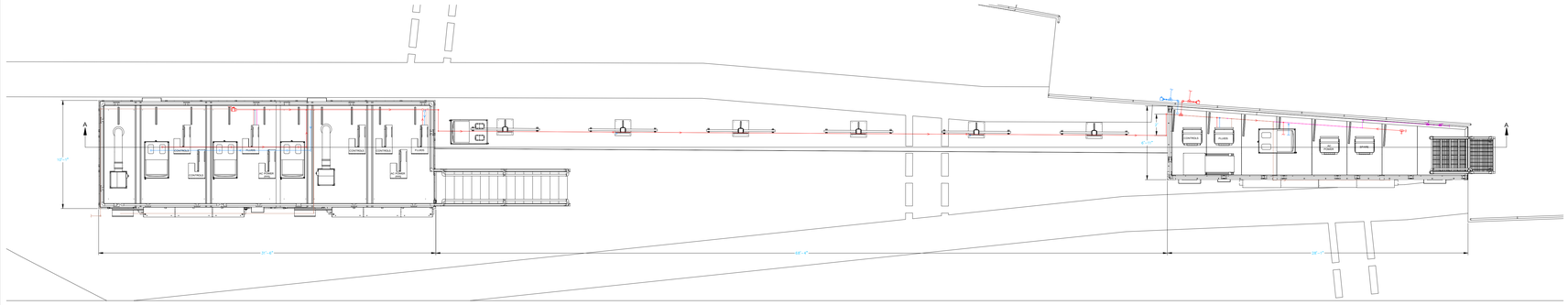
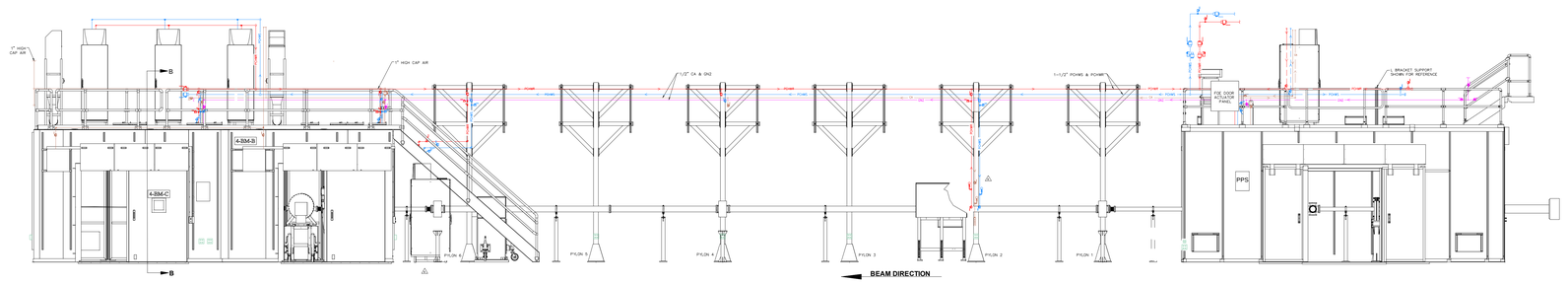
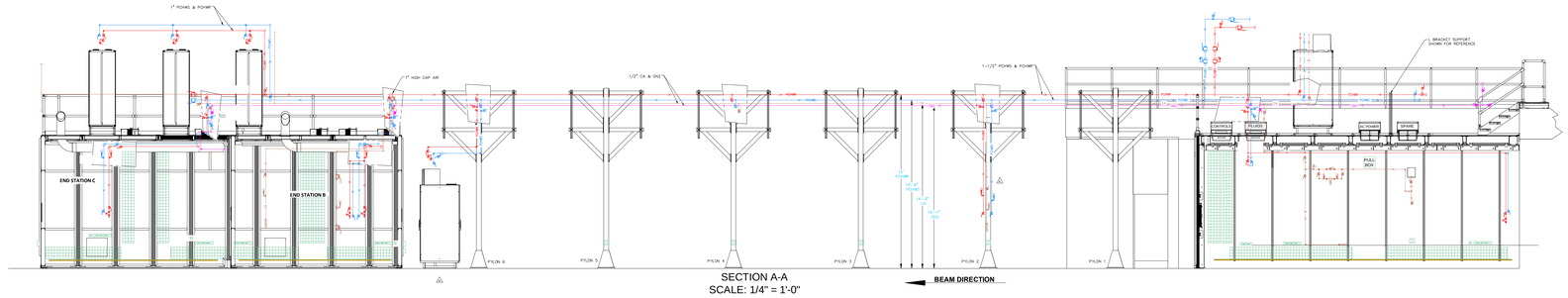
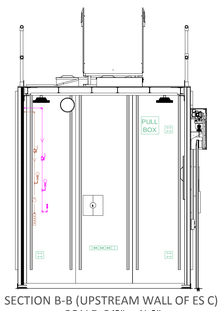
REVISION HISTORY					
REV	DESCRIPTION	DATE	DESIGNER	CHECKED BY	ENGINEER
A	RELEASE PER ECO-004595	1/2017	B.J.M.	C.A./M.L.	R. O'BRIEN
B	REVISED PER ECO-004978	3/2017	B.J.M.	C.A./M.L.	R. O'BRIEN







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



SECTION B-B (UPSTREAM WALL OF ES C)
SCALE: 3/8" = 1'-0"

OVERALL PIPING LAYOUT
SEE SEPARATE PIPING SHEETS FOR DETAILS

NOTES:

1. ALL UTILITY PIPING TO BE RUN ON THE OUTBOARD SIDE OF PYLONS.
2. ENSURE THAT ALL VALVE HANDLES ARE OPERATIONAL AND ARE NOT IN CONFLICT WITH ANY ADJACENT PIPING OR VALVES.
3. MOUNTING FOR ALL PIPING IN PYLON AREAS WILL BE FIELD ERECTED UNISTRUT SUPPORT STRUCTURE.
4. ALL DIMENSIONS SHOWN ARE INTENDED TO CONVEY APPROXIMATE LOCATIONS. EXACT LOCATIONS ARE TO BE DETERMINED ACCORDING TO FIELD CONDITIONS AT TIME OF INSTALLATION.
5. INSTALL OWENS-CORNING 1.0" FIBERGLASS ASJ/SSL-II INSULATION ON PCHW SUPPLY AND RETURN INSIDE THE HUTCHES AND ALL PCHW SUPPLY LINES OUTSIDE THE HUTCHES. USE PRE-FABRICATED FITTING COVERS FROM JOHNS-MANVILLE AND SELF-SEALING FACING TABS WITH A MINIMUM OF 1 INCH JOINT OVERLAP.
6. COPPER TUBING SHALL BE ASTM B-88 TYPE L. SOLDERED JOINTS SHALL USE ASTM-B32 SOLDER, 95% TIN 5% ANTIMONY SOLDER (STAY BRITE #8) WITH WROUGHT COPPER FITTINGS IAW ASME B16.22.

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN INCHES
DIMENSIONS IN BRACKETS (MILLIMETERS) ARE MILLIMETERS AND ARE FOR REFERENCE ONLY
INTERPRET DRAWING AS PER ASME Y14.5-1994 OR Y14.5-1973

DIMENSIONAL TOLERANCES	ANGULAR TOLERANCE
X. ± 0.060 .X ± 0.030 .XX ± 0.015 .XXX ± 0.005	± .5°
BREAK EDGES & SHARP CORNERS 0.005 MIN. TO 0.030 MAX.	FINISH 125

THIRD ANGLE PROJECTION

SCALE: SEE VIEWS

BROOKHAVEN NATIONAL LABORATORY
BROOKHAVEN SCIENCE ASSOCIATES
UPTON, NEW YORK 11973
Exploring Life's Mysteries, Protecting its Future

DRAWN BY	B. Mullany	6/2016
CHECKED BY		6/2016
VACUUM APPROVAL	N/A	N/A
ENGINEER APPROVAL	R. O'Brien	6/2016
SUPERVISOR APPROVAL	J. Gosman	6/2016
ESSAY APPROVAL	L. STIEGLER	6/2016
QA APPROVAL	J. Zipper	6/2016

