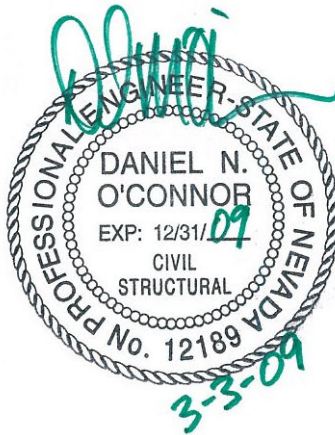
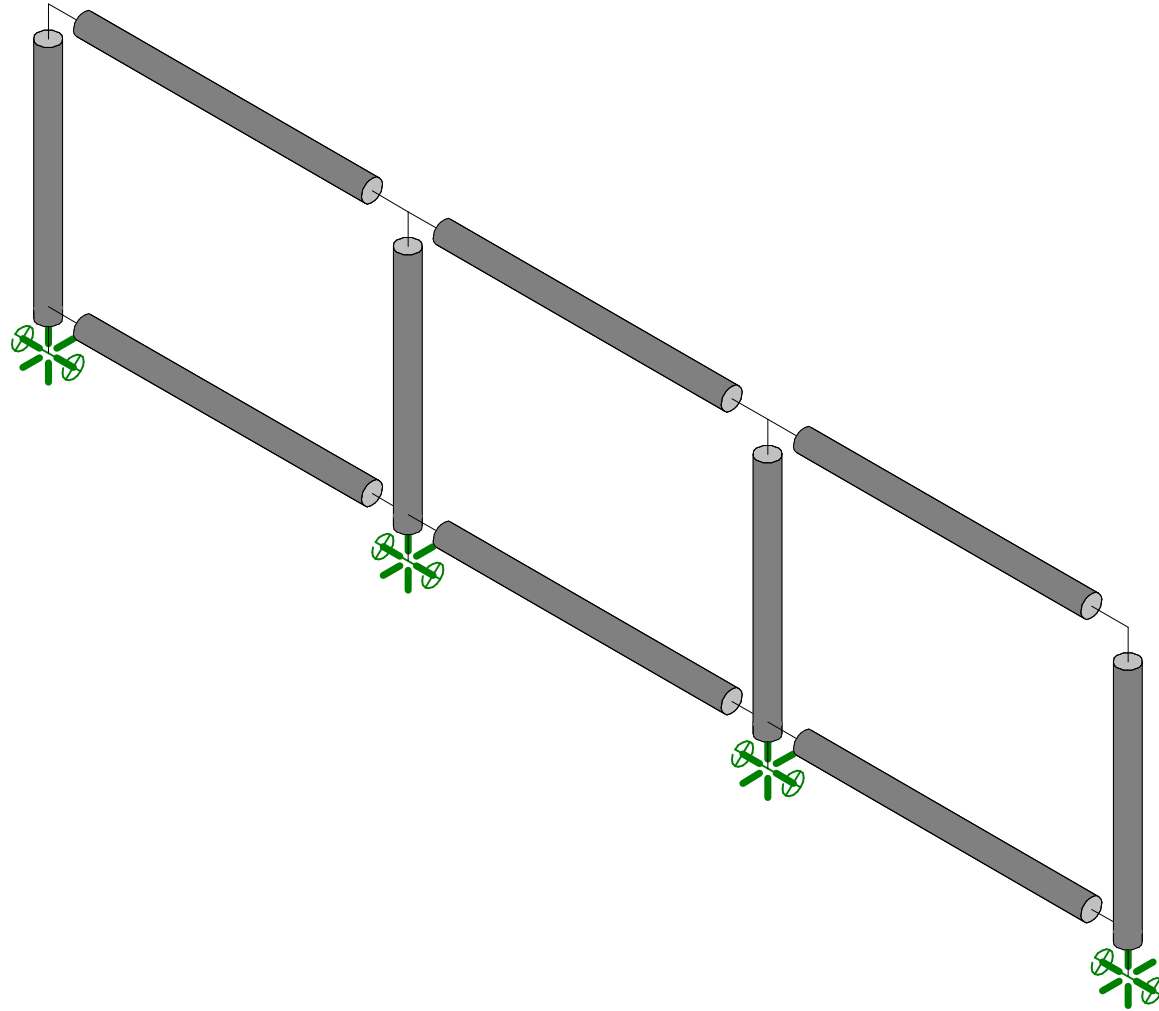
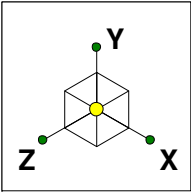


D17—2" PIPE x 36-1/2" HIGH RAIL WITH BOTTOM RAIL

Building Code:	2006 <i>International Building Code</i> 2007 <i>California Building Code</i> AISC <i>Steel Construction Manual</i>, 13th ed—ASD
Material:	Carbon Steel, A53, Grade B, Fy = 35 ksi or Carbon Steel, A501, Grade B, Fy = 36 ksi Stainless Steel, A312, Grade TP-304 or TP-316, Fy = 30 ksi
Height:	36.5"
Anchor Post:	2" SCHD 40 (2.375" OD x 0.154") Pipe
Intermediate Posts:	2" SCHD 40 (2.375" OD x 0.154") Pipe
Top Rail:	2" SCHD 40 (2.375" OD x 0.154") Pipe
Bottom Rail:	2" SCHD 40 (2.375" OD x 0.154") Pipe
Number of Cables:	8
Cable Spacing:	3.14"
Cable Prestress:	400 lbs



