WEST END ASSEMBLY HALL PLATFORM

DESIGN CALCULATIONS

D-ZERO ENGINEERING NOTE # 3823.115- EN-441

January 3, 1996

Russ Rucinski
RD/DØ Mech.

Approved : _____

This engineering note documents design calculations done for the bayonet feed can platform installed at the far west end of the assembly hall. The platform is mounted off of a cast concrete wall directly south of where the shielding block wall is stacked.

SUMMARY

A summary of the loading, reaction forces and stresses is shown on the page 3. As can be seen, the calculated stresses are very small, maximum value = 2540 psi. The material used is structural steel tubing, ASTM A500 Gr. B, with a minimum yield strength of 46 ksi and minimum ultimate tensile strength of 58 ksi.

The reaction forces for the upper two members will be carried together by a 1/2" mounting plate. The mounting plate is attached to the wall by four 1/2" Hilti wedge anchors. The allowables for each wedge anchor are 2400 lbs. tensile, 1960 lbs. shear. The major reaction load for the top members is a combined 3627 lbs. tensile load which can easily be handled by the four bolt pattern. Some small moment reactions not listed on the summary page add negligible (400 lbs.) force couples to the axial loading. The bottom members are also attached to a mounting plate that is bolted to the wall. See page 15 for Hilti wedge anchor data.

ANALYSIS DETAILS

A finite element program was run on a SDRC/IDEAS package for the structure. The printout and displays on pages 3 through 6 are from that run. Beam elements with 3" x 6" x 3/16" wall rectangular tubing properties were used. The model used114 nodes placed at 3" spacing which yeilded 112 beam elements between the nodes.
The largest maximum Von Mises stress calculated was 2.54 ksi. This is at least a factor of ten below the allowable. The allowable tensile, shear, and bending stress for these members are 27 ksi, 18.4 ksi, and 30.4 ksi respectively. [See D-Zero engineering note 3823.115-EN-417 HX support bracket Design Calcs. for allowables and similar structure.

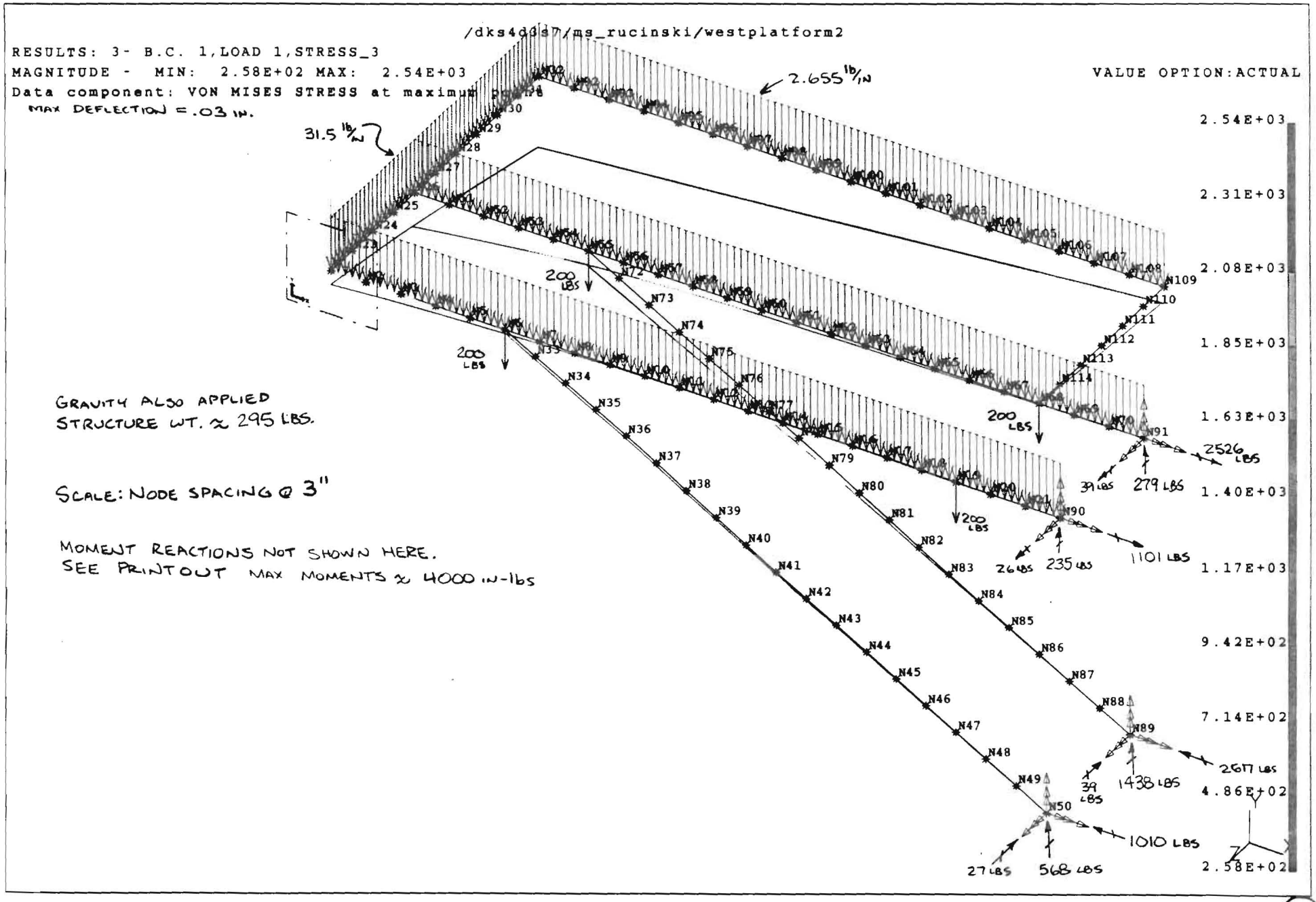
The loads used were generated by hand calcs. on pages 7 through 9. They consist of:

