



12810 NE 178TH ST STE 218  
WOODINVILLE, WA 98072 ▲ (425) 481-6601

PROJECT: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

JOB#: 9050

BY: EI/WR

DATE: 07/02/19 / OF 32

Job Name: Maheshwari tree house(Lateral Analysis)

Site Address: 7272 W Mercer Way  
Mercer Island, WA

Jurisdiction: City of Mercer Island

Job ID: 9050

Design Specifications: 2015 IBC

Building Type : Low-Rise

Importance Factor: 1

Basic Wind Velocity: 110 mph (ASCE 7-10 Fig 26-1a)

Wind Exposure: B (Strength Design Value)

Roof Snow Loading: 25 psf Kzt=1.6

Risk Category: II

Soil Site Class: D

Allowable Soil Bearing: 1500 psf

Analysis Procedure: Wind: ASCE 7-10 (Envelope Procedure)

Seismic: ASCE 7-10 Equiv. Lateral Force Procedure

Spectral Response Acceleration, Ss: 150 %g S1 56 %g

Load Combinations: ASD Basic

Building Design Parameters

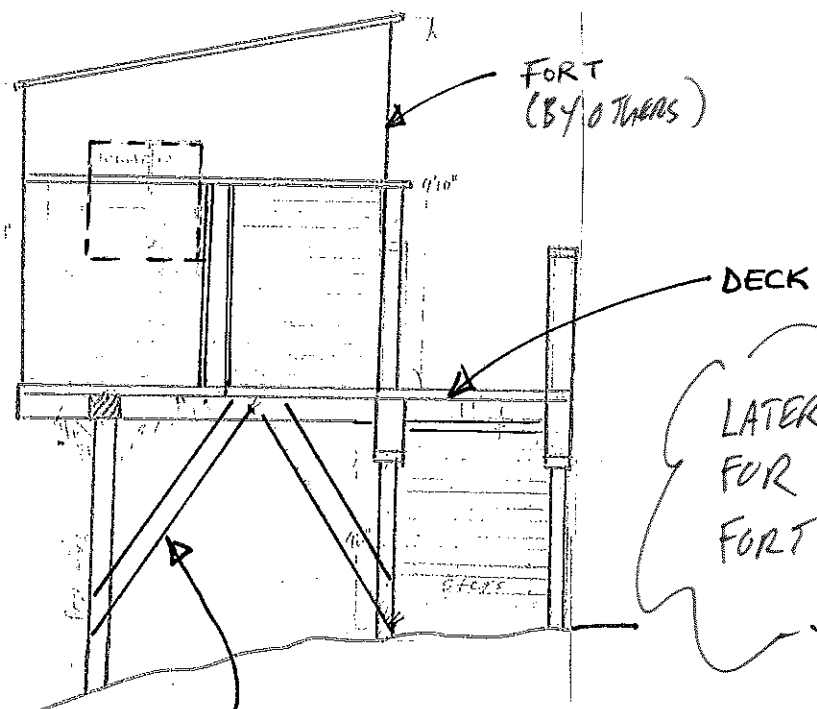
Roof DL: 15 psf

Floor DL: 10 psf



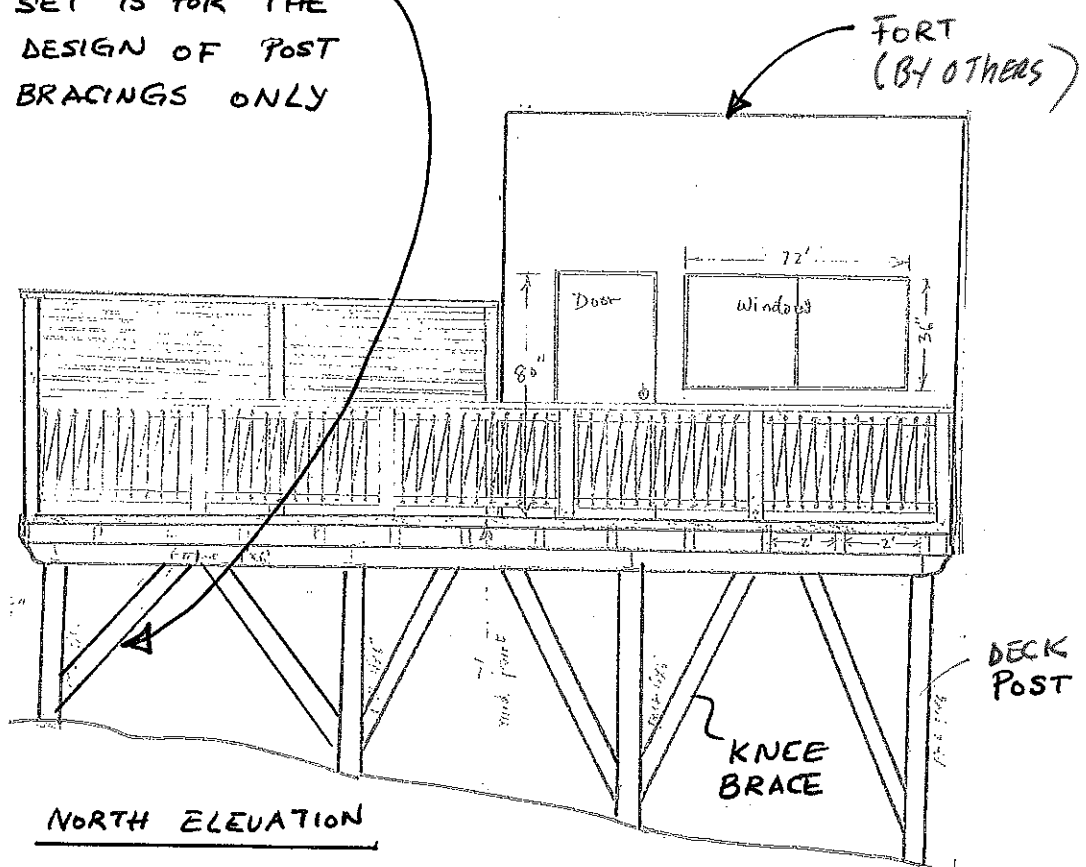
ENGINEER'S SEAL IS FOR LATERAL LOAD  
DESIGN DUE TO SEISMIC AND WIND FORCES  
OF ALL TREE FORT BEAMS,POSTS,  
AND BRACINGS. ALL OTHER BUILDING DESIGN  
IS BY OTHERS.  
EXCEPTIONS: NONE

ELEVATION /



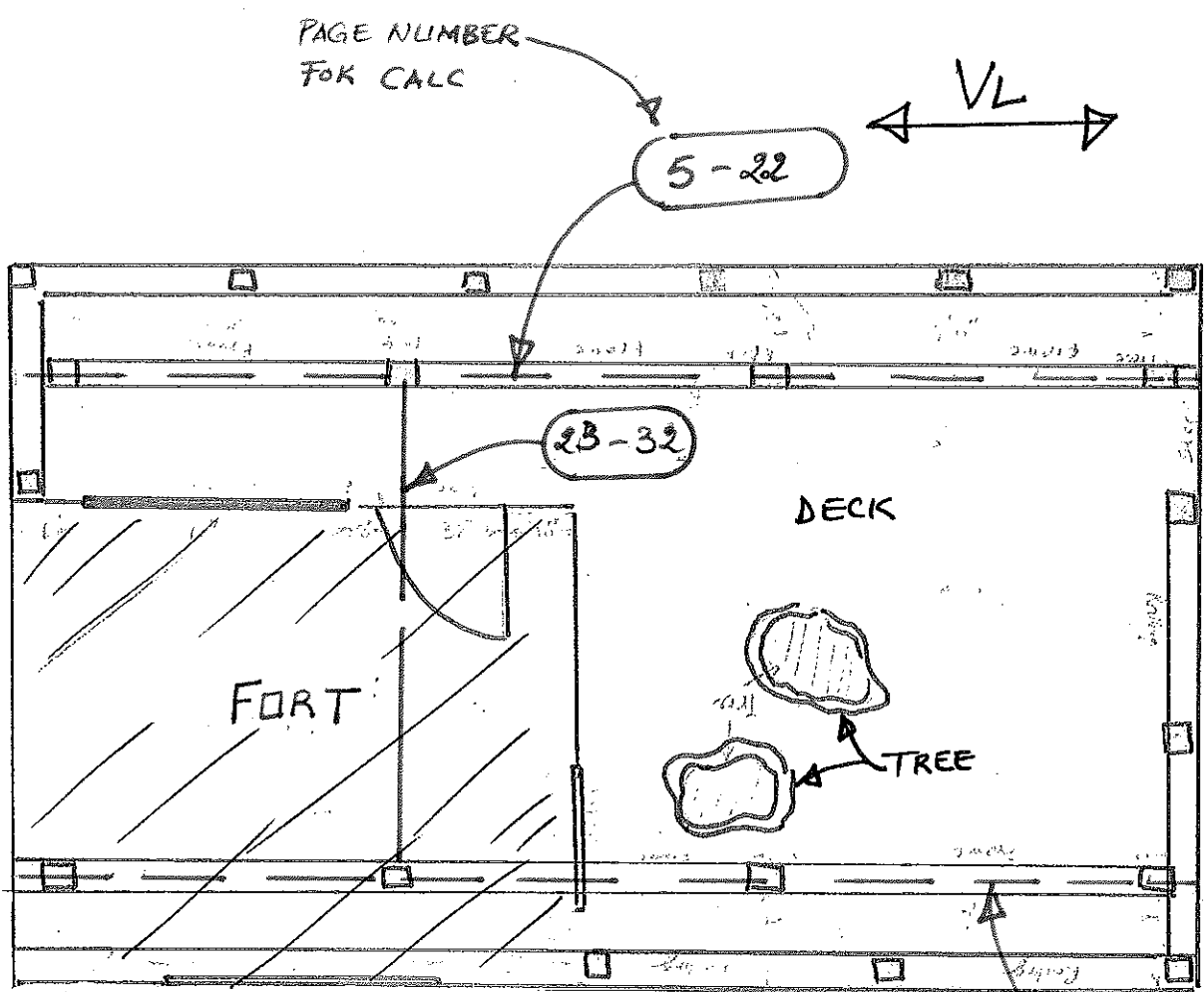
LATERAL DESIGN FOR EXISTING FORT

NOTE: THE CALCULATION SET IS FOR THE DESIGN OF POST BRACINGS ONLY



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PLAN VIEW



- SEE PAGES 23-32  
 FOR CALC OF POSTS WITH DIAGONAL BRACES  
 IN THE TRANSVERSE DIRECTION.