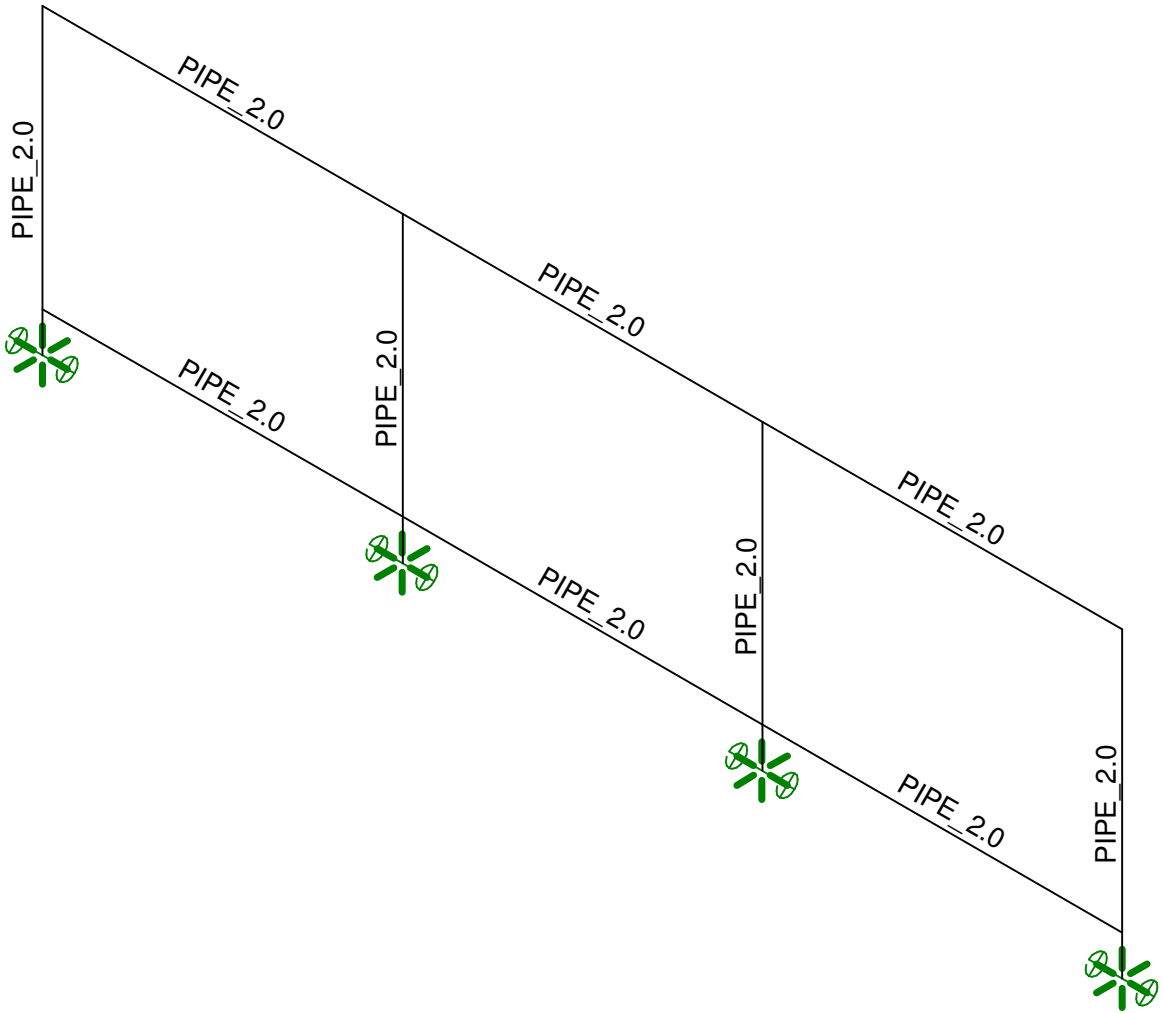
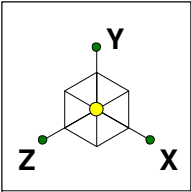
Disclaimer: Analysis and Structural Certification DOES NOT include base plates or anchorage to supporting structure. Where required by the Local Building Official, these shall be reviewed and designed by the project Structural Engineer of Record.



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Dan O'Connor
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D17 - 2" PIPE x 36.5" HIGH RAIL W/ BTM RAIL

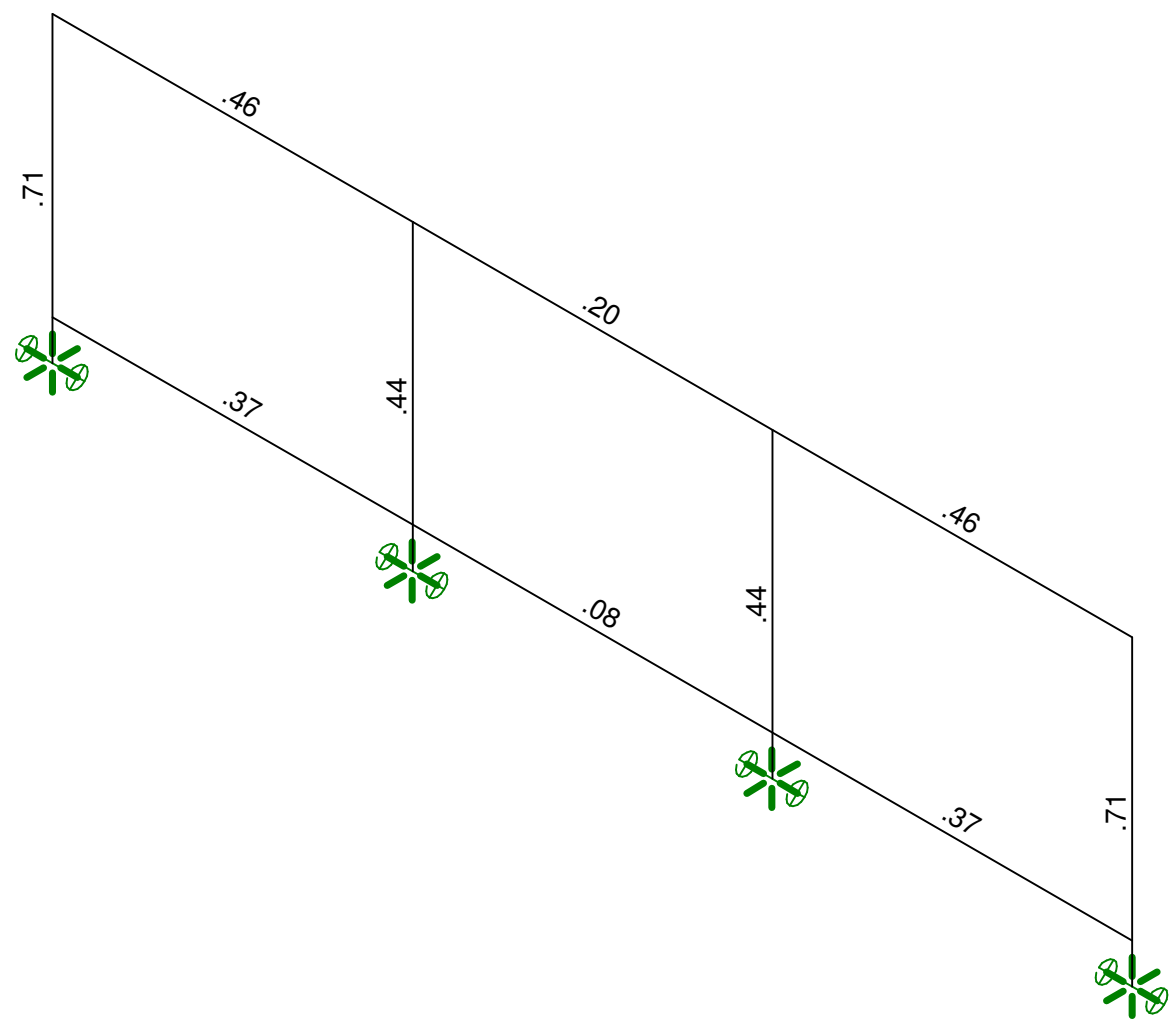
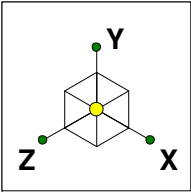
Dec 8, 2008 at 11:41 AM
D17.r3d



