO ORDERING THE BOILERS. THE EXISTING SUPPLY PRESSURE IS 1 PSI. NEW REGULATORS SHALL BE CAPABLE OF REDUCING A SUPPLY PRESSURE OF 2 PSI TO THE BURNER REQUIREMENTS.

NOTES (CONTINUED):

(5) FURNISH AND INSTALL A NEW CONDENSATE RECEIVER. CONNECT THE HEAT EXCHANGER DISCHARGE AND THE CONDENSATE PIPING FROM THE BUILDING HVAC SYSTEM TO THE NEW TANK. FURNISH AND INSTALL OVERFLOW PIPING, BOILER FEEDWATER TO EACH BOILER, VENT PIPING, WATER MAKEUP, THE OWNER'S CHEMICAL FEED SYSTEM, DRAIN PIPING, AND THE STEAM PIPING TO THE TANK SPARGE HEATER. INSULATE THE TANK AND ALL THE NEW PIPING.

(6) FURNISH AND INSTALL THE BOILER BLOWDOWN RECEIVER/COOLER. CONNECT TO BOTH OF THE BOILERS' SURFACE, AND BOTTOM BLOWDOWN, CONNECTIONS. FURNISH AND INSTALL PIPING TO THE FLOOR DRAIN, VENT, AND THE CITY WATER CONNECTIONS.

(7) FURNISH AND INSTALL NEW BELIMO DAMPER ACTUATORS ON THE OUTSIDE AIR LOUVER. VERIFY THE DAMPER OPERATIONS AND ADJUST AS REQUIRED. EACH BOILER CONTROL SYSTEM SHALL OPERATE AN INDIVIDUAL SECTION OF THE LOUVER.

NOTES (CONTINUED):

(8) MODIFY THE EXISTING CHILLED WATER EXPANSION TANKS SUPPORT COLUMN.

(9) FURNISH AND INSTALL A LEAD/LAG BOILER CONTROL SYSTEM. EACH BOILER SHALL HAVE TWO (2) SETS OF PRESSURE CONTROLS FOR OPERATION.

(10) FURNISH AND INSTALL A COMBINATION VENT FOR THE CONDENSATE STORAGE TANK AND THE BLOWDOWN RECIEVER/COOLER.

(11) FURNISH AND INSTALL NEW DOUBLE WALL VENT PIPING WITH 1" INSULATION FROM THE NEW BOILERS TO THE EXISTING STACK TO THE ROOF. THE PIPE SHALL BE SCHEBLER PIA, OR AN APPROVED EQUIVALENT.

A M1 NEW ROOM LAYOUT

SCALE: 3/8" = 1'-0"

4 0 4

SCALE IN FEET

KEY PLAN

SHADED AREA INDICATES LOCATION OF WORK

REV	DESCRIPTION	DATE	BY
0	ISSUE FOR BID	05/23/11	TMM

STATE OF MISSOURI THOMAS M. McKINNIS NUMBER E-18233 REGISTERED PROFESSIONAL ENGINEER

THOMAS M. McKINNIS
MECHANICAL ENGINEER – E-18233

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Springfield, MO 65803
Phone: 417-831-5500
MO Engineering Corporation 001251

MoDOT
DISTRICT 8

PROJECT NAME	BOILER REPLACEMENT				
PROJECT LOCATION	SPRINGFIELD, MO			ESC, Inc. PROJ No	11087
DRAWING TITLE	MAIN FACILITY – BASEMENT MECHANICAL NEW EQUIPMENT LAYOUT				
DESIGN BY	CHECKED BY	DATE	APPROVED BY	DATE	DRAWN BY
M. McKINNIS	ARS	05/23/11	TMM	05/23/11	KJK
HORIZ. SCALE: AS NOTED	SHEET ____ OF ____ SHEETS		DRAWING No		REV
VERT. SCALE: ____			M1		0

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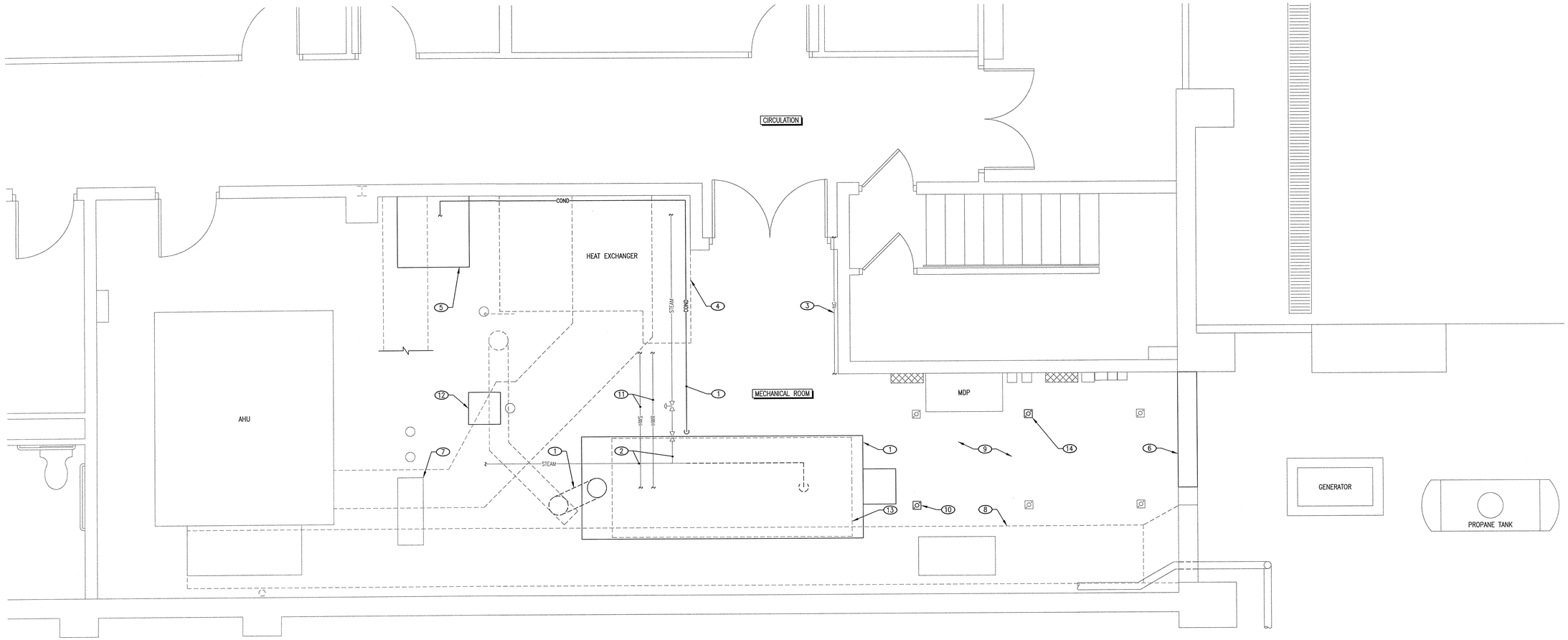

GENERAL NOTES:

A. COORDINATE ALL WORK WITH THE OWNER'S OPERATIONAL SCHEDULE. FURNISH AND INSTALL TEMPORARY BARRIERS, SIGNS, CAUTION TAPE, ETC TO DIRECT PERSONNEL TRAFFIC AROUND, OR AWAY FROM, THE WORK ACTIVITY.

B. THE WORK AREA SHALL BE RESTRICTED TO THE MECHANICAL ROOM AND THE ADJACENT CORRIDOR.

C. MAINTAIN BUILDING SECURITY AT ALL TIMES. DO NOT BLOCK DOORS, OR LEAVE THEM UNATTENDED, WHILE MOVING MATERIALS INTO, OR OUT OF, THE WORK AREA.

D. PROTECT AND MAINTAIN ALL EXISTING FINISHES IN THE MECHANICAL ROOM, CORRIDOR, AND EXTERIOR AREAS.

E. VERIFY THE NEED TO MAINTAIN NATURAL GAS SERVICE TO THE MAINTENANCE BUILDING AND THE EXISTING HOT WATER HEATER DURING THE MODIFICATION OF THE BOILER GAS SERVICE. WHERE OUTAGES ARE NECESSARY, PURGE AND RE-LIGHT ALL APPLIANCES.

GENERAL NOTES (CONTINUED):

F. IT IS ASSUMED THAT THE BOILER WILL BE SECTIONED INTO PIECES SMALL ENOUGH TO BE MOVED THROUGH THE EXISTING DOOR WAYS. AT THE CONTRACTORS OPTION, THE BOILER MAY BE REMOVED THROUGH THE OUTSIDE LOUVER/DAMPER. REMOVAL OF THE STANDBY GENERATOR, CHILLED WATER EXPANSION TANK SUPPORTS, AND OTHER OBSTACLES ENCOUNTERED SHALL BE RETURNED TO THEIR PRE-CONSTRUCTION CONDITION.

G. THE CONTRACTOR SHALL PROVIDE ONE (1) PERSON, NOT INVOLVED WITH THE ACTUAL HOT WORK ACTIVITIES, TO ACT AS A FIRE WATCH DURING ALL HOT WORK ACTIVITIES, AND FOR A MINIMUM OF THIRTY (30) MINUTES AFTER THE THE LAST HOT WORK OCCURRENCE.

H. VENTILATE THE WORK AREA TO THE OUTSIDE. SMOKE AND FUMES SHALL BE CONTROLLED AS TO NOT DISRUPT DISTRICT 8 OPERATIONS.

I. NOISE FROM THE WORK ACTIVITIES SHALL BE MINIMIZED OR THE WORK SHALL BE RESTRICTED TO HOURS WHEN THE BUILDING IS UNOCCUPIED. ALL ADDITIONAL EXPENSE FOR "OFF SHIFT", OR WEEKEND, WORK WILL BE THE CONTRACTORS RESPONSIBILITY.

NOTES:

(1) DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING BOILER, INCLUDING BUT NOT LIMITED TO, THE BOILER, BURNER, GAS SERVICE, PORTIONS OF THE VENT TO THE VERTICAL STACK, RELIEF VALVE PIPING, ABANDONED FUEL OIL SUPPLY AND RETURN PIPING, CONDENSATE RETURN PIPING, AND A PORTION OF THE STEAM DISTRIBUTION PIPING.

(2) PORTIONS OF THE EXISTING STEAM DISTRIBUTION PIPING SHALL REMAIN.

(3) THE EXISTING NATURAL GAS DISTRIBUTION TO THE MAINTENANCE BUILDING SHALL REMAIN.

(4) THE EXISTING HEAT EXCHANGER, HOT WATER PUMPS, AND SPECIALITIES SHALL REMAIN. THE CONDENSATE RETURN PIPING SHALL REQUIRE MODIFICATION.

(5) DISCONNECT AND REMOVE THE CONDENSATE RETURN RECEIVER, PUMPS, AND THE ASSOCIATED PIPING.

(6) DISCONNECT AND REMOVE THE EXISTING COMBINATION LOUVER DAMPER OPERATORS. THE LOUVER DAMPER SHALL REMAIN.

NOTES (CONTINUED):

(7) EXISTING CHILLED WATER PUMP AND PIPING TO REMAIN.

(8) EXISTING OUTSIDE AIR DUCT TO REMAIN.

(9) EXISTING CHILLED WATER EXPANSION TANKS TO REMAIN.

(10) MODIFY THE EXISTING CHILLED WATER TANK SUPPORT FOR THE NEW EQUIPMENT LAYOUT.

(11) THE EXISTING HOT WATER SUPPLY AND RETURN PIPING SHALL REMAIN UNDISTURBED.

(12) THE EXISTING GAS HOT WATER HEATER SHALL BE REMOVED, AND REPLACED, BY THE OWNER. UNUSED GAS AND VENT CONNECTIONS SHALL BE REMOVED, AND/OR REPAIRED, BY THE CONTRACTOR.

(13) THE EXISTING HOUSEKEEPING PAD SHALL REMAIN AND BE EXPANDED.

(14) REMOVE THE EXISTING CHILLED WATER TANK SUPPORT FOR THE NEW EQUIPMENT LAYOUT.