- SEE PAGES 5-22  
 FOR CALC OF POSTS WITH DIAGONAL  
 BRACES IN THE LONGITUDINAL  
 DIRECTION.



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**WIND ANALYSIS**

Job ID:  
9050

FORT FRAMING

Width =	15	ft.	Deck Height =	9	ft.
Length =	25	ft.	Roof Rise =	3	in 12
			Wind Pressure =	16	psf

TRANSVERSE DIRECTION

Wind Force =(PxArea)= 3200 lbs.

qh=22.39 psf (strength design)  
Kzt=1.6  
Kh=0.7  
Kd=0.85  
h=10  
p=qh G Cn  
G=gust factor=0.85  
Cn=net force coefficients  
(1.5, and 1.7)

LONGITUDINAL DIRECTION

Wind Force =(PxArea)= 1600 lbs.

**SEISMIC ANALYSIS**

Deck Width =	15	ft.	$\rho =$	1
Deck Length =	25	ft.	R =	1.5
		ft.		

SEISMIC WEIGHTS:      W deck =      3750 lbs.  
                                  W house=      5160 lbs.

$SDS = 2/3 Ss = 0.980$

$Cs = SDS / (R / I) = 0.653$

BASE SHEAR:      V = Cs Wt= 5820 lbs.      (ULTIMATE)

SEISMIC DESIGN FORCES:

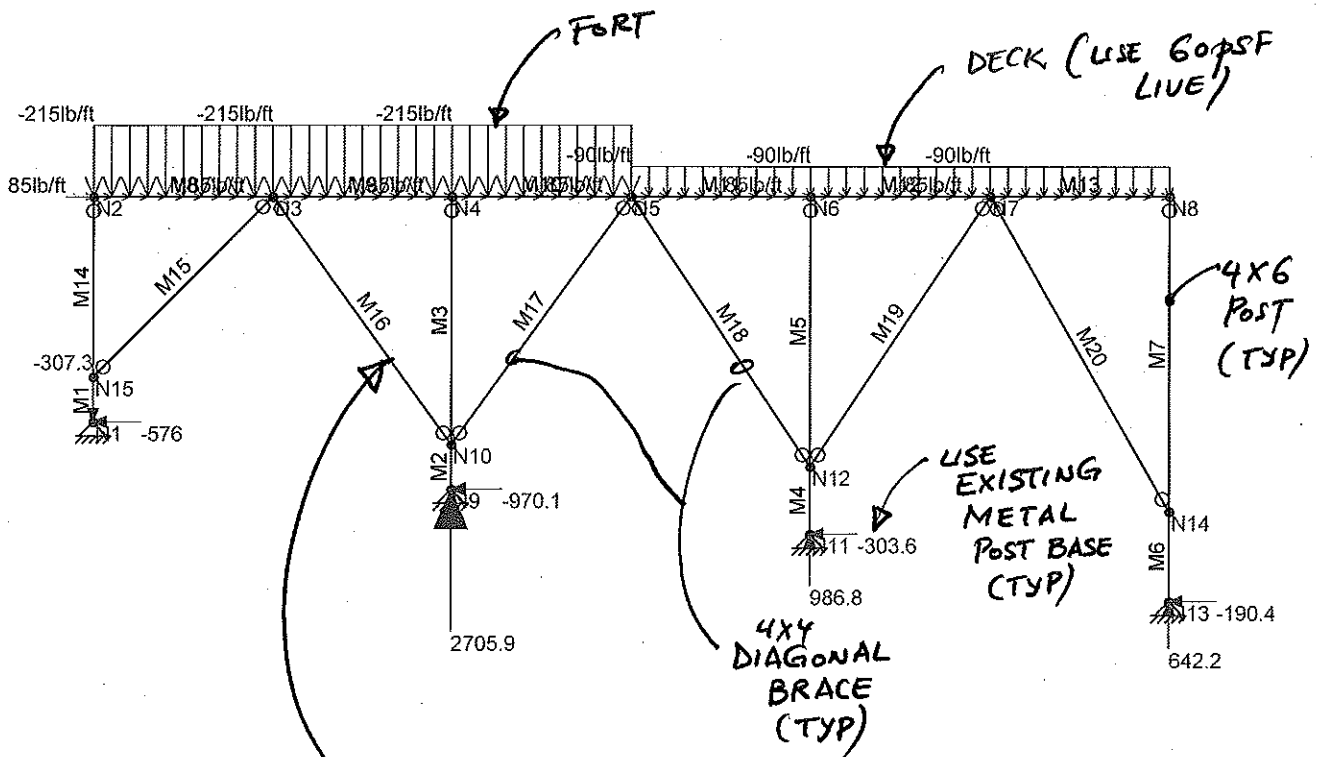
$V_T = Cs Wt \rho 0.7 = 4075 \text{ lbs. (ASD)}$

$V_L = Cs Wl \rho 0.7 = 4075 \text{ lbs. (ASD)}$

Wind and Seismic lateral forces are resisted by eight posts with diagonal braces.



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TYPICAL BRACE FORCE = 2045 lbs (WORST CASE)  
 USE EXISTING SCREWS  
 PLUS (1) NEW "HTP372" STRAP  
 AT EACH END OF BRACE  
 (ALLOW. SHEAR PER STRAP = 1600 lbs)

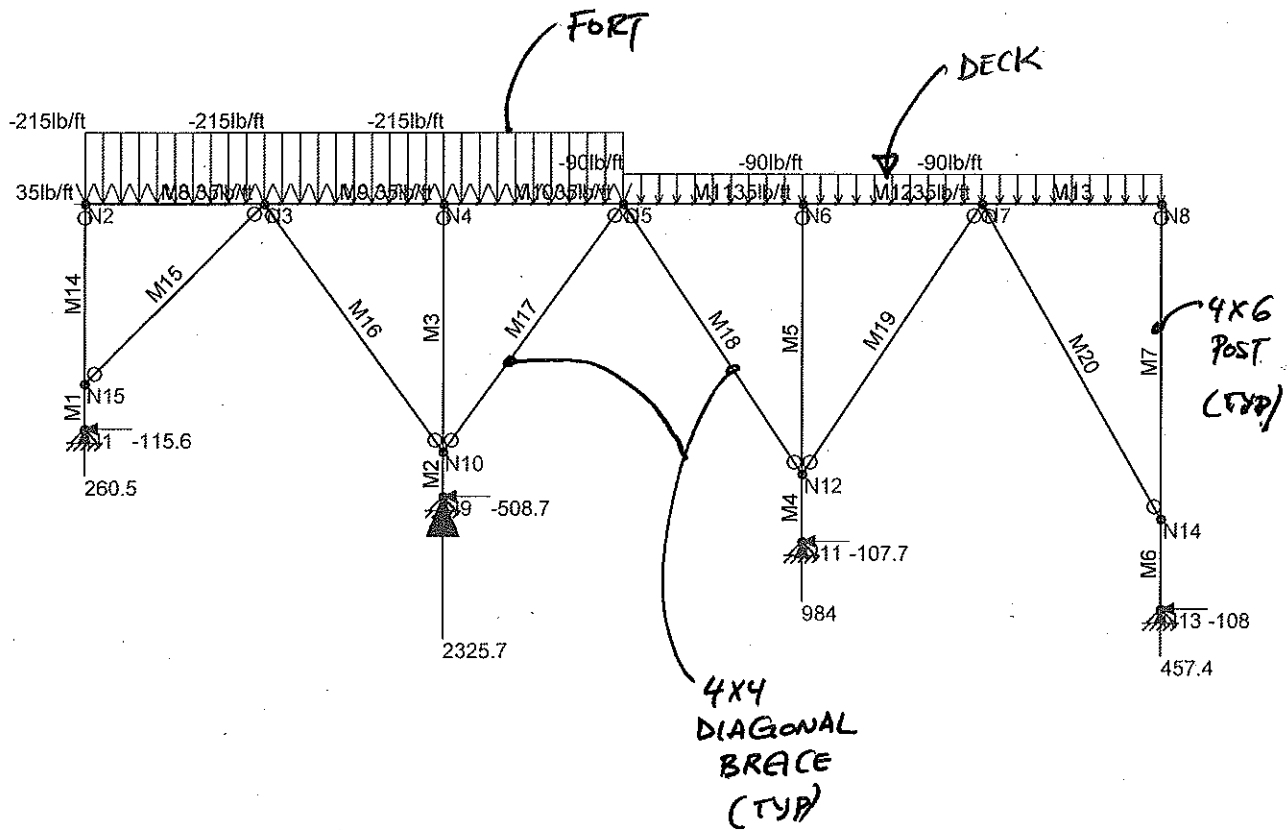
**LOAD CASE**

Loads: LC 2, DL+E  
 Results for LC 2, DL+E  
 Reaction and Moment Units are lb and k-ft