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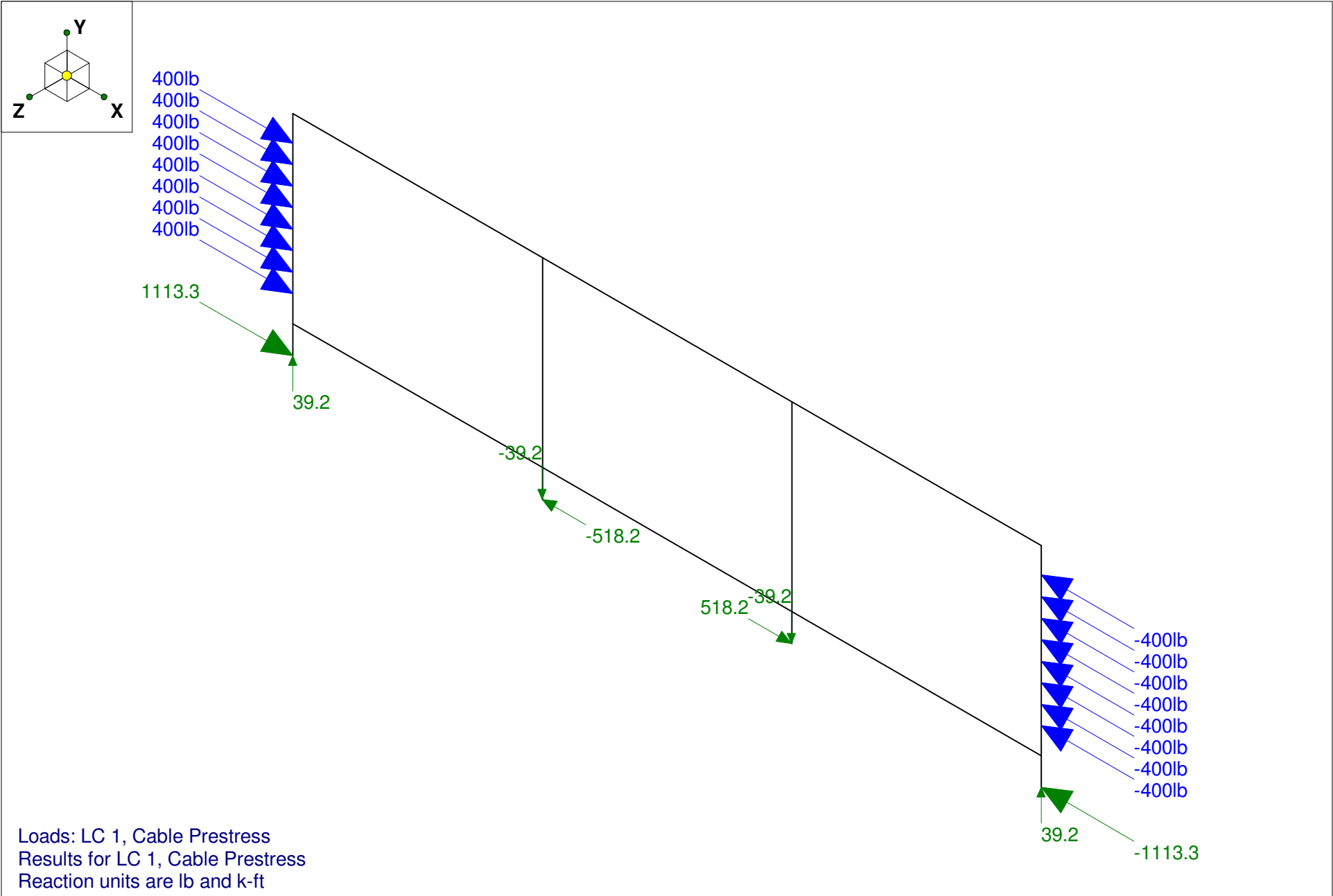
D17 - 2" PIPE x 36.5" HIGH RAIL W/ BTM RAIL

Dec 8, 2008 at 11:41 AM
D17.r3d



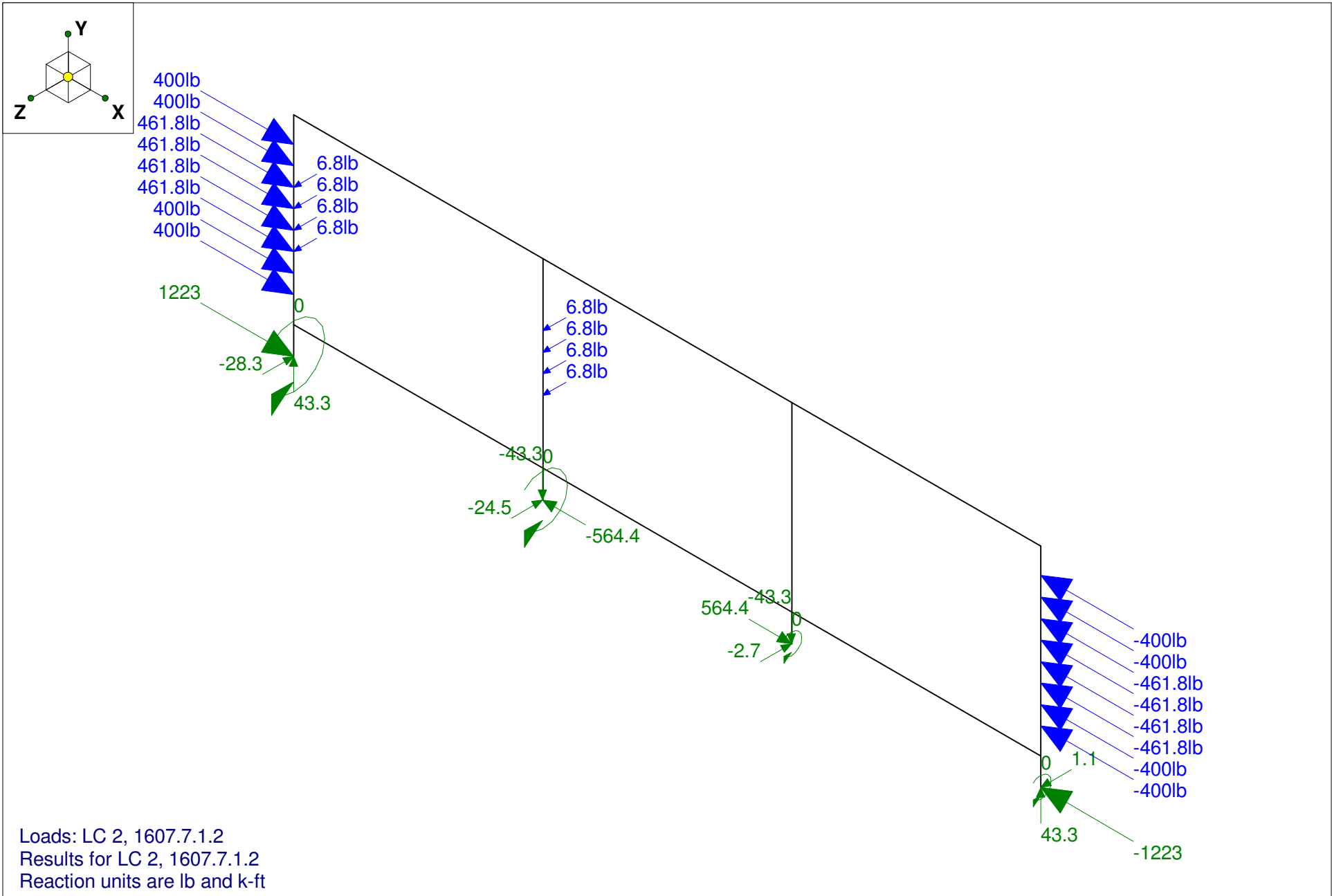
Member Code Checks Displayed
Solution: Envelope

