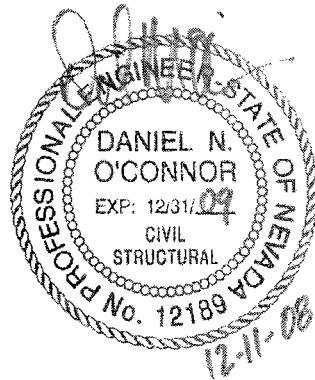
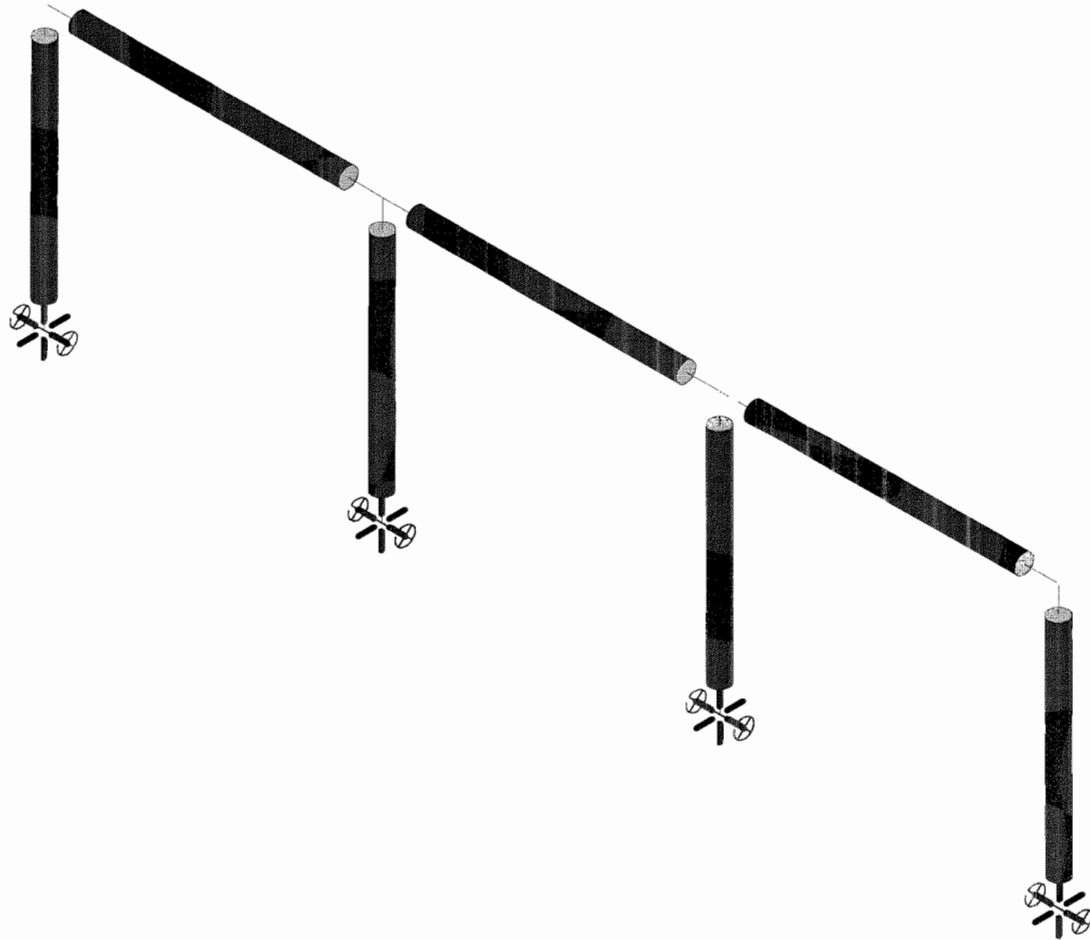
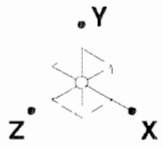


D18—2" PIPE x 36-1/2" HIGH RAIL WITHOUT BOTTOM RAIL

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 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" XXS (2.375" OD x 0.436") 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:	None
Number of Cables:	10
Cable Spacing:	3.10"



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.