Tri State Engineering, Inc.	Diagonal Brace	SK - 2
Elisee Ilunga		
		DIAG. BRACE LONG



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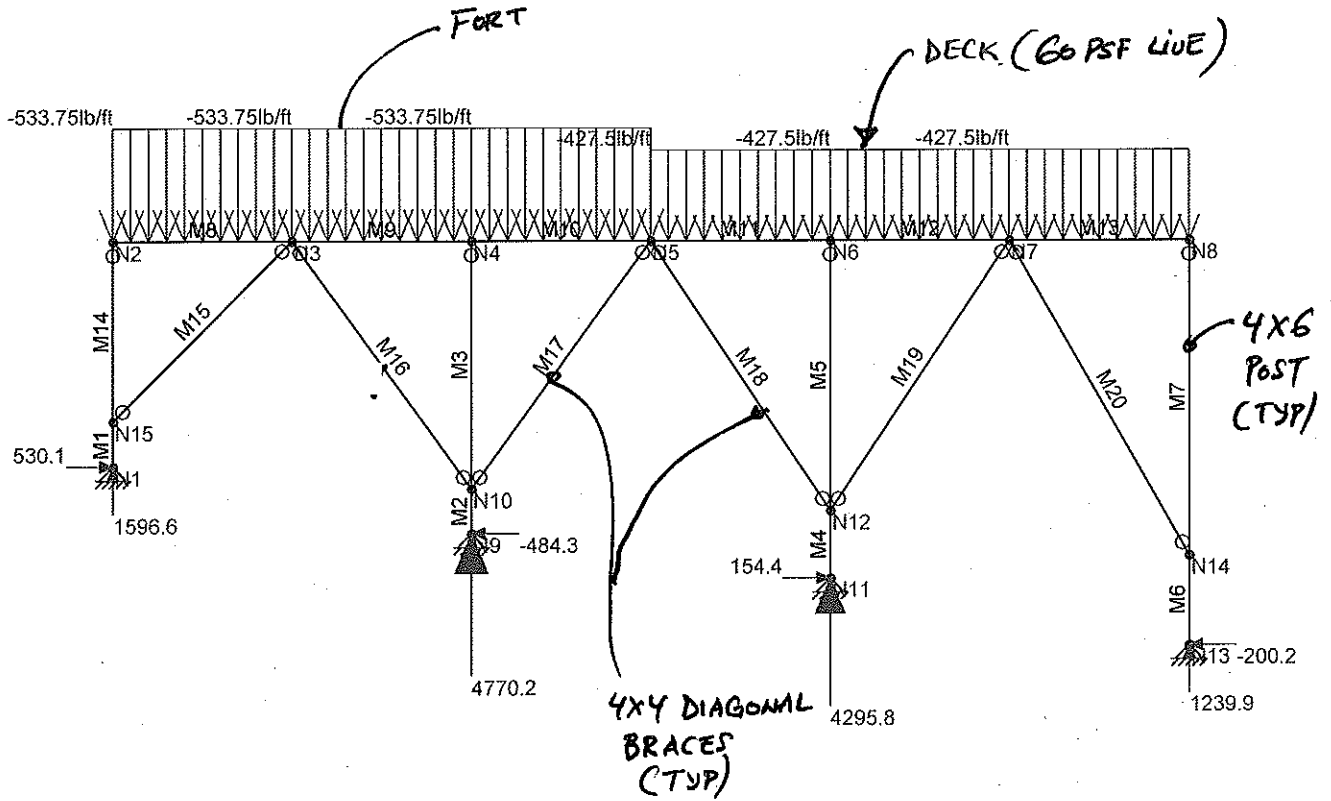
**LOAD CASE**

Loads: LC 3, DL+W  
 Results for LC 3, DL+W  
 Reaction and Moment Units are lb and k-ft

Tri State Engineering, Inc.	Diagonal Brace	SK - 3
Elisee Ilunga		
		DIAG. BRACE LONG



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**LOAD CASE**

Loads: LC 1, DL+.75 (SL+LL)  
 Results for LC 1, DL+.75 (SL+LL)  
 Reaction and Moment Units are lb and k-ft

Tri State Engineering, Inc.	Diagonal Brace	SK - 1
Elisee Ilunga		DIAG. BRACE LONG
		...



Company : Tri State Engineering, Inc.  
 Designer : Elisee Ilunga  
 Job Number :  
 Model Name : Diagonal Brace

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### Wood Material Properties

	Label	Type	Database	Species	Grade	Cm Emod	Nu	Ther...	Densf...
1	WOOD 1	Solid Sa...	Visually Grad..	Hem-Fir	No.2	1	.3	.3	.035
2	Wood 2	Solid Sa...	Visually Grad..	Douglas Fir-Larch	No.2	1	.3	.3	.035

### Wood Section Sets

	Label	Shape	Type	Design List	Material	Design Rul...	A [in2]	I (90.270)...	I (0.180) I...
1	Beam	4X6	Beam	Rectangular	Wood 2	Typical	19.25	19.651	48.526
2	post	4X6	Column	Rectangular	WOOD 1	Typical	19.25	19.651	48.526
3	Knee Brace	4X4	VBrace	Rectangular	Wood 2	Typical	12.25	12.505	12.505

### Wood Design Parameters

	Label	Shape	Length...	Le-out[ft]	Le-in[ft]	le-bend top[ft]	le-bend b...	K-out	K-in	CV	Cr	Out sw...	In sway
1	M1	post	1			Lb out							
2	M2	post	1			Lb out							
3	M3	post	5.5			Lb out							
4	M4	post	1.5			Lb out							
5	M5	post	6			Lb out							
6	M6	post	2			Lb out							
7	M7	post	7			Lb out							
8	M8	Beam	4	1.33		Lb out							
9	M9	Beam	4	1.33		Lb out							
10	M10	Beam	4	1.33		Lb out							
11	M11	Beam	4	1.33		Lb out							
12	M12	Beam	4	1.33		Lb out							
13	M13	Beam	4	1.33		Lb out							
14	M14	post	4			Lb out							
15	M15	Knee Brace	5.657			Lb out							
16	M16	Knee Brace	6.801			Lb out							
17	M17	Knee Brace	6.801			Lb out							
18	M18	Knee Brace	7.211			Lb out							
19	M19	Knee Brace	7.211			Lb out							
20	M20	Knee Brace	8.062			Lb out							

### Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Temp [F]
1	N1	0	4	0
2	N2	0	9	0
3	N3	4	9	0
4	N4	8	9	0
5	N5	12	9	0
6	N6	16	9	0
7	N7	20	9	0
8	N8	24	9	0
9	N9	8	2.5	0
10	N10	8	3.5	0
11	N11	16	1.5	0
12	N12	16	3	0
13	N13	24	0	0
14	N14	24	2	0
15	N15	0	5	0





Company : Tri State Engineering, Inc.  
 Designer : Elisee Ilunga  
 Job Number :  
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**Joint Boundary Conditions**

	Joint Label	X [k/in]	Y [k/in]	Rotation[k-ft/rad]
1	N1	Reaction	Reaction	
2	N9	Reaction	Reaction	
3	N11	Reaction	Reaction	
4	N13	Reaction	Reaction	

**Member Distributed Loads (BLC 1 : DEAD)**

	Member Label	Direction	Start Magnitude[lb/ft....]	End Magnitude[lb/ft.F...]	Start Location[ft.%]	End Location[ft.%]
1	M8	Y	-215	-215	0	0
2	M9	Y	-215	-215	0	0
3	M10	Y	-215	-215	0	0
4	M11	Y	-90	-90	0	0
5	M12	Y	-90	-90	0	0
6	M13	Y	-90	-90	0	0

**Member Distributed Loads (BLC 2 : LIVE)**

	Member Label	Direction	Start Magnitude[lb/ft....]	End Magnitude[lb/ft.F...]	Start Location[ft.%]	End Location[ft.%]
1	M8	Y	-300	-300	0	0
2	M9	Y	-300	-300	0	0
3	M10	Y	-300	-300	0	0
4	M11	Y	-450	-450	0	0
5	M12	Y	-450	-450	0	0
6	M13	Y	-450	-450	0	0

