

Appendix 4.04 June 2012 90% West Heating Plant Boiler
Project Drawings

ABBREVIATIONS

A	- AMP	mA	- MILLI-AMPS
ABI	- ADDITIVE BID ITEM	MAG	- MAGNETIC
AC	- ASPHALTIC CONCRETE	MAX	- MAXIMUM
AF	- AMPERE - FRAME	MB	- MASTERBOX
AFB	- ABOVE FINISHED FLOOR	MCB	- MAIN CIRCUIT BREAKER
AFG	- ABOVE FINISHED GRADE	MCC	- MOTOR CONTROL CENTER
AIC	- AMPERE INTERRUPTING CAPACITY	MCP	- MOTOR CRKT PROTECTOR CB
AS	- AMMETER SWITCH	MDP	- MAIN DISTRIBUTION PANEL
AT	- AMPERE - TRIP	MH	- MANHOLE
AUTO	- AUTOMATIC	MID	- MAIN LUGS ONLY
AWG	- AMERICAN WIRE GAUGE	MLO	- MOUNTED
		MNT	- MOUNTING
B.C.	- BARE COPPER	N	- NORTH
BLDG	- BUILDING	(N)	- NEW
BMS	- BUILDING MANAGEMENT SYSTEM	NC	- NORMALLY CLOSED
BOT	- BOTTOM	NA	- NOT APPLICABLE
C.	- CONDUIT	NEMA	- NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
CB	- COMMON	NFD	- NON-FUSED DISCONNECT
CCT	- CIRCUIT BREAKER	NFPA	- NATIONAL FIRE PROTECTION ASSOCIATION
CFI	- CONTRACTOR FURNISHED CONTRACTOR INSTLD.	NO	- NORMALLY OPEN
CL	- CLASS		
CNDCT	- CONDUCTOR		
CNLT	- CONTROL		
CON	- CONTROL CONTROLLER		
C.O.	- CONDUIT ONLY		
CR	- CIRCUIT RELAY		
CRKT	- CIRCUIT		
CT	- CURRENT XFMR		
(D)	- DEMOLISH OR REMOVE		
DF	- DRINKING FOUNTAIN		
DIN	- DEUTSCHE INDUSTRIE NORM		
DIST	- DISTRIBUTION		
DWV	- DOUBLE POLE DOUBLE THROW		
DPDT	- DOUBLE POLE DOUBLE THROW		
DPLX	- DUPLEX		
DPST	- DOUBLE POLE SINGLE THROW		
DR	- DOOR		
DWG	- DRAWING		
EPDM	- ETHYLENE PROPYLENE DIENE MONOMER		
EF	- EXHAUST FAN		
EMT	- ELECTRICAL METALLIC TUBING		
EOL	- END OF LINE		
EP	- EXPLOSION PROOF		
EPR	- ETHYLENE PROPYLENE RUBBER		
EPWR	- EMERGENCY POWERED		
EQP	- EQUIPMENT		
(E) OR EXIST	- EXISTING		
F/P	- FIRE PUMP AUTO XFR SW & CNTRL		
FA	- FIRE ALARM		
FACP	- FIRE ALARM CONTROL PANEL		
FASP	- FIRE ALARM SECURITY PANEL		
FCCP	- FAN CONTROL PANEL		
FCD	- FAN CONTROL RELAY		
FED	- FUSED DISCONNECT		
FXT	- FIXTURE		
FLA	- FULL LOAD AMPS		
FLOR	- FLORESCENT		
FS	- FLOW SWITCH		
FU	- FUSE		
FVNR	- FULL VOLTAGE NON-REVERSING		
FVR	- FULL VOLTAGE REVERSING		
G	- GROUND CONDUCTOR		
GB	- GROUND BUS BAR		
GEN	- GENERATOR		
GFCI	- GROUND FAULT CIRCUIT INTERRUPTER		
GFI	- GROUND FAULT INTERRUPTER		
GND	- GROUND		
GQVT	- GOVERNMENT		
GP	- GROUP		
HH	- HANDHOLE		
HID	- HIGH INTENSITY DISCHARGE		
HOA	- HAND-OFF-AUTO		
HP	- HORSE POWER		
HPS	- HIGH PRESSURE SODIUM		
HV	- HIGH VOLTAGE		
IC	- INTERCOM SYSTEM		
ICAND	- INCANDESCENT		
IG	- ISOLATED GROUND		
IOCT	- INSTANT ON TIMED CLOSE		
JBOX	- JUNCTION BOX (TYP CNDT BODY)		
KCM	- THOUSAND CIRCULAR MILS		
KV	- KILO-VOLT		
KVA	- KILO-VOLT-AMPERE		
KVAR	- KILO-VOLT-AMPERE-REACTIVE		
KW	- KILOWATT		
KWH	- KILOWATT HOUR		
LAN	- LOCAL AREA NETWORK		
LCC	- LIGHTING CONTROL CONTACTOR		
LCP	- LIGHTING CONTROL PANEL		
L/O	- LOCK OUT		
LS	- LEVEL SWITCH		
LT	- LONG TIME		
LV	- LOW VOLTAGE		
W	- WAIT, OR WIRE		
WH	- WATER HEATER		
WP	- WEATHERPROOF		
WW	- WARM WHITE		
XEMR	- TRANSFORMER		
XFR	- TRANSFER		
XLP	- CROSS-LINKED POLYETHYLENE		
ZS	- POSITION SWITCH (LIMIT SWITCH)		

