Appendix 5.02
Construction Drawings

Reference Alternates and Clarifications on PSU provided RFP documentation.

Portland State UNIVERSITY

PSU WHP BOILER REPLACEMENT PROJECT
ISSUED FOR CONSTRUCTION

DECEMBER ~~JULY~~, 2012

PROJECT NUMBER: 10909-12002

CONTRACTOR DESIGN AND PERMITTING ELEMENTS

SEE SPEC SECTION 01010 – SUMMARY OF WORK

1. ~~STRUCTURAL PLATFORMS, BOILER STACK, BOILER FOUNDATION, PIPE AND ELECTRICAL SUPPORTS CALCULATIONS.~~
2. ~~PETER STOTT BUILDING VENTILATION CHANGES INCLUDING EXHAUST FAN & DUCT REMOVAL AND DESIGN OF NEW FANS,INTER FILTER AND DUCTWORK AS PER H6.40.~~
3. ~~ALL CONTROLS BY SIEMENS.~~
4. EXIT MODIFICATION: ALL EXIT HARDWARE, ARCHITECTURAL AND ~~EMERGENCY LIGHTING~~ ME6.50, ~~E6.50.~~

PREPARED BY

GHD

CODE COMPLIANCE:

1. BUILDING: EXISTING NONCOMBUSTIBLE
   CONSTRUCTED IN 1967 AND
   EXPANDED IN 1976

2. PROJECT: DEMOLISH 1 EXISTING 15 PSIG STEAM BOILER
   REPLACE 1 EXISTING 15 PSIG STEAM BOILER WITH NEW 15 PSIG STEAM 300 BHP BOILER
   ADD 1 NEW 15 PSIG STEAM BOILER 600 BHP AS PLANNED IN 1976 CONSTRUCTION

3. OREGON 2010 MECHANICAL CODE:
   3A. SPECIALTY CODE APPENDIX C: SECTION C304
   A. PARAGRAPH C304.8 ENGINEERED SOLUTION
   1. THE MANUFACTURER'S PUBLISHED RECOMMENDATIONS FOR FORCED DRAFT BOILERS ARE USED FOR OUTSIDE AIR VOLUME AND AIR OPENING SIZE CALCULATIONS AS FOLOWS:
      a. 8 CFM/BHP FOR COMBUSTION
      b. 2 CFM/BHP FOR VENTILATION
      c. TOTAL BOILER HORSEPOWER = 1,500
      d. TOTAL VOLUME OF COMBUSTION AIR PLUS VENTILATON AIR
         = [(2+8)CFM/BHP] X 1,500 BHP = 15,000 CFM
      e. TOTAL VENTILATION OPENING AREA REQUIRED = 15,000 CFM/500 FPM = 30 SF
      f. ACCEPTABLE AIR VELOCITY ABOVE 7 FOOT HEIGHT IN BOILER ROOM IS 500 FPM.
      g. EXISTING HIGH OUTSIDE AIR LOUVER AREA = (14 IN X 26 FT) X 2 SETS = 60.67 SQ
      h. FREE AREA OF EXISTING HIGH LOUVER IS APPROXIMATELY 50%
      i. TOTAL EFFECTIVE HIGH OPENING AREA = 33 SF.
      j. EXISTING AREA OF LOW OUTSIDE AIR LOUVER = 6.0'x2.5'=15 SF
      k. FREE AREA IS 40% OF ACTUAL
      l. FREE LOW LOUVER AREA = 6 SF
      m. TOTAL EXISTING FREE OUTSIDE AIR OPENING AREA = 39 SF
   3B. SPECIALTY CODE CHAPTER 10
   A. PARAGRAPH 1006.2 STACK DAMPERS
      1. NO INTERNAL STACK DAMPERS ARE USED.
   B. PARAGRAPH 1006.2 SAFETY OR RELIEF VALVE DISCHARGE
      1. STEAM RELIEF ARE DISCHARGED OUTSIDE THE BOILER ROOM AND ARE EQUIPED WITH SPLASH GUARD. NO VALVES ARE INSTALLED BETWEEN THE SAFETY VALVES AND THE ATMOSPHERE.
   C. PARAGRAPH 1009.1 GAS PRESSURE REGULATORS
      1. APPROVED SEPARATE GAS REGULATORS SHALL BE PROVIDED FOR BOTH PILOT AND BURNER FOR EACH BOILER.

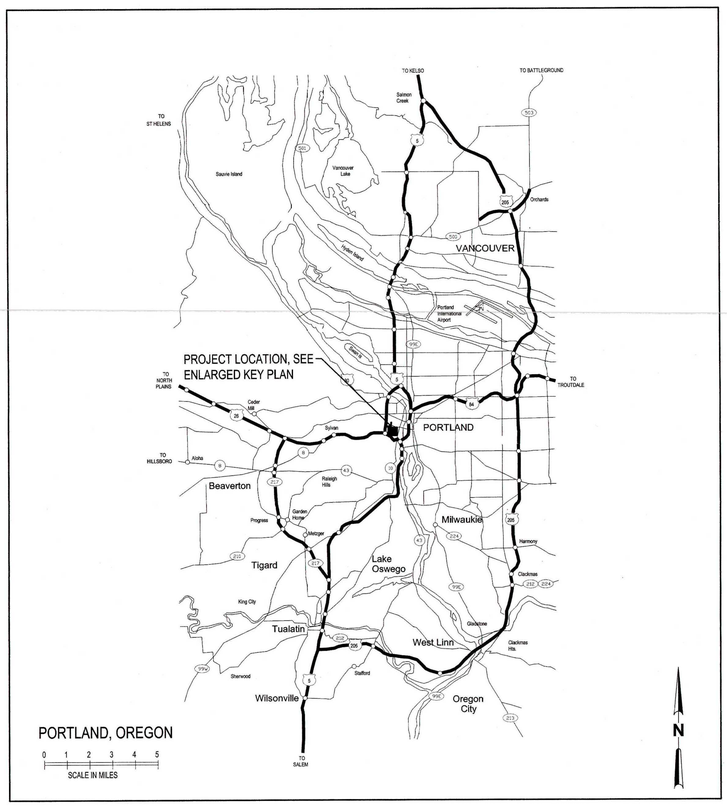
4. OREGON 2010 ENERGY CODE:
   A. TABLE 503.2.3(5)
      1. NEW BOILERS SHALL BE A MINIMUM 77% THERMALLY EFFICIENT WHEN FIRED WITH NATURAL GAS.
         PROPOSED 600 HP BOILER IS 85.6% EFFICIENT
         PROPOSED 300 HP BOILER IS 84.0% EFFICIENT
      2. NEW BOILERS SHALL BE A MINIMUM 81% THERMALLY EFFICEINT WHEN FIRED WITH OIL.
         PROPOSED 600 HP BOILER IS 89.0% EFFICIENT
         PROPOSED 300 HP BOILER IS 87.3% EFFICIENT
   B. PARAGRAPH 503.4.3 HYDRONIC SYSTEM CONTROLS
      1. CONTROLS WILL BE PROVIDED TO SEQUENCE BOILERS TO MATCH THE LOAD.
      2. BOILER SUPPLIER TO PROVIDE SOO (AT MAXIMUM EFFICIENCY) FOR PERMIT AND APPROVAL BY PSU.

5. EXITS – CHAPTER 10:
   A. BOILER ROOM REQUIRES 2 EXITS
   B. EXISTING BUILDING HAS 1 NORMAL EXIT, 1 EXIT HATCH, 1 EXIT THOUGH TUNNEL ENTRY TO THE BUILDING. HARDWARE WILL BE UPGRADED TO BE INCLUDED ON DOOR AND HATCH

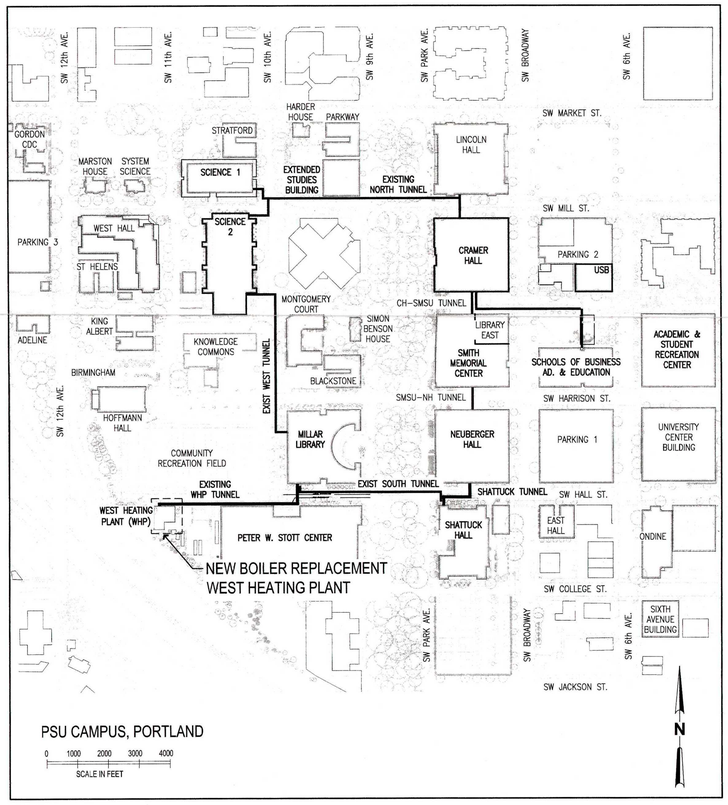
6. FIRE PROTECTION:
   EXISTING STANDPIPE IN BUILDING. NO BUILDING SPRINKLERS FOR NON COMBUSTIBLE CONSTRUCTION

7. CLOTHES DRYER EXHAUST UPGRADE DRAWING H6.40. INSTALLATION SHALL COMPLY WITH SECTION 504, CLOTHES DRYER EXHAUST, OF THE 2010 OREGON MECHANICAL SPECIALITY CODE.

AREA MAP



LOCATION MAP



DRAWING LIST

PSU Facilities & Planning

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Mail Code: FAP . PO Box 751
Portland, Oregon 97207-0751
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DRAWING LIST

CD	#	DWG#	TITLE SHEET /Drawing List
X	01	T1	TITLE SHEET AND DRAWING LIST
X	02	M0.1	LEGEND AND SYMBOLS
X	03	M0.4	PIPING & INSULATION & VALVE SCHEDULE
X	04	M0.6	EQUIPMENT SCHEDULES
X	05	M30	CRAMER HALL STEAM & CONDENSATE P&ID
X	06	M30.1	CRAMER HALL STEAM P&ID DEMO
X	07	M31	WEST CAMPUS STEAM P&ID
X	08	M31.1	WEST CAMPUS STEAM P&ID DEMO
X	09	M32	WEST HEATING PLANT P&ID
X	10	ME6.50	WHP EQUIPMENT AND SITE PLAN
X	11	ME6.51	WHP EQUIPMENT PLAN UPPER LEVEL
X	12	MP6.40	WEST HEATING PLANT TUNNEL PIPING PLAN
X	13	MP6.41	WEST HEATING PLANT TUNNEL PIPING DEMO PLAN
X	14	MP6.50	WEST HEATING PLANT PIPING PLANS
X	15	MP6.51	WEST HEATING PLANT PIPING SECTIONS
X	16	MP6.52	WEST HEATING PLANT PIPING DEMO PLAN
X	17	MP6.53	CRAMER HALL CONDENSATE PIPING PLANS
X	18	MP9.0	WEST HEATING PLANT PIPING DETAILS
X	19	H6.40	PETER STOTT BUILDING VENTILATION UPGRADE
X	20	E0.1	LEGEND – SCHEDULES / TABLES
X	21	E0.2	ONE–LINE DIAGRAM – WEST HEATING PLANT
X	22	E0.21	ORIGINAL DRAWING MARKUP – PLANS, SCHEDULE & DETAILS
X	23	E6.50	ELECTRICAL DIST PLAN PLAN WEST HEATING PLANT
X	24	E6.53	ELECTRICAL DIST PLAN PLAN CRAMER HALL
	24		

- See Structural Sheets S-0 through S-9
- See Structural Calcs.

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REGISTERED PROFESSIONAL ENGINEER 83388PE OREGON JUNE 22, 1979 RICHARD S. HEIST

EXPIRES: 12/31/2013

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"

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ISSUE

PORTLAND STATE UNIVERSITY
WEST HEATING PLANT
BOILER REPLACEMENT

TITLE SHEET AND DRAWING LIST

PROJ NO: 10909-12002

DRWN: MTC CHKD:

T1

SHEET 1 OF 24

Plot Date: 12 July 2012 - 4:58 PM Plotted By: Matthew Carmichael Cad File No: G:\10909 - PSU (Portland State University)\10909-12002 PSU WHP Boiler Replacement\06-CAD\Sheets\10909-12002_01_T1 Title Sheet.dwg

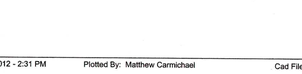
PROCESS PIPING LEGENDS AND ABBREVIATIONS

INSTRUMENT SOCIETY OF AMERICA TABLE

	FIRST LETTER(S)		SUCCEEDING LETTERS		
	PROCESS OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER FLAME		USERS CHOICE(*)	USERS CHOICE(*)	USERS CHOICE(*)
C	CONDUCTIVITY			CONTROL	
D	DENSITY (S.G.)	DIFFERENTIAL		DAMPER	
E	VOLTAGE		PRIMARY ELEMENT		
F	FLOW RATE	RATIO			
G	USERS CHOICE(*)		GLASS, GAUGE		
H	HAND (MANUAL)				HIGH
I	CURRENT		INDICATE		
J	POWER	SCAN			
K	TIME OR SCHEDULE	RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW
M	MOTION	MOMENTARY			MIDDLE, INTERMEDIATE
N	USERS CHOICE(*)		USERS CHOICE(*)	USERS CHOICE(*)	USERS CHOICE(*)
O	USERS CHOICE(*)		ORIFICE		
P	PRESSURE (OR VACUUM)		POINT (TEST CONNECTION)		
Q	QUANTITY OR EVENT(*)	INTEGRATE			
R	RADIATION		RECORD OR PRINT		
S	SPEED OR FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE(*)		MULTIFUNCTION(*)	MULTIFUNCTION(*)	MULTIFUNCTION(*)
V	VIBRATION			VALVE	
W	WEIGHT OR FORCE		WELL		
X	UNCLASSIFIED(*)		UNCLASSIFIED(*)	UNCLASSIFIED(*)	UNCLASSIFIED(*)
Y	EVENT, STATE OR PRESENSE			RELAY OR COMPUTE(*)	
Z	POSITION			DRIVE, ACTUATE OR UNCLASSIFIED FINAL CONTROL ELEMENT	

(*) WHEN USED, EXPLANATION IS SHOWN ADJACENT TO INSTRUMENT SYMBOL. SEE ABBREVIATIONS AND LETTER SYMBOLS.

INSTRUMENTATION ABBREVIATION



EXAMPLES

LS – LEVEL SWITCH
LT – LEVEL TRANSMITTER
LIT – LEVEL INDICATING TRANSMITTER
KY – TIME DELAY RELAY

TYPICAL INSTRUMENT ABBREVIATIONS
(THIS WORK)

QGA – GAS LEVEL SENSOR/TRANSMITTER
NIT – BTU INDICATING TRANSMITTER

INSTRUMENT/SIGNAL LEGEND

- ELECTRONIC: DISCRETE
- A – ELECTRONIC: ANALOG
- PF – ELECTRONIC: PULSE FREQUENCY
- (2) – INDICATES TWO SIGNALS TYP
- PNEUMATIC
- HYDRAULIC
- PI 0 – FIELD MOUNTED COMPONENT
- PI 0 – PANEL MOUNTED COMPONENT
- PI 0 – BACK PANEL MOUNTED COMPONENT
- PI 0 – AUX. LOCATION MOUNTED COMPONENT
- PI 0 – AUX. LOCATION BACK PANEL COMPONENT
- PI 0 – SHARED DISPLAY, SHARED CONTROL FIELD MOUNTED
- PI 0 – SHARED DISPLAY, SHARED CONTROL PRIMARY LOCATION
- PI 0 – SHARED DISPLAY, SHARED CONTROL AUX. LOCATION
- PI 0 – PLC INPUT OR OUTPUT
- PI 0 – PLC AUXILARY PANEL
- PI 0 – COMPUTER FUNCTION
- I – INTERLOCK
- FO – FLOW RATE POINT
- TB – TERMINAL BOX

ACTUATOR LEGEND

SYMBOL	DESCRIPTION
P	PNEUMATIC
P Z	PNEUMATIC WITH POSITIONER
P S	PNEUMATIC WITH SOLENOID
E	ELECTRIC
E Z	ELECTRIC WITH POSITIONER
H	HYDRAULIC
	DIAPHRAGM
M	MOTORIZED
	OUTSIDE SCREW & YOKE (OS & Y)
	MANUAL CHAIN OPERATOR
SET @ 30 PSIG	AIR SET WITH SET GAUGE PRESSURE
	PRESSURE REGULATING W/ PRESS. INDICATOR

PIPE SUPPORT TAG LEGEND

DESIGNATIONS FOR DETAIL AND GENERAL LOCATIONS OF PIPE SUPPORTS

- A — PIPE ANCHOR
- EJ — EXPANSION JOINT
- G — PIPE GUIDE
- H — HANGER
- RG — ROLLER GUIDE
- RS — ROLLER SUPPORT
- S — VERTICAL SUPPORT
- SH — SPRING HANGER ASSEMBLY

(XXX) – INDICATE KNOWN LOADS TO BE SUPPORTED

SYMBOL LEGEND

- S – SOLENOID VALVE
- CHECK VALVE
- BALL CHECK VALVE
- WAFER CHECK VALVE
- GATE VALVE
- GATE VALVE (NORMALLY CLOSED)
- BALL VALVE
- BALL VALVE (NORMALLY CLOSED)
- DIAPHRAGM VALVE
- DIAPHRAGM VALVE (NORMALLY CLOSED)
- GLOBE VALVE
- BUTTERFLY VALVE
- 3 WAY VALVE
- BALANCING VALVE
- TRIPLE DUTY VALVE
- PLUG VALVE
- PRESSURE REGULATOR VALVE
- RPBA – REDUCED PRESSURE BACKFLOW ASSEMBLY
- SAFETY PRESSURE RELIEF
- HIGH POINT AIR VENT (AAV)
- FLANGE
- UNION
- ISOLATION DIAPHRAGM
- MALE HOSE CONNECTION
- FEMALE HOSE CONNECTION
- FLEXIBLE COUPLING
- ROTAMETER
- FILTER
- LD – LEAK DETECTOR
- CS – COVER SWITCH
- POINT OF CONNECTION
- DL – DRIP LEG
- FR – FILTER, REGULATOR
- HB – HOSE BIBB
- T – TRAP
- M XXX – MOTOR
- PS – CONDENSATE PUMP STATION
- DISC METER
- X – TURBINE METER
- VORTEX METER
- SD – SUCTION DIFFUSER
- PETE'S PLUG
- FM – INSERTION TURBINE METER
- DOUBLE SPHERE FLEX CONNECTION

ABBREVIATIONS

ABI – ADDITIVE BID ITEM
AAV – AUTOMATIC AIR VENT
AFF – ABOVE FINISHED FLOOR

BOI – BOTTOM OF INSULATION
BOP – BOTTOM OF PIPE
BOS – BOTTOM OF SUMP/STEEL
BR – BOILER
BW – BUTT WELD

CFCI – CONTRACTOR FURNISHED CONTRACTOR INSTALLED
CO – CLEANOUT
CS – CARBON STEEL

DN – DOWN

EJ – EXPANSION JOINT
ESO – EMERGENCY SHUT-OFF
EW/SS – EMERGENCY EYEWASH / SAFETY SHOWER
EXIST – EXISTING

FC – FAIL CLOSE
FD – FLOOR DRAIN
FLG – FLANGE
FLP – FAIL LAST POSITION
FO – FAIL OPEN

HT – HEAT TRACE

INS – INSULATION

LVL – LEVEL

NC – NORMALLY CLOSED
NIC – NOT-IN-CONTRACT
NO – NORMALLY OPEN
NR – NOT REQUIRED

OFCI – OWNER FURNISHED CONTRACTOR INSTALLED
OFMI – OWNER FURNISHED MANUFACTURER INSTALLED
OFOI – OWNER FURNISHED OWNER INSTALLED

PSV – PRESSURE SAFETY VALVE
POC – POINT OF CONNECTION

RF – RAISED FACE
RPBA – REDUCED PRESSURE BACKFLOW ASSEMBLY

SP – SETPOINT
STL – STEEL
SS – STAINLESS STEEL
SST – SANITARY STAINLESS STEEL
SW – SOCKET WELD

T – TRAP
TBD – TO BE DETERMINED
TOP – TOP OF PIPE

VP – VENT PIPE
VR – VENT RISER
VTR – VENT THRU ROOF

(D) – DEMO
(E) – EXISTING
(F) – FUTURE
(N) – NEW
(R) – RELOCATED

FLUID IDENTIFICATION

BFW – BOILER FEED WATER
CA – COMPRESSED AIR
CDS – CONDENSER WATER SUPPLY
CDR – CONDENSER WATER RETURN
CF – CHEMICAL FEED
CW – CITY WATER
CWS – CHILLED WATER SUPPLY
CWR – CHILLED WATER RETURN
CR – CONDENSATE RETURN
DCW – DOMESTIC COLD WATER
DHW – DOMESTIC HOT WATER
DHWR – DOMESTIC HOT WATER RETURN
DRN – DRAIN
DW – DOMESTIC WATER
EV – EMERGENCY VENT
FOR – FUEL OIL RETURN
FOS – FUEL OIL SUPPLY
HPS – HIGH PRESSURE STEAM
HW – HOT WATER
HWR – HOT WATER RETURN
IA – INSTRUMENT AIR
LPS – LOW PRESSURE STEAM
NG – NATURAL GAS
OF – OVERFLOW
PCR – PUMPED CONDENSATE RETURN
SAN – SANITARY
TDR – TOWER DRAIN
WW – WELL WATER
WWR – WELL WATER RETURN

PIPING TAGS

XX" XXX
XX – FLUID
XXX – PIPE SIZE

(D) INDICATES DEMO PIPE – AND /OR SHOWN HATCHED
(E) INDICATES EXISTING PIPE – AND /OR SHOWN LIGHT
(N) INDICATES NEW PIPE – AND/OR SHOWN BOLD
(F) INDICATES FUTURE PIPE – AND/OR SHOWN LIGHT

PIPE LINE LEGEND

- NEW (BOLD)
- PRIMARY EXIST/FUTURE (LIGHT)
- INSULATED
- HEAT TRACED & INSULATED

VALVE TAGS

XX – VALVE IDENTIFICATION NUMBER

EQUIPMENT TAGS

XXX-XX-XX
- EQUIPMENT NUMBER
- EQUIPMENT TYPE
- BUILDING IDENTIFICATION

EQUIP ID

AC – AIR COMPRESSOR
AS – AIR SEPARATOR
BL – BOILER
BS – BASKET STRAINER
CD – CARBON DETECTOR
CDP – CONDENSER PUMP
CF – CHEMICAL FEED
CH – CHILLER
CHP – CHILLER PUMP
CP – CONDENSATE PUMP
CS – CARBON STEEL
CT – COOLING TOWER
DA – DEAERATOR
DS – DIRT SEPERATOR
ET – EXPANSION TANK
FL – FILTER
FOP – FUEL OIL PUMP
P – PUMP
SP – SUMP PUMP
SSP – SIDE STREAM PUMP
ST – SURGE TANK

PSU BUILDING IDENTIFICATION

AB	ART BUILDING
BH	THE BROADWAY
BLKS	BLACKSTONE
CH	CRAMER HALL
CLY	CLAY STREET BUILDING
CPL	CARPOOL PARKING LOT
CPSO	CAMPUS SECURITY BUILDING
EB	ENGINEERING BUILDING
ED	SCHOOL OF EDUCATION (GRADUATE)
EH	EAST HALL
FAB	FORTH AVENUE BUILDING
FBC	FIFTH AVENUE BUILDING
HGCD	HELEN GORDON CHILD DEVELOPMENT CENTER
HH	HARDER HOUSE
HOFF	GEORGE C. HOFFMANN HALL
HSB	HARRISON STREET BUILDING
KHSE	KOINONIA HOUSE
KNGA	KING ALBER BUILDING
LH	LINCOLN HALL
LIB-E	LIBRARY EAST (SMSU)
ML	BRANFORD PRICE MILLAR LIBRARY
MONT	MONTGOMERY COURT
NASC	NATIVE AMERICAN STUDENT & COMMUNITY CENTER
NH	NEUBERGER HALL
OND	ONDINE RESIDENCE
PCAT	PORTLAND CENTER FOR ADVANCED TECHNOLOGY
PKWY	PARKWAY BUILDING
PS1	PARKING 1
PS2	PARKING 2
PS3	PARKING 3
PSC	PETER W. STOTT CENTER
SB1	SCIENCE 1
SB2	SCIENCE 2
SBA	SCHOOL OF BUSINESS ADMINISTRATION
SBH	SIMON BENSON HOUSE
SEAS	SEAS ANEX (AKA CECS ANNEX)
SH	SHATTUCK HALL
SHE	STEPHEN E. EPLER HALL
SMSU	SMITH MEMORIAL STUDENT UNION
STFD	STRATFORD BUILDING
STHL	SAINT HELENS BUILDING
UCB	UNIVERSITY CENTER BUILDING
UHP	UNIVERSITY HONOR PROGRAM
UP	UNIVERSITY PLACE
URBN	URBAN CENTER
USB	UNIVERSITY SERVICES BUILDING
UTS\UNT	UNITUS BUILDING
WH	WEST HALL
WHP	WEST HEATING PLANT
XSB	SCHOOL OF EXTENDED STUDIES

NOTE: NOT ALL SYMBOLS & ABREVIATIONS USED.

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MARK	DATE	DESCRIPTION
0	07/10/12	ISSUED FOR CONSTRUCTION
		ISSUE

PORTLAND STATE UNIVERSITY
WEST HEATING PLANT
BOILER REPLACEMENT

MECHANICAL
LEGEND AND SYMBOLS

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

M0.1

SHEET 2 OF 24

UTILITY PIPING AND INSULATION SCHEDULE

SYSTEM ID	SERVICE	LOCATION	SIZE	DESIGN PRESS. PSIG	DESIGN TEMP. F	PIPE SPECIFICATIONS MAT'L	ASTM STD.	GRADE / PROC. TYPE	WALL THK.	END PREP	FITTING SPECIFICATIONS FITTING	FLANGES RATING, FACE, STD, TYPE	GASKETS	BOLT / NUT MAT'L	INSULATION TYPE UTILITY AREA	OUTSIDE / TUNNEL	INSULATION THICKNESS (IN)	INSTALL. CODE	PRESSURE TEST PROCEDURE TYPE	MEDIUM	TEST PRES.	TEST TEMP (F)	DURATION
DW CW	DOMESTIC WATER CITY WATER	UTILITY AREA	1/2" to 3"	80	50	CU	B88	L		SOLDERED	COPPER	150#, RF, ANSI	EPDM	304 SS	D	E	1	OPSC	H	WATER	120	AMB	4 HRS.
		UTILITY AREA*	2" and LESS	80	80	GALV	A53	B	SCH. 40	THREADED	THREADED	150#, RF, A105	EPDM	ZINC PLATED	D	E	3/4	OPSC	H	WATER	120	AMB	4 HRS.
		UTILITY AREA*	2 1/2" and LARGER	80	80	GALV	A53	B	SCH. 40	GROOVED	GROOVED	150#, RF, A105	EPDM	ZINC PLATED	D	E	1	OPSC	H	WATER	120	AMB	4 HRS.
PCR CR	PUMPED CONDENSATE CONDENSATE RETURN	ALL AREAS	2" and LESS	50	300	CS	A53	B	SCH. 80	PLAIN	3000# SW	150#, RF, A105	FLEXTALLIC CG	CS	B	A	1 1/2	B31.1	H	WATER	75	100	4 HRS.
		ALL AREAS	2 1/2" and LARGER	50	300	CS	A53	B	SCH. 40	BEVELED	WELDED	150#, RF, A105	FLEXTALLIC CG	CS	B	A	3	B31.1	H	WATER	75	100	4 HRS.
BF	BOILER FEED WATER	TUNNEL	2 1/2" and LARGER	50	300	CS	A53	B	SCH. 40	BEVELED	WELDED	150#, RF, A105	FLEXTALLIC CG	CS	B	A	3	B31.1	H	WATER	75	100	4 HRS.
LPS	LOW PRESSURE STEAM (10 psi) (FUTURE 125 psi SYSTEM)	ALL AREAS	2" and LESS	125	350	CS	A53	B	SCH. 40	PLAIN	3000# SW	150#, RF, A105	FLEXTALLIC CG	CS	B	A	2 1/2	B31.1	H	WATER	188	100	4 HRS.
		ALL AREAS	2 1/2" to 4"	125	350	CS	A53	B	SCH. 40	BEVEL	WELDED	150#, RF, A105	FLEXTALLIC CG	CS	B	A	3	B31.1	H	WATER	188	100	4 HRS.
		ALL AREAS	6" and LARGER	125	350	CS	A53	B	SCH. 40	BEVEL	WELDED	150#, RF, A105	FLEXTALLIC CG	CS	B	A	3.5	B31.1	H	WATER	188	100	4 HRS.
NG	NATURAL GAS	ALL AREAS	1/2" TO 1 1/2"	15	150	CS	A106	B/S	SCH 80	THREADED	THREADED	150#, RF, A105, SW	FLEXTALLIC CG	CAD/ZINC PLATED				OMSC	P	AIR	60	AMB	30 MINS.
		ALL AREAS	2" TO 6"	15	150	CS	A106	B/S	SCH 40	BEVEL	WELDED	150#, RF, A105, WN	FLEXTALLIC CG	CAD/ZINC PLATED				OMSC	P	AIR	60	AMB	30 MINS.
DRN	DRAIN	UTILITY AREA	4" and LESS	60	60	GALV.	A120	B	SCH. 40	THREADED	THREADED	150#, RF, A105	EPDM	ZINC PLATED				B31.9	H	WATER	90	AMB	4 HRS.
FOS FOR	FUEL OIL SUPPLY FUEL OIL RETURN	ALL AREAS	1/2" TO 3"	70	80	CS	A53	B	SCH 40	PLAIN	3000# SW	150#, RF, A105	FLEXTALLIC CG	304 SS				B31.1	P	AIR	105	AMB	4 HRS.

NOTE:
* = WHERE INDICATED
** = ABI (ADDITIVE BID ITEM)
*** = NO PIPING INSULATION REQ'D
**** = HEAT TRACE WHERE INDICATED

ABBREVIATION:
BW – BUTT WELD
CS – CARBON STEEL
ERW – ELECTRIC RESIST. WELDED
FF – FLAT FACE
GALV – GALVANIZED STEEL
GRV – GROOVED
H – HYDRAULIC
CU – COPPER
OMSC – OREGON MECH SPECIALTY CODE
P – PNEUMATIC
PTFE– TEFLON
RF – RAISED FACE
S – SEAMLESS
SCH– STAND. PIPE SCHED.
SCR – SCREWED
SO – SLIP ON
SS – STAINLESS STEEL
SW – SOCKET WELD
THD – THREADED
WI – WHERE INDICATED
WN – WELD NECK
U/G – UNDERGROUND

INSULATIONS:
A = GLASS FIBER / ALUMINUM JACKET (CAL–SIL INSERTS AT SUPPORTS)
B = GLASS FIBER / ALUMINUM CLAD JACKET (CAL–SIL INSERTS AT SUPPORTS)
C* = GLASS FIBER / SS JACKET (CAL–SIL INSERTS AT SUPPORTS)
D = CLOSED CELL / PVC JACKET (HIGH DENSITY CLOSED CELL AT SUPPORTS), (BLUE JACKET COLOR FOR CHILLED WATER)
E = CLOSED CELL / ALUMINUM JACKET (HIGH DENSITY CLOSED CELL AT SUPPORTS) ****
G = CLOSED CELL / PVC JACKET & HEAT TRACED (HIGH DENSITY CLOSED CELL AT SUPPORTS)
H = INORGANIC GRANULAR INSULATION (GILSULATE 500xr)

VALVE SPECIFICATION SCHEDULE

SYSTEM ID	SERVICE	VALVE ID	TYPE	SIZE	VALVE MAX. PRESS. (PSIG)	VALVE OP. TEMP. (F)	MATERIAL OF CONSTRUCTION BODY	TRIM	BALL / DISC	SEATS	PACKG.	TYPE OF CONSTRUCTION BODY / CLASS	CONNECTION	OPERATOR	MANUFACTURER	MODEL NO.	ALTERNATE MANUFACTURER / MODEL NO.	ALTERNATE MANUFACTURER / MODEL NO.	COMMENTS
		B2	BALL, 3–PC	1/4" – 3"	150 SAT	390	BRONZE	SS	SS	RPTFE	RPTFE	150#	THD	LEVER	APOLLO	82–140	FNW		
CW DW	CITY WATER DOMESTIC WATER	RPBA–1	RED. PRESS BACKF	3" & 6"	175	140	DI	SS		EPDM	BUNA–N	150#	FLG		WILKINS	375A	FEBCO		With Approval from Local Jurisdiction
		RPBA–2	RED. PRESS BACKF	2"	175	180	BRONZE	SS		SILICON	NORYL	150#	THD		WILKINS	975XL	FEBCO		With Approval from Local Jurisdiction
		S1	STRAINER	1/2" – 2"	200	150	BRONZE	SS				125#	THD		MUELLER	351M			
		PRV–01	PRESS. RED.	3/4"	300	180	BRONZE	BR/SS					THD		CONBRACO	36–100			
		B2	BALL, 3–PC	1/4" – 3"	150 SAT	390	BRONZE	SS	SS	RPTFE	RPTFE	150#	THD	LEVER	APOLLO	82–140			
PCR	PUMPED CONDENSATE	C2	SWING CHECK	2" – 12"	190	200	CI	BRONZE	BRONZE CMP	CI		125#	FLG	SWING	CRANE	373			
CR	CONDENSATE RETURN	C4	SPRING CHECK	1/2" – 2"	200	210	CI	SS	SS				THD	SS SPRING	MUELLER	303			
BF	BOILER FEED WATER	G2	GATE	2" – 24"	150	150	CS	SS	HF	SS	GRAPHITE	150#	FLG	OS & Y	CRANE	47			
		B2	BALL, 3–PC	1/4" – 3"	150 SAT	390	BRONZE	SS	SS	RPTFE	RPTFE	150#	THD	LEVER	APOLLO	82–140			
LPS	LOW PRESSURE STEAM (10 psi)	G2	GATE	2" – 24"	150	150	CS	SS	HF	SS	GRAPHITE	150#	FLG	OS & Y	CRANE	47			
	(FUTURE 125 psi SYSTEM)	S2	STRAINER	2" – 12"	150	560	CS	304SS				150#	FLG		MUELLER	781			Provide blow off valve
		F4	BUTTERFLY	3"–16"	250	400	CS	SS	CS/SS	SS	GRAPHITE	150#	FLG	LEVER	ZWICK	SERIES TRI–CON			Gear operated for 4" and larger
NG	NATURAL GAS	PL2	PLUG	1" – 6"	150	120	SEMI–STL					125#	FLG	WRENCH	HOMESTEAD	622	NORDSTRON		Lubricated Plug, UL Listed
FOS FOR	FUEL OIL SUPPLY FUEL OIL RETURN	B3	BALL, 3–PC	1/2"–2"	600	300	CS	SS	SS	TFE	GRAPHITE		SW	LEVER	FLOWSERVE	WORCESTER FZ44			With lockable handle.