**Member Distributed Loads (BLC 3 : SNOW)**

	Member Label	Direction	Start Magnitude[lb/ft....]	End Magnitude[lb/ft.F...]	Start Location[ft.%]	End Location[ft.%]
1	M8	Y	-125	-125	0	0
2	M9	Y	-125	-125	0	0
3	M10	Y	-125	-125	0	0

**Member Distributed Loads (BLC 4 : SEISMIC)**

	Member Label	Direction	Start Magnitude[lb/ft....]	End Magnitude[lb/ft.F...]	Start Location[ft.%]	End Location[ft.%]
1	M8	X	85	85	0	0
2	M9	X	85	85	0	0
3	M10	X	85	85	0	0
4	M11	X	85	85	0	0
5	M12	X	85	85	0	0
6	M13	X	85	85	0	0

**Member Distributed Loads (BLC 5 : WIND)**

	Member Label	Direction	Start Magnitude[lb/ft....]	End Magnitude[lb/ft.F...]	Start Location[ft.%]	End Location[ft.%]
1	M8	X	35	35	0	0
2	M9	X	35	35	0	0
3	M10	X	35	35	0	0
4	M11	X	35	35	0	0
5	M12	X	35	35	0	0
6	M13	X	35	35	0	0



**Basic Load Cases**

	BLC Description	Category	X Gravity	Y Gravity	Joint	Point	Distributed
1	DEAD	None					6
2	LIVE	None					6
3	SNOW	None					3
4	SEISMIC	None					6
5	WIND	None					6

**Load Combinations**

Description	Solve	P	S	B	Fa	B	Fa	B	Fa	B	Fa	B	Fa	B	Fa	B	Fa	B	Fa	B	Fa	
1 DL+.75 (SL+LL)	Yes	Y		Y	-1	1	1	2	.75	3	.75											
2 DL+E	Yes	Y		Y	-1	1	1	4	1													
3 DL+W	Yes	Y		Y	-1	1	1	5	1													
4 DL+0.75(SL+LL+E)		Y		Y	-1	1	1	2	.75	3	.75	4	.75									

**Joint Deflections**

LC	Joint Label	X [in]	Y [in]	Rotation [rad]
1	N1	0	0	1.753e-03
2	N2	.004	-.003	-2.34e-03
3	N3	.004	-.028	3.997e-04
4	N4	.006	-.008	3.976e-04
5	N5	.006	.006	1.633e-04
6	N6	.008	-.008	-5.252e-04
7	N7	.009	-.03	-3.126e-04
8	N8	.009	-.004	2.045e-03
9	N9	0	0	-2.328e-03
10	N10	.026	-.002	-1.764e-03
11	N11	0	0	1.139e-03
12	N12	-.018	-.003	7.313e-04
13	N13	0	0	-2.553e-03
14	N14	.054	-.001	-1.626e-03
15	N15	-.019	0	1.145e-03
16	N1	0	0	-2.85e-03
17	N2	.053	0	-1.108e-03
18	N3	.052	-.016	1.889e-04
19	N4	.054	-.004	1.512e-04
20	N5	.055	0	1.797e-04
21	N6	.057	-.002	-1.226e-04
22	N7	.057	-.006	-6.576e-05
23	N8	.058	-.001	4.206e-04
24	N9	0	0	-5.185e-03
25	N10	.058	-.001	-4.063e-03
26	N11	0	0	-2.989e-03
27	N12	.049	0	-2.202e-03
28	N13	0	0	-2.87e-03
29	N14	.062	0	-1.993e-03
30	N15	.032	0	-2.194e-03
31	N1	0	0	-7.77e-04
32	N2	.023	0	-1.013e-03
33	N3	.023	-.013	1.795e-04
34	N4	.024	-.004	1.243e-04
35	N5	.024	0	1.893e-04
36	N6	.025	-.002	-1.485e-04
37	N7	.025	-.007	-6.148e-05
38	N8	.026	-.001	4.393e-04
39	N9	0	0	-2.653e-03



Company : Tri State Engineering, Inc.  
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**Joint Deflections (Continued)**

LC	Joint Label	X [in]	Y [in]	Rotation [rad]
40	N10	.029	-.001	-2.066e-03
41	N11	0	0	-1.116e-03
42	N12	.018	0	-8.371e-04
43	N13	0	0	-1.56e-03
44	N14	.033	0	-1.064e-03
45	N15	.009	0	-6.449e-04

**Joint Reactions (By Combination)**

LC	Joint Label	X [lb]	Y [lb]	MZ [k-ft]
1	N1	530.129	1596.588	0
2	N9	-484.269	4770.236	0
3	N11	154.39	4295.826	0
4	N13	-200.25	1239.934	0
5	Totals:	0	11902.585	
6	COG (ft):	X: 11.385	Y: 8.93	
7	N1	-575.958	-307.306	0
8	N9	-970.099	2705.908	0
9	N11	-303.573	986.761	0
10	N13	-190.371	642.223	0
11	Totals:	-2040	4027.585	
12	COG (ft):	X: 9.846	Y: 8.792	
13	N1	-115.603	260.46	0
14	N9	-508.679	2325.719	0
15	N11	-107.669	983.957	0
16	N13	-108.048	457.449	0
17	Totals:	-840	4027.585	
18	COG (ft):	X: 9.846	Y: 8.792	

**Beam Deflections**

LC	Member Label	Span	Location [ft]	y' [in]	(n) L'/y' Ratio
1	M8	1	1.837	-.025	1948
2	M9	1	2	-.008	6017
3	M10	1	2	-.007	7292
4	M11	1	4	0	NC
5	M12	1	2.041	-.008	6240
6	M13	1	2.122	-.021	2320
7	M8	1	1.878	-.011	4325
8	M9	1	4	0	NC
9	M10	1	4	0	NC
10	M11	1	4	0	NC
11	M12	1	4	0	NC
12	M13	1	4	0	NC
13	M8	1	1.878	-.01	4579
14	M9	1	4	0	NC
15	M10	1	4	0	NC
16	M11	1	4	0	NC
17	M12	1	4	0	NC
18	M13	1	4	0	NC

**Member Section Forces**

LC	Member Label	Sec	Axial[lb]	Shear[lb]	Moment[k-ft]	
1	1	M1	1	1596.588	-532.601	0
2			2	1594.249	-532.601	.266
3			3	1591.91	-532.601	.533
4	1	M2	1	4770.236	494.468	0
5			2	4767.897	494.468	-.247
6			3	4765.557	494.468	-.494
7	1	M3	1	2184.873	-89.903	-.494
8			2	2172.007	-89.903	-.247
9			3	2159.14	-89.903	0
10	1	M4	1	4295.826	-158.694	0
11			2	4292.317	-158.694	.119
12			3	4288.808	-158.694	.238
13	1	M5	1	1726.846	39.674	.238
14			2	1712.809	39.674	.119
15			3	1698.773	39.674	0
16	1	M6	1	1239.934	203.021	0
17			2	1235.255	203.021	-.203
18			3	1230.576	203.021	-.406
19	1	M7	1	767.91	-58.006	-.406
20			2	751.534	-58.006	-.203
21			3	735.159	-58.006	0
22	1	M8	1	-132.716	902.555	0
23			2	-132.716	-174.302	-.728
24			3	-132.716	-1251.16	.697
25	1	M9	1	-688.033	1066.374	.697
26			2	-688.033	-10.484	-.359
27			3	-688.033	-1087.342	.739
28	1	M10	1	-598.793	1071.682	.739
29			2	-598.793	-5.176	-.327
30			3	-598.793	-1082.034	.76
31	1	M11	1	-704.443	909.761	.76
32			2	-704.443	45.404	-.195
33			3	-704.443	-818.954	.578
34	1	M12	1	-743.508	879.686	.578
35			2	-743.508	15.328	-.317
36			3	-743.508	-849.03	.517
37	1	M13	1	-57.603	993.588	.517
38			2	-57.603	129.231	-.606
39			3	-57.603	-735.127	0
40	1	M14	1	921.342	133.15	.533
41			2	911.984	133.15	.266
42			3	902.627	133.15	0
43	1	M15	1	942.865	5.955	0
44			2	936.911	0	-.008
45			3	930.956	-5.955	0
46	1	M16	1	2078.153	-5.955	0
47			2	2069.965	0	.01
48			3	2061.777	5.955	0
49	1	M17	1	1104.595	5.955	0
50			2	1096.407	0	-.01
51			3	1088.219	-5.955	0
52	1	M18	1	1362.157	-5.955	0
53			2	1353.224	0	.011
54			3	1344.292	5.955	0
55	1	M19	1	1709.221	5.955	0
56			2	1700.288	0	-.011
57			3	1691.356	-5.955	0