A / M1 DEMO

DEMOLITION PLAN

SCALE: 3/8" = 1'-0"

4 0 4

SCALE IN FEET

KEY PLAN

SHADED AREA INDICATES LOCATION OF WORK

REV	DESCRIPTION	DATE	BY
0	ISSUE FOR BID	05/23/11	TMM

STATE OF MISSOURI
THOMAS M. McKINNIS
NUMBER E-18233
REGISTERED PROFESSIONAL ENGINEER

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MoDOT
DISTRICT 8

PROJECT NAME	BOILER REPLACEMENT		
PROJECT LOCATION	SPRINGFIELD, MO	ESC, Inc. PROJ No	11087
DRAWING TITLE	MAIN FACILITY – BASEMENT MECHANICAL DEMOLITION PLAN		

DESIGN BY	CHECKED BY	DATE	APPROVED BY	DATE	DRAWN BY
M. McKINNIS	ARS	05/23/11	TMM	05/23/11	KJK

HORIZ. SCALE: AS NOTED
VERT. SCALE: _____
SHEET _____ OF _____ SHEETS
DRAWING No M1-DEMO
REV 0

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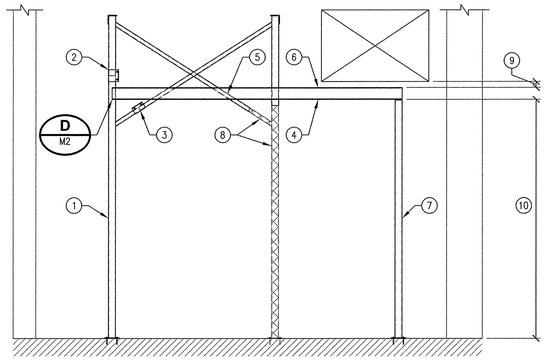
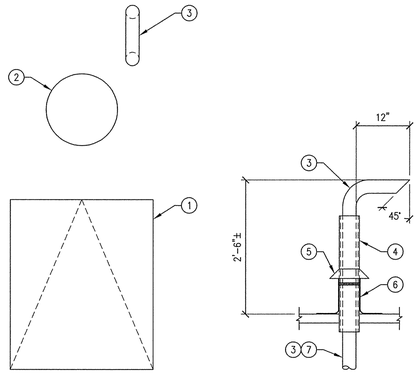


NOTES:

1. EXISTING 2" DIAMETER PIPE COLUMN TO REMAIN.
2. REMOVE THE EXISTING PIPE REPAIR CLAMP AND WELD THE PIPE BACK TOGETHER.
3. EXISTING PIPE REPAIR CLAMP TO REMAIN.
4. C 4x5.4 BACK-TO-BACK AT THE SUPPORTS. LOCATE JUST UNDER THE EXISTING OUTSIDE AIR DUCT.
5. INSTALL SPACERS FROM THE 1" DIAMETER SUPPORT PIPE CROSS BRACING TO THE NEW C 4x5.4'S. WELD TO THE CHANNEL SUPPORT.
6. INSTALL SPACERS BETWEEN THE CHANNELS.
7. NEW 2" DIAMETER PIPE COLUMN WITH 1/4" THICK CAP PLATE AND BASEPLATE.
8. CUT AND REMOVE THE EXISTING LEG SUPPORT AS INDICATED.
9. MINIMUM DISTANCE TO THE OUTSIDE AIR DUCT.
10. THE TARGET DISTANCE TO THE FLOOR IS 6'-8".

A M2 TANK SUPPORT MODIFICATION

SCALE: 1/2" = 1'-0"

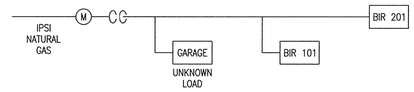


NOTES:

1. EXISTING ROOF ACCESS HATCH.
2. EXISTING BOILER VENT.
3. 3" DIAMETER VENT FROM THE CONDENSATE RECEIVER AND THE BLOWDOWN TANK. TRANSITION TO SCHEDULE 10 STAINLESS STEEL BELOW THE ROOF LINE.
4. 4" SCHEDULE 10 STAINLESS STEEL SLEEVE OVER THE VENT WITH A CLOSURE PLATE WELDED BETWEEN THE SLEEVE AND THE VENT.
5. COUNTER FLASHING ATTACHED TO THE SLEEVE.
6. SINGLE PLY ROOFING MEMBRANE FLASHING. REPAIRS SHALL BE MADE BY AN APPROVED ROOFING CONTRACTOR.
7. SUPPORT THE PIPE AT THE ROOF STRUCTURE AND AT THE CEILING LEVEL IN THE BASEMENT.

C M2 VENT TERMINATION AT THE ROOF

SCALE: 3/4" = 1'-0"



GENERAL NOTES:

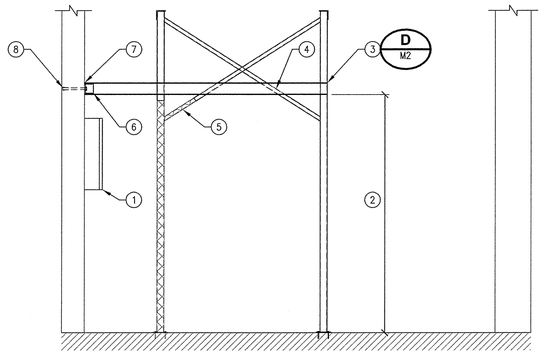
A. NO NEW GAS LOAD REQUIREMENT.

B. ESTIMATED EXISTING LOAD – 6,546,800.

C. ESTIMATED NEW LOAD – 6,316,800.

E M2 GAS RISER DIAGRAM

SCALE: NONE

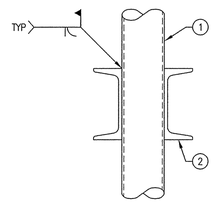


NOTES:

1. ELECTRICAL PANEL.
2. MINIMUM DISTANCE TO THE FLOOR 6'-6".
3. C 4x5.4 BACK-TO-BACK CHANNEL SUPPORTS.
4. SPACERS, AS REQUIRED, FROM THE 1" DIAMETER SUPPORT PIPE CROSS BRACING TO THE NEW C 4x5.4'S. WELD TO THE CHANNEL SUPPORT.
5. CUT AND REMOVE THE EXISTING LEG SUPPORT AS INDICATED. WELD EXISTING LEG TO THE CHANNELS.
6. CLIP ANGLE, 4x3x5/16x0'-3", WITH ONE (1) 11/16" DIAMETER HOLE. BOTH CHANNELS.
7. SPACERS BETWEEN THE CHANNELS.
8. HOLLOW CMU ANCHOR, HILTI HIT HY20 WITH HAS-E, 5/8"x8" WITH NUT, WASHER, AND SCREEN TUBE.

B M2 SUPPORT MODIFICATION AT ELECTRICAL PANEL

SCALE: 1/2" = 1'-0"



NOTES:

1. 2" DIAMETER PIPE COLUMN.
2. C 4x5.4 BACK-TO-BACK CHANNEL SUPPORTS.

D M2 CHANNEL TO SUPPORT CONNECTION

SCALE: 3" = 1'-0"

REV	DESCRIPTION	DATE	BY
0	ISSUE FOR BID	05/23/11	TMM

STATE OF MISSOURI
THOMAS M. McKINNIS
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REGISTERED PROFESSIONAL ENGINEER
05/23/11

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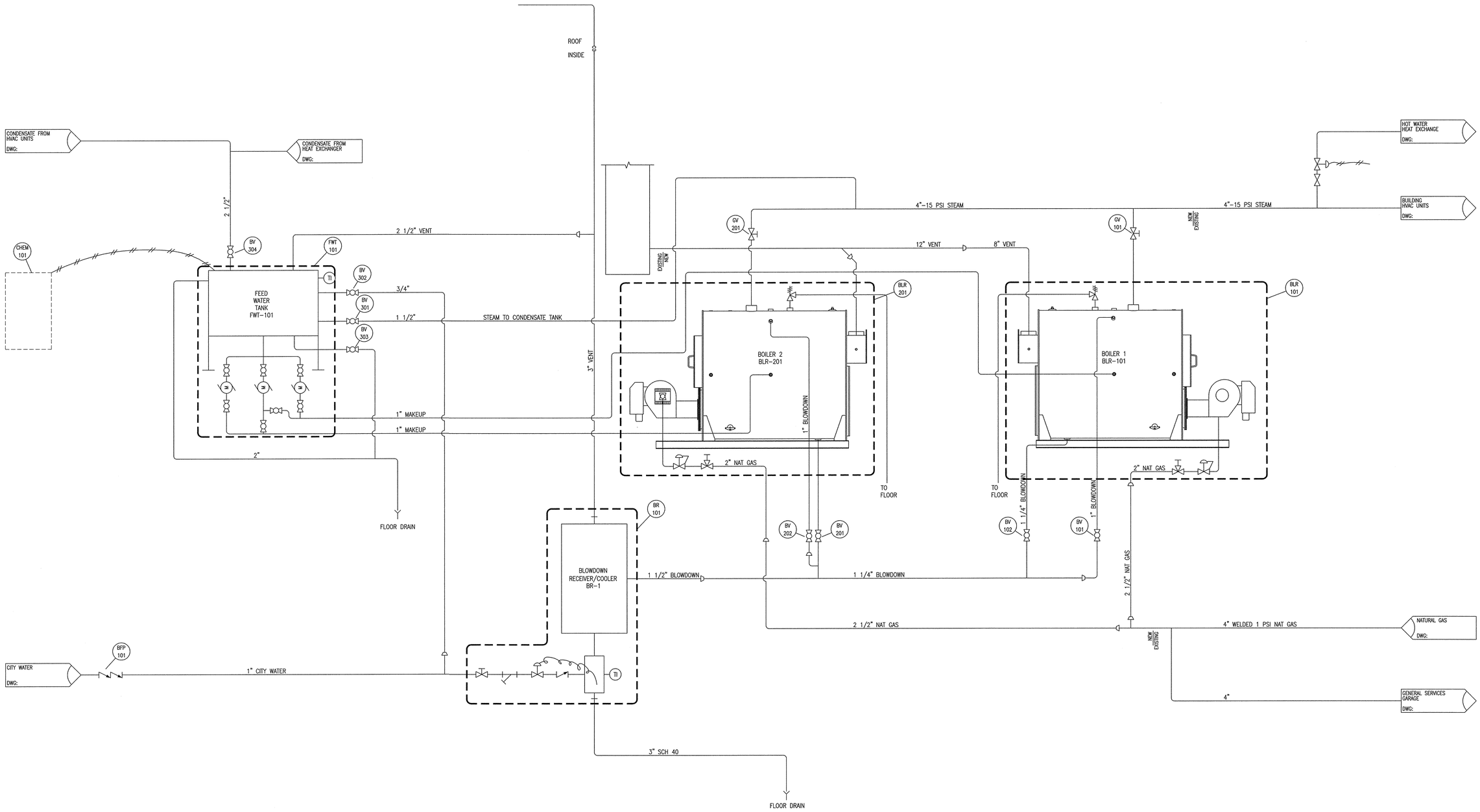
MoDOT
DISTRICT 8

PROJECT NAME	BOILER REPLACEMENT
PROJECT LOCATION	SPRINGFIELD, MO
ESC, Inc. PROJ No	11087
DRAWING TITLE	MAIN FACILITY – BASEMENT MECHANICAL SECTIONS AND DETAILS

DESIGN BY	CHECKED BY	DATE	APPROVED BY	DATE	DRAWN BY
M. McKINNIS	ARS	05/23/11	TMM	05/23/11	KJK

HORIZ. SCALE: AS NOTED
VERT. SCALE: _____
SHEET _____ OF _____ SHEETS
DRAWING No M2
REV 0



A M.3 BOILER SYSTEM P&ID

SCALE: NONE

ITEMS SHOWN WITHIN THIS BOUNDARY ARE SUPPLIED WITH EQUIPMENT.