MECHANICAL GENERAL NOTES:

1. THE FOLLOWING NOTES APPLY TO ALL MECHANICAL DRAWINGS. ADDITIONAL GENERAL NOTES AND KEYED NOTES ARE PROVIDED ON INDIVIDUAL DRAWINGS.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF THE PHASING AND INSTALLATION OF ALL MECHANICAL WORK WITH THE WORK OF ALL OTHER TRADES. THE CONTRACTOR SHALL BEAR THE TOTAL EXPENSE FOR ANY ADDITIONAL WORK WHICH MAY BE CAUSED BY THE IMPROPER SEQUENCING OF CONSTRUCTION ACTIVITIES.
3. THE DRAWINGS, P&ID, PLAN VIEWS, AND SPECIFICATIONS ARE COMPLEMENTARY. WHAT IS CALLED FOR IN ONE SHALL BE CALLED FOR IN BOTH.
4. CONTRACTOR SHALL INCLUDE ALL INCIDENTAL ITEMS AND WORK NOT SPECIFICALLY SHOWN OR SPECIFIED BUT REQUIRED BY GOOD PRACTICE IN A COMPLETE SYSTEM.
5. THE DRAWINGS ARE DIAGRAMMATIC AND EQUIPMENT HOOK–UP IS BASED ON ONE MANUFACTURER'S EQUIPMENT. THEY SHOULD BE FOLLOWED AS CLOSELY AS POSSIBLE, YET ARE NOT INTENDED TO SHOW EVERY ITEM IN ITS EXACT LOCATION OR ALL THE DETAILS OF THE EQUIPMENT. WHERE REQUIRED BY JOB–SITE CONDITIONS, RELOCATE AND PROVIDE FITTINGS, SUPPORTS, ETC. AS REQUIRED. EXISTING EQUIPMENT AND PIPING SIZES, LOCATIONS AND DIMENSIONS SHALL BE VERIFIED IN THE FIELD PRIOR TO DEMOLITION AND CONSTRUCTION. NOTIFY THE ENGINEER IMMEDIATELY OF ALL DISCREPANCIES AFFECTING THE REMOVAL OF EXISTING EQUIPMENT AND PIPING AND THE INSTALLATION OF NEW EQUIPMENT AND PIPING. ANY DEVIATIONS FROM THE DRAWINGS SHALL BE INCLUDED IN SHOP DRAWINGS APPROVED BY THE OWNER'S REPRESENTATIVE.
6. TO ENHANCE CLARITY OF DRAWINGS AND WHERE NOT NECESSARY TO DESCRIBE THE REQUIRED PIPE SIZES, INDIVIDUAL SEGMENTS OF PIPE BETWEEN CONNECTIONS ARE NOT NECESSARILY SIZED ON PLANS. PIPE SEGMENTS ARE SHOWN ON PLANS WITHOUT A SIZE INDICATED SHALL BE THE SAME SIZE AS THE NEXT UPSTREAM SEGMENT WITH A SIZE INDICATED.
7. COORDINATE ALL MECHANICAL PENETRATIONS, EMBEDS, AND ASSOCIATED END CONNECTORS WITH STRUCTURAL DRAWINGS. NO PENETRATIONS WILL BE ALLOWED THROUGH STRUCTURAL ELEMENTS UNLESS INDICATED ON STRUCTURAL DRAWINGS OR AS APPROVED BY THE STRUCTURAL ENGINEERS. DO NOT CORE DRILL OR DRILL THROUGH BEAMS, COLUMNS, FLOORS, CEILINGS, OR WALLS, UNLESS INDICATED ON STRUCTURAL DRAWINGS OR AS APPROVED BY THE STRUCTURAL ENGINEER. OBTAIN APPROVAL FROM STRUCTURAL ENGINEER FOR ALL MECHANICAL PENETRATIONS. X–RAY REQUIRED PRIOR TO ALL STRUCTURAL CORES.
8. COORDINATE LOCATIONS OF MECHANICAL EQUIPMENT AND PIPING TO PROVIDE ADEQUATE CLEARANCE FOR REMOVAL AND SERVICE ACCESS NECESSARY FOR ALL EQUIPMENT PREVENTATIVE MAINTENANCE AND REPAIR. COORDINATE SERVICE ACCESS FOR EQUIPMENT PROVIDED BY ALL OTHER TRADES, INCLUDING BUT NOT LIMITED TO ELECTRICAL EQUIPMENT, PLUMBING, FIRE PROTECTION, AND LIGHTING.
9. PROVIDE SUPPORTS AND SEISMIC RESTRAINTS FOR ALL PIPES AND RELATED EQUIPMENT THAT ARE SPECIFIED AND SHOWN ON THE DRAWINGS. PROVIDE ALL REQUIRED SUPPLEMENTARY STRUCTURAL STEEL, SUPPORTS, ATTACHMENTS, AND ANCHORAGES. PROVIDE ANCHOR BOLTS OF SIZE, TYPE, AND LENGTH AS REQUIRED TO SATISFY THE EQUIPMENT MANUFACTURER'S RECOMMENDATIONS, SPECIFICATION REQUIREMENTS, AND REQUIREMENTS WHICH MAY BE INDICATED ON THE CONTRACT DRAWINGS. SEE STRUCTURAL DRAWINGS AND SPECS FOR ADDITIONAL REQUIREMENTS.
10. PROVIDE PLUGGED DRAINS IN ALL PIPING LOW POINTS, AND MANUAL OR AUTOMATIC AIR VENTS AT ALL HIGH POINTS IN PIPING. IN GENERAL, THESE DEVICES ARE NOT INDICATED ON MECHANICAL OR PLUMBING DRAWINGS. NO AUTOMATIC AIR VENTS AT HIGH POINTS FOR STEAM SYSTEM.
11. PROVIDE ALL PIPE SLEEVES AND PENETRATION SEALS AS REQUIRED FOR THE INSTALLATION OF ALL PLUMBING AND PIPING ITEMS DESCRIBED WITHIN THE CONTRACT DOCUMENTS. SEE DRAWING DETAILS AND SPECIFICATIONS.
12. PROVIDE PLUG, CAP OR BLIND FLANGES ON OPEN ENDS OF VALVES, PIPES AND FITTINGS.
13. ALL PIPE SUPPORTS, PIPE SHOES, HANGERS, AND ASSOCIATED METAL WORK IN THE UTILITY AREA, OUTDOORS, UTILITY TUNNELS, AND WET AREAS SHALL BE ALL HOT DIP GALVANIZED OR STAINLESS STEEL.
14. INSULATION IS SOMETIMES NOT SHOWN ON THE DRAWINGS. INSULATION SHALL BE PROVIDED IN ACCORDANCE WITH THE SPECIFICATIONS AND SCHEDULES, EXCEPT WHERE INDICATED FOR A MORE STRINGENT REQUIREMENT.
15. DURING CONSTRUCTION, BUILDING UTILITIES WILL REMAIN OPERATIONAL. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING TEMPORARY UTILITIES, CONNECTIONS TO EXISTING SERVICE UTILITIES AND COORDINATION OF SHUTDOWNS WITH THE OWNER. SEE SPEC 01500.
16. PROTECT ALL EXISTING EQUIPMENT THAT IS TO REMAIN. REPAIR AND/OR REPLACE ALL EXISTING UTILITIES, STRUCTURAL ELEMENTS, EQUIPMENT, PIPING, CONDUIT, DUCTWORK, ETC. THAT IS DAMAGED OR BECOMES INOPERABLE AS A RESULT OF THIS WORK. COORDINATE MODIFICATIONS TO EXISTING SYSTEMS WITH OWNER TO MINIMIZE SHUTDOWN TIME OF BUILDING SYSTEMS.

DESIGN BASIS FOR MECH EQUIPMENT AND PIPE SUPPORTS

1. CONTRACTOR SHALL PROVIDED MECHANICAL EQUIPMENT AND PIPE SUPPORTS IN ACCORDANCE WITH THE 2010 OREGON STRUCTURAL SPECIALTY CODE THAT INCLUDES THE ICC 2006 INTERNATIONAL BUILDING CODE "IBC 2009" AND THE AMERICAN SOCIETY OF CIVIL ENGINEERS SEI/ASCE 7–05 "MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES"
2. SUPPORTS SHALL BE DESIGNED FOR SEISMIC LOADS BASED ON THE FOLLOWING PARAMETERS:

   BUILDING CATEGORY = III
   SITE CLASS = D
   MAX. 0.2 SEC. SPECTRAL RESPONSE ACCELERATION, SS = 1.0g
   MAX. 1.0 SEC. SPECTRAL RESPONSE ACCELERATION, S1 = 0.4g
3. SUPPORTS SHALL BE DESIGNED FOR THEIR SELF WEIGHT PLUS THE WEIGHT OF ALL PIPING AND EQUIPMENT TO BE SUPPORTED AND AN ADDITIONAL COLLATERAL DEAD LOAD OF 10% OF THE WEIGHT OF PIPING AND EQUIPMENT TO BE SUPPORTED.
4. SUPPORTS SHALL BE DESIGNED FOR ALL THRUST FORCES PRODUCED BY PIPING AND EQUIPMENT. THRUST FORCES SHALL BE AS REQUIRED BY MECHANICAL DRAWINGS AND SPECIFICATIONS.
5. SUPPORTS SHALL BE DESIGNED TO ALLOW EXPANSION OF ALL PIPES AND EQUIPMENT AS REQUIRED BY MECHANICAL DRAWINGS AND SPECIFICATIONS.
6. THE CONTRACTOR SHALL PROVIDE STEEL PIPE SUPPORT MEMBERS AND ANCHORAGES DESIGNED IN ACCORDANCE WITH THE 2007 OREGON STRUCTURAL SPECIALTY CODE AND SHALL INCLUDE THE FOLLOWING PARAMETERS:

   A. FRAMING SYSTEMS SHALL BE DESIGNED AND DETAILED TO RESIST GRAVITY AND LATERAL LOADS AS REQUIRED BY CODE AND AS REQUIRED ON THE DRAWINGS AND IN THE SPECIFICATIONS.

   B. TOTAL LOAD DEFLECTIONS SHALL BE LIMITED TO 1 / 600 OF THE SPAN.

SUBMITTALS FOR MECH EQUIPMENT AND PIPE SUPPORTS

1. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ALL MECHANICAL EQUIPMENT AND PIPING SUPPORTS THAT INDICATE SYSTEM LAYOUT WITH LOCATION INCLUDING CRITICAL DIMENSIONS, SIZES, AND PIPE HANGER AND SUPPORT LOCATIONS AND DETAILS OF TRAPEZE HANGERS.
2. CONTRACTOR SHALL SUBMIT MANUFACTURERS CATALOG DATA INCLUDING LOAD CAPACITY FOR ALL HANGERS, SUPPORTS AND ACCESSORIES.
3. CONTRACTOR SHALL SUBMIT DESIGN DRAWINGS AND CALCULATIONS PREPARED BY AN OREGON REGISTERED STRUCTURAL ENGINEER FOR ALL SUPPORTS AND CONNECTIONS FOR ALL MECHANICAL EQUIPMENT AND PIPING SUPPORTS. THESE DRAWINGS AND CALCULATIONS WILL CONSTITUTE A DEFERRED SUBMITTAL TO THE BUILDING DEPARTMENT. THE SUBMITTAL MUST BE REVIEWED BY THE UNIVERSITY'S STRUCTURAL ENGINEER PRIOR TO SUBMISSION TO THE BUILDING DEPARTMENT. PIPE AND EQUIPMENT SUPPORT DESIGNER SHALL RESPOND TO ALL COMMENTS FROM THE BUILDING DEPARTMENT AND UNIVERSITY REPRESENTATIVE AND MAKE REVISIONS AS REQUIRED BY BUILDING DEPARTMENT AND UNIVERSITY REPRESENTATIVE. CONTRACTOR SHALL BUILD TIME FOR MULTIPLE BUILDING DEPARTMENT AND UNIVERSITY REVIEWS INTO THEIR CONSTRUCTION SCHEDULE.
4. CONTRACTOR TO SUBMIT A SCHEDULE OF SPECIAL INSPECTIONS REQUIRED FOR ALL MECHANICAL EQUIPMENT AND PIPING SUPPORTS. SCHEDULE OF SPECIAL INSPECTIONS SHALL BE PREPARED BY THE STRUCTURAL ENGINEER OF RECORD FOR THE DEFERRED SUBMITTAL.

SPECIAL INSPECTIONS AND STRUCTURAL OBSERVATION FOR MECHANICAL EQUIPMENT AND PIPE SUPPORTS

1. CONTRACTOR SHALL BE REQUIRED TO COORDINATE AND EXECUTE ALL REQUIRED SPECIAL INSPECTIONS AT CONTRACTOR'S EXPENSE.
2. PERIODIC STRUCTURAL OBSERVATION SHALL BE REQUIRED FOR ALL PIPING AND MECHANICAL SUPPORTS. CONTRACTOR SHALL BE REQUIRED TO COORDINATE AND EXECUTE STRUCTURAL OBSERVATION BY THE STRUCTURAL ENGINEER OF RECORD FOR DEFERRED SUBMITTAL AT CONTRACTOR'S EXPENSE.

DEFERRED SUBMITTALS

1. THE DESIGN OF THE MECHANICAL EQUIPMENT AND PIPE SUPPORTS WILL CONSTITUTE A DEFERRED SUBMITTAL PER 2007 OREGON STRUCTURAL SPECIALTY CODE SECTION 106.3.4.2. OTHER DEFERRED SUBMITTALS TO BE MINIMIZED OR ELIMINATED.

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PROFESSIONAL ENGINEER — 12/31/12

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MARK	DATE	DESCRIPTION
0	07/10/12	ISSUED FOR CONSTRUCTION

ISSUE

PORTLAND STATE UNIVERSITY
WEST HEATING PLANT
BOILER REPLACEMENT

PIPING, INSULATION AND VALVE SCHEDULE

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

M0.4

SHEET 3 OF 24

Plot Date: 10 July 2012 - 10:47 AM Plotted By: Matthew Carmichael Cad File No: G:\10909 - PSU (Portland State University)\10909-12002 PSU WHP Boiler Replacement\06-CAD\Sheets\10909-12002_03_M0_4 Pipe-Valve Schedule.dwg

DEAERATOR

EQUIPMENT NUMBER	WHP-DA-01
STATUS	NEW
LOCATION	WHP
REF. DWG	M32
SYSTEM SERVED	CR
	(STEAM CONDENSATE)
UNIT CONFIGURATION	
MANUFACTURER	CLEAVER BROOKS
TYPE	HORIZONTAL
MODEL	SSP-70
STORAGE CAPACITY	1,400 GAL.
TOTAL LOAD CAPACITY	70,000 LBS/HR
OXYGEN LEVEL	0.005 cc/liter
TANK SIZE (DIA X LENGTH)	72" X 123"
DESIGN PRESSURE	50 PSIG
OPERATING PRESSURE	5 PSIG
MAKEUP WATER FLOW RATE	110 GPM
STORAGE TIME	13 MINUTES
ELECTRICAL	460 V/ 60 HZ/ 3 P
FEED WATER PUMPS	
TOTAL # OF PUMPS	3
PUMP MOTOR	7.5 HP
PUMP FLOW RATE	86 GPM
DISCHARGE PRESSURE	97 ' TDH
APPROX. PACKAGED WEIGHT	
(TOTAL FLOODED WEIGHT)	17,100 LBS.
REMARKS	1,2

REMARKS

1 SEE SPEC 23 53 00 - HEATING BOILER FEEDWATER EQUIPMENT
2 COMPLIANCE WITH ASME SECTION VIII / NATIONAL BOARD.
3

BOILER SCHEDULE

EQUIPMENT NUMBER	WHP-BL-01	WHP-BL-02	WHP-BL-03
STATUS	NEW	EXISTING	NEW
LOCATION	WHP	WHP	WHP
REF. DWG	M32	M32	M32
SYSTEM SERVED	LPS (STEAM)	LPS (STEAM)	LPS (STEAM)
UNIT CONFIGURATION			
MANUFACTURER	CLEAVER BROOKS	KEWANEE	CLEAVER BROOKS
BOILER TYPE	FIRE-TUBE	FIRE-TUBE	FIRE-TUBE
MODEL	CBLE 200-300-150s	L3S-600-G05	CBLE 200-600-150s
OUTPUT- BOILER HP	300 HP	600 HP	600 HP
STEAM OUTPUT	10,350 #/hr F&A 212F		20,700 #/hr F&A 212F
GROSS OUTPUT	10,043 MBH		20,085 MBH
DESIGN PRESSURE (CURRENT)	15 PSIG	15 PSIG	15 PSIG
DESIGN PRESSURE (FUTURE)	150 PSIG		150 PSIG
OPERATING PRESSURE	10 PSIG	10 PSIG	10 PSIG
FUEL TYPE	NAT. GAS / DIESEL	NAT. GAS / DIESEL	NAT. GAS / DIESEL
ELECTRICAL	460 V/ 60 HZ/ 3 P	460 V/ 60 HZ/ 3 P	460 V/ 60 HZ/ 3 P
FAN MOTOR	10 HP		25 HP
AIR COMP. MOTOR	5 HP		7.5 HP
OIL PUMP MOTOR	3/4 HP		3/4 HP
ECONOMIZER	YES	NONE	YES
APPROX. WEIGHT	25,200 LBS.		45,025 LBS
REMARKS	1,2,3	4	1,2,3

REMARKS

1 SEE SPEC 23 52 39 - FIRE TUBE BOILERS
2 PROVIDE HIGH-HIGH LEVEL FEEDWATER DUMP.
3 UPGRADED SINGLE FUEL PUMP FOR EACH NEW BOILERS.
4 UPGRADED WITH BURNER CONTROL CONVERSION KIT TO BE COMPATABLE WITH MASTER 3-BOILER SEQUENCER PANEL.

DIRT SEPARATOR

EQUIPMENT NUMBER	WHP-DS-01
STATUS	NEW
LOCATION	WHP
REF. DWG	M32
SYSTEM SERVED	CR
	(STEAM CONDENSATE)
UNIT CONFIGURATION	
MANUFACTURER	SPIROTHERM
TYPE	SPIROTRAP
MODEL	TQN500FA-SE
REC. FLOW	260 GPM
SHELL MATERIAL	STEEL
COALESCING MEDIUM (SCREEN)	STAINLESS STEEL
MAX. WORKING PRESSURE	150 PSIG
MAX OPERATING TEMP.	270 F
PIPE SIZE CONN.	5" FLANGE
APPROX. WEIGHT	302 LBS
REMARKS	1

REMARKS

1 SEE SPEC 23 22 16 - STEAM AND CONDENSATE PIPING SPECIALTIES
2 PROVIDE AUTOMATIC/TIMER BLOWDOWN DRAIN VALVE.
3

CONDENSATE RETURN PUMP STATION

EQUIPMENT NUMBER	CH-CP-02
STATUS	NEW
REF. DWG	M30
SERVICE / LOCATION	CR
FLUID	CONDENSATE
CONFIGURATION	
CAPACITY EDR (SQ.FT)	100,000 EDR
FLOW (GPM)	75 GPM
HEAD (FT)	138' TDH
MAX. TEMP.	250 F
NUMBER OF PUMPS	2
RECEIVER SHELL MATERIAL	CARBON STEEL
RECEIVER CAPACITY (2 TANKS)	225 GAL.
ELECTRICAL	460 V/ 60 HZ/ 3 P
PUMP MOTOR	5 HP (VERIFY)
VFD	NO
STANDARD OF ACCEPTANCE	
MANUFACTURER	BFS INDUSTRIES
MODEL	CUSTOM MODEL # G10.35BX-3D
REMARKS	1, 2, 3

REMARKS

1 SEE SPEC. 23 22 23
2 CONDENSATE RETURN PUMP SHALL BE PACKAGED UNIT INCLUDING FACTORY CONTROL PANEL WITH NEMA 4 ENCLOSURE, LEVEL SWITCHES. COMPLETE UNIT SHALL BE FACTORY ASSEMBLED AND TESTED.
3 UNIT TO BE DISASSEMBLED TO GO THROUGH 3'-0" X 6'-8" DOOR OPENING TO CRAMER HALL BASEMENT.

TRAP SCHEDULE

EQUIPMENT NUMBER	T1	T2
STATUS	NEW	NEW
REF. DWG	M32	M32
SERVICE / LOCATION	STEAM DRIP LEGS	STEAM DRIP LEGS
FLUID	CONDENSATE	CONDENSATE
CONFIGURATION		
TYPE	FLOAT & THERMOSTATIC	FLOAT & THERMOSTATIC
CAPACITY (LB / HR)	1,875 #/HR	2,300 #/HR
DIFFERENTIAL PRESSURE	10 PSIG	10 PSIG
PIPE CONNECTION	3/4"	1 1/4"
MATERIAL & ACCESS.	CAST IRON BODY	CAST IRON BODY
	STAINLESS STEEL TRIMS	STAINLESS STEEL TRIMS
STANDARD OF ACCEPTANCE		
MANUFACTURER	MEPCO	MEPCO
MODEL	SERIES 44	SERIES 44
REMARKS	1, 2, 3	1, 2, 3

REMARKS

1 PROVIDE BALL VALVE FOR BLOWDOWN.
2 PROVIDE FLEXIBILITY FOR PIPING.
3 ROUTE DRAIN INTO GRAVITY OR ATM. CONDENSATE RETURN LINE.

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ISSUE	DESCRIPTION	DATE	MARK
	ISSUED FOR CONSTRUCTION	07/10/12	0

PORTLAND STATE UNIVERSITY
WEST HEATING PLANT
BOILER REPLACEMENT

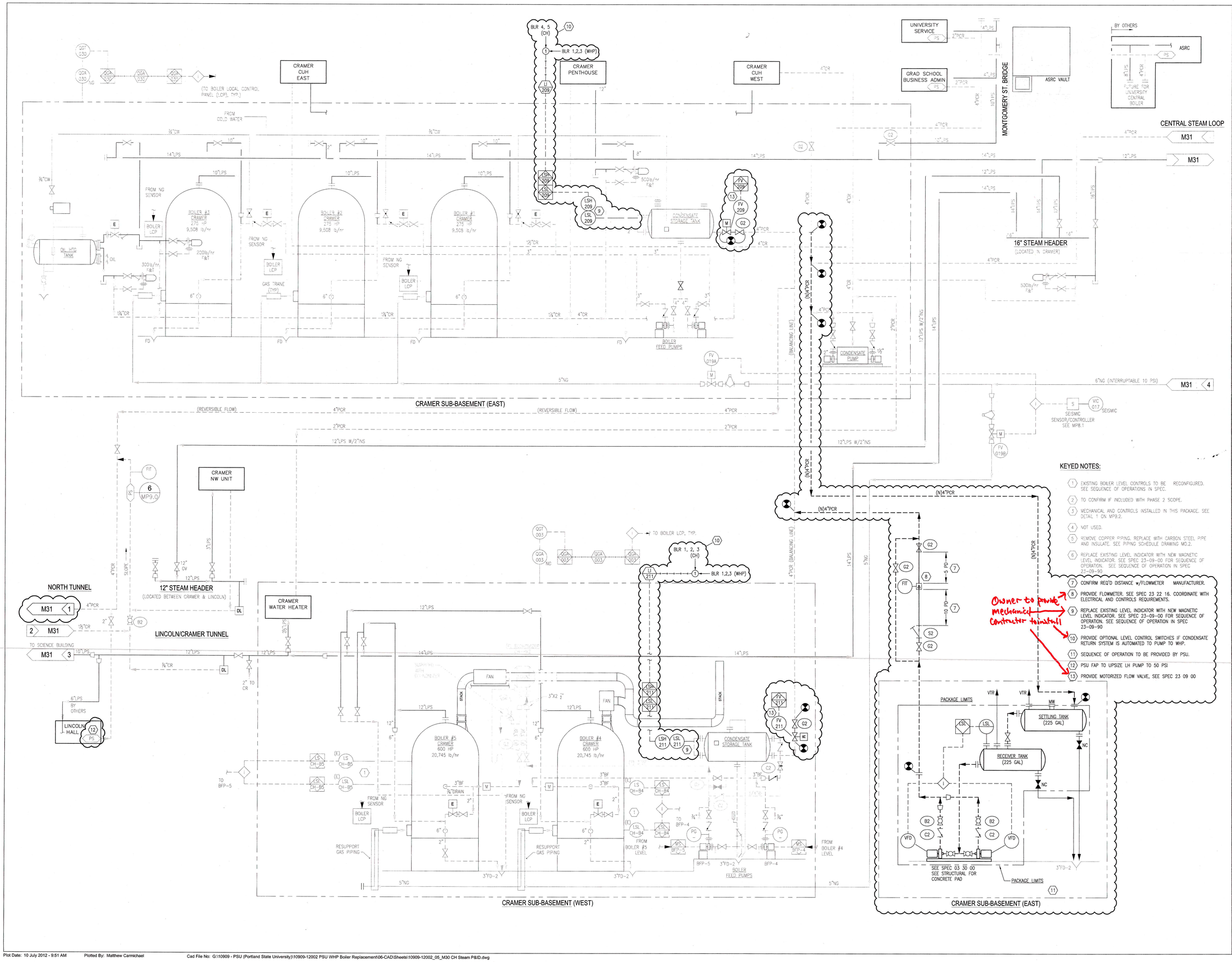
MECHANICAL
EQUIPMENT SCHEDULES

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

M0.6

SHEET 4 OF 24

Plot Date: 10 July 2012 - 9:45 AM Plotted By: Matthew Carmichael
Cad File No: G:\10909 - PSU (Portland State University)\10909-12002 PSU WHP Boiler Replacement\06-CAD\Sheets\10909-12002_04_M0_6 Equipment Schedule.dwg



KEYED NOTES:

1. EXISTING BOILER LEVEL CONTROLS TO BE RECONFIGURED. SEE SEQUENCE OF OPERATIONS IN SPEC.
2. TO CONFIRM IF INCLUDED WITH PHASE 2 SCOPE.
3. MECHANICAL AND CONTROLS INSTALLED IN THIS PACKAGE. SEE DETAIL 1 ON MP9.2.
4. NOT USED.
5. REMOVE COPPER PIPING. REPLACE WITH CARBON STEEL PIPE AND INSULATE. SEE PIPING SCHEDULE DRAWING MO.2.
6. REPLACE EXISTING LEVEL INDICATOR WITH NEW MAGNETIC LEVEL INDICATOR. SEE SPEC 23-09-00 FOR SEQUENCE OF OPERATION. SEE SEQUENCE OF OPERATION IN SPEC 23-09-90
7. CONFIRM REQ'D DISTANCE w/FLOWMETER MANUFACTURER.
8. PROVIDE FLOWMETER. SEE SPEC 23 22 16. COORDINATE WITH ELECTRICAL AND CONTROLS REQUIREMENTS.
9. REPLACE EXISTING LEVEL INDICATOR WITH NEW MAGNETIC LEVEL INDICATOR. SEE SPEC 23-09-00 FOR SEQUENCE OF OPERATION. SEE SEQUENCE OF OPERATION IN SPEC 23-09-90
10. PROVIDE OPTIONAL LEVEL CONTROL SWITCHES IF CONDENSATE RETURN SYSTEM IS AUTOMATED TO PUMP TO WHP.
11. SEQUENCE OF OPERATION TO BE PROVIDED BY PSU.
12. PSU FAP TO UPSIZE LH PUMP TO 50 PSI
13. PROVIDE MOTORIZED FLOW VALVE, SEE SPEC 23 09 00

Owner to provide mechanical contractor to install

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REGISTERED PROFESSIONAL ENGINEER 83398PE OREGON AUG 22, 1978 RICHARD B. FITZGERALD 12/31/2013

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ISSUE

PORTLAND STATE UNIVERSITY WEST HEATING PLANT BOILER REPLACEMENT

CRAMER HALL HEATING PLANT STEAM P&ID

PROJ NO: 10909-12002

DRWN: MTC CHKD: GCY

M30

SHEET 5 OF 24

Plot Date: 10 July 2012 - 9:51 AM Plotted By: Matthew Carmichael Cad File No: G:\10909 - PSU (Portland State University)\10909-12002 PSU WHP Boiler Replacement\06-CAD\Sheets\10909-12002_05_M30 CH Steam P&ID.dwg

CRAMER CUH EAST

CRAMER PENTHOUSE

CRAMER CUH WEST

UNIVERSITY SERVICE

GRAD SCHOOL BUSINESS ADMIN

MONTGOMERY ST. BRIDGE

ASRC VAULT

BY OTHERS

ASRC

FUTURE FOR UNIVERSITY CENTRAL BOILER

CENTRAL STEAM LOOP

M31

M31

FROM COLD WATER

¾"CW

(TO BOILER LOCAL CONTROL PANEL (LCP), TYP.)

FROM NG SENSOR

BOILER LCP

BOILER #3 CRAMER 275 HP 9,508 lb/hr

BOILER #2 CRAMER 275 HP 9,508 lb/hr

BOILER #1 CRAMER 275 HP 9,508 lb/hr

200lb/hr F&T

300lb/hr F&T

500lb/hr F&T

OIL HTG TANK

OIL

GAS TRANE (TYP)

CONDENSATE STORAGE TANK

DEMO SECTION OF 4"PCR LINE

DEMO SECTION OF 4"PCR LINE

16" STEAM HEADER

(LOCATED IN CRAMER)

CRAMER SUB-BASEMENT (EAST)

BOILER FEED PUMPS

CONDENSATE PUMP

(BALANCING LINE)

FV 019A

FV 019B

SEISMIC SENSOR/CONTROLLER SEE MP8.1

SEISMIC

6"NG (INTERRUPTABLE 10 PSI)

M31 4

5"NG

(REVERSIBLE FLOW)

4"PCR

2"PCR

12"LPS W/2"INS

CRAMER NW UNIT

6 MP9.0

3"LPS

12" GV

12"LPS

12" STEAM HEADER

(LOCATED BETWEEN CRAMER & LINCOLN)

NORTH TUNNEL

1 M31 4"PCR

2 M31 1½"CR

LINCOLN/CRAMER TUNNEL

TO SCIENCE BUILDING M31 3

10"LPS

¾"CR

2" TO CR

6"LPS BY OTHERS

LINCOLN HALL

PSU FAP TO UPSIZE LH PUMP TO 50 PSI

CRAMER WATER HEATER

12"LPS

14"LPS

10"LPS

8"LPS

6"LPS

4"LPS

2"LPS

BOILER #5 CRAMER 600 HP 20,745 lb/hr

BOILER #4 CRAMER 600 HP 20,745 lb/hr

FAN

STACK

3"X2 ½"

3"BF

¾"DRAIN

3"FD-2

BOILER FEED PUMPS

RESUPPORT GAS PIPING

FROM BOILER #5 LEVEL

FROM BOILER #4 LEVEL

TO BFP-4

TO BFP-5

BFP-5

BFP-4

TO BOILER LCP, TYP.

CRAMER SUB-BASEMENT (WEST)

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MARK	DATE	DESCRIPTION
0	07/10/12	ISSUED FOR CONSTRUCTION

ISSUE

PORTLAND STATE UNIVERSITY
WEST HEATING PLANT
BOILER REPLACEMENT

CRAMER HALL HEATING PLANT
STEAM P&ID DEMO

PROJ NO: 10909-12002

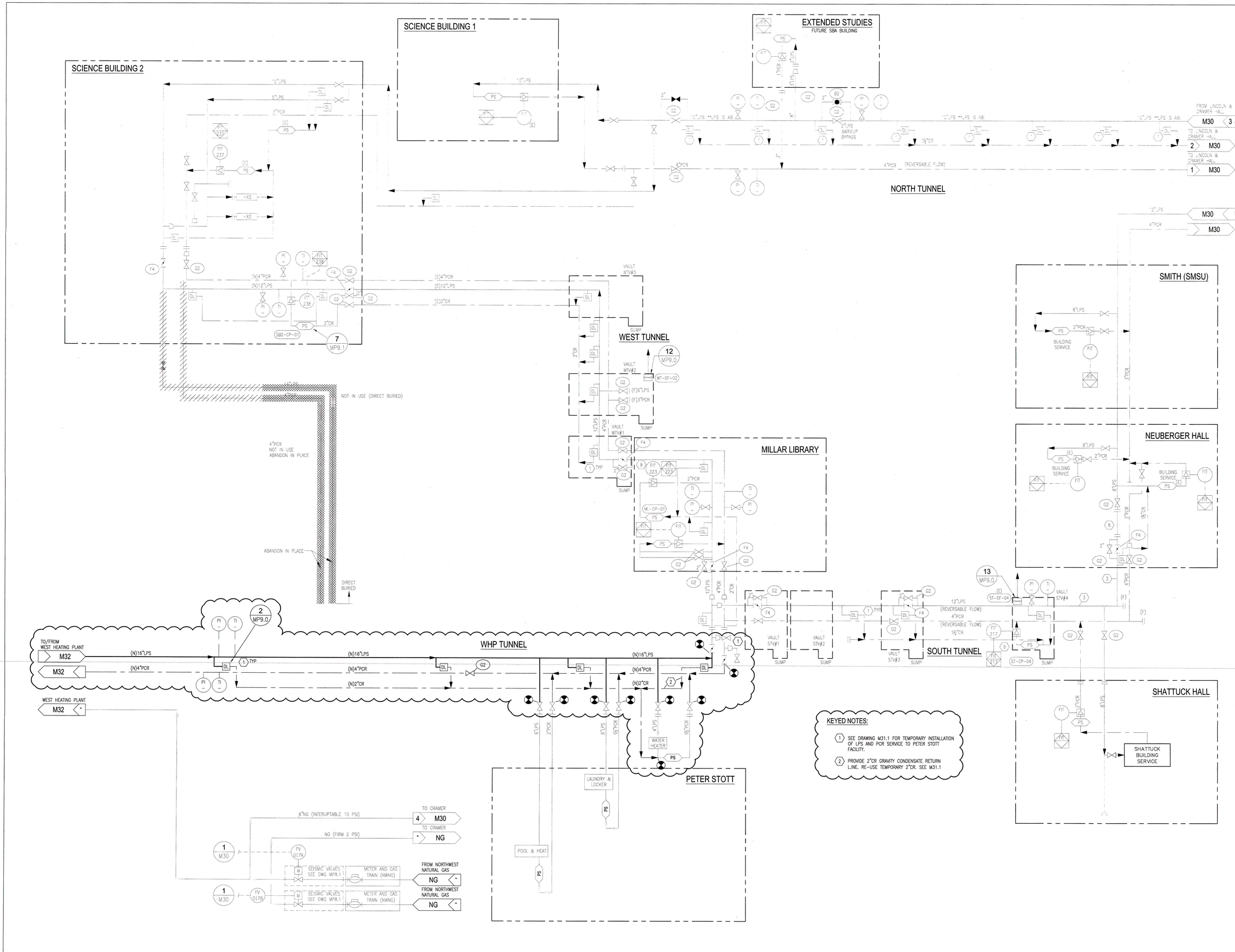
DRWN: MTC CHKD: GCY

M30.1

SHEET 6 OF 24

Plot Date: 9 July 2012 - 2:46 PM Plotted By: Matthew Carmichael

Cad File No: G:\10909 - PSU (Portland State University)\10909-12002 PSU WHP Boiler Replacement\06-CAD\Sheets\10909-12002_06_M30.1 CH Steam P&ID Demo.dwg



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REGISTERED PROFESSIONAL ENGINEER 8539PE OREGON AUG. 22, 1815 RICHARD S. FITZGERALD

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PORTLAND STATE UNIVERSITY
WEST HEATING PLANT
BOILER REPLACEMENT

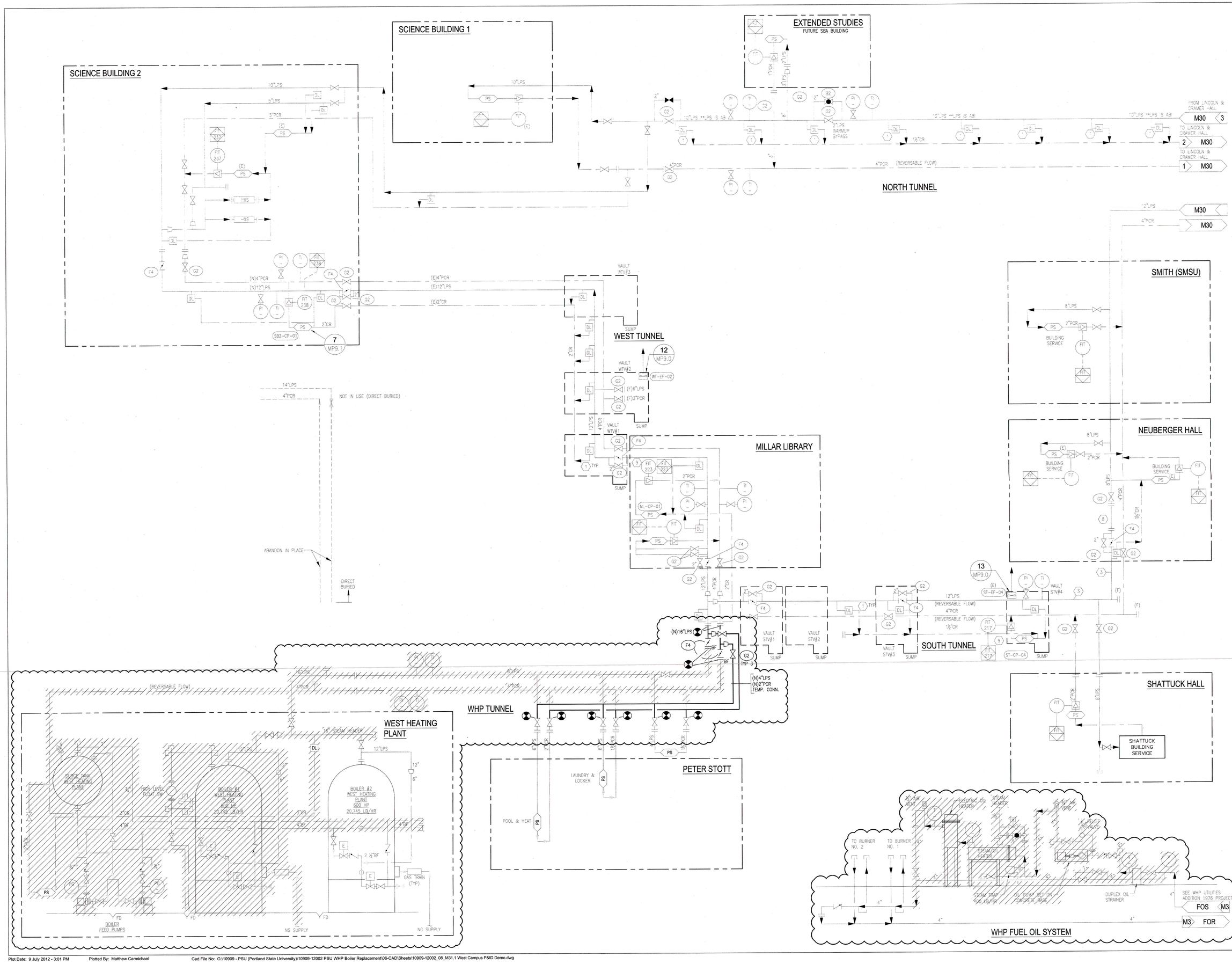
WEST CAMPUS
STEAM P&ID

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

M31

SHEET 07 OF 24

Plot Date: 9 July 2012 - 2:59 PM Plotted By: Matthew Carmichael Cad File No: G:\10909 - PSU (Portland State University)\10909-12002 PSU WHP Boiler Replacement\06-CAD\Sheets\10909-12002_07_M31 West Campus P&ID.dwg



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EXPIRES: 12/31/2013

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PORTLAND STATE UNIVERSITY
WEST HEATING PLANT
BOILER REPLACEMENT

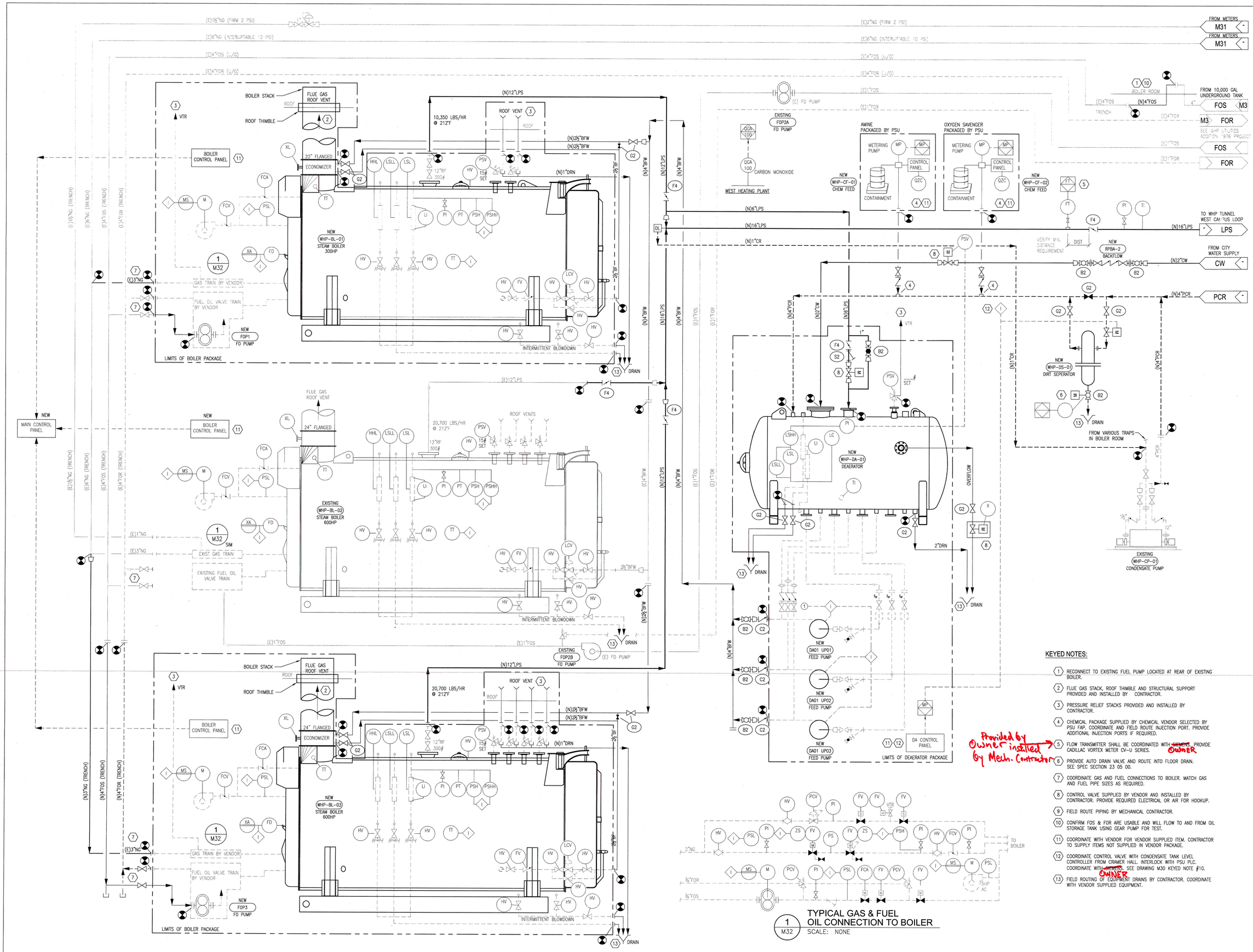
WEST CAMPUS
STEAM P&ID DEMO

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

M31.1

SHEET 08 OF 24

Plot Date: 9 July 2012 - 3:01 PM Plotted By: Matthew Carmichael Cad File No: G:\10909 - PSU (Portland State University)\10909-12002 PSU WHP Boiler Replacement\06-CAD\Sheets\10909-12002_08_M31.1 West Campus P&ID Demo.dwg



KEYED NOTES:

1. RECONNECT TO EXISTING FUEL PUMP LOCATED AT REAR OF EXISTING BOILER.
2. FLUE GAS STACK, ROOF THIMBLE AND STRUCTURAL SUPPORT PROVIDED AND INSTALLED BY CONTRACTOR.
3. PRESSURE RELIEF STACKS PROVIDED AND INSTALLED BY CONTRACTOR.
4. CHEMICAL PACKAGE SUPPLIED BY CHEMICAL VENDOR SELECTED BY PSU FAP. COORDINATE AND FIELD ROUTE INJECTION PORT. PROVIDE ADDITIONAL INJECTION PORTS IF REQUIRED.
5. FLOW TRANSMITTER SHALL BE COORDINATED WITH ~~OWNER~~ PROVIDE CADILLAC VORTEX METER CV-U SERIES. Provided by Owner installed By Mech. Contractor — ~~OWNER~~
6. PROVIDE AUTO DRAIN VALVE AND ROUTE INTO FLOOR DRAIN. SEE SPEC SECTION 23 05 00.
7. COORDINATE GAS AND FUEL CONNECTIONS TO BOILER. MATCH GAS AND FUEL PIPE SIZES AS REQUIRED.
8. CONTROL VALVE SUPPLIED BY VENDOR AND INSTALLED BY CONTRACTOR. PROVIDE REQUIRED ELECTRICAL OR AIR FOR HOOKUP.
9. FIELD ROUTE PIPING BY MECHANICAL CONTRACTOR.
10. CONFIRM FOS & FOR ARE USABLE AND WILL FLOW TO AND FROM OIL STORAGE TANK USING GEAR PUMP FOR TEST.
11. COORDINATE WITH VENDOR FOR VENDOR SUPPLIED ITEM. CONTRACTOR TO SUPPLY ITEMS NOT SUPPLIED IN VENDOR PACKAGE.
12. COORDINATE CONTROL VALVE WITH CONDENSATE TANK LEVEL CONTROLLER FROM CRAMER HALL. INTERLOCK WITH PSU PLC. COORDINATE WITH ~~OWNER~~. SEE DRAWING M30 KEYED NOTE #10.
13. FIELD ROUTING OF EQUIPMENT DRAINS BY CONTRACTOR. COORDINATE WITH VENDOR SUPPLIED EQUIPMENT.

