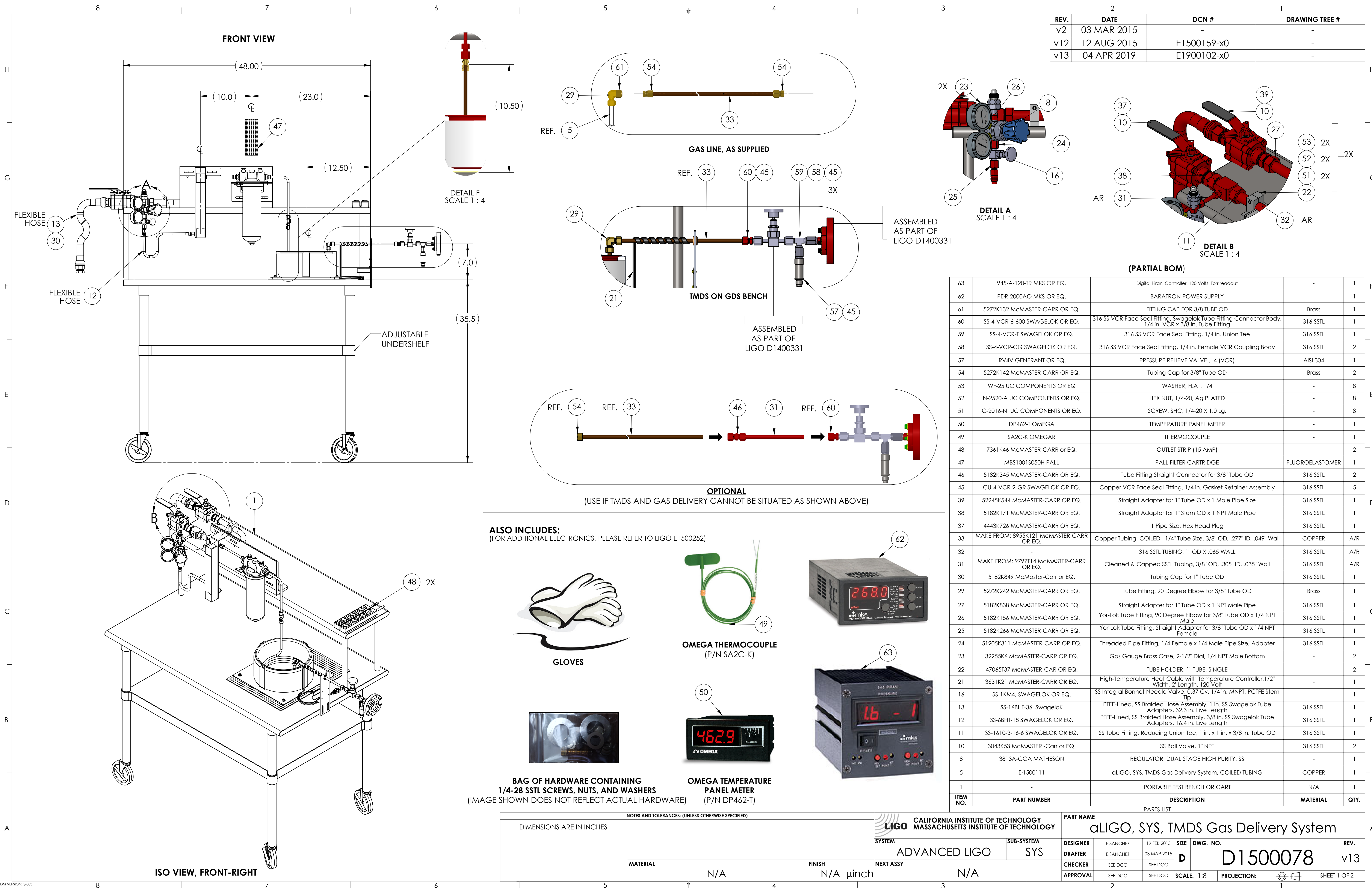
