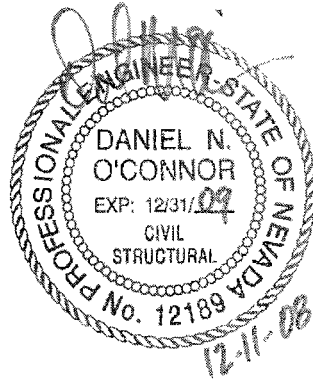
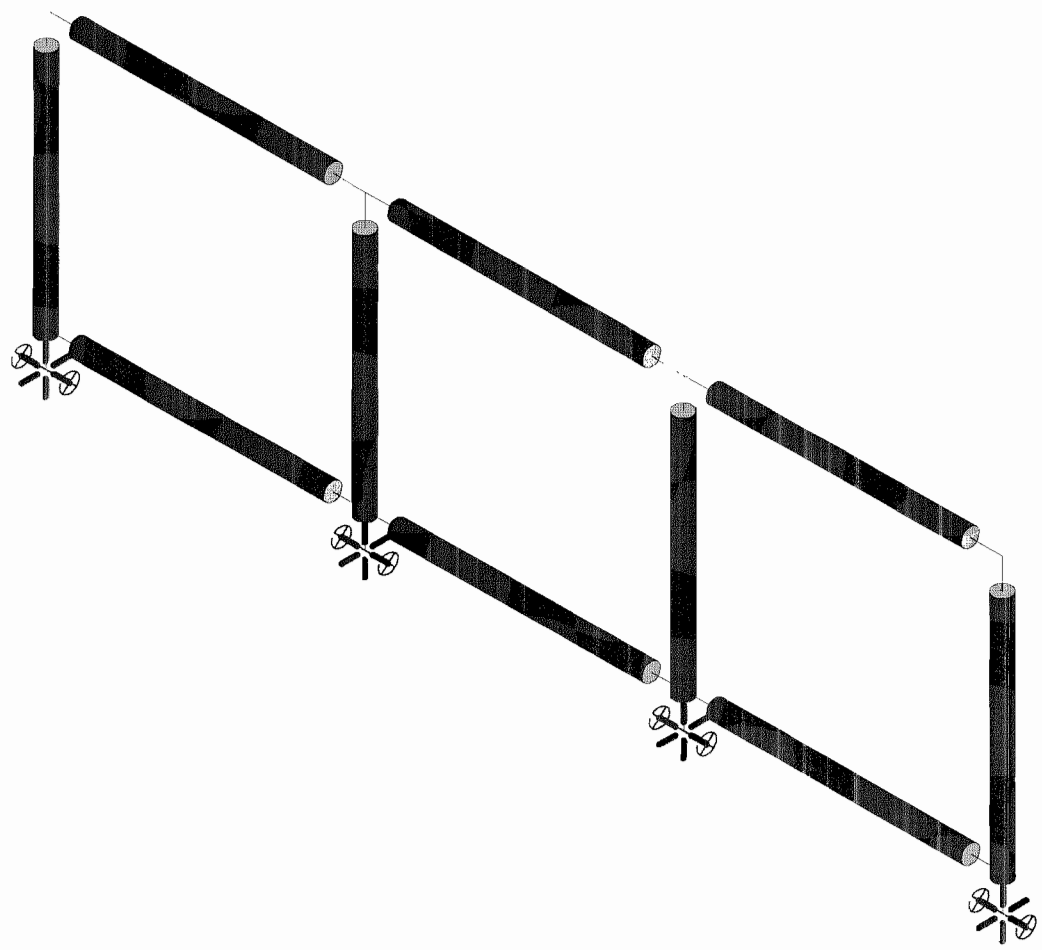
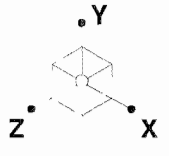


D19—2" PIPE x 42-1/2" HIGH RAIL WITH BOTTOM RAIL

Building Code:	2006 International Building Code 2007 California Building Code AISC Steel Construction Manual, 13th ed—ASD
Material:	Carbon Steel, A53, Grade B, Fy = 35 ksi Carbon Steel, A501, Grade B, Fy = 36 ksi Stainless Steel, A312, Grade TP-304 or TP-316, Fy = 30 ksi
Height:	42.5"
Anchor Post:	2" SCHD 80 (2.375" OD x 0.218") 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:	10
Cable Spacing:	3.11"



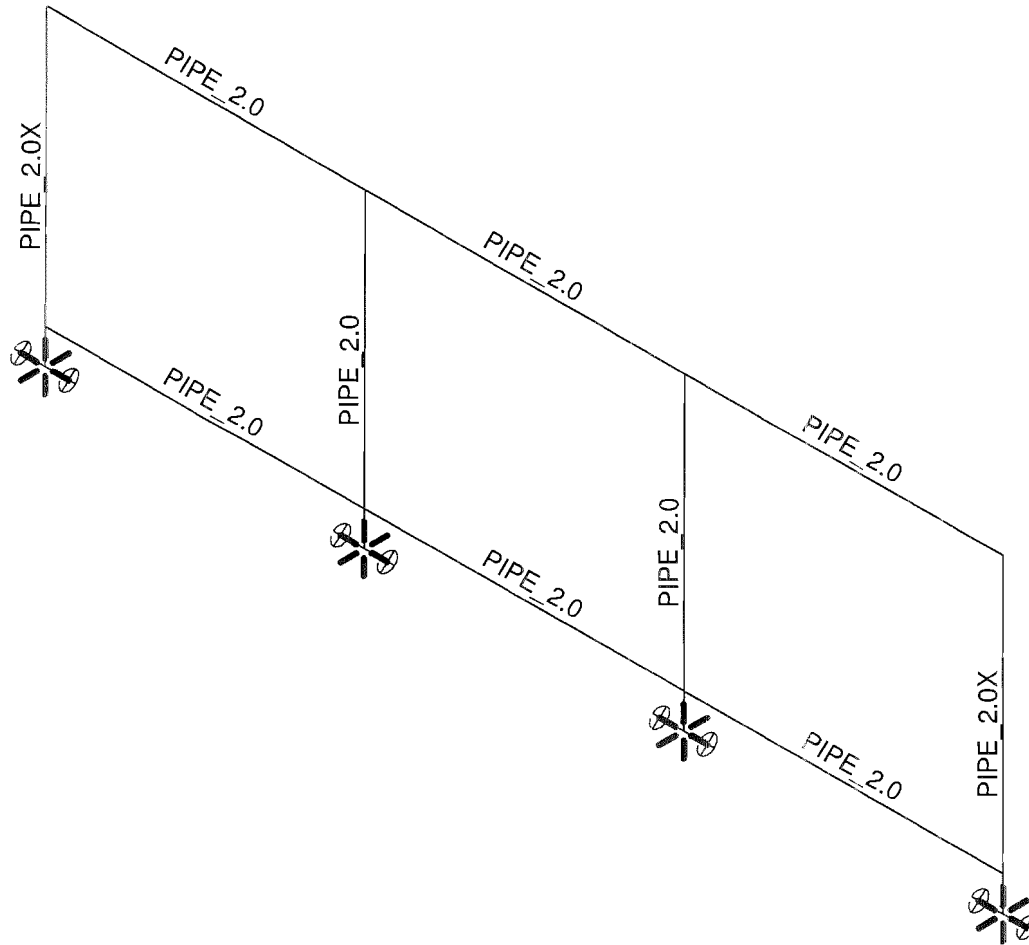
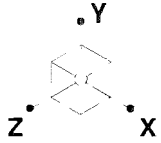
Disclaimer: Analysis and Structural Certification DOES NOT include base plates or anchorage to supporting structure. Where required by the Local Building Official, these shall be reviewed and designed by the project Structural Engineer of Record.