REV	DESCRIPTION	DATE	BY
0	ISSUE FOR BID	05/23/11	TMM

STATE OF MISSOURI
THOMAS M. McKINNIS
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MoDOT
DISTRICT 8

PROJECT NAME	BOILER REPLACEMENT		
PROJECT LOCATION	SPRINGFIELD, MO	ESC, Inc. PROJ No	11087
DRAWING TITLE	MAIN FACILITY MECHANICAL BOILER SYTEM P&ID		

DESIGN BY	CHECKED BY	DATE	APPROVED BY	DATE	DRAWN BY
M. McKINNIS	ARS	05/23/11	TMM	05/23/11	WLB

HORIZ. SCALE: AS NOTED
VERT. SCALE:
SHEET ____ OF ____ SHEETS
DRAWING No M3
REV 0

BOILER SYSTEM P&ID SCHEDULE

MARK	ITEM	SIZE	FITTINGS	RATING	MANUFACTURER	MODEL NO	STYLE/TYPE	DESCRIPTION	REMARKS AND INSTALLATION NOTES
BFP-101	BACKFLOW PREVENTER	1"	THREADED	175 PSI	WATTS	909QT	REDUCED PRESSURE	WATER MAKEUP AND COOLER	-
BLR-101	BOILER	60 HP	-	15 PSI STEAM	SUPERIOR	ARROWHEAD	FIREBOX	PACKAGED BOILER	-
BLR-201	BOILER	60 HP	-	15 PSI STEAM	SUPERIOR	ARROWHEAD	FIREBOX	PACKAGED BOILER	-
BR-101	BLOWDOWN RECEIVER	-	FLANGED/THREADED	150 PSI	LATTNER	1450/301A	-	SEPARATOR/COOLER	-
BV-101	BALL VALVE	1"	THREADED	150 SWP	APOLLO	77C-XXX--04	FULL PORT	SURFACE BLOWDOWN	-
BV-102	BALL VALVE	1 1/4"	THREADED	150 SWP	APOLLO	77C-XXX-04	FULL PORT	BOTTOM BLOWDOWN	-
BV-201	BALL VALVE	1 1/4"	THREADED	150 SWP	APOLLO	77C-XXX-04	FULL PORT	BOTTOM BLOWDOWN	-
BV-202	BALL VALVE	1"	THREADED	150 SWP	APOLLO	77C-XXX--04	FULL PORT	SURFACE BLOWDOWN	-
BV-301	BALL VALVE	1 1/2"	THREADED	150 SWP	APOLLO	77C-01	FULL PORT	STEAM HEATER	-
BV-302	BALL VALVE	3/4"	THREADED	150 SWP	APOLLO	77C-01	FULL PORT	WATER MAKEUP AND COOLER	-
BV-303	BALL VALVE	1"	THREADED	150 SWP	APOLLO	77C-01	FULL PORT	DRAIN	-
BV-304	BALL VALVE	2 1/2"	THREADED	150 SWP	APOLLO	94A10901	FULL PORT	RETURN ISOLATION	-
CHEM-101	CHEMICAL FEED SYSTEM	-	-	-	-	-	-	EXISTING - OWNER PROVIDED CHEMICAL FEED	-
FWT-101	FEEDWATER TANK	100 GALLON	THREADED	15 PSI	SUPERIOR	S3-120-15-T	-	TANK WITH MAKEUP, HEATER, SIGHT GLASS	TRIPLEX PUMPS, MODIFIED HEIGHT
GV-101	GATE VALVE	4"	FLANGED	100 SWP	APOLLO	611F SERIES	OS&Y	6GA11AB1	THREADED FITTING REQUIRED FOR BOILER CONNECTION
GV-201	GATE VALVE	4"	FLANGED	100 SWP	APOLLO	611F SERIES	OS&Y	6GA11AB1	THREADED FITTING REQUIRED FOR BOILER CONNECTION

REV	DESCRIPTION	DATE	BY
0	ISSUE FOR BID	05/23/11	TMM

STATE OF MISSOURI
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5/23/11

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MoDOT
DISTRICT 8

PROJECT NAME: BOILER REPLACEMENT
PROJECT LOCATION: SPRINGFIELD, MO
ESC, Inc. PROJ No: 11087
DRAWING TITLE: MAIN FACILITY MECHANICAL BOILER SYSTEM P&ID SCHEDULE

DESIGN BY	CHECKED BY	DATE	APPROVED BY	DATE	DRAWN BY
M. McKINNIS	ARS	05/23/11	TMM	05/23/11	WLB

HORIZ. SCALE: NONE
VERT. SCALE:
SHEET ____ OF ____ SHEETS
DRAWING No: M4
REV: 0

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DIVISION 23 – GENERAL MECHANICAL SPECIFICATIONS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. FURNISH MECHANICAL AND PLUMBING SYSTEMS WHICH MAY INCLUDE:

1. APPLICATION FOR PERMITS, AND BOILER INSTALLATION FROM THE DIVISION OF FIRE SAFETY, STATE OF MISSOURI.
2. BOILERS AND ASSOCIATED EQUIPMENT.
3. VENT SYSTEMS SHEET METAL WORK, FIRE DAMPERS, REGISTERS, GRILLES, AND DIFFUSERS.
4. PIPING, AND DRAINAGE SYSTEMS INCLUDING SERVICE WATER, CONDENSATE RETURN BOILER FEED WATER, AND OTHER DISTRIBUTION WATER SYSTEMS.
5. INSULATION OF PIPING SYSTEMS, AND EQUIPMENT.
6. FIRE STOPPING AT WALLS, CEILINGS, FLOORS, AND OTHER PENETRATIONS.
7. SYSTEM DISINFECTION, COMMISSIONING, TESTING, ADJUSTING, BALANCING, AND DOCUMENTATION.
8. PROPER LABELING FOR ALL SYSTEMS, PIPING, AND OTHER COMPONENTS.
9. PAINTING RELATED TO THIS SECTION OF WORK, INCLUDING REPAIR OF DAMAGED FINISHES AND TOUCH-UP OF INSTALLED EQUIPMENT FINISHES.
10. SITE CLEAN-UP AND LEGAL DISPOSAL OF ALL CONSTRUCTION DEBRIS. ALL EXCESS EQUIPMENT, MATERIALS, OR OTHER ITEMS SHALL BE REMOVED FROM THE SITE. COORDINATION WITH THE OWNER AND THE OTHER TRADES WORKING IN THE AREA.

1.02 RELATED SECTIONS AND DOCUMENTS

A. PROJECT SPECIFICATIONS, DOCUMENTS, CONTRACTS, WRITTEN INSTRUCTIONS, BIDDING ADDENDUMS, WRITTEN PRE-BID INSTRUCTIONS AND AGREEMENTS, AND ANY OTHER ITEMS AS DOCUMENTED IN OTHER PORTIONS OF THIS DOCUMENT.

B. PROJECT DRAWINGS THAT RELATE TO THIS WORK AND THE FURNISHING, METHODS, INSTALLATION, PROCEDURES, LIMITATIONS, RESTRICTIONS, AND INSTRUCTIONS AS SPECIFIED IN THE SPECIFICATION DOCUMENTS AS A WHOLE.

C. ALL OTHER SPECIFICATIONS, WHETHER ITEMIZED ABOVE OR NOT. DRAWINGS AND WORK AS REPRESENTED ON THE DRAWINGS, INCLUDING THE MANUFACTURER'S INSTRUCTIONS AND DETAILS REQUIRED FOR THE CORRECT INSTALLATION OF THE EQUIPMENT AS SPECIFIED AND COMMON TO THE TRADES, LABOR, MATERIALS, AND METHODS FOR THE COMPLETION OF THE SPECIFIED WORK.

1.03 REFERENCES (LATEST ISSUE SHALL APPLY UNLESS OTHERWISE NOTED)

A. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) STANDARDS.

B. AMERICAN SOCIETY OF TESTING AND MATERIALS (ASTM) STANDARDS.

C. MANUFACTURER'S STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS) STANDARDS.

D. AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) STANDARDS.

E. AMERICAN WATER WORKS ASSOCIATION (AWWA) STANDARDS.

F. MISCELLANEOUS STANDARDS REFERENCED HEREIN:

1. ASSE 1011 – HOSE CONNECTION VACUUM BREAKERS.
2. PFI ES3 – FABRICATING TOLERANCES.
3. CISPI 301 – HUBLESS CAST IRON SOIL PIPE AND FITTINGS.

G. BUILDING OFFICIALS AND CODE ADMINISTRATORS (BOCA) STANDARDS REFERENCED HEREIN:

1. NMC – NATIONAL MECHANICAL CODE.
2. NPC – NATIONAL PLUMBING CODE.

H. INTERNATIONAL BUILDING CODES REFERENCED HEREIN:

1. IMC – INTERNATIONAL MECHANICAL CODE.
2. IPC – INTERNATIONAL PLUMBING CODE.

1.04 SUBMITTALS FOR REVIEW

A. PRIOR TO ORDERING EQUIPMENT OR STARTING ANY INSTALLATION WORK, SUBMIT SEVEN (7) COPIES OF ITEMS PROPOSED FOR THIS WORK WITH NECESSARY ILLUSTRATIONS, DRAWINGS, AND ENGINEERING DATA FOR REVIEW BY THE OWNER AND/OR ENGINEER. SUBMIT IN TIME TO ALLOW NO LESS THAN SEVEN (7) WORKING DAYS FOR REVIEW, CHECKING, COMMENTING, AND TRANSMITTAL WITHOUT DELAYING THE CONSTRUCTION SCHEDULE. SUBMIT ALL ITEMS AT ONE TIME NO LESS THAN TWENTY (20) DAYS AFTER AWARD OF THE CONTRACT.

B. SUBMITTALS SHALL BE CLEARLY MARKED TO SHOW THE INTENDED ITEM, WITH IDENTIFICATION AS TO THE EQUIPMENT NUMBER OR OTHER MARKING TO SHOW LOCATION, SERVICE, AND FUNCTION. ALL OTHER EXTRANEOUS AND INAPPLICABLE INFORMATION SHALL BE MARKED OUT BEFORE SUBMITTAL. SUBMITTALS NOT CLEARLY MARKED TO PROPERLY IDENTIFY THE EQUIPMENT AND APPLICATION WILL BE REJECTED AND RETURNED FOR IMMEDIATE RE-SUBMITTAL BY THE CONTRACTOR.

C. THE CONTRACTOR AGREES THAT SUBMITTALS REVIEWED AND APPROVED BY THE OWNER AND/OR ENGINEER ARE NOT CHANGE ORDERS; THE PURPOSE OF SUBMITTALS BY THE CONTRACTOR IS TO DEMONSTRATE TO THE OWNER AND/OR ENGINEER THAT THE CONTRACTOR UNDERSTANDS THE PROJECT DESIGN, AND THAT THIS UNDERSTANDING IS DEMONSTRATED BY INDICATING THE EQUIPMENT AND MATERIALS HE OR SHE INTENDS TO FURNISH AND INSTALL AND/OR BY THE FABRICATION AND INSTALLATION METHODS HE OR SHE INTENDS TO USE.

D. REQUESTS FOR SUBSTITUTIONS OF MATERIALS AND EQUIPMENT SHALL BE ACCEPTED ONLY IF REQUEST IS MADE IN WRITING AT LEAST SEVEN (7) DAYS PRIOR TO THE BID DATE FOR THE WORK. NO SUBSTITUTION OF MATERIALS, EQUIPMENT, OR OTHER ITEMS SHALL BE ACCEPTED WITHOUT THE WRITTEN APPROVAL OF THE OWNER. THE CONTRACTOR ACCEPTS FULL RESPONSIBILITY FOR ANY RESULTANT WORK CHANGE OR ADDITIONAL EXPENSE, EITHER DIRECTLY OR INDIRECTLY, THAT RESULTS FROM THE IMPROPER AND UNAPPROVED USE OF SUBSTITUTED MATERIALS OR EQUIPMENT.