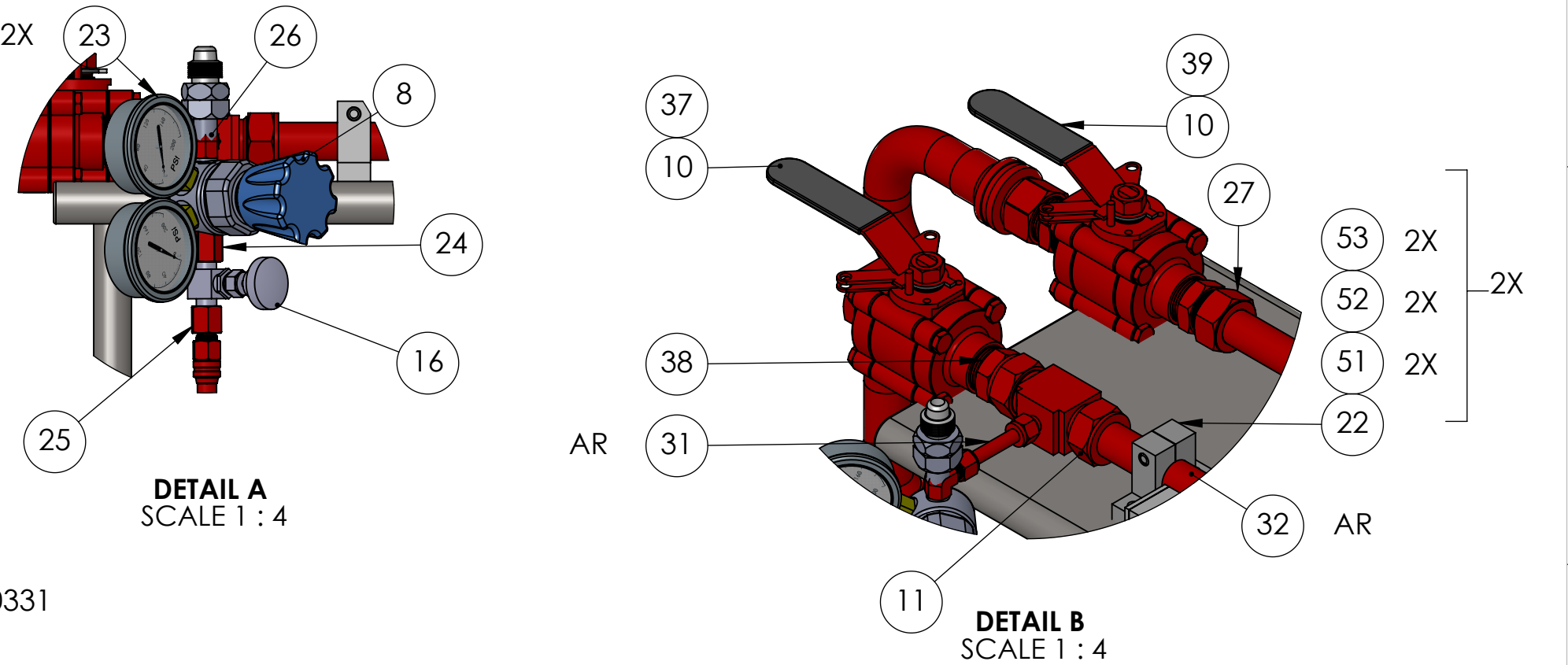