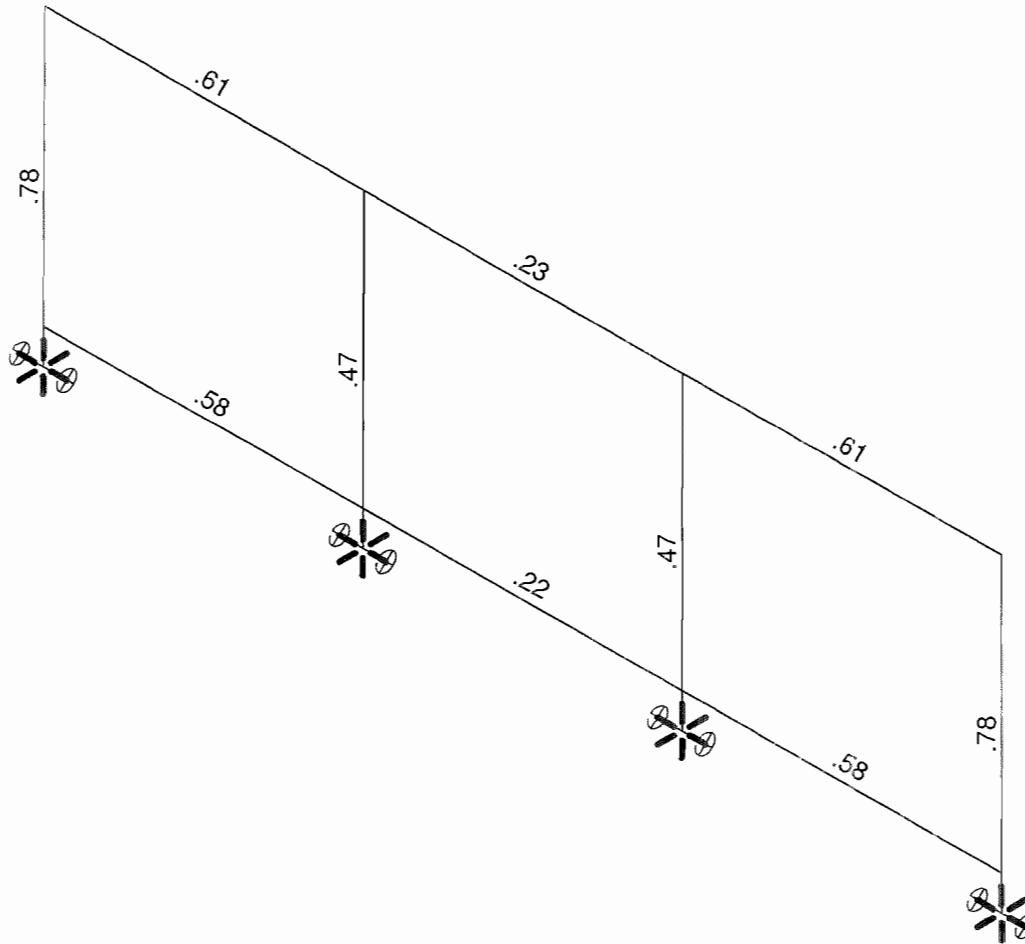
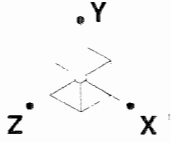


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D19 - 2" PIPE x 42.5" HIGH TOP RAIL W/ BTM RAIL