E. THE CONTRACTOR FURTHER AGREES THAT IF DEVIATIONS, DISCREPANCIES, OR CONFLICTS BETWEEN SUBMITTALS AND CONTRACT DOCUMENTS ARE DISCOVERED, EITHER PRIOR TO OR AFTER, SUBMITTALS ARE TO BE PROCESSED BY THE OWNER AND THE CONTRACT DOCUMENTS SHALL CONTROL AND SHALL BE FOLLOWED. SUBMITTALS ARE REQUIRED OF ALL EQUIPMENT AND MATERIALS FURNISHED ON THE PROJECT AND SHALL INCLUDE AND BE CLEARLY MARKED AS FOLLOWS:

1. THE NAME OF THE PROJECT.
2. SUBMITTAL DATE.
3. NAMES OF CONTRACTORS, SUBCONTRACTORS, SUPPLIERS, AND MANUFACTURERS OF MATERIALS AND SUPPLIES.
4. ALL PERFORMANCE DATA FOR MECHANICAL EQUIPMENT, INCLUDING DIMENSIONAL INFORMATION, WEIGHTS, PERFORMANCE, AND OTHER INFORMATION PERTAINING TO SPECIFIC EQUIPMENT.
5. IF APPLICABLE, VOLTAGE, PHASE, OPERATING AND NAMEPLATE AMPERAGE OF EACH ELECTRICAL ITEM SUCH AS MOTORS, HEATERS, OR OTHER ITEMS. FOR MOTORS, FURNISH THE MANUFACTURERS NAMEPLATE INFORMATION FOR REVIEW AND APPROVAL.
6. IF APPLICABLE, ALL AUXILIARY EQUIPMENT, INCLUDING VARIOUS DETAILS TO ASSURE THE INTENT OF THE WORK WILL BE MET.
7. INSULATION INFORMATION INCLUDING "U" OR "K" VALUES, INSULATION THICKNESS, AND COMPLETE LISTINGS OF PHYSICAL PROPERTIES. INCLUDE MANUFACTURER'S INFORMATION ON ADHESIVES, MOUNTING MATERIALS, PAINTS, JACKETING AND OTHER DESCRIPTIVE INFORMATION.
8. FULL DESCRIPTION OF CAPABILITIES AND CAPACITIES OF EQUIPMENT, INCLUDING BUT NOT LIMITED TO THE MANUFACTURER'S DRAWINGS, CUT SHEETS, DATA SHEETS, AND OTHER DESCRIPTIVE INFORMATION.
9. MSDS INFORMATION FOR ALL POTENTIALLY HAZARDOUS CHEMICALS AND MATERIALS. ALSO, POST A COPY OF THE MSDS AT THE JOBSITE AS REQUIRED TO INDICATE THE REQUIRED PROPER HANDLING TECHNIQUES AND SAFETY PROCEDURES FOR THE MATERIALS.

F. USE WELDERS, FITTERS, LABORERS, TECHNICIANS, ETC QUALIFIED FOR THE WORK TO BE DONE. WRITTEN CERTIFICATION AND DOCUMENTATION IS REQUIRED.

1.05 SITE CONDITIONS

A. THE CONTRACTOR MUST INSPECT THE WORK AREAS, DRAWINGS AND SPECIFICATIONS AND BECOME THOROUGHLY ACQUAINTED WITH THE CONDITIONS WHICH MAY BE ENCOUNTERED DURING THE INSTALLATION OF THE WORK. NO EXTRA COMPENSATION OR INVOICING WILL BE ALLOWED TO COVER THE WORK WHICH HAS NOT BEEN INCLUDED IN THE BID DUE TO FAILURE OF THE CONTRACTOR TO THOROUGHLY EXAMINE THE PREMISES.

B. ARRANGEMENT OF SYSTEMS INDICATED ON THE DRAWINGS IS DIAGRAMMATIC, AND INDICATES THE MINIMUM REQUIREMENTS FOR THE WORK. SITE CONDITIONS MAY DETERMINE THE ACTUAL ARRANGEMENT OF SYSTEMS. FIELD MEASUREMENTS SHALL BE TAKEN AND CONFIRMED. THE CONTRACTOR SHALL CONFIRM ACCURACY OF DIMENSIONS BEFORE FABRICATION AND SHALL BE RESPONSIBLE FOR ALL EQUIPMENT AND COMPONENT LAYOUTS. OVERHEAD WORK SHALL BE LAID OUT TO OBTAIN THE MAXIMUM HEAD ROOM. COORDINATE THE LOCATION OF ALL MECHANICAL SYSTEMS TO AVOID INTERFERENCE WITH THE LOCATION OF OTHER SYSTEMS OR WITH TRAFFIC FLOW WITHIN THE BUILDING. CONFIRM LOCATIONS WITH THE OWNER PRIOR TO INSTALLATION.

C. THE CONTRACTOR IS RESPONSIBLE FOR THE DAILY INSPECTION OF THE PROJECT WORK SITE FOR THE PRESENCE OF ASBESTOS MATERIALS OR FOR MATERIALS THAT MAY BE ASBESTOS CONTAMINATED. IT IS BELIEVED THAT THERE ARE NO KNOWN ASBESTOS MATERIALS ON THE WORK SITE. ALL KNOWN MATERIALS ARE MARKED INDICATING THE PRESENCE OF ASBESTOS. THE OWNER KNOWS OF NO OTHER POTENTIALLY CONTAMINATED AREAS, PIPING SYSTEM, DUCT SYSTEM, ETC THAT MIGHT CONTAIN SUCH MATERIALS. THE CONTRACTOR SHALL NOT ALLOW EMPLOYEES OR OWNER'S PERSONNEL TO BE EXPOSED IN ANY FASHION TO ANY UNKNOWN MATERIALS THAT MAY CONTAIN ASBESTOS MATERIALS. EXPOSURE TO MATERIALS IN QUESTION SHALL BE COMPLETELY AVOIDED IMMEDIATELY. THE CONTRACTOR SHALL CORDON OFF THE AREA WITH "SAFETY TAPE" TO IDENTIFY THE POTENTIAL RISK AND THEREFORE LIMIT EXPOSURE FOR OTHERS. THE OWNER SHALL BE CONTACTED IMMEDIATELY. THE OWNER WILL MAKE IMMEDIATE ARRANGEMENTS FOR THE INSPECTION OF MATERIALS IN QUESTION AND, IF NECESSARY, FOR REMOVAL OF SAME MATERIALS BY AN OUTSIDE CONSULTING FIRM. THE ENGINEER HAS NOT BEEN RETAINED BY THE OWNER TO INSPECT THE SITE FOR THE PRESENCE OF ASBESTOS MATERIALS AND THEREFORE HAS NO SPECIFIC KNOWLEDGE OF THE PRESENCE OF SUCH MATERIALS.

D. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT THE TEMPERATURE IN THE WORK AREAS AND OTHER ENVIRONMENTAL CONDITIONS ARE FAVORABLE DURING THE PROGRESS OF THE WORK.

1.06 QUALITY ASSURANCE

A. COMPLY WITH ALL GOVERNING CODES AND REGULATIONS. FURNISH PRODUCTS OF ACCEPTABLE MANUFACTURERS WHICH HAVE BEEN IN SATISFACTORY USE IN SIMILAR SERVICE FOR TEN (10) YEARS. USE EXPERIENCED INSTALLERS. DELIVER, HANDLE, AND STORE MATERIALS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

B. THE CONTRACT DRAWINGS FOR THIS WORK ARE IN PART SCHEMATIC, INTENDED TO CONVEY THE SCOPE OF WORK AND INDICATE THE GENERAL LAYOUT, DESIGN, AND ARRANGEMENT. THE CONTRACTOR SHALL FOLLOW THESE DRAWINGS IN THE LAYOUT OF HIS WORK AND SHALL CONSULT ALL OTHER DRAWINGS AND SPECIFICATIONS FOR THIS PROJECT TO DETERMINE ALL CONDITIONS AFFECTING THE WORK. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE EQUIPMENT INSTALLATION LAYOUTS, ORIENTATION, CLEARANCES FOR ACCESS AND MAINTENANCE, INSPECTION, TESTING, FINISHING, SAFETY, AND OTHER ITEMS FOR ANY EQUIPMENT FURNISHED.

C. THE CONTRACTOR SHALL BEAR ALL ADDITIONAL COSTS PERTAINING TO ANY CONTRACTOR REQUESTED ALTERNATE/CHANGES AND SHALL NOT ASK FOR ADDITIONS MONIES, OR CAUSE OTHER CONTRACTORS OR TRADES TO REQUEST ADDITIONAL MONIES FROM THE OWNER AS A DIRECT OR INDIRECT RESULT OF THE USE OF THE ALTERNATE/CHANGES RESULTING FROM AN ALTERNATE ACCEPTED BY THE OWNER OR ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ACCURACY OF DIMENSIONS AND LAYOUT.

D. A REPRESENTATIVE MAY BE APPOINTED BY THE OWNER AS THE OWNER'S PROJECT INSPECTOR AND MAY INSPECT THE WORK AS IT PROGRESSES. ANY WORK OR MATERIAL REJECTED BY THE INSPECTOR SHALL BE REMOVED AND REPLACED WITH WORK OR MATERIALS AS SPECIFIED OR AS SHOWN ON THE DRAWINGS OR AS REQUIRED BY CODES OR INDUSTRY STANDARDS AT NO ADDITIONAL COST TO THE OWNER.

E. SUBMIT DOCUMENTATION OF ALL WELDER CERTIFICATIONS AND WELDING PROCEDURES TO THE OWNER PRIOR TO THE START OF ANY WORK. PERFORM WELDING OF METALLIC PIPING SYSTEMS WITH QUALIFIED WELDERS AND WELDING OPERATORS. QUALIFY WELDS AND WELDING OPERATORS IN ACCORDANCE WITH THE APPLICABLE CODE.

F. PERFORM ALL BONDING OF NON-METALLIC PIPING SYSTEMS WITH QUALIFIED BONDERS OR BONDING OPERATORS. QUALIFY BONDERS AND BONDING OPERATORS IN ACCORDANCE WITH THE APPLICABLE CODE. MAINTAIN QUALIFICATION RECORDS IN ACCORDANCE WITH THE APPLICABLE CODE. GIVE THE OWNER A COPY OF THE QUALIFICATION RECORDS. KEEP RECORDS CURRENT AT ALL TIMES.

G. IF REQUESTED BY THE OWNER BEFORE FABRICATION OF ANY METALLIC OR NON-METALLIC PIPING SYSTEMS UNDER THIS SECTION, THE CONTRACTOR SHALL PREPARE AND SUBMIT FOR APPROVAL BY THE OWNER THREE (3) QUALITY CONTROL SAMPLES OF PIPE JOINTS MADE IN ACCORDANCE WITH APPLICABLE SPECIFICATIONS. THE CONTRACTOR SHALL PREPARE AND SUBMIT ADDITIONAL SAMPLES AS REQUIRED UNTIL THREE (3) SAMPLES OF EACH PIPE SYSTEM ARE APPROVED BY THE OWNER ONE APPROVED SAMPLE WILL BE RETURNED TO THE CONTRACTOR. THE APPROVED SAMPLES SHALL BE THE BASIS OF MINIMUM ACCEPTABLE QUALITY OF PIPE JOINTS FURNISHED UNDER THIS CONTRACT. THESE SAMPLES WILL BE KEPT IN THE OWNER'S OFFICE AT THE JOB-SITE.

1.07 REGULATORY REQUIREMENTS

A. SPECIAL PART OF WORK: THE CONTRACTOR SHALL STRICTLY COMPLY WITH ALL OSHA SAFETY RULES AND REGULATIONS AND USE ONLY APPROVED EQUIPMENT REQUIRED FOR THE PERFORMANCE OF THE WORK. THE CONTRACTOR SHALL ALSO STRICTLY COMPLY WITH ALL OSHA SAFETY RULES AND REGULATIONS AND USE ONLY APPROVED METHODS OF EXCAVATION, TRENCHING, AND SHORING METHODS AS DESCRIBED IN OSHA 29 CFR SUBPART P, EXCAVATIONS. THE CONTRACTOR SHALL MAINTAIN AND CLOSELY SUPERVISE SAFETY PRACTICES AND CODES. PROVIDE AND USE PERSONAL RESTRAINT DEVICES. EXTREME CARE SHALL BE TAKEN TO SAFEGUARD THE SAFETY OF THE PUBLIC, THE OWNER'S EMPLOYEES, AND THE CONTRACTOR'S EMPLOYEES.

B. FALL PROTECTION ON THE JOB SITE MUST COMPLY WITH PROVISIONS OF OSHA STANDARDS FOUND IN 29 CFR 1926 SUBPART M; AND AS SPECIFICALLY DEFINED BY 1926.501(B), SUBSECTIONS (1) THROUGH (15).

C. REMOVE MATERIALS AS SPECIFIED OR AS REQUIRED DURING THE COURSE OF THE WORK. COMMUNICATE WITH THE OWNER AND VERIFY THE DISPOSITION PLAN WITH THE OWNER. DISPOSE OF ALL MATERIALS IN A LEGAL, ACCEPTABLE, AND PROPER FASHION.