1 / M32 TYPICAL GAS & FUEL OIL CONNECTION TO BOILER
SCALE: NONE

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PORTLAND STATE UNIVERSITY
WEST HEATING PLANT
BOILER REPLACEMENT

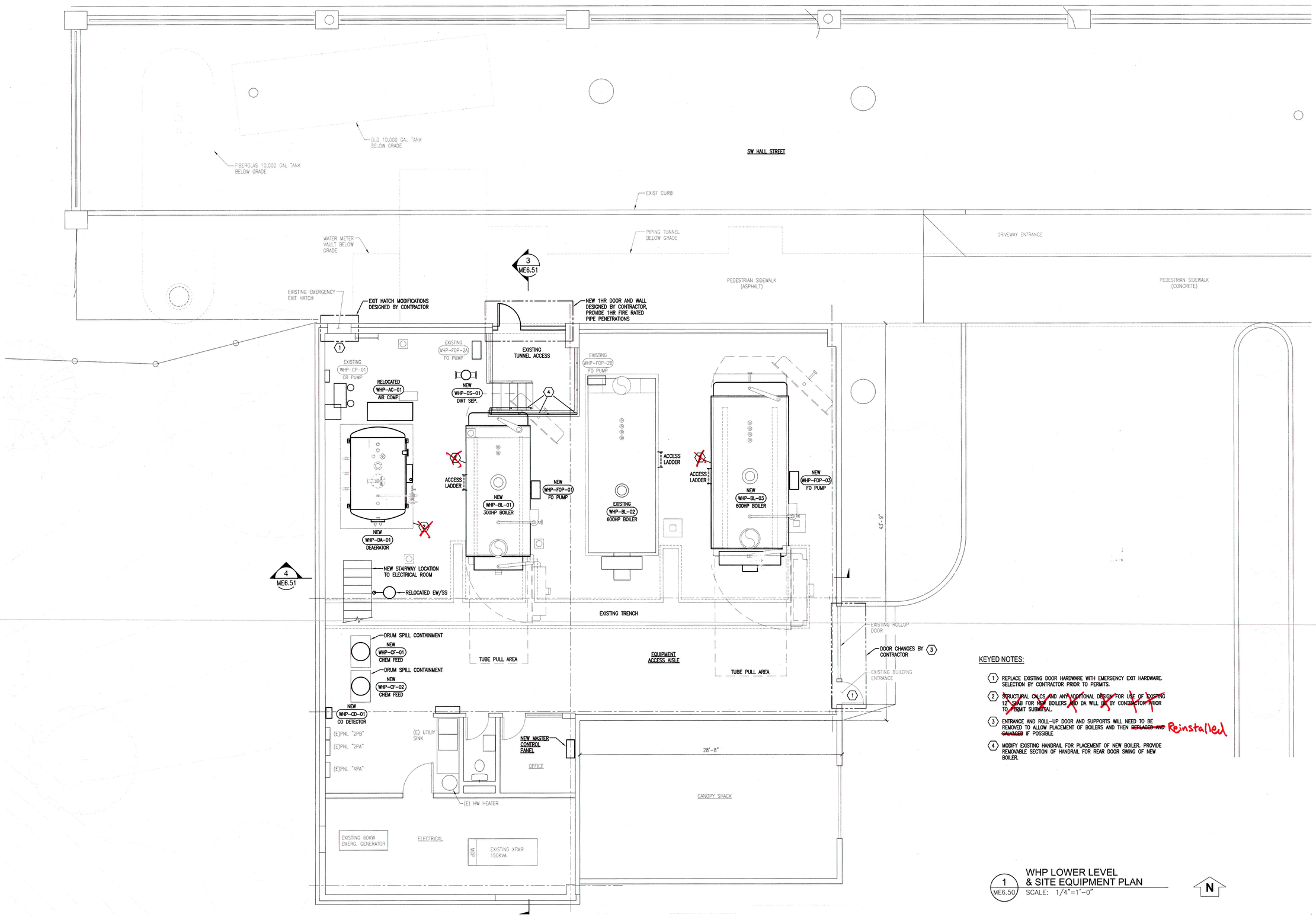
WEST HEATING PLANT
STEAM AND CONDENSATE P&ID

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

M32

SHEET 09 OF 24

Plot Date: 12 July 2012 - 4:57 PM Plotted By: Matthew Carmichael Cad File No: G:\10909 - PSU (Portland State University)\10909-12002 PSU WHP Boiler Replacement\06-CAD\Sheets\10909-12002_09_M32 P&ID New Boilers.dwg



KEYED NOTES:

1. REPLACE EXISTING DOOR HARDWARE WITH EMERGENCY EXIT HARDWARE. SELECTION BY CONTRACTOR PRIOR TO PERMITS.
2. ~~STRUCTURAL CALCS AND ANY ADDITIONAL DESIGN FOR USE OF EXISTING 12" SLAB FOR NEW BOILERS AND DA WILL BE BY CONTRACTOR PRIOR TO PERMIT SUBMITTAL.~~
3. ENTRANCE AND ROLL-UP DOOR AND SUPPORTS WILL NEED TO BE REMOVED TO ALLOW PLACEMENT OF BOILERS AND THEN ~~REPLACED AND SALVAGED~~ Reinstalled IF POSSIBLE
4. MODIFY EXISTING HANDRAIL FOR PLACEMENT OF NEW BOILER. PROVIDE REMOVABLE SECTION OF HANDRAIL FOR REAR DOOR SWING OF NEW BOILER.

1 ME6.50 WHP LOWER LEVEL & SITE EQUIPMENT PLAN
SCALE: 1/4"=1'-0"

N

1/4" = 1'-0" 5' 0 5' 10' 15'

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ISSUE

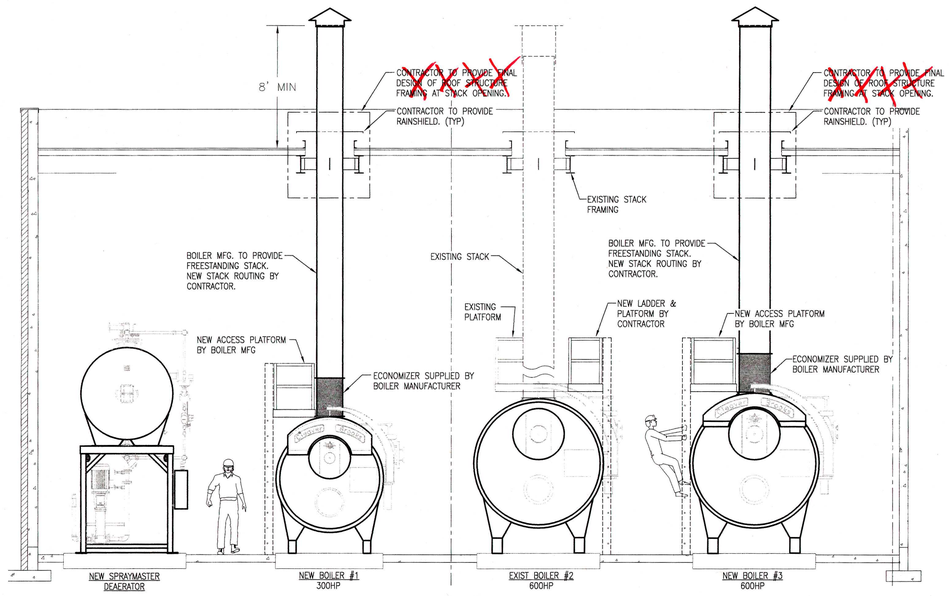
PORTLAND STATE UNIVERSITY WEST HEATING PLANT BOILER REPLACEMENT

WHP LOWER LEVEL & SITE EQUIPMENT PLAN

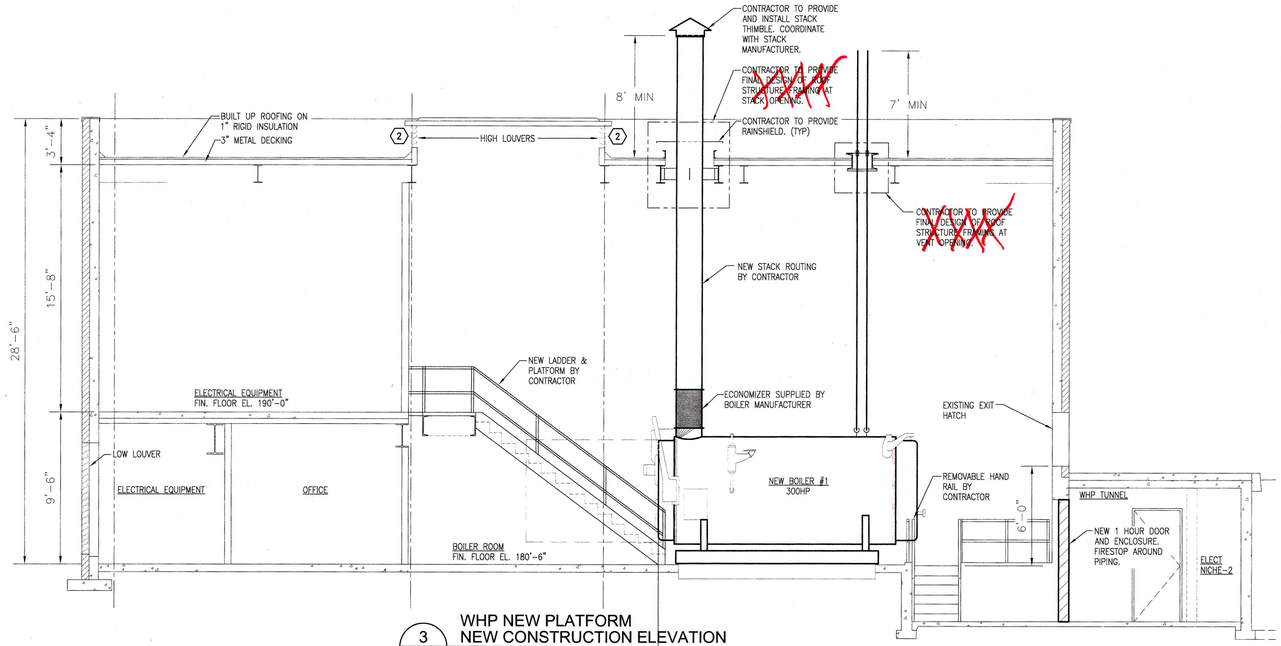
PROJ NO: 10909-12002
DRWN: MTC CHKD: GCY

ME6.50

SHEET 10 OF 24



4 ME6.51 WHP NEW PLATFORM NEW CONSTRUCTION ELEVATION
SCALE: 1/4"=1'-0"



3 ME6.51 WHP NEW PLATFORM NEW CONSTRUCTION ELEVATION
SCALE: 1/4"=1'-0"

2 ME6.51 WHP NEW PLATFORM UPPER LEVEL NEW PLAN
SCALE: 1/4"=1'-0"

KEYED NOTES:

1. PROVIDE NEW SUPPORTS FOR ALL PIPING SUPPORTED BY PLATFORM TO BE DEMOLISHED.
2. CONTRACTOR TO LOCK OPEN OR REMOVE EXISTING LOUVER DAMPERS.

1 ME6.51 WHP EXISTING PLATFORM UPPER LEVEL DEMO PLAN
SCALE: 1/4"=1'-0"

1/4" = 1'-0" 5' 0 5' 10' 15'

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PORTLAND STATE UNIVERSITY
WEST HEATING PLANT
BOILER REPLACEMENT

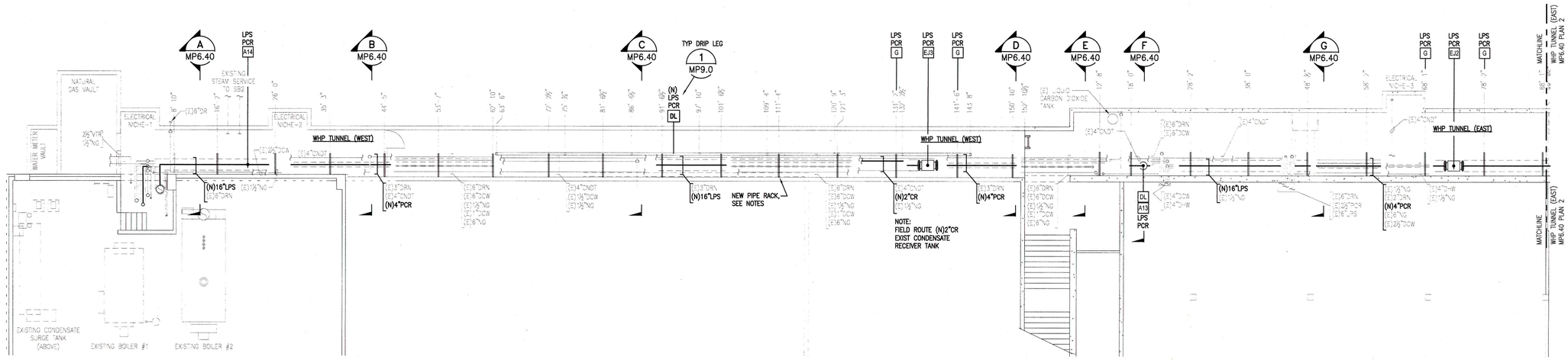
WEST HEATING PLANT
PLATFORM PLAN

PROJ NO: 10909-12002
DRWN: MTC CHKD:

ME6.51

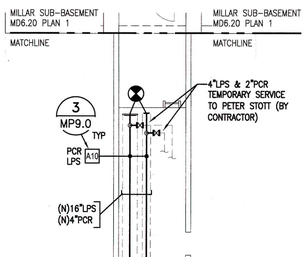
SHEET 11 OF 24

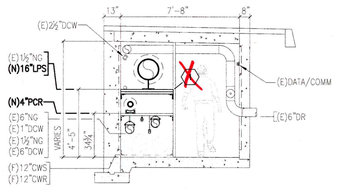
Plot Date: 9 July 2012 - 4:00 PM Plotted By: Matthew Carmichael
Cad File No: G:\10909 - PSU (Portland State University)\10909-12002 PSU WHP Boiler Replacement\06-CAD\Sheets\10909-12002_11_ME6.51 Equipment Plan Upper Level.dwg



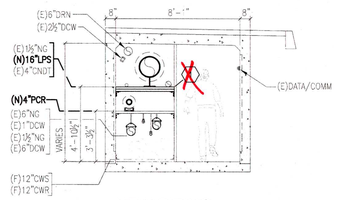
1 MP6.40 NEW PIPING PLAN
WEST HEATING PLANT TUNNEL (WEST)
SCALE: 1/8" = 1'-0"

N

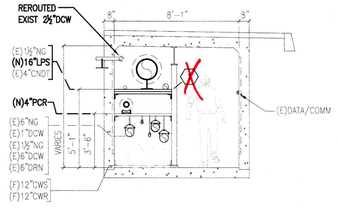




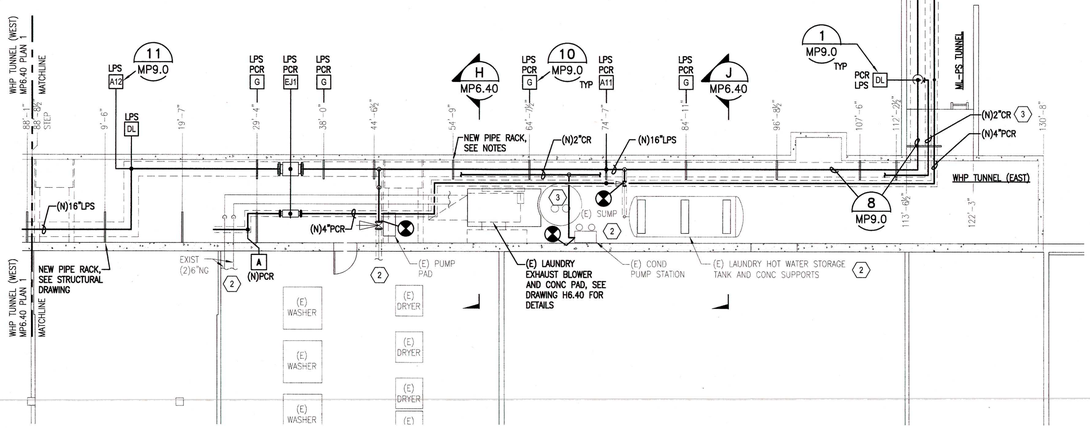
A MP6.40 NEW PIPING TUNNEL SECTION
SCALE: 1/4" = 1'-0"



B MP6.40 NEW PIPING TUNNEL SECTION
SCALE: 1/4" = 1'-0"



C MP6.40 NEW PIPING TUNNEL SECTION
SCALE: 1/4" = 1'-0"



2 MP6.40 NEW PIPING PLAN
WEST HEATING PLANT TUNNEL (EAST)
SCALE: 1/8" = 1'-0"

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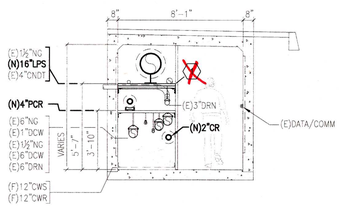

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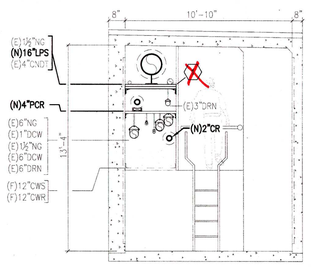

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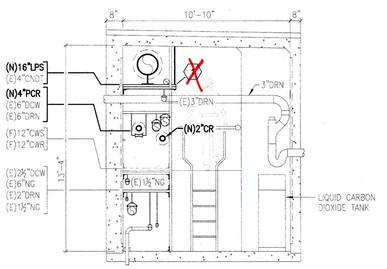
SCALE: 1/4" = 1'-0"



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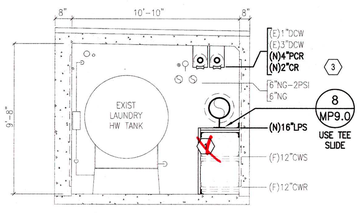
SCALE: 1/4" = 1'-0"



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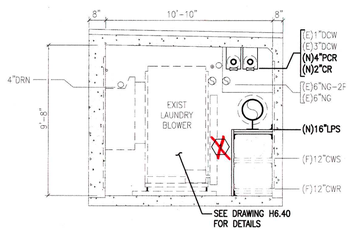
SCALE: 1/4" = 1'-0"



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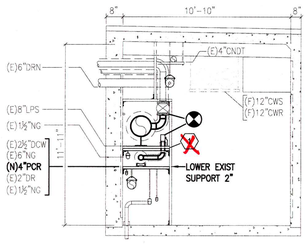
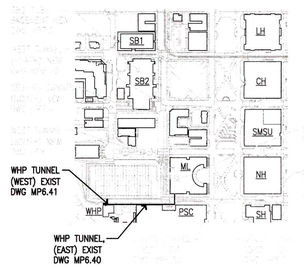
SCALE: 1/4" = 1'-0"



G MP6.40 NEW PIPING TUNNEL SECTION
SCALE: 1/4" = 1'-0"

KEYED NOTES

1. PIPE RACK DESIGNED BY CONTRACTOR, SEE STRUCTURAL PERFORMANCE SPECIFICATION DRAWING M0.4.
2. ALL PETER STOTT FACILITIES TO REMAIN OPERATIONAL DURING CONSTRUCTION. PROVIDE EXECUTION PLAN FOR REVIEW PRIOR TO COMMENCING WORK.
3. RE-USE TEMPORARY 2"CR FOR GRAVITY CONDENSATE RETURN. FIELD ROUTE TO EXISTING CONDENSATE PUMP.



PIPING KEY PLAN
CAMPUS WIDE LOOP
PHASE 2

N

1/8" = 1'-0" 5' 0 5' 10' 15' 20' 25'

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PORTLAND STATE UNIVERSITY
WEST HEATING PLANT
BOILER REPLACEMENT

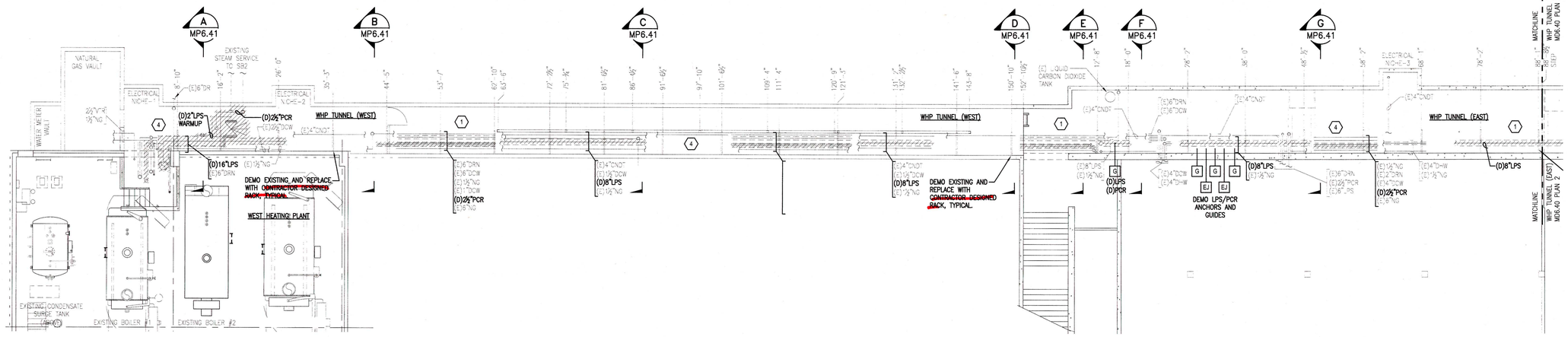
WEST HEATING PLANT TUNNEL
PIPING PLAN

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

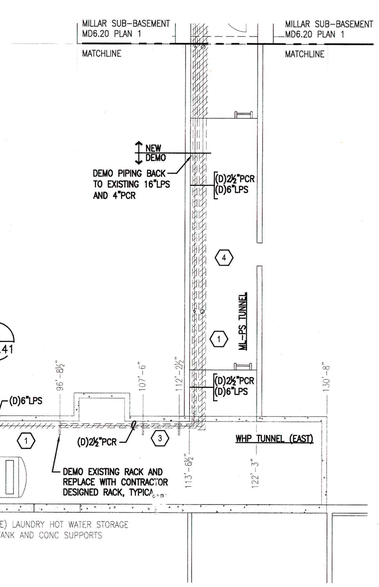
MP6.40

SHEET 12 OF 24

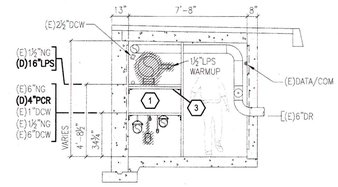
Plot Date: 10 July 2012 - 10:46 AM Plotted By: Matthew Carmichael
Cad File No: G:\10909 - PSU (Portland State University)\10909-12002 PSU WHP Boiler Replacement\06-CAD\Sheets\10909-12002_12_MP6.40 Tunnel Piping.dwg



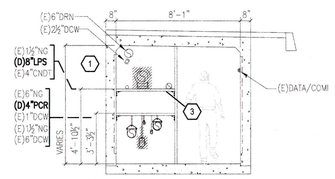
1 MP6.41 PIPING DEMO PLAN
WEST HEATING PLANT TUNNEL (WEST)
SCALE: 1/8" = 1'-0"



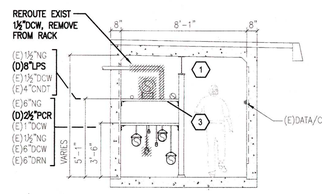
2 MP6.41 PIPING DEMO PLAN
WEST HEATING PLANT TUNNEL (EAST)
SCALE: 1/8" = 1'-0"



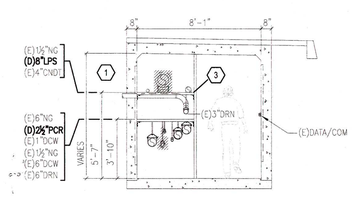
A MP6.41 DEMO - EXISTING TUNNEL SECTION
SCALE: 1/4" = 1'-0"



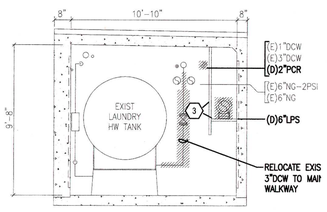
B MP6.41 DEMO - EXISTING TUNNEL SECTION
SCALE: 1/4" = 1'-0"



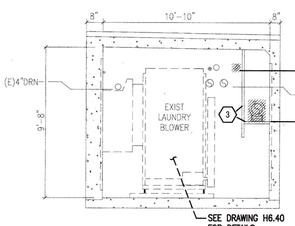
C MP6.41 DEMO - EXISTING TUNNEL SECTION
SCALE: 1/4" = 1'-0"



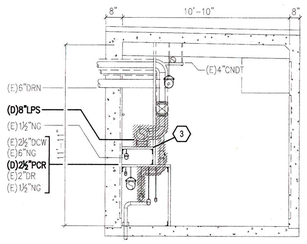
D MP6.41 DEMO - EXISTING TUNNEL SECTION
SCALE: 1/4" = 1'-0"



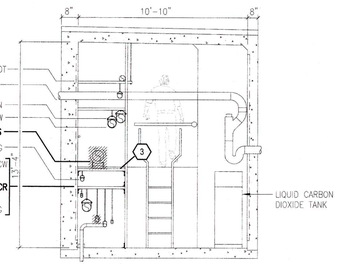
J MP6.41 DEMO - EXISTING TUNNEL SECTION
SCALE: 1/4" = 1'-0"



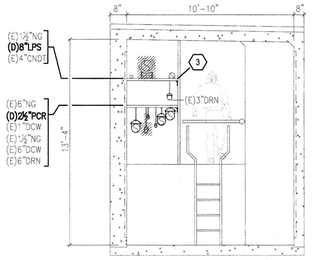
H MP6.41 DEMO - EXISTING TUNNEL SECTION
SCALE: 1/4" = 1'-0"



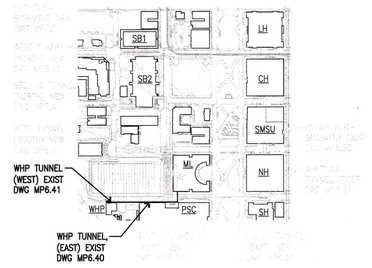
G MP6.41 DEMO - EXISTING TUNNEL SECTION
SCALE: 1/4" = 1'-0"



F MP6.41 DEMO - EXISTING TUNNEL SECTION
SCALE: 1/4" = 1'-0"



E MP6.41 DEMO - EXISTING TUNNEL SECTION
SCALE: 1/4" = 1'-0"



PIPING KEY PLAN
CAMPUS WIDE LOOP
PHASE 2

DEMOLITION NOTES:

1. COORDINATE ASBESTOS ABATEMENT (BY OTHERS) WITH PSU FACILITIES DEPARTMENT.
2. NOT USED.
3. DEMO EXISTING RACK AND INSTALL NEW RACK SYSTEM DESIGNED FOR LARGER PIPING. ~~DESIGN OF RACK AND ANCHOR BOLTS BY CONTRACTOR.~~ SEE KEY NOTE 17 ON DRAWING M0.4
4. SEQUENCE STEAM DEMO TO KEEPING BUILDINGS OPERATIONAL.

1/8" = 1'-0" 5' 0 5' 10' 15' 20' 25'

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MARK	DATE	DESCRIPTION
0	07/10/12	ISSUED FOR CONSTRUCTION

ISSUE

PORTLAND STATE UNIVERSITY
WEST HEATING PLANT
BOILER REPLACEMENT

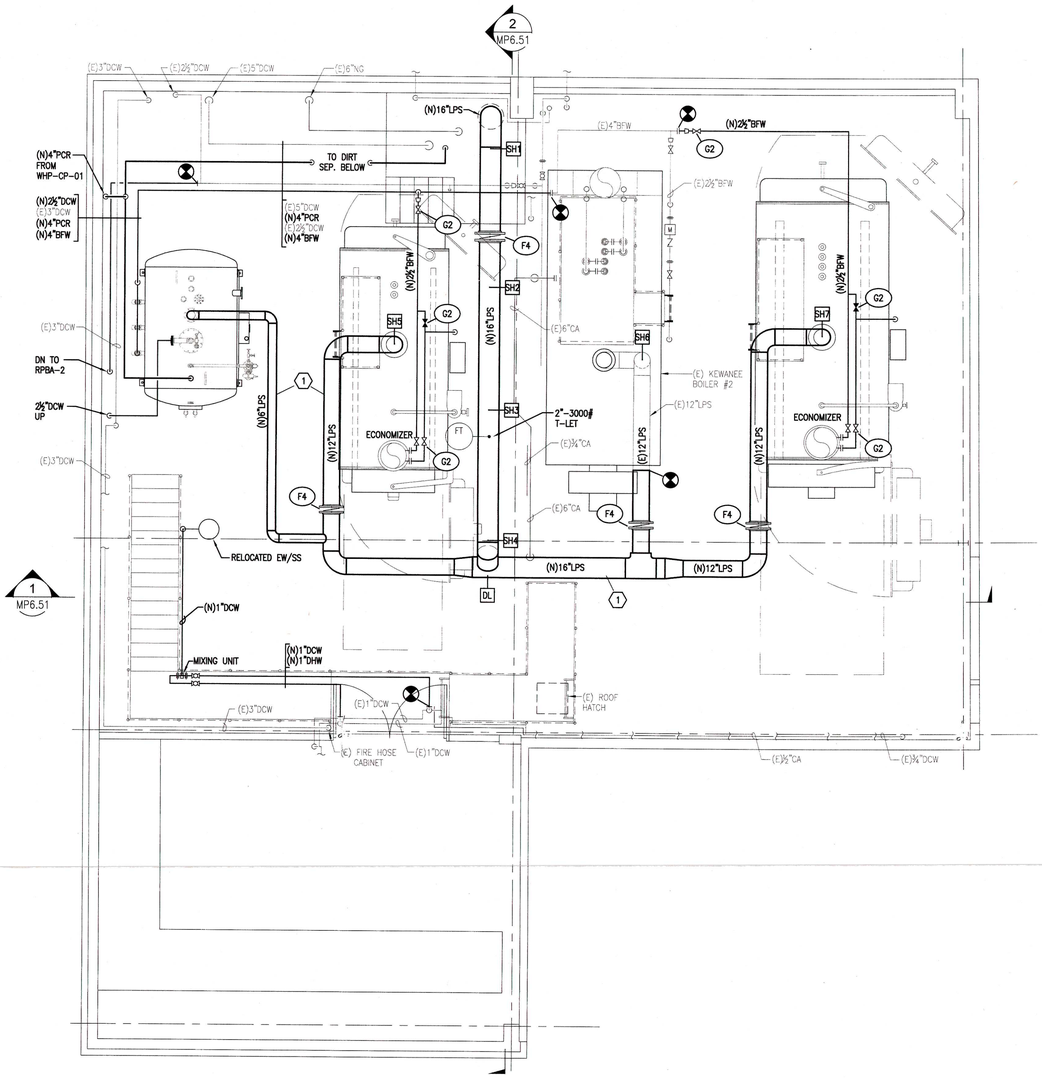
WEST HEATING PLANT TUNNEL
PIPING DEMO PLAN

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

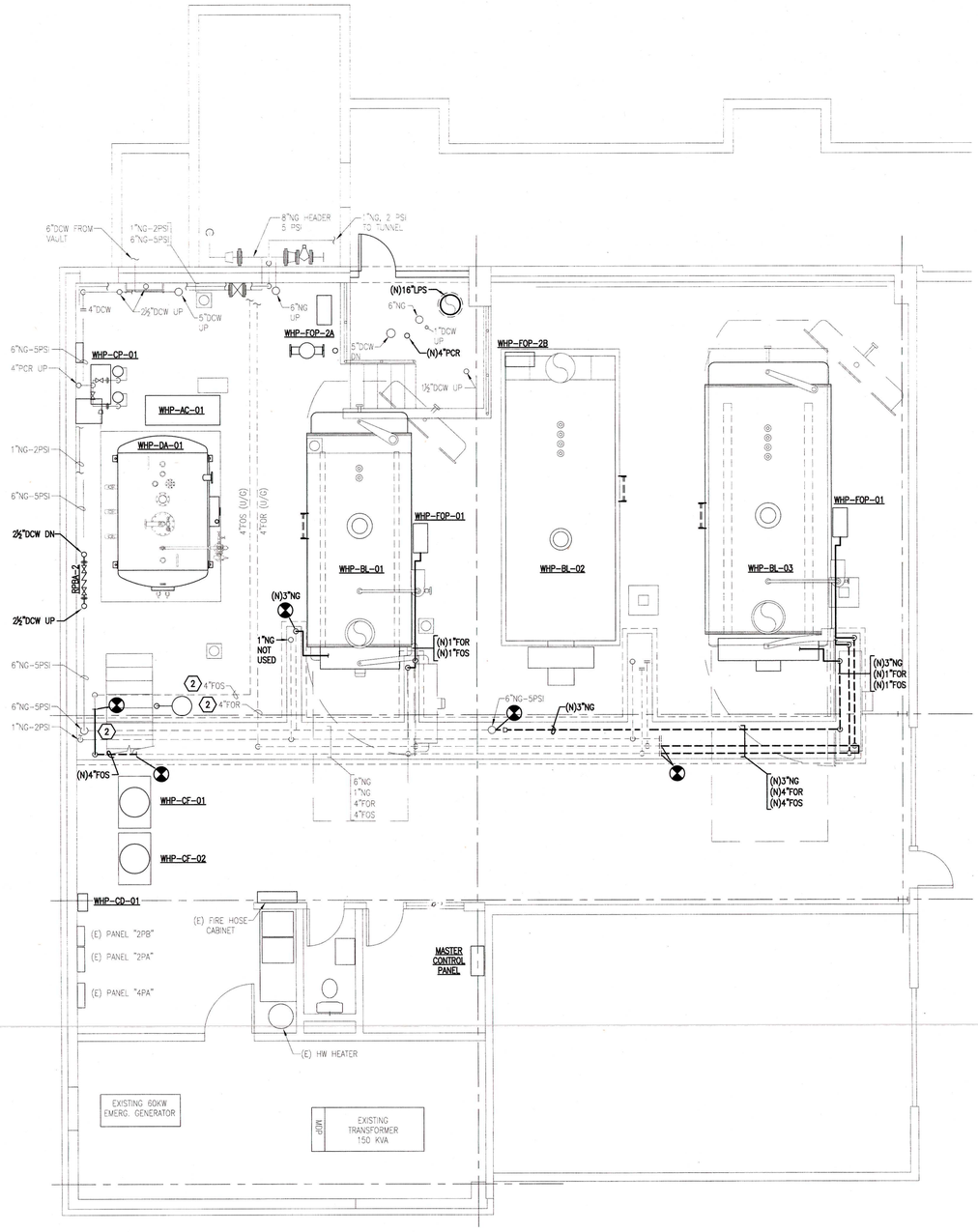
MP6.41

SHEET 13 OF 24

Plot Date: 9 July 2012 - 4:59 PM Plotted By: Matthew Carmichael
Cad File No: G:\10909 - PSU (Portland State University)\10909-12002 PSU WHP Boiler Replacement\06-CAD\Sheets\10909-12002_13_MP6.41 Tunnel Demo.dwg



2 MP6.50 WEST HEATING PLANT UPPER PIPING PLAN PLAN
SCALE: 1/4"=1'-0"



1 MP6.50 WEST HEATING PLANT LOWER PIPING PLAN PLAN
SCALE: 1/4"=1'-0"

KEYED NOTES:

1. PROVIDE STRUCTURAL DESIGN AND PROVIDE NEW INSTALL HANGER SUPPORTS THROUGHOUT BOILER ROOM.
2. CONFIRM FOS & FOR ARE USABLE AND WILL FLOW TO AND FROM OIL STORAGE TANK USING GEAR PUMP FOR TEST.