Oct 28, 2008 at 3:04 PM
D19.r3d





Member Code Checks Displayed
Solution: Envelope

Ferrari Shields & Associates

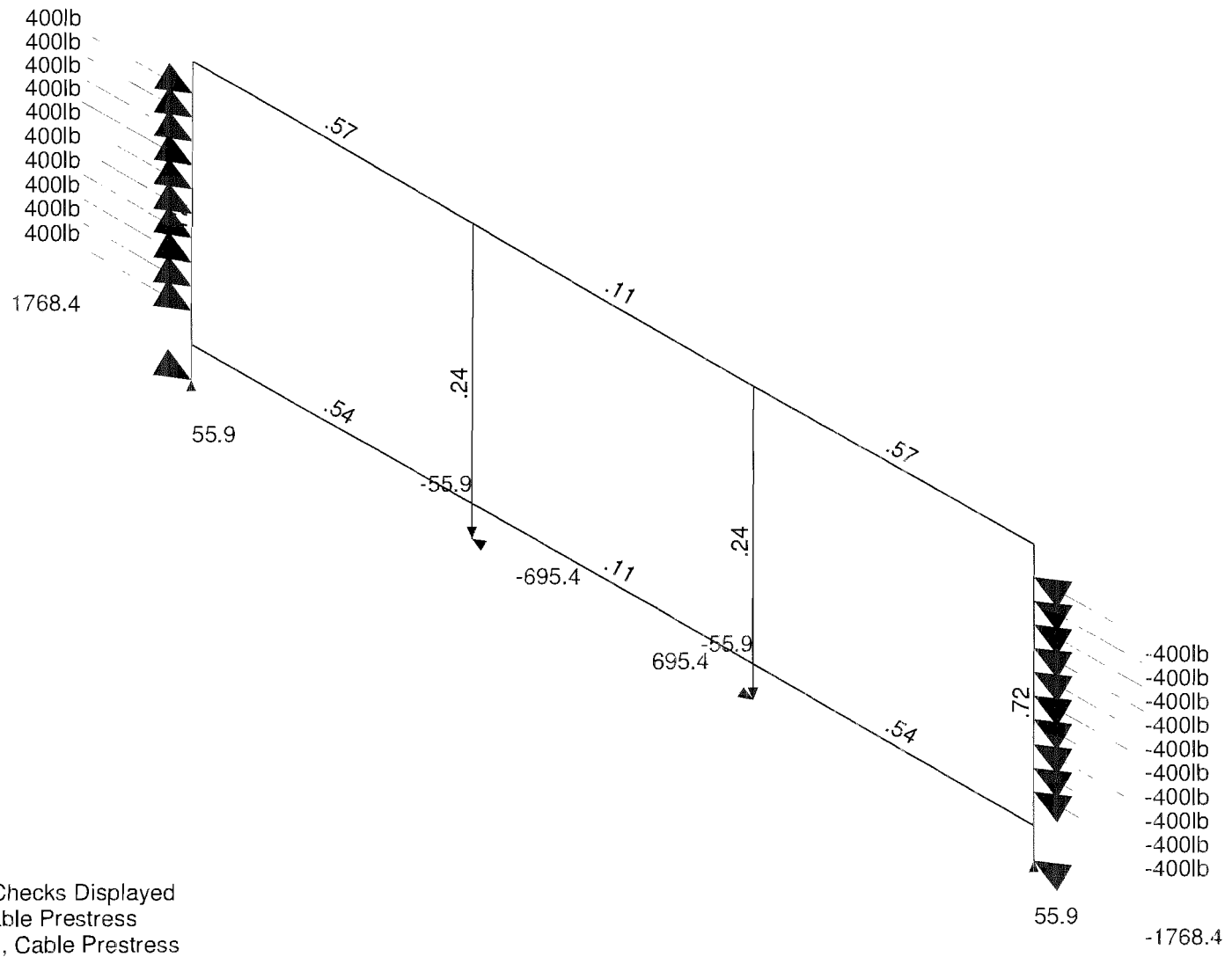
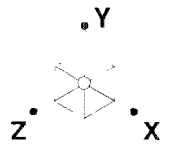
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D19 - 2" PIPE x 42.5" HIGH TOP RAIL W/ BTM RAIL

Oct 28, 2008 at 3:04 PM

D19.r3d

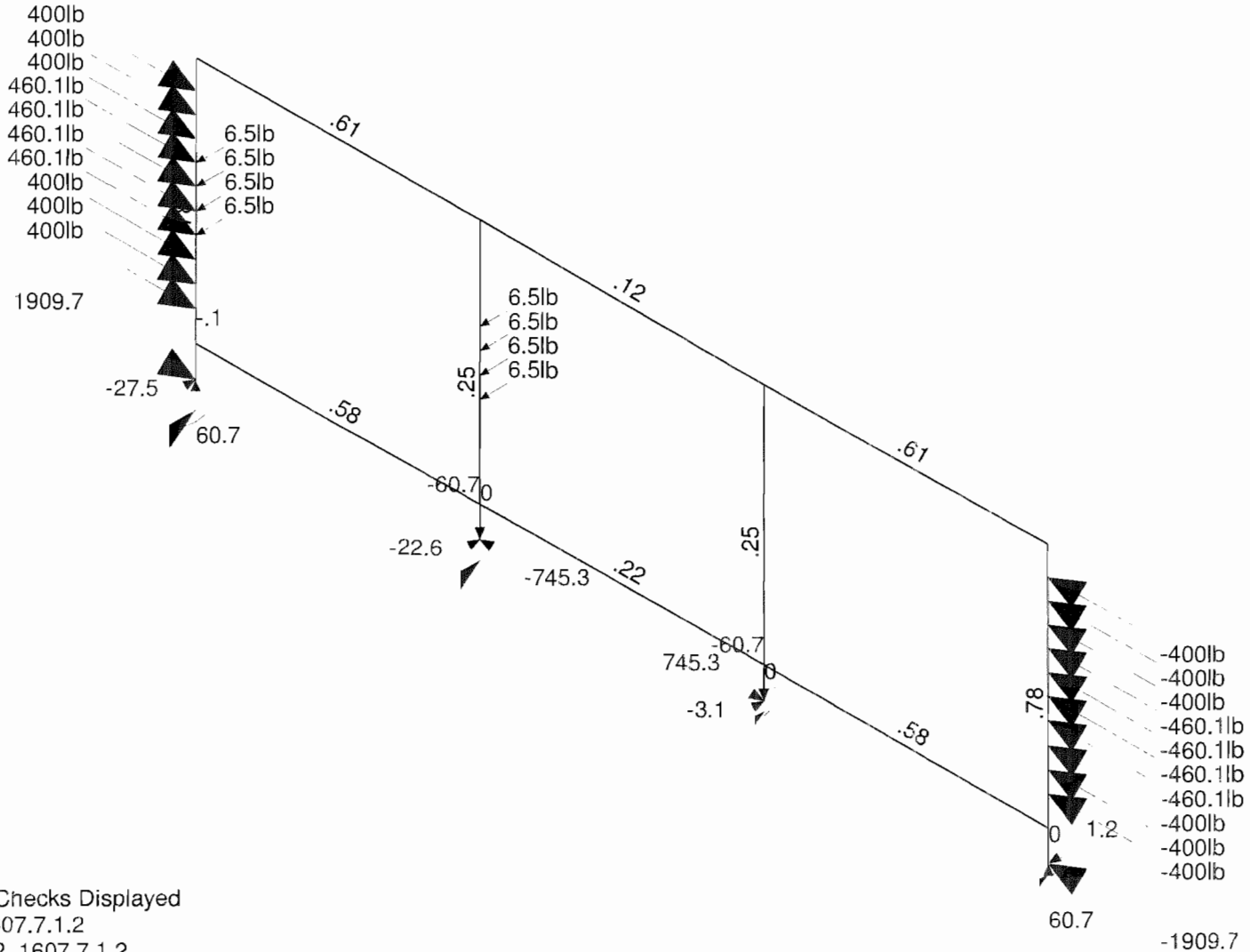
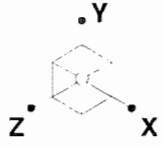