D. THE CONTRACTOR SHALL BE RESPONSIBLE FOR BECOMING FAMILIAR WITH LOCAL GOVERNING AUTHORITIES HAVING JURISDICTION, CODES, AND STATUTES AND, IF REQUIRED, SHALL OBTAIN THE REQUIRED PERMITS, PAY ALL RELATED FEES INCLUDING INSPECTION FEES, AND OBTAIN INSPECTIONS AS REQUIRED TO COMPLETE AND FINISH HIS WORK. THE FOLLOWING CODES SHALL BE STRICTLY BE ADHERED TO:

1. ALL OSHA REQUIREMENTS AND GUIDELINES INCLUDING OSHA 29 CFR 1926 AND 1910.
2. INTERNATIONAL, STATE AND LOCAL BUILDING CODES.
3. INTERNATIONAL, STATE AND LOCAL MECHANICAL CODES.
4. NFPA STANDARDS.
5. LIFE SAFETY CODES AND STANDARDS.
6. ADA REQUIREMENTS.
7. CSR DIVISION 40
   CHAPTER 2 – BOILER AND PRESSURE VESSEL SAFETY RULES.

1.08 MATERIAL DELIVERY, HANDLING, STORAGE, AND PROTECTION

A. DELIVER, STORE, PROTECT, AND HANDLE PRODUCTS TO THE SITE. OBTAIN MSDS SHEETS ON CHEMICALS AND OTHER MATERIALS UPON DELIVERY AND PROVIDE TRAINING AND DOCUMENTATION FOR ALL WORKERS ON CONSTRUCTION SITE.

B. ALL MATERIALS AND EQUIPMENT SHALL BE INSPECTED UPON RECEIPT FOR DAMAGE AND MANUFACTURING FLAWS. ANY DAMAGE OR FLAWS SHALL BE DULY NOTED AND ITEMS RETURNED TO THE SUPPLYING VENDOR OR MANUFACTURER OR REPAIRED SATISFACTORILY. SHIPMENT OF THE EQUIPMENT SHALL BE SCHEDULED TO AVOID ANY DELAY AS THE CONSTRUCTION SCHEDULE SHALL NOT BE CHANGED. AS REQUIRED, ACCEPT THE MATERIALS ON SITE IN SHIPPING CONTAINERS WITH THE LABELING IN PLACE. DOCUMENT THE CONDITION OF MATERIALS UPON RECEIPT.

C. STORE ALL MATERIALS ON PALLETS, SHORING, OR TIMBERS AS REQUIRED TO PREVENT THE MATERIALS FROM RESTING ON THE GROUND OR FINISHED SURFACES WHERE DAMAGE TO THE MATERIALS OR FINISHED SURFACES MAY OCCUR. PROTECT, STORE, AND HANDLE ALL MATERIALS SUCH THAT NO SPILL MAY OCCUR THAT CAN DAMAGE THE ENVIRONMENT IN ANY FASHION. STORE MATERIALS SUCH THAT NO DANGER EXISTS FROM THE POTENTIAL OF STACKED MATERIALS FALLING ON PERSONNEL OR OTHER MATERIALS. FURNISH TEMPORARY PROTECTIVE COVERING OR COATINGS FOR FERROUS MATERIALS SUCH AS CAST IRON, STEEL VALVES, AND OTHER SURFACES. PROTECT MATERIALS THAT MAY BE DAMAGED FROM FREEZING BY STORING IN HEATED AREAS.

D. FURNISH TEMPORARY END CAPS OR CLOSURES ON PIPING, FITTINGS AND EQUIPMENT OPENINGS. MAINTAIN THE CAPS IN PLACE UNTIL INSTALLATION. DURING HANDLING AND INSTALLATION OF THE MATERIALS, PROTECT PIPING SYSTEMS FROM ENTRY OF FOREIGN MATERIALS BY UTILIZING TEMPORARY COVERS, COMPLETING AND CLOSING SECTIONS OF THE WORK, AND ISOLATING PARTS OF THE COMPLETED SYSTEM.

E. DAMAGED, LOST OR STOLEN MATERIALS SHALL BE REPLACED BY THE CONTRACTOR AT THE EXPENSE OF THE CONTRACTOR.

F. THE CONTRACTOR SHALL PROTECT THE EQUIPMENT FROM DAMAGE AND KEEP THE EQUIPMENT IN AN "AS NEW" CONDITION FOR ALL THE FURNISHED MATERIALS AND EQUIPMENT UNTIL FINAL ACCEPTANCE BY THE OWNER.

1.09 BIDDING AND SCOPE OF WORK COORDINATION

A. THE FOLLOWING CONTRACTORS SHALL BE RESPONSIBLE FOR INCLUDING THE FOLLOWING IN THEIR BIDDING ACTIVITIES AND WORK ACTIVITIES:

1. MECHANICAL CONTRACTOR SHALL FURNISH:

a) LABOR AND MATERIALS FOR THE INSTALLATION OF ALL EQUIPMENT AND DEVICES, CONTROL SYSTEMS, ELECTRICAL POWER CONDUIT AND WIRING, CONTROL CONDUIT AND WIRING AND ASSOCIATED DEVICES, BREAKERS, SWITCHES, CONTROL PANELS, AND ENCLOSURES. THE FURNISHED AND INSTALLED SYSTEM SHALL BE FULLY OPERATIONAL AND PERFORMING ACCORDING TO THE REQUIREMENTS OF THE DESIGN DOCUMENTS AND ALSO TO THE MANUFACTURER'S REQUIREMENTS FOR THE EQUIPMENT. REFER TO DESIGNS AND SPECIFICATIONS INCLUDED IN THE OTHER DESIGN DOCUMENTS.

b) LABOR AND MATERIALS AS REQUIRED TO PERFORM AND DOCUMENT THE TESTING AND BALANCING OF ALL MECHANICAL AND CONTROLS SYSTEMS INCLUDED IN THE DESIGN DOCUMENTS. A SEPARATE TESTING AND BALANCING CONTRACTOR IS NOT NECESSARILY A SPECIFIC REQUIREMENT. HOWEVER, THE MECHANICAL CONTRACTOR SHALL FURNISH A CONFIRMED, WITNESSED, AND DOCUMENTED TEST FOR ALL MECHANICAL SYSTEMS THAT LIST EQUIPMENT PERFORMANCES, SYSTEM OPERATING PARAMETERS, RPM'S, TEMPERATURES, DIFFERENTIAL PRESSURES, PRESSURES, FLOW RATES, ETC AS REQUESTED BY THE OWNER AND ENGINEER. THE RESULTS OF THE TESTING SHALL BE DOCUMENTED AND SHALL BECOME A PART OF THE OPERATIONS AND MAINTENANCE MANUALS FURNISHED TO THE OWNER AFTER THE ENGINEERS APPROVAL. REFER TO DESIGNS AND SPECIFICATIONS INCLUDED IN THE OTHER DESIGN DOCUMENTS.

1.10 COORDINATION

A. THE CONTRACTORS AND SUB-CONTRACTORS SHALL OBTAIN CONFIRMATION OF THE PROJECT WORK SCHEDULE PRIOR TO BIDDING WORK.

B. COORDINATE WORK AND ACTIVITIES AT THE SITE WITH THE OWNER DURING ALL WORK TO PROVIDE ADEQUATE AND TIMELY ACCESS TO ALL CONTRACT WORK AREAS WITH A MINIMAL DISRUPTION OF THE OWNER'S ACTIVITIES AND BUSINESS NEEDS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR A SCHEDULED SEQUENCE IN PERFORMING THE WORK SO THAT IT WILL NOT INTERFERE WITH THE OWNER'S OPERATION. BEFORE ANY WORK IS STARTED, THE CONTRACTOR SHALL CONSULT WITH THE OWNER AND ARRANGE A SATISFACTORY WORK SCHEDULE. THE CONTRACTOR SHALL MAKE TEMPORARY ALTERATIONS AS REQUIRED TO EXECUTE THE WORK SO THAT ALL OPERATIONS AND SERVICES IN THE FACILITY ARE MAINTAINED WITH THE MINIMUM POSSIBLE INTERRUPTION. TEMPORARY SHUT-DOWNS SHALL BE MINIMIZED AND SHALL BE OF THE SHORTEST POSSIBLE DURATION. ALL FACILITIES SHALL BE KEPT IN CONTINUOUS OPERATION UNLESS SPECIFIC PERMISSION TO THE CONTRARY IS GRANTED IN WRITING BY THE OWNER. DAILY SCHEDULING AND WORK LOCATION IS A PART OF THE CONTRACTOR'S WORK INCLUDED HEREIN.

C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION AND COOPERATION WITH THE OTHER TRADES SO THAT THE INSTALLATION IS PERFORMED WITH MINIMUM OF INTERFERENCE AND CONFLICT. PARTICULAR ATTENTION MUST BE PAID TO COMMUNICATION WITH THE VARIOUS TRADES REGARDING THE PLANNED INSTALLATION OF THIS WORK.

D. THE CONTRACTOR SHALL BE PREPARED TO START, PROGRESS WITH, AND COMPLETE THE WORK AS PER THE OWNER'S PROJECT SCHEDULE AND COORDINATING THE ACTIVITY OF OTHERS PERFORMING PROJECT WORK.

E. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE TIMELY PROCUREMENT OF MATERIALS AS SPECIFIED IN THIS SPECIFICATION. THE CONTRACTOR SHALL SCHEDULE PROCUREMENT OF ALL MATERIALS SO THAT THEY MAY BE DELIVERED AND INSTALLED WITHIN THE TERMS OF THE PROJECT SCHEDULE. ANY DIFFICULTIES IN PROCUREMENT AFFECTING THE INTENDED SCHEDULE SHOULD BE PROMPTLY REPORTED TO THE OWNER IN WRITING.

1.11 SPARE PARTS, EXTRA MATERIALS, AND SUPPLIES

A. FURNISH REPLACEMENT FILTERS, SCREENS, OR OTHER ITEMS CONSUMED DURING INSTALLATION CONSTRUCTION, TESTING, AND START-UP AT NO ADDITIONAL COST TO THE OWNER. PROVIDE TWO (2) SETS OF ESSENTIAL SPARE PARTS AS RECOMMENDED BY THE MANUFACTURER FOR EACH SYSTEM COMPONENT.

1.12 WARRANTY

A. ALL MATERIALS, LABOR AND SYSTEM COMPONENTS SHALL BE GUARANTEED FOR A MINIMUM PERIOD OF ONE (1) YEAR FROM DATE OF ACCEPTANCE OF WORK BY THE OWNER, UNLESS SPECIFIED OTHERWISE. ALL EQUIPMENT SHALL BE COVERED BY A SEPARATE WARRANTY. CONFLICTS IN STATED WARRANTY PERIODS SHALL AUTOMATICALLY DEFAULT TO THE LONGEST STATED PERIOD. SHOULD ANY MECHANICAL OR OTHER RELATED PROBLEM DUE TO FAULTY MATERIALS OR WORKMANSHIP OCCUR, THE PROBLEM SHALL BE CORRECTED TO THE SATISFACTION OF THE OWNER AT NO COST TO THE OWNER. ANY DEFECTIVE MATERIALS OR INFERIOR WORKMANSHIP DISCOVERED AT THE TIME OF INSTALLATION AND/OR DURING THE GUARANTEE PERIOD SHALL BE CORRECTED IMMEDIATELY TO THE COMPLETE SATISFACTION OF THE OWNER.

1.13 PROJECT CLOSEOUT

A. ADEQUATELY INSTRUCT THE OWNER'S PERSONNEL IN THE PROPER OPERATION AND MAINTENANCE OF EACH SYSTEM AND EQUIPMENT ITEM.

B. FURNISH THE OWNER WITH THREE (3) SETS OF OPERATION AND MAINTENANCE MANUALS WITH APPROPRIATELY DIVIDED SECTIONS FOR EACH SYSTEM OR EQUIPMENT ITEM. FOR ALL ITEMS FURNISHED BY THE RESPECTIVE TRADES, SUBCONTRACTORS AND CONTRACTORS, PROVIDE SETS OF MANUFACTURERS OPERATING, MAINTENANCE, INSTRUCTIONS AND SPARE PARTS MANUALS IN A SINGLE COMB BOUND MANUAL OR HEAVY DUTY THREE RING BINDER FORMAT FOR THE OWNER'S USE. WORK OF ALL TRADES, SUBCONTRACTORS AND CONTRACTORS SHALL BE IN THIS ONE BINDER WITH DIVIDERS FOR THE RESPECTIVE SECTIONS OF WORK.

C. FURNISH FOR THE REUSE BY THE OWNER OR PROPER AND LEGAL DISPOSAL OF EXCESS MATERIALS AS REQUIRED TO APPROVED LOCATIONS ON THE SITE OR FOR LEGAL DISPOSAL AS REQUIRED IF NO ACCEPTABLE PLACE FOR DISPOSAL EXISTS ON THE SITE. THE HAULING, HANDLING, CONFIRMATION, COORDINATION, AND MANAGEMENT OF THIS ACTIVITY IS WHOLLY THE RESPONSIBILITY OF THE CONTRACTOR.