REV.	DATE	DCN #	DRAWING TREE #
v2	03 MAR 2015	-	-
v12	12 AUG 2015	E1500159-x0	-
v13	04 APR 2019	E1900102-x0	-



ITEM NO.	PART NUMBER	DESCRIPTION	MATERIAL	QTY.
63	945-A-120-TR MKS OR EQ.	Digital Pirani Controller, 120 Volts, Torr readout	-	1
62	PDR 2000AO MKS OR EQ.	BARATRON POWER SUPPLY	-	1
61	5272K132 McMaster-CARR OR EQ.	FITTING CAP FOR 3/8" TUBE OD	Brass	1
60	SS-4-VCR-6-600 SWAGELOK OR EQ.	316 SS VCR Face Seal Fitting, Swagelok Tube Fitting Connector Body, 1/4 in. VCR x 3/8 in. Tube Fitting	316 SSSL	1
59	SS-4-VCR-T SWAGELOK OR EQ.	316 SS VCR Face Seal Fitting, 1/4 in. Union Tee	316 SSSL	1
58	SS-4-VCR-CG SWAGELOK OR EQ.	316 SS VCR Face Seal Fitting, 1/4 in. Female VCR Coupling Body	316 SSSL	2
57	IRV4V GENERANT OR EQ.	PRESSURE RELIEVE VALVE, -4 (VCR)	AISI 304	1
54	5272K142 McMaster-CARR OR EQ.	Tubing Cap for 3/8" Tube OD	Brass	2
53	WF-25 UC COMPONENTS OR EQ.	WASHER, FLAT, 1/4	-	8
52	N-2520-A UC COMPONENTS OR EQ.	HEX NUT, 1/4-20, Ag PLATED	-	8
51	C-2016-N UC COMPONENTS OR EQ.	SCREW, SHC, 1/4-20 X 1.0 Lg.	-	8
50	DP462-T OMEGA	TEMPERATURE PANEL METER	-	1
49	SA2C-K OMEGAR	THERMOCOUPLE	-	1
48	7361K46 McMaster-CARR OR EQ.	OUTLET STRIP (15 AMP)	-	2
47	MBS1001S050H PALL	PALL FILTER CARTRIDGE	FLUOROELASTOMER	1
46	5182K345 McMaster-CARR OR EQ.	Tube Fitting Straight Connector for 3/8" Tube OD	316 SSSL	2
45	CU-4-VCR-2-GR SWAGELOK OR EQ.	Copper VCR Face Seal Fitting, 1/4 in. Gasket Retainer Assembly	316 SSSL	5
39	52245K544 McMaster-CARR OR EQ.	Straight Adapter for 1" Tube OD x 1 Male Pipe Size	316 SSSL	1
38	5182K171 McMaster-CARR OR EQ.	Straight Adapter for 1" Stem OD x 1 NPT Male Pipe	316 SSSL	1
37	4443K726 McMaster-CARR OR EQ.	1 Pipe Size, Hex Head Plug	316 SSSL	1
33	MAKE FROM: 8955K121 McMaster-CARR OR EQ.	Copper Tubing, COILED, 1/4" Tube Size, 3/8" OD, .277" ID, .049" Wall	COPPER	A/R
32	-	316 SSSL TUBING, 1" OD X .065 WALL	316 SSSL	A/R
31	MAKE FROM: 7979T114 McMaster-CARR OR EQ.	Cleaned & Capped SSSL Tubing, 3/8" OD, .305" ID, .035" Wall	316 SSSL	A/R
30	5182K849 McMaster-Carr OR EQ.	Tubing Cap for 1" Tube OD	316 SSSL	1
29	5272K242 McMaster-CARR OR EQ.	Tube Fitting, 90 Degree Elbow for 3/8" Tube OD	Brass	1
27	5182K838 McMaster-CARR OR EQ.	Straight Adapter for 1" Tube OD x 1 NPT Male Pipe	316 SSSL	1
26	5182K156 McMaster-CARR OR EQ.	Yor-Lok Tube Fitting, 90 Degree Elbow for 3/8" Tube OD x 1/4 NPT Male	316 SSSL	1
25	5182K266 McMaster-CARR OR EQ.	Yor-Lok Tube Fitting, Straight Adapter for 3/8" Tube OD x 1/4 NPT Female	316 SSSL	1
24	51205K311 McMaster-CARR OR EQ.	Threaded Pipe Fitting, 1/4 Female x 1/4 Male Pipe Size, Adapter	316 SSSL	1
23	32255K6 McMaster-CARR OR EQ.	Gas Gauge Brass Case, 2-1/2" Dial, 1/4 NPT Male Bottom	-	2
22	47065T37 McMaster-CAR OR EQ.	TUBE HOLDER, 1" TUBE, SINGLE	-	2
21	3631K21 McMaster-CARR OR EQ.	High-Temperature Heat Cable with Temperature Controller, 1/2" Width, 2' Length, 120 Volt	-	1
16	SS-1KM4, SWAGELOK OR EQ.	SS Integral Bonnet Needle Valve, 0.37 Cv, 1/4 in. MNPT, PCTFE Stem Tip	-	1
13	SS-16BHT-36, Swagelok	PTFE-Lined, SS Braided Hose Assembly, 1 in. SS Swagelok Tube Adapters, 32.3 in. Live Length	316 SSSL	1
12	SS-6BHT-18 SWAGELOK OR EQ.	PTFE-Lined, SS Braided Hose Assembly, 3/8 in. SS Swagelok Tube Adapters, 16.4 in. Live Length	316 SSSL	1
11	SS-1610-3-16-6 SWAGELOK OR EQ.	SS Tube Fitting, Reducing Union Tee, 1 in. x 1 in. x 3/8 in. Tube OD	316 SSSL	1
10	3043K53 McMaster-Carr OR EQ.	SS Ball Valve, 1" NPT	316 SSSL	2
8	3813A-CGA MATHESON	REGULATOR, DUAL STAGE HIGH PURITY, SS	-	1
5	D1500111	aLIGO, SYS, TMDS Gas Delivery System, COILED TUBING	COPPER	1
1	-	PORTABLE TEST BENCH OR CART	N/A	1