SYMBOLS

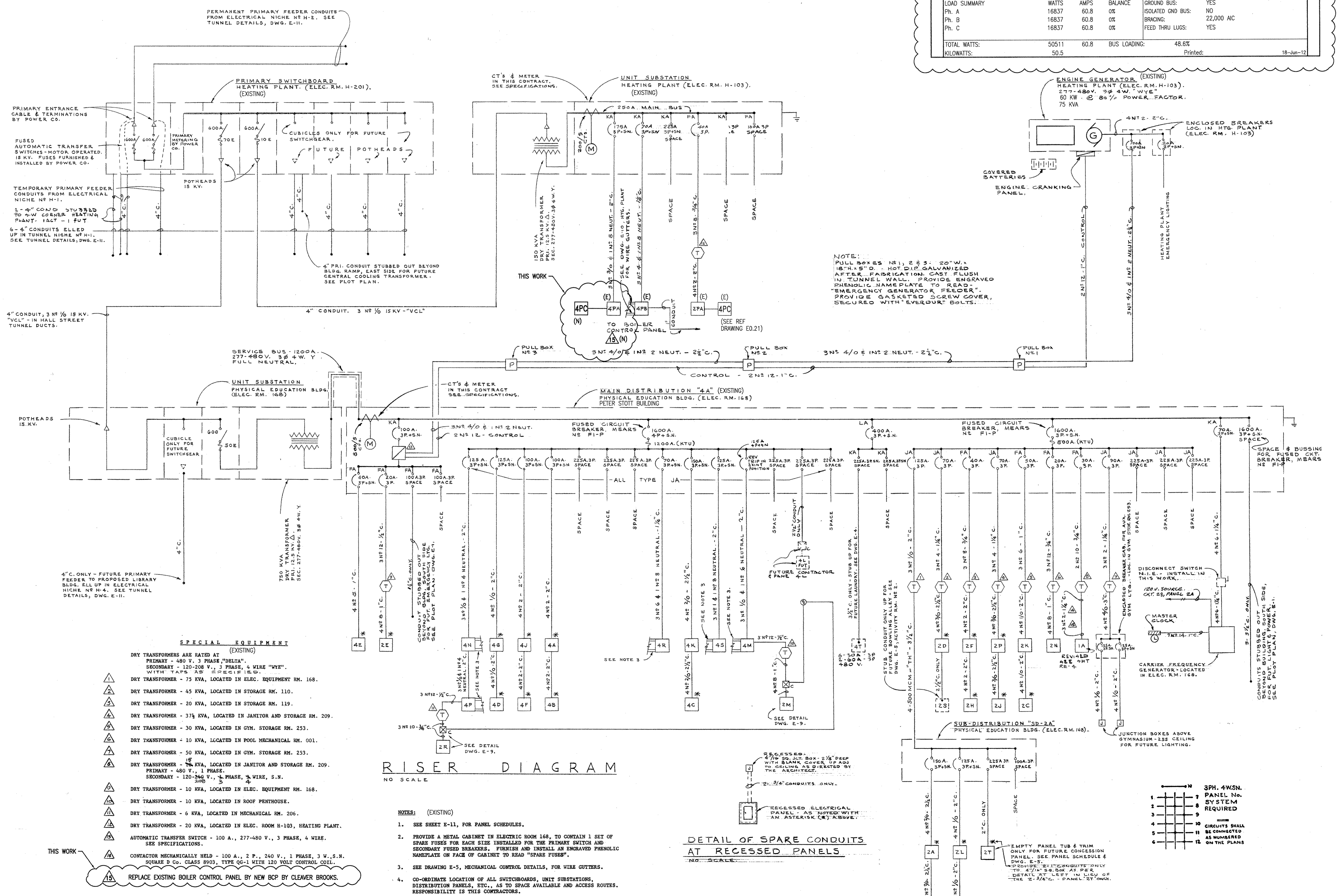
GENERAL		RECEPTACLES	
	AMMETER		SIMPLEX RECEPTACLE
	CIRCUIT BREAKER		DUPLEX RECEPTACLE
	OVERLOADS		GFI - 125V, 20A, NEMA 5-20R WALL, CEILING
	FUSE		SPECIAL - VOLT, AMPS AS NOTED IN SPECIFICATIONS
	INDICATING PILOT LIGHT (NOTE: AMBER, BLUE, GREEN, RED, WHITE)		WELDER RECEPTACLE
	NON-FUSED DISCONNECT (TYP INDICATES FUSED DISC.)		SPECIAL - VOLT, AMPS AS NOTED IN SPECIFICATIONS
	FULL VOLTAGE NON-REVERSING MOTOR STARTER		DUPLEX RECEPTACLE - EMERGENCY POWER
	FURNISHED VARIABLE FREQUENCY DRIVE WITH INTERNAL DISCONNECT		COMBINATION SWITCH/DUPLEX RECEPTACLE
	3 POLE, MOTOR RATED SWITCH		FLUSH FLOOR DEVICE TYPE PER SYMBOLS ABOVE
	MOTOR - (480V)		PEDESTAL FLOOR DEVICE TYPE PER SYMBOLS ABOVE
	MOTOR - (120V)		TELE/POWER POLE, POWER POLE
	DAMPER MOTOR		RAISED FLOOR MULTI SERVICE FLOOR BOX DUPLEX AND SIGNAL OUTPUTS AS NOTED
	MOTOR, VERTICAL		CLOCK RECEPTACLE
	ELECTRIC HEATER		DUPLEX DATA COMM PORT
	PANEL		
	TRANSFORMER		
	VOLTMETER		
	PANEL		
	POINT OF CONNECTION		
	POWER POLE		
	PRESSURE SWITCH		
	POLYVINYL CHLORIDE		
	QUANTITY		
	EXISTING TO BE REMOVED		
	RECEPTACLE		
	RIGID GALVANIZED STEEL		
	EXISTING TO BE RELOCATED		
	ROOM		
	EXISTING TO BE REMOVED & REPLACED		
	RAPID START		
	VOLTAGE SURGE ARRESTOR		
	DIGITAL METER UNIT		