**Member Section Forces (Continued)**

LC	Member Label	Sec	Axial[lb]	Shear[lb]	Moment[k-ft]	
58	1	M20	1	529.637	-5.955	0
59			2	519.216	0	.012
60			3	508.795	5.955	0
61	2	M1	1	-307.306	575.143	0
62			2	-309.646	575.143	-.288
63			3	-311.985	575.143	-.575
64	2	M2	1	2705.908	983.104	0
65			2	2703.569	983.104	-.492
66			3	2701.229	983.104	-.983
67	2	M3	1	971.114	-178.746	-.983
68			2	958.248	-178.746	-.492
69			3	945.381	-178.746	0
70	2	M4	1	986.761	306.254	0
71			2	983.251	306.254	-.23
72			3	979.742	306.254	-.459
73	2	M5	1	379.803	-76.563	-.459
74			2	365.766	-76.563	-.23
75			3	351.73	-76.563	0
76	2	M6	1	642.223	192.014	0
77			2	637.544	192.014	-.192
78			3	632.865	192.014	-.384
79	2	M7	1	191.793	-54.861	-.384
80			2	175.417	-54.861	-.192
81			3	159.041	-54.861	0
82	2	M8	1	143.958	380.344	0
83			2	313.958	-59.013	-.321
84			3	483.958	-498.371	.236
85	2	M9	1	-1432.321	408.386	.236
86			2	-1262.321	-30.972	-.141
87			3	-1092.321	-470.329	.36
88	2	M10	1	-913.624	474.798	.36
89			2	-743.624	35.44	-.15
90			3	-573.624	-403.917	.218
91	2	M11	1	-908.94	214.955	.218
92			2	-738.94	25.597	-.022
93			3	-568.94	-163.76	.116
94	2	M12	1	-492.338	187.966	.116
95			2	-322.338	-1.392	-.071
96			3	-152.338	-190.749	.121
97	2	M13	1	-394.852	219.697	.121
98			2	-224.852	30.339	-.129
99			3	-54.852	-159.018	0
100	2	M14	1	398.961	-143.786	-.575
101			2	389.603	-143.786	-.288
102			3	380.246	-143.786	0
103	2	M15	1	-1011.773	5.955	0
104			2	-1017.727	0	-.008
105			3	-1023.682	-5.955	0
106	2	M16	1	2041.787	-5.955	0
107			2	2033.599	0	.01
108			3	2025.411	5.955	0
109	2	M17	1	89.064	5.955	0
110			2	80.876	0	-.01
111			3	72.688	-5.955	0
112	2	M18	1	699.253	-5.955	0
113			2	690.321	0	.011
114			3	681.389	5.955	0

**Member Section Forces (Continued)**

	LC	Member Label	Sec	Axial[lb]	Shear[lb]	Moment[k-ft]
115	2	M19	1	13.815	5.955	0
116			2	4.883	0	-.011
117			3	-4.05	-5.955	0
118	2	M20	1	504.622	-5.955	0
119			2	494.201	0	.012
120			3	483.78	5.955	0
121	3	M1	1	260.46	115.792	0
122			2	258.121	115.792	-.058
123			3	255.781	115.792	-.116
124	3	M2	1	2325.719	514.388	0
125			2	2323.379	514.388	-.257
126			3	2321.04	514.388	-.514
127	3	M3	1	948.581	-93.525	-.514
128			2	935.714	-93.525	-.257
129			3	922.847	-93.525	0
130	3	M4	1	983.957	108.673	0
131			2	980.448	108.673	-.082
132			3	976.938	108.673	-.163
133	3	M5	1	375.2	-27.168	-.163
134			2	361.163	-27.168	-.082
135			3	347.127	-27.168	0
136	3	M6	1	457.449	108.68	0
137			2	452.771	108.68	-.109
138			3	448.092	108.68	-.217
139	3	M7	1	192.753	-31.051	-.217
140			2	176.377	-31.051	-.109
141			3	160.001	-31.051	0
142	3	M8	1	29.06	373.252	0
143			2	99.06	-66.106	-.307
144			3	169.06	-505.463	.264
145	3	M9	1	-768.493	421.393	.264
146			2	-698.493	-17.965	-.139
147			3	-628.493	-457.323	.336
148	3	M10	1	-535.049	465.43	.336
149			2	-465.049	26.073	-.155
150			3	-395.049	-413.285	.232
151	3	M11	1	-465.136	219.468	.232
152			2	-395.136	30.11	-.018
153			3	-325.136	-159.248	.112
154	3	M12	1	-297.934	187.877	.112
155			2	-227.934	-1.48	-.075
156			3	-157.934	-190.838	.117
157	3	M13	1	-171.035	218.726	.117
158			2	-101.035	29.368	-.131
159			3	-31.035	-159.989	0
160	3	M14	1	391.942	-28.948	-.116
161			2	382.585	-28.948	-.058
162			3	373.227	-28.948	0
163	3	M15	1	-198.573	5.955	0
164			2	-204.528	0	-.008
165			3	-210.483	-5.955	0
166	3	M16	1	1355.962	-5.955	0
167			2	1347.774	0	.01
168			3	1339.586	5.955	0
169	3	M17	1	332.554	5.955	0
170			2	324.366	0	-.01
171			3	316.178	-5.955	0

**Member Section Forces (Continued)**

LC	Member Label	Sec	Axial[lb]	Shear[lb]	Moment[k-ft]	
172	3	M18	1	479.241	-5.955	0
173			2	470.308	0	.011
174			3	461.376	5.955	0
175	3	M19	1	236.014	5.955	0
176			2	227.082	0	-.011
177			3	218.15	-5.955	0
178	3	M20	1	290.701	-5.955	0
179			2	280.28	0	.012
180			3	269.859	5.955	0

**Member Section Stresses**

LC	Member Label	Sec	Axial[ksi]	Shear[ksi]	Top Bending[ksi]	Bot Bending[ksi]	
1	1	M1	1	.083	-.042	0	0
2			2	.083	-.042	-.181	.181
3			3	.083	-.042	-.362	.362
4	1	M2	1	.248	.039	0	0
5			2	.248	.039	.168	-.168
6			3	.248	.039	.336	-.336
7	1	M3	1	.113	-.007	.336	-.336
8			2	.113	-.007	.168	-.168
9			3	.112	-.007	0	0
10	1	M4	1	.223	-.012	0	0
11			2	.223	-.012	-.081	.081
12			3	.223	-.012	-.162	.162
13	1	M5	1	.09	.003	-.162	.162
14			2	.089	.003	-.081	.081
15			3	.088	.003	0	0
16	1	M6	1	.064	.016	0	0
17			2	.064	.016	.138	-.138
18			3	.064	.016	.276	-.276
19	1	M7	1	.04	-.005	.276	-.276
20			2	.039	-.005	.138	-.138
21			3	.038	-.005	0	0
22	1	M8	1	-.007	.07	0	0
23			2	-.007	-.014	.495	-.495
24			3	-.007	-.097	-.474	.474
25	1	M9	1	-.036	.083	-.474	.474
26			2	-.036	0	.244	-.244
27			3	-.036	-.085	-.503	.503
28	1	M10	1	-.031	.084	-.503	.503
29			2	-.031	0	.223	-.223
30			3	-.031	-.084	-.517	.517
31	1	M11	1	-.037	.071	-.517	.517
32			2	-.037	.004	.133	-.133
33			3	-.037	-.064	-.393	.393
34	1	M12	1	-.039	.069	-.393	.393
35			2	-.039	.001	.215	-.215
36			3	-.039	-.066	-.352	.352
37	1	M13	1	-.003	.077	-.352	.352
38			2	-.003	.01	.412	-.412
39			3	-.003	-.057	0	0
40	1	M14	1	.048	.01	-.362	.362
41			2	.047	.01	-.181	.181
42			3	.047	.01	0	0
43	1	M15	1	.077	0	0	0

**Member Section Stresses (Continued)**

LC	Member Label	Sec	Axial[ksil]	Shear[ksil]	Top Bending[ksil]	Bot Bending[ksil]
44		2	.076	0	.014	-.014
45		3	.076	0	0	0
46	1	1	.17	0	0	0
47		2	.169	0	-.017	.017
48		3	.168	0	0	0
49	1	1	.09	0	0	0
50		2	.09	0	.017	-.017
51		3	.089	0	0	0
52	1	1	.111	0	0	0
53		2	.11	0	-.018	.018
54		3	.11	0	0	0
55	1	1	.14	0	0	0
56		2	.139	0	.018	-.018
57		3	.138	0	0	0
58	1	1	.043	0	0	0
59		2	.042	0	-.02	.02
60		3	.042	0	0	0
61	2	1	-.016	.045	0	0
62		2	-.016	.045	.196	-.196
63		3	-.016	.045	.391	-.391
64	2	1	.141	.077	0	0
65		2	.14	.077	.334	-.334
66		3	.14	.077	.669	-.669
67	2	1	.05	-.014	.669	-.669
68		2	.05	-.014	.334	-.334
69		3	.049	-.014	0	0
70	2	1	.051	.024	0	0
71		2	.051	.024	.156	-.156
72		3	.051	.024	.312	-.312
73	2	1	.02	-.006	.312	-.312
74		2	.019	-.006	.156	-.156
75		3	.018	-.006	0	0
76	2	1	.033	.015	0	0
77		2	.033	.015	.131	-.131
78		3	.033	.015	.261	-.261
79	2	1	.01	-.004	.261	-.261
80		2	.009	-.004	.131	-.131
81		3	.008	-.004	0	0
82	2	1	.007	.03	0	0
83		2	.016	-.005	.219	-.219
84		3	.025	-.039	-.161	.161
85	2	1	-.074	.032	-.161	.161
86		2	-.066	-.002	.096	-.096
87		3	-.057	-.037	-.245	.245
88	2	1	-.047	.037	-.245	.245
89		2	-.039	.003	.102	-.102
90		3	-.03	-.031	-.148	.148
91	2	1	-.047	.017	-.148	.148
92		2	-.038	.002	.015	-.015
93		3	-.03	-.013	-.079	.079
94	2	1	-.026	.015	-.079	.079
95		2	-.017	0	.048	-.048
96		3	-.008	-.015	-.083	.083
97	2	1	-.021	.017	-.083	.083
98		2	-.012	.002	.088	-.088
99		3	-.003	-.012	0	0
100	2	1	.021	-.011	.391	-.391