ALSO INCLUDES:
(FOR ADDITIONAL ELECTRONICS, PLEASE REFER TO LIGO E1500252)

GLOVES

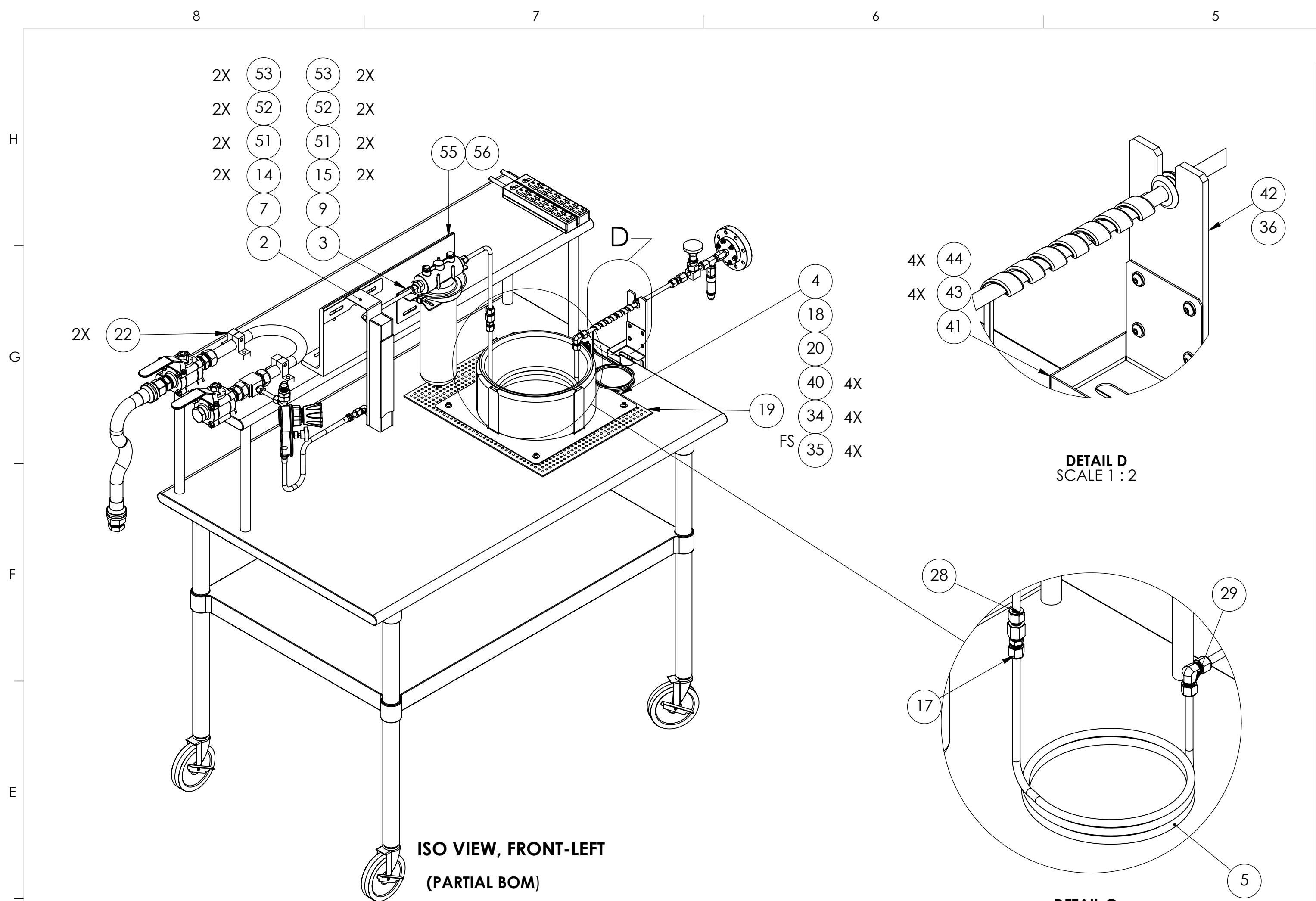
OMEGA THERMOCOUPLE
(P/N SA2C-K)

OMEGA TEMPERATURE PANEL METER
(P/N DP462-T)