WBS# 6.10.04.02

NSLSII NATIONAL SYNCHROTRON LIGHT SOURCE II

PHOTON DIVISION
XFM BEAMLINE, UTILITIES
UTILITIES INSTALLATION, 4-BM

SHEET SIZE	DRAWING/PART NUMBER	REVISION
E	PD-XFM-UT-1500	B

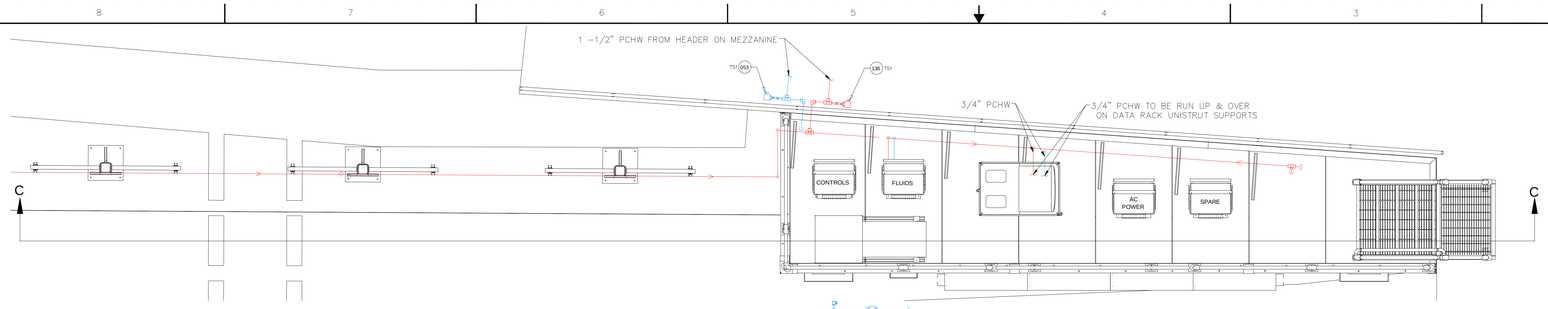
ESH&Q RISK LEVEL: A-2

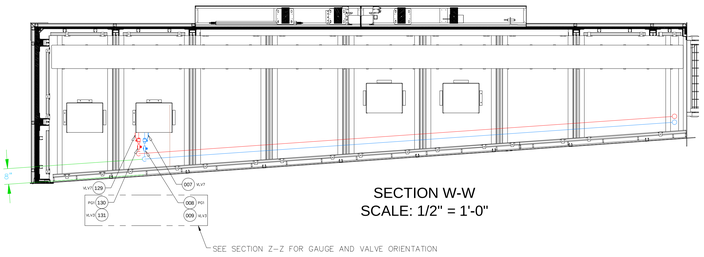
SHEET 1 OF 8

NEXT ASSY:

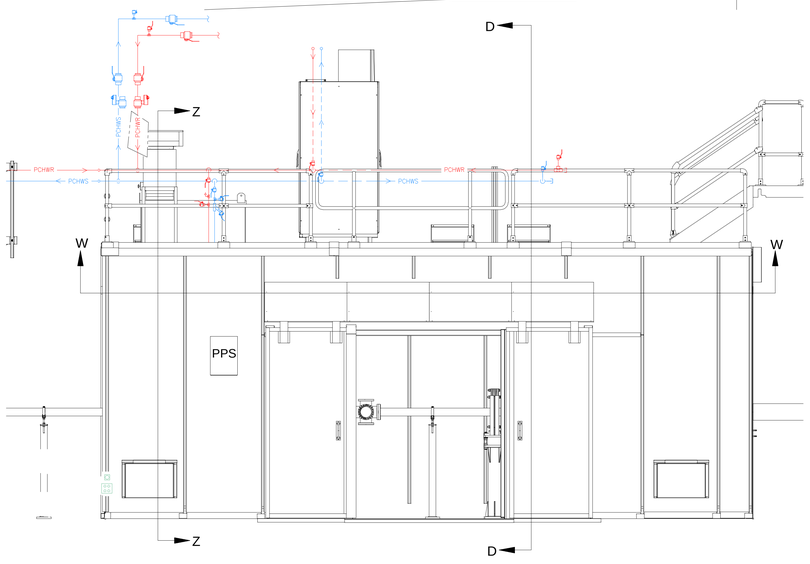
PROJECT:

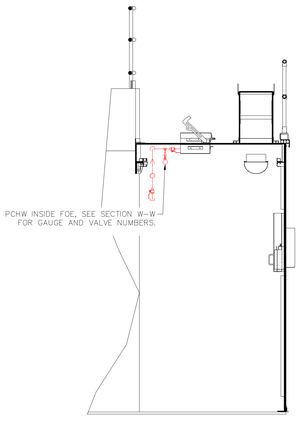
RELEASED – EFFECTIVE





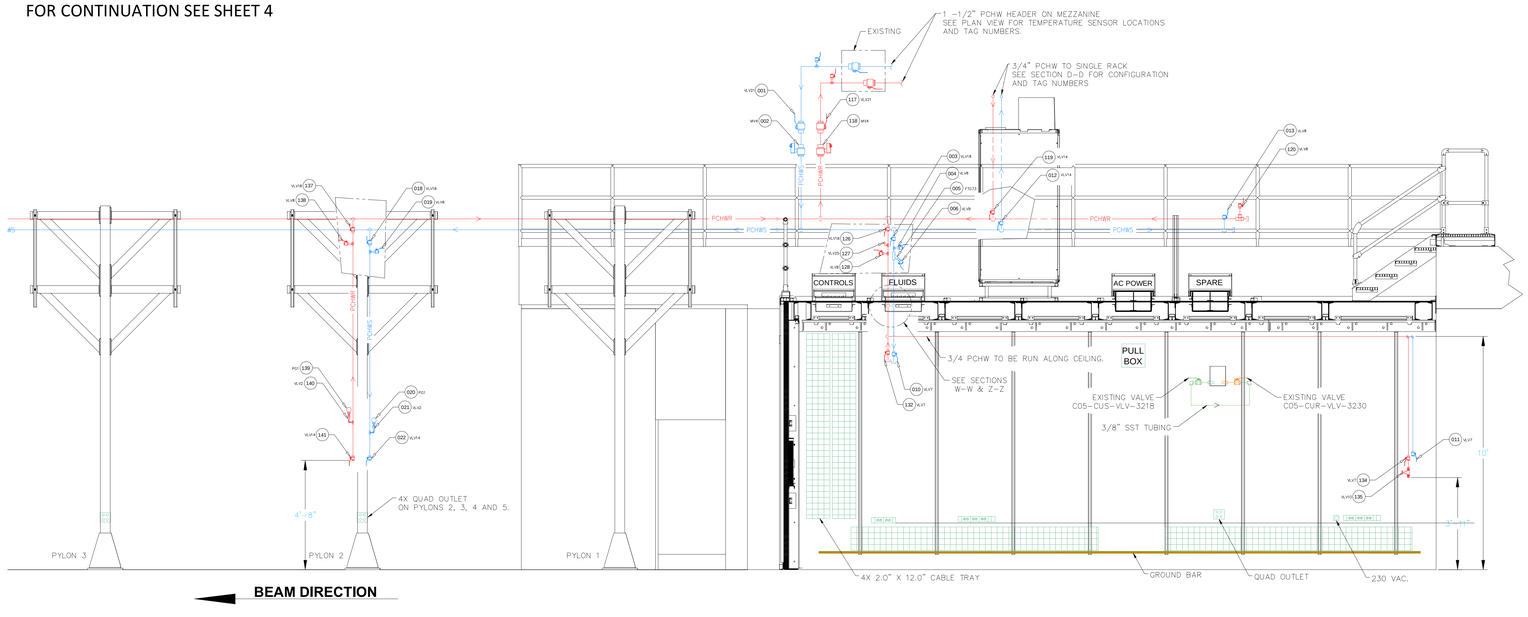
SECTION W-W
SCALE: 1/2" = 1'-0"