**Member Section Stresses (Continued)**

LC	Member Label	Sec	Axial[ksi]	Shear[ksi]	Top Bending[ksi]	Bot Bending[ksi]
101		2	.02	-.011	.196	-.196
102		3	.02	-.011	0	0
103	2	1	-.083	0	0	0
104		2	-.083	0	.014	-.014
105		3	-.084	0	0	0
106	2	1	.167	0	0	0
107		2	.166	0	-.017	.017
108		3	.165	0	0	0
109	2	1	.007	0	0	0
110		2	.007	0	.017	-.017
111		3	.006	0	0	0
112	2	1	.057	0	0	0
113		2	.056	0	-.018	.018
114		3	.056	0	0	0
115	2	1	.001	0	0	0
116		2	0	0	.018	-.018
117		3	0	0	0	0
118	2	1	.041	0	0	0
119		2	.04	0	-.02	.02
120		3	.039	0	0	0
121	3	1	.014	.009	0	0
122		2	.013	.009	.039	-.039
123		3	.013	.009	.079	-.079
124	3	1	.121	.04	0	0
125		2	.121	.04	.175	-.175
126		3	.121	.04	.35	-.35
127	3	1	.049	-.007	.35	-.35
128		2	.049	-.007	.175	-.175
129		3	.048	-.007	0	0
130	3	1	.051	.008	0	0
131		2	.051	.008	.055	-.055
132		3	.051	.008	.111	-.111
133	3	1	.019	-.002	.111	-.111
134		2	.019	-.002	.055	-.055
135		3	.018	-.002	0	0
136	3	1	.024	.008	0	0
137		2	.024	.008	.074	-.074
138		3	.023	.008	.148	-.148
139	3	1	.01	-.002	.148	-.148
140		2	.009	-.002	.074	-.074
141		3	.008	-.002	0	0
142	3	1	.002	.029	0	0
143		2	.005	-.005	.209	-.209
144		3	.009	-.039	-.18	.18
145	3	1	-.04	.033	-.18	.18
146		2	-.036	-.001	.095	-.095
147		3	-.033	-.036	-.229	.229
148	3	1	-.028	.036	-.229	.229
149		2	-.024	.002	.106	-.106
150		3	-.021	-.032	-.158	.158
151	3	1	-.024	.017	-.158	.158
152		2	-.021	.002	.012	-.012
153		3	-.017	-.012	-.076	.076
154	3	1	-.015	.015	-.076	.076
155		2	-.012	0	.051	-.051
156		3	-.008	-.015	-.08	.08
157	3	1	-.009	.017	-.08	.08



Company : Tri State Engineering, Inc.  
 Designer : Elisee Ilunga  
 Job Number :  
 Model Name : Diagonal Brace

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 W

**Member Section Stresses (Continued)**

LC	Member Label	Sec	Axial[ksi]	Shear[ksi]	Top Bending[ksi]	Bot Bending[ksi]
158		2	-.005	.002	.089	-.089
159		3	-.002	-.012	0	0
160	3 M14	1	.02	-.002	.079	-.079
161		2	.02	-.002	.039	-.039
162		3	.019	-.002	0	0
163	3 M15	1	-.016	0	0	0
164		2	-.017	0	.014	-.014
165		3	-.017	0	0	0
166	3 M16	1	.111	0	0	0
167		2	.11	0	-.017	.017
168		3	.109	0	0	0
169	3 M17	1	.027	0	0	0
170		2	.026	0	.017	-.017
171		3	.026	0	0	0
172	3 M18	1	.039	0	0	0
173		2	.038	0	-.018	.018
174		3	.038	0	0	0
175	3 M19	1	.019	0	0	0
176		2	.019	0	.018	-.018
177		3	.018	0	0	0
178	3 M20	1	.024	0	0	0
179		2	.023	0	-.02	.02
180		3	.022	0	0	0

**Member Section Deflections Strength**

LC	Member Label	Sec	x [in]	y [in]	(n) L/y Ratio
1	1 M1	1	0	0	NC
2		2	0	.01	NC
3		3	0	.019	NC
4	1 M2	1	0	0	NC
5		2	-.001	-.014	NC
6		3	-.002	-.026	NC
7	1 M3	1	-.002	-.026	NC
8		2	-.005	-.041	2577
9		3	-.008	-.006	NC
10	1 M4	1	0	0	NC
11		2	-.002	.01	NC
12		3	-.003	.018	NC
13	1 M5	1	-.003	.018	NC
14		2	-.006	.02	4907
15		3	-.008	-.008	NC
16	1 M6	1	0	0	NC
17		2	0	-.03	8631
18		3	-.001	-.054	NC
19	1 M7	1	-.001	-.054	NC
20		2	-.002	-.065	2466
21		3	-.004	-.009	NC
22	1 M8	1	.004	-.003	NC
23		2	.004	-.04	1965
24		3	.004	-.028	NC
25	1 M9	1	.004	-.028	NC
26		2	.005	-.026	6017
27		3	.006	-.008	NC
28	1 M10	1	.006	-.008	NC
29		2	.006	-.008	7292



Company : Tri State Engineering, Inc.  
 Designer : Elisee Ilunga  
 Job Number :  
 Model Name : Diagonal Brace

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 KL

**Member Section Deflections Strength (Continued)**

	LC	Member Label	Sec	x [in]	y [in]	(n) L/V Ratio
30			3	.006	.006	NC
31	1	M11	1	.006	.006	NC
32			2	.007	-.003	NC
33			3	.008	-.008	NC
34	1	M12	1	.008	-.008	NC
35			2	.008	-.027	6243
36			3	.009	-.03	NC
37	1	M13	1	.009	-.03	NC
38			2	.009	-.037	2335
39			3	.009	-.004	NC
40	1	M14	1	0	.019	NC
41			2	-.002	.022	3290
42			3	-.003	-.004	NC
43	1	M15	1	-.014	.013	NC
44			2	-.015	-.008	NC
45			3	-.017	-.023	NC
46	1	M16	1	-.017	-.019	NC
47			2	-.021	.001	NC
48			3	-.026	.013	NC
49	1	M17	1	.013	-.022	NC
50			2	.011	-.016	NC
51			3	.009	-.002	NC
52	1	M18	1	.007	.017	NC
53			2	.004	.009	NC
54			3	.001	-.009	NC
55	1	M19	1	-.013	.013	NC
56			2	-.016	-.01	NC
57			3	-.02	-.024	NC
58	1	M20	1	-.028	-.046	NC
59			2	-.029	-.012	NC
60			3	-.03	.007	NC
61	2	M1	1	0	0	NC
62			2	0	-.017	NC
63			3	0	-.032	NC
64	2	M2	1	0	0	NC
65			2	0	-.031	7129
66			3	-.001	-.058	NC
67	2	M3	1	-.001	-.058	NC
68			2	-.003	-.107	1296
69			3	-.004	-.054	NC
70	2	M4	1	0	0	NC
71			2	0	-.026	NC
72			3	0	-.049	NC
73	2	M5	1	0	-.049	NC
74			2	-.001	-.081	2543
75			3	-.002	-.057	NC
76	2	M6	1	0	0	NC
77			2	0	-.034	9126
78			3	0	-.062	NC
79	2	M7	1	0	-.062	NC
80			2	0	-.092	2607
81			3	-.001	-.058	NC
82	2	M8	1	.053	0	NC
83			2	.053	-.019	4346
84			3	.052	-.016	NC
85	2	M9	1	.052	-.016	NC
86			2	.053	-.013	NC

**Member Section Deflections Strength (Continued)**

	LC	Member Label	Sec	x [in]	y [in]	(n) L/y' Ratio
87			3	.054	-.004	NC
88	2	M10	1	.054	-.004	NC
89			2	.055	-.005	NC
90			3	.055	0	NC
91	2	M11	1	.055	0	NC
92			2	.056	0	NC
93			3	.057	-.002	NC
94	2	M12	1	.057	-.002	NC
95			2	.057	-.006	NC
96			3	.057	-.006	NC
97	2	M13	1	.057	-.006	NC
98			2	.057	-.008	NC
99			3	.058	-.001	NC
100	2	M14	1	0	-.032	NC
101			2	0	-.058	3046
102			3	0	-.053	NC
103	2	M15	1	.022	-.022	NC
104			2	.024	-.038	NC
105			3	.026	-.048	NC
106	2	M16	1	-.035	-.046	NC
107			2	-.039	-.035	NC
108			3	-.043	-.033	NC
109	2	M17	1	.033	-.047	NC
110			2	.033	-.05	NC
111			3	.033	-.045	NC
112	2	M18	1	-.028	-.04	NC
113			2	-.029	-.038	NC
114			3	-.031	-.046	NC
115	2	M19	1	.027	-.041	NC
116			2	.027	-.051	NC
117			3	.027	-.051	NC
118	2	M20	1	-.031	-.053	NC
119			2	-.032	-.043	NC
120			3	-.034	-.047	NC
121	3	M1	1	0	0	NC
122			2	0	-.005	NC
123			3	0	-.009	NC
124	3	M2	1	0	0	NC
125			2	0	-.016	NC
126			3	-.001	-.029	NC
127	3	M3	1	-.001	-.029	NC
128			2	-.002	-.053	2477
129			3	-.004	-.024	NC
130	3	M4	1	0	0	NC
131			2	0	-.01	NC
132			3	0	-.018	NC
133	3	M5	1	0	-.018	NC
134			2	-.001	-.032	7166
135			3	-.002	-.025	NC
136	3	M6	1	0	0	NC
137			2	0	-.018	NC
138			3	0	-.033	NC
139	3	M7	1	0	-.033	NC
140			2	0	-.048	4606
141			3	-.001	-.026	NC
142	3	M8	1	.023	0	NC
143			2	.023	-.017	4610