	CURRENT TRANSFORMER SHORTING TERMINAL BLOCK		
	DELTA CONNECTION		
	GROUND WYE CONNECTION		
	GENERATOR		
	MANHOLE, HANDHOLE		
	AUTOMATIC TRANSFER SWITCH		
	GROUND ROD		
	GROUND ROD, TEST WELL		
	CONCEALED OR UNDERGROUND		
	EXPOSED		
	ROUTED DOWN		
	ROUTED UP		
	CONDUIT STUBBED OUT AT LOCATION SHOWN PROVIDE INSULATED BUSHING & PULLROPE		
	RACEWAY STUBBED OUT FOR FUTURE CONTINUATION		
	FLEX CONDUIT - LIQUIDTIGHT		
	SURFACE MOUNTED DIVIDED METAL RACEWAY		
	CONDUIT SEAL FITTING		
	JUNCTION BOX - WALL AND FLOOR MOUNTED		
	PULL BOX		
	TERMINAL BOX		
	HOME RUN CRKT - PNL AND CB #		
	CONDUCTOR QTY - INCLUDING NEUT. & GND		
	NEUTRAL - ISOLATED GND GND		
	WIRE SIZE (#12 IF NOT SHOWN)		
	HEAT TRACING		
	AIR TERMINAL		
	LIGHTING		
	BATTERY POWER EMERGENCY LIGHT		
	CEILING MOUNT, PENDANT, HID OR INCANDESCENT		
	HID FIXTURE WITH QUARTZ STANDBY RESTRIKE		
	EXIT LIGHT		
	1'x4' FLUORESCENT		
	1'x4' FLUORESCENT FIXTURE W/ EMERGENCY BATTERY PACK		
	2'x4' FLUORESCENT		
	2'x4' FLUORESCENT FIXTURE W/ EMERGENCY BATTERY PACK		
	FLUORESCENT STRIP W/ EMERGENCY BATTERY PACK		
	OCCUPANCY SENSOR		
	DOCK LIGHT		
	WALL MOUNT FIXTURE		
	PHOTOELECTRIC CELL		
	TIME CLOCK		
	277V, 20A SWITCH		
	277V, 20A 3-WAY SWITCH		
	120V, MANUAL MOTOR STARTER		
	120V, TWIST TIMER		
	277V, 20A DIMMING SWITCH		
	FIXTURE TYPE DESIGNATION		
	FIXTURE WATTS		