1/4" = 1'-0" 5' 0 5' 10' 15'

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REGISTERED PROFESSIONAL ENGINEER
OREGON
AUG 22, 1975
RICHARD S. FITTERER
EXPIRES: 12/31/2013

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PORTLAND STATE UNIVERSITY
WEST HEATING PLANT
BOILER REPLACEMENT

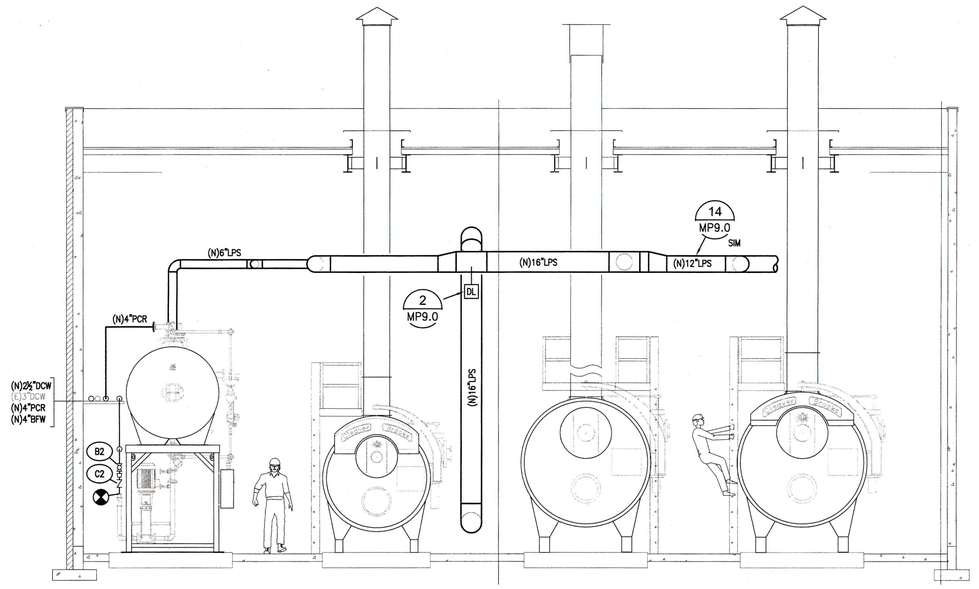
WEST HEATING PLANT
NEW PIPING PLAN

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

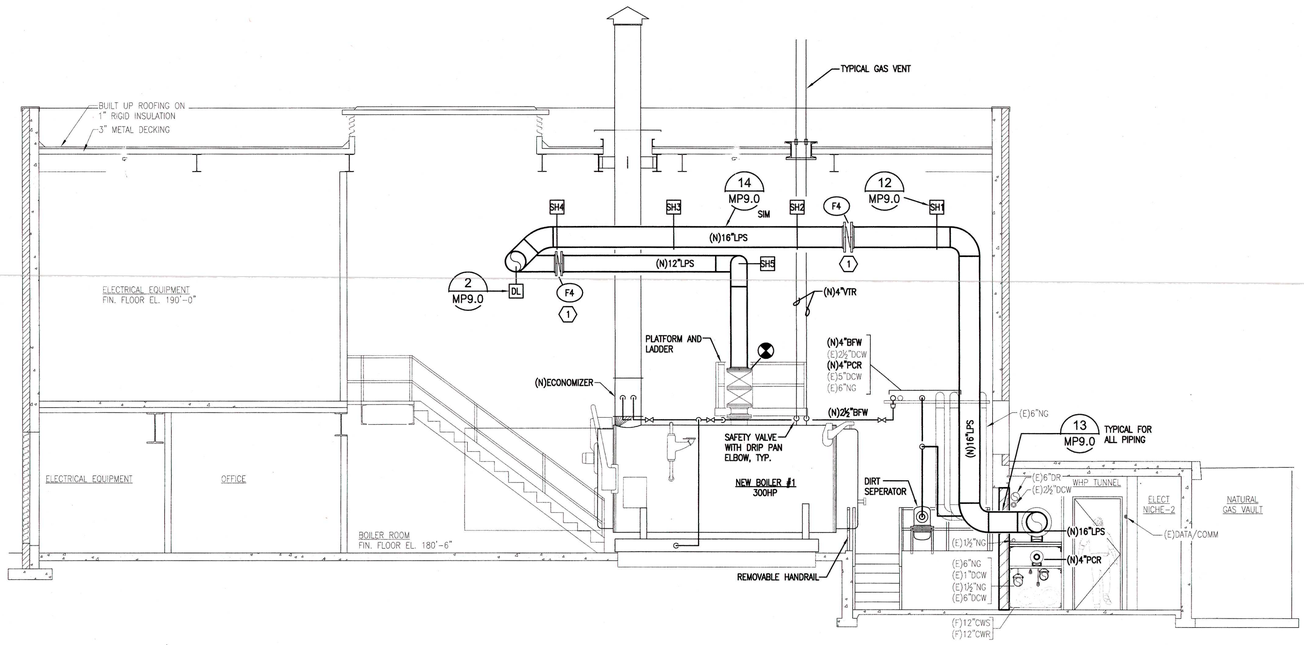
MP6.50

SHEET 14 OF 24

Plot Date: 9 July 2012 - 5:02 PM Plotted By: Matthew Carmichael Cad File No: G:\10909 - PSU (Portland State University)\10909-12002 PSU WHP Boiler Replacement\06-CAD\Sheets\10909-12002_14_MP6.50 Piping Plan New.dwg



1 MP6.51 WEST HEATING PLANT
PIPING SECTION LOOKIG NORTH
SCALE: 1/4"=1'-0"



2 MP6.51 WEST HEATING PLANT
PIPING SECTION LOOKIG WEST
SCALE: 1/4"=1'-0"

KEYED NOTES:

1 PROVIDE CHAIN OPERATOR ON ALL ELEVATED STEAM VALVES..

1/4" = 1'-0" 5' 0 5' 10' 15'

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RICHARD S. FITTERER
OREGON
AUG. 22, 1975
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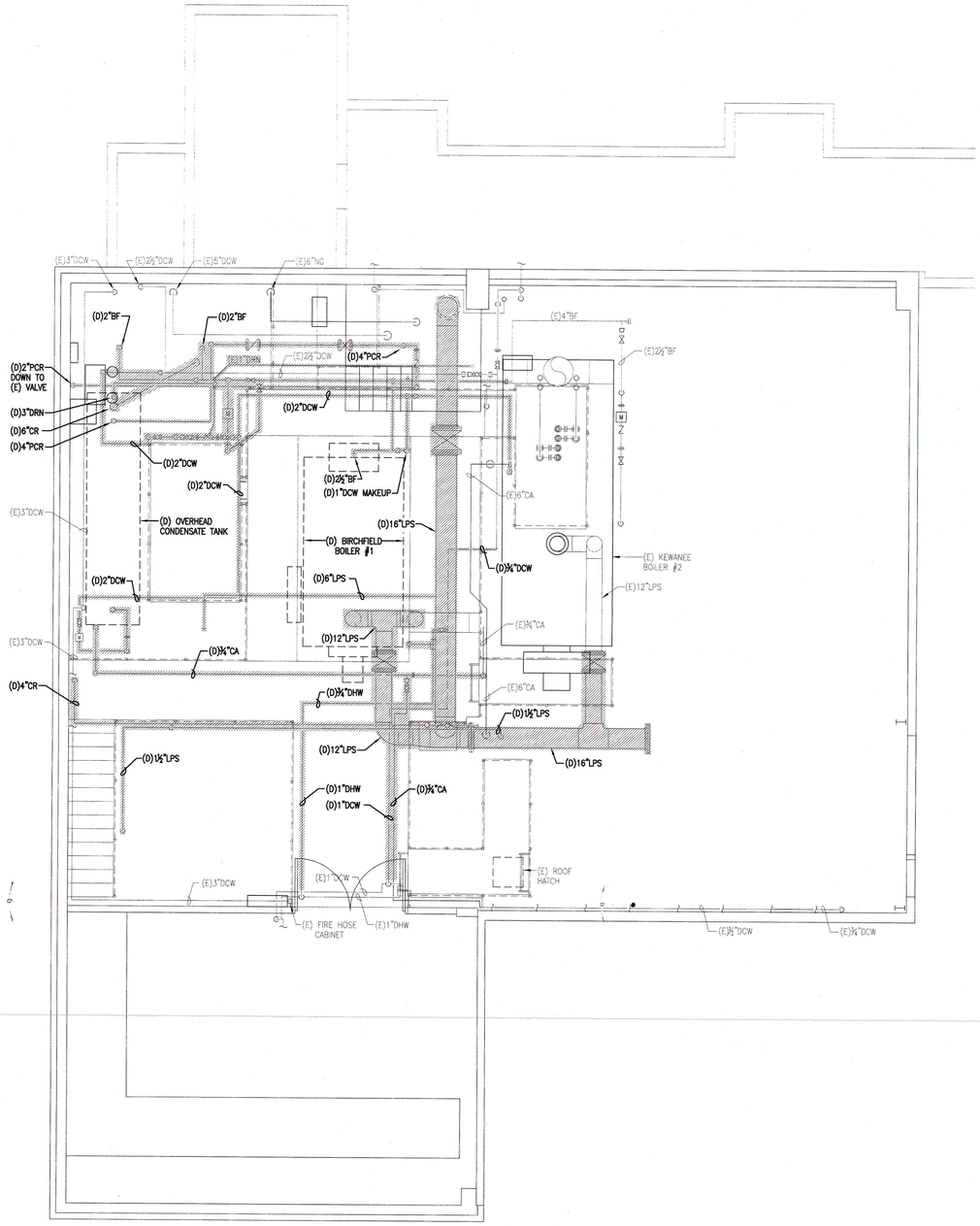
WEST HEATING PLANT
BOILER REPLACEMENT

WEST HEATING PLANT
PIPING SECTIONS

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

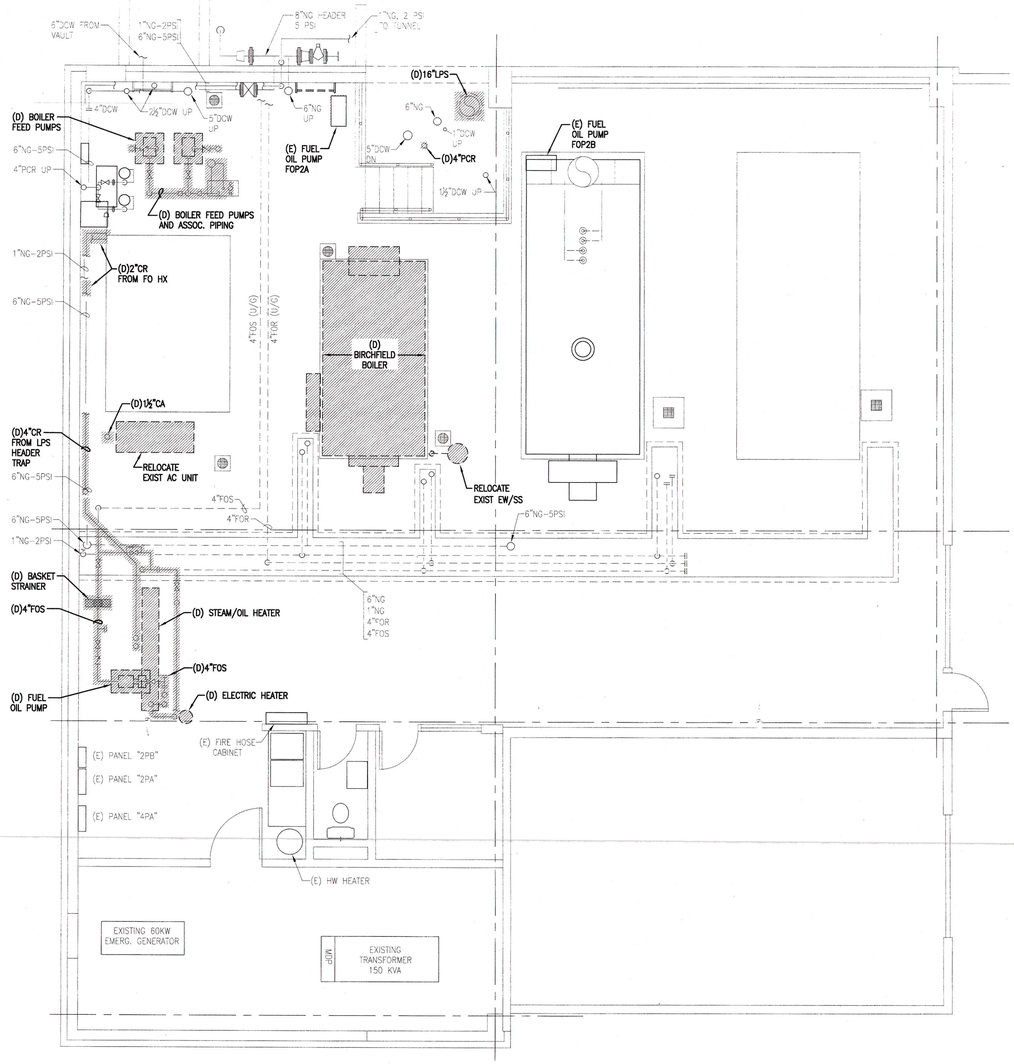
MP6.51

SHEET 15 OF 24



2 MP6.52 WEST HEATING PLANT
UPPER PIPING DEMO PLAN PLAN
SCALE: 1/4"=1'-0"

N



1 MP6.52 WEST HEATING PLANT
LOWER PIPING DEMO PLAN PLAN
SCALE: 1/4"=1'-0"

N

1/4" = 1'-0" 5' 0 5' 10' 15'

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AUG. 22, 1978
MICHAEL T. CARMICHAEL
RENEWS: 6/30/13

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WEST HEATING PLANT
BOILER REPLACEMENT

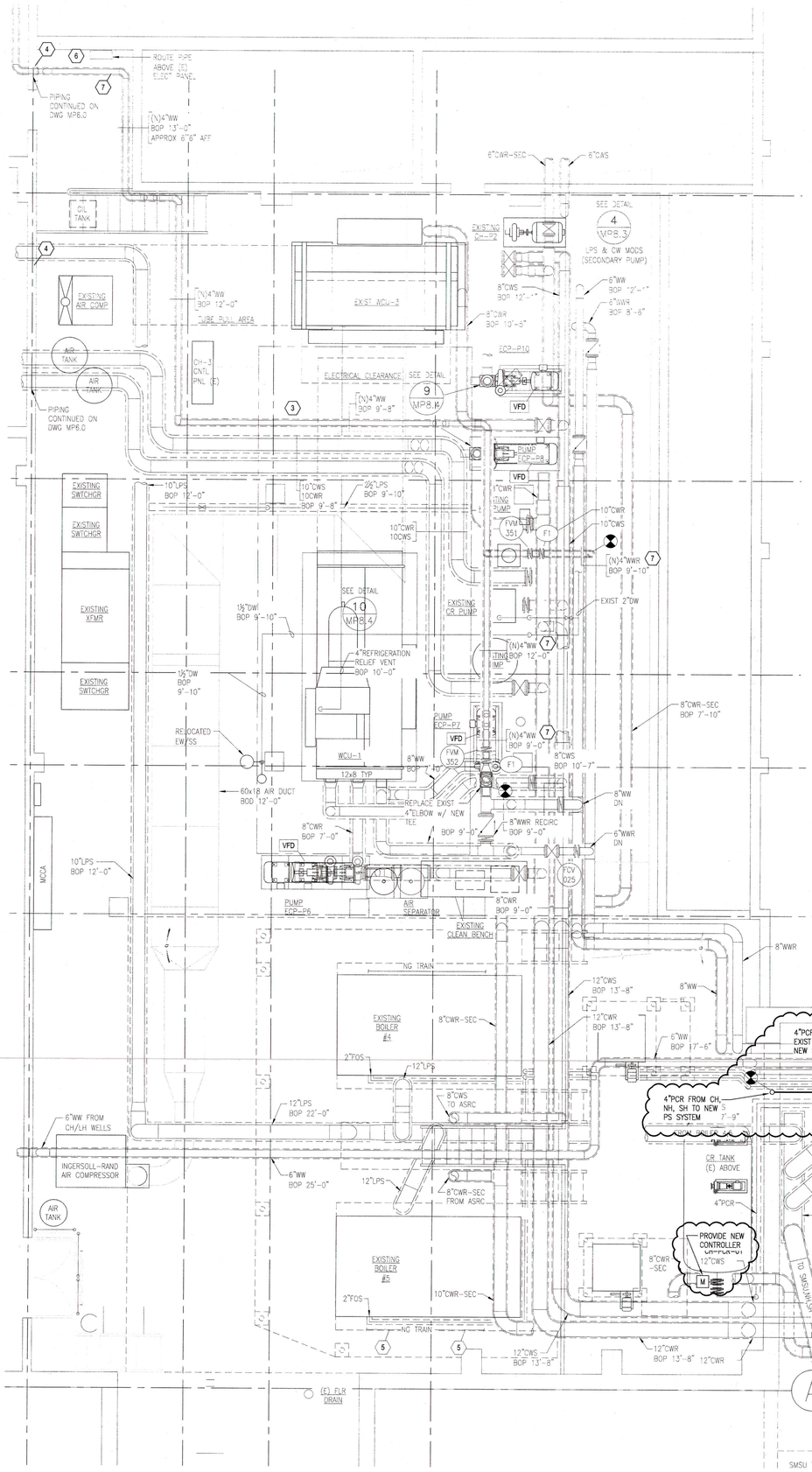
WEST HEATING PLANT
PIPING DEMO PLAN

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

MP6.52

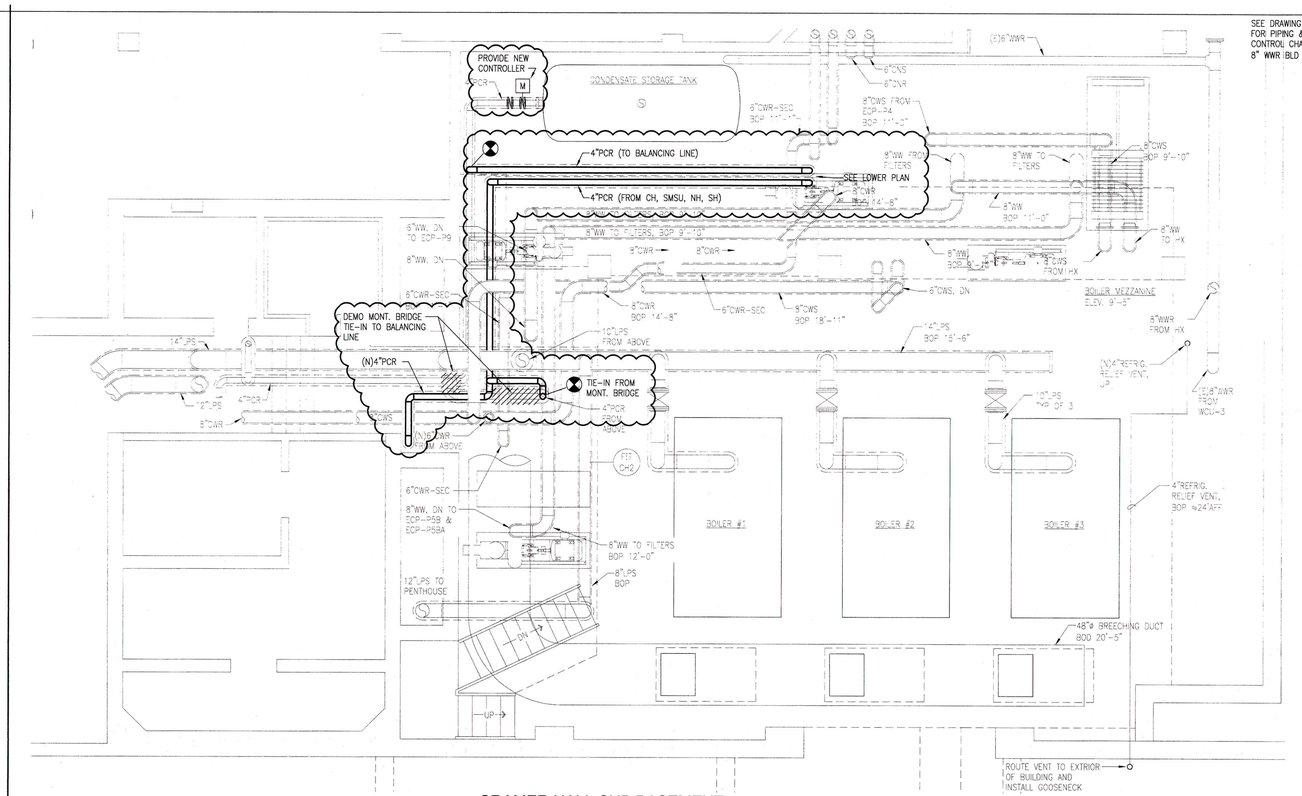
SHEET 16 OF 24

Plot Date: 9 July 2012 - 5:27 PM Plotted By: Matthew Carmichael Cad File No: G:\10909 - PSU (Portland State University)\10909-12002 PSU WHP Boiler Replacement\06-CAD\Sheets\10909-12002_16_MP6.52 Piping Demo.dwg



1 MP6.53 CRAMER HALL SUB BASEMENT LOWEL LEVEL NEW PIPING PLAN
SCALE: 1/4" = 1'-0"

N



2 MP6.53 CRAMER HALL SUB BASEMENT UPPER LEVEL NEW PIPING PLAN
SCALE: 1/4" = 1'-0"

N

KEYED NOTES:

1. POINT OF CONNECTION. TIE INTO EXISTING 10"CWS LINE @ BOI 9'-8".
2. POINT OF CONNECTION. TIE INTO EXISTING 10"CWR LINE @ BOI 9'-8".
3. PROVIDE FOR SUPPORTS OVERHEAD PIPING.
4. PROVIDE OPENING THRU WALL AND SEAL AT COMPLETION OF PIPE INSTALLATION. SEE DETAIL 8/MP9.0
5. CO-ORDINATE PIPE ROUTING WITH INSTALLATION OF CHILLER HOIST.
6. ALLOW ACCESS AND REQUIREMENT CLEARANCE IN FRONT OF PANEL WB-A.
7. WW = 1" INSULATION & PVC JACKET.

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WEST HEATING PLANT
BOILER REPLACEMENT

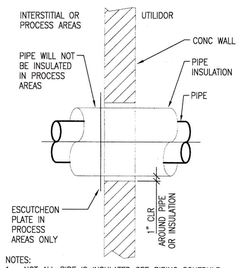
CRAMER HALL SUB BASEMENT
PIPING PLAN

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

MP6.53

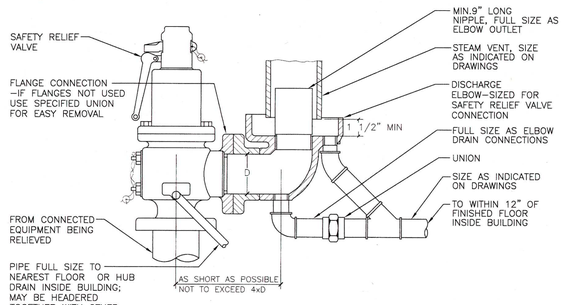
SHEET 17 OF 24

Plot Date: 9 July 2012 - 5:56 PM Plotted By: Matthew Carmichael
Cad File No: G:\10909 - PSU (Portland State University)\10909-12002 PSU WHP Boiler Replacement\06-CAD\Sheets\10909-12002_17_MP6.53 CH Piping Plan.dwg

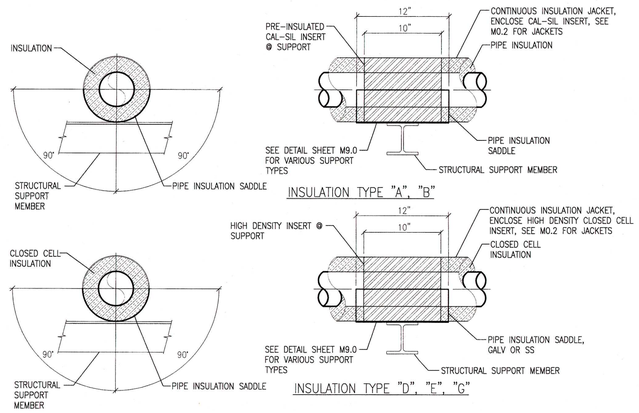


NOTES:
1. NOT ALL PIPE IS INSULATED SEE PIPING SCHEDULE.
2. FOR PIPE SIZES GREATER THAN 6".

13 MP9.0 WALL PENETRATION
SCALE: 1/2" = 1'-0"

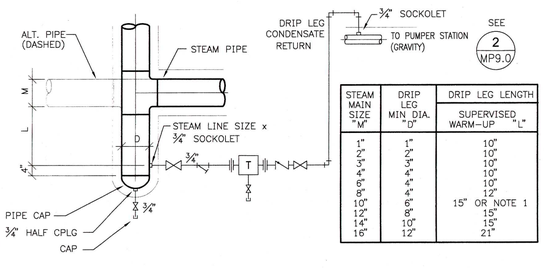


9 MP9.0 SAFETY RELIEF VALVE WITH DRIP PAN BELOW
SCALE: NONE



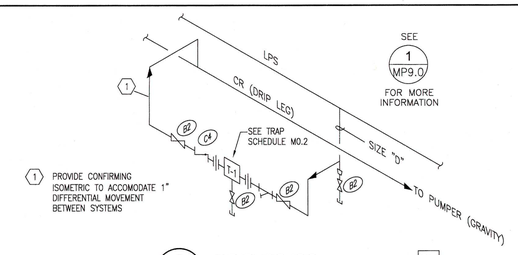
NOTE:
FOR GUIDES, LEAVE LOOSE OR USE OVERSIZED U–BOLT.

5 MP9.0 PIPE INSULATION SADDLE
SCALE: NONE

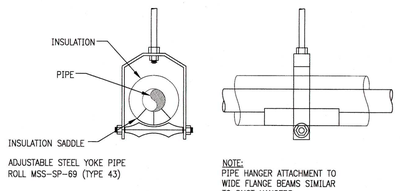


STEAM MAIN SIZE "M"	DRIP LEG MIN DIA. "D"	DRIP LEG LENGTH SUPERVISED WARM–UP "L"
1"	1"	10"
1½"	2"	10"
2"	3"	10"
3"	4"	10"
4"	4"	12"
6"	4"	12"
10"	6"	15" OR NOTE 1
12"	8"	15"
14"	10"	15"
16"	12"	21"

1 MP9.0 TYPICAL DRIP LEG STEAM TRAP DETAIL DL
SCALE: 1/2"=1'.1"



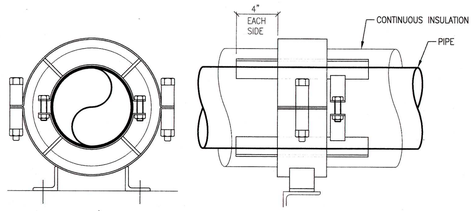
2 MP9.0 DRIPLEG ISO DL
SCALE: NONE
SEE PLAN & P&ID'S FOR LOCATIONS



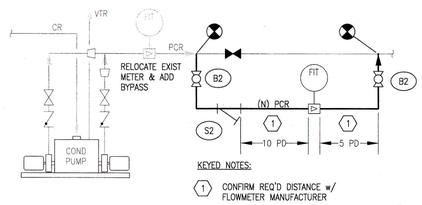
ADJUSTABLE STEEL YOKE PIPE ROLL MSS–SP–69 (TYPE 43)

NOTE:
PIPE HANGER ATTACHMENT TO WIDE FLANGE BEAMS SIMILAR TO DUCT HANGERS

14 MP9.0 TYP YOKE ROLL PIPE HANGER
SCALE: NONE

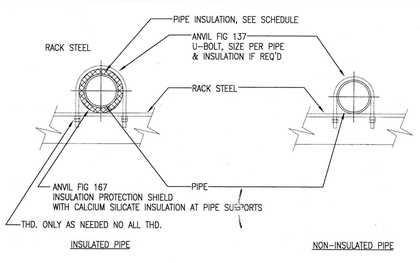


10 MP9.0 TYPICAL PIPE GUIDE WITH INSULATION G
SCALE: NONE

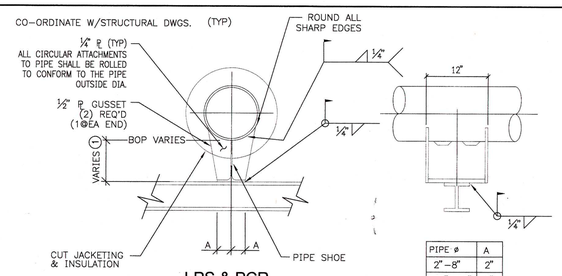


6 MP9.0 TYPICAL EXISTING CONDENSATE PUMP STATION
SCALE: NTS

TAG	FORCES (LB)			MOMENTS (INCH–LB)		
	X	Y	Z	X	Y	Z
A10	2395	–1025	–887	8901	409545	–83935
A11	32888	–412	807	30908	–234229	–5848
A12	186	–185	972	–500	2617686	130
A13	–3174	57790	–7	533	–2978	–1897083
A14	–36971	–206	–682	–14102	–106781	1075

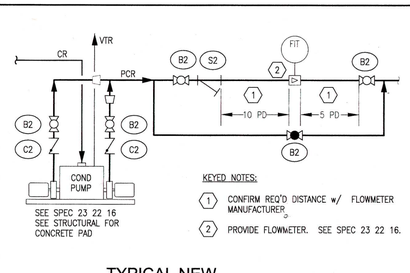


15 MP9.0 TYPICAL PIPE GUIDE (EXCEPT SM & CO)
SCALE: NONE

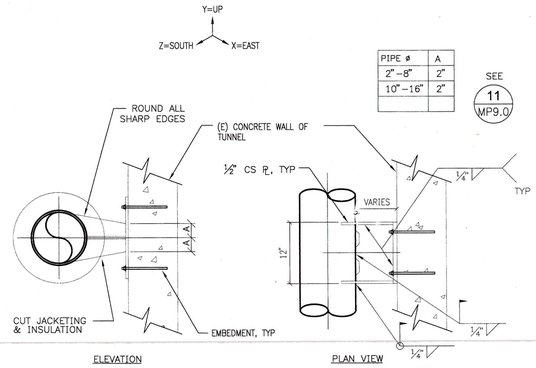


PIPE ø	A
2"–8"	2"
10"–16"	2"

11 MP9.0 LPS & PCR PIPE ANCHOR A
SCALE: NONE



7 MP9.0 TYPICAL NEW CONDENSATE PUMP STATION
SCALE: NTS

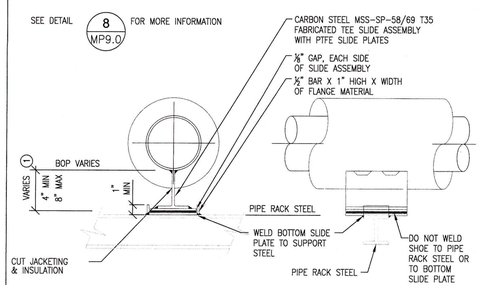


PIPE ø	A
2"–8"	2"
10"–16"	2"

SEE 11 MP9.0

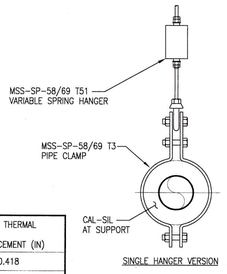
NOTE:
SEE STRUCTURAL DRAWINGS. COORDINATE WITH STRUCTURAL FOR LOAD CALS.

3 MP9.0 LPS PIPE ANCHOR A
SCALE: NONE



1 DIMS WILL VARY w/SLOPE – SLOPE SHALL BE IN THE DIRECTION OF FLOW, w/STEAM DRIP LEGS AT LOW POINTS AND APPROX 4" ELEVATION CHANGE BETWEEN DRIP LEGS, RESET AT LOOPS. FOR CONDENSATE LINES, APPROX 4" OVER LENGTH OF EACH MAIN.

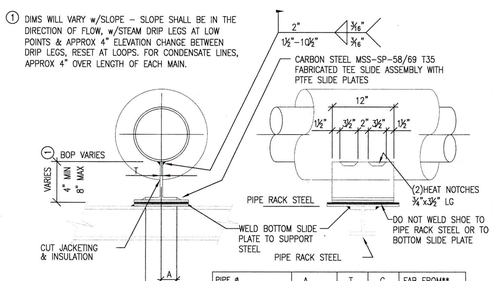
16 MP9.0 PIPE GUIDE FOR G
SCALE: 1"=1'–0"



HANGER	NO. OF SPRINGS	SPRING STIFFNESS	GRINNELL SPRING SIZE	OPERATING LOAD (LBS)	FREE THERMAL DISPLACEMENT (IN)
SH1	1	520 LB/INCH	11	1240	0.418
SH2	1	224 LB/INCH	8	508	0.342
SH3	1	224 LB/INCH	8	601	0.247
SH4	1	300 LB/INCH	9	731	0.146
SH5	1	70 LB/INCH	4	166	0.158
SH6	1	94 LB/INCH	5	242	0.145
SH7	1	94 LB/INCH	5	226	0.164

NOTE: 1. RIGID HANGER SELECTION CRITERIA = 0.100 INCH
2. PERMISSIBLE LOAD VARIATION = 0.250
3. THERMAL DISPLACEMETN IS PIPE MOVEMENT FROM INSTALLATION (COLD) TO OPERATING CONDITIONS.

12 MP9.0 SPRING HANGER DETAIL SH
SCALE: NONE



PIPE ø	A	T	C	FAB FROM**
2" – 16"	2"	0.24"	*	W10x17

* C = INSULATION THICKNESS, SEE SCHEDULE, DWG M–0.2
** IF CONTRACTOR FABRICATED.

8 MP9.0 PIPE SHOE & SLIDE BASE S
SCALE: NONE

4 MP9.0 NOT USED
SCALE: NONE

GHD Inc.
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REGISTERED PROFESSIONAL ENGINEER 86388PE OREGON MECHANICAL AUG 22, 2012 RICHARD S

BAR IS ONE INCH ON ORIGINAL DRAWING 0 1"

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MARK	DATE	DESCRIPTION
0	07/10/12	ISSUED FOR CONSTRUCTION

ISSUE

PORTLAND STATE UNIVERSITY
WEST HEATING PLANT
BOILER REPLACEMENT

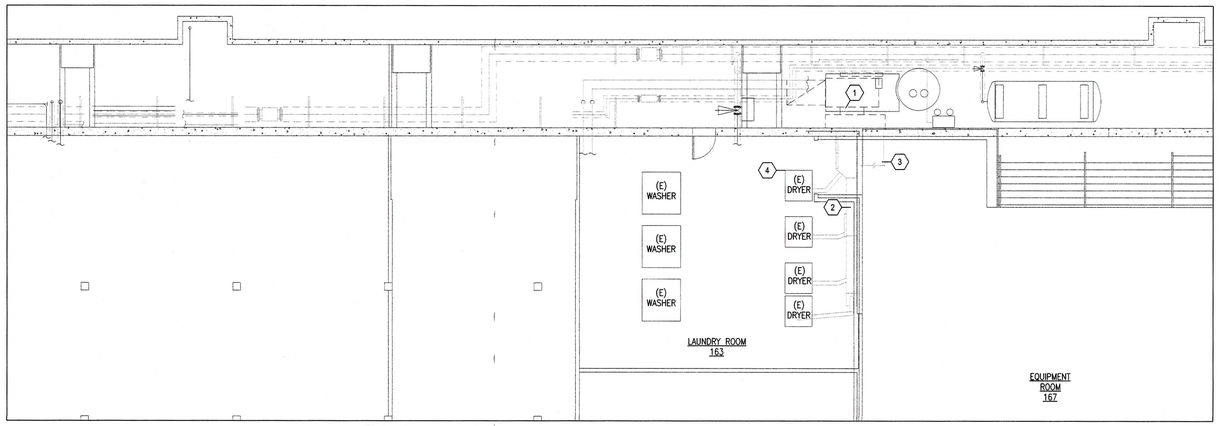
MECHANICAL DETAILS
-

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

MP9.0

SHEET 18 OF 24

Plot Date: 9 July 2012 - 6:18 PM Plotted By: Matthew Carmichael
Cad File No: G:\10909 - PSU (Portland State University)\10909-12002 PSU WHP Boiler Replacement\06-CAD\Sheets\10909-12002_18_MP9_0 Mechanical Details.dwg



19 / 1 / H6.40 LAUNDRY EXHAUST PLAN-DEMO
SCALE: 1/8" = 1'-0"

GENERAL NOTES

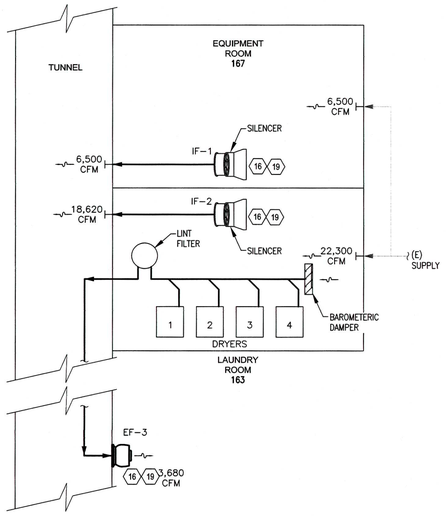
A. ALL CONSTRUCTION RELATED TO THE DRYER EXHAUST SYSTEM TO ADHERE TO SECTION 504 OF THE 2010 OREGON MECHANICAL SPECIALTY CODE.