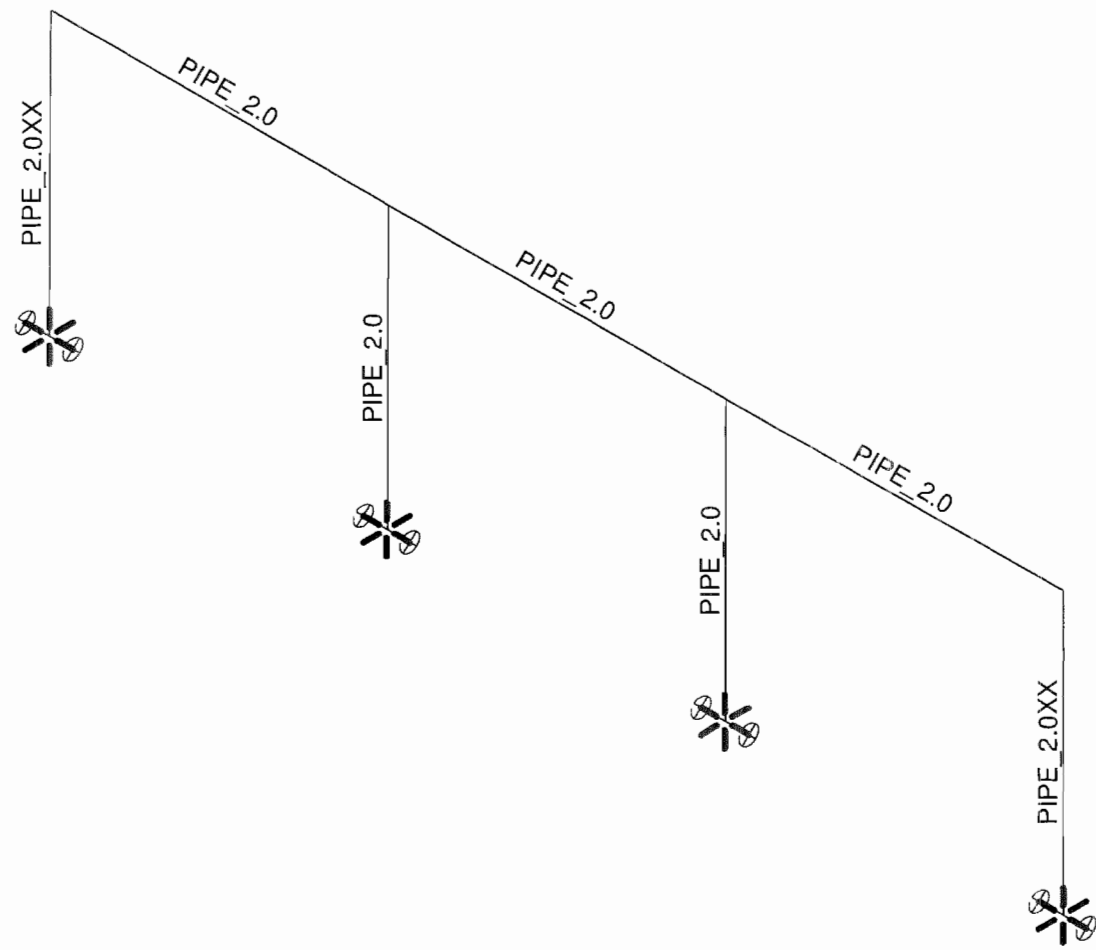
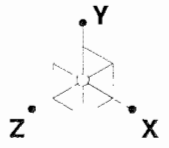


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D18 - 2" PIPE x 36.5" HIGH RAIL W/O BTM RAIL