400 lbs. for each bayonet can, 800 lbs. total
882 lbs. for support of the west end piping
A 50 lbs./ft^2 floor loading, 478 lbs.
Gravity on the members, 295 lbs. weight

This is a grand total vertical y direction loading of 2455 lbs. This corresponds well to the summation of y reaction forces of 2520 lbs. on the finite element reaction force printout.

A fabrication sketch of the platform is shown on page 10. The platform was detailed for 4 x 8 x 1/4" rectangular tubing, because that was the free stock available at the D-Zero assembly building. Since that fab. sketch was made, we found and chose to make the platform out of 3" x 6" x 3/16" rectangular tubing. The calculations were done for that choice. A formal "as built" detail drawing is being made. The D-Zero drawing number is 3823.115-MC-317494 and is kept in the electronic drawing control system. Some overall layout views are included on pages 11 through 14 to give some perspective to the platform's intended use.

SUMMARY OF LOADS, REACTIONS, AND STRESSES



GRAVITY ALSO APPLIED
STRUCTURE WT. ≈ 295 LBS.

SCALE: NODE SPACING @ 3"

MOMENT REACTIONS NOT SHOWN HERE.
SEE PRINTOUT MAX MOMENTS ≈ 4000 IN-lbs

4

I-DEAS Master Series 2.1: Simulation 04-Jan-96 09:03:36
/dks4d3s7/ms_rucinski/westplatform2

Group ID : None
Result Set : 2 - B.C. 1,LOAD 1,REACTION FORCE_2
Report Type : Contour Units : IN
Result Type : REACTION FORCE
Frame of Reference: Part Data Component: Magnitude

Node	Reacti-X	Reacti-Y	Reacti-Z	Reacti-RX	Reacti-RY	Reacti-RZ
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
19	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
23	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
25	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
26	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
27	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
28	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
29	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
30	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
31	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
32	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
33	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
34	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
35	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
36	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
37	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
38	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
39	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
40	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
41	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
42	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
43	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
44	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
45	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
46	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
47	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
48	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

6

I-DEAS Master Series 2.1: Simulation 04-Jan-96 09:03:36
/dks4d3s7/ms_rucinski/westplatform2

ode	Reacti-X	Reacti-Y	Reacti-Z	Reacti-RX	Reacti-RY	Reacti-RZ
103	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
104	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
105	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
106	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
107	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
108	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
109	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
110	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
111	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
112	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
113	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
114	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	2.520E+03	0.000E+00	6.315E+03	-1.013E+03	-7.009E+03
	91	89	91	91	90	1
Maximum	2.526E+03	1.438E+03	3.910E+01	4.048E+03	5.517E+02	0.000E+00
	89	1	89	1	89	91
Minimum	-2.617E+03	0.000E+00	-3.901E+01	0.000E+00	-1.029E+03	-4.302E+03
Average	0.000E+00	2.250E+01	0.000E+00	5.638E+01	-9.049E+00	-6.258E+01

10" BOLT SPACING
∴ ≈ 400 LB FORCE
COUPLE @ ANCHORS

(5)

I-DEAS Master Series 2.1: Simulation 04-Jan-96 09:03:36
/dks4d3s7/ms_rucinski/westplatform2

ode	Reacti-X	Reacti-Y	Reacti-Z	Reacti-RX	Reacti-RY	Reacti-RZ
49	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
50	-1.010E+03	5.684E+02	-2.657E+01	5.792E+02	-7.360E+02	-2.439E+02
51	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
52	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
53	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
54	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
55	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
56	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
57	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
58	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
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60	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
61	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
62	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
63	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
64	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
65	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
66	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
67	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
68	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
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72	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
73	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
74	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
75	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
76	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
77	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
78	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
79	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
80	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
81	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
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85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
86	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
87	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
89	-2.617E+03	1.438E+03	-3.901E+01	6.115E+02	-1.029E+03	-2.801E+02
90	1.101E+03	2.346E+02	2.649E+01	1.076E+03	5.517E+02	-2.183E+03
91	2.526E+03	2.785E+02	3.910E+01	4.048E+03	1.999E+02	-4.302E+03
92	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
93	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
94	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
95	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
97	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
98	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
99	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
100	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
101	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
102	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

LOADS FOR WEST END PLATFORM

- **VLPC BAYONET FEED CAN:**

TOP PLATE: $\frac{\pi D^2}{4} \times t \times \rho_{S.S.} = \frac{\pi (20\,in)^2}{4}(.625)(.283\ lb/in^3)$

$= 56$ lbs

PIPE SHELL = 20" SCH. 5S × 31" (39.8 lb/ft)

$= 103$ lbs

BOTTOM HEAD ≈ 50 lbs

Cu RAD SHIELD.