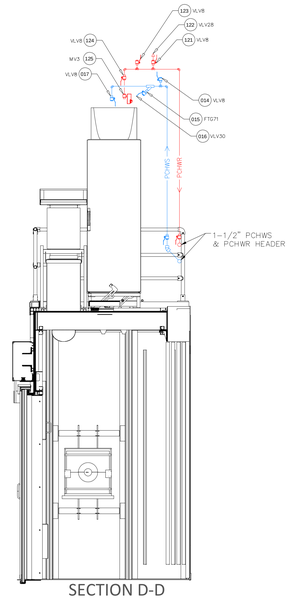


SECTION Z-Z

FOR CONTINUATION SEE SHEET 4



SECTION C-C

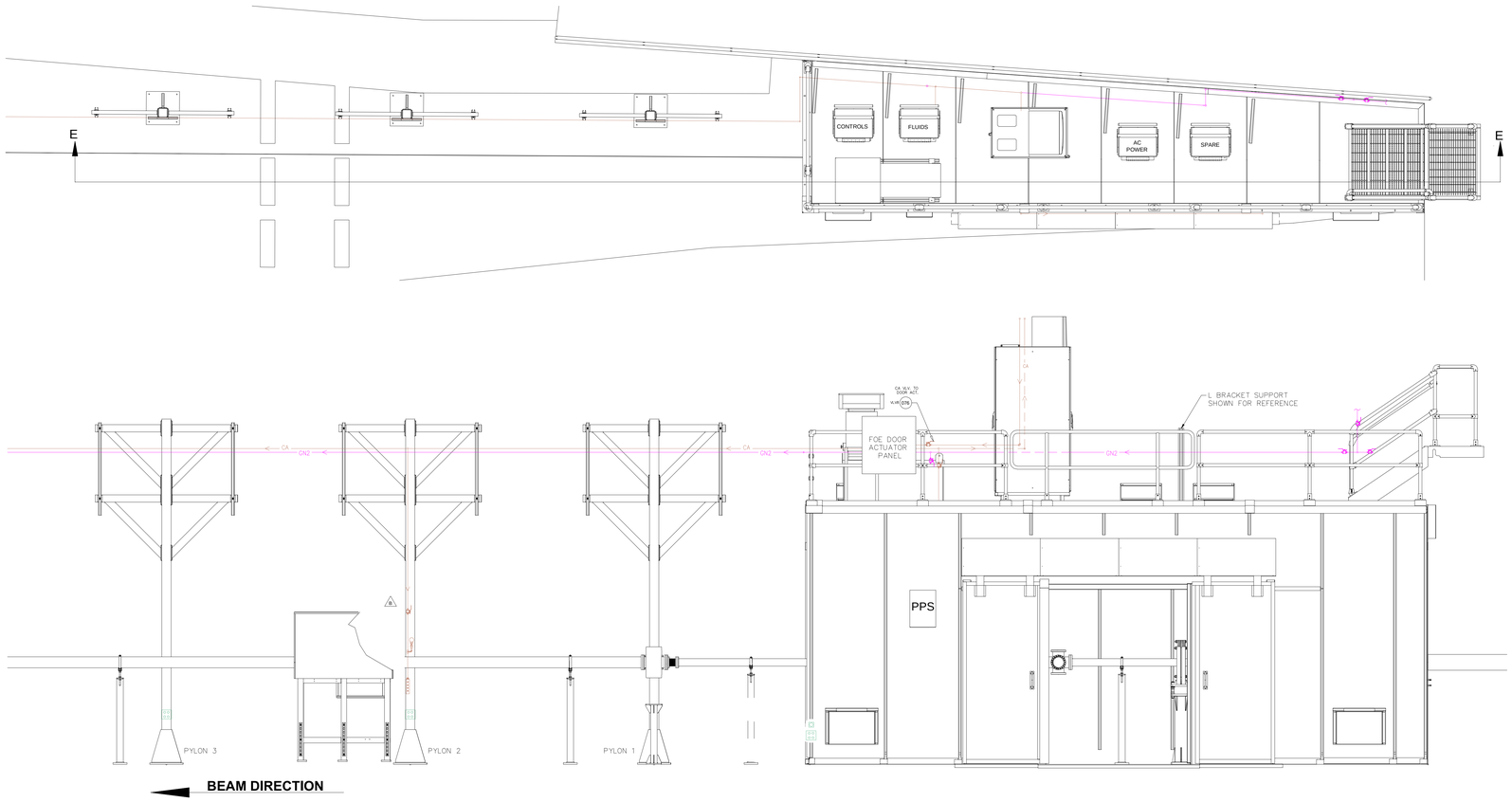


SECTION D-D

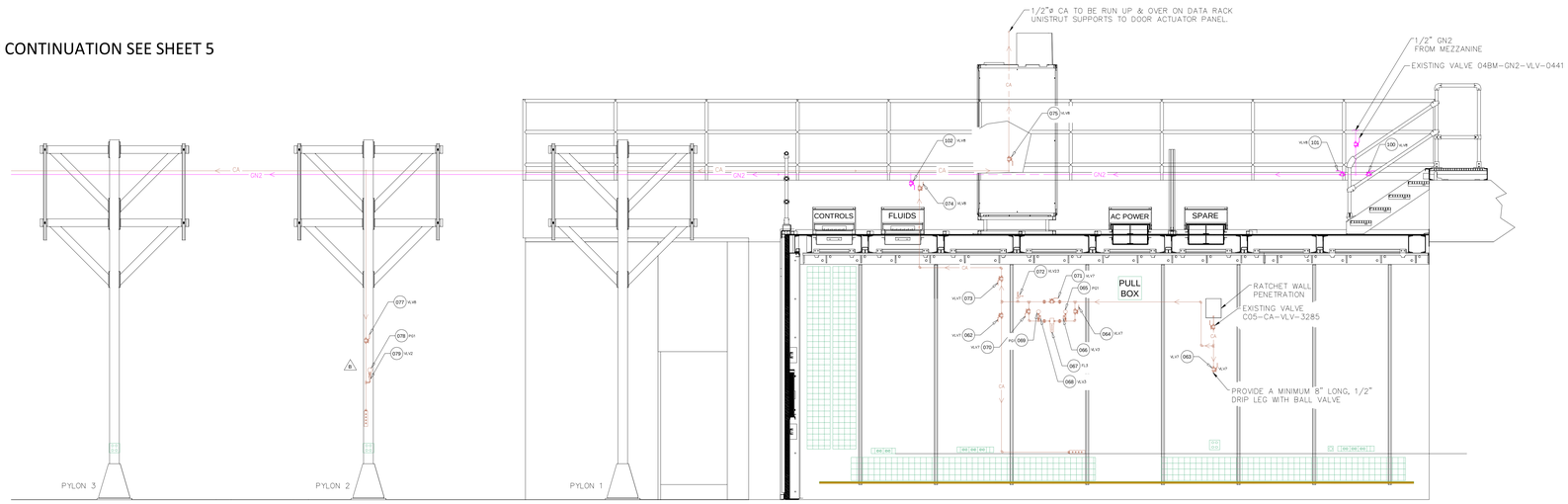
PCHW AT FOE AND ALONG THE 3 UPSTREAM PYLONS
DI BYPASS LOOP IN FOE

E	PD-XFM-UT-1500	B
SHEET SIZE	DRAWING/PART NUMBER	REVISION
ESH&Q RISK LEVEL	A-2	SHEET 2 OF 8

RELEASED – EFFECTIVE