Oct 28, 2008 at 11:04 AM

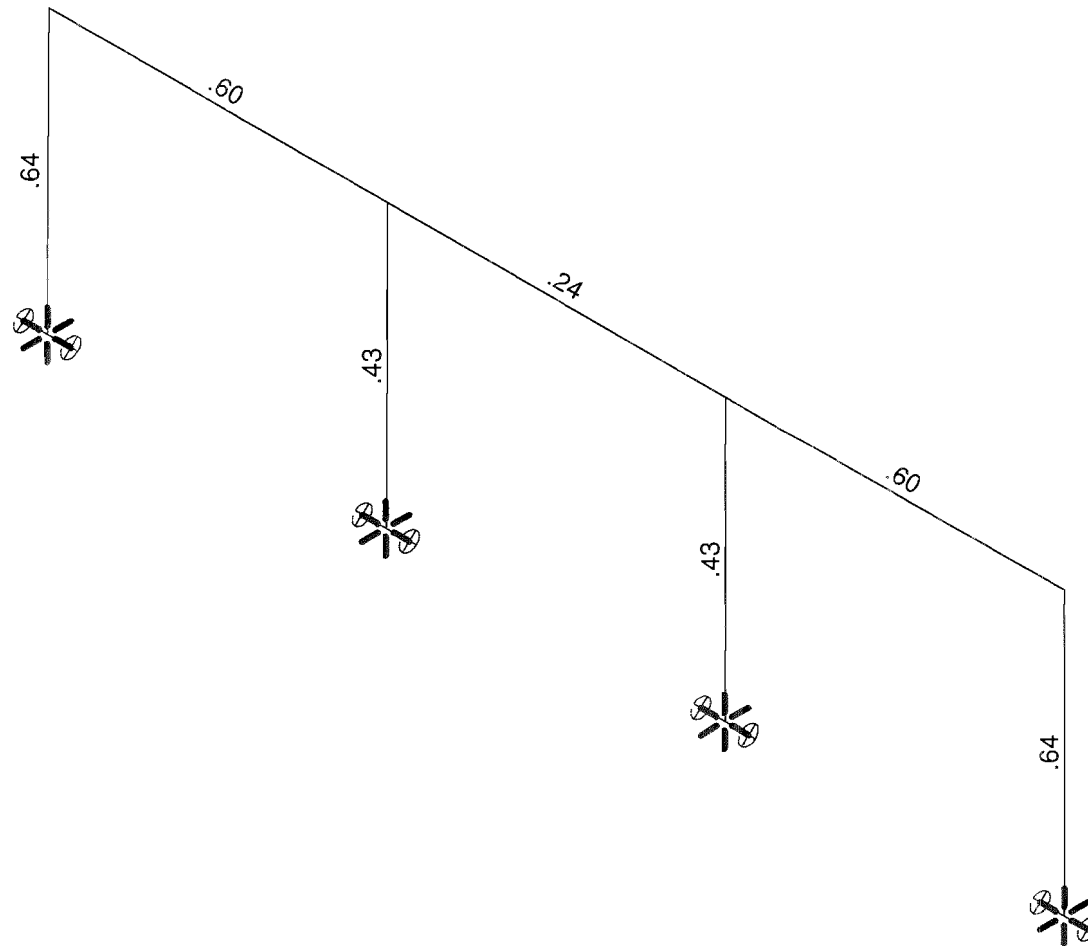
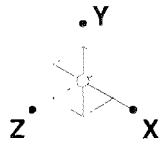
D18.r3d



Solution: Envelope
Ferrari Shields & Associates
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D18 - 2" PIPE x 36.5" HIGH RAIL W/O BTM RAIL

Oct 28, 2008 at 1:22 PM
D18.r3d



Member Code Checks Displayed
Solution: Envelope
Reaction units are lb and k-ft

Ferrari Shields & Associates

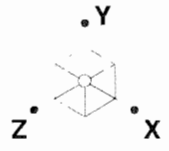
Dan O'Connor

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D18 - 2" PIPE x 36.5" HIGH RAIL W/O BTM RAIL