**Member Section Deflections Strength (Continued)**

LC	Member Label	Sec	x [in]	v [in]	(n) L/V Ratio
144		3	.023	-.013	NC
145	3 M9	1	.023	-.013	NC
146		2	.023	-.011	NC
147		3	.024	-.004	NC
148	3 M10	1	.024	-.004	NC
149		2	.024	-.005	NC
150		3	.024	0	NC
151	3 M11	1	.024	0	NC
152		2	.025	0	NC
153		3	.025	-.002	NC
154	3 M12	1	.025	-.002	NC
155		2	.025	-.006	NC
156		3	.025	-.007	NC
157	3 M13	1	.025	-.007	NC
158		2	.026	-.008	NC
159		3	.026	-.001	NC
160	3 M14	1	0	-.009	NC
161		2	0	-.019	NC
162		3	0	-.023	NC
163	3 M15	1	.006	-.006	NC
164		2	.006	-.018	NC
165		3	.007	-.025	NC
166	3 M16	1	-.018	-.023	NC
167		2	-.021	-.013	NC
168		3	-.024	-.011	NC
169	3 M17	1	.016	-.025	NC
170		2	.016	-.026	NC
171		3	.015	-.019	NC
172	3 M18	1	-.011	-.015	NC
173		2	-.012	-.013	NC
174		3	-.013	-.021	NC
175	3 M19	1	.01	-.016	NC
176		2	.009	-.025	NC
177		3	.009	-.025	NC
178	3 M20	1	-.017	-.029	NC
179		2	-.018	-.017	NC
180		3	-.018	-.019	NC

**Member Wood Code Checks**

LC	Member	Shape	UC Max	Loc[ft]	Shear	Loc[ft]	Fc' [ksi]	Ft' [ksi]	Fb' [ksi]	Fv' [ksi]	RB	CL	CP	Eqn	
1	1	M1	4X6	.288	1	.241	0	1.628	.785	1.27	.172	2.321	.999	.99	3.9-3
2	1	M2	4X6	.289	1	.223	0	1.628	.785	1.27	.172	2.321	.999	.99	3.9-3
3	1	M3	4X6	.293	0	.041	0	.889	.785	1.266	.172	5.444	.996	.54	3.9-3
4	1	M4	4X6	.148	1.5	.072	0	1.605	.785	1.27	.172	2.843	.999	.976	3.9-3
5	1	M5	4X6	.146	0	.018	0	.781	.785	1.266	.172	5.686	.996	.475	3.9-3
6	1	M6	4X6	.220	2	.092	0	1.571	.785	1.269	.172	3.283	.999	.955	3.9-3
7	1	M7	4X6	.228	0	.026	0	.607	.785	1.265	.172	6.141	.995	.369	3.9-3
8	1	M8	4X6	.390	1.673	.471	4	1.599	.86	1.345	.207	2.677	.999	.936	3.9-1
9	1	M9	4X6	.415	4	.409	4	1.599	.86	1.343	.207	4.642	.998	.936	3.9-1
10	1	M10	4X6	.420	4	.407	4	1.599	.86	1.343	.207	4.642	.998	.936	3.9-1
11	1	M11	4X6	.427	0	.342	0	1.599	.86	1.343	.207	4.642	.998	.936	3.9-1
12	1	M12	4X6	.337	0	.331	0	1.599	.86	1.343	.207	4.642	.998	.936	3.9-1
13	1	M13	4X6	.319	2.286	.374	0	1.599	.86	1.345	.207	2.677	.999	.936	3.9-1
14	1	M14	4X6	.290	0	.060	0	1.258	.785	1.268	.172	4.642	.997	.765	3.9-3
15	1	M15	4X4	.076	0	.004	5.657	1.012	.992	1.552	.207	4.404	1	.567	3.6.3



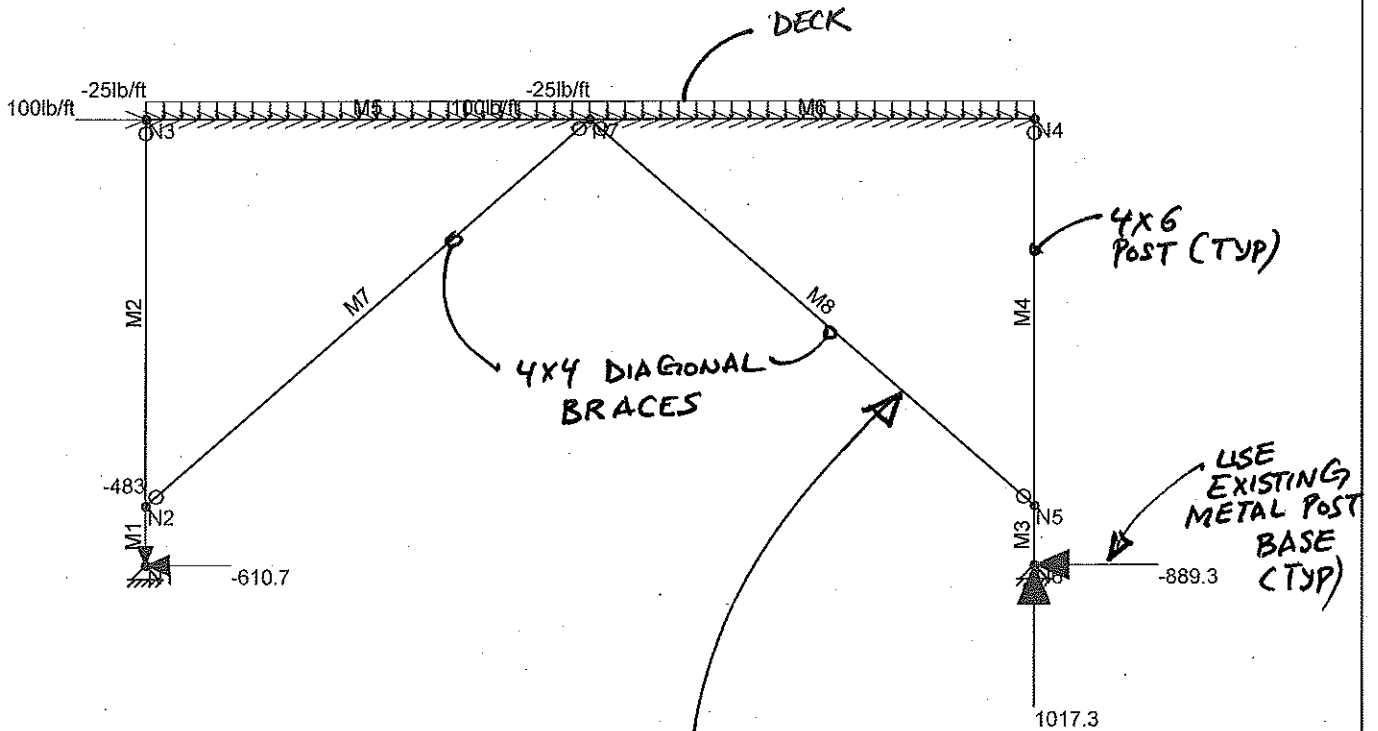
Company : Tri State Engineering, Inc.  
 Designer : Elisee Ilunga  
 Job Number :  
 Model Name : Diagonal Brace

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**Member Wood Code Checks (Continued)**