Ferrari Shields & Associates	D17 - 2" PIPE x 36.5" HIGH RAIL W/ BTM RAIL	
Dan O'Connor		Dec 8, 2008 at 11:42 AM
08196		D17.r3d

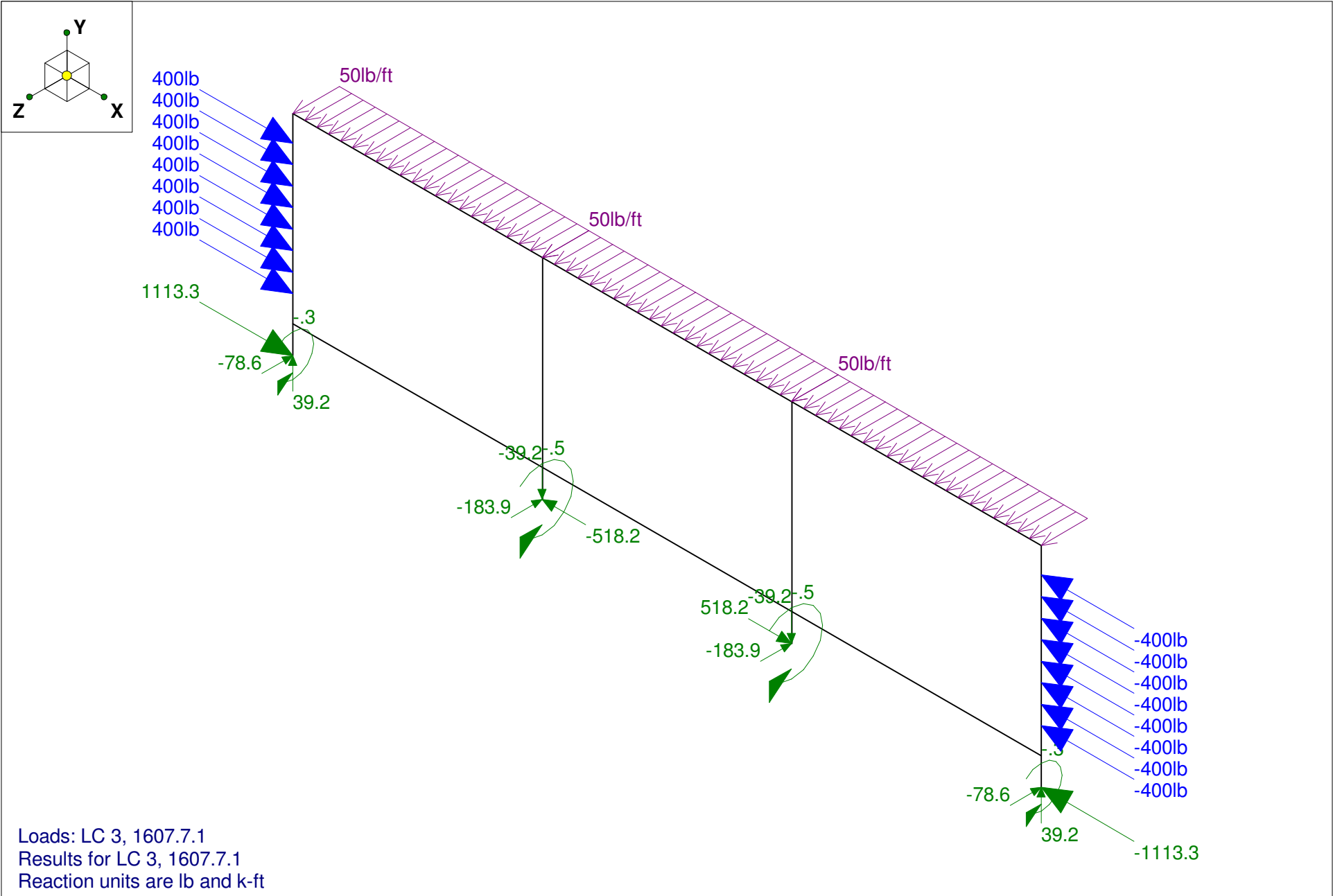


Loads: LC 1, Cable Prestress
 Results for LC 1, Cable Prestress
 Reaction units are lb and k-ft