Oct 28, 2008 at 11:10 AM

D18.r3d



400lb
400lb
400lb
400lb
400lb
400lb
400lb
400lb
400lb



197

-1890.4

35.2

.10

.56

.13

.10

-35.2

1890.4

.56



197

.59

-400lb
-400lb
-400lb
-400lb
-400lb
-400lb
-400lb
-400lb

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

Ferrari Shields & Associates

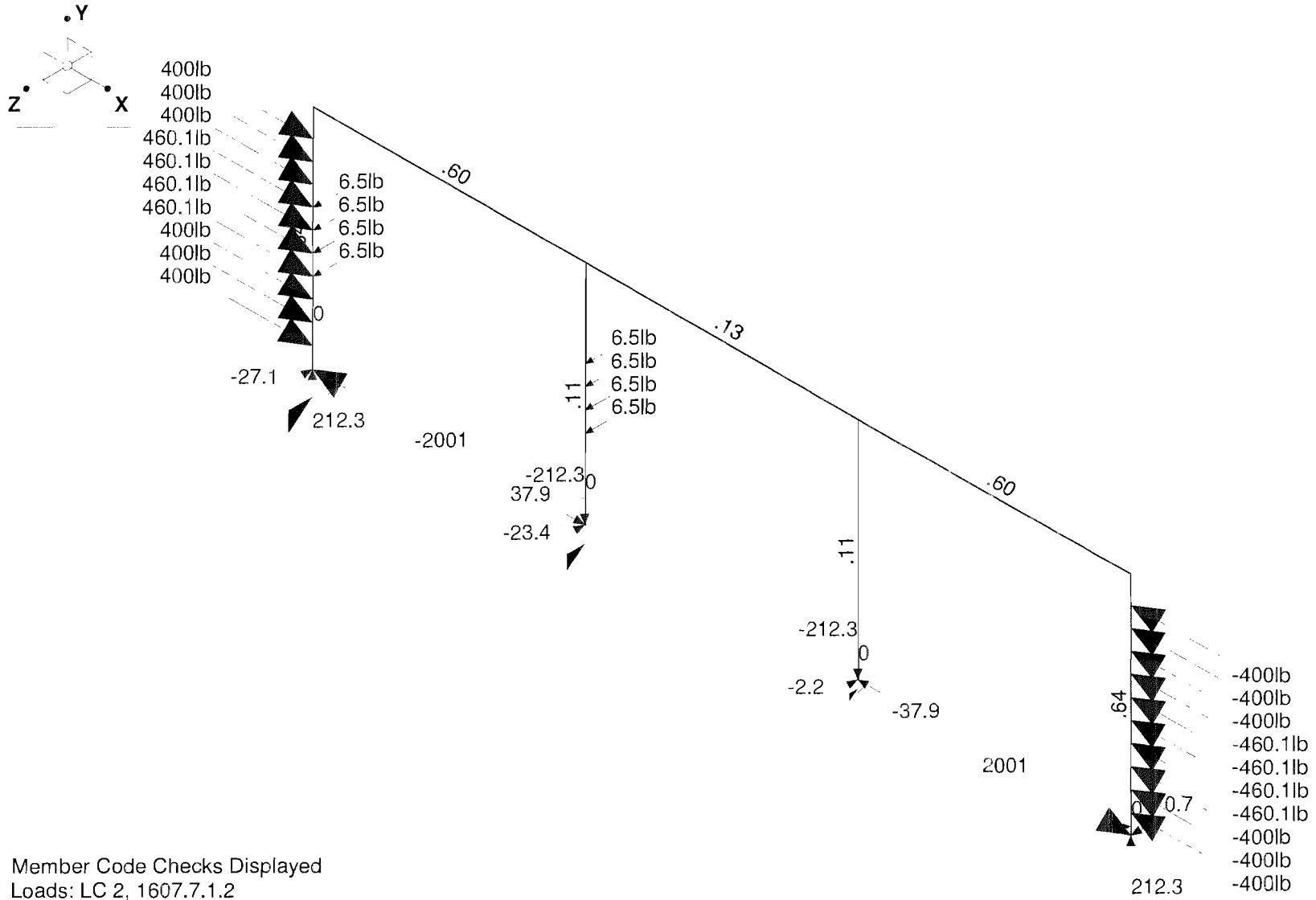
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D18 - 2" PIPE x 36.5" HIGH RAIL W/O BTM RAIL