Member Code Checks Displayed
 Loads: LC 1, Cable Prestress
 Results for LC 1, Cable Prestress
 Reaction units are lb and k-ft

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D19 - 2" PIPE x 42.5" HIGH TOP RAIL W/ BTM RAIL

Oct 28, 2008 at 3:11 PM
 D19.r3d

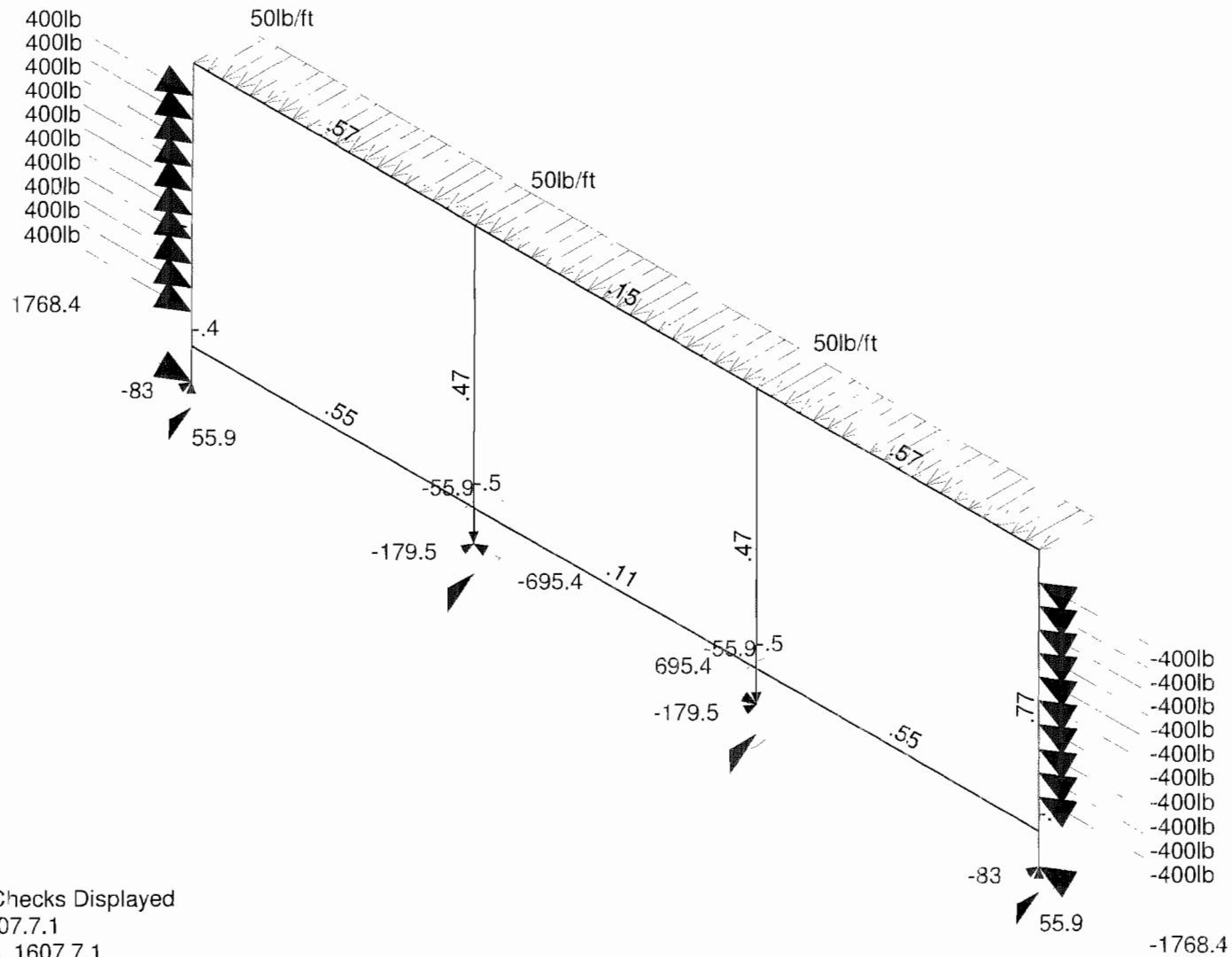
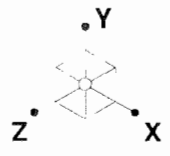


Member Code Checks Displayed
 Loads: LC 2, 1607.7.1.2
 Results for LC 2, 1607.7.1.2
 Reaction units are lb and k-ft

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D19 - 2" PIPE x 42.5" HIGH TOP RAIL W/ BTM RAIL