1 EQUIPMENT POWER CIRCUITS SCALE: NONE

TYPE I.D.	TYPE I.D.	QTY	WIRE SIZE	GROUND		CONDUIT SIZE
				QTY	GND SIZE	
1	P 00	2	#12	1	#12	3/4
2	P 01	3	#12	1	#12	3/4
3	P 02	6	#12	1	#12	3/4
4	P 03	9	#12	1	#12	1
5	P 04	12	#12	2	#12	1.25
6	P 05	15	#12	2	#12	1.25
7	P 06	18	#12	2	#12	1.5
8						
9	P 11	3	#10	1	#12	3/4
10	P 12	6	#10	1	#12	1
11	P 13	9	#10	1	#12	1.25
12	P 14	12	#10	1	#12	1.25
13						
14	P 21	3	#8	1	#10	3/4
15	P 22	6	#8	1	#10	1.25
16	P 23	9	#8	1	#10	1.5
17						
18	P 31	3	#6	1	#8	1
19	P 32	6	#6	1	#8	1.5
20						
21	P 41	3	#4	1	#6	1.25
22	P 42	3	#2	1	#6	1.25
23	P 43	3	#1	1	#6	1.5
24	P 44	3	#1/0	1	#6	2
25	P 45	3	#2/0	1	#6	2
26	P 46	3	#3/0	1	#6	2
27	P 47	3	#4/0	1	#6	2.5
28						
29	P 51	3	250 KCM	1	#6	2.5
30	P 52	3	300 KCM	1	#4	3
31	P 53	3	350 KCM	1	#4	3
32	P 54	3	400 KCM	1	#4	3
33	P 55	3	500 KCM	1	#3	3.5
34	P 56	3	600 KCM	1	#3	3.5
35	P 57	3	750 KCM	1	#2	4
36						
37	P 61	2	#12	1	#12	3/4
38	P 62	4	#12	1	#12	3/4
39	P 63	5	#12	1	#12	3/4
40	P 64	7	#12	1	#12	3/4
41	P 65	8	#12	2	#12	1
42	P 66	10	#12	2	#12	1.25
43						
44	P 71	2	#10	1	#12	3/4
45	P 72	4	#10	2	#12	1
46	P 73	5	#10	1	#12	3/4
47	P 74	6	#10	1	#12	1
48	P 75	7	#10	1	#12	1
49	P 76	8	#10	1	#12	1.25
50	P 77	9	#10	1	#12	1.25
51	P 78	10	#10	1	#12	1.25
52						
53	P 81	2	#8	1	#10	3/4
54	P 82	4	#8	1	#10	1
55	P 83	5	#8	1	#10	1.25
56	P 84	6	#8	1	#10	1.25
57	P 85	7	#8	1	#10	1.25
58						
59	P 91	2	#12	1	#12	3/4
60	P 92	4	#12	2	#12/G	1"
61	P 93	6	#12	3	#12/G	1 1/4"
62	P 94	8	#12	4	#12/G	1 1/4"
63	C 01	2	#12			3/4
64	C 02	4	#12			3/4
66	C 03	6	#12			3/4
67	C 04	8	#12			3/4
68	C 05	10	#12			1
69	C 06	12	#12			1

Type I.D.	QTY	CIRCUIT		GROUND		Cndt Size
		Wire Size	QTY	Gnd Size	QTY	
H101	3	#2 (Skw)	1	#4/0	4"	
H102	3	#2 (15kV SHLD)	1	#4/0	4"	
H103	3	#2 (25kV SHLD)	1	#4/0	4"	
H104	3	#1 (Skw)	1	#4/0	4"	
H105	3	#1 (25kV SHLD)	1	#4/0	4"	
H106	3	#1/0 (Skw)	1	#4/0	4"	
H107	3	#1/0 (15kV SHLD)	1	#4/0	3.5"	
H108	3	#1/0 (25kV SHLD)	1	#4/0	4"	
H109	3	#2/0 (Skw)	1	#4/0	3.5"	
H110	3	#2/0 (15kV SHLD)	1	#4/0	4"	
H111	3	#2/0 (25kV SH				

PANEL LABEL:	LOCATION:	MOUNTING SURFACE:
11 4PC	First Floor	?
PANEL VOLTAGE:	480 PHASE: 3 WIRE: 4	BUS: 125 125A MLO
SERVICE	WATTS	A/P # A B C # WATTS
BOILER NO. 1 COMPRESSOR 5 Hp	1167 15A/3P 1 A 2 1167	BOILER NO. 3 COMPRESSOR 7.5 Hp
BOILER NO. 1 BLOWER 10 Hp	2500 30A/3P 7 A 10 2500	BOILER NO. 3 BLOWER 25 Hp
BOILER NO. 1 OIL PUMP 3/4 Hp	167 3A/3P 13 A 14 167	BOILER NO. 3 OIL PUMP 3/4 Hp
FEED WATER PUMP NO. 1 7.5 Hp	1834 15A/3P 19 A 20 1834	FEED WATER PUMP NO. 3 7.5 Hp
FEED WATER PUMP NO. 2 7.5 Hp	1834 15A/3P 27 B 28 1834	SPARE
SPARE	15A/3P 31 A 32 15A/3P	SPARE
SPACE	39 B 40 41 C 42	SPACE
LOAD SUMMARY	WATTS AMPS BALANCE	GROUND BUS: YES
Ph. A	16837 60.8 0%	ISOLATED OND BUS: NO
Ph. B	16837 60.8 0%	BRACING: 22,000 AIC
Ph. C	16837 60.8 0%	FEED THRU LUGS: YES
TOTAL WATTS:	50511 60.8	BUS LOADING: 48.6%
KILOWATTS:	50.5	Printed: 18-Jun-12