D. FURNISH AS BUILT MARK-UP DRAWINGS OF THE FINAL INSTALLATION NOTING IMPORTANT DATA, SUCH AS COVERED OR ENCLOSED PIPE OR OTHER MATERIALS ETC DURING AND AFTER THE FINAL INSTALLATION IS COMPLETE AND SYSTEMS ARE OPERATIONAL. MARK-UP DRAWINGS SHALL BE THOROUGH WITH ATTENTION TO DETAILS. THE OWNER RETAINS THE RIGHT TO REQUEST MORE INFORMATION TO BE ADDED TO DRAWINGS AS NEEDED. MARK-UP DRAWINGS SHALL BE CLEARLY MARKED WITH AN ERASABLE RED LEAD PENCIL.

E. COPIES OF ALL PROJECT CLOSE-OUT DOCUMENTS SHALL BE FORWARDED TO THE OWNER FOR REVIEW, APPROVAL, AND USE.

PART 2 – PRODUCTS AND MATERIALS

2.01 MATERIAL STANDARDS

A. ALL PRODUCTS SHALL BE FIRST-LINE QUALITY, NEW AND UNUSED OF THE GRADE AND TYPE AS SHOWN ON THE DRAWINGS AND AS SPECIFIED, OR THE EQUIVALENTS AS APPROVED BY THE OWNER IN WRITING.

B. ALL PRODUCTS SHALL BE IN CURRENT PRODUCTION WITH NO NOTICE HAVING BEEN GIVEN THAT THIS PRODUCT IS TO BE DRASTICALLY CHANGED, MODIFIED, OR DISCONTINUED FROM PRODUCTION.

C. WHEN ANY MATERIAL OR EQUIPMENT IS IDENTIFIED ON THE PLANS OR IN THE SPECIFICATIONS BY REFERENCE TO ONE MANUFACTURER'S NAME OR MODEL NUMBER, IT IS INTENDED TO ESTABLISH THE REQUIRED STANDARD OF DESIGN AND QUALITY, AND IT IS NOT INTENDED TO LIMIT COMPETITION. IT IS UNDERSTOOD THAT, WHETHER PRESENT OR NOT, THE PHRASE "OR EQUAL" OR "OR AN APPROVED EQUAL" APPLIES TO ALL FURNISHED MATERIALS AND IS MEANT TO MEAN AN "ACCEPTED" EQUIVALENT IF APPROVED BY THE OWNER AND ENGINEER PRIOR TO BIDDING PROJECT.

2.02 MATERIAL ALTERNATIVES

A. IF THE CONTRACTOR DESIRES TO SUGGEST CHANGES, MODIFICATIONS OR ALTERNATIVES, THE CONTRACTOR SHALL SUBMIT, IN WRITING, A DESCRIPTION OF THE PROPOSED CHANGES OR MODIFICATIONS FOR REVIEW BY THE OWNER AND ENGINEER.

B. THE CONTRACTOR SHALL SUBMIT TO THE OWNER FOR APPROVAL THREE (3) COPIES OF DESCRIPTIVE INFORMATION FOR ANY MATERIALS PROPOSED BY THE CONTRACTOR WHICH ARE NOT EXACTLY AS SPECIFIED AND ARE INTENDED TO BE EQUAL OR BETTER IN QUALITY OR PERFORMANCE. THE INFORMATION SHALL INCLUDE, AS A MINIMUM, CATALOG DATA SHEETS AND SHOP DRAWINGS, SAMPLES AND OTHER SUPPORTIVE INFORMATION AS NECESSARY FOR THE OWNER TO EVALUATE THE PROPOSED MATERIALS OR EQUIPMENT.

C. THE OWNER SHALL REVIEW ALTERNATIVE MATERIAL AND EQUIPMENT RECOMMENDATIONS AND SHALL BE THE SOLE JUDGE IN DETERMINING WHETHER THE PROPOSED MATERIAL, ACCESSORY, OR ITEM MEETS THE STATED CRITERIA FOR THE SERVICE AND CONDITIONS IMPOSED. THE OWNER MAY REQUEST THE ENGINEER TO PROVIDE AN OPINION REGARDING SUCH ISSUES.

D. THE CONTRACTOR SHALL NOT PROCEED WITH ANY PROPOSED CHANGES OR MODIFICATIONS UNTIL AUTHORIZED TO DO SO BY THE OWNER IN WRITING. THE COST OF ANY WORK PERFORMED ON PROPOSED CHANGES OR MODIFICATIONS WITHOUT THE OWNER'S WRITTEN APPROVAL WILL BE AT THE CONTRACTOR'S EXPENSE, AS WELL AS ANY COST FOR UNDOING SUCH UNAUTHORIZED WORK.

E. ACCEPTED ALTERNATIVES OR CHANGES BY THE CONTRACTOR SHALL NOT INCUR OTHER TRADE COSTS OR EXPENSES TO THE OWNER AND ANY RESULTANT ENGINEERING COSTS ARISING OUT OF THE CONSIDERATION OF AND/OR THE ACCEPTANCE OF ANY REQUESTED CHANGE SHALL BE PAID FOR BY THE CONTRACTOR.

F. ACCEPTANCE OF REQUESTS FOR SUBSTITUTIONS OF EQUIPMENT, MATERIALS OR PROCESSES SPECIFIED WILL BE CONTINGENT UPON SUBMISSION OF PROOF, SATISFACTORY TO THE OWNER THAT:

1. THEY ARE SATISFACTORY IN TERMS OF QUALITY AND SERVICEABILITY.
2. THEIR USE WILL NOT ENTAIL CHANGES IN DETAILS AND CONSTRUCTION OF RELATED WORK.
3. THEY ARE ACCEPTABLE IN CONSIDERATION OF THE REQUIRED DESIGN. THE BURDEN OF PROOF SHALL BE UPON THE PARTY PROPOSING THE SUBSTITUTION. NO CONSIDERATION WILL BE GIVEN TO INCOMPLETE SUBMITTALS.

G. THE CONTRACTOR IS ENCOURAGED TO SUGGEST ALTERNATES COVERING EACH OF THE FOLLOWING SUBJECTS:

1. ALTERNATIVE MATERIALS AND EQUIPMENT TO IMPROVE QUALITY, SCHEDULE OR TO REDUCE PRICING.
2. EXCEPTIONS TO THE SPECIFICATIONS COVERING MATERIALS AND EQUIPMENT, MANNER OF APPLICATION, OR OTHER DETAILS.

PART 3 – EXECUTION OF WORK

3.01 EXAMINATION AND INSPECTION

A. PRIOR TO BIDDING THE WORK, THE CONTRACTOR SHALL VISIT THE SITE AND BECOME FULLY FAMILIAR WITH ALL CONDITIONS SUCH AS OVERHEAD OBSTRUCTIONS, STRUCTURES, EQUIPMENT, AND OTHER ITEMS THAT PERTAIN TO THE WORK DESCRIBED HEREIN. FAILURE TO UNDERSTAND OR HAVE KNOWLEDGE OF ISSUES THAT COULD HAVE BEEN DETERMINED PRIOR TO BIDDING WILL NOT CONSTITUTE GROUNDS FOR ASKING FOR WORK CHANGE ORDERS OR EXTRA WORK.

B. VERIFY FIELD DIMENSIONS, ROUTING, CLEARANCES, ACCESS, HEIGHTS, SCHEDULES, AND OTHER ITEMS BY FIELD INSPECTION AND SITE ASSESSMENT PRIOR TO BEGINNING THE WORK.

C. ARRANGEMENT OF SYSTEMS INDICATED ON THE DRAWINGS IS DIAGRAMMATIC, AND INDICATES THE MINIMUM REQUIREMENTS FOR MECHANICAL WORK. SITE CONDITIONS MAY DETERMINE THE ACTUAL ARRANGEMENT OF SYSTEMS. FIELD MEASUREMENTS SHALL BE TAKEN BEFORE FABRICATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ACCURACY OF DIMENSIONS AND LAYOUT. OVERHEAD WORK SHALL BE LAID OUT IN A JOINT COORDINATION AND COOPERATION WITH THE OTHER TRADES. FINISHED WORK SHALL PROVIDE MAXIMUM HEAD ROOM, UNLESS SPECIFIED OR REQUIRED OTHERWISE. COORDINATE THE LOCATION OF ALL SYSTEMS TO AVOID INTERFERENCE WITH THE LOCATION OF OTHER SYSTEMS, WORK OF OTHER TRADES OR WITH TRAFFIC FLOW WITHIN THE AREAS.

D. WHERE SPECIFIC DETAILS AND DIMENSIONS FOR THE WORK ARE NOT SHOWN ON THE DRAWINGS, THE CONTRACTOR SHALL TAKE MEASUREMENTS AND MAKE LAYOUTS AS REQUIRED FOR THE PROPER INSTALLATION OF THE WORK AND SHALL PROVIDE COORDINATION WITH ALL OTHER WORK ON THE PROJECT. IN CASE OF ANY DISCREPANCIES BETWEEN THE DRAWINGS AND THE SPECIFICATIONS THAT HAVE NOT BEEN CLARIFIED BY ADDENDUM PRIOR TO BIDDING, IT SHALL BE ASSUMED BY THE SIGNING OF THE CONTRACT THAT THE HIGHER COST (IF THERE IS ANY DIFFERENCE IN COSTS) IS INCLUDED IN THE CONTRACT PRICE, AND THE CONTRACTOR SHALL PERFORM THE WORK IN ACCORDANCE WITH THE DRAWINGS AND WITH THE SPECIFICATIONS, AS DETERMINED AND APPROVED BY THE OWNER, AND NO ADDITIONAL COSTS SHALL BE ADDED TO THE CONTRACT PRICE.

E. THE CONTRACTOR SHALL EXAMINE THE AREAS AND CONDITIONS UNDER WHICH THIS WORK IS TO BE INSTALLED. DO NOT PROCEED WITH THE WORK UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED. THE STARTING OF WORK IS ACCEPTANCE OF THE CONDITIONS WITHIN ANY PARTICULAR AREA.

F. THE CONTRACTOR SHALL TAKE EXTRA PRECAUTIONS TO PROTECT THE FLOORS, ROOFS, AND GROUND FROM OIL SPILLAGE AND DRIPPING. ANY OPERATION, SUCH AS CUTTING AND THREADING OF PIPE, THAT CAN RESULT IN DRIPPING OF OIL AND THREAD CUTTINGS SHALL BE DONE OVER A DRAIN PAN THAT WILL COLLECT ALL DRIPPINGS. TARPAULINS, PLYWOOD OR DROP CLOTHS SHALL BE USED AROUND SUCH PIPING TO PREVENT WORKERS FROM TRACKING OIL OVER THE AREA. WORKERS SHALL BE CAUTIONED ABOUT CLEANING THEIR SHOES. ANY LIQUIDS, SUCH AS OIL, THAT WILL BE USED IN THIS WORK SHALL BE KEPT IN TIGHTLY STOPPERED CONTAINERS; AND EXTREME CARE SHALL BE USED WHEN CHARGING EQUIPMENT WITH THESE MATERIALS SO AS TO AVOID ANY SPILLS.

3.02 INSTALLATION

A. COMPLY WITH ALL APPLICABLE REGULATIONS AND BUILDING CODE REQUIREMENTS.

B. WORK UNDER THIS DIVISION OF THE SPECIFICATIONS SHALL CONSIST OF THE FURNISHING OF ALL LABOR AND MATERIALS NECESSARY FOR THE COMPLETE INSTALLATION OF ALL MECHANICAL AND PLUMBING SYSTEMS AS SHOWN ON THE DRAWINGS AND/OR AS SPECIFIED HEREIN. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL MINOR ITEMS WHICH ARE OBVIOUSLY REQUIRED AND REASONABLY NECESSARY FOR THE WORK. SUCH ITEMS ARE ANCHORS, BOLTS, SLEEVES, BRACKETS, VENTS, OFFSETS, AND OTHER COMPONENTS TO PROVIDE AN OPERATING SYSTEM. THE CONTRACTOR SHALL DRILL, CUT, OR OTHERWISE ATTACH COMPONENTS FOR INSTALLATION OF THE WORK WITH THE FULL UNDERSTANDING THAT THE CONTRACTOR IS RESPONSIBLE FOR LEAVING THE FINISHED AREAS IN AN "AS ORIGINAL" CONDITION. CAULKING, FILLING, TOUCH-UP PAINTING, AND OTHER SURFACE FINISH AROUND THE CONTRACTOR'S WORK AND WORK AREA IS THEREFORE WITHIN THE SCOPE OF WORK OF THIS SPECIFICATION. ALL WORK SHALL BE COMPLETED AND READY FOR FULL OPERATION.