Cu SHELL = $\pi(16")(28\,in.)(.0625\,in.)(.317\ lb/in^3)$

$= 28$ lbs.

Cu LIDS = $\frac{\pi(16)^2}{4}(.0625)(.317)(2_{LIDS}) = 8$ lbs

6 ~ OMMONESS ≈ 120 lbs

TOTAL DEAD WT. = 56+103+50+28+8+120 = 365 lbs

≈ **400 lbs.**

- **SOLENOID FEED CAN:** ≈ **400 lbs**

- **DISTRIBUTED LOADS**

8×4×1/4 MEMBERS @ 19.02 lb/ft.

TOTAL WT. = 29 ft × 19 lb/ft = **553 lbs.**

SUCTION HEADER + OTHER PIPES SPANNING FROM BRACKETS.

≈ 875 * FOR 12.5 ft OF SPAN.

{SEE WEST PIPING LOADS 12-20-95}

- ADDITIONAL 50 lb/ft² LOADING.

FLOOR AREA = $\left(\frac{62.25}{12}\text{ ft}\right)\left(\frac{27.8125+4}{12}\text{ ft}\right)$

$= 13.75\text{ ft}^2$

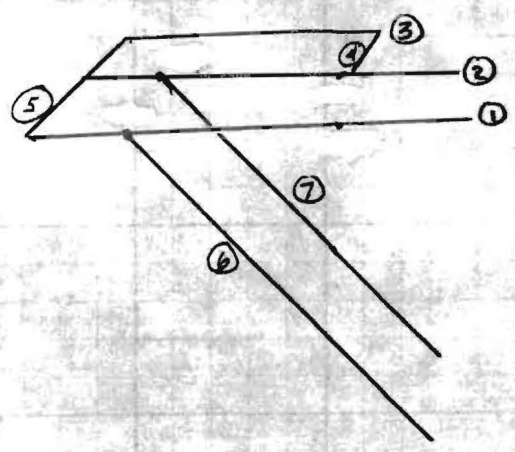
CAN AREAS = $\frac{\pi D^2}{4} \times 2 = \frac{\pi\left(\frac{20}{12}\right)^2}{4} \times 2 = 4.36\text{ ft}^2$

NET AREA = 9.4 ft^2

NET 50 lb/ft² LOADING = **470 lbs**

- INTEGRATING THESE LOADS INTO MODEL:

APPLY 200 lbs POINT LOAD TO (1) & (2) @ SOLENOID & VLPC CAN LOCATIONS.



APPLY GRAVITY TO ALL MEMBERS

APPLY DISTRIBUTED; $\frac{875\text{ lbs}}{27.8125\text{ IN}} = 31.5\frac{\text{lbs}}{\text{IN.}}$ TO (5)

FOR PIPE LOADING

APPLY DISTRIBUTED; $\frac{470\text{ lbs}}{(62.25)2 + (62.25-9.25)\text{ IN}} = 2.65\frac{\text{lbs}}{\text{IN}}$ TO (1) (2) (3)

FOR 50 lb/ft² LOAD

~~SINCE ≈ BEAM WT,~~
~~WILL DOUBLE GRAVITY,~~

TOTAL LOADS

$31.5\ \#/\text{IN.} \times (30\ \text{in.}) = 882\ \#'s$

$2.655367\ \text{lb/in} \times 180\ \text{in} = 478\ \#'s$

GRAVITY $\approx 295\ \#'s$ FOR 3x6x1/4 TUBE

CANS 4 LOADS $\times 200 = 800\ \#'s$

$$\boxed{\Sigma\ \text{LOADS}\Big|_{\text{Y DIRECTION}} \approx 2455\ \#}$$

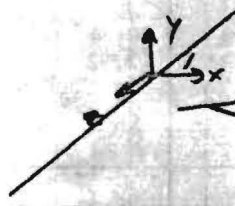
OLD RUNS DISREGARD.

BASED ON LOW STRESSES & LOADINGS, I WILL DECREASE THE 45° ANGLE TO 30°.

THIS CHANGES THE VERTICAL CENTER TO CENTER SPACING ON THE MOUNTING PADS

FROM 50.163" (MODEL) ≈ 2
TO 26.105

THEREFORE % TENSION/COMPRESSION WILL DOUBLE



$(1363+782)(2) = 4290\ \#$

$(1406+738)(2) = 4288\ \#$

A FOUR BOLT PATTERN FOR THE PLATES IS ADEQUATE BASED ON HX BRACKET DESIGN.

LOOK @ BENDING MOMENTS.