Oct 28, 2008 at 11:11 AM

D18.r3d



Ferrari Shields & Associates

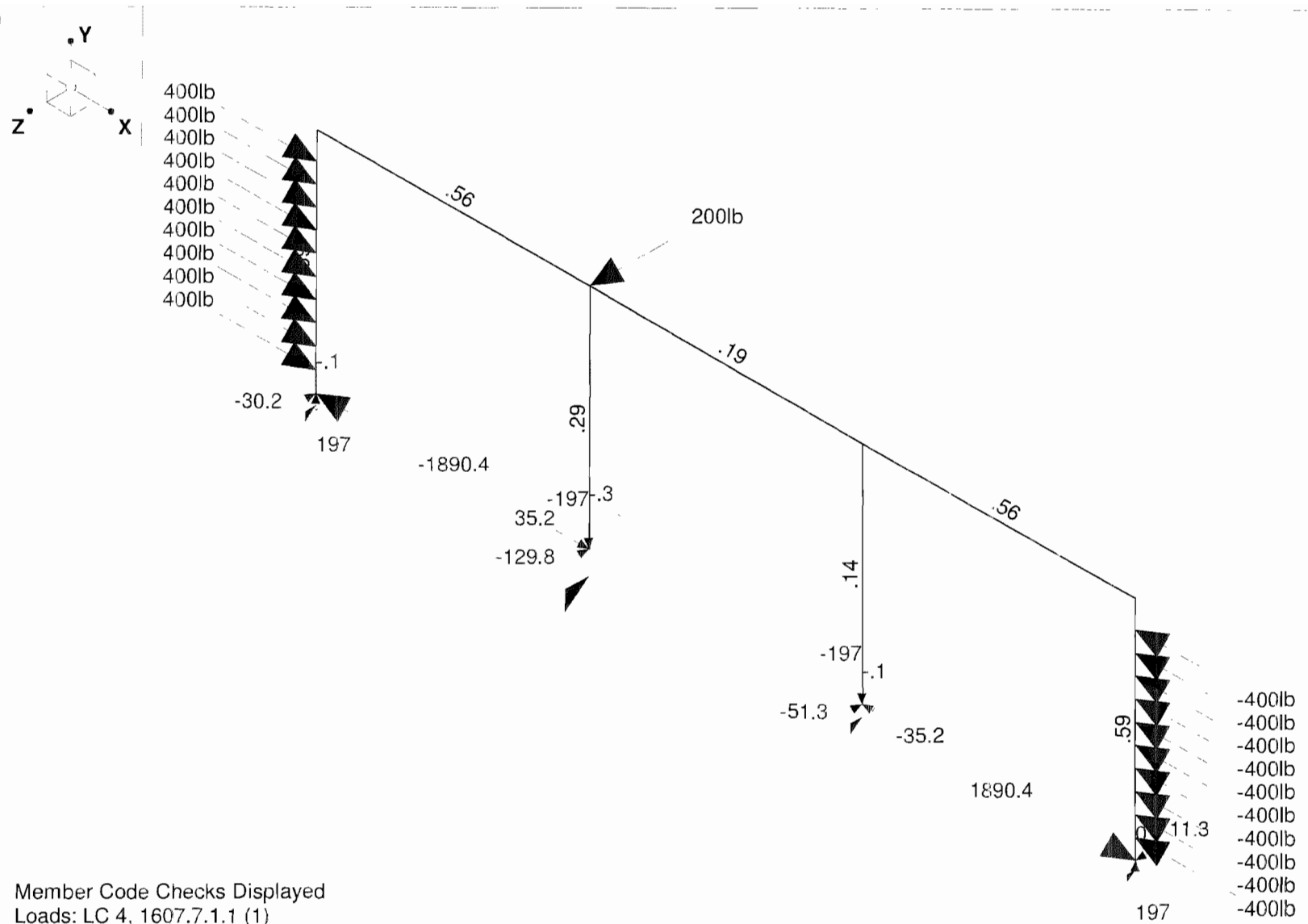
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D18 - 2" PIPE x 36.5" HIGH RAIL W/O BTM RAIL