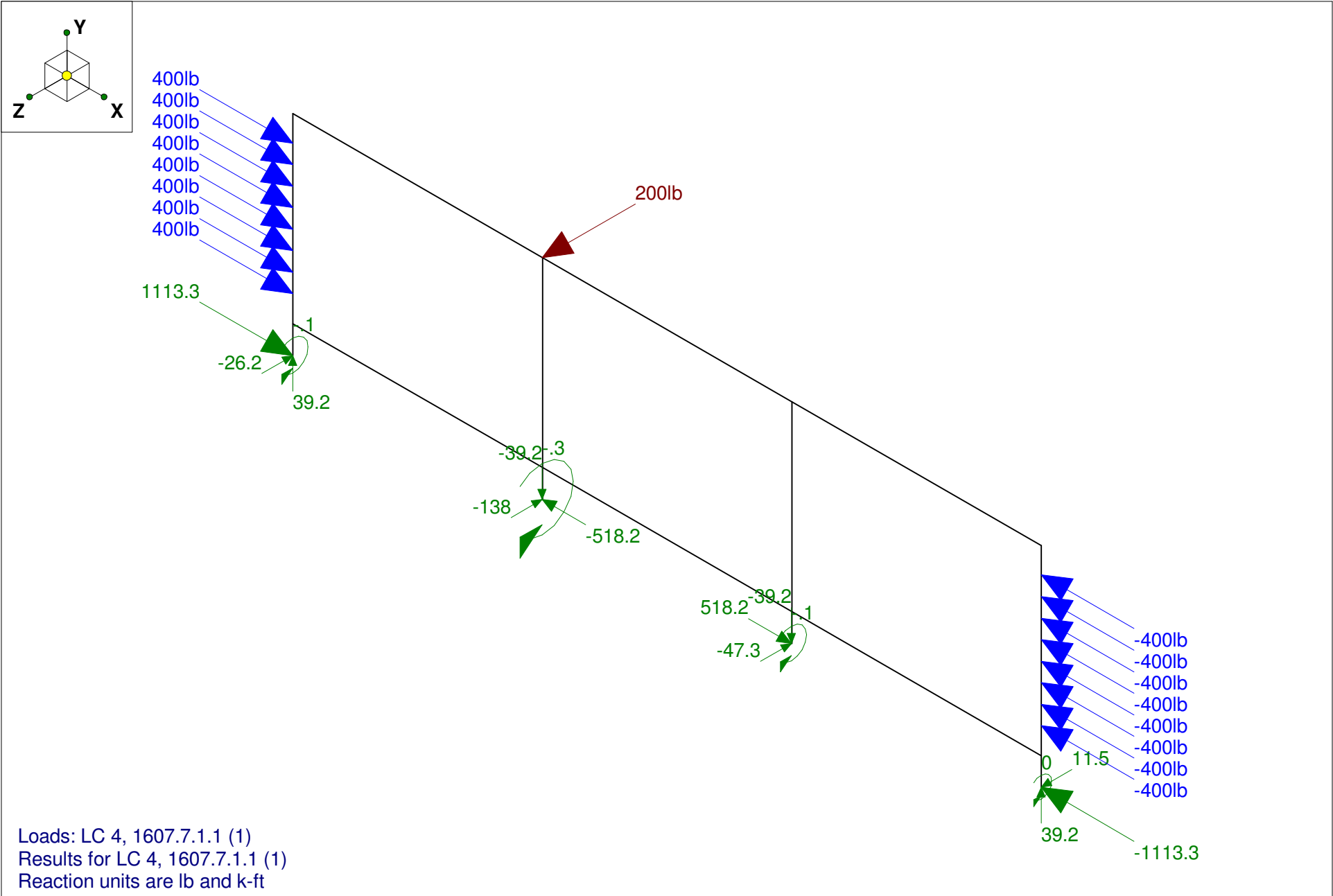
Ferrari Shields & Associates	D17 - 2" PIPE x 36.5" HIGH RAIL W/ BTM RAIL	
Dan O'Connor		Dec 8, 2008 at 11:39 AM
08196		D17.r3d



Ferrari Shields & Associates	D17 - 2" PIPE x 36.5" HIGH RAIL W/ BTM RAIL	
Dan O'Connor		Dec 8, 2008 at 11:39 AM
08196		D17.r3d

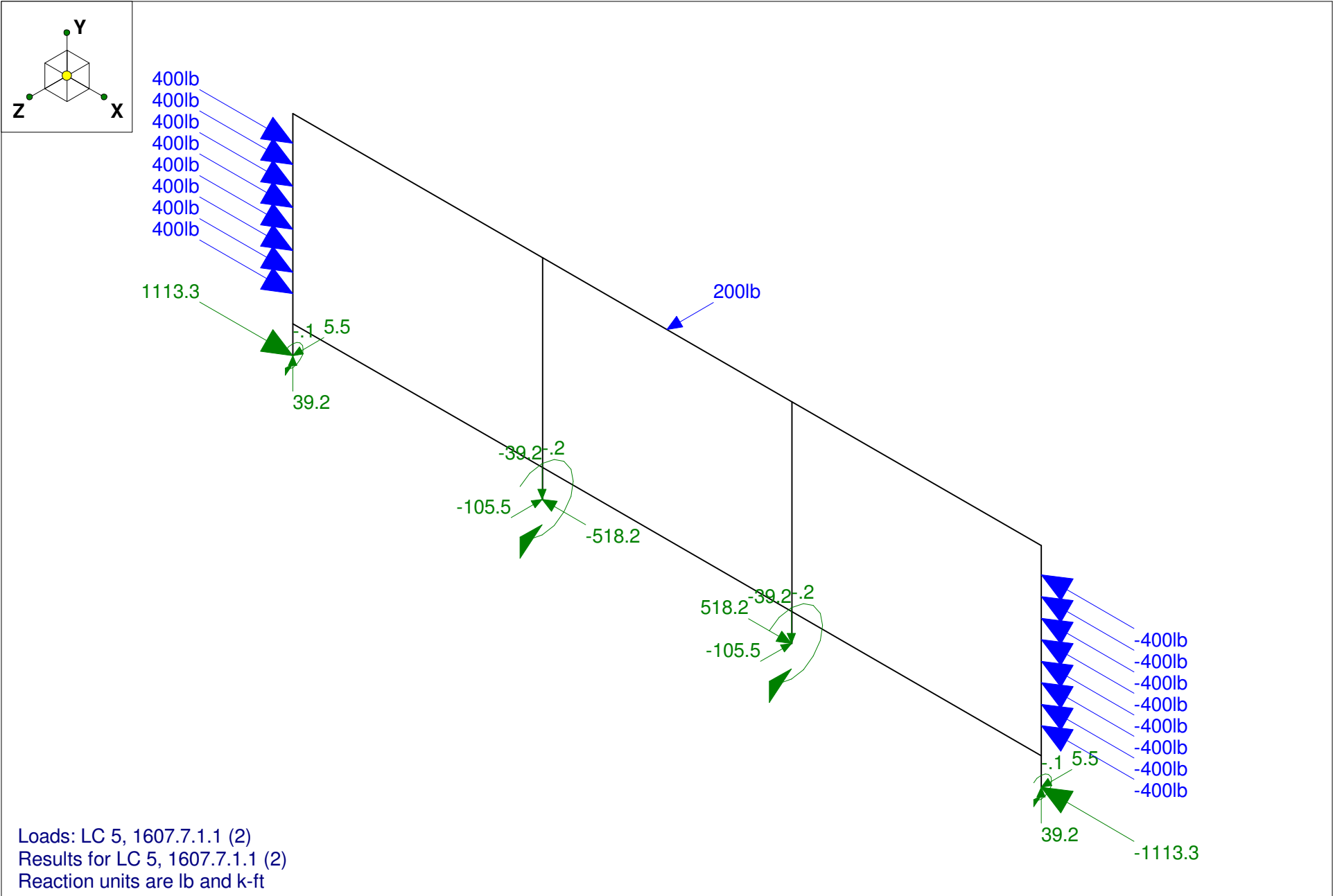


Ferrari Shields & Associates	D17 - 2" PIPE x 36.5" HIGH RAIL W/ BTM RAIL	
Dan O'Connor		Dec 8, 2008 at 11:39 AM
08196		D17.r3d