B. ALL DUCT WORK TO BE CONSTRUCTED PER SMACNA STANDARDS.

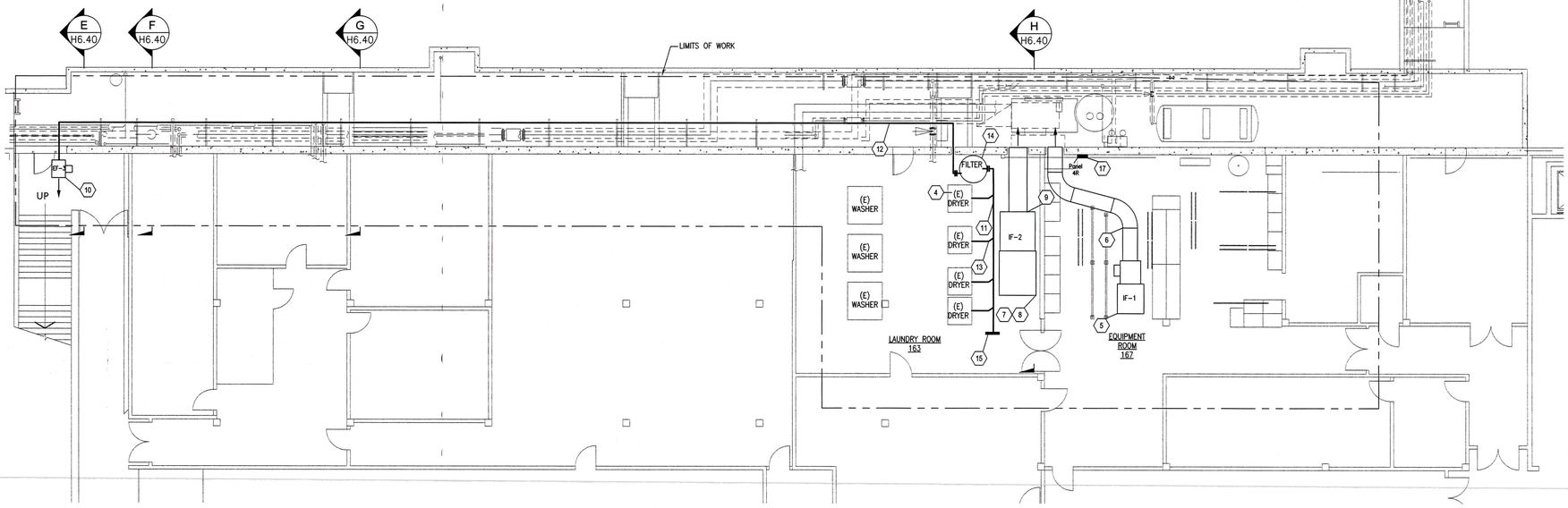
C. DRAWINGS ARE DIAGRAMMATIC. DRAWINGS ARE NOT INTENDED TO BE ABSOLUTELY PRECISE, AND DO NOT SPECIFY OR SHOW EVERY OFFSET, FITTING, AND COMPONENT. THE PURPOSE OF THE DRAWINGS IS TO INDICATE A SYSTEM CONCEPT, THE MAIN COMPONENTS OF THE SYSTEM AND THE GEOMETRIC RELATIONSHIPS. BASED ON THE SYSTEM CONCEPT, THE MAIN COMPONENTS OF THE SYSTEM AND THE GEOMETRIC RELATIONSHIPS THE CONTRACTOR SHALL PROVIDE ALL OTHER COMPONENTS AND MATERIALS NECESSARY TO MAKE THE SYSTEM FULLY COMPLETE AND OPERATIONAL. CONTRACTOR SHALL PROVIDE OFFSETS TO AVOID INTERFERENCE WITH STRUCTURAL ELEMENTS, ELECTRICAL PANELS, JUNCTION BOXES, EXISTING BUILDING UTILITIES, ETC. VERIFY EXISTING FIELD CONDITIONS, LOCATIONS AND DIMENSIONS, ETC. BEFORE CONSTRUCTION.

KEYED NOTES

1. REMOVE EXISTING EXHAUST FAN SERVING LAUNDRY ROOM AND EQUIPMENT ROOM.
2. DEMO AND REMOVE EXISTING DUCT HEADER FROM DRYERS.
3. DEMO AND REMOVE EXISTING EXHAUST DUCTWORK IN EQUIPMENT ROOM.
4. RELOCATE EXISTING DRYER'S APPROXIMATELY 3' TO THE WEST IN ORDER TO ALLOW ACCESS THE NEW IF-1. DISCONNECT GAS AND ELECTRICAL UTILITIES. EXTEND GAS AND ELECTRICAL PIPING AND RECONNECT TO DRYER'S.
5. PROVIDE NEW EXHAUST FAN IF-1. IF-1 SHALL BE A GREENHECK MODEL QEI-27-L-10 OR APPROVED EQUAL. IF-1 SHALL BE SIZED FOR 6,500 CFM AT 0.75 IN OF STATIC PRESSURE; IF-1 SHALL HAVE A 460/3/60 POWER SUPPLY. IF-1 AND ITS COMPONENTS WEIGHS 622 POUNDS AND SHALL BE HUNG FROM THE CONCRETE DECK BETWEEN CLOTHING RACKS, PROVIDE SPRING ISOLATION. ATTACH TO STRUCTURE PER STRUCTURAL ENGINEERS DESIGN. PROVIDE SILENCER AND FILTER AT FAN INLET, GREENHECK OR APPROVED EQUAL.
6. CONTRACTOR TO TAKE OFF OF IF-1 WITH 26" X 26" DUCT WORK AND TERMINATE INTO TUNNEL THROUGH EXISTING OPENING. PATCH REMAINING OPENING AIR AND WATER TIGHT. TRANSITION DUCT WORK ACCORDINGLY FOR REQUIRED ROUTING.
7. PROVIDE NEW EXHAUST FAN IF-2. IF-2 SHALL BE A GREENHECK MODEL QEI-40-I-50 OR APPROVED EQUAL. IF-2 SHALL BE SIZED FOR 18,620 CFM AT 0.75 IN OF STATIC PRESSURE; IF-2 SHALL HAVE A 460/3/60 POWER SUPPLY. IF-2 AND ITS COMPONENTS WEIGHS 1704. PROVIDE NEW HOUSE KEEPING PAD AND SPRING ISOLATION. INSTALL PER STRUCTURAL ENGINEERS DESIGN. PROVIDE SILENCER AND FILTER AT FAN INLET, GREENHECK OR APPROVED EQUAL.
8. PROVIDE REMOVABLE CAGE AROUND MOTOR ASSEMBLY.
9. CONTRACTOR TO TAKE OFF OF IF-2 WITH NEW 32" X 48" DUCT WORK AND TERMINATE INTO TUNNEL THROUGH EXISTING OPENING. PATCH REMAINING EXISTING OPENING AIR AND WATER TIGHT.
10. PROVIDE NEW EXHAUST FAN EF-3. EF-3 SHALL BE A GREENHECK MODEL QEI-15-I-30 OR APPROVED EQUAL. EF-3 SHALL BE SIZED FOR 3,680 CFM AT 2.36 IN OF STATIC PRESSURE; EF-3 SHALL HAVE A 460/3/60 POWER SUPPLY. EF-3 AND ITS COMPONENTS WEIGHS 324 POUNDS AND SHALL BE HUNG FROM THE STRUCTURE. INSTALL PER STRUCTURAL ENGINEERS DESIGN. CONTROLS TECHNICIAN TO PROVIDE RENO ALARM IN BAS WHEN FAN IS DISABLED. EF-2 TO BE SEALED FOR OUTDOOR USE.



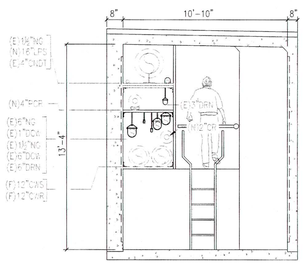
1 / H6.40 LAUNDRY EXHAUST SCHEMATIC
SCALE: NONE



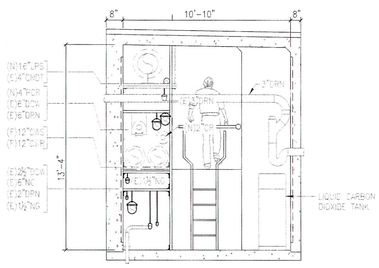
19 / 2 / H6.40 LAUNDRY EXHAUST PLAN - NEW WORK
SCALE: 1/8" = 1'-0"

KEYED NOTES (CONTINUED)

11. ROUTE 20" X 20" DRYER EXHAUST DUCT WORK THROUGH EXISTING OPENING AND INTO UTILITY TUNNEL. ROUTE DUCT WORK AS HIGH AS POSSIBLE TO STRUCTURE IN LAUNDRY ROOM. PATCH REMAINING EXISTING OPENING AIR AND WATER TIGHT. INSULATE NEW DUCT WORK PER CODE.
12. ONCE IN TUNNEL CONTRACTOR TO TRANSITION EXHAUST DUCT WORK TO 36" X 12" AND ROUTE UNDER FUTURE CHILLED WATER PIPING, REFERENCE DETAIL G/H6.4. COORDINATE WITH MECHANICAL PIPING CONTRACTOR AND PROVIDE SHOP DRAWING'S FOR APPROVAL BEFORE INSTALLATION.
13. CONTRACTOR TO TAKE OFF EXISTING DRYER'S WITH NEW 8" DUCT WORK AND CONNECT TO NEW 20" X 20" EXHAUST HEADER. PROVIDE MANUAL SHUT OFF DAMPER AT EACH TAKE OFF.
14. CONTRACTOR TO PROVIDE NEW LINT FILTER: CLEAN CYCLE SYSTEMS MODEL OPL-305, OR APPROVED EQUAL, COMPLETE WITH OVER PRESSURE ALERT HORN. TRANSITION NEW EF-3 DUCT WORK ACCORDINGLY FOR INLET AND OUTLET CONNECTIONS.
15. CONTRACTOR TO PROVIDE NEW 24" X 24" BAROMETRIC DAMPER GREENHECK EM-30 OR APPROVED EQUAL. PROVIDE TRANSITION TO NEW EXHAUST HEADER.
16. ALL FANS TO BE FURNISHED WITH VARIABLE FREQUENCY DRIVES IN ACCORDANCE WITH SPECIFICATION 26 29 23.
17. PROVIDE ELECTRICAL CONNECTIONS TO NEW EXHAUST FAN'S IN PANEL 4R. (2) OF THE FAN'S CAN TIE INTO THE EXISTING BREAKERS. PROVIDE NEW 20 AMP, 3-POLE CIRCUIT BREAKER REMAINING EXHAUST FAN TO CONNECT. ALL ELECTRICAL WORK TO BE INSTALLED PER CODE.
18. ALL PETER STOTT FACILITIES TO REMAIN OPERATIONAL DURING CONSTRUCTION. PROVIDE EXECUTION PLAN FOR REVIEW PRIOR TO COMMENCING WORK.
19. PROVIDE AIR BALANCING FOR ALL NEW EXHAUST FAN'S. PROVIDE THREE COPIES OF REPORT TO OWNER UPON COMPLETION.



E / H6.40 TUNNEL SECTION
SCALE: 1/4" = 1'-0"



F / H6.40 TUNNEL SECTION
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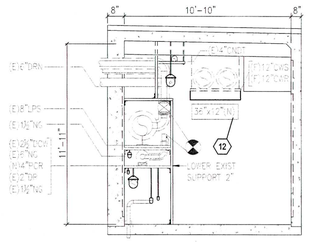

G / H6.40 TUNNEL SECTION
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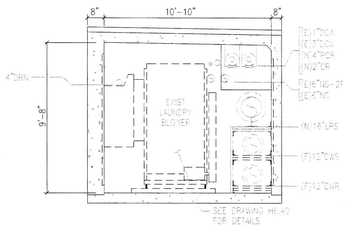

H / H6.40 TUNNEL SECTION
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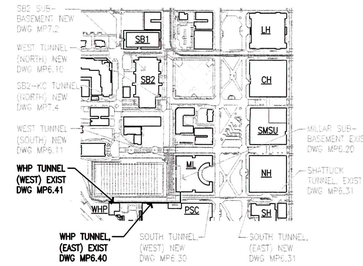

PIPING KEY PLAN
CAMPUS WIDE LOOP PHASE 2

1/8" = 1'-0" 5' 0 5' 10' 15' 20' 25'

REGISTERED PROFESSIONAL ENGINEER
77747PE
OREGON
JAN. 4, 2013
QUINN D. SOIFER
EXPIRES: 6/30/14

PORTLAND STATE UNIVERSITY
WEST HEATING PLANT BOILER REPLACEMENT
238, WEST HEATING PLANT, S.W. ELEVENTH
PORTLAND STATE UNIVERSITY

PORTLAND STATE UNIVERSITY, CAPITAL PROJECTS & CONSTRUCTION, 617 SW MONTGOMERY STREET, Ph. (503)725-3738, Fax (503)725-4329

JOB NO.:	~~XXXXXX~~ WHP12cm1
DRAWN:	QDS
CHECKED:	QDS
DATE:	Sept.-2012

REVISIONS
#-DATE-BY/DESCRP.

SHEET TITLE
PETER STOTT BUILDING
VENTILATION UPGRADE

H6.40

ABBREVIATIONS

A – AMP
ABI – ADDITIVE BID ITEM
AC – ASPHALTIC CONCRETE
AF – AMPERE – FRAME
AFF – ABOVE FINISHED FLOOR
AFG – ABOVE FINISHED GRADE
AIC – AMPERE INTERRUPTING CAPACITY
AS – AMMETER SWITCH
AT – AMPERE – TRIP
AUTO – AUTOMATIC
AWG – AMERICAN WIRE GAUGE

B.C. – BARE COPPER
BLDG – BUILDING
BMS – BUILDING MANAGEMENT SYSTEM
BOT – BOTTOM

C. OR CNDT – CONDUIT
C – COMMON
CB – CIRCUIT BREAKER
CCT – CONTROL CIRCUIT XFMR
CFCI – CONTRACTOR FURNISHED CONTRACTOR INSTLD.
CL – CLASS
CNDCT – CONDUCTOR
CNTL – CONTROL
CON – CONTROL, CONTROLLER
C.O. – CONDUIT ONLY
CR – CONTROL RELAY
CRKT – CIRCUIT
CT – CURRENT XFMR

(D) – DEMOLISH OR REMOVE
DF – DRINKING FOUNTAIN
DIN – DEUTSCHE INDUSTRIE NORM
DIST – DISTRIBUTION
DIV – DIVISION
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 EXST – EXISTING

F/P – FIRE PUMP AUTO XFR SW & CNTLR
FA – FIRE ALARM
FACP – FIRE ALARM CONTROL PANEL
FASP – FIRE ALARM SECURITY PANEL
FCP – FAN CONTROL PANEL
FCR – FAN CONTROL RELAY
FD – FUSED DISCONNECT
FXT – FIXTURE
FLA – FULL LOAD AMPS
FLUOR – FLUORESCENT
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
GOVT – 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 – ICANDESCENT
IG – ISOLATED GROUND
IOTC – INSTANT ON TIMED CLOSE

JBOX – JUNCTION BOX (TYP CNDT BODY)

kCM – THOUSAND CIRCULAR MILS
kV – KILO–VOLT
kVA – KILO–VOLT–AMPERE
kVAR – KILO–VOLT–APMERE–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

mA – MILLI–AMPS
MAG – MAGNETIC
MAX – MAXIMUM
MB – MASTERBOX
MCB – MAIN CIRCUIT BREAKER
MCC – MOTOR CONTROL CENTER
MCP – MOTOR CRKT PROTECTOR CB
MDP – MAIN DISTRIBUTION PANEL
MH – MANHOLE
MIN – MININUM
MLO – MAIN LUGS ONLY
MTD – MOUNTED
MTG – MOUNTING

N – NORTH
(N) – NEW
NC – NORMALLY CLOSED
NA – NOT APPLICABLE
NEMA – NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
NEUT – NEUTRAL
NFD – NON–FUSED DISCONNECT
NFPA – NATIONAL FIRE PROTECTION ASSOCIATION
NO – NORMALLY OPEN

OC – ON CENTER
OFC – OIL–FUSED CB
OFCI – OWNER FURNISHED CONTRACTOR INSTALLED
OHP – OVERHEAD POWER/COMMUNICATION LINES
OVHD – OVERHEAD
OL – OVERLOAD RELAY (THERMAL)

P – POLE
PA – PUBLIC ADDRESS
PB – PULL BOX
PBS – PUSH BUTTON STATION
PEC – PHOTOELECTRIC CELL PF– POWER FACTOR
PFC – POWER FACTOR CORRECTION
PH, OR ϕ – PHASE
PLCS – PLACES
PMH – POWER MANHOLE
PNL – PANEL
POC – POINT OF CONNECTION
PP – POWER POLE
PS – PRESSURE SWITCH
PVC – POLYVINYL CHLORIDE

QTY – QUANTITY

(R) – EXISTING TO BE REMOVED
RCPT – RECEPTACLE
RGS – RIGID GALVANIZED STEEL
(RL) – EXISTING TO BE RELOCATED
RM – ROOM
(RR) – EXISTING TO BE REMOVED & REPLACED
RS – RAPID START

SHLD – SHIELDED
SCA – SHORT CIRCUIT AMPERES (AVAILABLE)
SECP – SECURITY PANEL
SP – SPARE
SPDT – SINGLE POLE DOUBLE THROW
SPST – SINGLE POLE SINGLE THROW
SV – SOLENOID VALVE
SW – SWITCH
SWBD – SWITCHBOARD
SWGR – SWITCHGEAR
SYM – SYMMETRICAL
TB – TERMINAL BOX
TDR – TIME DELAY RELAY
TEL – TELEPHONE SYSTEM
TMH – TELEPHONE MANHOLE
TSW – TEMPERATURE SWITCH
TSD – TREATMENT, STORAGE, AND DISPOSAL
TVSS – TRANSIENT VOLTAGE SURGE SUPPRESSION
TYP – TYPICAL

UGP – UNDERGROUND POWER CONDUIT OR DUCT
UGT – UNDERGROUND TELEPHONE CONDUIT OR DUCT
U.L. – UNDERWRITER'S LABORATORY
UOS – UNLESS OTHERWISE SPECIFIED

V – VOLT
VA – VOLT–AMPS
VAC – VOLTAGE – ALTERNATING CURRENT
VDC – VOLTAGE – DIRECT CURRENT
VS – VOLTMETER SWITCH

W – WATT, OR WIRE
WH – WATER HEATER
WP – WEATHERPROOF
WW – WARM WHITE

XFMR – TRANSFORMER
XFR – TRANSFER
XLP – CROSS–LINKED POLYETHYLENE

ZS – POSITION SWITCH (LIMIT SWITCH)

NOT ALL ABBREVIATIONS OR SYMBOLS USED THIS PHASE

SYMBOLS

GENERAL

- AMMETER
- AMMETER SWITCH
- CIRCUIT BREAKER
- CIRCUIT BREAKER
- OVERLOADS
- DISCONNECT, (FD INDICATES FUSED DISC.)
- OR FUSE
- INDICATING PILOT LIGHT (NOTE: AMBER, BLUE, GREEN, RED, WHITE)
- NON–FUSED DISCONNECT ('FD' INDICATES FUSED DISC.)
- FULL VOLTAGE NON–REVERSING MOTOR STARTER
- FURNISHED VARIABLE FREQUENCY DRIVE WITH INTERNAL DISCONNECT
- 3 POLE, MOTOR RATED SWITCH
- MOTOR – (480V)
- MOTOR – (120V)
- DAMPER MOTOR
- MOTOR, VERTICAL
- ELECTRIC HEATER
- PANEL
- TRANSFORMER
- VOLTMETER
- VOLTMETER SWITCH
- KILOWATT–HOUR METER, WITH DEMAND & PEAK DEMAND REGISTER
- LOCAL STOP/START SWITCH
- VOLTAGE SURGE ARRESTOR
- TRANSIENT VOLTAGE SURGE SUPPRESSOR
- DIGITAL METER UNIT
- CURRENT TRANSFORMER SHORTING TERMINAL BLOCK
- DELTA CONNECTION
- GROUND WYE CONNECTION
- GENERATOR
- MH, HH MANHOLE, HANDHOLE
- AUTOMATIC TRANSFER SWITCH
- GROUND ROD
- GROUND ROD, TEST WELL

RACEWAY

- 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 – LIQUIDTITE
- SURFACE MOUNTED DIVIDED METAL RACEWAY
- CONDUIT SEAL FITTING
- JUNCTION BOX – WALL AND FLOOR MOUNTED
- PB PULL BOX
- TB TERMINAL BOX
- 4PP1–1 HOME RUN CRKT – PNL AND CB #
- CONDUCTOR QTY – INCLUDING NEUT. & GND
- #8 NEUTRAL, ISOLATED GND, GND, CIRCUITS; 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
- FLUORESCENT STRIP, W/ EMERGENCY BATTERY PACK
- M1 M2 M3 OCCUPANCY SENSOR
- DOCK LIGHT
- WALL MOUNT FIXTURE
- PC PHOTOELECTRIC CELL
- T/C TIME CLOCK
- $ 277V, 20A SWITCH
- $3 277V, 20A 3–WAY SWITCH
- $M 120V, MANUAL MOTOR STARTER
- $T 120V, TWIST TIMER
- $D 277V, 20A DIMMING SWITCH
- F3 – FIXTURE TYPE; 34W – FIXTURE WATTS; FIXTURE TYPE DESIGNATION

RECEPTACLES

- SIMPLEX RECEPTACLE
- DUPLEX – 125V, 20A, NEMA 5–20R WALL, CEILING
- GFI – 125V, 20A, NEMA 5–20R
- QUADPLEX RECEPTACLE
- SPECIAL – VOLT, AMPS AS NOTED IN SPECIFICATIONS
- WELDER RECEPTACLE
- SPECIAL – VOLT, AMPS AS NOTED IN SPECIFICATIONS
- DUPLEX RECEPTACLE – EMERGENCY POWER
- COMBINATION SWITCH/DUPLEX RECEPTACLE
- FLUSH FLOOR DEVICE TYPE PER SYMBOLS ABOVE
- PEDESTAL FLOOR DEVICE TYPE PER SYMBOLS ABOVE
- TELE/POWER POLE, POWER POLE
- RAISED FLOOR MULTI SERVICE FLOOR BOX DUPLEX AND SIGNAL OUTPUTS AS NOTED
- CLOCK RECEPTACLE
- DUPLEX DATA COMM PORT

FIRE & GAS ALARM

- FACP FIRE ALARM CONTROL PANEL
- FASA FIRE ALARM SYSTEM ANNUNICIATOR
- ECS "EMERGENCY CHEMICAL SPILL" MANUAL STATION
- EMO "EMERGENCY MANUAL OFF" GAS SHUTDOWN STATION
- ALARM INDICATION LIGHT
- TROUBLE INDICATION LIGHT
- FA FIRE HORN & STROBE
- F MANUAL PULL STATION
- MB MASTER BOX
- MASTERBOX FRONT BUTTON
- B TROUBLE BELL
- SMOKE DETECTOR CEILING OR PLENUM MOUNTED
- HEAT DETECTOR
- HEAT DETECTOR, RATE COMBUSTION
- HEAT DETECTOR, FIXED TEMP. ONLY
- HEAT DETECTOR, RATE OF RISE ONLY
- PRESSURE SWITCH
- H BREATHING AIR FAILURE HORN/STROBE
- VALVE TAMPER SWITCH
- FLOW SWITCH
- SOLENOID

SECURITY

- CCTV SECURITY CAMERA
- D DOOR POSITION MONITOR SWITCH
- CR CARD READER
- ER EMERGENCY DOOR RELEASE BREAK–GLASS
- EB ELECTRIC BOLT
- EL ELECTRIC LOCK
- ES ELECTRIKE STRIKE
- ML MAGNETIC LOCK
- AD AUTO DIALER
- K CARD SENSOR WITH KEYPAD
- BUZZER
- SECURITY MOTION SENSOR

COMMUNICATION

- DOOR ALARM
- KEY OVERRIDE (BYPASS)
- TELEPHONE BACKBOARD
- TELEPHONE OUTLET
- TELEPHONE OUTLET – FLUSH FLOOR
- TELEPHONE OUTLET – PEDESTAL FLOOR
- DATA OUTLET
- DATA OUTLET – FLUSH FLOOR
- DATA OUTLET – PEDESTAL FLOOR
- S SPEAKER / P.A.
- MICROPHONE
- INTERCOM STATION – WALL, DESK M = MASTER STATION

TABLE 3 - CIRCUIT/CONDUIT I.D. TABLE

	TYPE I.D.	CIRCUIT QTY	CIRCUIT WIRE SIZE	GROUND QTY	GROUND GND SIZE	CONDUIT 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 1	#12 #12/IG	3/4
60	P 92	4	#12	2 2	#12 #12/IG	1"
61	P 93	6	#12	3 3	#12 #12/IG	1 1/4
62	P 94	8	#12	4 4	#12 #12/IG	1 1/4"
63						
64	C 01	2	#12			3/4
65	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

1 / E0.1 EQUIPMENT POWER CIRCUITS
SCALE: NONE

MV POWER DISTRIBUTION CABLE IN CONDUIT

Type I.D.	CIRCUIT QTY	CIRCUIT Wire Size	GROUND QTY	GROUND Gnd Size	Cndt SIZE
FUDGE FACTOR			1.25		
H101	3	#2 (5kV)	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 (5kV)	1	#4/0	4"
H105	3	#1 (25kV SHLD)	1	#4/0	4"
H106	3	#1/0 (5kV)	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 (5kV)	1	#4/0	3.5"
H110	3	#2/0 (15kV SHLD)	1	#4/0	4"
H111	3	#2/0 (25kV SHLD)	1	#4/0	4"
H112	3	#4/0 (5kV)	1	#4/0	5"
H113	3	#4/0 (15kV SHLD)	1	#4/0	4"
H114	3	#4/0 (25kV SHLD)	1	#4/0	5"
H115					

2 / E0.1 MV POWER CIRCUIT SCHEDULE
SCALE: NONE (N.I.C.)

LV POWER DISTRIBUTION CABLE

Type I.D.	CIRCUIT QTY	CIRCUIT Wire Size	GROUND QTY	GROUND Gnd Size	Cndt SIZE
FUDGE FACTOR			1.25		
--	...	...			...
H01	4	1000 KCM	1	#4/0	5"
H02	3	1000 KCM	1	#4/0	5"
H03	4	900 KCM	1	#4/0	5"
H04	3	900 KCM	1	#4/0	5"
H05	4	800 KCM	1	#4/0	5"
H06	3	800 KCM	1	#4/0	4"
H07	4	750 KCM	1	#4/0	5"
H08	3	750 KCM	1	#4/0	4"
H09	4	700 KCM	1	#4/0	5"
H10	3	700 KCM	1	#4/0	4"
H11	4	600 KCM	1	#4/0	5"
H12	3	600 KCM	1	#4/0	4"
H13	4	500 KCM	1	#4/0	4"
H14	3	500 KCM	1	#4/0	3.5"
H15	4	350 KCM	1	#4/0	3.5"
H16	3	350 KCM	1	#4/0	3"
H17	4	300 KCM	1	#4/0	3.5"
H18	3	300 KCM	1	#4/0	3"
H19	4	250 KCM	1	#4/0	3"
H20	3	250 KCM	1	#4/0	3"
H21	4	#4/0	1	#2	3"
H22	3	#4/0	1	#2	2.5"
H23	4	#3/0	1	#4	2.5"
H24	3	#3/0	1	#4	2"
H25	4	#2/0	1	#4	2.5"
H26	3	#2/0	1	#4	2"
H27	4	#1/0	1	#6	2"
H28	3	#1/0	1	#6	2"
H29	4	#1	1	#6	2"
H30	3	#1	1	#6	1.5"
H31	4	#2	1	#6	1.5"
H32	3	#2	1	#8	1.25"
H33	4	#3	1	#8	1.5"
H34	3	#3	1	#8	1.25"
H35	4	#4	1	#8	1.25"
H36	3	#4	1	#8	1.25"
H37	4	#6	1	#8	1.25"
H38	3	#6	1	#8	1"
H39	4	#8	1	#8	1"
H40	3	#8	1	#8	1"

3 / E0.1 LV POWER CIRCUIT SCHEDULE
SCALE: NONE (N.I.C.)

TABLE 2 RECOMMENDED DISTANCE (in inches) BETWEEN CONDUIT TRADE SIZES

SIZE	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	3-1/2"	4"	4-1/2"	5"	6"
1/2"	1-3/8"												
3/4"	1-1/2"	1-5/8"											
1"	1-3/4"	1-7/8"	2"										
1-1/4"	2"	2-1/8"	2-1/4"	2-1/2"									
1-1/2"	2-1/8"	2-1/4'	2-3/8"	2-5/8"	2-3/4"								
2"	2-3/8"	2-1/2"	2-3/4"	3"	3-1/8"	3-3/8"							
2-1/2"	2-5/8"	2-3/4"	3"	3-1/4"	3-1/2"	3-3/4"	4"						
3"	3"	3-1/8"	3-3/8"	3-5/8"	3-3/4"	4"	4-3/8"	4-3/4"					
3-1/2"	3-3/8"	3-1/2"	3-5/8"	3-7/8"	4"	4-3/8"	4-5/8"	5"	5-3/8"				
4"	3-3/4"	3-7/8"	4"	4-1/4"	4-3/8"	4-3/4"	5"	5-3/8"	5-3/4"	6"			
4-1/2"	4"	4-1/8"	4-1/4"	4-1/2"	4-3/4"	5"	5-1/4"	5-5/8"	6"	6-1/4"	6-1/2"		
5"	4-3/8"	4-1/2"	4-5/8"	4-7/8"	5"	5-3/8"	5-5/8"	6"	6-1/4"	6-5/8"	7"	7-1/4"	
6"	5"	5-1/8"	5-1/4"	5-1/2"	5-3/4"	6"	6-1/4"	6-5/8"	7"	7-1/4"	7-5/8"	8"	8-1/2"

TABLE 1 - 460V, MOTOR CONDUIT, CONDUCTOR AND STARTER SCHEDULE

MOTOR HP	FULL LOAD (AMPS) ****	CONDUIT SIZE ** (INCHES)	MTR LEAD SIZE (AWG)	GRD WIRE SIZE	STARTER SIZE	FUSE SWITCH SW	FUSE SWITCH FUSE*	*CRKT BRKR MCP CONT. RATING***	OVERLOAD HEATER ****	VERTICAL SPACE-IN FVNR
1/3	1.0	3/4	12	14	1	30A	1.4	3	1.15	12
1/2	1.1						1.4	3	1.27	
3/4	1.6						1.8	3	1.84	
1	2.1						2.25	3	2.42	
1-1/2	3.0						3.2	7	3.45	
2	3.4						4.5	7	3.91	
3	4.8			14			6.25	7	5.52	
5	7.6			12			10	15	8.74	
7-1/2	11		12	12			15	15	12.65	
10	14		10	10	1		17.5	30	16	
15	21	3/4	10	10	2	30A	25	30	24	
20	27		8	10	2	60A	35	50	31	
25	34	1	8	8	2	60A	40	50	39	12
30	40	1	6	8	3	60A	50	50	46	18
40	52	1	6	6	3	100A	70	70	59	18
50	65	1-1/4	4	6	3	100A	80	100	74	18
60	77	1-1/4	2	6	4	100A	100	100	88	24
75	96	1-1/2	1	2	4	200A	125	150	110	24
100	124	2	2/0	2	4	200A	175	400	142	24
125	156	2	3/0	2	5	400A	225	400	179	42
150	180	2-1/2	4/0	1	5	400A	250	400	207	42
200	240	3	350KCM	1	5	400A	350	400	276	42
250	302	3	500KCM	1	6	400A	350	400	347	72

MCP = MOTOR CIRCUIT PROTECTOR

* WESTINGHOUSE SERIES C, TYPE HMCP; OR EQUAL.
** SIZE BASED ON 3 CONDUCTORS, TYPE THW, AWG/MCM, 600V.
*** OR AS PER MANUFACTURER'S RECOMMENDATIONS & INSTRUCTIONS.
**** BASED ON NEC, FIELD VERIFY MOTOR NAMEPLATE VALUES.

MULTI-CONDUCTOR CABLE IN CNDT.

TYPE I.D.	CIRCUIT QTY	CIRCUIT WIRE SIZE	CRKT AREA	CNDT SIZE	OKONITE CAT. No.
--	...	...		...	
M01	1	3/C-#12	0.18	1	202-10-3443
M02	2	3/C-#12	0.36	1.25	202-10-3443
M03	3	3/C-#12	0.54	1.5	202-10-3443
M21	1	3/C-#10	0.23	1.25	202-10-3543
M22	2	3/C-#10	0.46	1.5	202-10-3543
M23	3	3/C-#10	0.69	2	202-10-3543
M41	1	3/C-#8	0.35	1.25	112-10-3844
M42	2	3/C-#8	0.71	2	112-10-3844
M43	3	3/C-#8	1.06	2	112-10-3844
M51	1	3/C-#6	0.50	1.5	112-10-3854
M52	2	3/C-#6	1.01	2.5	112-10-3854
M53	3	3/C-#6	1.51	2.5	112-10-3854
M61	1	3/C-#4	0.57	2	112-10-3864
M65	1	3/C-#2	0.82	2	112-10-3874
M71	1	3/C-#1	1.02	2.5	112-10-3884
M75	1	3/C-#1/0	1.17	2.5	112-10-3894
M81	1	3/C-#2/0	1.37	3	112-10-3904
M85	1	3/C-#4/0	1.89	3.5	112-10-3924
M87	1	3/C-250 KCM	3.08	4	112-10-3929
M89	1	3/C-500 KCM	4.01	5	112-10-3937

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REGISTERED PROFESSIONAL ENGINEER 9980 OREGON October 6, 1978 SHANTUBHAI N. SHAH
EXP 06/30/14

BAR IS ONE INCH ON ORIGINAL DRAWING
0 — 1"

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MARK	DATE	DESCRIPTION
0	07/10/12	ISSUED FOR CONSTRUCTION

ISSUE

PORTLAND STATE UNIVERSITY WEST HEATING PLANT BOILER REPLACEMENT

ELECTRICAL LEGEND, ABBREVIATIONS & GENERAL NOTES

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

E0.1

SHEET 20 OF 24

PANEL LABEL: 4PC	LOCATION: First Floor					MOUNTING: SURFACE		
PANEL VOLTAGE:	480	PHASE:	3	WIRE:		BUS:	INCOMING CONNECTIONS:	
	277	WIRE:	4	SEE 1-LINE		125	125A MLO	
SERVICE	WATTS	A/P	#	A B C	#	A/P	WATTS	SERVICE
BOILER NO.1 COMPRESSOR 5 Hp	1167	15A/3P	1	A	2	15A/3P	1167	BOILER NO. 3 COMPRESSOR 7.5 Hp
	1167		3	B	4		1167	
	1167		5	C	6		1167	
BOILER NO. 1 BLOWER 10 Hp	2500	30A/3P	7	A	8	40A/3P	6167	BOILER NO. 3 BLOWER 25 Hp
	2500		9	B	10		6167	
	2500		11	C	12		6167	
BOILER NO. 1 OIL PUMP 3/4 Hp	167	3A/3P	13	A	14	3A/3P	167	BOILER NO. 3 OIL PUMP 3/4 Hp
	167		15	B	16		167	
	167		17	C	18		167	
FEED WATER PUMP NO. 1 7.5 Hp	1834	15A/3P	19	A	20	15A/3P	1834	FEED WATER PUMP NO.3 7.5 Hp
	1834		21	B	22		1834	
	1834		23	C	24		1834	
FEED WATER PUMP NO. 2 7.5 Hp	1834	15A/3P	25	A	26	15A/3P		SPARE
	1834		27	B	28			
	1834		29	C	30			
SPARE		15A/3P	31	A	32	30A/3P		SPARE
			33	B	34			
			35	C	36			
SPACE			37	A	38			SPACE
			39	B	40			
			41	C	42			

LOAD SUMMARY	WATTS	AMPS	BALANCE
Ph. A	16837	60.8	0%
Ph. B	16837	60.8	0%
Ph. C	16837	60.8	0%
TOTAL WATTS:	50511	60.8	BUS LOADING: 48.6%
KILOWATTS:	50.5		Printed: 26-Jun-12

GROUND BUS:	YES
ISOLATED GND BUS:	NO
BRACING:	22,000 AIC
FEED THRU LUGS:	YES

THIS WORK

PERMANENT PRIMARY FEEDER CONDUITS FROM ELECTRICAL NICHE Nº H-2. SEE TUNNEL DETAILS, DWG. E-11.

PRIMARY SWITCHBOARD HEATING PLANT. (ELEC. RM. H-201). (EXISTING)

PRIMARY ENTRANCE CABLE & TERMINATIONS BY POWER CO.

FUSED AUTOMATIC TRANSFER SWITCHES - MOTOR OPERATED 15 KV. FUSES FURNISHED & INSTALLED BY POWER CO.

600A 600A PRIMARY METERING BY POWER CO. 600A 600A 70E 210E CUBICLES ONLY FOR FUTURE SWITCHGEAR. FUTURE POTHEADS

POTHEADS 15 KV.

TEMPORARY PRIMARY FEEDER CONDUITS FROM ELECTRICAL NICHE Nº H-1.

1 - 4" COND STUBBED TO S.W. CORNER HEATING PLANT - 1 ACT - 1 FUT

6 - 4" CONDUITS ELED UP IN TUNNEL NICHE Nº H-1. SEE TUNNEL DETAILS, DWG. E-11.

4" PRI. CONDUIT STUBBED OUT BEYOND BLDG. RAMP, EAST SIDE FOR FUTURE CENTRAL COOLING TRANSFORMER. SEE PLOT PLAN.

4" CONDUIT, 3 Nº 1/0 15 KV - "VCL"

4" CONDUIT, 3 Nº 1/0 15 KV - "VCL" IN HALL STREET TUNNEL DUCTS.

CT'S & METER IN THIS CONTRACT. SEE SPECIFICATIONS.

UNIT SUBSTATION HEATING PLANT (ELEC. RM. H-103). (EXISTING)

250A MAIN BUS

KA 175A 3P+S.N. KA 200A 3P+S.N. KA 225A 3P+S.N. SPACE PA 50A 3P. SPACE KA 150A 3P SPACE PA 100A 3P SPACE

300/5 C.T.'s

150 KVA DRY TRANSFORMER PRI: 12.5 KV Δ SEC: 277-480V, 3Ø 4 W. Y.

3 Nº 3/0 & 1 Nº 8 NEUT. - 2"C.

SEE DWG. E-10 FOR PLANT POR. WIRE GUTTERS.

3 Nº 4 & 1 Nº 8 NEUT. - 1½"C.

3 Nº 8 - ¾"C.

4 Nº 2 - 2"C.

THIS WORK

4PC (N) 4PA 4PB (E) (E) CONDUIT

TO BOILER CONTROL PANEL 15 (N)

2PA (E) 4PC (E) (SEE REF DRAWING E0.21)

NOTE: PULL BOXES Nº 1, 2 & 3 - 20"W. x 15"H. x 5"D. - HOT DIP GALVANIZED AFTER FABRICATION. CAST FLUSH IN TUNNEL WALL. PROVIDE ENGRAVED PHENOLIC NAMEPLATE TO READ - "EMERGENCY GENERATOR FEEDER". PROVIDE GASKETED SCREW COVER, SECURED WITH "EVERDUR" BOLTS.

ENGINE GENERATOR (EXISTING) HEATING PLANT (ELEC. RM. H-103). 277-480V. 3Ø 4W. "WYE" 60 KW @ 80% POWER FACTOR. 75 KVA

4 Nº 2 - 2"C.

ENCLOSED BREAKERS LOC. IN MTG. PLANT (ELEC. RM. H-103)

100A 3P+S.N. 50A 3P+S.N.