Oct 28, 2008 at 11:11 AM

D18.r3d

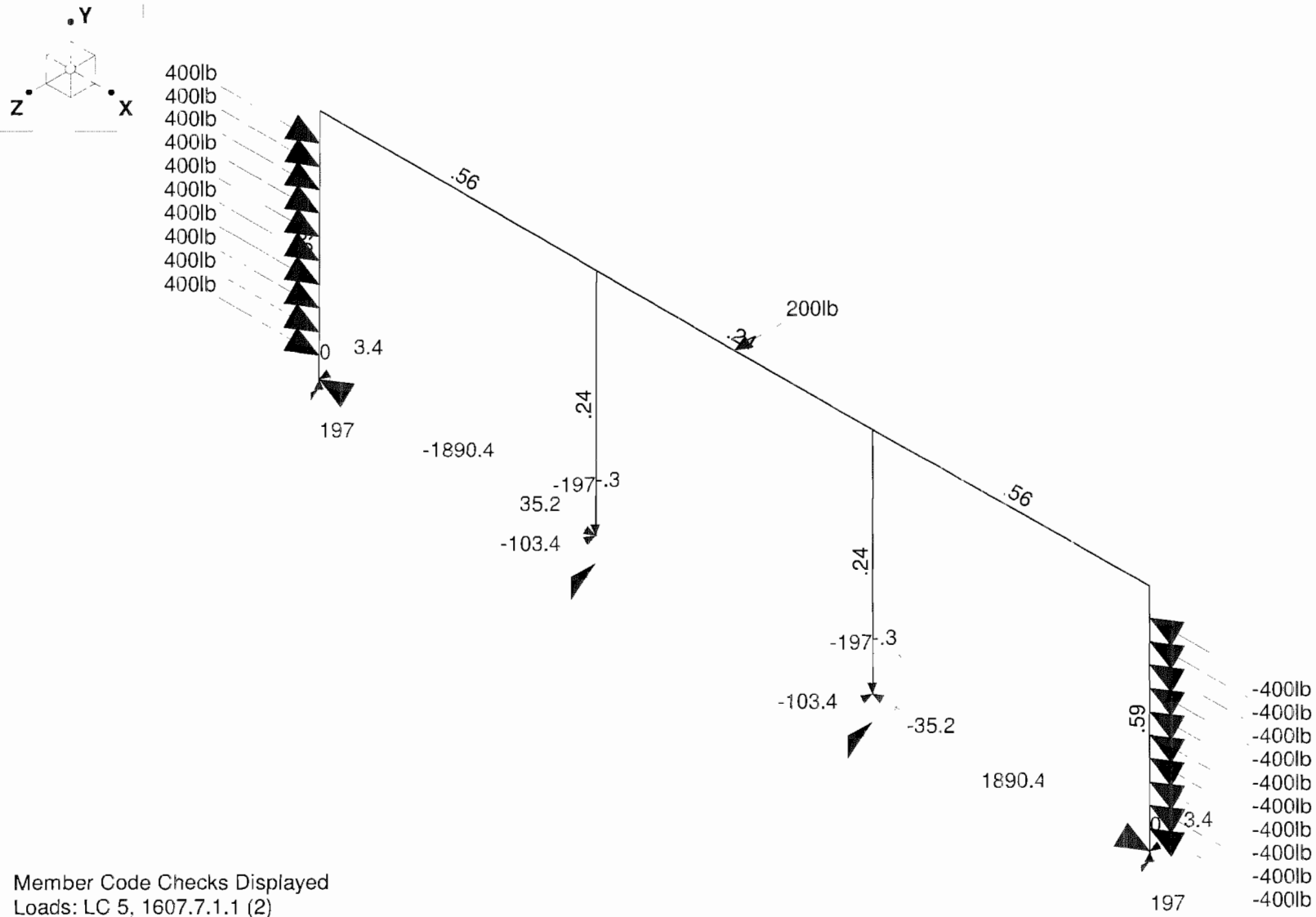


Member Code Checks Displayed
 Loads: LC 4, 1607.7.1.1 (1)
 Results for LC 4, 1607.7.1.1 (1)
 Reaction units are lb and k-ft

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D18 - 2" PIPE x 36.5" HIGH RAIL W/O BTM RAIL

Oct 28, 2008 at 11:12 AM
 D18.r3d

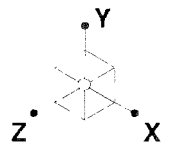


Member Code Checks Displayed
 Loads: LC 5, 1607.7.1.1 (2)
 Results for LC 5, 1607.7.1.1 (2)
 Reaction units are lb and k-ft

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D18 - 2" PIPE x 36.5" HIGH RAIL W/O BTM RAIL

Oct 28, 2008 at 11:13 AM
 D18.r3d



400lb
400lb
400lb
400lb
400lb
400lb
400lb
400lb
400lb



184

-1894.3

.55

-200lb



.13

46.8



.55

.13

-46.8

1894.3



184

.59

-400lb
-400lb
-400lb
-400lb
-400lb
-400lb
-400lb
-400lb

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

Ferrari Shields & Associates

Dan O'Connor

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D18 - 2" PIPE x 36.5" HIGH RAIL W/O BTM RAIL

Oct 28, 2008 at 11:13 AM

D18.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
Parme 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_2.0XX	Column	Pipe	A53GrB/A501...	Typical	2.51	1.27	1.27	2.54

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			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