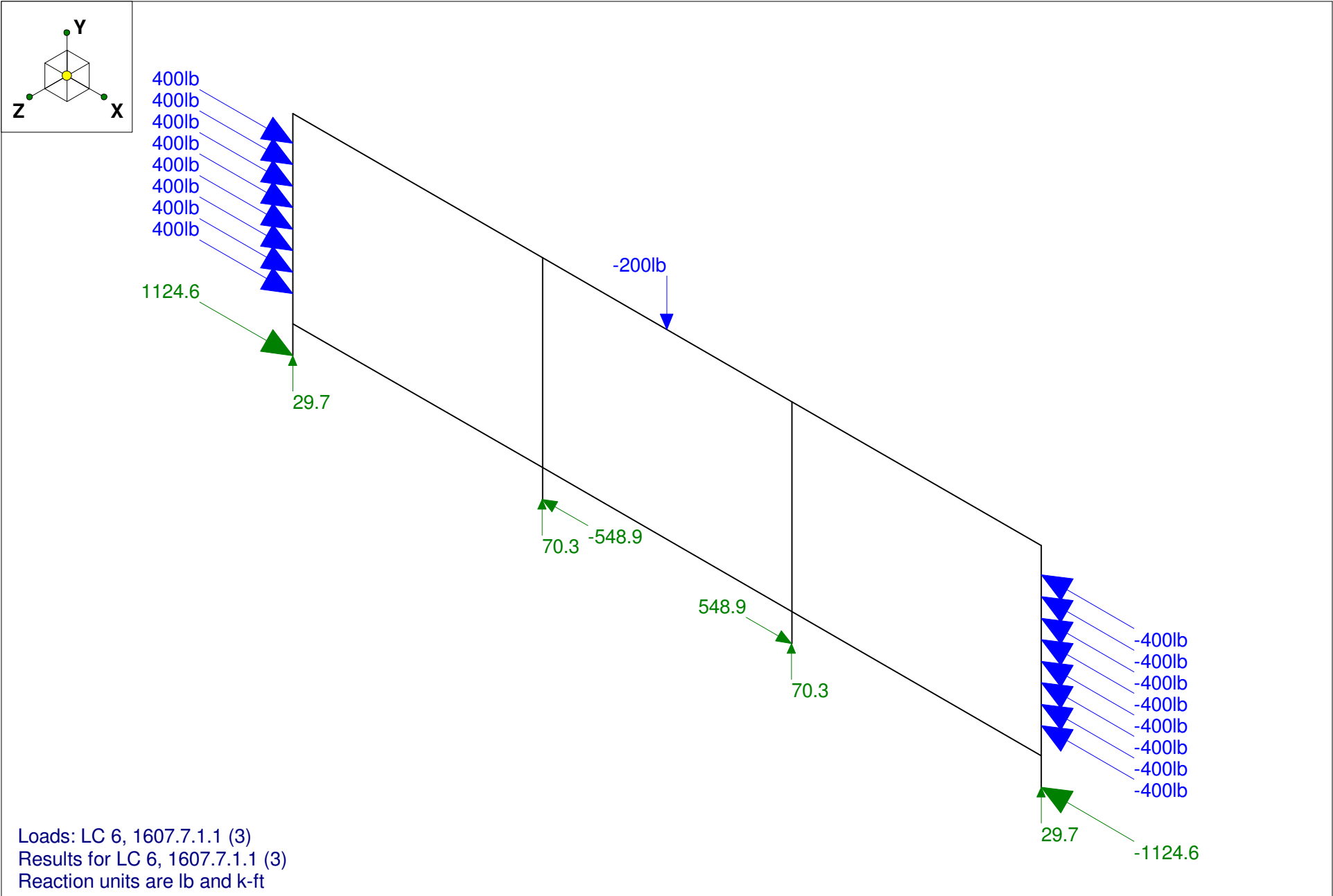
Loads: LC 4, 1607.7.1.1 (1)
 Results for LC 4, 1607.7.1.1 (1)
 Reaction units are lb and k-ft

Ferrari Shields & Associates	D17 - 2" PIPE x 36.5" HIGH RAIL W/ BTM RAIL	
Dan O'Connor		Dec 8, 2008 at 11:39 AM
08196		D17.r3d



Loads: LC 5, 1607.7.1.1 (2)
 Results for LC 5, 1607.7.1.1 (2)
 Reaction units are lb and k-ft

Ferrari Shields & Associates	D17 - 2" PIPE x 36.5" HIGH RAIL W/ BTM RAIL	
Dan O'Connor		Dec 8, 2008 at 11:40 AM
08196		D17.r3d



Loads: LC 6, 1607.7.1.1 (3)
 Results for LC 6, 1607.7.1.1 (3)
 Reaction units are lb and k-ft

Ferrari Shields & Associates	D17 - 2" PIPE x 36.5" HIGH RAIL W/ BTM RAIL	
Dan O'Connor		Dec 8, 2008 at 11:40 AM
08196		D17.r3d

Global

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation	Yes
Include Warping	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Vertical Axis	Y

Hot Rolled Steel Code	AISC : ASD 13th
Cold Formed Steel Code	AISI 01: ASD
Wood Code	NDS 2005: ASD
Wood Temperature	< 100F
Concrete Code	ACI 2005

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	PCA Load Contour
Parame Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections	Yes
Bad Framing Warnings	No
Unused Force Warnings	Yes

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E5 F)	Density[k/ft^3]	Yield[ksi]
1	A53GrB/A501/SS316	29000	11154	.3	.65	.49	30

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	RAIL	PIPE 2.0	Beam	Pipe	A53GrB/A501...	Typical	1	.627	.627	1.25
2	IPOST	PIPE 2.0	Column	Pipe	A53GrB/A501...	Typical	1	.627	.627	1.25
3	EPOST	PIPE 2.0	Column	Pipe	A53GrB/A501...	Typical	1	.627	.627	1.25

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area (Mem...	Surface (Pl...
1	Cable Prestress	None					16			
2	1607.7.1.2	None					16			
3	1607.7.1	None						3		
4	1607.7.1.1 (1)	None				1				
5	1607.7.1.1 (2)	None					1			
6	1607.7.1.1 (3)	None					1			

Load Combinations

	Description	Solve PDelta	SR...	BLC Factor	BLC Factor	BLC Factor	BLC Factor	BLC Factor	BLC Factor	BLC Factor	BLC Factor
1	Cable Prestress	Yes	C	1	1						
2	1607.7.1.2	Yes	C	1	1	2	1				

Load Combinations (Continued)

	Description	Solve	PDelta	SR...	BLC Factor	BLC Factor	BLC Factor	BLC Factor	BLC Factor	BLC Factor	BLC Factor	BLC Factor	BLC Factor
3	1607.7.1	Yes	C		1	1	3	1					
4	1607.7.1.1 (1)	Yes	C		1	1	4	1					
5	1607.7.1.1 (2)	Yes	C		1	1	5	1					
6	1607.7.1.1 (3)	Yes	C		1	1	6	1					