COVERED BATTERIES

ENGINE CRANKING PANEL.

2 Nº 12 - 1"C. - CONTROL

3 Nº 4/0 & 1 Nº 2 NEUT. - 2½"C.

HEATING PLANT EMERGENCY LIGHTING

SERVICE - BUS - 1200A. 277-480V. 3Ø 4 W. Y. FULL NEUTRAL.

UNIT SUBSTATION PHYSICAL EDUCATION BLDG. (ELEC. RM. 165)

POTHEADS 15 KV.

CUBICLE ONLY FOR FUTURE SWITCHGEAR. 600 50E

4"C. ONLY - FUTURE PRIMARY FEEDER TO PROPOSED LIBRARY BLDG. ELL UP IN ELECTRICAL NICHE Nº H-4. SEE TUNNEL DETAILS, DWG. E-11.

750 KVA DRY TRANSFORMER PRI: 12.5 KV Δ SEC: 277-480V, 3Ø 4W. Y

CT'S & METER IN THIS CONTRACT. SEE SPECIFICATIONS.

MAIN DISTRIBUTION "4A" (EXISTING) PHYSICAL EDUCATION BLDG. (ELEC. RM. 168) PETER STOTT BUILDING

KA 800/5 C.T.'s M 100A 3P+S.N. 3 Nº 4/0 & 1 Nº 2 NEUT. 2 Nº 12 - CONTROL

FUSED CIRCUIT BREAKER, MEARS NE F1-P 1600A 4P+S.N. 1200A.(KTU)

FUSED CIRCUIT BREAKER, MEARS NE F1-P 1600A. 3P+S.N. 800A.(KTU)

KA 70A. 3P+S.N. 1600A. 3P+S.N. SPACE

SPACE & BUSSING FOR FUSED CKT. BREAKER, MEARS NE F1-P

FA 40A. 3P+S.N. FA 20A. 3P. FA 100A 3P SPACE FA 100A 3P SPACE

JA 125A. 3P+S.N. JA 125A. 3P+S.N. JA 100A. 3P+S.N. JA 100A. 3P+S.N. 225A 3P SPACE 225A 3P SPACE JA 70A. 3P+S.N. JA 150A. 3P+S.N. JA 125A. 3P+S.N. 225A 3P SPACE 225A 3P SPACE

- ALL TYPE JA -

LA 400A. 3P.+S.N. 225A 3P+S.N. SPACE 225A 3P SPACE

JA 125A. 3P. JA 70A. 3P. FA 40A. 3P. FA 70A. 3P. FA 50A. 3P. FA 20A. 3P. FA 30A. 3P. JA 90A. 3P. JA 225A 3P SPACE 225A 3P SPACE

4 Nº 6 - 1¼"C.

3½"C. ONLY - STUB UP FOR FUTURE LAUNDRY. SEE DWG. E-4.

3½" CONDUIT ONLY FOR FUTURE CONTACTOR (PANEL 4L)

FUTURE CONTACTOR (PANEL 4L)

3 Nº 1/0 & 1 Nº 6 NEUTRAL - 2"C.

3 Nº 1/0 & 1 Nº 8 NEUTRAL - 2"C.

3 Nº 4 & 1 Nº 8 NEUTRAL - 1¼"C.

3 Nº 6 & 1 Nº 8 NEUTRAL - 2"C.

4 Nº 2/0 - 2½"C.

SEE NOTE 3

3 Nº 12 - ½"C.

3 Nº 10 - ¾"C.

SEE DETAIL DWG. E-9.

4 Nº 350 MCM - "TH" - 3½"C.

STUB CONDUIT ONLY UP FOR FUTURE LAUNDRY. SEE DWG. E-4, DWG. E-5, ACTIVITY RM. Nº 2.

SUB-DISTRIBUTION "SD-2A" PHYSICAL EDUCATION BLDG. (ELEC. RM. 168).

4 Nº 500 MCM - "TH" - 3½"C.

2 Nº 10 - ¾"C.

2 Nº 8 - 1"C.

4 Nº 350 - 3"C.

JUNCTION BOXES ABOVE GYMNASIUM - 25S CEILING FOR FUTURE LIGHTING.

DISCONNECT SWITCH (N.I.C. - INSTALL IN THIS WORK.)

120 V. SOURCE CKT. 23, PANEL 2A

MASTER CLOCK

3 Nº 14 - 1"C.

REVISED 4LE "HT RE-4

ENCLOSED BREAKER CAB. FOR AUX. GYM LTG. - LOC. IN GYM STOR. RM. 253.

CARRIER FREQUENCY GENERATOR - LOCATED IN ELEC. RM. 168.

CONDUITS STUBBED OUT BEYOND BUILDING SOUTH SIDE, 80' EAST OF GRID 6. SEE PLOT PLAN, DWG. E-1.

9 - 3½"C. ONLY.

SPECIAL EQUIPMENT (EXISTING)

DRY TRANSFORMERS ARE RATED AT PRIMARY - 480 V. 3 PHASE "DELTA". SECONDARY - 120-208 V., 3 PHASE, 4 WIRE "WYE". WITH TAPS AS SPECIFIED.

1. DRY TRANSFORMER - 75 KVA, LOCATED IN ELEC. EQUIPMENT RM. 168.
2. DRY TRANSFORMER - 45 KVA, LOCATED IN STORAGE RM. 110.
3. DRY TRANSFORMER - 20 KVA, LOCATED IN STORAGE RM. 119.
4. DRY TRANSFORMER - 37½ KVA, LOCATED IN JANITOR AND STORAGE RM. 209.
5. DRY TRANSFORMER - 30 KVA, LOCATED IN GYM. STORAGE RM. 253.
6. DRY TRANSFORMER - 10 KVA, LOCATED IN POOL MECHANICAL RM. 001.
7. DRY TRANSFORMER - 50 KVA, LOCATED IN GYM. STORAGE RM. 253.
8. DRY TRANSFORMER - 15 KVA, LOCATED IN JANITOR AND STORAGE RM. 209. PRIMARY - 480 V., 1 PHASE. SECONDARY - 120-240 V., 1 PHASE, 3 WIRE, S.N. 208
9. DRY TRANSFORMER - 10 KVA, LOCATED IN ELEC. EQUIPMENT RM. 168.
10. DRY TRANSFORMER - 10 KVA, LOCATED IN ROOF PENTHOUSE.
11. DRY TRANSFORMER - 6 KVA, LOCATED IN MECHANICAL RM. 206.
12. DRY TRANSFORMER - 20 KVA, LOCATED IN ELEC. ROOM H-103, HEATING PLANT.
13. AUTOMATIC TRANSFER SWITCH - 100 A., 277-480 V., 3 PHASE, 4 WIRE. SEE SPECIFICATIONS.
14. CONTACTOR MECHANICALLY HELD - 100 A., 2 P., 240 V., 1 PHASE, 3 W.,S.N. SQUARE D Co. CLASS 8903, TYPE GG-1 WITH 120 VOLT CONTROL COIL.

THIS WORK

15. REPLACE EXISTING BOILER CONTROL PANEL BY NEW BCP BY CLEAVER BROOKS.

RISER DIAGRAM
NO SCALE

NOTES: (EXISTING)

1. SEE SHEET E-11, FOR PANEL SCHEDULES.
2. PROVIDE A METAL CABINET IN ELECTRIC ROOM 168, TO CONTAIN 1 SET OF SPARE FUSES FOR EACH SIZE INSTALLED FOR THE PRIMARY SWITCH AND SECONDARY FUSED BREAKERS. FURNISH AND INSTALL AN ENGRAVED PHENOLIC NAMEPLATE ON FACE OF CABINET TO READ "SPARE FUSES".
3. SEE DRAWING E-5, MECHANICAL CONTROL DETAILS, FOR WIRE GUTTERS.
4. CO-ORDINATE LOCATION OF ALL SWITCHBOARDS, UNIT SUBSTATIONS, DISTRIBUTION PANELS, ETC., AS TO SPACE AVAILABLE AND ACCESS ROUTES. RESPONSIBILITY IS THIS CONTRACTORS.

RECESSED: 4"/16 SQ. JCT. BOX - 2⅛" DEEP WITH BLANK COVER. 3 PAD TO CEILING AS DIRECTED BY THE ARCHITECT.

2 - 3/4" CONDUITS ONLY.

RECESSED ELECTRICAL PANEL - AS NOTED WITH AN ASTERISK (*) ABOVE.

DETAIL OF SPARE CONDUITS AT RECESSED PANELS
NO SCALE

3PH. 4W.SN. PANEL No. SYSTEM REQUIRED

CIRCUITS SHALL BE CONNECTED AS NUMBERED ON THE PLANS

EMPTY PANEL TUB & TRIM ONLY FOR FUTURE CONCESSION PANEL. SEE PANEL SCHEDULE & DWG. E-5. PROVIDE 2" CONDUITS ONLY TO 4"/16" SQ. BOX AS PER DETAIL AT LEFT IN LIEU OF THE 2 - 3/4"C. - PANEL "2T" ONLY.

NOTE:
ORIGINAL RISER DIAGRAM BY WOLFF & ZIMMER ARCHITECTS (11/6/1964)

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REGISTERED PROFESSIONAL ENGINEER — STATE OF OREGON — CHRISTOPHER J. ZIMMER — 9080 — EXPIRES: 06/30/14

BAR IS ONE INCH ON ORIGINAL DRAWING 0 1"

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MARK	DATE	DESCRIPTION
0	07/10/12	ISSUED FOR CONSTRUCTION

ISSUE

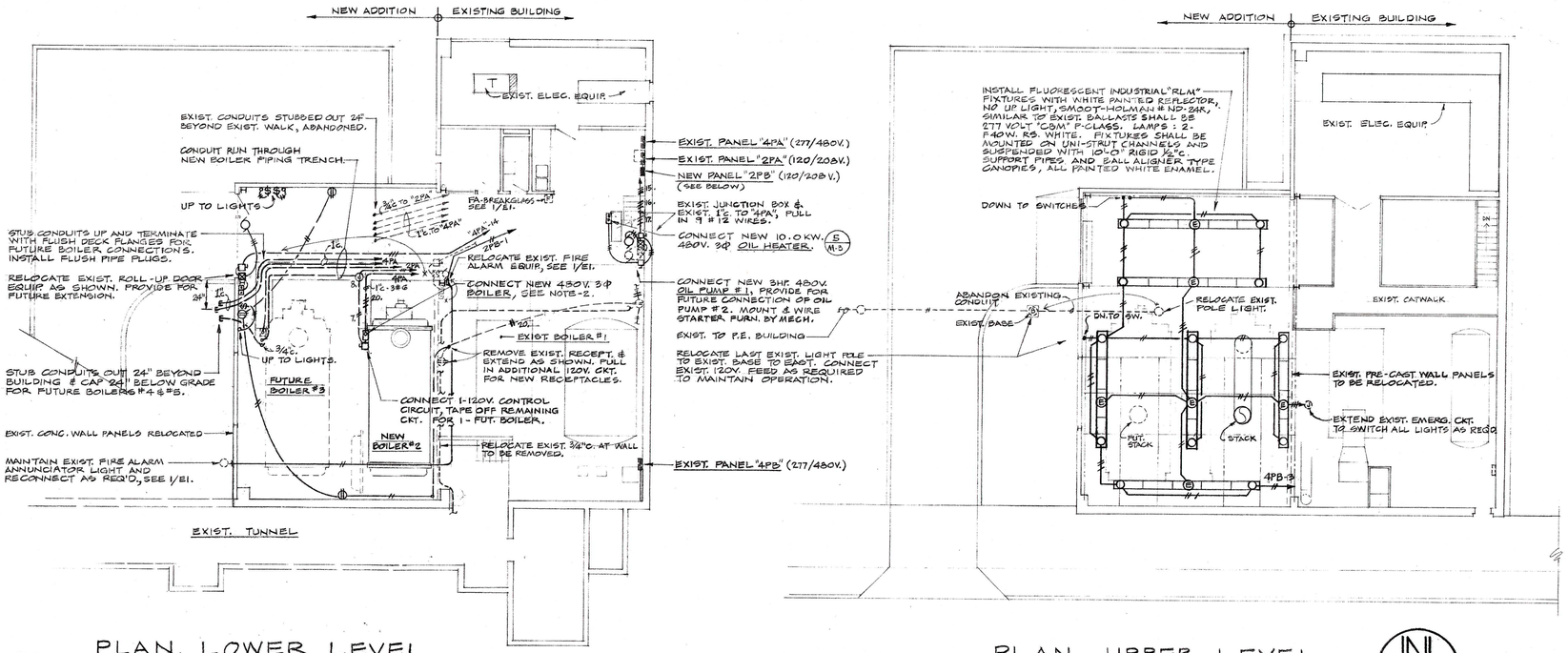
PORTLAND STATE UNIVERSITY
WEST HEATING PLANT
BOILER REPLACEMENT

ONE-LINE DIAGRAM
WEST HEATING PLANT

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

E0.2

SHEET 21 OF 24

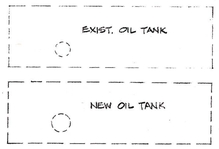


PLAN, LOWER LEVEL

1/8" = 1'-0"

NOTES:

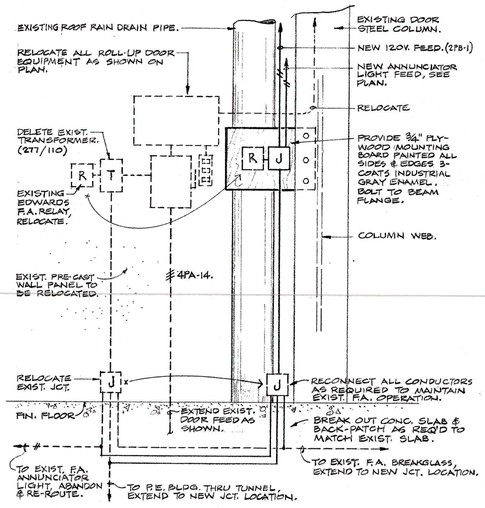
1. VERIFY LOCATIONS PRIOR TO ROUGH-IN OF ALL MECHANICAL EQUIPMENT.
2. PACKAGE BOILER WITH CONTROL PANEL, CONSISTING OF 1-20HP. BLOWER; 1-1HP OIL PUMP; 1-10KW OIL HEATER, AND 1-5HP AIR COMPRESSOR. ALL 480V. 3φ. CONNECT LINE LEADS AND CONTROL CIRCUIT, VERIFY.
3. RETURN ALL USABLE ELECTRICAL EQUIPMENT TO UNIVERSITY AS DIRECTED.
4. DISCONNECT EXIST. DUPLEX ½ HP. PUMP MOTORS & RECONNECT AT NEW DUPLEX 2 HP. PUMP MOTORS IN EXIST. DIVISION OF CONTINUING EDUCATION MECH. RM. SEE SHT. M1' AND SPECS.



PLAN, UPPER LEVEL

1/8" = 1'-0"

SYMBOL SCHEDULE	
	FLUORESCENT LIGHT FIXTURE.
	FLUORESCENT LIGHT FIXTURE ON EMERGENCY SYSTEM.
	INCANDESCENT WALL MOUNTED LIGHT FIXTURE.
S	SWITCH-1P, 277V.
J	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.



1/E1 FIRE ALARM REVISIONS

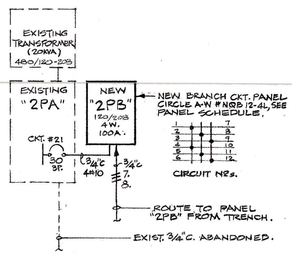
APPROX. 1'-0"

ADDITIONS TO EXISTING PANELS

PANEL	CIRCUIT #	BREAKER AMP	BREAKER POLE	ITEM	
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-1¼HP-5HP-24 KW.)	NEW BRKR.
	10	90	3	SPACE ONLY FOR FUTURE BOILER #3.	
				(LEAVE REMAINING SPARE BREAKERS IN PLACE)	
4PB 277/480 V.	3	20	1	LIGHTING CIRCUIT	EXIST. BRKR.
2PA 120/208 Y.	21	30	3	SUB-FEED FOR NEW PANEL "2PB"	

NEW PANEL

2PB 120/208V. 60A. 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	—	1	SPACE	



2/E1 PARTIAL ONE-LINE DIAGRAM

NO SCALE

⚠ REVISED AS REPORTED "AS BUILT" 7-6-76

REGISTERED PROFESSIONAL ENGINEER — ROSS OREGON — JULY 14 1967 — LOUIS M. PERKINS

PLANS, SCHEDULES AND DETAILS	Project No. 1049
WEST HEATING PLANT UTILITIES ADDITION	Date 6-13-74
PORTLAND STATE UNIVERSITY - PORTLAND, OREGON	Scale SHOWN
C. W. **Timmer Associates** Inc. Consulting Engineers / Beaverton, Oregon	Dwg. No. E-1
	Sht. 12 of 12

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REGISTERED PROFESSIONAL ENGINEER 9980 — OREGON — STANTON N. KNOX — RENEWAL 12-31-12

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MARK	DATE	DESCRIPTION
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ISSUE

PORTLAND STATE UNIVERSITY
WEST HEATING PLANT
BOILER REPLACEMENT

EXISTING ELECTRICAL PLANS, SCHEDULES AND DETAILS

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

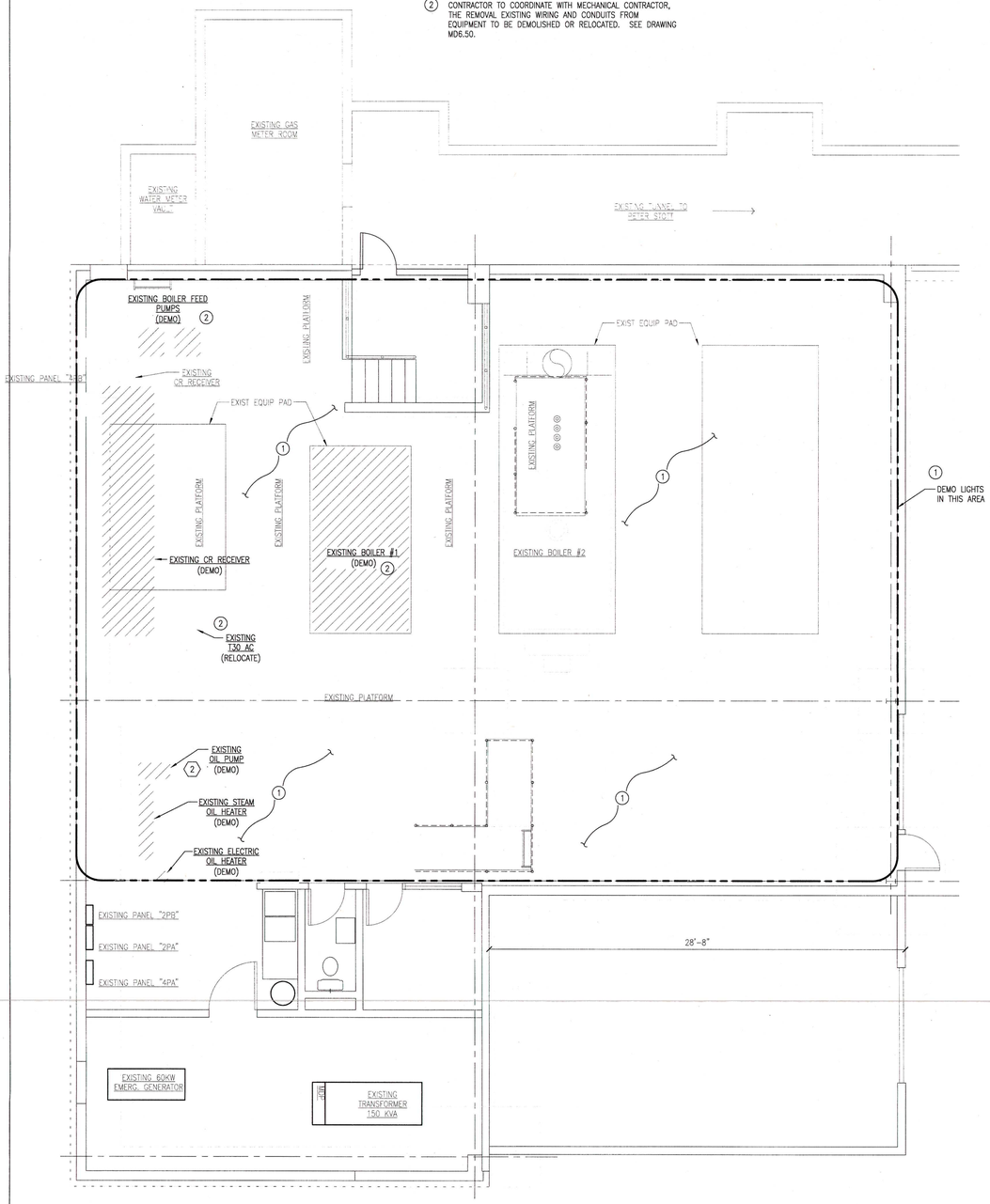
E0.21

SHEET 22 OF 24

Plot Date: 9 July 2012 - 7:16 PM Plotted By: Matthew Carmichael Cad File No: G:\10909 - PSU (Portland State University)\10909-12002 PSU WHP Boiler Replacement\06-CAD\Sheets\10909-12002_22_E0.21 Reference Drawing.dwg

CONSTRUCTION KEYED NOTES:

1. CONTRACTOR TO REMOVE EXISTING LIGHT FIXTURES AND RETURN TO OWNER. USE TEMPORARY CONSTRUCTION LIGHTING DURING EXISTING EQUIPMENT/BOILER REMOVAL AND INSTALLATION OF NEW EQUIPMENT AND BOILER.
2. CONTRACTOR TO COORDINATE WITH MECHANICAL CONTRACTOR, THE REMOVAL EXISTING WIRING AND CONDUITS FROM EQUIPMENT TO BE DEMOLISHED OR RELOCATED. SEE DRAWING MD6.50.

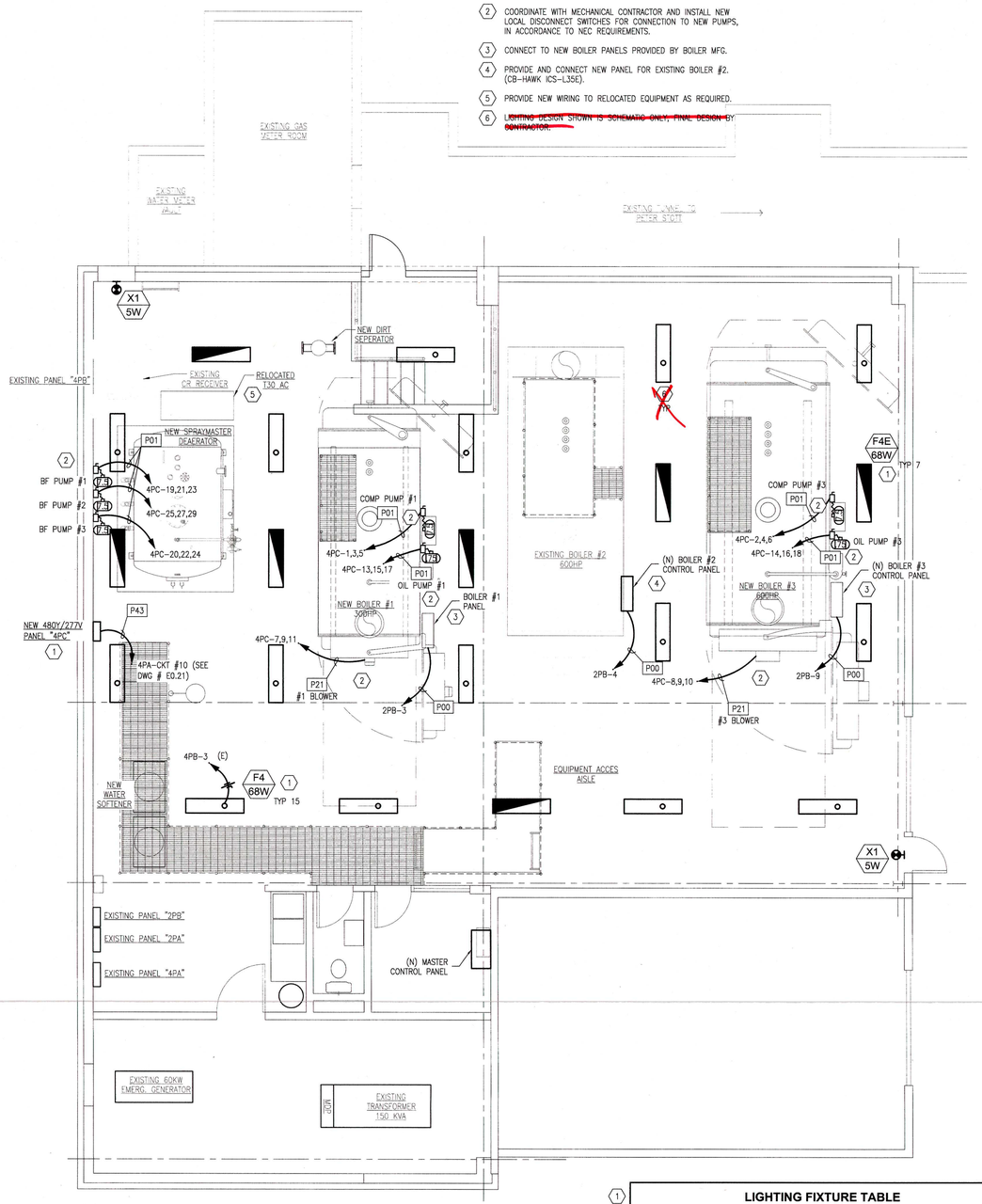


2 E6.50 WHP EXISTING LIGHTING AND POWER DEMO PLAN
SCALE: 1/4"=1'-0"

N

CONSTRUCTION KEYED NOTES:

1. INSTALL NEW WIRING, CONDUITS AND LIGHTING FIXTURES AS SHOWN ON FIXTURE SCHEDULE AFTER NEW BOILERS ARE INSTALLED.
2. COORDINATE WITH MECHANICAL CONTRACTOR AND INSTALL NEW LOCAL DISCONNECT SWITCHES FOR CONNECTION TO NEW PUMPS, IN ACCORDANCE TO NEC REQUIREMENTS.
3. CONNECT TO NEW BOILER PANELS PROVIDED BY BOILER MFG.
4. PROVIDE AND CONNECT NEW PANEL FOR EXISTING BOILER #2. (CB-HAWK ICS-L35E).
5. PROVIDE NEW WIRING TO RELOCATED EQUIPMENT AS REQUIRED.
6. ~~LIGHTING DESIGN SHOWN IS SCHEMATIC ONLY, FINAL DESIGN BY CONTRACTOR.~~



1 E6.50 WHP LIGHTING AND POWER PLAN
SCALE: 1/4"=1'-0"

N

1/4" = 1'-0" 5' 0 5' 10' 15'

LIGHTING FIXTURE TABLE

FIXTURE			MOUNTING		
KEY	SYMBOL	TYPE	METHOD	BOT OF FIXTURE	DETAIL
X1 5W	⊗	LED WALL MOUNT EXIT SIGN	SURFACE, WALL	MOUNT ABOVE EXIT OPENINGS AS INDICATED	LQM ELN
F4 68W	▭	STRIP W/ REFLECTOR 1'x4', LAMP T5HO	CHAIN HUNG	ELEV. AFF AS NOTED	AF232
F4E 68W	▬	STRIP W/ REFLECTOR 1'x4', LAMP T5HO, BATTERY BALLAST	CHAIN HUNG	ELEV. AFF AS NOTED	AF232 W/PS1400QD

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EXP 06/30/14

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ISSUE

PORTLAND STATE UNIVERSITY
WEST HEATING PLANT
BOILER REPLACEMENT

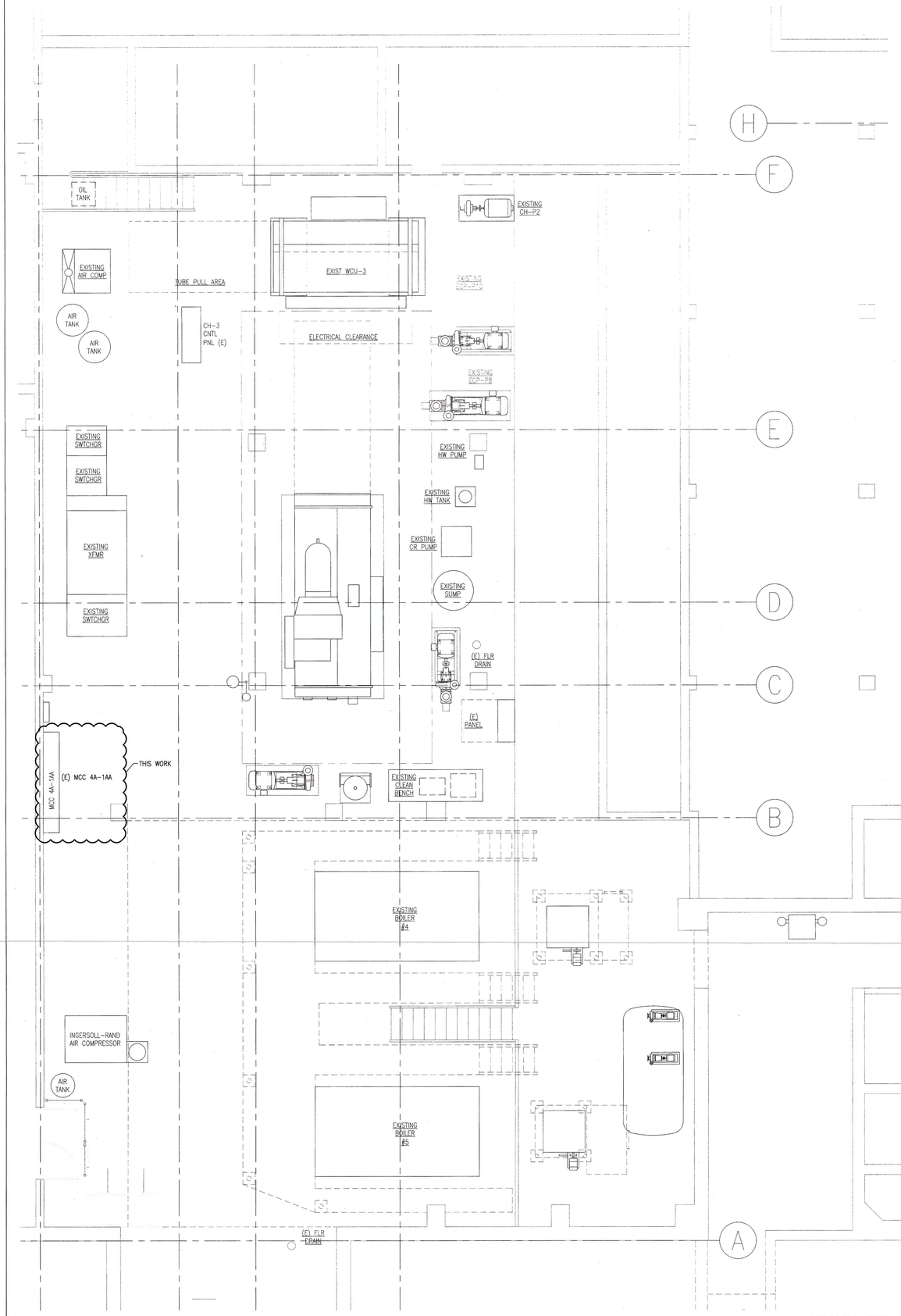
WEST HEATING PLANT
ELECTRICAL POWER & LIGHTING PLAN

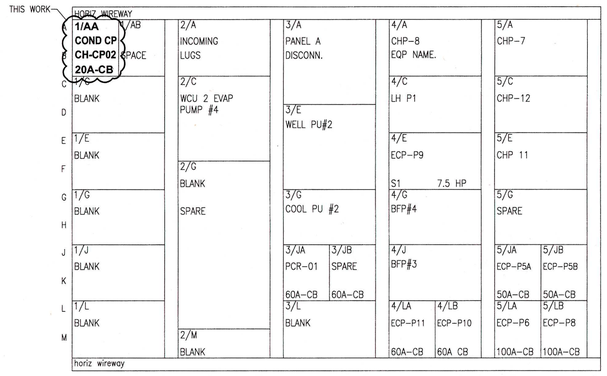
PROJ NO: 10909-12002
DRWN: MTC CHKD: GCY

E6.50

SHEET 23 OF 24

Plot Date: 10 July 2012 - 10:20 AM Plotted By: Richard George
Cad File No: G:\10909 - PSU (Portland State University)\10909-12002 PSU WHP Boiler Replacement\06-CAD\Sheets\10909-12002_23_E6.50 WHP Elect Dist.dwg





MANUFACTURER: CUTLER-HAMMER
SERIES: 2100
HORIZ. BUS: 600A
VERTICAL BUS: 300A (VERT. UNIT #2 = 600A)
VOLTAGE: 480V / 3PH / 3W

CRAMER BASEMENT – MCC 4A (aka "4")

2 / E6.53 (E) MCC 4A-1AA ELEVATION
SCALE:

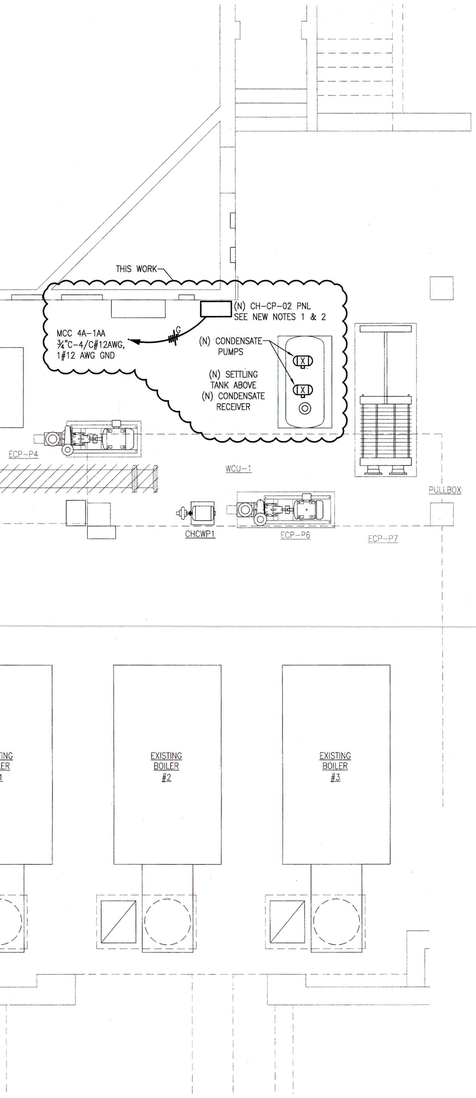
EXISTING NOTES

1. PUMP ECP-P8 RE-CIRCUITED TO 100A BRKR, FEEDING (N) VFD, W/LOCAL DISC.
2. NEW PUMP.
3. NEW PUMPS, FEEDERS FOR NEW VFDS, W/LOCAL DISC.
4. PUMP ECP-P10 RE-CIRCUITED TO 100A BRKR, FEEDING (N) VFD, W/LOCAL DISC.
5. INSTALL 1000AF/600AT BREAKER FOR NEW CHILLER #1 IN MDP.
6. CHILLER AND CNTL PNL BY OTHERS. BREAKER AND CIRCUIT THIS WORK.

THIS WORK

NEW NOTES

1. **INSTALL 20-AMP, 3-PHASE, 480-VOLT BREAKER IN COMPARTMENT 1/AA**
2. **CONTRACTOR TO RELOCATE FIRE ALARM SWITCH TO ACCOMMODATE LOCATION OF NEW CONDENSATE CONTROL PANEL ON WALL.**



1 / E6.53 CRAMER HALL SUB BASEMENT LOWEL LEVEL EQUIPMENT PLAN
SCALE: 1/4" = 1'-0"

N

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REGISTERED PROFESSIONAL ENGINEER 9980 OREGON SHANE T. NELSON
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ISSUE

PORTLAND STATE UNIVERSITY
WEST HEATING PLANT
BOILER REPLACEMENT

CRAMER HALL SUB-BASEMENT ELECTRICAL PLAN

PROJ NO: 10909-12002
DRWN: RAG CHKD:

E6.53

SHEET 12 OF 24

Plot Date: 10 July 2012 - 11:06 AM Plotted By: Matthew Carmichael
Cad File No: G:\10909 - PSU (Portland State University)\10909-12002 PSU WHP Boiler Replacement\06-CAD\Sheets\10909-12002_24_E6.53 CH Elect Dist.dwg

GENERAL STRUCTURAL NOTES

GENERAL PROJECT NOTES

1. THE GOVERNING CODE IS THE 2009 INTERNATIONAL BUILDING CODE (IBC) AS AMENDED BY THE 2010 OREGON STRUCTURAL SPECIALTY CODE (OSSC)

2. UNLESS OTHERWISE NOTED, MATERIAL AND DESIGN SPECIFICATIONS CITED HEREIN SHALL BE THOSE CONFORMING WITH THE VERSION OF THE APPLICABLE SPECIFICATION OR CODE MOST RECENTLY ADOPTED BY THE PERMITTING AUTHORITIES. THESE STRUCTURAL NOTES ARE TO BE USED AS A SUPPLEMENT.

3. ALL FEATURES OF CONSTRUCTION NOT FULLY SHOWN SHALL BE OF THE SAME TYPE AND CHARACTER AS SHOWN FOR SIMILAR CONDITIONS, SUBJECT TO REVIEW BY THE PROJECT ENGINEER.

4. ALL PRODUCTS AND MATERIALS USED BY THE CONTRACTOR SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

5. ALL CONSTRUCTION SHALL BE COORDINATED WITH THE PROJECT ENGINEER & ANY DEVIATIONS FROM DRAWINGS SHALL BE NOTED TO THE ENGINEER IN WRITING.

6. THE SUPPORTING STRUCTURE IS BEYOND THE SCOPE OF THIS SUBMITTAL. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO SUBMIT THESE CALCULATIONS AND ASSOCIATED DOCUMENTS TO THE ENGINEER OF RECORD TO ANALYZE THE ABILITY OF THE SUPPORTING STRUCTURE TO ACCOMMODATE THE REACTIONS FROM THE CONNECTIONS SPECIFIED IN THIS SUBMITTAL. THIS SET OF CALCULATIONS IS BASED ON THE LOADS AND ASSUMPTIONS STATED WITHIN THIS SUBMITTAL. IF THE LOADS AND ASSUMPTIONS ARE NOT CORRECT THIS SUBMITTAL SHALL BE REVISED.

DESIGN LOADS:

DEAD LOAD
SELF WEIGHT OF PIPING AND EQUIPMENT INCLUDES 10% INCREASE PER PROJECT SPECIFICATIONS.