Oct 28, 2008 at 3:07 PM
 D19.r3d

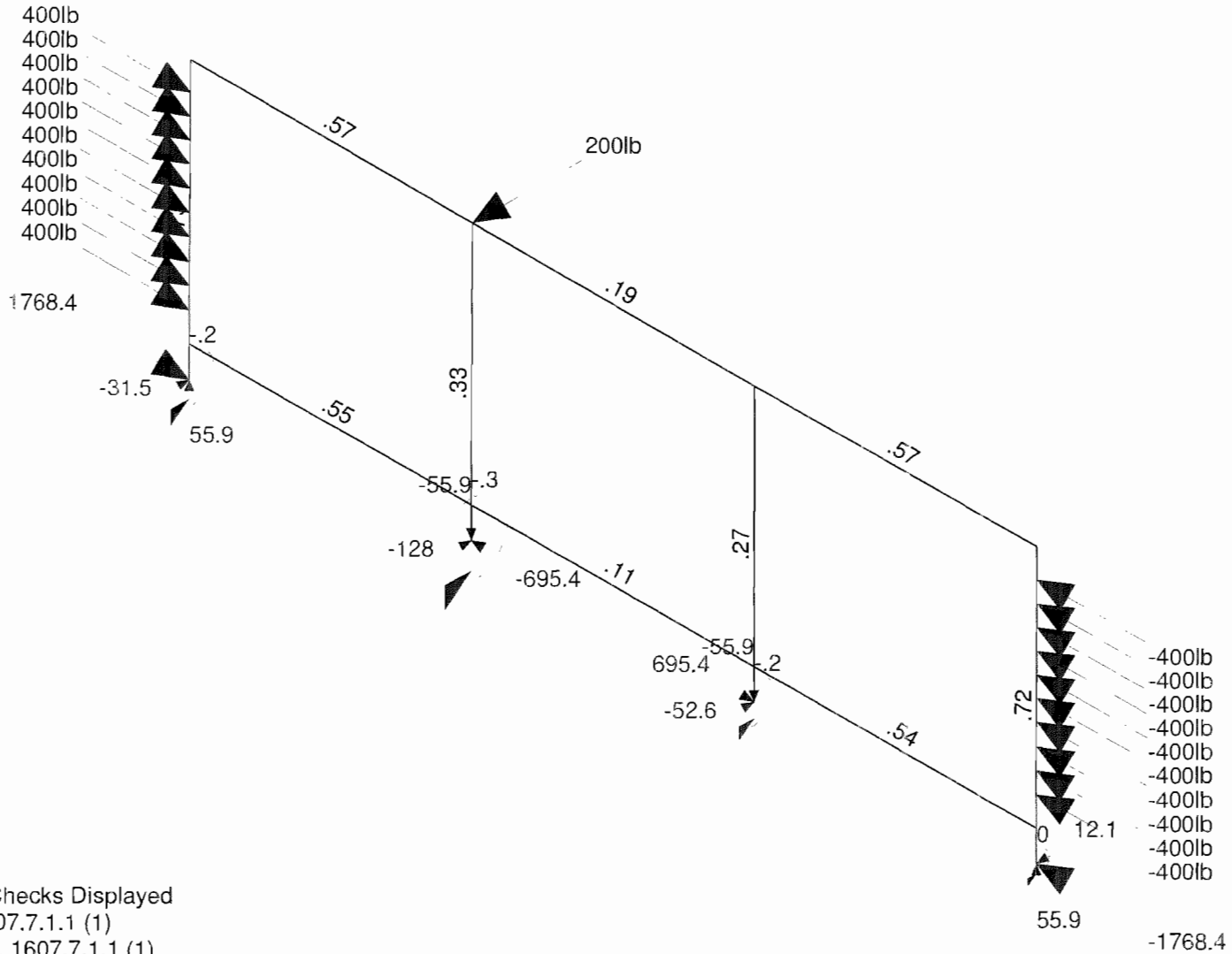
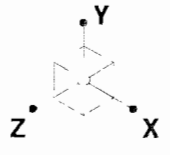


Member Code Checks Displayed
 Loads: LC 3, 1607.7.1
 Results for LC 3, 1607.7.1
 Reaction units are lb and k-ft

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D19 - 2" PIPE x 42.5" HIGH TOP RAIL W/ BTM RAIL

Oct 28, 2008 at 3:07 PM
 D19.r3d



Member Code Checks Displayed
 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

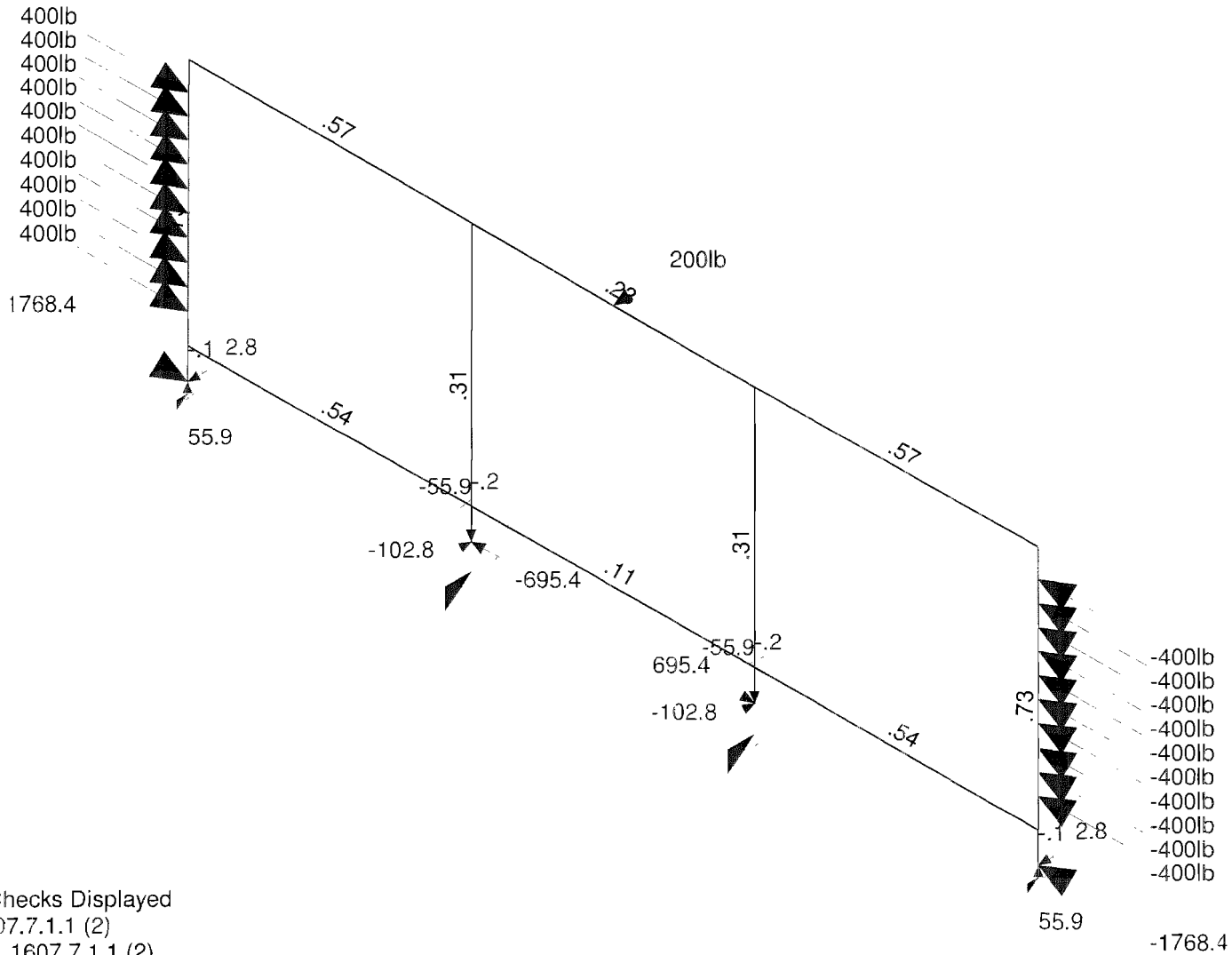
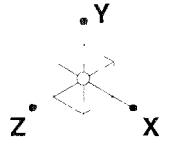
D19 - 2" PIPE x 42.5" HIGH TOP RAIL W/ BTM RAIL