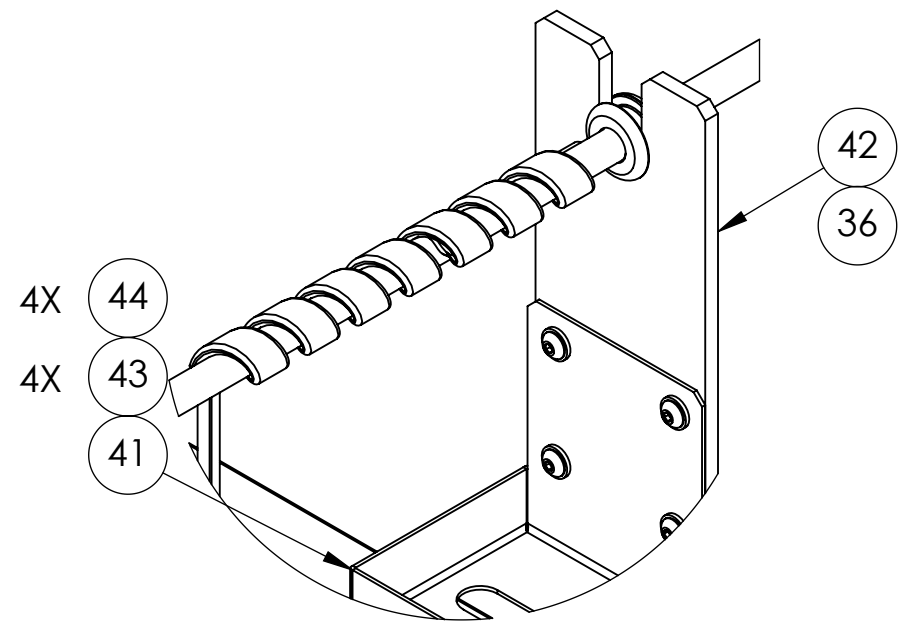
BAG OF HARDWARE CONTAINING
1/4-28 SSSL SCREWS, NUTS, AND WASHERS
(IMAGE SHOWN DOES NOT REFLECT ACTUAL HARDWARE)

NOTES AND TOLERANCES: (UNLESS OTHERWISE SPECIFIED)				PARTS LIST			
DIMENSIONS ARE IN INCHES		MATERIAL		FINISH		N/A	
N/A		N/A		N/A		N/A	

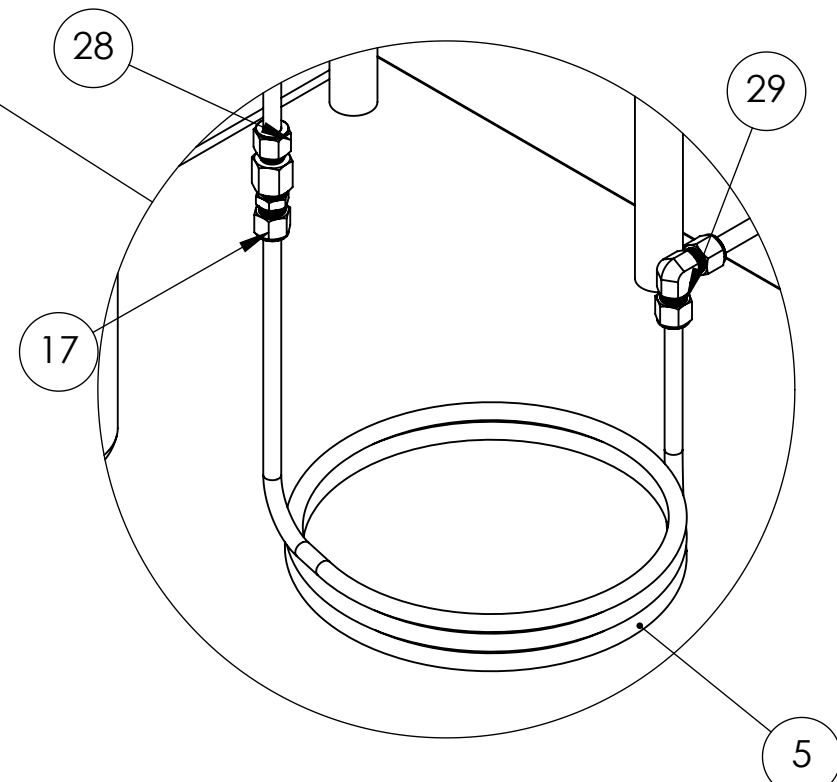
LIGO CALIFORNIA INSTITUTE OF TECHNOLOGY MASSACHUSETTS INSTITUTE OF TECHNOLOGY				PART NAME aLIGO, SYS, TMDS Gas Delivery System			
SYSTEM ADVANCED LIGO		SUB-SYSTEM SYS		DESIGNER E.SANCHEZ		DATE 19 FEB 2015	
DRAFTER E.SANCHEZ		CHECKER SEE DCC		APPROVAL SEE DCC		SIZE D	
NEXT ASSY N/A		SCALE 1:8		PROJECTION FIRST ANGLE		REV. v13	
						SHEET 1 OF 2	