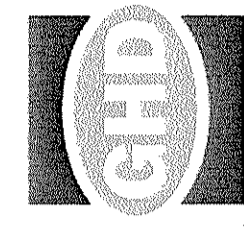
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MARK	DATE	DESCRIPTION	ISSUE
A	06/20/12	90% DESIGN REVIEW	

**PORTLAND STATE UNIVERSITY
 WEST HEATING PLANT
 BOILER REPLACEMENT
 ONE-LINE DIAGRAM
 WEST HEATING PLANT**

PROJ NO: 10909-12002
 DRWN: MTC CHKD: SNS

E0.2



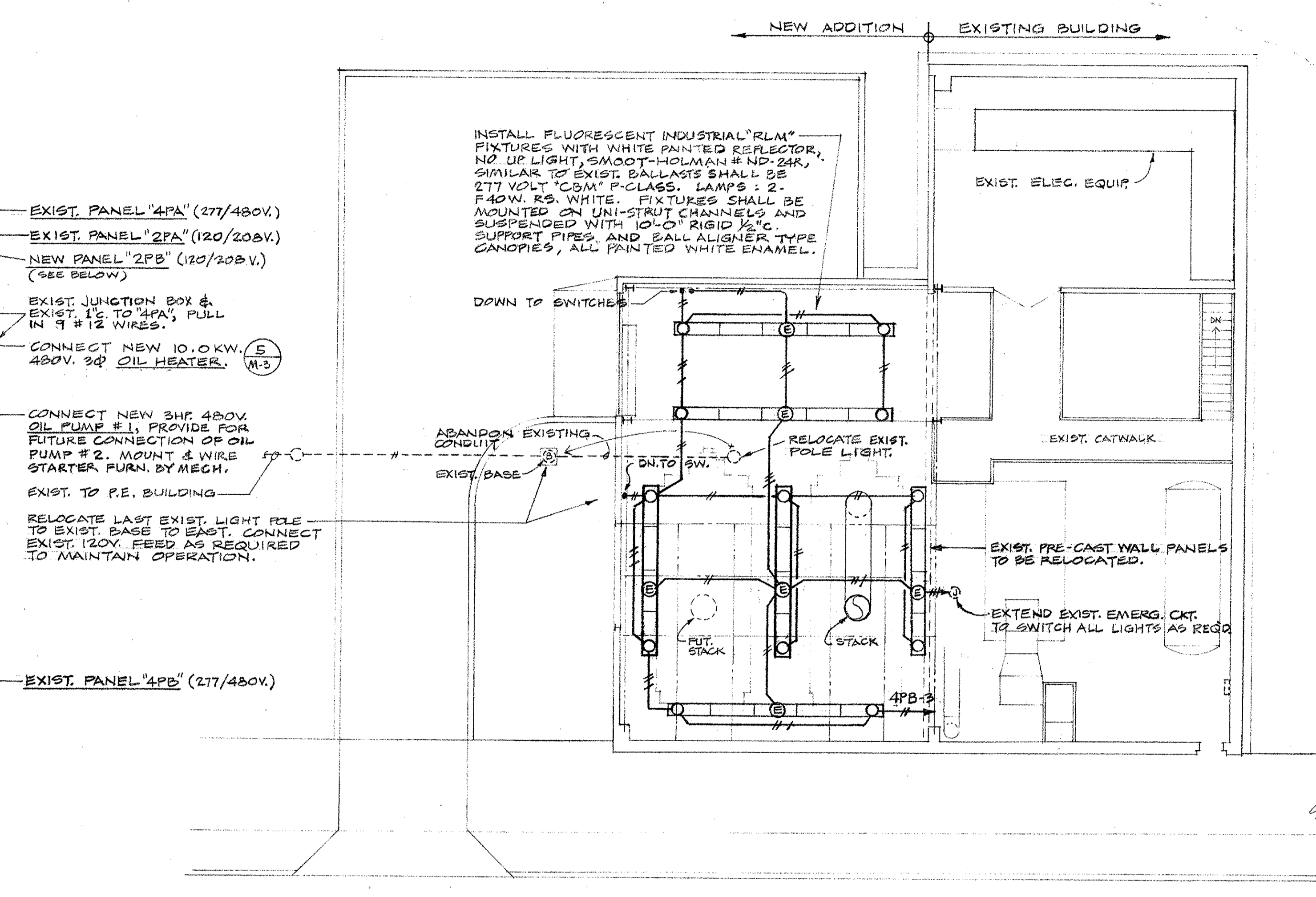
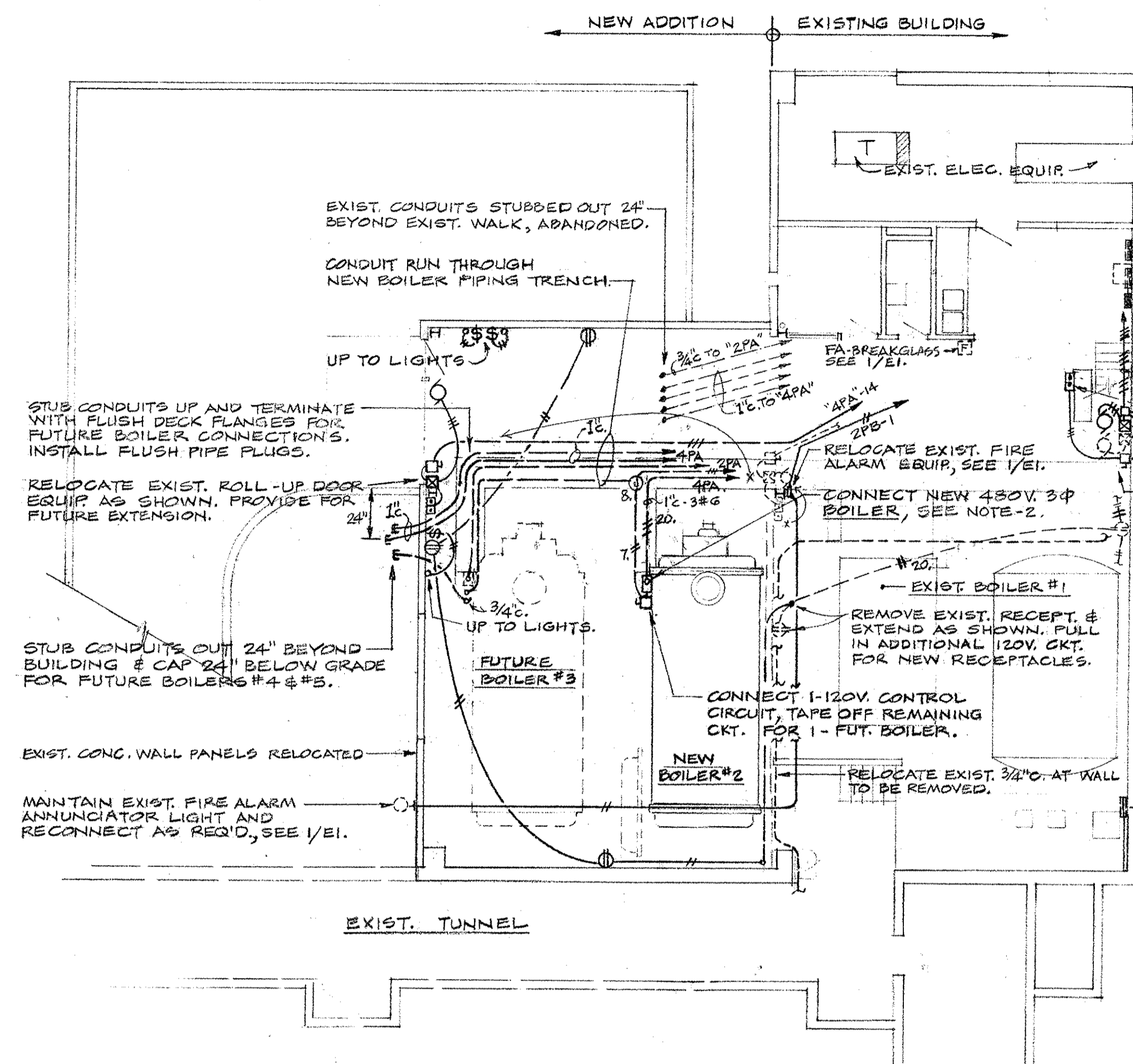
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MARK	DATE	DESCRIPTION
A	06/20/12	90% DESIGN REVIEW