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Oct 28, 2008 at 3:08 PM

D19.r3d



Member Code Checks Displayed
 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

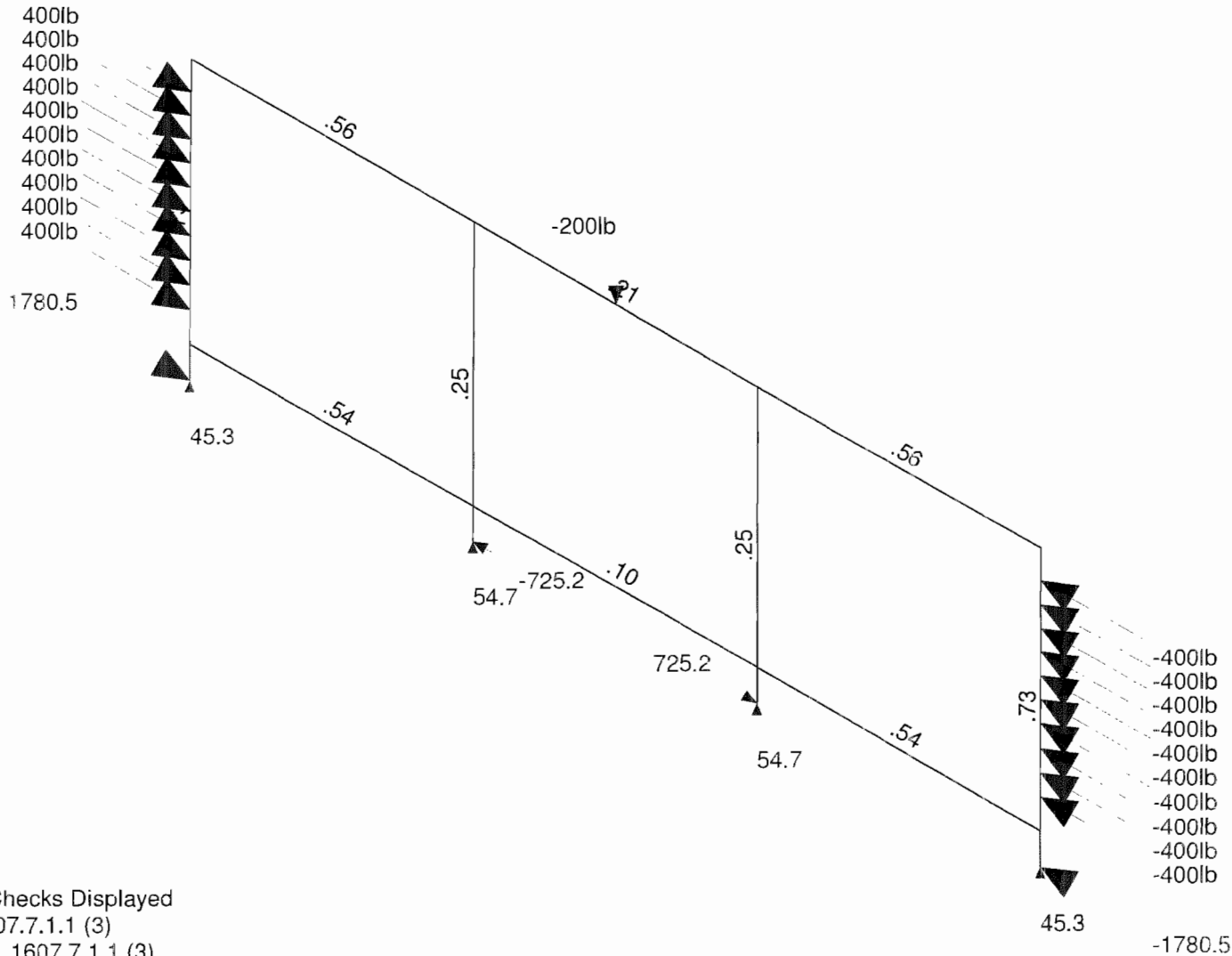
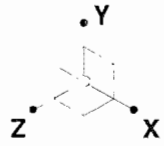
D19 - 2" PIPE x 42.5" HIGH TOP RAIL W/ BTM RAIL

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Oct 28, 2008 at 3:08 PM

08196

D19.r3d



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

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D19 - 2" PIPE x 42.5" HIGH TOP RAIL W/ BTM RAIL