FOR CONTINUATION SEE SHEET 5



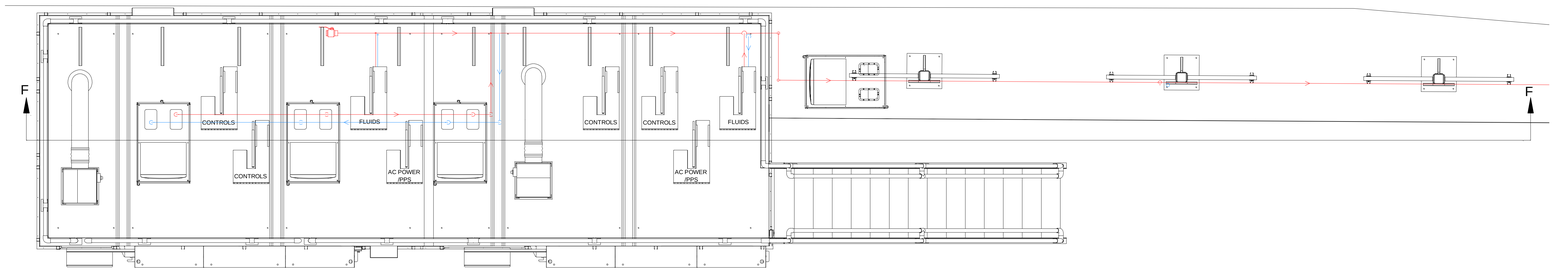
SECTION E-E

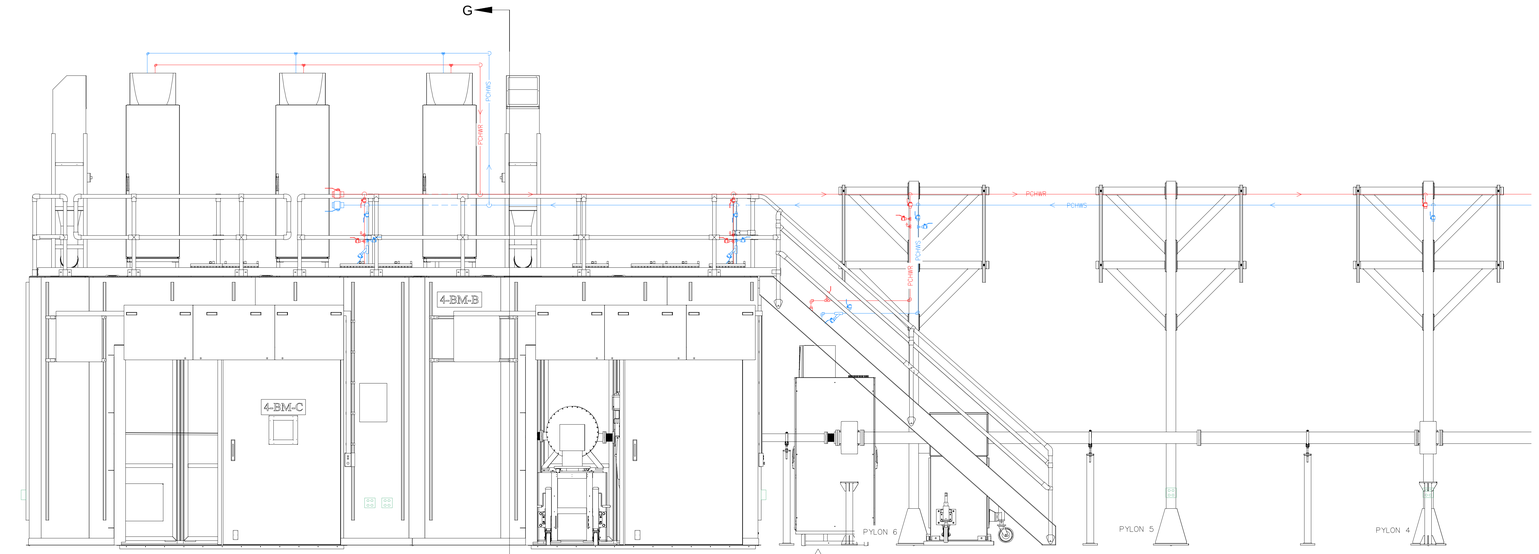
CA & GN2 AT FOE AND ALONG THE 3 UPSTREAM PYLONS

ALL PIPING INSIDE FOE TO BE INSTALLED ON INBOARD WALL SUPPORTED ONE UNISTRUT DEPTH OFF WALL.

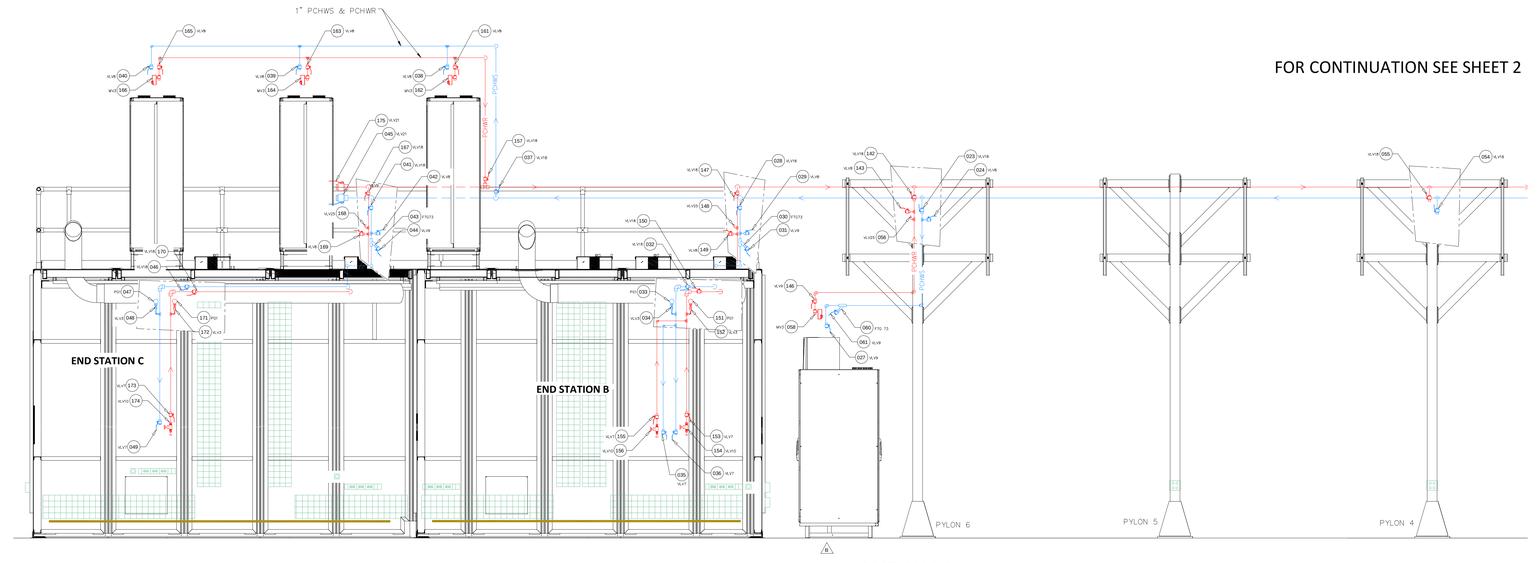
E	PD-XFM-UT-1500	B
SHEET SIZE	DRAWING/PART NUMBER	REVISION
ES&HQ RISK LEVEL A-2	SHEET 3 OF 8	