PORTLAND STATE UNIVERSITY
 WEST HEATING PLANT
 BOILER REPLACEMENT
 EXISTING ELECTRICAL PLANS,
 SCHEDULES AND DETAILS

PROJ NO: 10909-12002
 DRWN: MTC CHKD: SNS
E0.21
 SHEET 19 OF 22



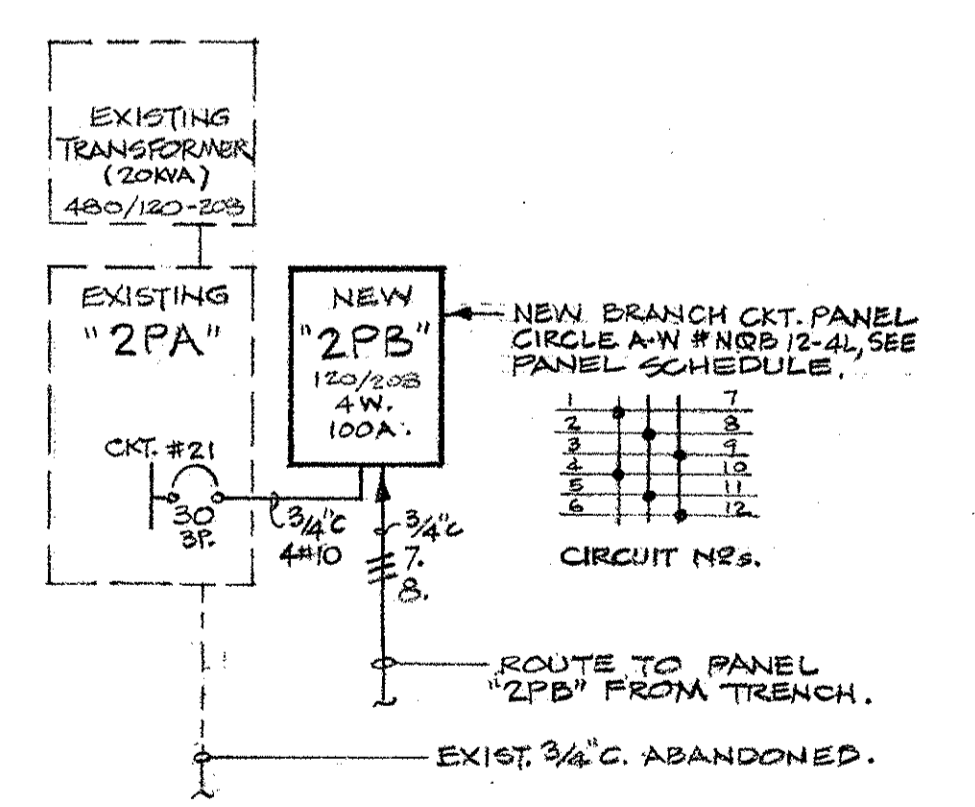
PLAN, LOWER LEVEL
 1/8" = 1'-0"

- NOTES:
1. VERIFY LOCATIONS PRIOR TO ROUGH-IN OF ALL MECHANICAL EQUIPMENT.
 2. PACKAGE BOILER WITH CONTROL PANEL, CONSISTING OF 1-20HP BLOWER, 1-1HP OIL PUMP, 1-100V OIL HEATER AND 1-5HP AIR COMPRESSOR, ALL 480V. 3P. CONNECT LINE LEADS AND CONTROL CIRCUIT, VERIFY.
 3. RETURN ALL USABLE ELECTRICAL EQUIPMENT TO UNIVERSITY AS DIRECTED.
 4. DISCONNECT EXIST. DUPLEX 1/2 HP PUMP MOTORS & RECONNECT NEW DUPLEX 2 HP PUMP MOTORS IN EXIST. DIVISION OF CONTINUING EDUCATION MECH. RM. SEE SHT. "M-1" AND SPECS.

PANEL	CIRCUIT #	BREAKER AMP	POLE	ITEM	EXIST. BRKR.
4PA 277/480V.	15	20	3	OIL PUMP #1, 3HP	EXIST. BRKR.
	16	20	3	SPARE ONLY FOR FUTURE OIL PUMP #2	EXIST. BRKR.
	17	20	3	OIL HEATER, 10.0 KW.	EXIST. BRKR.
	20	90	3	BOILER #2, (25HP-11HP-5HP-24 KW.)	NEW BRKR.
	10	90	3	SPACE ONLY FOR FUTURE BOILER #3.	
(LEAVE REMAINING SPARE BREAKERS IN PLACE)					
4PB 277/480V.	3	20	1	LIGHTING CIRCUIT	EXIST. BRKR.
2PA 120/208V.	21	30	3	SUB-FEED FOR NEW PANEL "2PB"	