56	92705k28 McMaster-Carr OR EQ.	SSTL SAFETY WIRE, .125 DIA.	316 SSTL	1
55	D1500175	aLIGO, SYS. TMDS GAS DELIVERY SYSTEM, RIGHT ANGLE BRACKET	6061-T6 Al	1
53	WF-25 UC COMPONENTS OR EQ.	WASHER, FLAT, 1/4	-	8
52	N-2520-A UC COMPONENTS OR EQ.	HEX NUT, 1/4-20, Ag PLATED	-	8
51	C-2016-N UC COMPONENTS OR EQ.	SCREW, SHC, 1/4-20 X 1.0 Lg.	-	8
44	92949A191 McMaster-Carr OR EQ.	SCREW, BHSC, 8-32 X 5/16 LG.	18-8 SSTL	4
43	MS15795-807 OR EQ.	WASHER, FLAT, NO. 8	300 SSTL	4
42	D1500014	TMDS, GAS DELIVERY SYSTEM, PIPE SUPPORT	6061 Alloy	1
41	D1500155	TMDS, GAS DELIVERY SYSTEM, HEAT TAPE CONTROLLER MT. BRACKET	6061-T6 Al	1
40	MS15795-810 OR EQ.	WASHER, FLAT, 1/4"	300 SSTL	4
37	4443K726 McMaster-Carr OR EQ.	1 Pipe Size, Hex Head Plug	316 SSTL	1
36	1061T36 McMaster-Carr OR EQ.	Grommet, 5/8" Diameter Hole & 3/16" Thick Panel.	-	1
35	93115K212 McMaster-Carr OR EQ.	Bumper, 1/4-20 X 1/2" High	-	4
34	92196A534 McMaster-Carr OR EQ.	SCREW, SHC, 1/4-20 X 5/16 LG.	18-8 SSTL	4
30	5182K849 McMaster-Carr OR EQ.	Tubing Cap for 1" Tube OD	316 SSTL	1
29	5272K242 McMaster-Carr OR EQ.	Tube Fitting, 90 Degree Elbow for 3/8" Tube OD	Brass	1
28	5943K285 McMaster-Carr OR EQ.	Yor-Lok Fitting, Straight Adapter for 3/8" Tube OD x 1/4 NPT Female	316 SSTL	1
22	47065T37 McMaster-Car OR EQ.	TUBE HOLDER, 1" TUBE, SINGLE	-	2
20	9349K33 McMaster-Carr OR EQ.	Ultra-Flexible Foam Rubber Insulation, Adhesive Back, 3/4" Thick, 36" x 48" Sheet, Black	PS HI	1
19	S-14748, ULINE OR EQ.	15" x 19" Hazmat Medium Sorbent Pads	-	1
18	200007 TOLEDO METAL SPINNING OR EQ.	SEAMLESS SSTL FLANGED CUPS, 10" ID X 5.13 H X .07 WALL	304, 316 OR 302 SSTL	1
17	B-600-1-4 SWAGELOK OR EQ.	Tube Fitting, Male Connector, 3/8 in. Tube OD x 1/4 in. Male NPT	Brass	1
15	SS-600-1-12 SWAGELOK OR EQ.	Tube Fitting, Male Connector, 3/8 in. Tube OD x 3/4 in. Male NPT	316 SSTL	2
14	316L-600-2-4 SWAGELOK OR EQ.	Tube Fitting, Male Elbow, 3/8 in. Tube OD x 1/4 in. Male NPT	316 SSTL	2
9	IDL11GN12H PALL FILTER	FILTER HOUSING	-	1
7	GF-6541-1250 Gilmont Instruments	FLOW METER, Gilmont Accucal 150mm, Size 250 w/Valve	-	1
6	D1500111-101	aLIGO, SYS. TMDS Gas Delivery System, COILED TUBING (VERT)	COPPER	1
5	D1500111	aLIGO, SYS. TMDS Gas Delivery System, COILED TUBING	COPPER	1
4	D1500112	aLIGO, SYS. TMDS Gas Delivery System, COLD TRAP MT. BRACKET	5052-H32	1
3	D1500110	aLIGO, SYS. TMDS Gas Delivery System, PALL FILTER MT. BRACKET	6061-T6 Al	1
2	D1500109	aLIGO, SYS. TMDS GAS DELIVERY SYSTEM, FLOW METER MT. BRACKET	5052-H32	1
ITEM NO.	PART NUMBER	DESCRIPTION	MATERIAL	Default/REQ