WIND
BASIC WIND SPEED : 95 MPH (3 SECOND GUST)
EXPOSURE CATEGORY: B

SEISMIC
DESIGN G-FORCE OF 1.0g's APPLIED TO DEAD LOAD WITH 10% INCREASE PER PROJECT SPECIFICATION

FOUNDATION AND FOOTINGS

1. EXISTING FOUNDATIONS WERE ANALYSIZED FOR NET BEARING PRESSURE OF 2500 PSF AS INDICATED ON ORIGINAL DRAWINGS DATED 06/13/1974

POST INSTALLED ANCHORS

1. MECHANICAL ANCHORS IN CONCRETE SHALL CONFORM TO ICC REPORT ESR-1917

2. ADHESIVE ANCHORS IN CONCRETE SHALL CONFORM TO ICC REPORT ESR-2322

3. PERIODIC SPECIAL INSPECTION IS REQUIRED FOR MECHANICAL AND ADHESIVE ANCHOR INSTALLATION.

CONCRETE

1. CONCRETE WORK SHALL CONFORM TO ALL REQUIREMENTS OF ACI 301 LATEST EDITION. "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDING" EXCEPT AS OTHERWISE NOTED OR SPECIFIED.

2. MATERIALS:
   A) CEMENT SHALL CONFORM TO ASTM C 150, PORTLAND CEMENT, TYPE I OR TYPE II.
   B) AGGREGATES SHALL CONFORM TO ASTM C33, CONCRETE AGGREGATES WITH THE FOLLOWING MAXIMUM AGGREGATE SIZES:
      1 HOUSEKEEPING PADS - 3/4 INCH

   C) WATER USED IN MIXING CONCRETE SHALL BE CLEAN AND FREE FROM INJURIOUS AMOUNTS OF OILS, ACIDS, ALKALIS, SALTS, ORGANIC MATERIALS OR OTHER SUBSTANCES DELETERIOUS TO CONCRETE OR REINFORCEMENT. NONPOTABLE WATER SHALL NOT BE USED IN CONCRETE.

3. CONCRETE SHALL BE PROPORTIONED TO PROVIDE AN AVERAGE COMPRESSIVE STRENGTH AS FOLLOWS:
   A) HOUSEKEEPING PADS: 3000 PSI

   MIX REQUIREMENTS
   -- MINIMUM 28 DAY f_c = 3000 psi
   -- MINIMUM 5.5 SACKS OF CEMENT PER CUBIC YARD
   -- SLUMP RANGE BETWEEN 2" AND 4"
   -- AIR ENTRAINMENT RANGE BETWEEN 4% AND 6% AT PERIMETER WALLS AND FOOTINGS.
   -- MAXIMUM 6.0 GALLONS OF WATER PER SACK OF CEMENT
   -- FLY ASH ADMIXTURE TO 25% BY VOLUME REPLACEMENT OF PORTLAND CEMENT.

4. CONCRETE SHALL BE DEPOSITED AS NEARLY AS PRACTICABLE IN ITS FINAL POSITION TO AVOID SEGREGATION DUE TO REHANDLING OR FLOWING. CONCRETING SHALL BE CARRIED ON AT SUCH A RATE THAT CONCRETE IS AT ALL TIMES PLASTIC AND FLOWS READILY INTO SPACES BETWEEN REINFORCEMENT. CONCRETE THAT HAS PARTIALLY HARDENED OR BEEN CONTAMINATED BY FOREIGN MATERIALS SHALL NOT BE DEPOSITED IN THE STRUCTURE.

5. CONCRETE (OTHER THAN HIGH-EARLY-STRENGTH) SHALL BE MAINTAINED ABOVE 50 DEGREES F. AND IN A MOIST CONDITION FOR AT LEAST THE FIRST SEVEN DAYS AFTER PLACEMENT.

6. CONCRETE MATERIALS, FORM WORK, MIXING, PLACING AND CURING SHALL WITH THE SPECIFICATIONS CONTAINED IN THE AACI "MANUAL OF PRACTICE

7. CONCRETE SHALL NOT BE PLACED ON FROZEN GROUND OR AT BELOW FREEZING TEMPERATURES.

8. ADDITIVES AND ADMIXTURES TO CONCRETE SHALL NOT BE USED UNLESS APPROVED BY THE ENGINEER OF RECORD.

REINFORCING STEEL

1. REINFORCEMENT SHALL BE DEFORMED REINFORCEMENT AND REINFORCEMENT SHALL CONFORM TO ASTM A 615, REINFORCING BARS FOR CONCRETE.

2. REINFORCING BARS SHALL HAVE THE FOLLOWING SPECIFIED YIELD STRENGTHS:
   NO. 4 AND SMALLER - 60,000 PSI (GRADE 60)

3. REINFORCING STEEL SHALL NOT BE BENT OR DISPLACED FOR THE CONVENIENCE OF OTHER TRADES UNLESS APPROVED BY THE STRUCTURAL ENGINEER.

4. REINFORCEMENT BARS SHALL NOT BE TACK WELDED, WELDED, HEATED, OR CUT, UNLESS INDICATED ON THE CONTRACT DOCUMENTS OR APPROVED BY THE STRUCTURAL ENGINEER.

STRUCTURAL STEEL

1. STRUCTURAL STEEL SHALL BE:
   A) MISCELLANEOUS PLATES & SHAPES: ASTM A36, FY = 36 KSI
   B) STRUCTURAL TUBING: ASTM A500-82A, GRADE B, FY = 46 KSI
   C) STRUT: ASTM A653 (Fy = 33 KSI)
   D) HIGH STRENGTH BOLTS: ASTM A325-83C 1/2" TO 1" DIAMETER, INCLUSIVE, FY=92 KSI, 1-1/8" TO 1-1/2" DIAMETER, INCLUSIVE, FY=81 KSI

2. CONNECTORS SHALL CONFORM TO SPECIFICATIONS FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS.

3. ALL STEEL SHALL BE CORROSION- RESISTANT BY GALVANIZING OR BY THE USE OF STAINLESS STEEL.

4. THE CONTRACTOR IS RESPONSIBLE FOR ANY AND ALL TEMPORARY SUPPORTS REQUIRED FOR ERECTION.

WELDING

1. WELDING SHALL BE CONDUCTED BY CERTIFIED WELDERS AND SHALL CONFORM TO THE AWS CODES FOR ARC AND GAS WELDING IN BUILDING CONSTRUCTION.

2. WELDS SHALL BE MADE USING E70XX ELECTRODES AND SHALL BE 3/16" MINIMUM, UNLESS OTHERWISE NOTED.

3. WELDING SHALL BE PERFORMED IN ACCORDANCE WITH A WELDING PROCEDURE SPECIFICATION (WPS) AS PER AWS D1.1, D1.3, AND D1.4. ONLY PREQUALIFIED WELDING PROCEDURES SHALL BE USED.

4. GRIND GALVANIZED SURFACES CLEAN PRIOR TO WELDING AND REPLACE WITH COLD GALVANIZING AFTER COMPLETION OF WELDING.

NBZ
Consulting Engineers
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PORTLAND STATE UNIVERSITY
WEST HEATING PLANT - BOILER REPLACEMENT
PORTLAND, OR

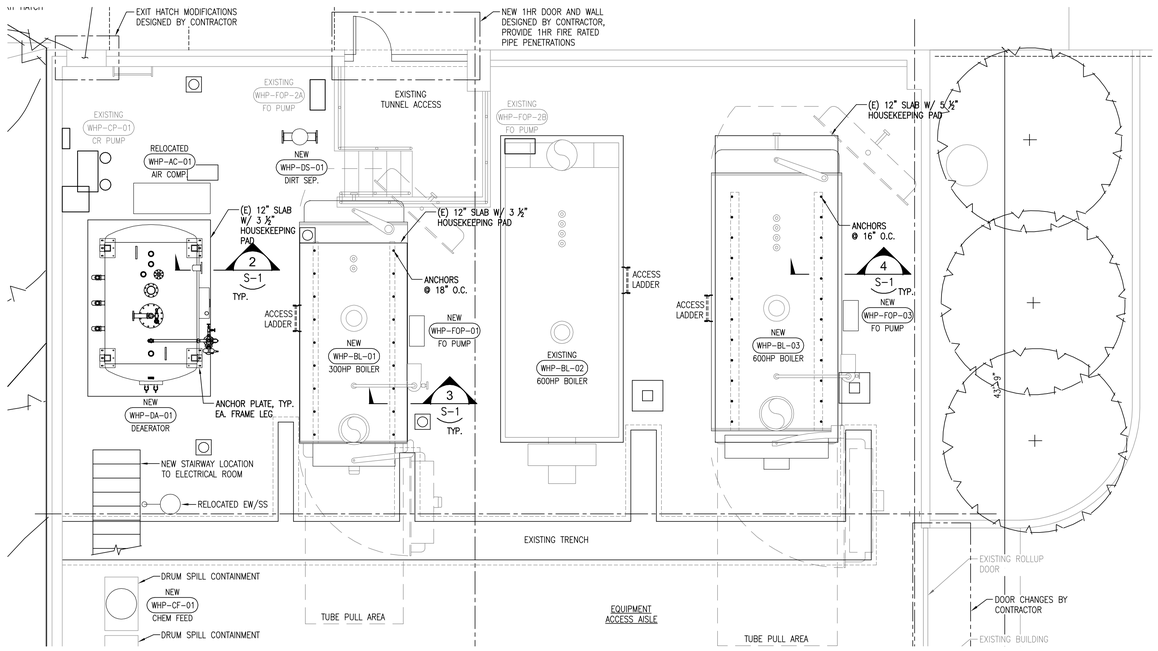
DRAWING INFORMATION

DRAWING FILE:	
DRAWN BY:	DS & ND
CHECKED BY:	
DATE:	11/4/2013
REVISION 1:	
DATE:	
REVISION 2:	
DATE:	
SCALE:	

JOB No:
12-020

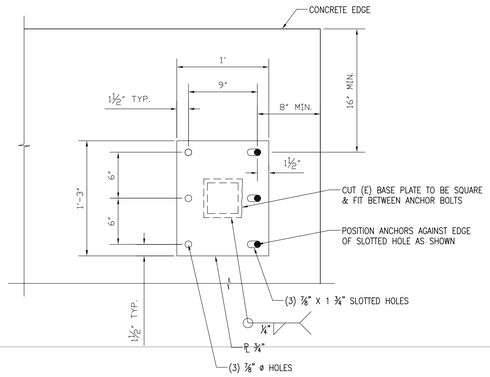
SHEET No:
S- 0 OF S- 9

REGISTERED PROFESSIONAL ENGINEER
65743PE
OREGON
JUNE 2, 2005
NADIA ZOUIED
EXPIRES: 06/30/14

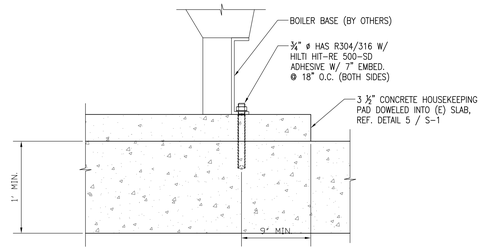


1 S-1 WHP LOWER LEVEL & SITE EQUIPMENT PLAN
SCALE: 1/4"=1'-0"

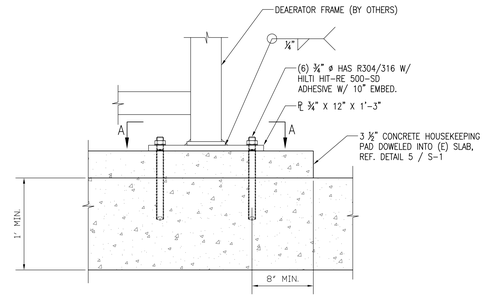
N 1/4" = 1'-0" 5' 0 5' 10' 15'



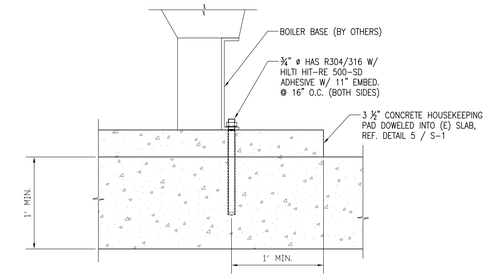
A-A SECTION
PLATE DETAIL



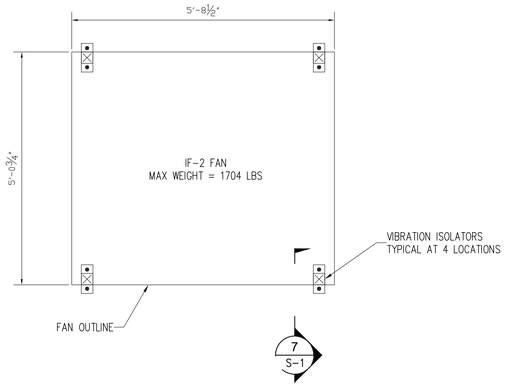
3 S-1 WHP-BL-01 300 HP BOILER SEISMIC ANCHORAGE DETAIL
SCALE: 1 1/2"=1'-0"



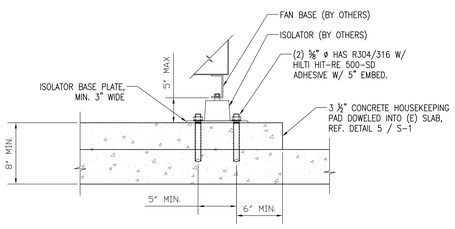
2 S-1 WHP-DA-01 DEAERATOR SEISMIC ANCHORAGE DETAIL
SCALE: 1 1/2"=1'-0"



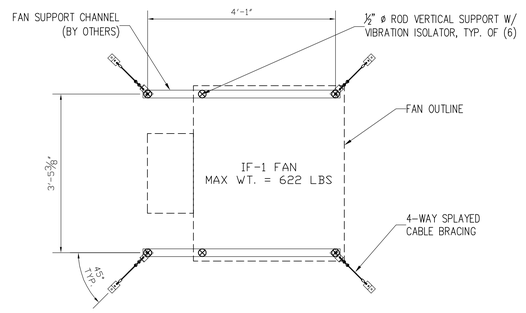
4 S-1 WHP-BL-03 600 HP BOILER SEISMIC ANCHORAGE DETAIL
SCALE: 1 1/2"=1'-0"



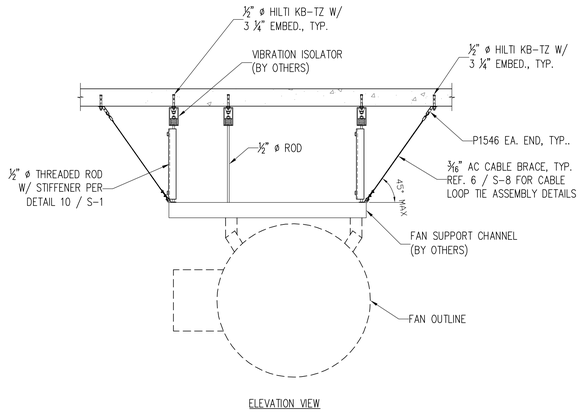
6 S-1 PLAN VIEW FLOOR MOUNTED FAN
SCALE: 1/2"=1'-0"



7 S-1 IF-2 FAN ANCHORAGE DETAIL
SCALE: 1 1/2"=1'-0"

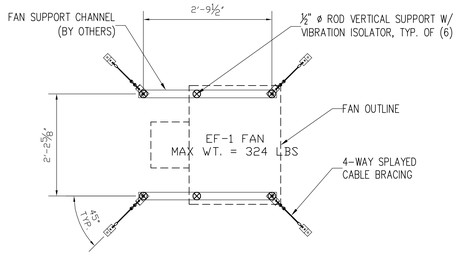


PLAN VIEW

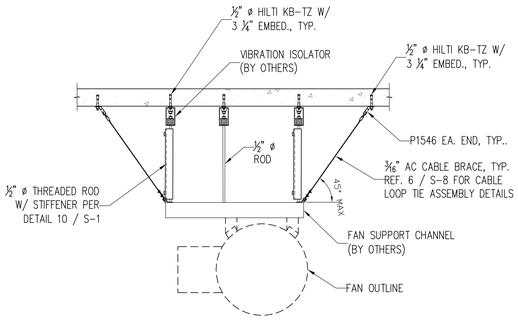


ELEVATION VIEW

8 S-1 IF-1 FAN SUPPORT PLAN AND ELEVATION
SCALE: 1/2"=1'-0"

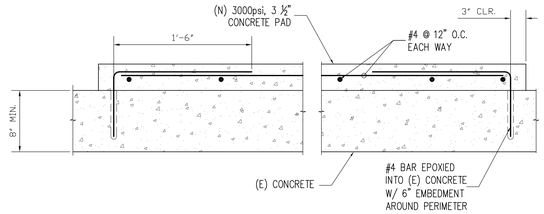


PLAN VIEW

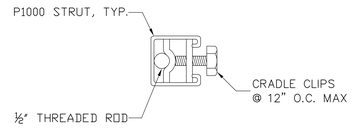


ELEVATION VIEW

9 S-1 EF-1 FAN SUPPORT PLAN AND ELEVATION
SCALE: 1/2"=1'-0"



5 S-1 TYPICAL HOUSEKEEPING PAD DETAIL
SCALE: 1 1/2"=1'-0"



10 S-1 ROD STIFFENER DETAIL
SCALE: 6"=1'-0"

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ph: 971.222.4378 21617 SW Sioan Lane
fx: 503.848.8748 Beaverton, OR 97006

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WEST HEATING PLANT - BOILER REPLACEMENT
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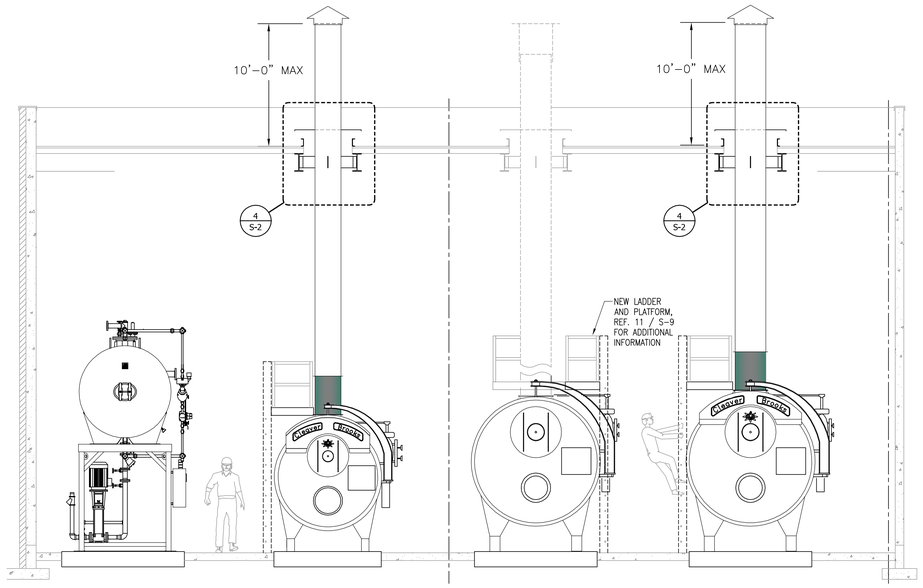
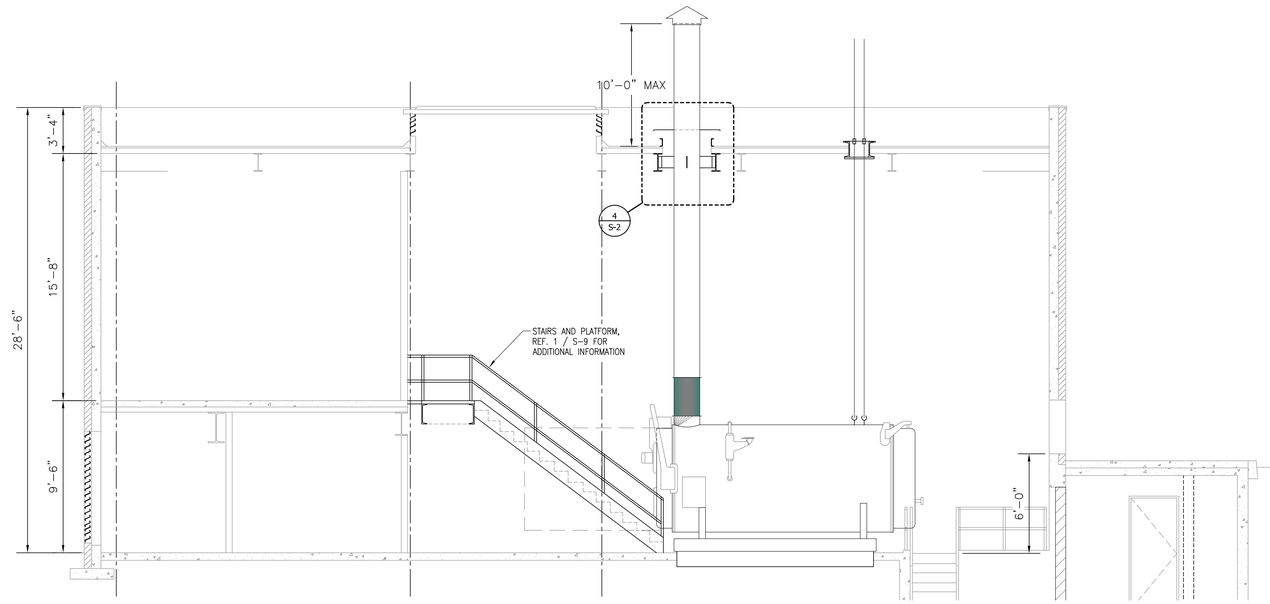
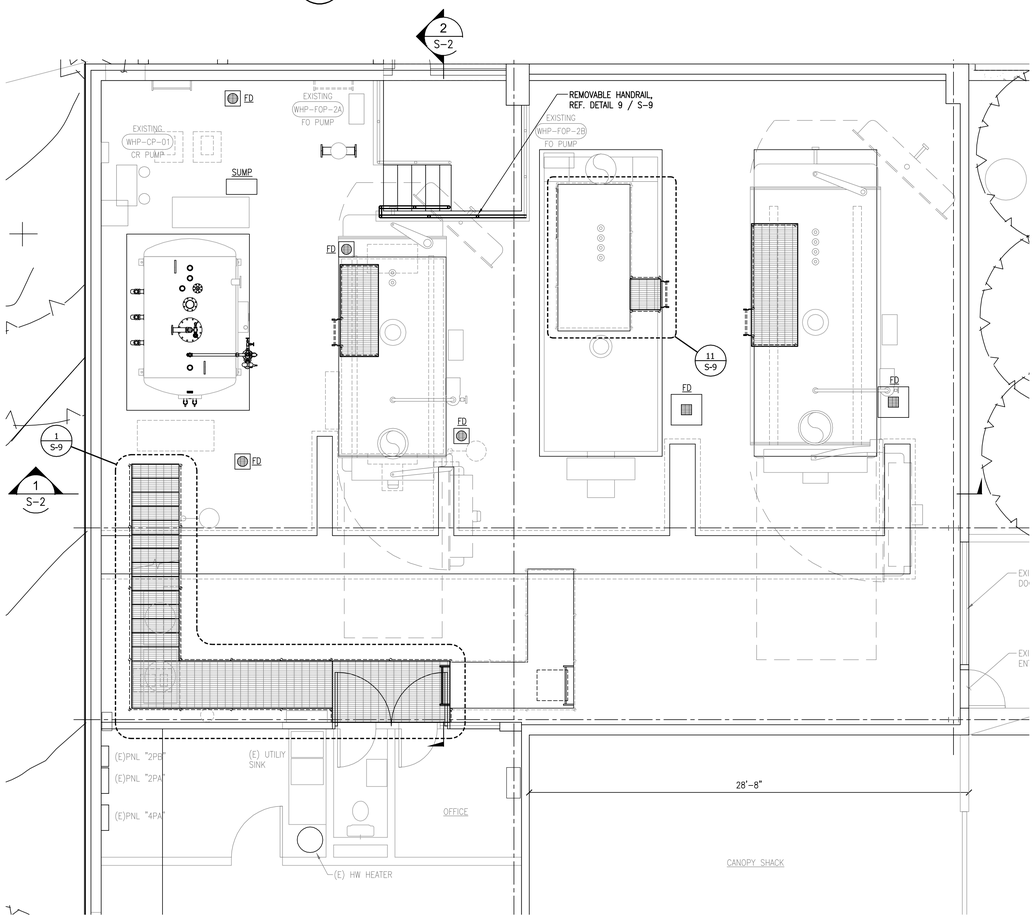
65743PE
OREGON
JUNE 2, 2010
NADIA ZONTED
EXPIRES: 06/30/14



1 S-2 ELEVATION VIEW AT BOILER STACKS
SCALE: 1/4"=1'-0"



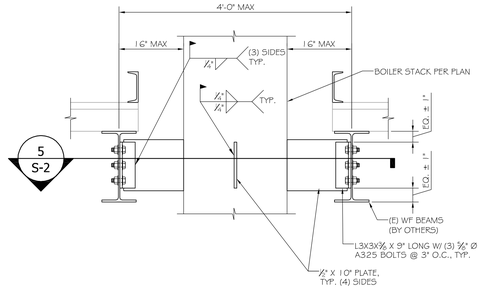
2 S-2 WHP NEW PLATFORM NEW CONSTRUCTION ELEVATION
SCALE: 1/4"=1'-0"



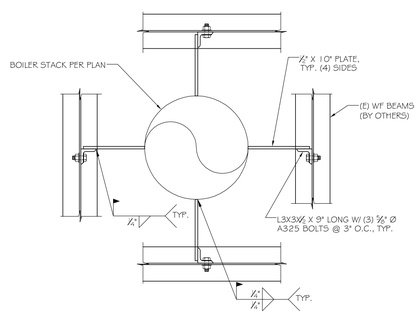
3 S-2 WHP NEW PLATFORM UPPER LEVEL NEW PLAN
SCALE: 1/4"=1'-0"

N

1/4" = 1'-0" 5' 0 5' 10' 15'



4 S-2 DETAIL AT STACK ROOF PENETRATION
SCALE: 1"=1'-0"



5 S-2 SECTION VIEW
SCALE: 1"=1'-0"

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OREGON
JUNE 2, 2006
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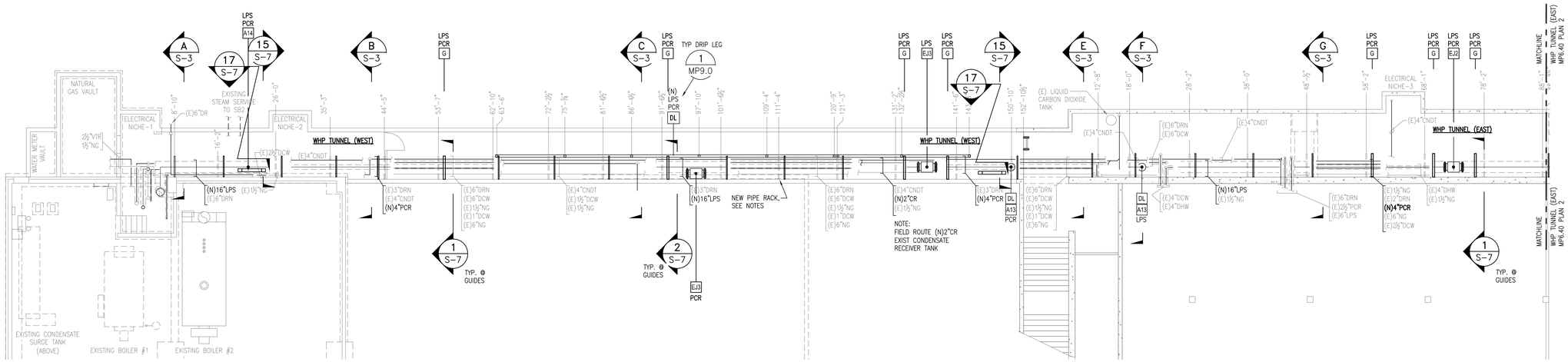
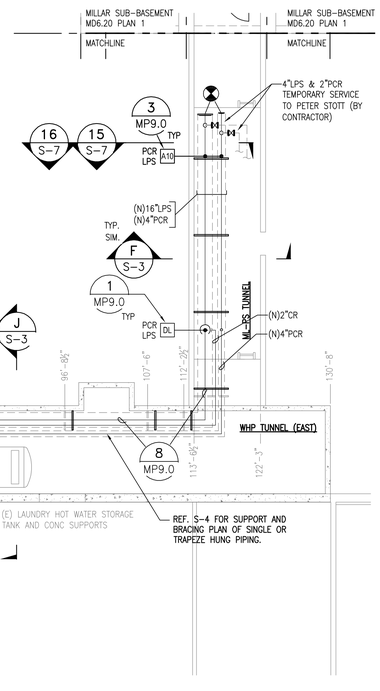
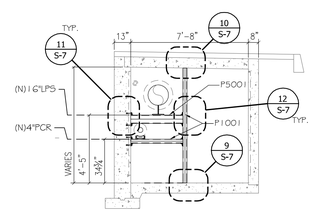


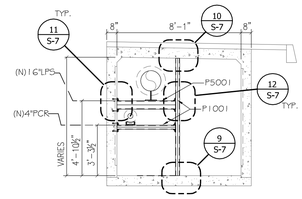
1 S-3 NEW PIPING PLAN
WEST HEATING PLANT TUNNEL (WEST)
SCALE: 1/8" = 1'-0"



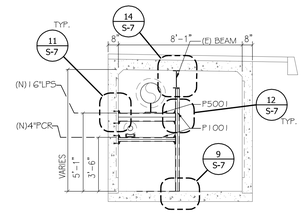
2 S-3 NEW PIPING PLAN
WEST HEATING PLANT TUNNEL (EAST)
SCALE: 1/8" = 1'-0"



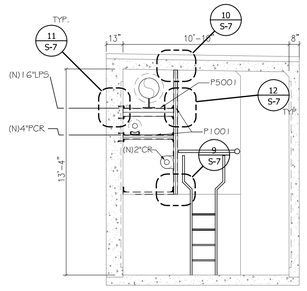
A S-3 NEW PIPING TUNNEL SECTION
SCALE: 1/4" = 1'-0"



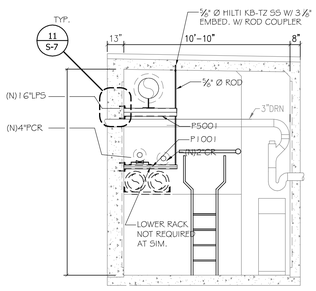
B S-3 NEW PIPING TUNNEL SECTION
SCALE: 1/4" = 1'-0"



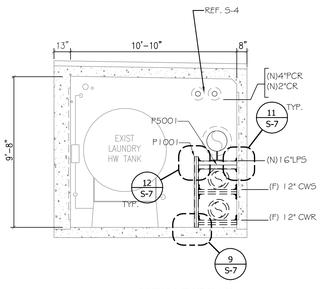
C S-3 NEW PIPING TUNNEL SECTION
SCALE: 1/4" = 1'-0"



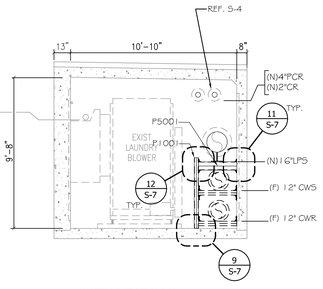
E S-3 NEW PIPING TUNNEL SECTION
SCALE: 1/4" = 1'-0"



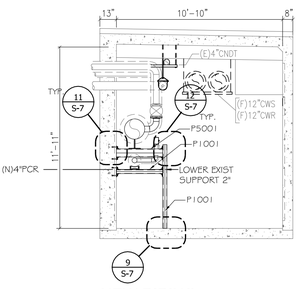
F S-3 NEW PIPING TUNNEL SECTION
SCALE: 1/4" = 1'-0"



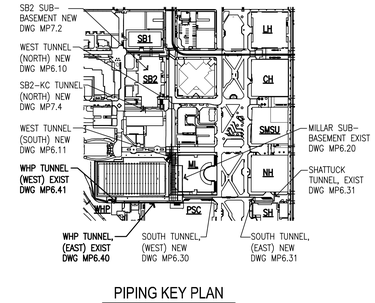
J S-3 NEW PIPING TUNNEL SECTION
SCALE: 1/4" = 1'-0"



H S-3 NEW PIPING TUNNEL SECTION
SCALE: 1/4" = 1'-0"



G S-3 NEW PIPING TUNNEL SECTION
SCALE: 1/4" = 1'-0"



PIPING KEY PLAN
CAMPUS WIDE LOOP
PHASE 2

1/8" = 1'-0" 5' 0 5' 10' 15' 20' 25'

NBZ
Consulting Engineers
ph. 971.222.4378 21617 SW Sioan Lane
fx. 503.848.8748 Beaverton, OR 97006

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WEST HEATING PLANT - BOILER REPLACEMENT
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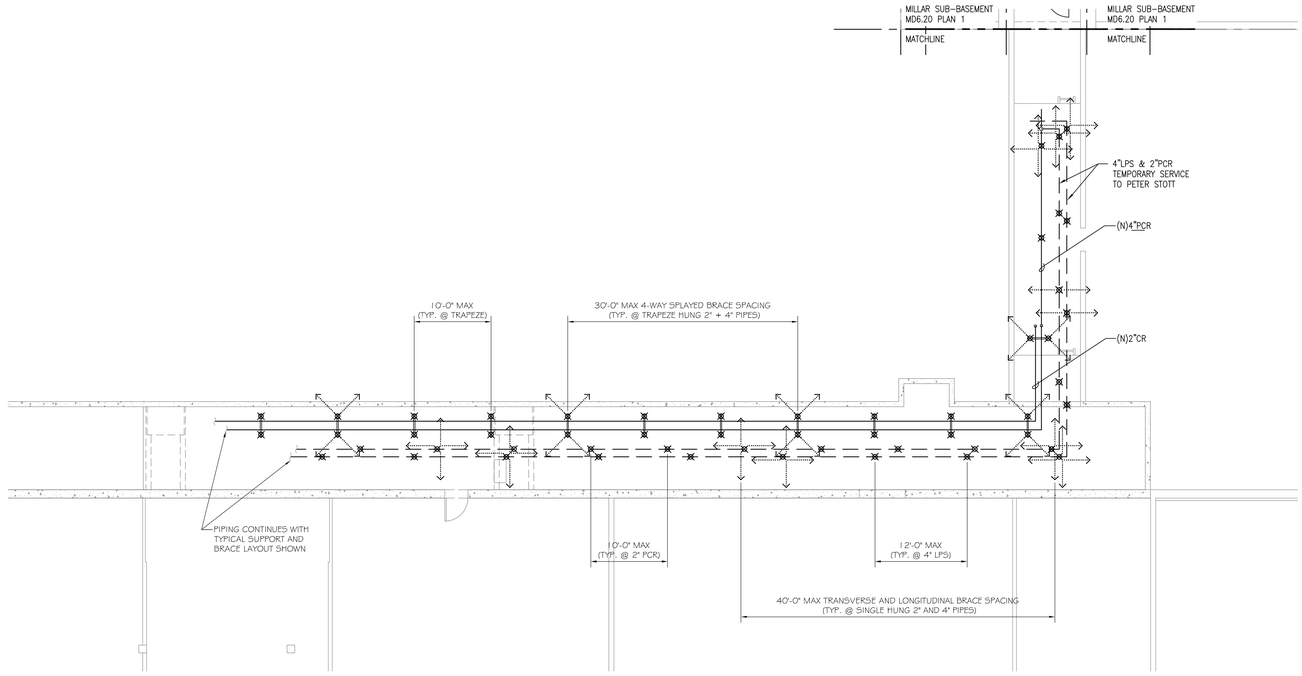
SHEET No: S-3 OF S-9

REGISTERED PROFESSIONAL ENGINEER 65743PE OREGON JUNE 2, 2006 NADIA ZOUIED

EXPIRES: 06/30/14

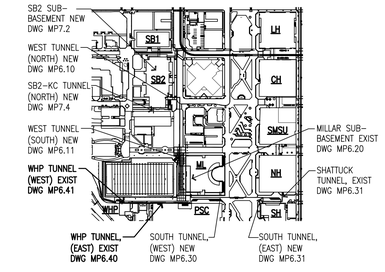


1 / S-4 SINGLE HUNG PIPING PLAN
WEST HEATING PLANT TUNNEL (EAST)
SCALE: 1/8" = 1'-0"

N

SUPPORT LEGEND

- VERTICAL SUPPORT ROD W/ SPRING HANGER 1/S-8
- SUPPORT WITH 2-WAY TRANSVERSE CABLE BRACING 2/S-8
- SUPPORT WITH 4-WAY LONGINTUDINAL AND TRANSVERSE CABLE BRACING 3/S-8
- 2-ROD TRAPEZE SUPPORT WITH SPRING HANGERS 4/S-8
- 2-ROD SUPPORT WITH 4-WAY SPLAYED (TRANSVERSE/LONGITUDNIAL) CABLE BRACING 5/S-8



PIPING KEY PLAN
CAMPUS WIDE LOOP
PHASE 2

N

1/8" = 1'-0" 5' 0 5' 10' 15' 20' 25'