$R_z = 247$ in-lbs

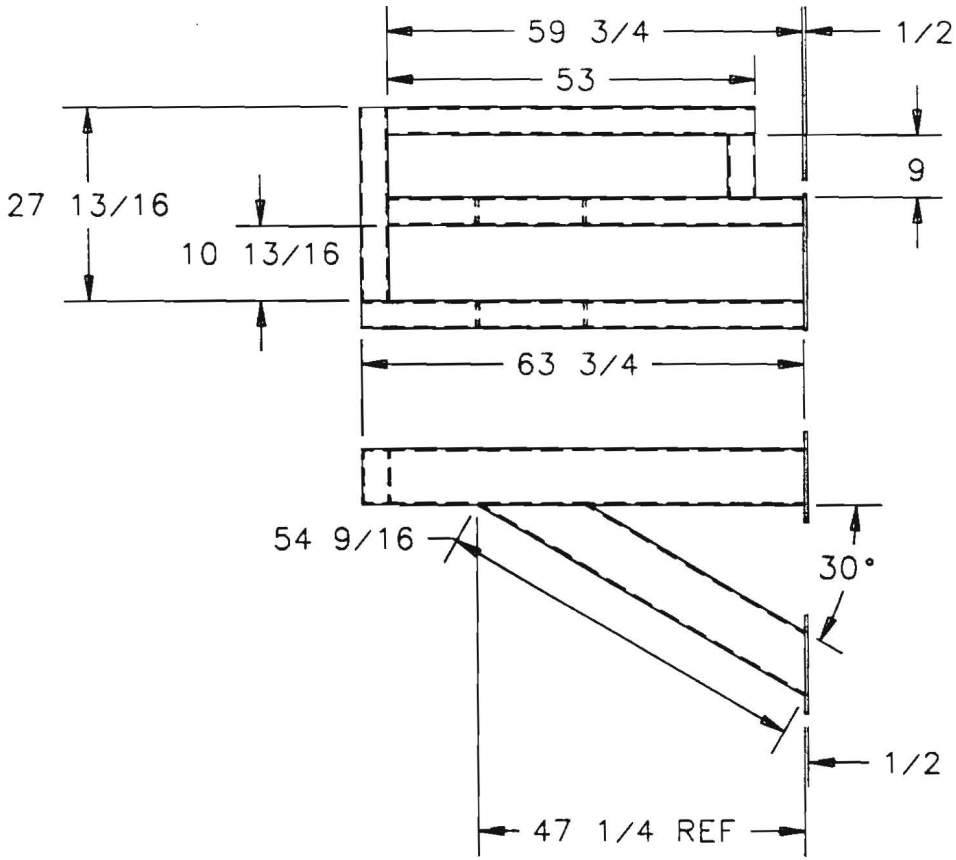
$R_y = 310$ in-lbs

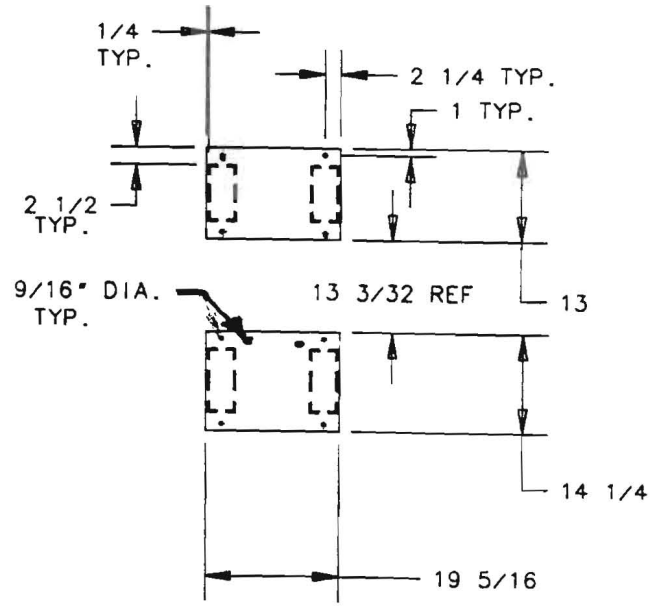
$R_z = 2358$ in-lbs @ $10\frac{1}{2}$" SPACING

225 # FORCE COUPLE

NEGLIGIBLE.. OK.