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N1	N2			EPOST	Column	Pipe	A53GrB/A...	Typical
2	M2	N3	N4			IPOST	Column	Pipe	A53GrB/A...	Typical
3	M3	N2	N4			RAIL	Beam	Pipe	A53GrB/A...	Typical
4	M4	N4	N8			RAIL	Beam	Pipe	A53GrB/A...	Typical
5	M5	N5	N6			EPOST	Column	Pipe	A53GrB/A...	Typical
6	M6	N7	N8			IPOST	Column	Pipe	A53GrB/A...	Typical
7	M7	N8	N6			RAIL	Beam	Pipe	A53GrB/A...	Typical
8	M8	N9	N10			RAIL	Beam	Pipe	A53GrB/A...	Typical
9	M9	N10	N12			RAIL	Beam	Pipe	A53GrB/A...	Typical
10	M10	N12	N11			RAIL	Beam	Pipe	A53GrB/A...	Typical

Envelope Joint Reactions

	Joint		X [lb]	lc	Y [lb]	lc	Z [lb]	lc	MX [k-ft]	lc	MY [k-ft]	lc	MZ [k-ft]	lc
1	N1	max	1222.984	2	43.284	2	5.541	5	0	1	0	1	0	1
2		min	1113.315	1	29.668	6	-78.571	3	-.311	3	0	1	0	1
3	N3	max	-518.183	1	70.332	6	0	1	0	1	0	1	0	1
4		min	-564.35	2	-43.284	2	-183.929	3	-.463	3	0	1	0	1
5	N5	max	-1113.315	1	43.284	2	11.515	4	0	1	0	1	0	1
6		min	-1222.984	2	29.668	6	-78.571	3	-.311	3	0	1	0	1
7	N7	max	564.35	2	70.332	6	0	1	0	1	0	1	0	1
8		min	518.183	1	-43.284	2	-183.929	3	-.463	3	0	1	0	1
9	Totals:	max	0	3	200	6	0	1						
10		min	0	1	0	1	-525	3						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	lc	y Shear[lb]	lc	z Shear[lb]	lc	Torque[k-ft]	lc	y-y Moment[...]	lc	z-z Moment[...]	lc
1	M1	1	max	43.284	2	-1113.239	3	5.534	5	0	1	.311	3	0	1
2			min	29.668	6	-1222.893	2	-78.602	3	0	1	0	1	0	1
3		2	max	169.365	2	1853.038	2	0	1	.034	3	.237	3	.13	2
4			min	144.21	6	1717.896	3	-93.207	3	0	2	0	1	.11	3
5		3	max	169.365	2	591.238	2	0	1	.034	3	.168	3	-604	1
6			min	144.21	6	517.896	3	-93.207	3	0	2	0	1	-671	2
7		4	max	169.365	2	-677.386	6	0	1	.034	3	.1	3	-494	1
8			min	144.21	6	-794.162	2	-93.207	3	0	2	-.002	2	-539	2
9		5	max	169.365	2	-1477.386	6	0	1	.034	3	.034	5	.437	2
10			min	144.21	6	-1594.162	2	-93.207	3	0	2	-.002	2	.391	6
11	M2	1	max	70.332	6	564.35	2	0	1	0	1	.463	3	0	1
12			min	-43.284	2	518.183	1	-183.929	3	0	1	0	1	0	1
13		2	max	-44.21	6	-65.518	1	0	1	.031	5	.344	3	-.039	1
14			min	-169.365	2	-88.56	6	-169.999	3	-.002	2	0	1	-.048	6
15		3	max	-44.21	6	-65.518	1	0	1	.031	5	.219	3	.018	6

Envelope Member Section Forces (Continued)

Member	Sec		Axial[lb]	lc	y Shear[lb]	lc	z Shear[lb]	lc	Torque[k-ft]	lc	y-y Moment[...]	lc	z-z Moment[...]	lc
16		min	-169.365	2	-88.56	6	-169.999	3	-.002	2	0	1	.009	3
17	4	max	-44.21	6	-65.518	1	2.64	2	.031	5	.094	3	.083	6
18		min	-169.365	2	-88.56	6	-169.999	3	-.002	2	-.002	2	.058	1
19	5	max	-44.21	6	-65.518	1	2.64	2	.031	5	0	1	.148	6
20		min	-169.365	2	-88.56	6	-169.999	3	-.002	2	-.057	4	.106	1
21	M3	1	max	1594.138	2	169.337	2	0	.002	2	.034	3	.437	2
22		min	1477.367	6	144.197	6	-94.481	3	-.034	5	0	2	.391	6
23	2	max	1594.138	2	169.337	2	0	1	.002	2	.015	5	.289	2
24		min	1477.367	6	144.197	6	-50.731	3	-.034	5	-.029	3	.265	1
25	3	max	1594.138	2	169.337	2	0	1	.002	2	.006	5	.141	2
26		min	1477.367	6	144.197	6	-38.106	4	-.034	5	-.055	3	.129	1
27	4	max	1594.138	2	169.337	2	36.769	3	.002	2	0	1	.013	6
28		min	1477.367	6	144.197	6	-38.106	4	-.034	5	-.072	4	-.007	2
29	5	max	1594.138	2	169.337	2	80.519	3	.002	2	.01	3	-.113	6
30		min	1477.367	6	144.197	6	-38.106	4	-.034	5	-.105	4	-.155	2
31	M4	1	max	1665.692	2	100	6	44.02	.032	4	.024	3	.035	6
32		min	1547.602	3	0	1	-100	5	0	1	-.107	4	-.04	2
33	2	max	1665.692	2	100	6	44.02	4	.032	4	0	1	-.036	3
34		min	1547.602	3	0	1	-100	5	0	1	-.068	4	-.053	6
35	3	max	1665.692	2	0	1	100	5	.032	4	0	2	-.036	3
36		min	1547.602	3	-100	6	0	1	0	1	-.155	5	-.14	6
37	4	max	1665.692	2	0	1	100	5	.032	4	.009	4	-.036	3
38		min	1547.602	3	-100	6	0	1	0	1	-.067	5	-.053	6
39	5	max	1665.692	2	0	1	100	5	.032	4	.048	4	.035	6
40		min	1547.602	3	-100	6	0	1	0	1	0	1	-.04	2
41	M5	1	max	43.284	2	1222.893	2	11.513	4	0	.311	3	0	1
42		min	29.668	6	1113.239	3	-78.602	3	0	1	0	1	0	1
43	2	max	169.365	2	-1717.896	3	2.545	4	0	1	.237	3	-.11	3
44		min	144.21	6	-1853.038	2	-93.207	3	-.034	3	0	1	-.13	2
45	3	max	169.365	2	-517.896	3	2.545	4	0	1	.168	3	.671	2
46		min	144.21	6	-591.238	2	-93.207	3	-.034	3	0	1	.604	1
47	4	max	169.365	2	794.162	2	2.545	4	0	1	.1	3	.539	2
48		min	144.21	6	677.386	6	-93.207	3	-.034	3	0	1	.494	1
49	5	max	169.365	2	1594.162	2	2.545	4	0	1	.034	5	-.391	6
50		min	144.21	6	1477.386	6	-93.207	3	-.034	3	0	1	-.437	2
51	M6	1	max	70.332	6	-518.183	1	0	1	0	.463	3	0	1
52		min	-43.284	2	-564.35	2	-183.929	3	0	1	0	1	0	1
53	2	max	-44.21	6	88.56	6	0	1	0	1	.344	3	.048	6
54		min	-169.365	2	65.518	1	-169.999	3	-.031	5	0	1	.039	1
55	3	max	-44.21	6	88.56	6	0	1	0	1	.219	3	-.009	3
56		min	-169.365	2	65.518	1	-169.999	3	-.031	5	0	1	-.018	6
57	4	max	-44.21	6	88.56	6	0	1	0	1	.094	3	-.058	1
58		min	-169.365	2	65.518	1	-169.999	3	-.031	5	0	1	-.083	6
59	5	max	-44.21	6	88.56	6	0	1	0	1	.004	4	-.106	1
60		min	-169.365	2	65.518	1	-169.999	3	-.031	5	-.034	5	-.148	6
61	M7	1	max	1594.138	2	-144.197	6	9.601	.034	5	.018	4	-.113	6
62		min	1477.367	6	-169.337	2	-80.519	3	0	1	-.01	5	-.155	2
63	2	max	1594.138	2	-144.197	6	9.601	5	.034	5	.017	4	.013	6
64		min	1477.367	6	-169.337	2	-36.769	3	0	1	-.042	3	-.007	2
65	3	max	1594.138	2	-144.197	6	9.601	5	.034	5	.016	4	.141	2
66		min	1477.367	6	-169.337	2	-1.062	4	0	1	-.055	3	.129	1
67	4	max	1594.138	2	-144.197	6	50.731	3	.034	5	.015	4	.289	2
68		min	1477.367	6	-169.337	2	-1.062	4	0	1	-.029	3	.265	1