Oct 28, 2008 at 3:08 PM
 D19.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 2.0X	Column	Pipe	A53GrB/A501...	Typical	1.39	.827	.827	1.65

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area (Mem...	Surface (Pl...
1	Cable Prestress	None					20			
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
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			RAIL	Beam	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			RAIL	Beam	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	1909.654	2	60.676	2	2.778	5	0	1	0	1	0	1
2		min	1768.426	1	45.277	6	-82.968	3	-411	3	0	1	0	1
3	N3	max	-695.41	1	54.723	6	0	1	0	1	0	1	0	1
4		min	-745.34	2	-60.676	2	-179.532	3	-496	3	0	1	0	1
5	N5	max	-1768.426	1	60.676	2	12.132	4	0	1	0	1	0	1
6		min	-1909.654	2	45.277	6	-82.968	3	-411	3	0	1	0	1
7	N7	max	745.34	2	54.723	6	0	1	0	1	0	1	0	1
8		min	695.41	1	-60.676	2	-179.532	3	-496	3	0	1	0	1
9	Totals:	max	0	1	200	6	0	1						
10		min	0	2	0	4	-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	60.676	2	-1768.273	4	2.767	5	0	1	.411	3	0	1
2			min	45.277	6	-1909.477	2	-83.011	3	0	1	0	1	0	1
3		2	max	226.171	2	1893.889	2	0	1	.052	3	.316	3	.093	2
4			min	198.586	6	1761.087	4	-105.61	3	0	2	0	1	.075	4
5		3	max	226.171	2	633.789	2	0	1	.052	3	.225	3	-899	1
6			min	198.586	6	561.087	4	-105.61	3	0	2	0	1	-983	2
7		4	max	226.171	2	-1005.789	6	0	1	.052	3	.134	3	-737	1
8			min	198.586	6	-1117.842	2	-105.61	3	0	2	-.001	2	-788	2
9		5	max	226.171	2	-1834.457	6	0	1	.052	3	.043	3	.589	2
10			min	198.586	6	-1946.511	2	-105.61	3	0	2	-.002	2	.538	6
11	M2	1	max	54.723	6	745.34	2	0	1	0	1	.496	3	0	1
12			min	-60.676	2	695.41	1	-179.532	3	0	1	0	1	0	1
13		2	max	-98.586	6	-70.236	1	0	1	.033	5	.365	3	-.047	1
14			min	-226.171	2	-88.072	6	-158.001	3	-.002	2	0	1	-.055	6
15		3	max	-98.586	6	-70.236	1	0	1	.033	5	.229	3	.021	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	-226.171	2	-88.072	6	-158.001	3	-.002	2	0	1	.013	4	
17	4	max	-98.586	6	-70.236	1	3.405	2	.033	5	.093	3	.097	6	
18		min	-226.171	2	-88.072	6	-158.001	3	-.002	2	-.003	2	.074	1	
19	5	max	-98.586	6	-70.236	1	3.405	2	.033	5	0	1	.173	6	
20		min	-226.171	2	-88.072	6	-158.001	3	-.002	2	-.061	4	.134	1	
21	M3	1	max	1946.469	2	226.129	2	0	.002	2	.052	3	.589	2	
22		min	1834.423	6	198.561	6	-108.475	3	-.043	3	0	2	.538	6	
23	2	max	1946.469	2	226.129	2	0	1	.002	2	.019	5	.391	2	
24		min	1834.423	6	198.561	6	-64.725	3	-.043	3	-.023	3	.364	1	
25	3	max	1946.469	2	226.129	2	0	1	.002	2	.003	5	.193	2	
26		min	1834.423	6	198.561	6	-49.064	4	-.043	3	-.061	3	.18	1	
27	4	max	1946.469	2	226.129	2	22.775	3	.002	2	0	1	.017	6	
28		min	1834.423	6	198.561	6	-49.064	4	-.043	3	-.09	4	-.004	2	
29	5	max	1946.469	2	226.129	2	66.525	3	.002	2	0	1	-.157	6	
30		min	1834.423	6	198.561	6	-49.064	4	-.043	3	-.132	4	-.202	2	
31	M4	1	max	2021.942	2	100	6	50.583	4	.033	4	.004	5	.016	6
32		min	1909.113	4	0	1	-100	5	0	1	-.131	4	-.058	2	
33	2	max	2021.942	2	100	6	50.583	4	.033	4	0	1	-.054	1	
34		min	1909.113	4	0	1	-100	5	0	1	-.087	4	-.072	6	
35	3	max	2021.942	2	0	1	100	5	.033	4	0	1	-.054	1	
36		min	1909.113	4	-100	6	0	1	0	1	-.171	5	-.159	6	
37	4	max	2021.942	2	0	1	100	5	.033	4	.002	2	-.054	1	
38		min	1909.113	4	-100	6	0	1	0	1	-.084	5	-.072	6	
39	5	max	2021.942	2	0	1	100	5	.033	4	.046	4	.016	6	
40		min	1909.113	4	-100	6	0	1	0	1	0	1	-.058	2	
41	M5	1	max	60.676	2	1909.477	2	12.127	4	0	1	411	3	0	1
42		min	45.277	6	1768.273	4	-83.011	3	0	1	0	1	0	1	
43	2	max	226.171	2	-1761.087	4	.277	2	0	1	.316	3	-.075	4	
44		min	198.586	6	-1893.889	2	-105.61	3	-.052	3	0	1	-.093	2	
45	3	max	226.171	2	-561.087	4	.277	2	0	1	.225	3	.983	2	
46		min	198.586	6	-633.789	2	-105.61	3	-.052	3	0	1	.899	1	
47	4	max	226.171	2	1117.842	2	.277	2	0	1	.134	3	.788	2	
48		min	198.586	6	1005.789	6	-105.61	3	-.052	3	0	1	.737	1	
49	5	max	226.171	2	1946.511	2	.277	2	0	1	.043	3	-.538	6	