RELEASED – EFFECTIVE



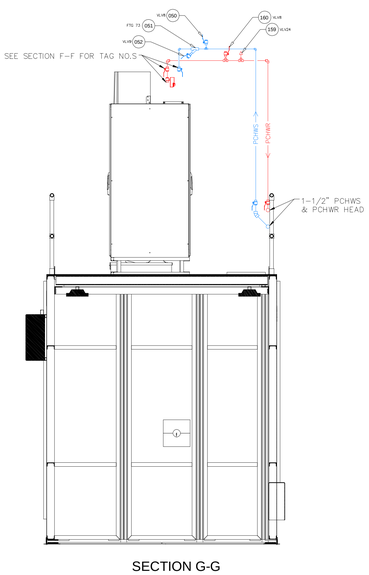


BEAM DIRECTION



SECTION F-F

FOR CONTINUATION SEE SHEET 2

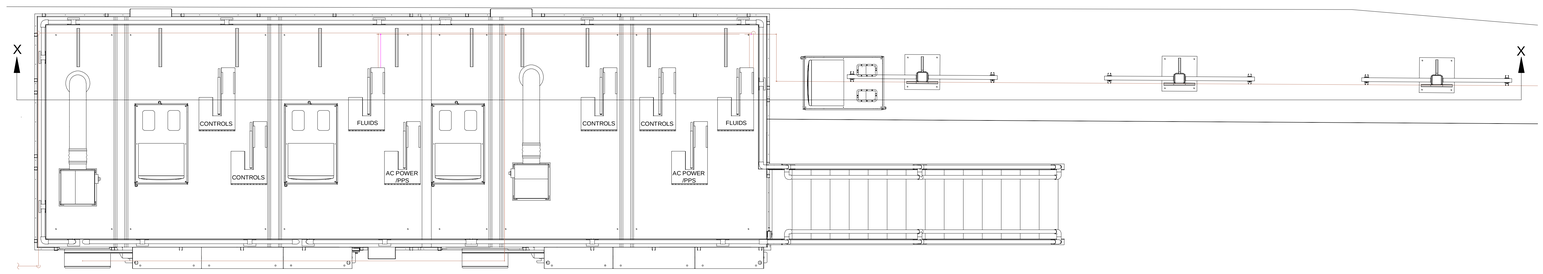


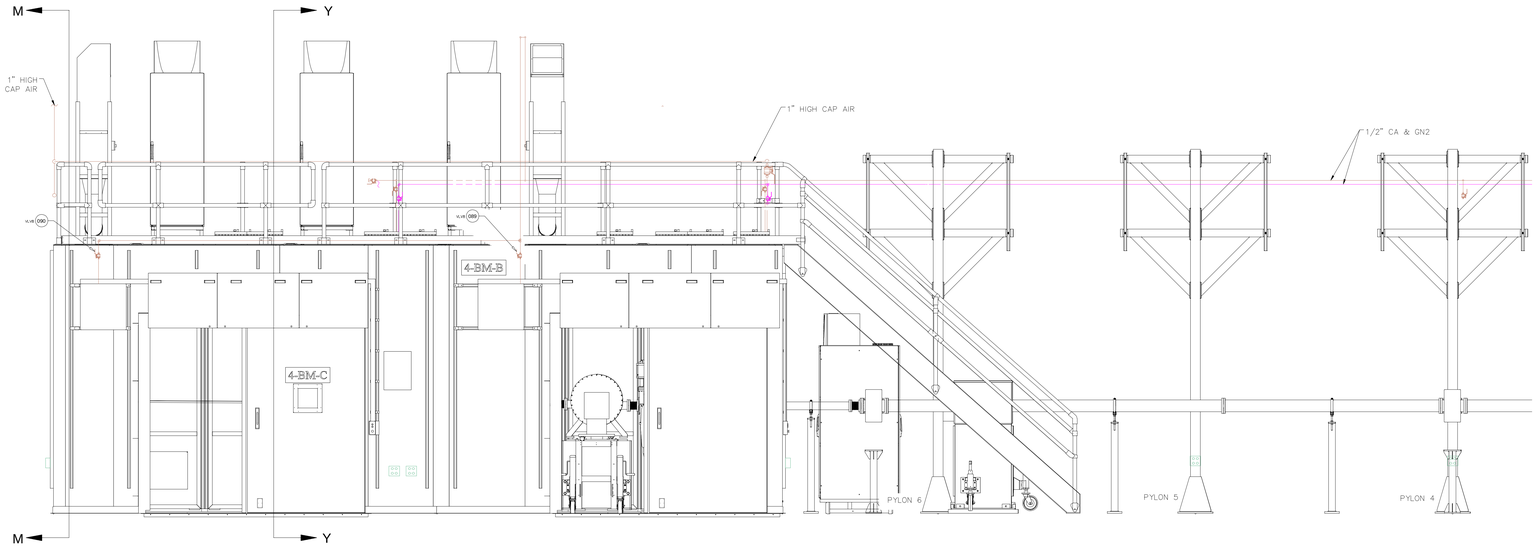
SECTION G-G

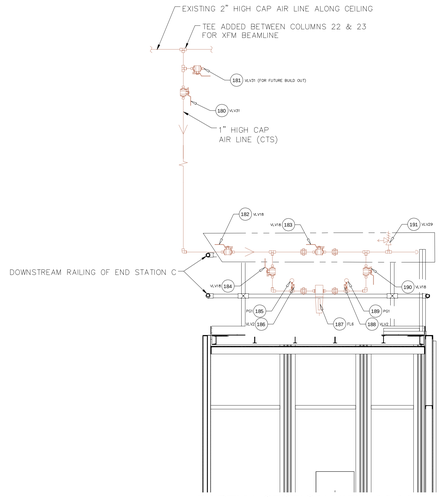
PCHW AT END STATIONS B & C AND ALONG THE 3 DOWNSTREAM PYLONS

E	PD-XFM-UT-1500	B
SHEET SIZE	DRAWING/PART NUMBER	REVISION
ES&HQ RISK LEVEL A-2	SHEET 4 OF 8	

RELEASED – EFFECTIVE

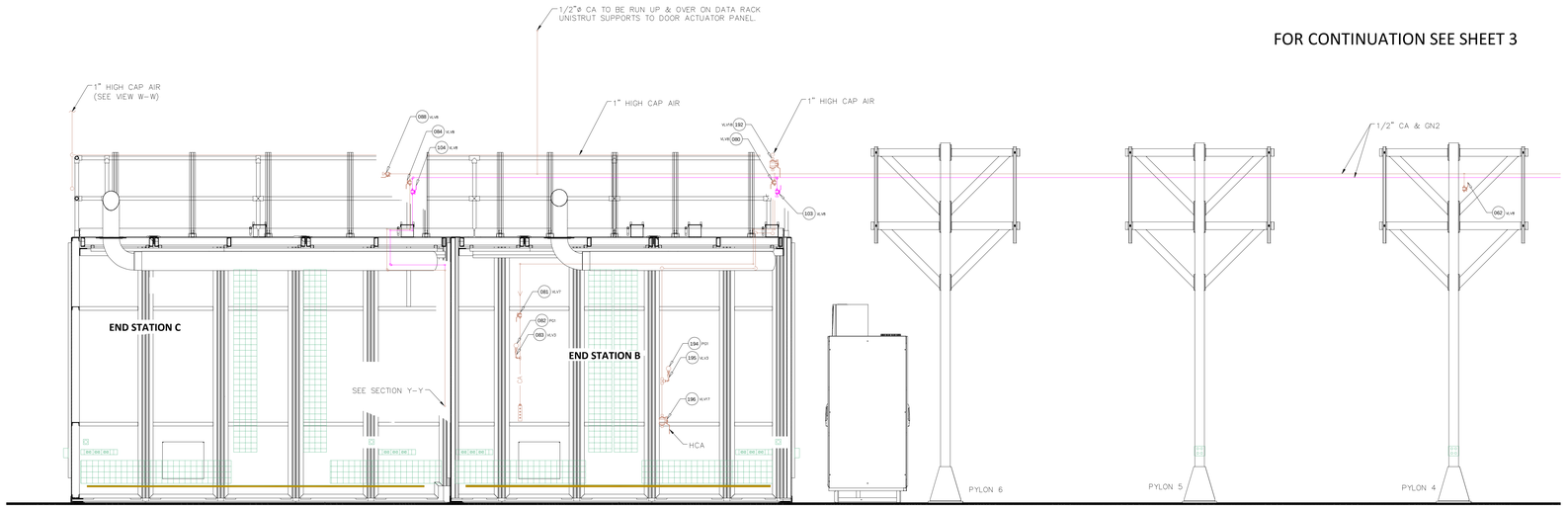




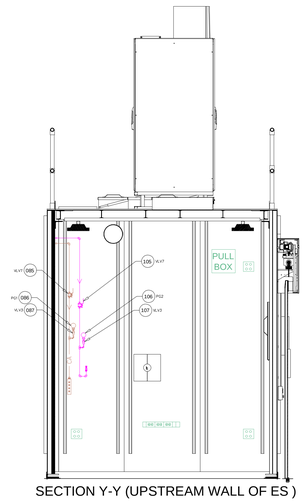


PARTIAL SECTION VIEW M-M

FOR CONTINUATION SEE SHEET 3



SECTION X-X

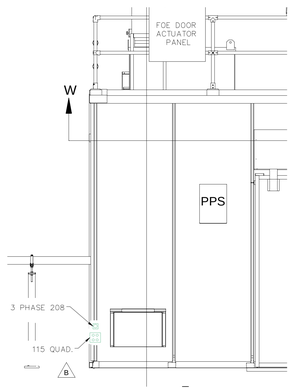


SECTION Y-Y (UPSTREAM WALL OF ES)