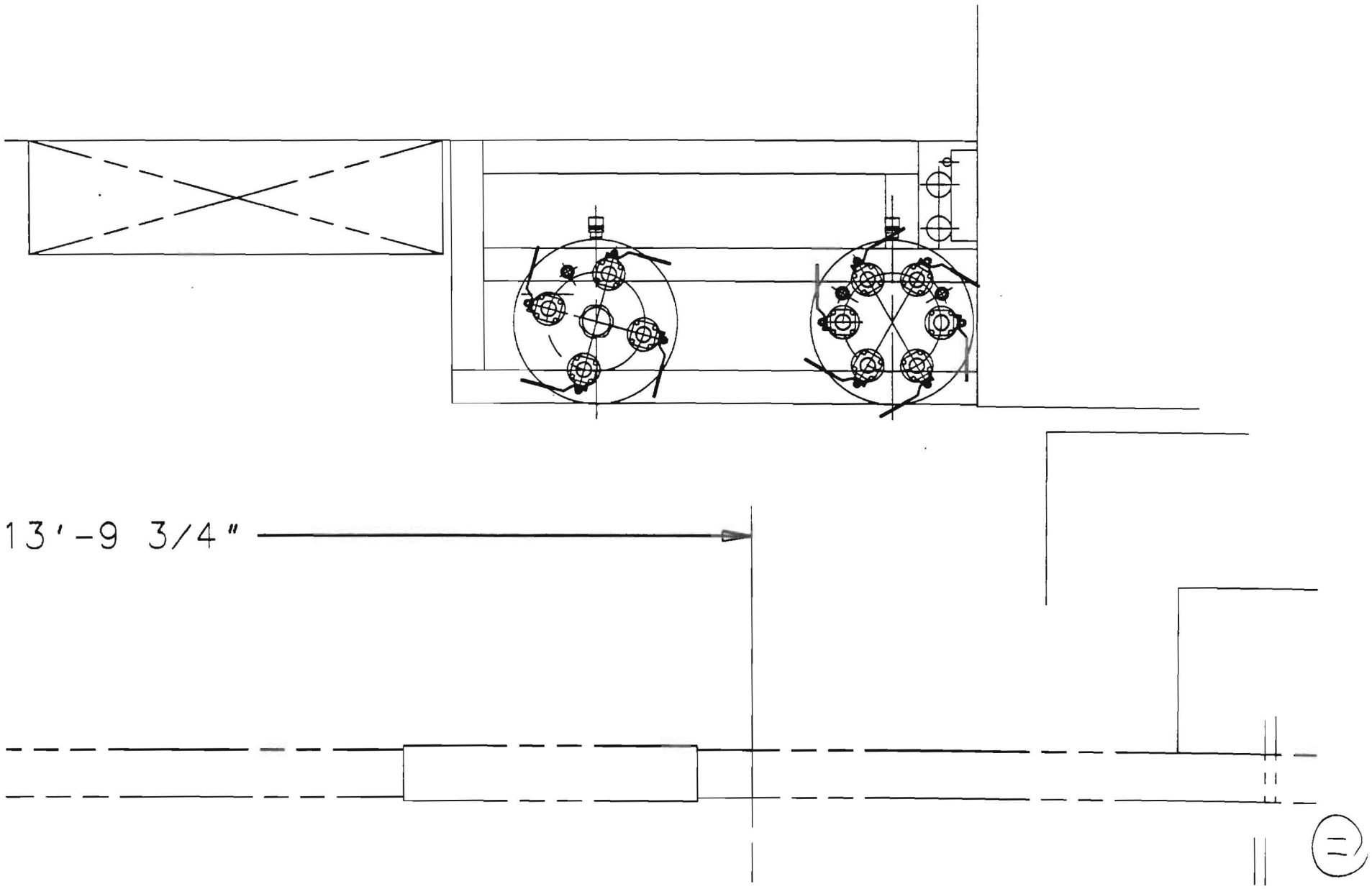
FABRICATION DETAIL SKETCH

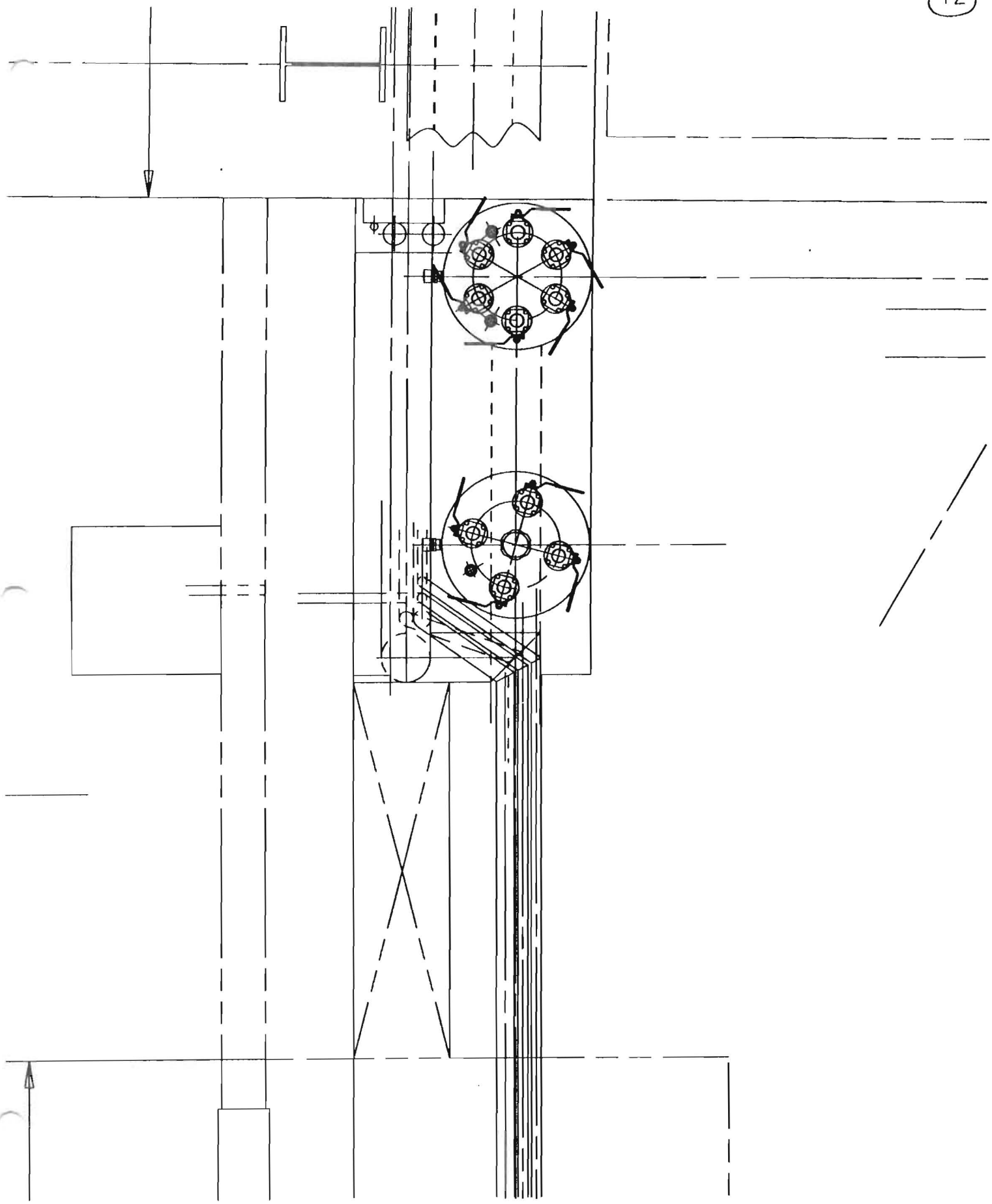