C. INSTALL ALL MATERIALS AND SYSTEMS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND AS PER THE APPROVED SUBMITTALS. INSTALL MATERIALS IN PROPER RELATIONSHIP WITH ADJACENT CONSTRUCTION AND WITH A UNIFORM APPEARANCE FOR EXPOSED WORK. COORDINATION OF THE INSTALLATION WITH THE WORK OF OTHER TRADES AND SECTIONS IS A SIGNIFICANT AND IMPORTANT PORTION OF THE WORK FOR THE PROJECT.

D. PROPERLY SUPPORT ALL PIPING. PITCH THE PIPING TO THE DRAIN POINTS. INSTALL PIPING WITH PROPER EXPANSION LOOPS, FLEXIBLE CONNECTORS, MECHANICAL EXPANSION JOINTS, HANGER SYSTEMS, VIBRATION ISOLATION SYSTEMS, AND ANCHORS.

E. CLEARLY LABEL AND TAG ALL COMPONENTS, EQUIPMENT, ACCESS DOORS, SYSTEM MAIN VALVES, FILTER LOCATIONS, INCLUDING WATER SERVICE VALVES, AND ALL OTHER COMPONENTS ACCORDING TO THE DRAWINGS AND SPECIFICATIONS.

F. CLEAN, WASH, LUBRICATE, TEST AND BALANCE, AS REQUIRED, ALL SYSTEMS AS PER THE MANUFACTURER'S INSTRUCTIONS FOR PROPER OPERATION PRIOR TO PLACING THE SYSTEMS INTO SERVICE.

G. RESTORE DAMAGED FINISHES. CLEAN AND PROTECT THE WORK FROM DAMAGE DURING CONSTRUCTION AND CLEAN THE FINAL WORK AT PROJECT COMPLETION. ANY DAMAGED, SCRATCHED, MARRED, OR OTHERWISE DEFACED PAINTED SURFACES, WALLS, CEILINGS, ROOFS, FLOORS, DOORS, INSULATED SURFACES OR INSULATION COVERINGS OR FINISHES, OR OTHER ITEMS SHALL BE SO REPAIRED TO RESTORE THE FINISH TO ORIGINAL CONDITION BY PERSONNEL WORKING IN THE REQUIRED RESPECTIVE TRADE.

H. AS REQUIRED, INSTALL APPROVED FIRE STOP MATERIALS AROUND ALL PIPE AND DUCT MATERIAL PENETRATION THROUGH FIRE RATED WALLS AND FLOORS.

I. IT IS THE INTENT THAT ALL MATERIALS AND MATERIAL SURFACES HAVE A PROTECTIVE FINISH WHEN IN PLACE. ALL NON-GALVANIZED FERROUS METAL ITEMS INSIDE THE BUILDING, EXPOSED TO WEATHER OR OTHER AREA SUBJECT TO RUSTING SHALL BE GIVEN ONE HEAVY COAT OF RUST PREVENTIVE PRIMER AT THE TIME OF INITIAL INSTALLATION TO PREVENT RUSTING OR CORROSION PRIOR TO FINAL PAINTING.

J. INSTRUCT THE OWNER'S PERSONNEL IN THE PROPER OPERATION AND MAINTENANCE OF ALL SYSTEMS.

REV	DESCRIPTION	DATE	BY
0	ISSUE FOR BID	05/23/11	TMM

STATE OF MISSOURI – THOMAS M. McKINNIS – NUMBER E-18233 – REGISTERED PROFESSIONAL ENGINEER

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PROJECT NAME	BOILER REPLACEMENT
PROJECT LOCATION	SPRINGFIELD, MO
ESC, Inc. PROJ No	11087
DRAWING TITLE	OVERALL FACILITY MECHANICAL GENERAL MECHANICAL SPECIFICATIONS
DESIGN BY	M. McKINNIS
CHECKED BY / DATE	ARS 05/23/11
APPROVED BY / DATE	TMM 05/23/11
DRAWN BY	NHT
HORIZ. SCALE:	NONE
VERT. SCALE:	
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DRAWING No	M5
REV	0

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3.03 PENETRATIONS, CUTTING, AND PATCHING

A. FOR ALL MECHANICAL, HVAC, PLUMBING, AND FIRE PROTECTION WORK, THIS SPECIFICATION GOVERNS THE MINIMUM REQUIREMENTS FOR THE MATERIAL PROCUREMENT, LABOR, SUPERVISION, TOOLS, AND EQUIPMENT NECESSARY FOR PENETRATION OF THE BUILDING ELEMENTS. WORK TO BE PERFORMED SHALL INCLUDE THE COMPLETE AND PROPER PENETRATION OF BUILDING ELEMENTS AS SHOWN ON THE DRAWINGS AND AS NECESSARY TO PROPERLY INSTALL AN OPERATING SYSTEM.

B. PIPE SLEEVES AND OPENINGS SHALL BE PROVIDED WHERE DUCTS, PIPES, HANGERS, AND VALVE OPERATOR STEMS PASS THROUGH FLOORS, ROOFS, WALLS, PARTITIONS, OR OTHER BUILDING ELEMENTS.

C. SLEEVES AND OPENINGS SHALL BE LOCATED, AS CLOSELY AS POSSIBLE, CONCENTRIC WITH THE CENTERLINE AXIS OF THE PENETRATING PIPE. CONCENTRICITY OF PIPE, SLEEVE AND OPENING CENTERLINES SHALL NOT VARY MORE THAN ONE-EIGHTH OF THE TOTAL CLEARANCE.

D. PENETRATIONS THROUGH THE EXTERIOR WALL SHALL BE FLASHED AND WATER TIGHT, AND ALLOW FOR THE NORMAL DUCT OR PIPE MOVEMENTS. FOR NON-FIRE RATED WALLS, PACK AROUND BOTH PIPE AND DUCT SLEEVES WITH FIBERGLASS AND CAULK WITH A COMPOUND TO CREATE A WATERTIGHT SEAL. FOR FIRE RATED WALLS, SEAL AS REQUIRED TO PROVIDE THE FULL FIRE RATING CAPACITY OF THE FIRE RATED ASSEMBLY. IF APPLICABLE, THE LOCATION OF FIRE RATED WALLS AND FLOORS WILL BE PROVIDED BY THE OWNER.

E. ALL PENETRATIONS OF INSULATION PANELS SHALL BE PROPERLY INSULATED TO PREVENT FORMATION OF CONDENSATION ON THE WARM SIDE. PIPES AND DUCTS SHALL BE ALSO INSULATED FOR THE REQUIRED LENGTH FROM THE PENETRATION TO PREVENT FORMATION OF CONDENSATION ON THE WARM SIDE. WHERE DUCTS OR PIPES PASS THROUGH INSULATED PANELS, THE PANELS SHALL BE NEATLY CUT TO FIT AROUND THE PIPE, WITH OPENINGS FILLED TIGHTLY WITH INSULATION. OPENINGS FILLED WITH POLYURETHANE FOAM SHALL BE COVERED WITH THE FINISH SIMILAR TO ADJACENT PANELS.

F. STAINLESS STEEL ESCUTCHEON PLATES SHALL BE PLACED AROUND PIPE SLEEVES IN WALLS, PARTITIONS, AND CEILINGS TO ENCLOSE AND SEAL OFF THE OPENING.

G. IF POSSIBLE, SLEEVES SHALL BE EMBEDDED IN THE STRUCTURAL SLAB CONCRETE.

H. HOLES IN REINFORCED CAST IN PLACE CONCRETE PANELS OR PRECAST PANELS SHALL NOT CUT ANY REINFORCING STEEL WITHIN THE PANEL. IN GENERAL, THE PENETRATIONS HOLES SHALL BE AT THE PANEL EDGE AWAY FROM THE REINFORCING STEEL. MASONRY SHALL BE DRILLED WITH A SUITABLE DIAMOND CORE BIT ROTARY DRILL.

I. HOLES IN MASONRY SHALL BE DRILLED WITH A SUITABLE DIAMOND CORE BIT ROTARY DRILL. WALL SLEEVES THROUGH CONCRETE SHALL BE GROUTED AND INSTALLED WITH FOUR (4) 1 1/2" ANCHORING LUGS. AIR HAMMERS SHALL NOT BE USED. OPENINGS SHALL BE MADE BY CORING, SAWING, OR OTHER METHODS AS APPROVED BY THE OWNER.

J. PERMISSION TO PATCH ANY AREAS OR ITEMS OF WORK SHALL NOT CONSTITUTE A WAIVER OF THE OWNER'S RIGHT TO REQUIRE COMPLETE REMOVAL AND REPLACEMENT OF SAID AREAS OR ITEMS OF WORK, IF IN THE OWNER'S OPINION, SAID PATCHING DOES NOT SATISFACTORILY RESTORE THE QUALITY AND APPEARANCE OF SAME.

K. DURING THE PROCESS OF CUTTING AND PATCHING WORK, A TEMPORARY ENCLOSURE SHALL BE CONSTRUCTED WITH 2 BY 4 LUMBER AND 4 MIL PLASTIC SHEETING SUCH THAT ALL OF THE DUST IS CONTROLLED AND CONTAINED. THE CONTRACTOR SHALL PROVIDE VENTILATION AIR WITHIN THE ENCLOSURE AND EXHAUST CAPABILITIES TO REMOVE THE DUST LADEN AIR. IF SOLVENTS OR SIMILAR MATERIALS ARE USED WITHIN THE ENCLOSURE, THE SPACE SHALL BE CONSIDERED TO BE A CONFINED ENTRY REQUIREMENT AREA AND THE CONTRACTOR SHALL MAKE PROVISIONS TO PROTECT ALL WORKERS ACCORDINGLY. BREATHING AIR WILL BE REQUIRED IN SUCH SITUATIONS.

3.04 CLEANING AND TREATING OF SYSTEMS

A. ALL SYSTEMS SHALL BE CAREFULLY FLUSHED DURING INSTALLATION WITH AIR OR WATER TO REMOVE DIRT, SCALE, FOREIGN MATTER AND OTHER CONTAMINANTS. IF ANY SYSTEM FAILS TO FUNCTION OR SYSTEM SEALS FAIL DUE TO DIRT IN THE SYSTEM, THE NECESSARY REPAIRS AND ADJUSTMENTS SHALL BE MADE AT THE CONTRACTOR'S EXPENSE.

B. ALL STRAINERS SHALL BE CHECKED AT LEAST THREE TIMES AND CLEANED AS REQUIRED. THE FIRST CHECK SHALL BE MADE AFTER THE INITIAL START-UP AND AFTER THE INITIAL LOADING CONDITIONS HAVE BEEN REACHED. THE SECOND CHECK SHALL BE MADE AFTER ALL SYSTEMS ARE IN OPERATION AND ARE BEING BALANCED. A THIRD CHECK SHALL BE MADE WHEN THE SYSTEM IS TO BE TURNED OVER TO THE OWNER AFTER ALL TESTS AND RUN-IN PERIODS HAVE BEEN COMPLETED. COMPLETE INSTRUCTIONS REGARDING THE STRAINERS AND THEIR CLEANING PROCEDURES SHALL BE INCLUDED IN THE OPERATION AND MAINTENANCE MANUAL AND GIVEN TO THE OWNER.

C. ALL PIPING AND EQUIPMENT SHALL BE FLUSHED, AND CLEANED AS REQUIRED. PIPING AND EQUIPMENT PROVIDING POTABLE WATER FOR SANITARY SERVICE AND FOR HUMAN CONSUMPTION SHALL BE FLUSHED, CLEANED AND DISINFECTED AS SPECIFIED HEREIN. CLEANING AND DISINFECTING WORK SHALL NOT BE PERFORMED UNTIL THE SYSTEMS ARE THOROUGHLY FLUSHED, HYDROSTATICALLY OR PNEUMATICALLY TESTED AND APPROVED.