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	-1890.426	4	212.287	2	3.393	5	0	1	0	1	0	1
2		min	-2000.969	2	184.021	6	-84.981	3	-317	3	0	1	0	1
3	N3	max	46.787	6	-84.021	6	0	1	0	1	0	1	0	1
4		min	35.173	4	-212.287	2	-177.519	3	-457	3	0	1	0	1
5	N5	max	2000.969	2	212.287	2	11.311	4	0	2	0	1	0	1
6		min	1890.426	4	184.021	6	-84.981	3	-317	3	0	1	0	1
7	N7	max	-35.173	4	-84.021	6	0	1	0	1	0	1	0	1
8		min	-46.787	6	-212.287	2	-177.519	3	-457	3	0	1	0	1
9	Totals:	max	0	3	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 Momentf[...]	lc	z-z Momentf[...]	lc
1	M1	1	max	212.287	2	2001.016	2	3.313	5	0	1	.317	3	0	1
2			min	184.021	6	1890.468	1	-85.405	3	0	1	0	1	0	1
3		2	max	212.287	2	1201.016	2	3.313	5	0	1	.254	3	-1.112	1
4			min	184.021	6	1090.468	1	-85.405	3	0	1	0	1	-1.194	2
5		3	max	212.287	2	-105.623	6	3.313	5	0	1	.191	3	-1.389	1
6			min	184.021	6	-119.184	2	-85.405	3	0	1	0	1	-1.514	2
7		4	max	212.287	2	-1305.623	6	3.313	5	0	1	.128	3	-.83	1
8			min	184.021	6	-1439.384	2	-85.405	3	0	1	0	1	-.885	2
9		5	max	212.287	2	-2105.623	6	3.313	5	0	1	.065	3	.565	2
10			min	184.021	6	-2239.384	2	-85.405	3	0	1	0	2	.513	6
11	M2	1	max	-84.021	6	-35.173	4	0	1	0	1	.457	3	0	1
12			min	-212.287	2	-46.787	6	-177.519	3	0	1	0	1	0	1
13		2	max	-84.021	6	-35.173	4	0	1	0	1	.326	3	.034	6
14			min	-212.287	2	-46.787	6	-177.519	3	0	1	0	1	.026	4
15		3	max	-84.021	6	-35.173	4	0	1	0	1	.196	3	.069	6
16			min	-212.287	2	-46.787	6	-177.519	3	0	1	-.002	2	.052	4
17		4	max	-84.021	6	-35.173	4	2.607	2	0	1	.065	3	.103	6
18			min	-212.287	2	-46.787	6	-177.519	3	0	1	-.003	2	-.078	4