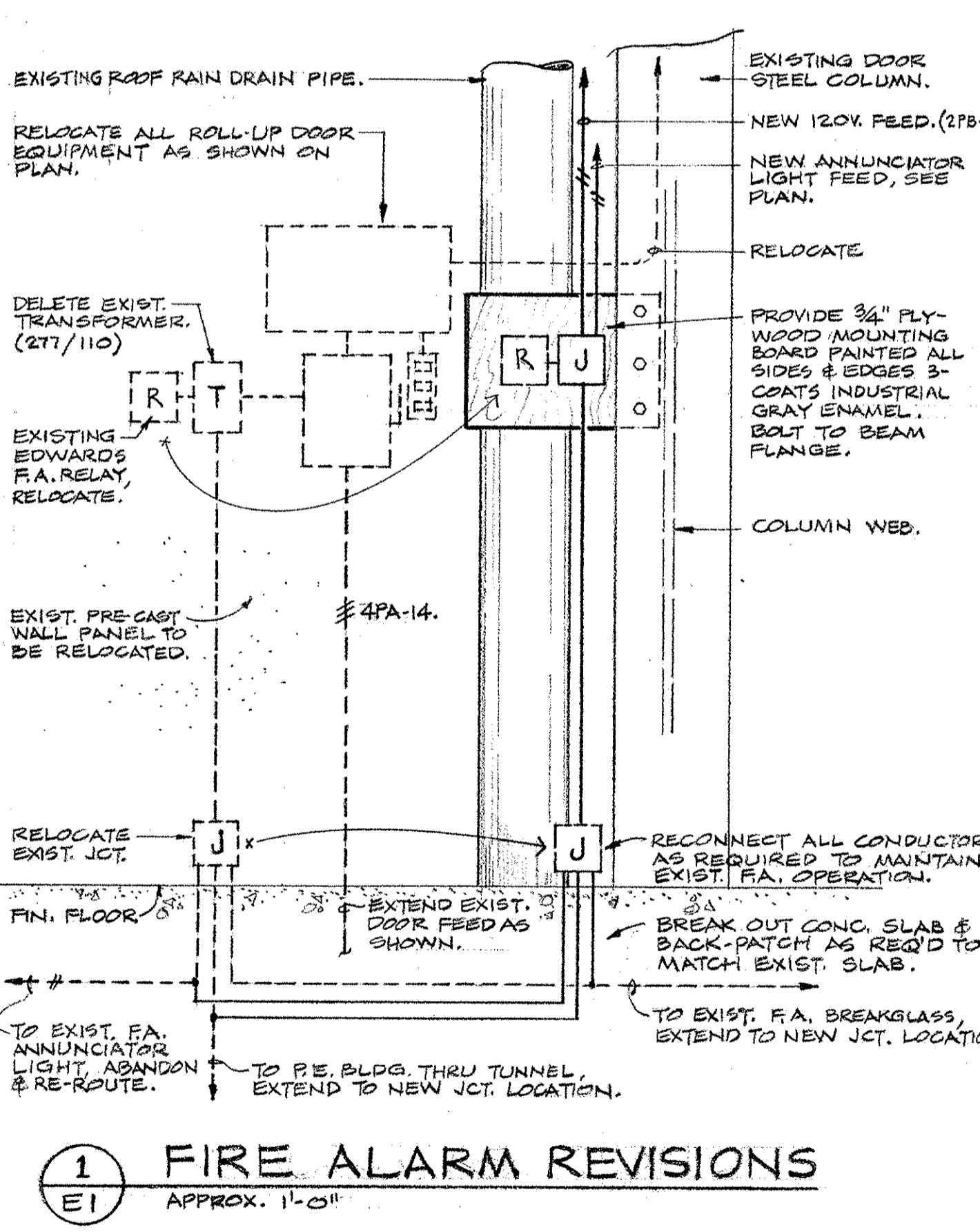
PANEL	CIRCUIT #	BREAKER AMP	POLE	ITEM
2PB 120/208V. GOA. SURFACE	1	20	1	FIRE ALARM CIRCUIT.
	2	20	1	SPARE
	7-8	20	1	CONTROL CIRCUITS, BOILER #2, #3.
	3-4-9-10	20	1	SPARES (FUTURE BOILER #4, #5 CONTROL CKTS.)
	5-6-11-12	-	-	SPACE

2 PARTIAL ONE-LINE DIAGRAM
 NO SCALE



PLAN, UPPER LEVEL
 1/8" = 1'-0"

SYMBOL SCHEDULE	
⊙	FLUORESCENT LIGHT FIXTURE.
⊙	FLUORESCENT LIGHT FIXTURE ON EMERGENCY SYSTEM.
⊙	INCANDESCENT WALL MOUNTED LIGHT FIXTURE.
⊙	SWITCH-1P, 2T/TV.
⊙	JUNCTION BOX.
⊙	DUPLEX RECEPTACLE.
⊙	DISCONNECT SWITCH.
⊙	MOTOR STARTER.
⊙	RAISE-LOWER PUSHBUTTON STATION.
⊙	MOTOR OUTLET.
---	CONDUIT AT WALL OR OVERHEAD, #12 WIRE UNLESS NOTED.
---	CONDUIT UNDERFLOOR.
---	BRANCH CIRCUIT PANEL.
---	CONTROL CABINET OR JUNCTION BOX ON UNIT (N.I.E.) VERIFY LOCATION.
---	DENOTES EXISTING WIRING AS INDICATED.



REVISOR AS REPORTED "AS BUILT" 7-6-76

PLANS, SCHEDULES AND DETAILS
WEST HEATING PLANT UTILITIES ADDITION
 PORTLAND STATE UNIVERSITY - PORTLAND, OREGON

C. W. Timmer Associates Inc.
 Consulting Engineers / Beaverton, Oregon

Project No. 1049
 Date 6-13-74
 Scale SHOWN
 Dwg. No. E-1
 Sht. 12 of 12

FOR INFORMATION ONLY