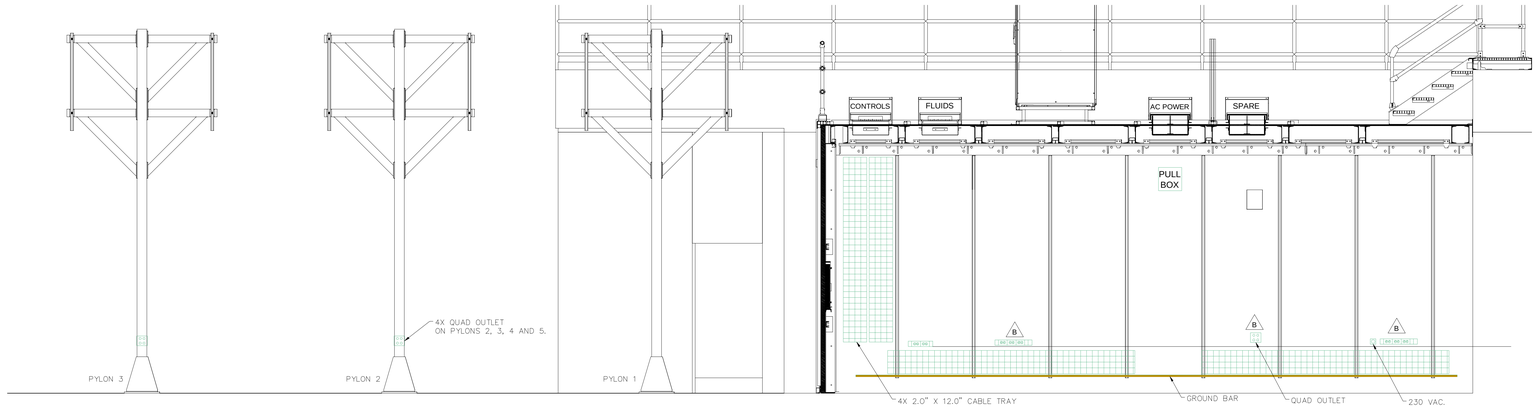
CA & GN2 AT END STATIONS B & C AND ALONG THE 3 DOWNSTREAM PYLONS

E	PD-XFM-UT-1500	B
SHEET SIZE	DRAWING/PART NUMBER	REVISION
ESH&Q RISK LEVEL A-2	SHEET 5 OF 8	

RELEASED – EFFECTIVE

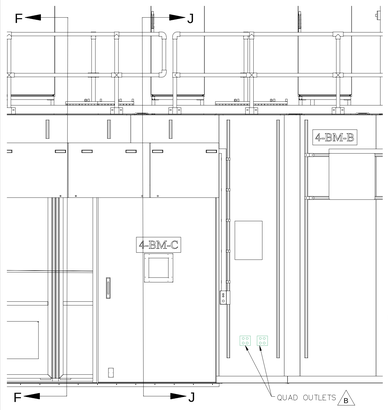


ELECTRICAL OUTSIDE OF FOE

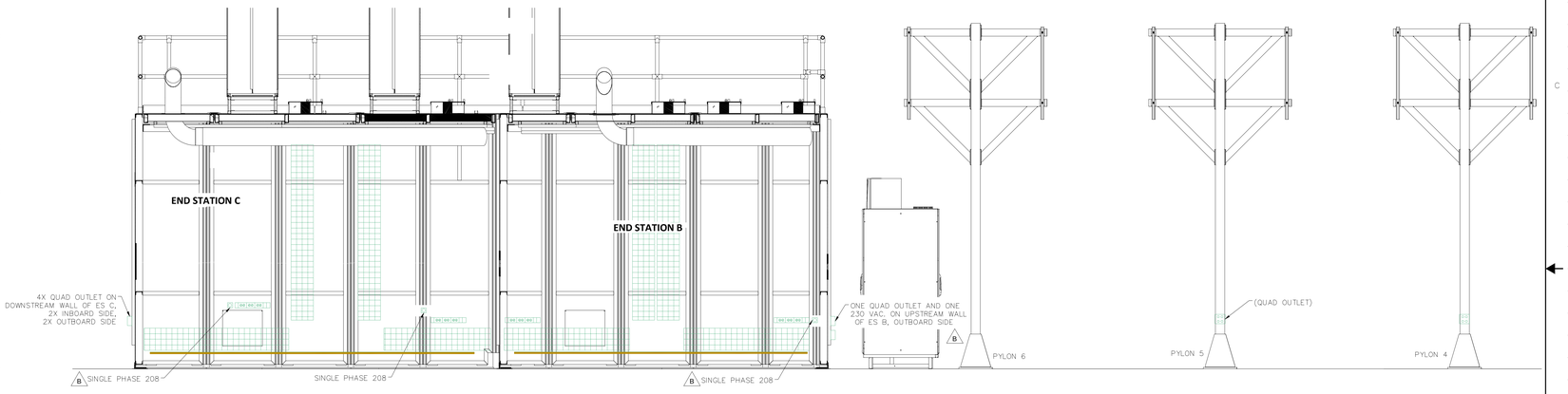


BEAM DIRECTION

ELECTRICAL IN FOE (INBOARD WALLS)



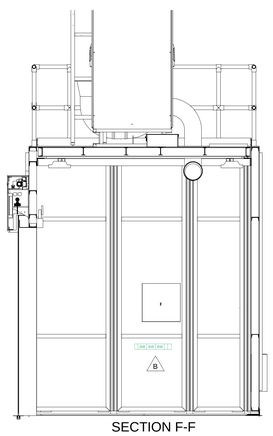
ELECTRICAL OUTSIDE OF END STATIONS B AND C

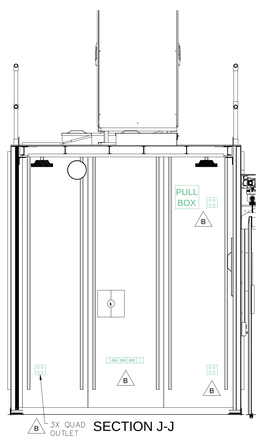


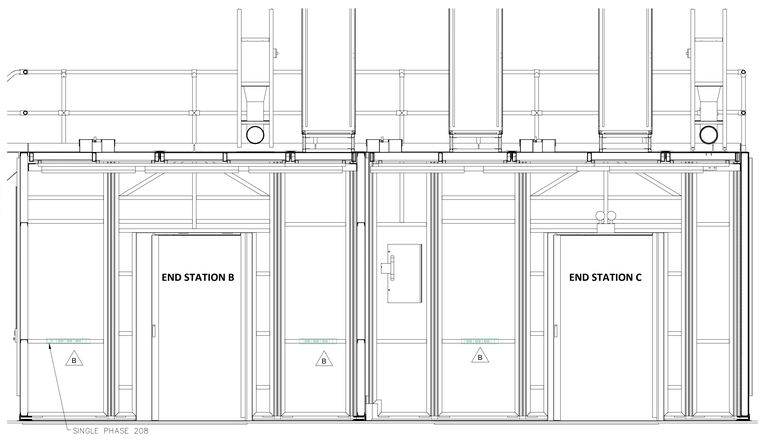
BEAM DIRECTION

ELECTRICAL IN END STATIONS B AND C (INBOARD WALLS)

$\frac{1}{2}$" = 1'-0"

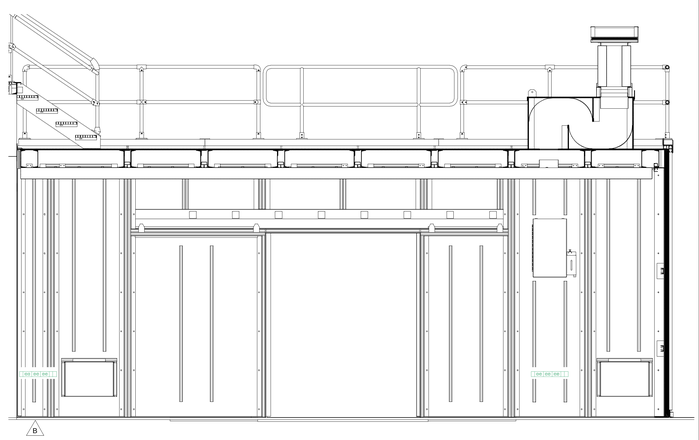






ELECTRICAL OUTBOARD WALLS INSIDE OF END STATIONS B AND C

$\frac{1}{2}$" = 1'-0"