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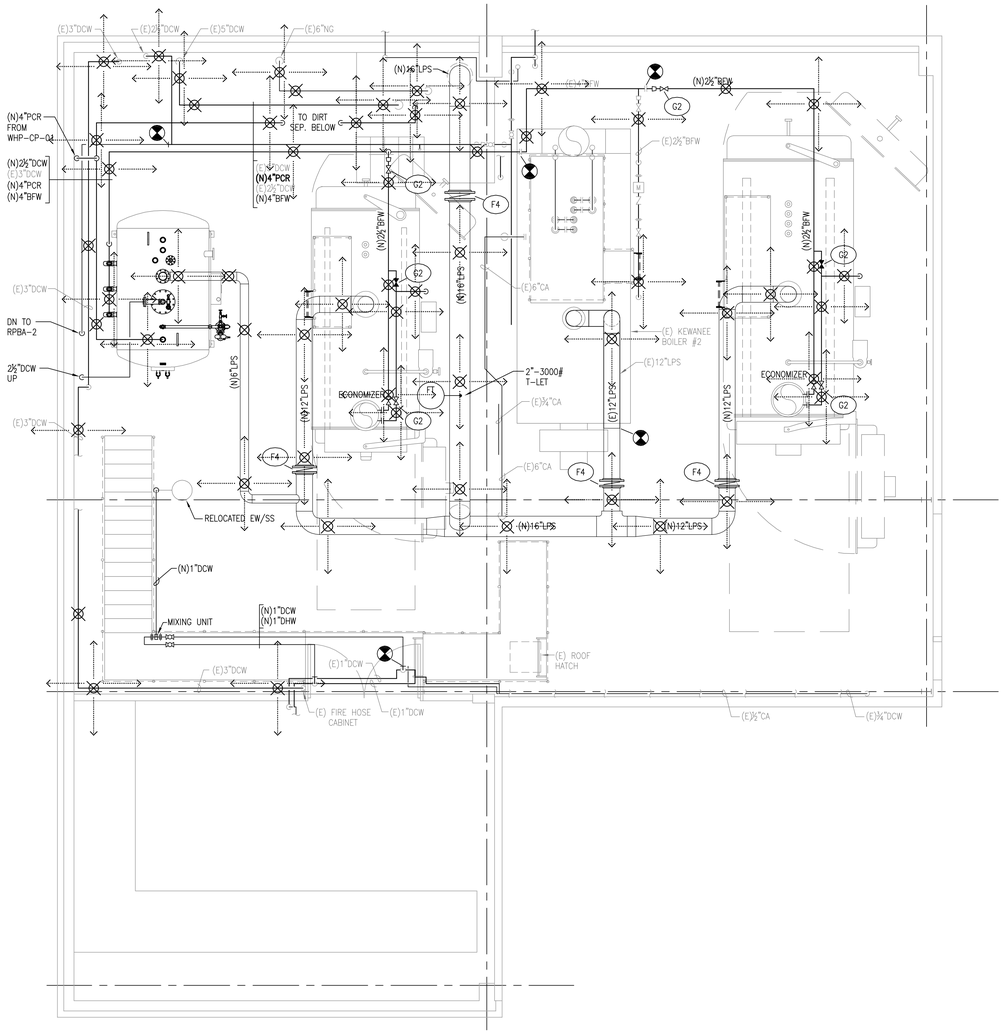
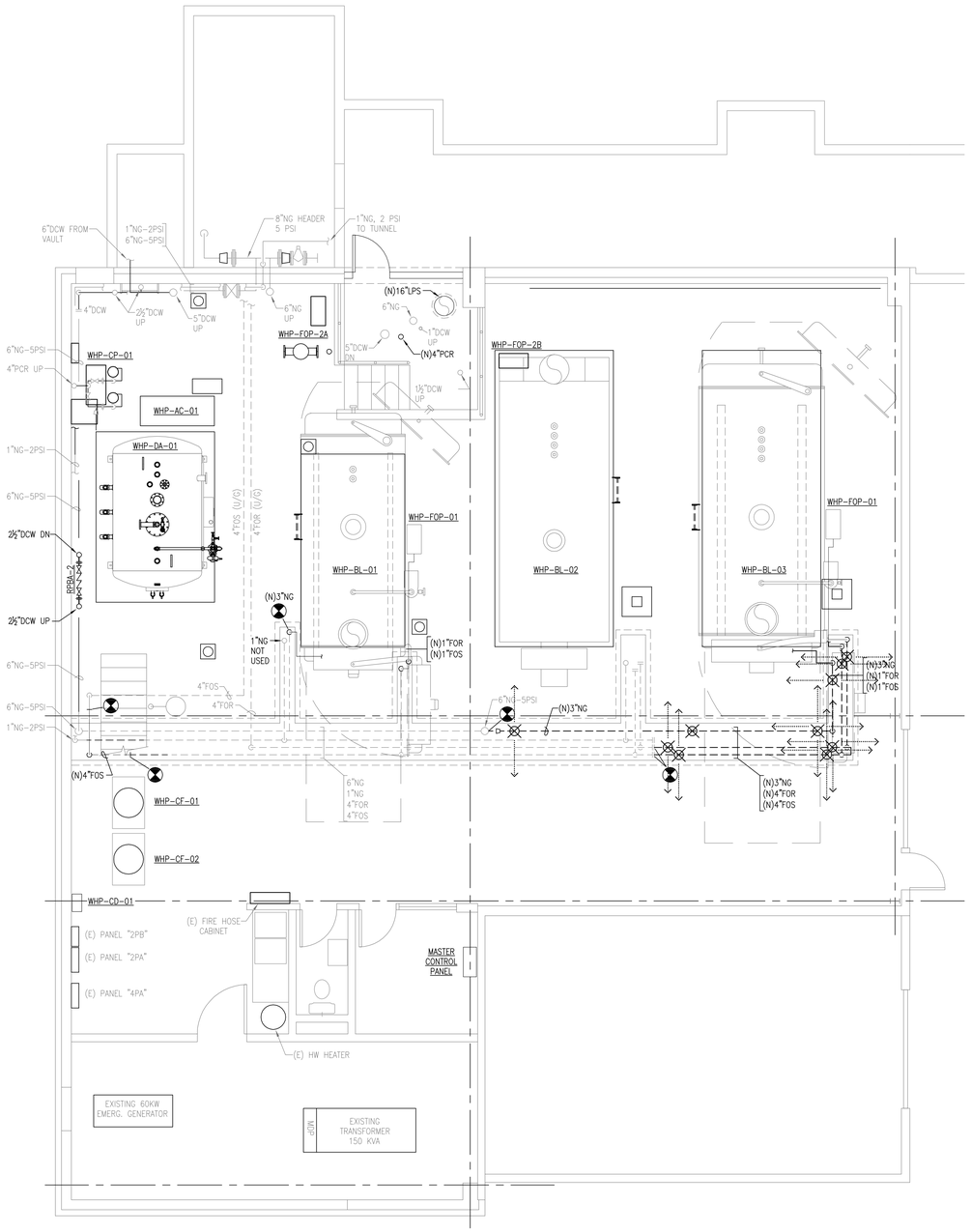


2 S-5 WEST HEATING PLANT
UPPER PIPING PLAN PLAN
SCALE: 1/4"=1'-0"

N



1 S-5 WEST HEATING PLANT
LOWER PIPING PLAN PLAN
SCALE: 1/4"=1'-0"

N

SUPPORT LEGEND

VERTICAL SUPPORT ROD W/ SPRING HANGER (1 S-8)

SUPPORT WITH 2-WAY TRANSVERSE CABLE BRACING (2 S-8)

SUPPORT WITH 4-WAY LONGINTUDINAL AND TRANSVERSE CABLE BRACING (3 S-8)

1/4" = 1'-0" 5' 0 5' 10' 15'

NBZ
Consulting Engineers
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REGISTERED PROFESSIONAL ENGINEER
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OREGON
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NADIA ZOUYED
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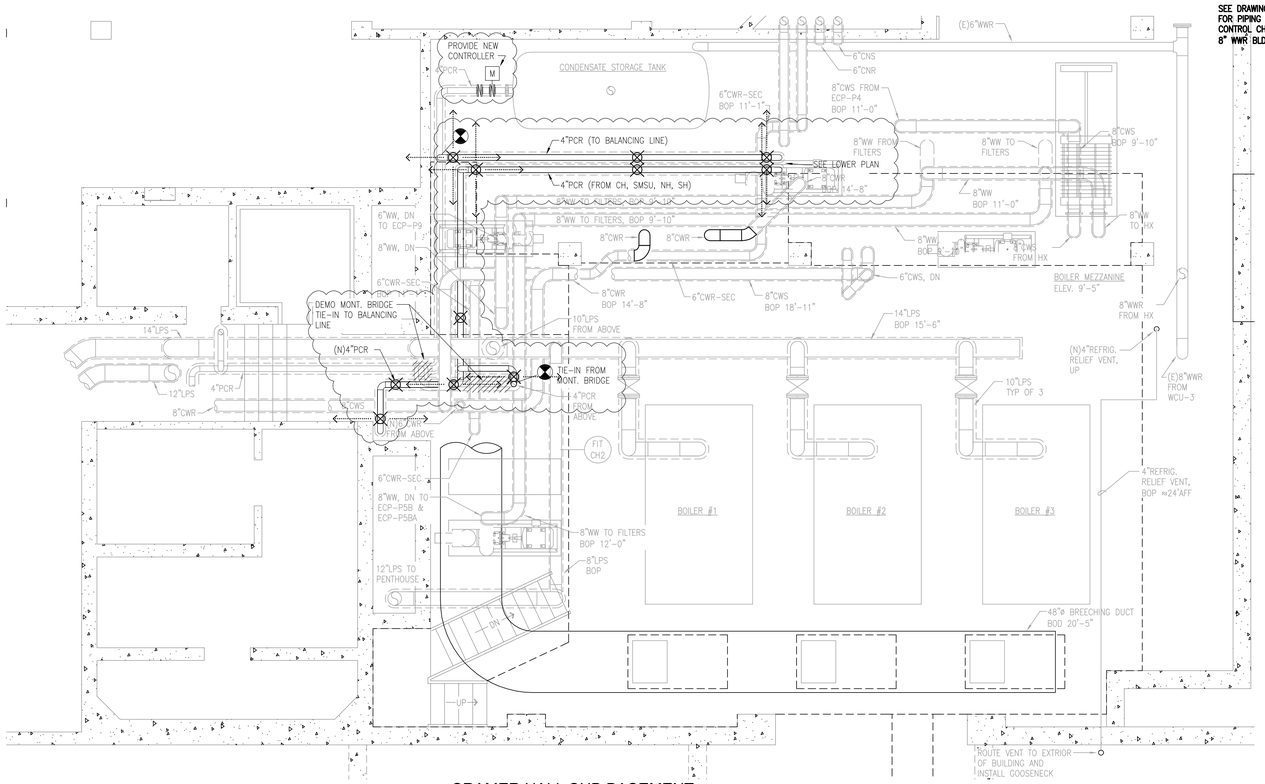


2 S-6 CRAMER HALL SUB BASEMENT UPPER LEVEL NEW PIPING PLAN
SCALE: 1/4" = 1'-0"

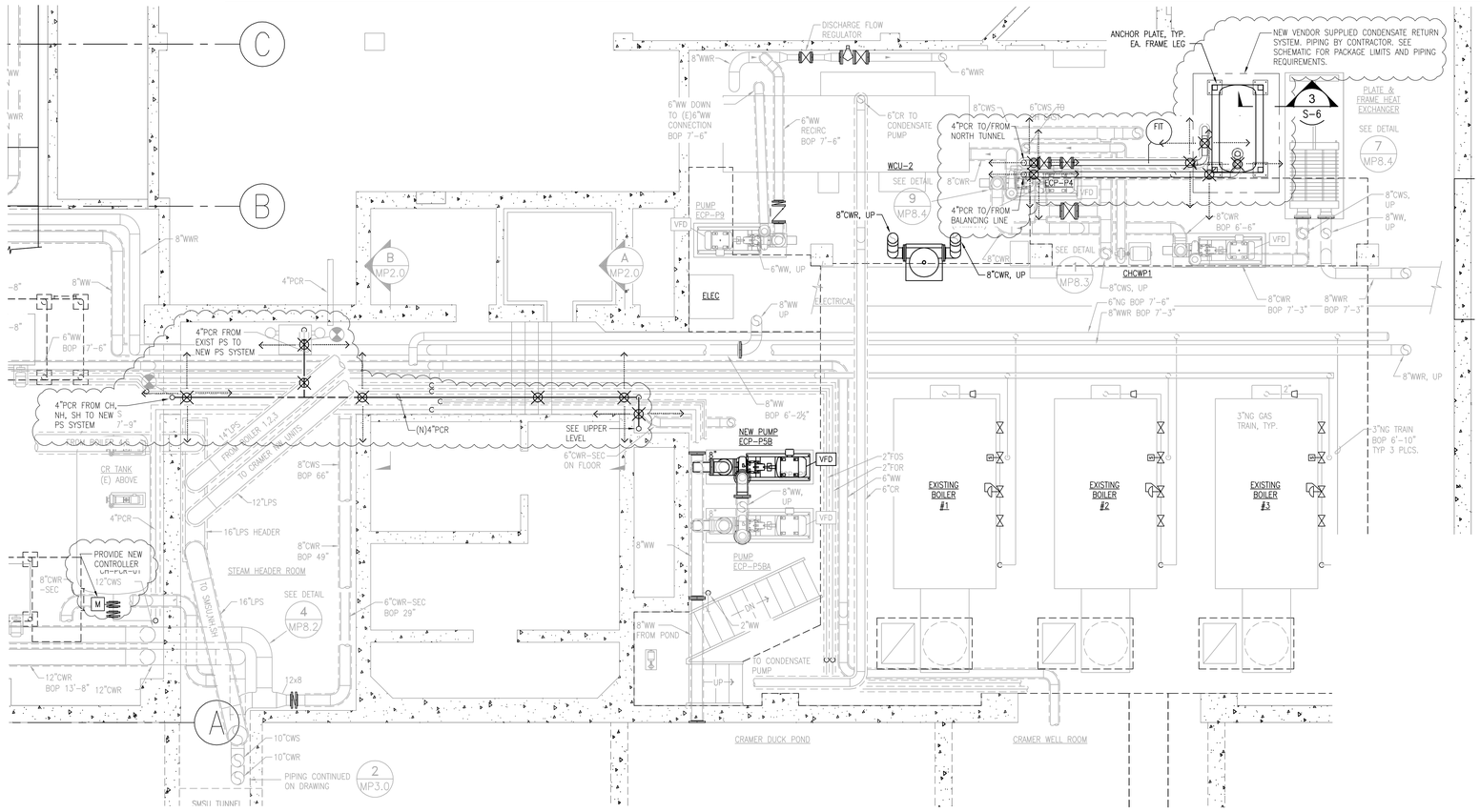
N

SUPPORT LEGEND

VERTICAL SUPPORT ROD W/ SPRING HANGER 1 S-8

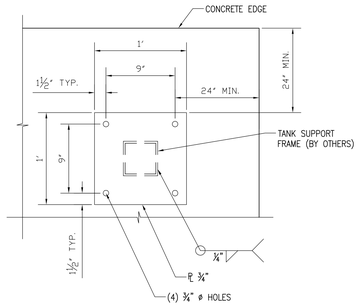
SUPPORT WITH 2-WAY TRANSVERSE CABLE BRACING 2 S-8

SUPPORT WITH 4-WAY LONGITUDINAL AND TRANSVERSE CABLE BRACING 3 S-8



1 S-6 CRAMER HALL SUB BASEMENT LOWEL LEVEL NEW PIPING PLAN
SCALE: 1/4" = 1'-0"

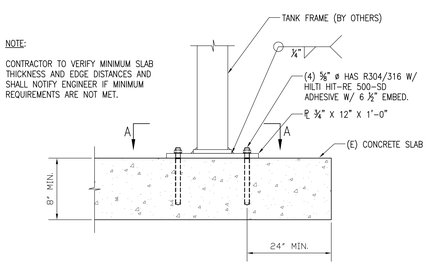
N



A-A SECTION
PLATE DETAIL

NOTE:

CONTRACTOR TO VERIFY MINIMUM SLAB THICKNESS AND EDGE DISTANCES AND SHALL NOTIFY ENGINEER IF MINIMUM REQUIREMENTS ARE NOT MET.



3 S-6 STACKED TANKS SEISMIC ANCHORAGE DETAIL
SCALE: 1 1/2"=1'-0"

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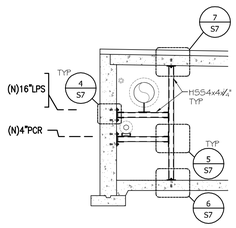
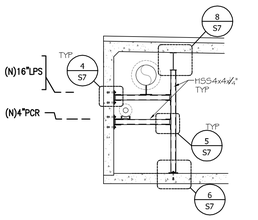
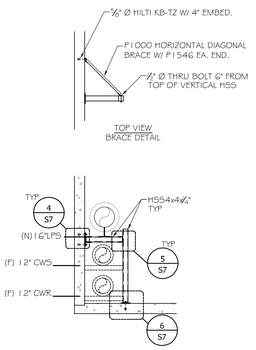


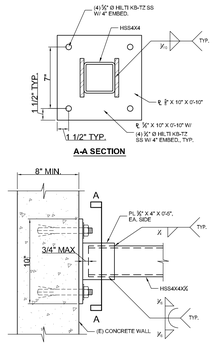
1 SECTION AT GUIDE FRAME
Scale: 1/4" = 1'-0"



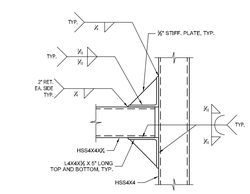
2 SECTION AT GUIDE FRAME
Scale: 1/4" = 1'-0"



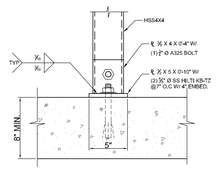
3 SECTION AT GUIDE FRAME
Scale: 1/4" = 1'-0"



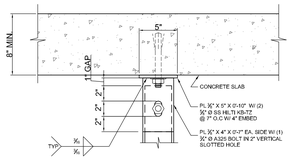
4 HSS BEAM CONNECTION AT CONCRETE WALL
Scale: 1 1/2" = 1'-0"



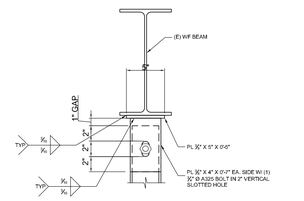
5 HSS POST TO HSS BEAM CONNECTION
Scale: 1 1/2" = 1'-0"



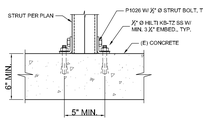
6 BASE PLATE DETAIL
Scale: 1 1/2" = 1'-0"



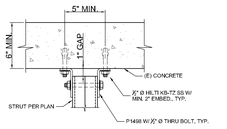
7 HSS POST CONNECTION AT CONCRETE CEILING
Scale: 1 1/2" = 1'-0"



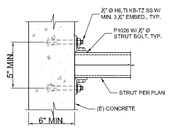
8 HSS COLUMN CONNECTION AT (E) BEAM
Scale: 1 1/2" = 1'-0"



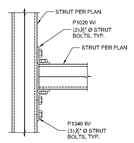
9 STRUT CONNECTION TO FLOOR
Scale: 1 1/2" = 1'-0"



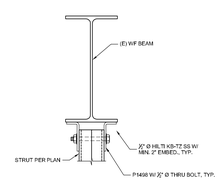
10 STRUT CONNECTION TO CEILING
Scale: 1 1/2" = 1'-0"



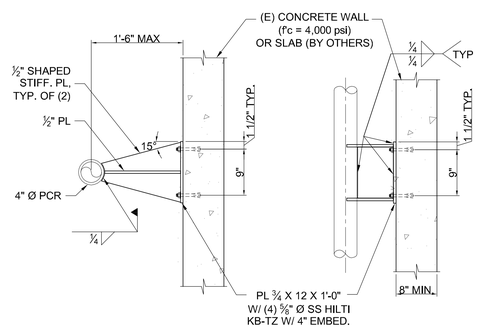
11 STRUT CONNECTION TO STRUT
Scale: 1 1/2" = 1'-0"



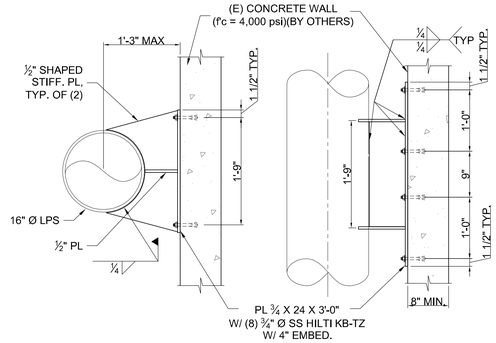
12 STRUT CONNECTION TO FLOOR
Scale: 1 1/2" = 1'-0"



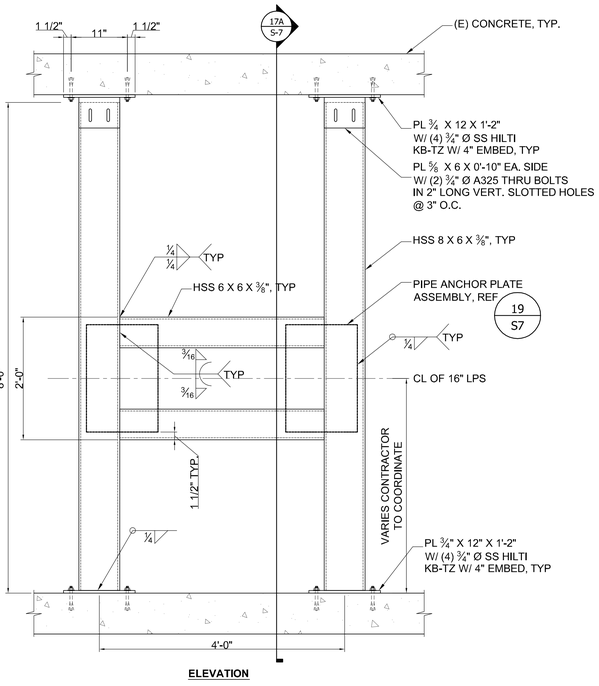
14 STRUT CONNECTION TO WF BEAM
Scale: 1 1/2" = 1'-0"



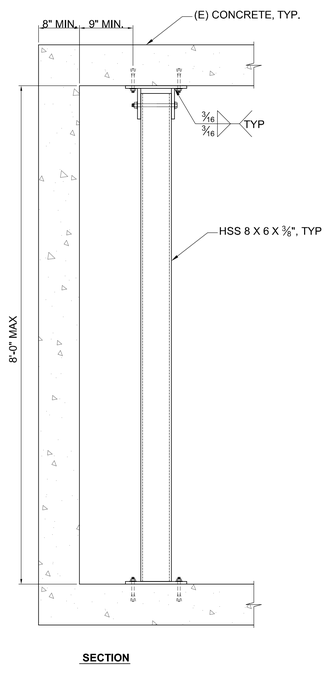
15 4" PCR ANCHOR DETAIL
Scale: 1" = 1'-0"



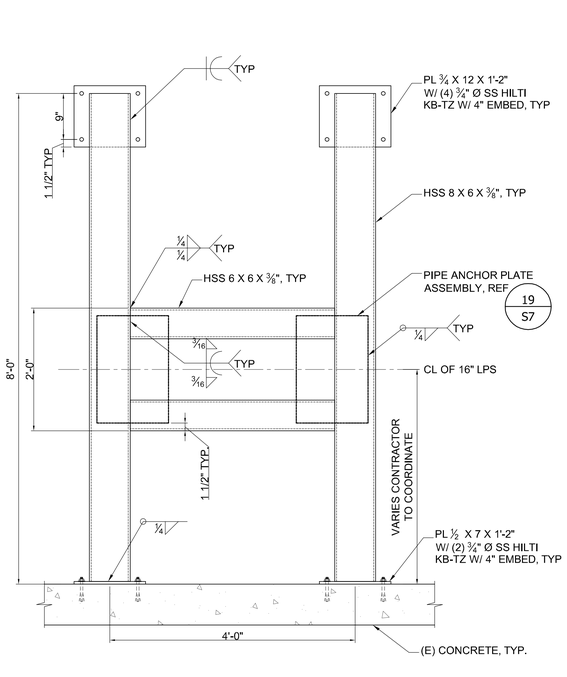
16 16" LPS ANCHOR A10 DETAIL
Scale: 1" = 1'-0"



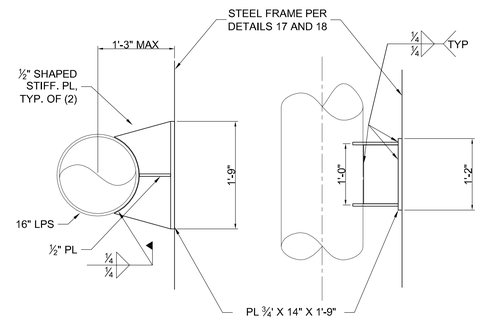
17 16" LPS ANCHOR A13 & A14 DETAIL
Scale: 1" = 1'-0"



17A SECTION VIEW
Scale: 1" = 1'-0"



18 16" LPS ANCHOR A11 DETAIL
Scale: 1" = 1'-0"



19 16" LPS ANCHOR PLATE ASSEMBLY FOR STEEL FRAMES
Scale: 1" = 1'-0"

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PORTLAND STATE UNIVERSITY
WEST HEATING PLANT - BOILER REPLACEMENT
PORTLAND, OR

DRAWING INFORMATION
DRAWING FILE:
DRAWN BY: DS & ND
CHECKED BY:
DATE: 11/4/2012
DATE:
DATE:
SCALE:
REVISION 1:
REVISION 2:

JOB No: 12-020

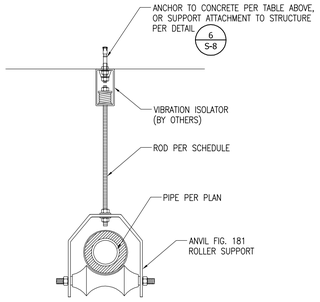
SHEET No: S- 7 OF S- 9

REGISTERED PROFESSIONAL ENGINEER
65743PE
OREGON
JUNE 2, 2010
NADIA ZONTED
EXPIRES: 06/30/14

VERTICAL SUPPORT SCHEDULE			
PIPE SIZE	MIN. ROD SIZE	ANCHOR SIZE	MIN. CONCRETE THICKNESS
2"	⅜"	⅜" ø HILTI KB-TZ W/ 2" EMBED.	4"
4"	½"	½" ø HILTI KB-TZ W/ 2" EMBED.	6"
6"	½"	NA	6"
12"	¾"	NA	8"
16"	¾"	NA	8"

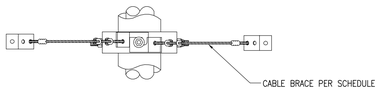
NOTE: ROD SIZE SHALL BE SELECTED TO FIT EXISTING HANGER BRACKET HOLES SUCH THAT HOLES ARE LESS THAN ⅛" OVERSIZED.

CABLE BRACE SCHEDULE				
PIPE SIZE	CABLE SIZE	ANCHOR SIZE	MIN. CONCRETE THICKNESS	CABLE LOOP TIE DETAIL
2"	3/16"	½" ø HILTI KB-TZ W/ 3 ¼" EMBED.	4"	7 / S-8
4"	3/16"	½" ø HILTI KB-TZ W/ 3 ¼" EMBED.	6"	7 / S-8
2" + 4" ON TRAPEZE	3/16"	½" ø HILTI KB-TZ W/ 3 ¼" EMBED.	6"	7 / S-8
6"	5/16"	NA	NA	8 / S-8
12"	5/16"	NA	NA	8 / S-8
16"	5/16"	NA	NA	8 / S-8

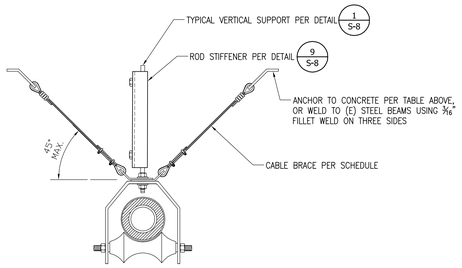


PIPE SECTION VIEW

1 S-8 TYPICAL SINGLE HUNG PIPE VERTICAL SUPPORT DETAIL
SCALE: 1 1/2" = 1'-0"

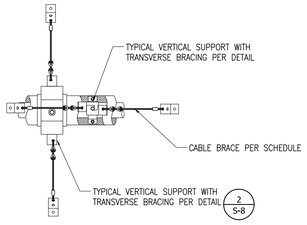


PIPE TOP VIEW

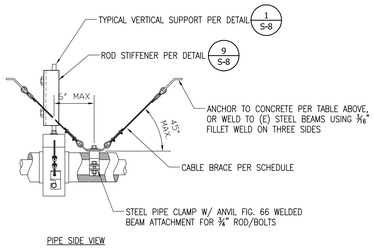


PIPE SECTION VIEW

2 S-8 TYPICAL SINGLE HUNG PIPE TRANSVERSE CABLE BRACING DETAIL
SCALE: 1 1/2" = 1'-0"

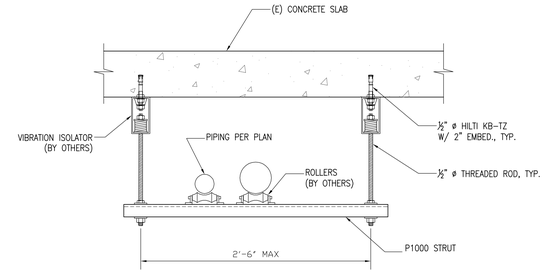


PIPE TOP VIEW

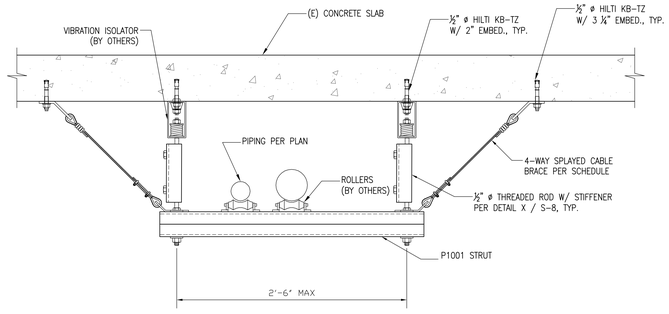


PIPE SIDE VIEW

3 S-8 TYPICAL SINGLE HUNG PIPE TRANSVERSE AND LONGITUDINAL CABLE BRACING DETAIL
SCALE: 1 1/2" = 1'-0"



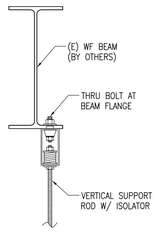
4 S-8 TRAPEZE SUPPORTED PIPE VERTICAL SUPPORT DETAIL
SCALE: 1 1/2" = 1'-0"



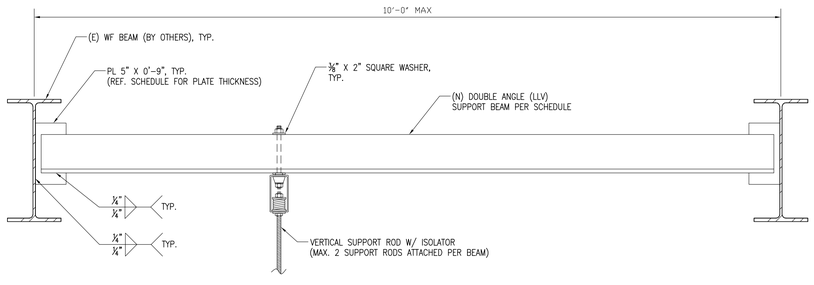
5 S-8 TRAPEZE SUPPORTED PIPE 4-WAY SPLAYED CABLE BRACING DETAIL
SCALE: 1 1/2" = 1'-0"

PIPE SUPPORT BEAM SCHEDULE (OPTION 2)		
PIPE SIZE	SIZE WITH MAX. 2 SUPPORT RODS ATTACHED	MIN. CONNECTION PLATE THICKNESS*
6" MAX	DBL L 4 X 4 X 5/16 (LLV)	⅜" *
16" MAX	DBL L 6 X 4 X ⅜ (LLV)	¾" *

* VERIFY CONNECTION PLATE THICKNESS EXCEEDS HANGER ROD DIAMETER.

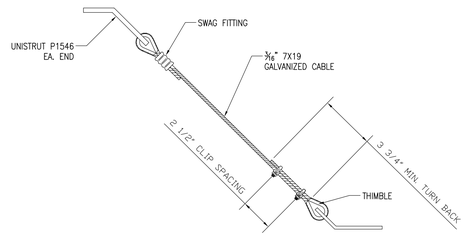


OPTION 1:
SUPPORT DIRECTLY FROM EXISTING WF BEAM

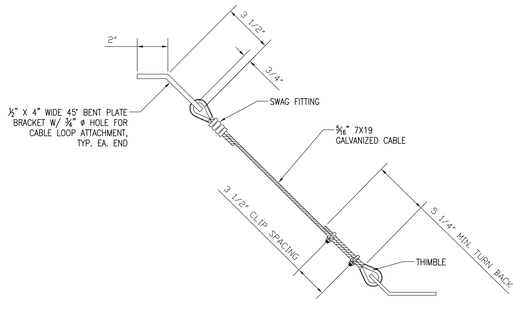


OPTION 2:
SUPPORT FROM SUPPLEMENTAL STEEL

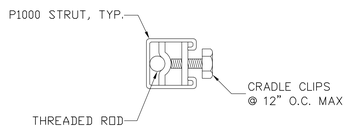
6 S-8 VERTICAL SUPPORT CONNECTION DETAIL AT EXISTING STEEL
SCALE: 1 1/2" = 1'-0"



7 S-8 3/16" CABLE BRACE CABLE LOOP TIE ASSEMBLY DETAIL
SCALE: 3" = 1'-0"



8 S-8 5/16" CABLE BRACE CABLE LOOP TIE ASSEMBLY DETAIL
SCALE: 3" = 1'-0"



9 S-8 ROD STIFFENER DETAIL
SCALE: 6" = 1'-0"

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PORTLAND STATE UNIVERSITY
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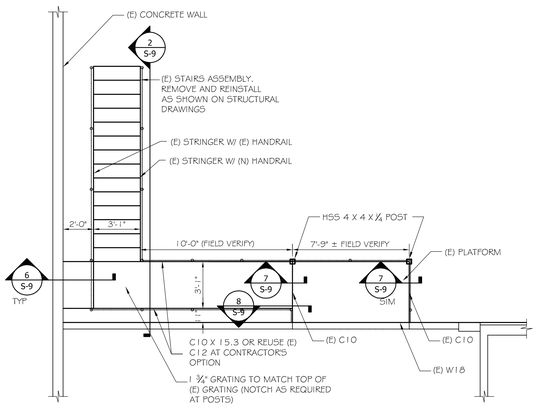
SCALE:

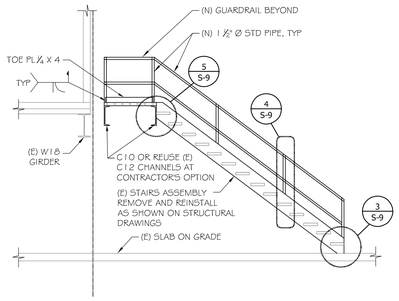
JOB No: 12-020

SHEET No: S-8 OF S-9

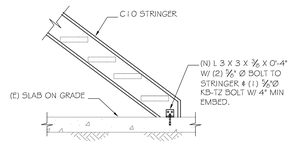
REGISTERED PROFESSIONAL ENGINEER 65743PE OREGON JUNE 2, 2012 NADIA ZOUIED
EXPIRES: 06/30/14



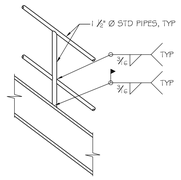
1 S-9 **STAIRS / PLATFORM PLAN**
SCALE: 1/4"=1'-0"



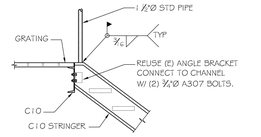
2 S-9 **STAIRS ELEVATION DETAIL**
SCALE: 1/4"=1'-0"



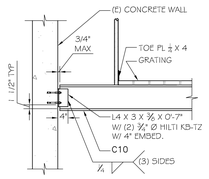
3 S-9 **STRINGER CONNECTION TO S.O.G**
SCALE: 1/2"=1'-0"



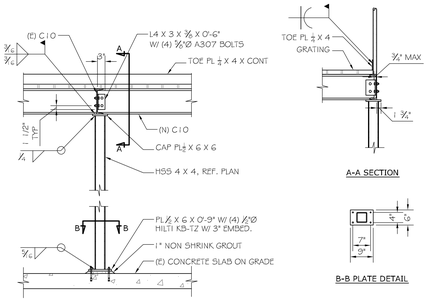
4 S-9 **GUARDRAIL CONNECTION DETAIL**
SCALE: 1/2"=1'-0"



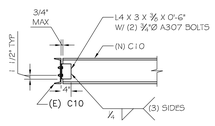
5 S-9 **STRINGER CONNECTION DETAIL**
SCALE: 1/2"=1'-0"



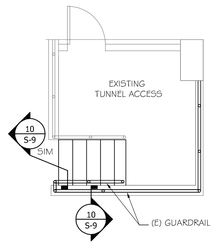
6 S-9 **CHANNEL TO CONCRETE WALL CONNECTION**
SCALE: 1/2"=1'-0"



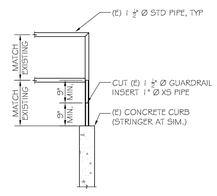
7 S-9 **POST CONNECTION DETAIL**
SCALE: 1/2"=1'-0"



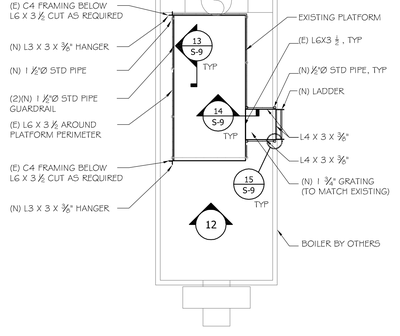
8 S-9 **CHANNEL CONNECTION TO (E) FRAME**
SCALE: 1/2"=1'-0"



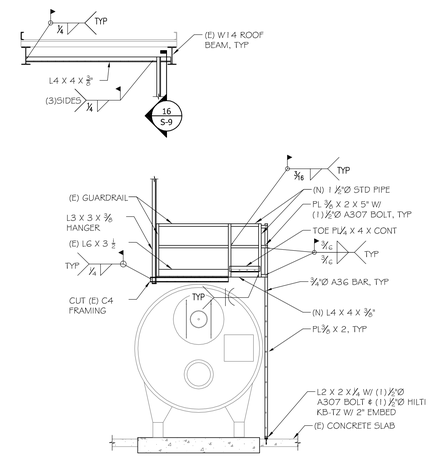
9 S-9 **REMOVABLE GUARDRAIL PLAN**
SCALE: 1/2"=1'-0"



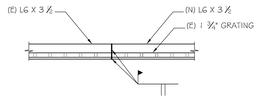
10 S-9 **REMOVABLE GUARDRAIL DETAIL**
SCALE: 1/2"=1'-0"



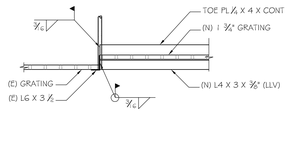
11 S-9 **PLATFORM PLAN VIEW**
SCALE: 1/4"=1'-0"



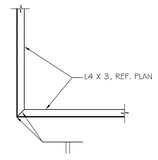
12 S-9 **PLATFORM ELEVATION VIEW**
SCALE: 1/4"=1'-0"



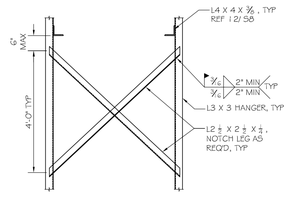
13 S-9 **(N) TO (E) ANGLE CONNECTION**
SCALE: 1/2"=1'-0"



14 S-9 **(N) TO (E) PLATFORM CONNECTION**
SCALE: 1/2"=1'-0"



15 S-9 **PLATFORM ANGLE TO ANGLE CONNECTION**
SCALE: 1/2"=1'-0"



16 S-9 **PLATFORM GROSS BRACING DETAIL**
SCALE: 1/2"=1'-0"

NBZ
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PORTLAND STATE UNIVERSITY
WEST HEATING PLANT - BOILER REPLACEMENT
PORTLAND, OR

DRAWING INFORMATION

DRAWING FILE:	
DRAWN BY:	DS & ND
CHECKED BY:	
DATE:	11/4/2012
REVISION 1:	
DATE:	
REVISION 2:	
SCALE:	

JOB No:
12-020
SHEET No:
S- 9 OF S- 9

REGISTERED PROFESSIONAL ENGINEER
65743PE
OREGON
JUNE 2, 2006
NADIA ZOUTED
EXPIRES: 06/30/14