Envelope Member Section Forces (Continued)

Member	Sec		Axial[lb]	lc	y Shear[lb]	lc	z Shear[lb]	lc	Torque[k-ft]	lc	y-y Moment[...]	lc	z-z Moment[...]	lc	
69		5	max	1594.138	2	-144.197	6	94.481	3	.034	5	.034	3	.437	2
70			min	1477.367	6	-169.337	2	-1.062	4	0	1	0	1	.391	6
71	M8	1	max	3076.046	2	-114.541	6	13.813	3	0	2	0	2	-.267	6
72			min	2831.231	1	-126.083	2	-.645	2	-.012	5	-.034	3	-.292	2
73		2	max	3076.046	2	-114.541	6	13.813	3	0	2	0	2	-.166	1
74			min	2831.231	1	-126.083	2	-.645	2	-.012	5	-.022	3	-.181	2
75		3	max	3076.046	2	-114.541	6	13.813	3	0	2	0	1	-.065	1
76			min	2831.231	1	-126.083	2	-.645	2	-.012	5	-.011	4	-.071	2
77		4	max	3076.046	2	-114.541	6	13.813	3	0	2	.01	5	.039	2
78			min	2831.231	1	-126.083	2	-.645	2	-.012	5	-.002	4	.034	6
79		5	max	3076.046	2	-114.541	6	13.813	3	0	2	.022	5	.15	2
80			min	2831.231	1	-126.083	2	-.645	2	-.012	5	-.001	2	.134	6
81	M9	1	max	2440.142	2	0	1	0	1	.011	4	.008	4	-.002	6
82			min	2209.713	6	0	1	-6.025	4	0	1	-.009	5	-.004	2
83		2	max	2440.142	2	0	1	0	1	.011	4	.003	4	-.002	6
84			min	2209.713	6	0	1	-6.025	4	0	1	-.009	5	-.004	2
85		3	max	2440.142	2	0	1	0	1	.011	4	0	2	-.002	6
86			min	2209.713	6	0	1	-6.025	4	0	1	-.009	5	-.004	2
87		4	max	2440.142	2	0	1	0	1	.011	4	0	1	-.002	6
88			min	2209.713	6	0	1	-6.025	4	0	1	-.009	5	-.004	2
89		5	max	2440.142	2	0	1	0	1	.011	4	0	1	-.002	6
90			min	2209.713	6	0	1	-6.025	4	0	1	-.013	4	-.004	2
91	M10	1	max	3076.046	2	126.083	2	0	1	.012	5	.022	5	.15	2
92			min	2831.231	1	114.541	6	-13.813	3	0	1	0	1	.134	6
93		2	max	3076.046	2	126.083	2	0	1	.012	5	.01	5	.039	2
94			min	2831.231	1	114.541	6	-13.813	3	0	1	0	1	.034	6
95		3	max	3076.046	2	126.083	2	0	1	.012	5	.001	4	-.065	1
96			min	2831.231	1	114.541	6	-13.813	3	0	1	-.01	3	-.071	2
97		4	max	3076.046	2	126.083	2	0	1	.012	5	0	1	-.166	1
98			min	2831.231	1	114.541	6	-13.813	3	0	1	-.022	3	-.181	2
99		5	max	3076.046	2	126.083	2	0	1	.012	5	0	1	-.267	6
100			min	2831.231	1	114.541	6	-13.813	3	0	1	-.034	3	-.292	2

Envelope AISC 13th ASD Steel Code Checks

Member	Shape	Code Check	Loc[in]	lc	Shear ...	Loc[in]	Dir	lc	Pnc/om [lb]	Pnt/om [lb]	Mnyy/om [k-ft]	Mnzz/om ...	Cb	LRFD E...
1	M1	PIPE 2.0	.713	4.782	2	.355	4.782	3	16463.153	17964.072	1.067	1.067	1...	H1-1b
2	M2	PIPE 2.0	.435	0	3	.105	0	2	16463.153	17964.072	1.067	1.067	2...	H1-1b
3	M3	PIPE 2.0	.460	0	2	.067	0	3	15878.23	17964.072	1.067	1.067	2...	H1-1b
4	M4	PIPE 2.0	.198	21	5	.042	0	4	15878.23	17964.072	1.067	1.067	1	H1-1b
5	M5	PIPE 2.0	.712	4.782	2	.355	4.782	3	16463.153	17964.072	1.067	1.067	1...	H1-1b
6	M6	PIPE 2.0	.435	0	3	.105	0	2	16463.153	17964.072	1.067	1.067	2...	H1-1b
7	M7	PIPE 2.0	.460	42	2	.067	42	3	15878.23	17964.072	1.067	1.067	2...	H1-1b
8	M8	PIPE 2.0	.370	0	2	.035	0	5	15878.23	17964.072	1.067	1.067	2...	H1-1b
9	M9	PIPE 2.0	.083	42	4	.013	0	4	15878.23	17964.072	1.067	1.067	1	H1-1b
10	M10	PIPE 2.0	.370	42	2	.035	0	5	15878.23	17964.072	1.067	1.067	2...	H1-1b

*** End of Calculations ***