D. PROVIDE ALL NECESSARY PUMPS, HIGH PRESSURE SPRAYERS, TEMPORARY PIPING CONNECTIONS, SPOOL PIECES, VALVES, HOSES, CHEMICALS, DETERGENTS, SPONGES, PIGS, BRUSH BALLS, AND OTHER ITEMS AS REQUIRED. DISCONNECTION OF THE ITEMS FOR TESTING IS PART OF THE WORK UNDER THIS SECTION. COMPLETE AND SUBMIT TO THE OWNER A COPY OF THE PIPING CLEANING REPORT FOR EACH SYSTEM CLEANED UNDER THIS SECTION.

E. PROVIDE POSITIVE ISOLATION OF SYSTEMS BEING CLEANED OR DISINFECTED TO PREVENT THE BACKFLOW OF CHEMICALS OR DETERGENTS INTO OTHER SYSTEMS OR PIPING LOOPS.

F. FLUSH ALL NEW PIPING AND EQUIPMENT OF EACH SYSTEM WITH WATER OR AIR. FLUSHING MEDIA SHALL BE THE SAME AS THE PRESSURE TEST MEDIA SPECIFIED HEREIN. HYDROSTATICALLY TESTED PIPING SYSTEMS SHALL BE FLUSHED WITH WATER. PNEUMATICALLY TESTED PIPING SYSTEMS SHALL BE FLUSHED WITH AIR. ALL SYSTEMS SHALL BE FLUSHED BEFORE PRESSURE TESTING.

G. DO NOT EXCEED THE WORKING PRESSURE OF ANY SYSTEM WHILE PERFORMING WORK UNDER THIS SECTION. THE WORKING PRESSURE FOR PIPING IS DETERMINED BY USING TWO THIRDS OF THE HYDROSTATIC TEST PRESSURE OR 91% OF THE PNEUMATIC TEST PRESSURE. REFER TO THE SPECIFICATIONS FOR EACH PIPING SYSTEM FOR SPECIFICS OF PIPING SYSTEM TESTING, INCLUDING TEST PRESSURES.

H. AFTER VISUALLY INSPECTING AND VERIFYING ALL SYSTEM COMPONENTS, VESSELS, AND OTHER ITEMS ARE CLEAN, POTABLE WATER AT AMBIENT TEMPERATURE SHALL BE USED FOR ALL FLUSHING. MAINTAIN A HIGH FLUID VELOCITY TO ENSURE COMPLETE REMOVAL OF ALL SCALE, WELD SPLATTER AND OTHER DEBRIS. DRAIN THE WATER TO THE SEWER OR OTHER APPROVED LOCATION. THE OWNER SHALL OBSERVE THE INITIAL DISCHARGE AND INTERMITTENTLY OBSERVE THE FLUSHING PROCESS.

I. WHILE OBSERVING THE APPROPRIATE SAFETY EQUIPMENT AND WHILE OBSERVING APPROPRIATE OSHA AND RELATED SAFETY REQUIREMENTS AND GUIDELINES, CLEAN, DRY, AND OIL FREE COMPRESSED AIR AT AMBIENT TEMPERATURE SHALL BE USED FOR ALL AIR FLUSHING. MAINTAIN A HIGH VELOCITY TO ENSURE COMPLETE REMOVAL OF ALL SCALE, WELD SPLATTER AND OTHER DEBRIS. DISCHARGE THE AIR TO ATMOSPHERE IN A SAFE MANNER TO PROTECT PERSONNEL FROM FLUSHED DEBRIS. WHERE FLUSHED LINES PASS THROUGH REFRIGERATED OR OUTDOOR AREAS, THE DEWPOINT OF THE COMPRESSED AIR SHALL BE LOW ENOUGH TO PREVENT CONDENSING OF MOISTURE IN THE LINES. THE OWNER SHALL OBSERVE THE INITIAL DISCHARGE AND INTERMITTENTLY OBSERVE DURING THE FLUSHING PROCESS.

J. ALL RESIDUAL MATTER DEPOSITED ON FLOORS, ROOFS, WALLS AND OTHER SURFACES AS A RESULT OF THE SYSTEM INSTALLATION SHALL BE COMPLETELY REMOVED. IF NECESSARY, THE FINISH SHALL BE RESTORED TO THE SATISFACTION OF THE OWNER.

END OF SECTION

DIVISION 23 52 39 FIRE TUBE PACKAGED BOILER AND ACCESSORIES

1.00 OVERVIEW

A. THE BOILER SHALL BE A 3-PASS SEMI-WETBACK BOILER EQUIVALENT TO THE ARROWHEAD AS MANUFACTURED BY SUPERIOR BOILER WORKS. THE BOILER SHALL HAVE A MAXIMUM OUTPUT OF 2,520,000 BTU/HR, OR 60 HORSEPOWER AND DESIGN PRESSURE OF 15 PSIG STEAM. THE BOILER SHALL NOT HAVE LESS THAN 4 SQUARE FEET OF A.S.M.E. HEATING SURFACE, MEASURED ON THE FIRESIDE, PER RATED BOILER HORSEPOWER.

B. BOILER SHALL FIT THROUGH A STANDARD 36" x 80" DOORWAY OPENING WITH TRIM AND CONTROLS REMOVED.

C. THE BOILER IS TO BE MOUNTED ON A STRUCTURAL STEEL BASE WITH A FORCED DRAFT BURNER AND BURNER CONTROLS. THE BOILER IS TO BE DESIGNED, CONSTRUCTED AND TESTED IN ACCORDANCE WITH THE LATEST EDITION AND ADDENDA OF THE A.S.M.E. BOILER AND PRESSURE VESSEL CODE AND SHALL BE REGISTERED WITH THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS.

D. THE BOILER SHALL BE COMPLETELY PRE-ASSEMBLED AND FIRE-TESTED AT THE FACTORY TO CHECK CONSTRUCTION, CONTROLS AND COMBUSTION CHARACTERISTICS OF THE UNIT.

E. BOILER IS CONSTRUCTED TO MEET THE REQUIREMENT OF CSD-1.

2.00 STRUCTURAL SPECIFICATION

A. THE FURNACE IS TO BE LOCATED IN THE BOTTOM THIRD OF THE BOILER TO PROVIDE FOR MAXIMUM HEAT TRANSFER WHILE BEING IN CONTACT WITH THE COOLEST BOILER WATER.

B. SHELL PLATE TO BE CONSTRUCTED OF NOT LESS THAN 3/8" THICK.

C. ALL TUBES ARE TO HAVE A MINIMUM WALL THICKNESS OF .095" AND HAVE AN OD OF 2". THE TUBES ARE TO BE ATTACHED BY FLARE ROLLING.

D. TUBE-SHEETS TO BE CONSTRUCTED OF NOT LESS THAN 1/2" THICK PLATE WITH MINIMUM TUBE HOLES LIGAMENT OF 1/2".

E. THE BOILER SHALL BE MOUNTED ON A HEAVY STRUCTURAL STEEL BASE.

F. THE REAR LEGS ARE TO BE SLOTTED TO PROVIDE FOR EXPANSION WHEN THE BOILER GOES FROM A COLD SITUATION TO A HOT SITUATION.

G. THE BOILER IS TO BE EQUIPPED WITH TWO LIFTING EYES.

H. ALL HEATING SURFACES MUST BE FULLY ACCESSIBLE FOR INSPECTION AND CLEANING WITHOUT DISTURBING THE BURNER EQUIPMENT. AN ACCESS OPENING COMPLETE WITH A GASKETED PLUG AND A PYREX OBSERVATION PORT SHALL BE PROVIDED TO ALLOW FOR ACCESS INTO THE TURNAROUND AND FURNACE.

I. ALL NECESSARY HANDHOLES AND MANHOLES SHALL BE PROVIDED IN ACCORDANCE WITH THE ASME CODE, TO IMPROVE THE EASE OF WATERSIDE INSPECTION AND CLEANING.

J. TUBESHEETS MUST BE FULLY ACCESSIBLE FOR INSPECTIONS OR CLEANING WHEN THE FRONT OR REAR DOORS ARE OPEN. OPENING OF THE DOORS IS NOT TO BE IMPEDED BY ANY FUEL LINES, DOOR PLATES, BAFFLES, LINKAGE OR ELECTRICAL CONNECTIONS. THE DOORS ARE TO BE INSULATED WITH A 1" THICK CERAMIC FIBER BLANKET AND TO BE COATED WITH A HARDENER TO PREVENT EROSION FROM THE FLUE GASES. ALL DOORS ARE TO BE HELD IN PLACE BY REPLACEABLE BRASS NUTS. THE DOORS ARE TO BE SEALED GAS TIGHT WITH NON-PROPRIETARY CERAMIC FIBER ROPE WITH A MINIMUM DENSITY OF 20 LBS. PER SQUARE FOOT AND A CONTINUOUS USE LIMIT OF 1800ΩF.

K. THE BOILER SHELL IS TO BE INSULATED WITH TWO INCH THICK, EIGHT POUND PER CUBIC FOOT DENSITY MINERAL WOOL WITH A K FACTOR OF .27. THE INSULATION IS TO BE HELD IN PLACE BY BANDS AND IS TO BE COVERED WITH A 22 GAUGE PHOSPHATE COATED GALVANIZED STEEL JACKET. ALL OPENINGS IN THE JACKET ARE TO HAVE TRIM RINGS.

L. THE ENTIRE BOILER IS TO BE PAINTED WITH A HIGH TEMPERATURE, 500 DEGREES F MINIMUM, ACRYLIC SILICONE BASED PAINT. THE FRONT AND REAR DOORS ARE TO BE SAND BLASTED BEFORE PAINTING AND THE JACKET IS TO BE PRIMED WITH A VINYL WASH PRIMER BEFORE PAINTING.

3.00 BURNER AND CONTROL SPECIFICATION

A. THE BOILER SHALL COME COMPLETELY WIRED WITH CONTROLS TO ALLOW LEAD/LAG SWITCHING BETWEEN TWO BOILERS WITHOUT ADJUSTING OR RE-CONFIGURING THE CONTROL SETPOINTS.

B. THE BURNERS SHALL UTILIZE A HONEYWELL BURNER MANAGEMENT SYSTEM. THE BURNER SHALL OPERATE AS (FULL MODULATING BASED ON LOAD) (A LOW/HIGH/LOW) OPERATION ON THE PRESSURE SETPOINTS.

4.00 FEEDWATER ACCESSORIES

A. CONDENSATE RETURN SYSTEM SHALL BE PROVIDED BY THE SAME MANUFACTURER AS THE BOILER MANUFACTURER. THERE SHALL BE PROVIDED WITH A TRIPLEX PUMP ARRANGEMENT TO PROVIDE ONE PUMP FOR EACH BOILER AND A STANDBY PUMP WITH VALVES AND PIPING TO PERMIT SWITCHING TO THE STANDBY PUMP FOR EITHER BASE PUMP. PUMPS SHALL BE CENTRIFUGAL, MULTISTAGE IF REQUIRED, DESIGNED FOR BOILER FEEDWATER APPLICATIONS.

B. STORAGE CAPACITY OF THE TANK SHALL BE 100 GALLON MINIMUM. THE SYSTEM SHALL BE FULLY ASSEMBLED ON A COMMON BASE OR SKID. ALL ELECTRICAL CONTROLS AND PUMPS SHALL BE PRE-WIRED TO A COMMON JUNCTION/CONTROL BOX.

C. BOILER BLOWDOWN RECEIVER SHALL HAVE INTEGRAL COOLER TO TEMPER DISCHARGE. ASME RATED FOR 150 PSIG AT 550 F.

REV	DESCRIPTION	DATE	BY
0	ISSUE FOR BID	05/23/11	TMM

STATE OF MISSOURI
THOMAS M. McKINNIS
NUMBER E-18233
REGISTERED PROFESSIONAL ENGINEER
5/23/11

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DISTRICT 8

PROJECT NAME: BOILER REPLACEMENT
PROJECT LOCATION: SPRINGFIELD, MO
ESC, Inc. PROJ No: 11087
DRAWING TITLE: OVERALL FACILITY MECHANICAL GENERAL MECHANICAL SPECIFICATIONS

DESIGN BY	CHECKED BY	DATE	APPROVED BY	DATE	DRAWN BY
M. McKINNIS	ARS	05/23/11	TMM	05/23/11	NHT

HORIZ. SCALE: NONE
VERT. SCALE:
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DRAWING No: M6
REV: 0

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