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	
19		5	max	-84.021	6	-35.173	4	2.607	2	0	1	0	1	.138	6
20			min	-212.287	2	-46.787	6	-177.519	3	0	1	-.076	4	.104	4
21	M3	1	max	2239.431	2	212.248	2	0	1	0	2	0	1	.565	2
22			min	2105.661	6	184.001	6	-90.587	3	-.065	3	0	1	.513	6
23		2	max	2239.431	2	212.248	2	0	1	0	2	0	1	.379	2
24			min	2105.661	6	184.001	6	-46.837	3	-.065	3	-.06	3	.352	6
25		3	max	2239.431	2	212.248	2	0	1	0	2	0	1	.194	2
26			min	2105.661	6	184.001	6	-34.483	4	-.065	3	-.082	3	.18	4
27		4	max	2239.431	2	212.248	2	40.663	3	0	2	0	1	.03	6
28			min	2105.661	6	184.001	6	-34.483	4	-.065	3	-.091	4	.007	1
29		5	max	2239.431	2	212.248	2	84.413	3	0	2	0	1	-.131	6
30			min	2105.661	6	184.001	6	-34.483	4	-.065	3	-.121	4	-.178	2
31	M4	1	max	2277.341	2	100	6	42.925	4	.03	4	0	1	.007	6
32			min	2144.747	1	0	1	-100	5	0	1	-.121	4	-.066	2
33		2	max	2277.341	2	100	6	42.925	4	.03	4	0	1	-.062	4
34			min	2144.747	1	0	1	-100	5	0	1	-.091	5	-.081	6
35		3	max	2277.341	2	0	1	100	5	.03	4	0	1	-.062	4
36			min	2144.747	1	-100	6	0	1	0	1	-.178	5	-.168	6
37		4	max	2277.341	2	0	1	100	5	.03	4	0	2	-.062	4
38			min	2144.747	1	-100	6	0	1	0	1	-.091	5	-.081	6
39		5	max	2277.341	2	0	1	100	5	.03	4	.03	4	.007	6
40			min	2144.747	1	-100	6	0	1	0	1	-.011	3	-.066	2
41	M5	1	max	212.287	2	-1890.468	1	11.283	4	0	1	.317	3	0	1
42			min	184.021	6	-2001.016	2	-85.405	3	0	1	0	2	0	1
43		2	max	212.287	2	-1090.468	1	11.283	4	0	1	.254	3	1.194	2
44			min	184.021	6	-1201.016	2	-85.405	3	0	1	0	1	1.112	1
45		3	max	212.287	2	119.184	2	11.283	4	0	1	.191	3	1.514	2
46			min	184.021	6	105.623	6	-85.405	3	0	1	0	1	1.389	1
47		4	max	212.287	2	1439.384	2	11.283	4	0	1	.128	3	.885	2
48			min	184.021	6	1305.623	6	-85.405	3	0	1	0	1	.83	1
49		5	max	212.287	2	2239.384	2	11.283	4	0	1	.065	3	-.513	6
50			min	184.021	6	2105.623	6	-85.405	3	0	1	0	1	-.565	2
51	M6	1	max	-84.021	6	46.787	6	0	1	0	1	.457	3	0	1
52			min	-212.287	2	35.173	4	-177.519	3	0	1	0	1	0	1
53		2	max	-84.021	6	46.787	6	0	1	0	1	.326	3	-.026	4
54			min	-212.287	2	35.173	4	-177.519	3	0	1	0	1	-.034	6
55		3	max	-84.021	6	46.787	6	0	1	0	1	.196	3	-.052	4
56			min	-212.287	2	35.173	4	-177.519	3	0	1	0	1	-.069	6
57		4	max	-84.021	6	46.787	6	0	1	0	1	.065	3	-.078	4
58			min	-212.287	2	35.173	4	-177.519	3	0	1	0	1	-.103	6
59		5	max	-84.021	6	46.787	6	0	1	0	1	0	1	-.104	4
60			min	-212.287	2	35.173	4	-177.519	3	0	1	-.065	3	-.138	6
61	M7	1	max	2239.431	2	-184.001	6	.963	5	.065	3	.03	4	-.131	6
62			min	2105.661	6	-212.248	2	-84.413	3	0	1	-.011	3	-.178	2
63		2	max	2239.431	2	-184.001	6	.963	5	.065	3	.022	4	.03	6
64			min	2105.661	6	-212.248	2	-40.663	3	0	1	-.066	3	.007	1
65		3	max	2239.431	2	-184.001	6	3.087	3	.065	3	.015	4	.194	2
66			min	2105.661	6	-212.248	2	-8.443	4	0	1	-.082	3	.18	4
67		4	max	2239.431	2	-184.001	6	46.837	3	.065	3	.007	4	.379	2
68			min	2105.661	6	-212.248	2	-8.443	4	0	1	-.06	3	.352	6
69		5	max	2239.431	2	-184.001	6	90.587	3	.065	3	0	1	.565	2
70			min	2105.661	6	-212.248	2	-8.443	4	0	1	0	1	.513	6

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_2.0XX	.643	15.449	2	.166	31.266	2	40469.09	45089.82	2.395	2.395	1...		H1-1b
2	M2	PIPE_2.0	.434	0	3	.034	0	3	16463.153	17964.072	1.067	1.067	1...		H1-1b
3	M3	PIPE_2.0	.600	0	2	.109	0	3	15878.23	17964.072	1.067	1.067	2...		H1-1b
4	M4	PIPE_2.0	.244	21	5	.040	0	4	15878.23	17964.072	1.067	1.067	1		H1-1b
5	M5	PIPE_2.0XX	.643	15.449	2	.166	31.266	2	40469.09	45089.82	2.395	2.395	1...		H1-1b
6	M6	PIPE_2.0	.434	0	3	.034	0	3	16463.153	17964.072	1.067	1.067	1...		H1-1b
7	M7	PIPE_2.0	.600	42	2	.109	42	3	15878.23	17964.072	1.067	1.067	2...		H1-1b

*** End of Calculations ***