ELECTRICAL OUTBOARD WALLS INSIDE OF FOE

BEAM DIRECTION

E	PD-XFM-UT-1500	B
SHEET SIZE	DRAWING/PART NUMBER	REVISION
ESH&Q RISK LEVEL: A-2	SHEET 6 OF 8	

RELEASED – EFFECTIVE

XFM BEAMLINE, 4-BM MECHANICAL UTILITIES

DRAWING ID	DEVICE ID	COMMENT
1001	4BM R - PCHWS - VLV - 1001	
1002	4BM R - PCHWS - MV - 1002	
1003	4BM R - PCHWS - VLV - 1003	
1004	4BM R - PCHWS - VLV - 1004	
1005	4BM R - PCHWS - STR - 1005	
1006	4BM R - PCHWS - VLV - 1006	
1007	4BM A - PCHWS - VLV - 1007	
1008	4BM A - PCHWS - PG - 1008	
1009	4BM A - PCHWS - VLV - 1009	
1010	4BM A - PCHWS - VLV - 1010	
1011	4BM A - PCHWS - VLV - 1011	
1012	4BM R - PCHWS - VLV - 1012	
1013	4BM R - PCHWS - VLV - 1013	
1014	4BM R - PCHWS - VLV - 1014	
1015	4BM R - PCHWS - STR - 1015	
1016	4BM R - PCHWS - VLV - 1016	
1017	4BM R - PCHWS - VLV - 1017	
1018	4BM F - PCHWS - VLV - 1018	
1019	4BM F - PCHWS - VLV - 1019	
1020	4BM F - PCHWS - PG - 1020	
1021	4BM F - PCHWS - VLV - 1021	
1022	4BM F - PCHWS - VLV - 1022	
1023	4BM F - PCHWS - VLV - 1023	
1024	4BM F - PCHWS - VLV - 1024	
1025	Not Used - 1025	
1026	Not Used - 1026	
1027	4BM F - PCHWS - VLV - 1027	
1028	4BM R - PCHWS - VLV - 1028	
1029	4BM R - PCHWS - VLV - 1029	
1030	4BM R - PCHWS - STR - 1030	
1031	4BM R - PCHWS - VLV - 1031	
1032	4BM B - PCHWS - VLV - 1032	
1033	4BM B - PCHWS - PG - 1033	
1034	4BM B - PCHWS - VLV - 1034	
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1036	4BM B - PCHWS - VLV - 1036	
1037	4BM R - PCHWS - VLV - 1037	
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1044	4BM R - PCHWS - VLV - 1044	
1045	4BM R - PCHWS - VLV - 1045	
1046	4BM C - PCHWS - VLV - 1046	
1047	4BM C - PCHWS - PG - 1047	
1048	4BM C - PCHWS - VLV - 1048	
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1051	4BM R - PCHWS - STR - 1051	
1052	4BM R - PCHWS - VLV - 1052	
1053	4BM R - PCHWS - TS - 1053	
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1056	4BM F - PCHWR - VLV - 1056	
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1076	4BM R - CA - VLV - 1076	
1077	4BM F - CA - VLV - 1077	
1078	4BM F - CA - PG - 1078	
1079	4BM F - CA - VLV - 1079	
1080	4BM R - CA - VLV - 1080	
1081	4BM B - CA - VLV - 1081	
1082	4BM B - CA - PG - 1082	
1083	4BM B - CA - VLV - 1083	
1084	4BM R - CA - VLV - 1084	
1085	4BM C - CA - VLV - 1085	
1086	4BM C - CA - PG - 1086	
1087	4BM C - CA - VLV - 1087	
1088	4BM R - CA - VLV - 1088	
1089	4BM R - CA - VLV - 1089	
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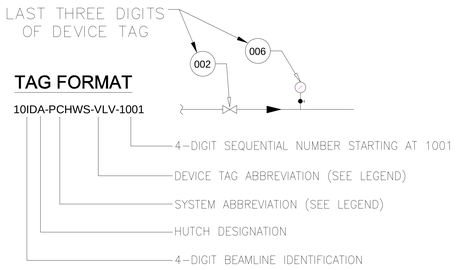
1091	Not Used - 1091	
1092	Not Used - 1092	
1093	Not Used - 1093	
1094	Not Used - 1094	
1095	Not Used - 1095	
1096	Not Used - 1096	
1097	Not Used - 1097	
1098	Not Used - 1098	
1099	Not Used - 1099	
1100	4BM R - GN2 - VLV - 1100	
1101	4BM R - GN2 - VLV - 1101	
1102	4BM R - GN2 - VLV - 1102	
1103	4BM R - GN2 - VLV - 1103	
1104	4BM R - GN2 - VLV - 1104	
1105	4BM C - GN2 - VLV - 1105	
1106	4BM C - GN2 - PG - 1106	
1107	4BM C - GN2 - VLV - 1107	
1108	Not Used - 1108	
1109	Not Used - 1109	
1110	Not Used - 1110	
1111	Not Used - 1111	
1112	Not Used - 1112	
1113	Not Used - 1113	
1114	Not Used - 1114	
1115	Not Used - 1115	
1116	Not Used - 1116	
1117	4BM R - PCHWR - VLV - 1117	
1118	4BM R - PCHWR - MV - 1118	
1119	4BM R - PCHWR - VLV - 1119	
1120	4BM R - PCHWR - VLV - 1120	
1121	4BM R - PCHWR - VLV - 1121	
1122	4BM R - PCHWR - VLV - 1122	
1123	4BM R - PCHWR - VLV - 1123	
1124	4BM R - PCHWR - VLV - 1124	
1125	4BM R - PCHWR - MV - 1125	
1126	4BM R - PCHWR - VLV - 1126	
1127	4BM R - PCHWR - VLV - 1127	
1128	4BM R - PCHWR - VLV - 1128	
1129	4BM A - PCHWR - VLV - 1129	
1130	4BM A - PCHWR - PG - 1130	
1131	4BM A - PCHWR - VLV - 1131	
1132	4BM A - PCHWR - VLV - 1132	
1133	Not Used - 1133	
1134	4BM A - PCHWR - VLV - 1134	
1135	4BM A - PCHWR - VLV - 1135	
1136	4BM R - PCHWR - TS - 1136	
1137	4BM F - PCHWR - VLV - 1137	
1138	4BM F - PCHWR - VLV - 1138	
1139	4BM F - PCHWR - PG - 1139	
1140	4BM F - PCHWR - VLV - 1140	
1141	4BM F - PCHWR - VLV - 1141	
1142	4BM F - PCHWR - VLV - 1142	
1143	4BM F - PCHWR - VLV - 1143	
1144	Not Used - 1144	
1145	Not Used - 1145	
1146	4BM F - PCHWR - VLV - 1146	
1147	4BM R - PCHWR - VLV - 1147	
1148	4BM R - PCHWR - VLV - 1148	
1149	4BM R - PCHWR - VLV - 1149	
1150	4BM B - PCHWR - VLV - 1150	
1151	4BM B - PCHWR - PG - 1151	
1152	4BM B - PCHWR - VLV - 1152	
1153	4BM B - PCHWR - VLV - 1153	
1154	4BM B - PCHWR - VLV - 1154	
1155	4BM B - PCHWR - VLV - 1155	
1156	4BM B - PCHWR - VLV - 1156	
1157	4BM R - PCHWR - VLV - 1157	
1158	Not Used - 1158	
1159	4BM R - PCHWR - VLV - 1159	
1160	4BM R - PCHWR - VLV - 1160	
1161	4BM R - PCHWR - VLV - 1161	
1162	4BM R - PCHWR - MV - 1162	
1163	4BM R - PCHWR - VLV - 1163	
1164	4BM R - PCHWR - MV - 1164	
1165	4BM R - PCHWR - VLV - 1165	
1166	4BM R - PCHWR - MV - 1166	
1167	4BM R - PCHWR - VLV - 1167	
1168	4BM R - PCHWR - VLV - 1168	
1169	4BM R - PCHWR - VLV - 1169	
1170	4BM C - PCHWR - VLV - 1170	
1171	4BM C - PCHWR - PG - 1171	
1172	4BM C - PCHWR - VLV - 1172	
1173	4BM C - PCHWR - VLV - 1173	
1174	4BM C - PCHWR - VLV - 1174	
1175	4BM R - PCHWR - VLV - 1175	
1176	Not Used - 1176	
1177	Not Used 1177	
1178	Not Used 1178	
1179	Not Used 1179	
1180	4BM R - CA - VLV - 1180	
1181	4BM R - CA - VLV - 1181	
1182	4BM R - CA - VLV - 1182	
1183	4BM R - CA - VLV - 1183	
1184	4BM R - CA - VLV - 1184	
1185	4BM R - CA - PG - 1185	
1186	4BM R - CA - VLV - 1186	
1187	4BM R - CA - FL - 1187	
1188	4BM R - CA - VLV - 1188	
1189	4BM R - CA - PG - 1189	
1190	4BM R - CA - VLV - 1190	
1191	4BM R - CA - VLV - 1191	
1192	4BM R - CA - VLV - 1192	
1193	Not Used - 1193	
1194	4BM B - CA - PG - 1194	
1195	4BM B - CA - VLV - 1195	
1196	4BM B - CA - VLV - 1196	