50		min	198.586	6	1834.457	6	-105.61	3	-.052	3	0	1	-.589	2	
51	M6	1	max	54.723	6	-695.41	1	0	1	0	1	.496	3	0	1
52		min	-60.676	2	-745.34	2	-179.532	3	0	1	0	1	0	1	
53	2	max	-98.586	6	88.072	6	0	1	0	1	.365	3	.055	6	
54		min	-226.171	2	70.236	1	-158.001	3	-.035	4	0	1	.047	1	
55	3	max	-98.586	6	88.072	6	0	1	0	1	.229	3	-.013	4	
56		min	-226.171	2	70.236	1	-158.001	3	-.035	4	0	1	-.021	6	
57	4	max	-98.586	6	88.072	6	0	1	0	1	.093	3	-.074	1	
58		min	-226.171	2	70.236	1	-158.001	3	-.035	4	0	1	-.097	6	
59	5	max	-98.586	6	88.072	6	0	1	0	1	0	1	-.134	1	
60		min	-226.171	2	70.236	1	-158.001	3	-.035	4	-.043	3	-.173	6	
61	M7	1	max	1946.469	2	-198.561	6	18.62	5	.043	3	.011	4	-.157	6
62		min	1834.423	6	-226.129	2	-66.525	3	0	1	-.03	5	-.202	2	
63	2	max	1946.469	2	-198.561	6	18.62	5	.043	3	.014	4	.017	6	
64		min	1834.423	6	-226.129	2	-22.775	3	0	1	-.06	3	-.004	2	
65	3	max	1946.469	2	-198.561	6	20.975	3	.043	3	.017	4	.193	2	
66		min	1834.423	6	-226.129	2	-.072	2	0	1	-.061	3	.18	1	
67	4	max	1946.469	2	-198.561	6	64.725	3	.043	3	.021	4	.391	2	
68		min	1834.423	6	-226.129	2	-.072	2	0	1	-.023	3	.364	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	1946.469	2	-198.561	6	108.475	3	.043	3	.052	3	.589	2
70		min	1834.423	6	-226.129	2	-.072	2	0	1	0	1	.538	6
71	M8	1	max	4203.585	2	-153.309	6	21.335	3	0	2	0	-355	6
72		min	3929.549	1	-165.498	2	-.558	2	-.014	3	-.052	3	-.381	2
73	2	max	4203.585	2	-153.309	6	21.335	3	0	2	0	2	-.22	1
74		min	3929.549	1	-165.498	2	-.558	2	-.014	3	-.034	3	-.236	2
75	3	max	4203.585	2	-153.309	6	21.335	3	0	2	0	1	-.085	1
76		min	3929.549	1	-165.498	2	-.558	2	-.014	3	-.015	3	-.091	2
77	4	max	4203.585	2	-153.309	6	21.335	3	0	2	.01	5	.053	2
78		min	3929.549	1	-165.498	2	-.558	2	-.014	3	-.002	4	.048	6
79	5	max	4203.585	2	-153.309	6	21.335	3	0	2	.026	5	.198	2
80		min	3929.549	1	-165.498	2	-.558	2	-.014	3	-.001	2	.182	6
81	M9	1	max	3382.772	2	0	1	0	.01	4	.01	4	-.005	6
82		min	3132.854	6	0	1	-6.821	4	0	1	-.008	5	-.007	2
83	2	max	3382.772	2	0	1	0	1	.01	4	.004	4	-.005	6
84		min	3132.854	6	0	1	-6.821	4	0	1	-.008	5	-.007	2
85	3	max	3382.772	2	0	1	0	1	.01	4	0	3	-.005	6
86		min	3132.854	6	0	1	-6.821	4	0	1	-.008	5	-.007	2
87	4	max	3382.772	2	0	1	0	1	.01	4	0	3	-.005	6
88		min	3132.854	6	0	1	-6.821	4	0	1	-.008	4	-.007	2
89	5	max	3382.772	2	0	1	0	1	.01	4	0	3	-.005	6
90		min	3132.854	6	0	1	-6.821	4	0	1	-.014	4	-.007	2
91	M10	1	max	4203.585	2	165.498	2	0	.014	3	.026	5	.198	2
92		min	3929.549	1	153.309	6	-21.335	3	0	1	0	1	.182	6
93	2	max	4203.585	2	165.498	2	0	1	.014	3	.01	5	.053	2
94		min	3929.549	1	153.309	6	-21.335	3	0	1	0	1	.048	6
95	3	max	4203.585	2	165.498	2	0	1	.014	3	0	2	-.085	1
96		min	3929.549	1	153.309	6	-21.335	3	0	1	-.015	3	-.091	2
97	4	max	4203.585	2	165.498	2	0	1	.014	3	0	1	-.22	1
98		min	3929.549	1	153.309	6	-21.335	3	0	1	-.034	3	-.236	2
99	5	max	4203.585	2	165.498	2	0	1	.014	3	0	1	-.355	6
100		min	3929.549	1	153.309	6	-21.335	3	0	1	-.052	3	-.381	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 2.0X	.780	4.734	2	.331	4.734	3	22017.34	24970.06	1.443	1.443	1... H1-1b
2	M2	PIPE 2.0	.468	4.303	3	.138	0	2	15941.992	17964.072	1.067	1.067	2... H1-1b
3	M3	PIPE 2.0	.613	0	2	.089	0	3	15878.23	17964.072	1.067	1.067	2... H1-1b
4	M4	PIPE 2.0	.228	21	5	.044	0	4	15878.23	17964.072	1.067	1.067	1 H1-1b
5	M5	PIPE 2.0X	.780	4.734	2	.331	4.734	3	22017.34	24970.06	1.443	1.443	1... H1-1b
6	M6	PIPE 2.0	.468	4.303	3	.138	0	2	15941.992	17964.072	1.067	1.067	2... H1-1b
7	M7	PIPE 2.0	.613	42	2	.089	42	3	15878.23	17964.072	1.067	1.067	2... H1-1b
8	M8	PIPE 2.0	.582	0	2	.043	0	3	15878.23	17964.072	1.067	1.067	2... H1-1a
9	M9	PIPE 2.0	.219	42	2	.012	0	4	15878.23	17964.072	1.067	1.067	1 H1-1a
10	M10	PIPE 2.0	.582	42	2	.043	0	3	15878.23	17964.072	1.067	1.067	2... H1-1a

*** End of Calculations ***