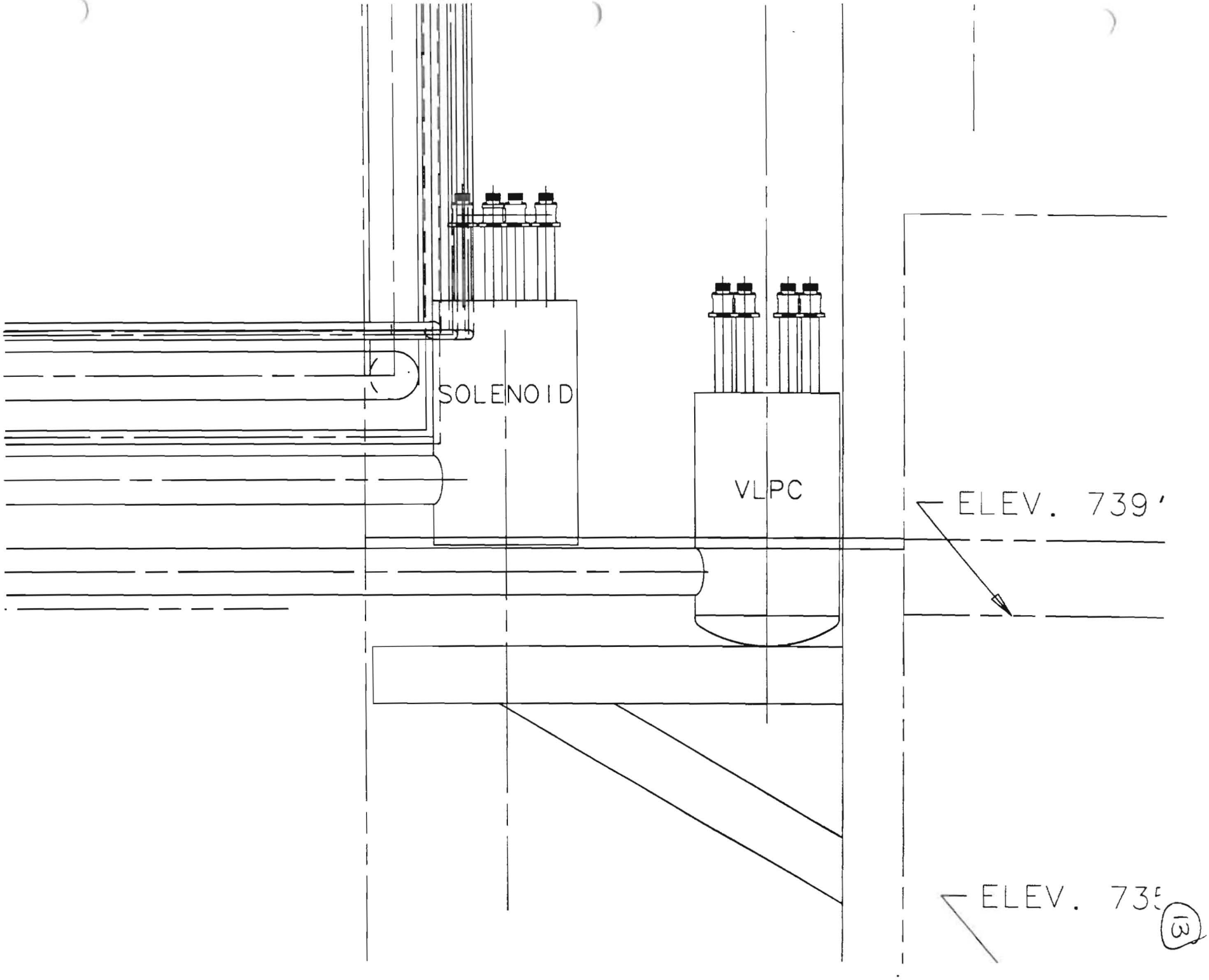


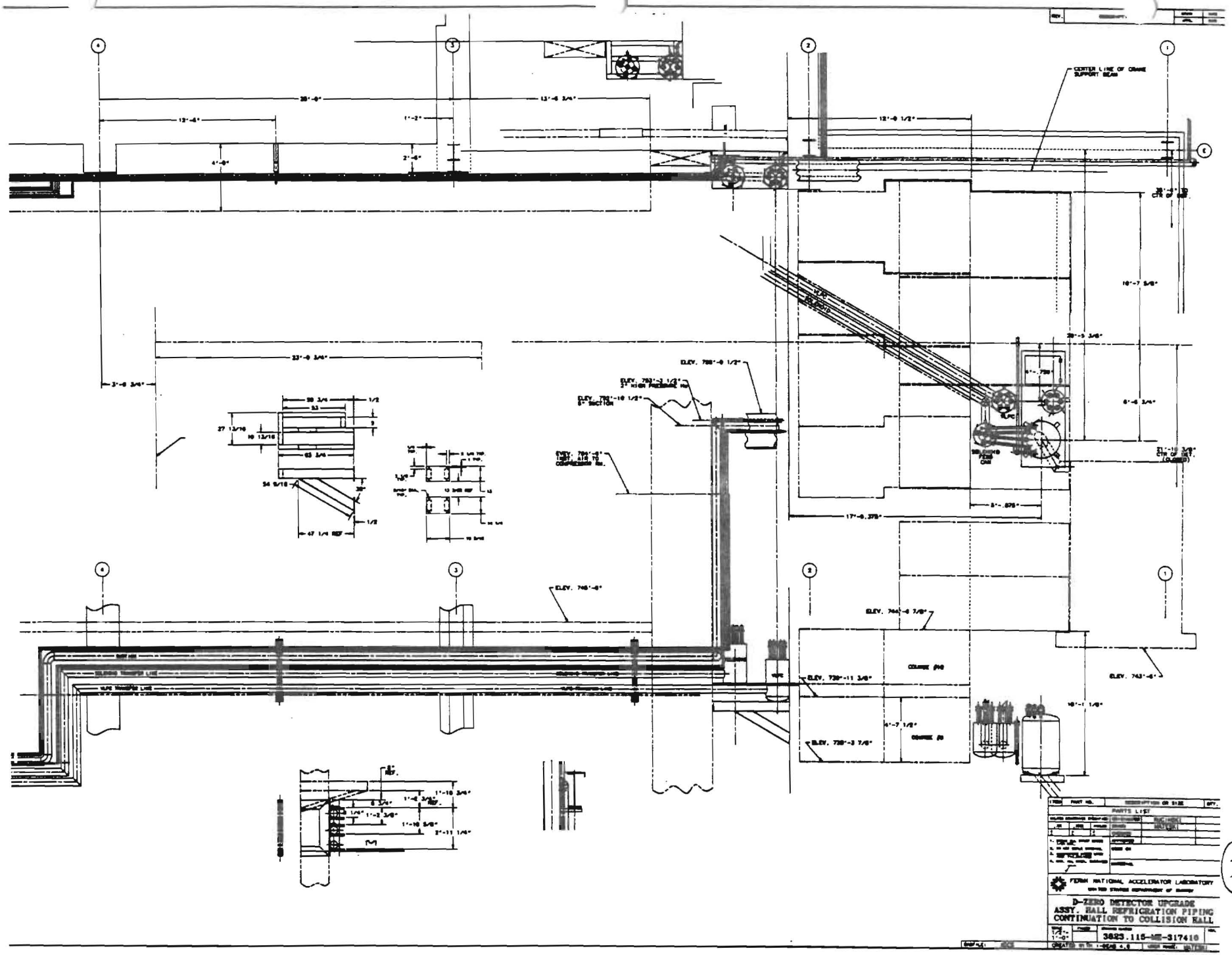
NOTE: THIS DETAIL IS DRAWN FOR 4×8×1/4 TUBE MEMBERS
3"×6"×3/16" TUBE MEMBERS WERE ACTUALLY USED.
USED MIN. 3/16" FILLET OR 3/16" FULL PENETRATION GROOVE WELDS AT ALL JOINTS AS APPROPRIATE.