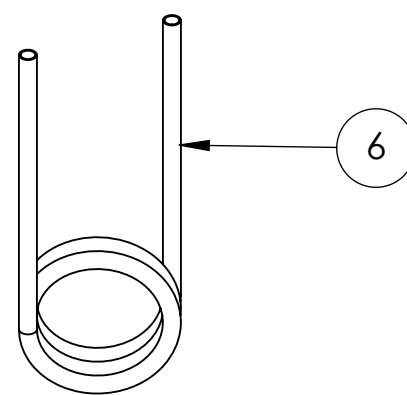


DETAIL D
SCALE 1 : 2



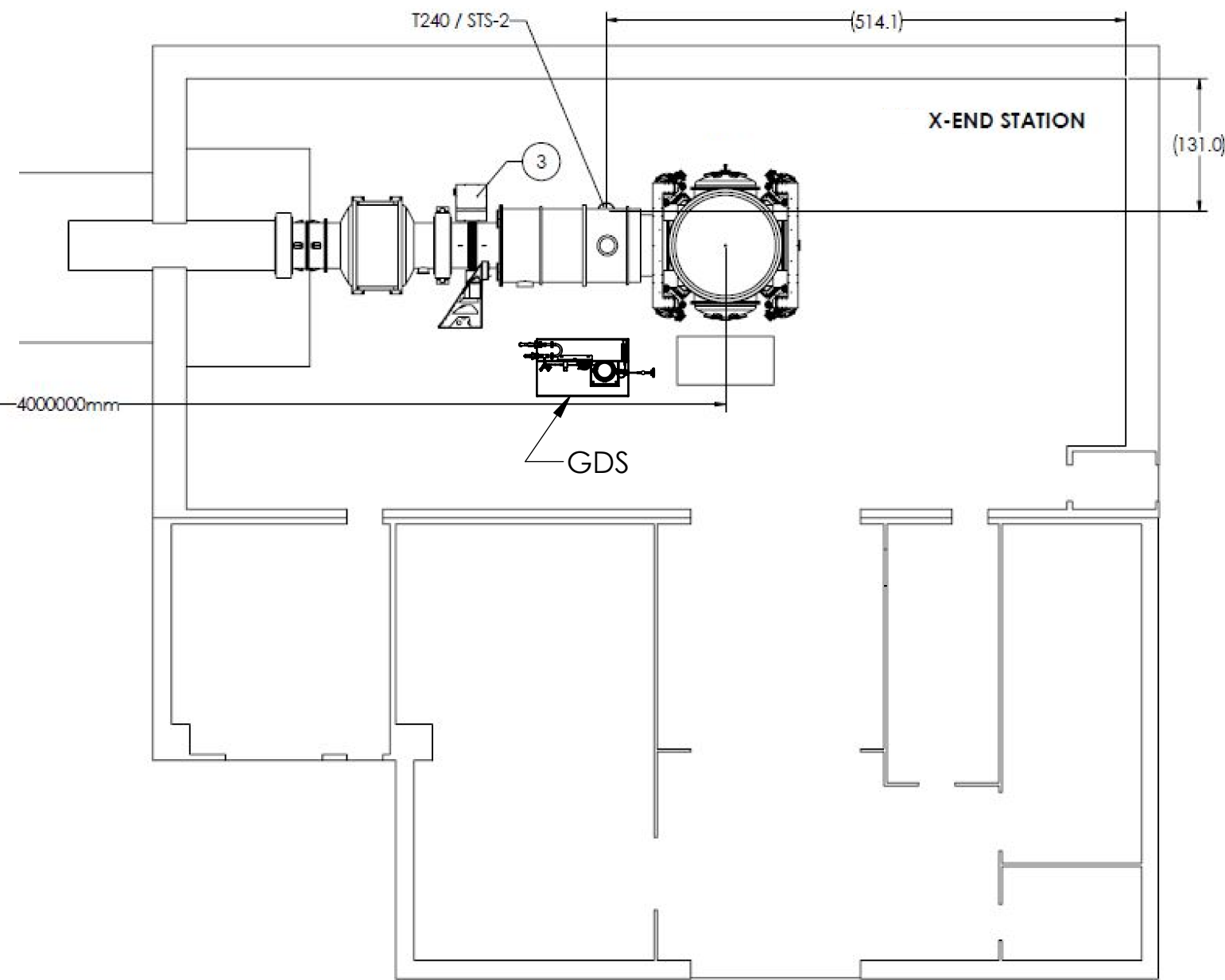
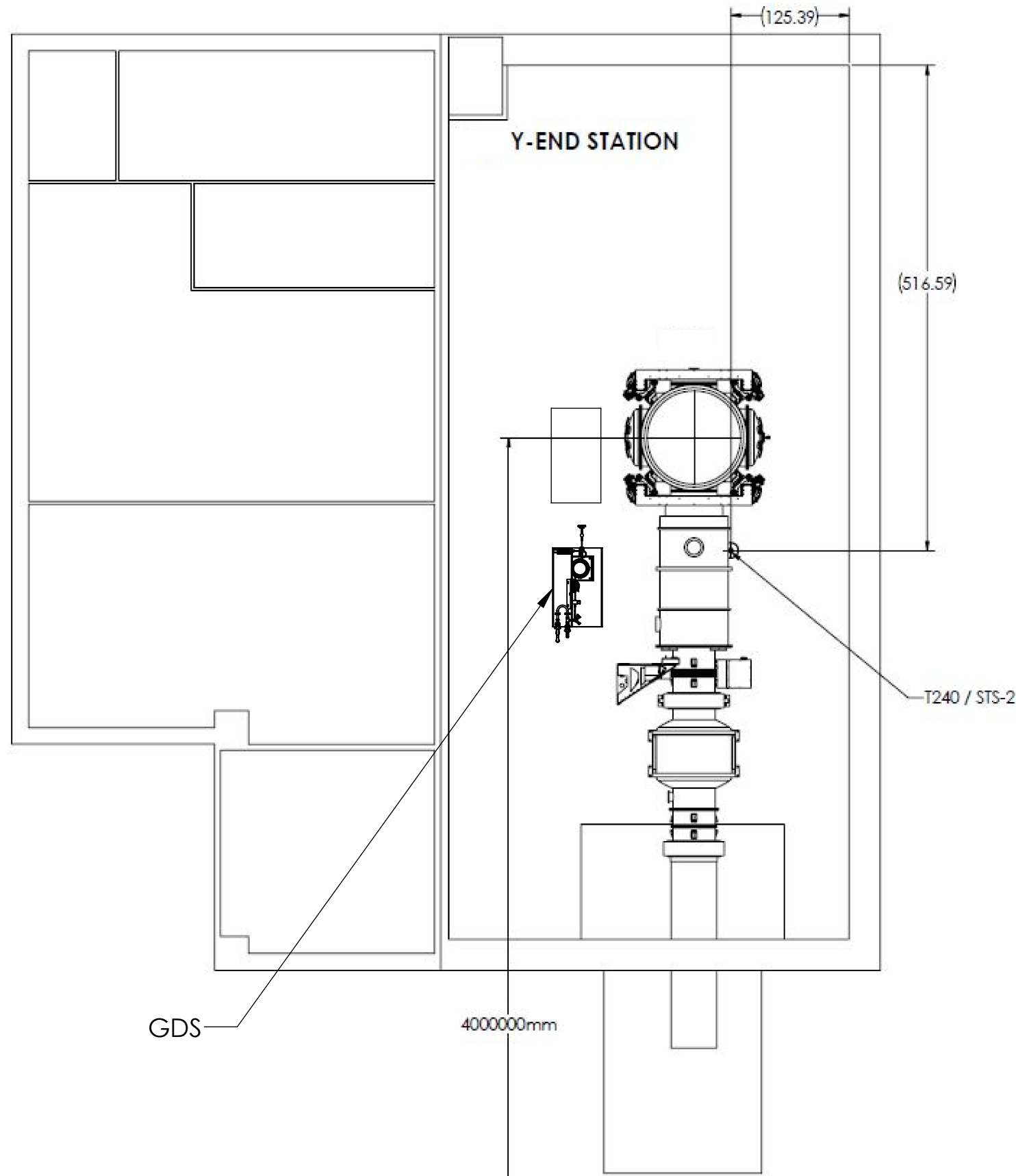
DETAIL C
SCALE 1 : 4

OR



OPTIONAL COIL
ORIENTATION
(VERTICAL)

TMDS TABLE (PROPOSED LOCATION)





CALIFORNIA INSTITUTE OF TECHNOLOGY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

SIZE DWG. NO.

D D1500078

REV.

v13

SCALE: 1:8

PROJECTION:

SHEET 2 OF 2