E	PD-XFM-UT-1500	B
SHEET SIZE	DRAWING/PART NUMBER	REVISION
ESH&Q RISK LEVEL A-2	SHEET 7 OF 8	

RELEASED – EFFECTIVE

TAG LEGEND	
BEAMLINE LOCATION	
BEAMLINE NO.	1BM/1ID THROUGH 30BM/30ID
HUTCH DESIGNATION	A = HUTCH A (FOE) B = HUTCH B C = HUTCH C D = HUTCH D F = FLOOR MOUNTED R = HUTCH ROOF MOUNTED
DEVICE TYPE	
ABBREVIATION	DEVICE
AV	AIR VENT
DPS	DIFFERENTIAL SENSOR
FL	FILTER
FM	FLOW METER
PG	PRESSURE GAUGE
PRG	PRESSURE REGULATOR
PRV	PRESSURE RELIEF VALVE
PT	PRESSURE TRANSMITTER
MV	MOTORIZED VALVE
TI	TEMPERATURE INDICATOR
TS	TEMPERATURE SENSOR
VLV	MANUAL VALVE
SYSTEM DESIGNATION	
ABBREVIATION	SYSTEM
CA	COMPRESSED AIR
PCHWS	PROCESS CHILLED WATER SUPPLY
PCHWR	PROCESS CHILLED WATER RETURN
CUS	COPPER SKID DE-IONIZED WATER SUPPLY
CUR	COPPER SKID DE-IONIZED WATER RETURN
GN2	GASEOUS NITROGEN

PIPE IDENTIFICATION LABEL FORMAT			
SYSTEM	LABEL TEXT	LABEL FIELD COLOR	COLOR OF LETTERS
COMPRESSED AIR	COMPRESSED AIR	BLUE	WHITE
PROCESS CHILLED WATER	PROCESS CHILLED WATER SUPPLY PROCESS CHILLED WATER RETURN	GREEN	WHITE
COPPER SKID DE-IONIZED WATER	COPPER DI SUP COPPER DI RET	GREEN	WHITE
GASEOUS NITROGEN	GASEOUS NITROGEN	PURPLE	WHITE



VALVES

ID	#	SIZE	TYPE	MATERIAL	CONNECTION	TRIM	MANUFACTURER	PART NUMBER	DESCRIPTION
VLV	2	1/4"	BALL	BRONZE	NPT	STANDARD	APOLLO	70-141-27	1/4", LEVER LOCKING, STAINLESS BALL & STEM
VLV	3	1/4"	BALL	BRONZE	NPT	UHMWPE	APOLLO	70-141-21-27	1/4", LEVER LOCKING, STAINLESS BALL & STEM
VLV	7	1/2"	BALL	BRONZE	NPT	UHMWPE	APOLLO	70-143-21-27	1/2", LEVER LOCKING, STAINLESS BALL & STEM
VLV	8	1/2"	BALL	BRONZE	SWEAT	STANDARD	APOLLO	70-243-27	1/2", LEVER LOCKING, STAINLESS BALL & STEM
VLV	9	1/2"	BALL	BRONZE	NPT	STANDARD	APOLLO	70-143-27	1/2", LEVER LOCKING, STAINLESS BALL & STEM
VLV	10	1/2"	GLOBE	STAINLESS	NPT	GRAPHOIL	APOLLO	60A-703-07-09-24	1 PIECE, LOCKING BONNET; STAINLESS TEE HANDLE
VLV	14	3/4"	BALL	BRONZE	SWEAT	STANDARD	APOLLO	70-244-27	3/4", LEVER LOCKING, STAINLESS BALL & STEM
VLV	17	1"	BALL	BRONZE	NPT	UHMWPE	APOLLO	70-145-21-27	1", LEVER LOCKING, STAINLESS BALL & STEM
VLV	18	1"	BALL	BRONZE	SWEAT	STANDARD	APOLLO	70-245-27	1", LEVER LOCKING, STAINLESS BALL & STEM
VLV	21	1-1/2"	BALL	BRONZE	SWEAT	STANDARD	APOLLO	70-247-27	1-1/2", LEVER LOCKING, STAINLESS BALL & STEM
VLV	23	1/4"	RELIEF	BRASS	NPT	STANDARD	MCMASTER	48435K72	85 PSIG POP PRESSURE; ASME 'NB' STAMPED
VLV	24	1"	AUTO AIR VENT	BRASS	NPT	STANDARD	SPIROTHERM SPIROVENT	VJR100TM	THREADED MODEL IN HORIZONTAL
VLV	25	1"	AUTO AIR VENT	BRASS	NPT	STANDARD	SPIROTHERM SPIROVENT	VJV100FT	THREADED MODEL IN VERTICAL
VLV	29	1/2"	RELIEF	BRASS	NPT	STANDARD	MCMASTER	48435K83	110 PSIG POP PRESSURE
VLV	30	3/8"	BALL	BRONZE	NPT	STANDARD	APOLLO	70-142-27	3/8", LEVER LOCKING, STAINLESS BALL & STEM
VLV	31	2"	BALL	BRONZE	SWEAT	STANDARD	APOLLO	70-248-27	2", LEVER LOCKING, STAINLESS BALL & STEM
MV	3	1/2"	MOTORIZED	BRONZE	NPT	STANDARD	BELLIMO	B209+TR24-SR-T	NICKEL PLATED BODY, CHARACTERIZED SS BALL, FAIL IN PLACE
MV	4	1-1/2"	MOTORIZED	BRONZE	NPT	STANDARD	BELLIMO	B240+ARB24-3-S	NICKEL PLATED BODY, CHARACTERIZED SS BALL, FAIL IN PLACE

STAINLESS STEEL FITTINGS

FTG	73	1"	STRAINER	BRONZE	KECKLEY STYLE E-150	1" 1SJY-BCM20M34-FTI-E	1/2" BLOW DOWN; SWEAT SOCKET - PCHW SUPPLY LINES	

FILTERS & INSTRUMENTATION

ID	#	SIZE	TYPE	MATERIAL	CONNECTION	MANUFACTURER	PART NUMBER	DESCRIPTION	USE
FL	3	1/2"	FILTER/REGULATOR COMBO	ACETAL	NPT	PARKER	FB11-04WGC-SS	5 MICRON MESH	COMPRESSED AIR
FL	6	1"	FILTER/REGULATOR COMBO	METAL WITH SIGHT GLASS	NPT	ARO	P39464-610 (GRAINGER P/N 6CRN8)	5 MICRON MESH	HIGH CAPACITY FILTER/REGULATOR COMBO
PG	1	1/4"	PRESSURE GAUGE	STAINLESS	NPT	NO SHOK	25-500-160-PSI-1/4	0-160 PSIG NEEDLE GAUGE	DIW/HCA/CA/PCHW
PG	2	1/4"	PRESSURE GAUGE	STAINLESS	NPT	NO SHOK	25-500-60-PSI-1/4	0-60 PSIG NEEDLE GAUGE	GN2

RELEASED – EFFECTIVE