R. RUCINSKI
1-3-95


13'-9 3/4"




SOLENOID
VLPC
ELEV. 739'
ELEV. 735
3


CENTER LINE OF CRANE SUPPORT BEAM
ELEV. 745'-6"
ELEV. 744'-6 7/8"
ELEV. 743'-6"
ELEV. 739'-11 3/8"
ELEV. 739'-3 7/8"
COURSE #10
COURSE #9
PARTS LIST
FERMI NATIONAL ACCELERATOR LABORATORY
UNITED STATES DEPARTMENT OF ENERGY
D-ZERO DETECTOR UPGRADE
ASSY. HALL REFRIGERATION PIPING
CONTINUATION TO COLLISION HALL
3823.115-ME-317410
14

Specification Table

Setting Details				Anchor Size					
				HKB ¼"	HKB ⅜"	HKB ½"	HKB ⅝"	HKB ¾"	HKB 1"
BD = D drill bit size = anchor diameter				¼"	⅜"	½"	⅝"	¾"	1"
E	depth of embedment (minimum/standard)			1⅛"/2"	1⅝"/2½"	2¼"/3½"	2¾"/4"	3¼"/4¾"	4½"/6"
HD	hole depth (E + 1 *D) min./std.			1⅜" / 2¼"	2" / 2⅞"	2¾" / 4"	3⅜" / 4⅝"	4" / 5½"	5½" / 7"
DC	wedge clearance hole			5/16"	7/16"	9/16"	11/16"	13/16"	1⅛"
L	anchor length min./max.			1¾" 4½"	2¼" 7"	2¾" 7"	3¾" 10"	4¾" 12"	6" 12"
TL	thread length std./ extra thread length			¾" 3"	⅞"/1⅛" 4"	1¼" 4"	1½" 3½"/4½"	1½" 3½"/4½"	2¼" 4½"
M	Installation torque (ft. lb.) guide values	Stainless Steel	min. E	4	20	40	85	150	235
			std. E	7	30	75	110	200	450
		Carbon Steel	min. E	4	20	40	85	150	250
			std. E	7	25	65	110	235	450
BMT	Min. Base Material Thickness (inches)			3" or 1.3E whichever number is greater					

Listings

Conforms to the description in Federal Specification FF-S-325, Group II, Type 4, Class 1 for concrete expansion anchors.
UL listed, "Pipe Hangers" (⅜" - ¾" diameters). International Conference of Buildings Officials, ICBO Evaluation Report #4627.
Factory Mutual listed "Pipe Hangers" ⅜ KB II w/rod coupler.
Southern Building Code Congress International, SBCCI Report #8913
City of Los Angeles Research Report #24946

Anchor Program
Standard Kwik Bolt II Sizes

Item Number	Description	Hole Dia. (In.)	Anchor Length (In.)	Min. Embed. Depth (In.)	Thread Length	Hilti Drill Bit	Qty. Per Box/Ctn.	Std. Emb. (In.)	Allowable Working Loads 4000 psi Concrete Tension (lbs.)	Shear (lbs.)
000453597	KB II 14-134	¼	1¾	1⅛	¾"	TE-C+ ¼-6	100/900	2"	630	530*
000453605	KB II 14-214	¼	2¼				100/900			
000453613	KB II 14-314	¼	3¼				100/400			
000453621	KB II 38-214	⅜	2¼	1⅝	⅞"	TE-C+ ⅜-6	100/500	1⅝"	750	1470*
000453639	KB II 38-3	⅜	3	1⅝	1⅛"	TE-C+ ⅜-6	100/400	2½"	1370	1470*
000453647	KB II 38-334	⅜	3¾				100/400			
000453654	KB II 38-5	⅜	5				50/200			
000453662	KB II 12-234	½	2¾	2¼	1¼"	TE-C+½-6	50/200	3½"	2400	2450*
000453670	KB II 12-334	½	3¾				50/200			
000453688	KB II 12-412	½	4½			TE-C+ ½-12	50/200			
000453696	KB II 12-512	½	5½				25/125			
000453704	KB II 58-334	⅝	3¾	2¾	1½"	TE-C+⅝-6	25/100	4"	3290	3840**
000453712	KB II 58-434	⅝	4¾				25/75			
000453720	KB II 58-6	⅝	6			TE-C+ ⅝-12	25/75			
000453738	KB II 58-7	⅝	7				25/75			
000453746	KB II 34-434	¾	4¾	3¼	1½"	TE-C+¾-8	20/80	4¾"	4800	5120**
000453753	KB II 34-512	¾	5½				20/80			
000453761	KB II 34-7	¾	7			TE-C+ ¾-12	10/40			
000453779	KB II 34-8	¾	8				10/40			
000454124	KB II 1-6	1	6	4½	2¼"	TE-FY1-13	5/25	6"	7070	9200
000454132	KB II 1-9	1	9				5/20			

*Values shown are for shear plane acting through the anchor bolt shank. When the shear plane is acting through the anchor bol threads, reduce shear values by 20%

**Values shown are for a shear plane acting through the anchor bolt shank. When the shear plane is acting through the anchor bc threads, reduce the shear value by 12%.

All other valves shown are for shear plane acting through either body or threads.