LC	Member	Shape	UC Max	Loc(ft)	Shear	Loc(ft)	Fc' [ksi]	Ft' [ksi]	Fb' [ksi]	Fv' [ksi]	RB	CL	CP	Egn	
16	1	M16	4X4	.221	0	.004	6.801	.768	.992	1.552	.207	4.829	1	.43	3.6.3
17	1	M17	4X4	.117	0	.004	6.801	.768	.992	1.552	.207	4.829	1	.43	3.6.3
18	1	M18	4X4	.160	0	.004	0	.697	.992	1.552	.207	4.972	1	.39	3.6.3
19	1	M19	4X4	.200	0	.004	0	.697	.992	1.552	.207	4.972	1	.39	3.6.3
20	1	M20	4X4	.075	0	.004	8.062	.574	.992	1.552	.207	5.258	1	.322	3.6.3
21	2	M1	4X6	.236	1	.187	0	2.255	1.092	1.766	.24	2.321	.999	.986	3.9-1
22	2	M2	4X6	.383	1	.319	0	2.255	1.092	1.766	.24	2.321	.999	.986	3.9-3
23	2	M3	4X6	.390	0	.058	0	.959	1.092	1.759	.24	5.444	.995	.419	3.9-3
24	2	M4	4X6	.178	1.5	.099	0	2.21	1.092	1.766	.24	2.843	.999	.966	3.9-3
25	2	M5	4X6	.180	0	.025	0	.828	1.092	1.758	.24	5.686	.994	.362	3.9-3
26	2	M6	4X6	.148	2	.062	0	2.139	1.092	1.765	.24	3.283	.998	.935	3.9-3
27	2	M7	4X6	.150	0	.018	0	.63	1.092	1.756	.24	6.141	.993	.275	3.9-3
28	2	M8	4X6	.120	1.714	.135	4	2.153	1.196	1.87	.288	2.677	.999	.906	3.9-3
29	2	M9	4X6	.178	4	.127	4	2.153	1.196	1.866	.288	4.642	.997	.906	3.9-1
30	2	M10	4X6	.170	0	.128	0	2.153	1.196	1.866	.288	4.642	.997	.906	3.9-1
31	2	M11	4X6	.119	0	.058	0	2.153	1.196	1.866	.288	4.642	.997	.906	3.9-1
32	2	M12	4X6	.063	0	.052	4	2.153	1.196	1.866	.288	4.642	.997	.906	3.9-1
33	2	M13	4X6	.061	0	.059	0	2.153	1.196	1.866	.288	4.642	.997	.906	3.9-1
34	2	M14	4X6	.223	0	.047	0	1.502	1.092	1.762	.24	4.642	.996	.656	3.9-3
35	2	M15	4X4	.067	2.886	.003	5.657	1.102	1.38	2.16	.288	4.404	1	.444	3.9-1
36	2	M16	4X4	.207	0	.003	6.801	.806	1.38	2.16	.288	4.829	1	.325	3.6.3
37	2	M17	4X4	.009	0	.003	6.801	.806	1.38	2.16	.288	4.829	1	.325	3.6.3
38	2	M18	4X4	.079	0	.003	0	.726	1.38	2.16	.288	4.972	1	.292	3.6.3
39	2	M19	4X4	.008	3.606	.003	0	.726	1.38	2.16	.288	4.972	1	.292	3.9-3
40	2	M20	4X4	.070	0	.003	8.062	.592	1.38	2.16	.288	5.258	1	.238	3.6.3
41	3	M1	4X6	.045	1	.038	0	2.255	1.092	1.766	.24	2.321	.999	.986	3.9-3
42	3	M2	4X6	.201	1	.167	0	2.255	1.092	1.766	.24	2.321	.999	.986	3.9-3
43	3	M3	4X6	.205	0	.030	0	.959	1.092	1.759	.24	5.444	.995	.419	3.9-3
44	3	M4	4X6	.063	1.5	.035	0	2.21	1.092	1.766	.24	2.843	.999	.966	3.9-3
45	3	M5	4X6	.064	0	.009	0	.828	1.092	1.758	.24	5.686	.994	.362	3.9-3
46	3	M6	4X6	.084	2	.035	0	2.139	1.092	1.765	.24	3.283	.998	.935	3.9-3
47	3	M7	4X6	.085	0	.010	0	.63	1.092	1.756	.24	6.141	.993	.275	3.9-3
48	3	M8	4X6	.115	1.714	.137	4	2.153	1.196	1.87	.288	2.677	.999	.906	3.9-3
49	3	M9	4X6	.149	4	.124	4	2.153	1.196	1.866	.288	4.642	.997	.906	3.9-1
50	3	M10	4X6	.145	0	.126	0	2.153	1.196	1.866	.288	4.642	.997	.906	3.9-1
51	3	M11	4X6	.104	0	.059	0	2.153	1.196	1.866	.288	4.642	.997	.906	3.9-1
52	3	M12	4X6	.053	0	.052	4	2.153	1.196	1.866	.288	4.642	.997	.906	3.9-1
53	3	M13	4X6	.053	2.286	.059	0	2.153	1.196	1.87	.288	2.677	.999	.906	3.9-1
54	3	M14	4X6	.045	0	.009	0	1.502	1.092	1.762	.24	4.642	.996	.656	3.9-3
55	3	M15	4X4	.019	2.886	.003	5.657	1.102	1.38	2.16	.288	4.404	1	.444	3.9-1
56	3	M16	4X4	.137	0	.003	6.801	.806	1.38	2.16	.288	4.829	1	.325	3.6.3
57	3	M17	4X4	.034	0	.003	6.801	.806	1.38	2.16	.288	4.829	1	.325	3.6.3
58	3	M18	4X4	.054	0	.003	0	.726	1.38	2.16	.288	4.972	1	.292	3.6.3
59	3	M19	4X4	.027	0	.003	7.211	.726	1.38	2.16	.288	4.972	1	.292	3.6.3
60	3	M20	4X4	.040	0	.003	0	.592	1.38	2.16	.288	5.258	1	.238	3.6.3

∴ OK



TYPICAL BRACE FORCE = 1020 lbs  
 USE EXISTING SCREWS  
 PLUS (1) NEW "HTP372" STRAP  
 AT EACH END OF BRACE  
 (ALLOW. SHEAR PER STRAP = 1600 lbs)

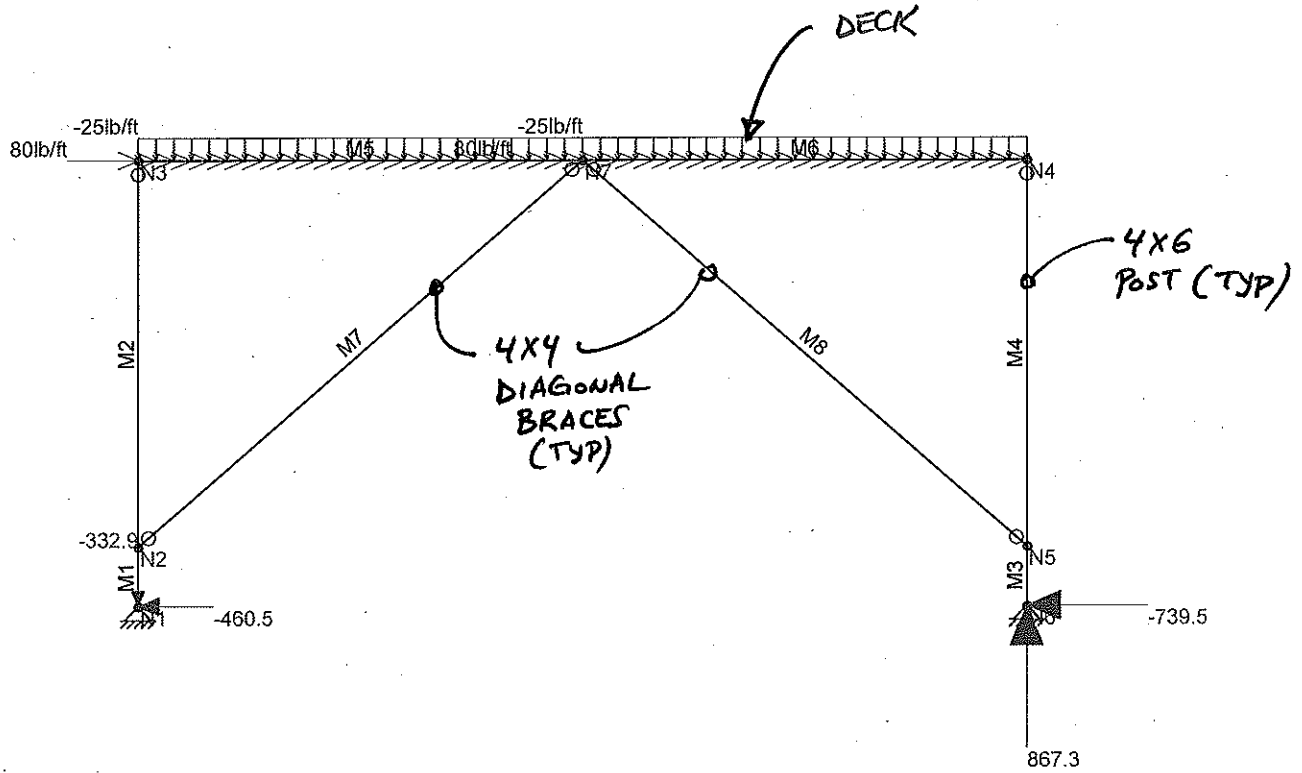
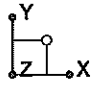
\*NOTE: WHERE BRACE IS ATTACHED  
 TO JOIST, USE (5) 1/4" Ø X 4"  
 SDS SCREWS.

ALLOW. SHEAR PER SCREW =  
 $250 \times 1.6 = 400$  lbs

**LOAD CASE**

Loads: LC 2, DL+E  
 Results for LC 2, DL+E  
 Reaction and Moment Units are lb and k-ft

Tri State Engineering, Inc.	Knee Brace	SK - 2
Elisee Ilunga		
		DIAG. BRACE TRANS

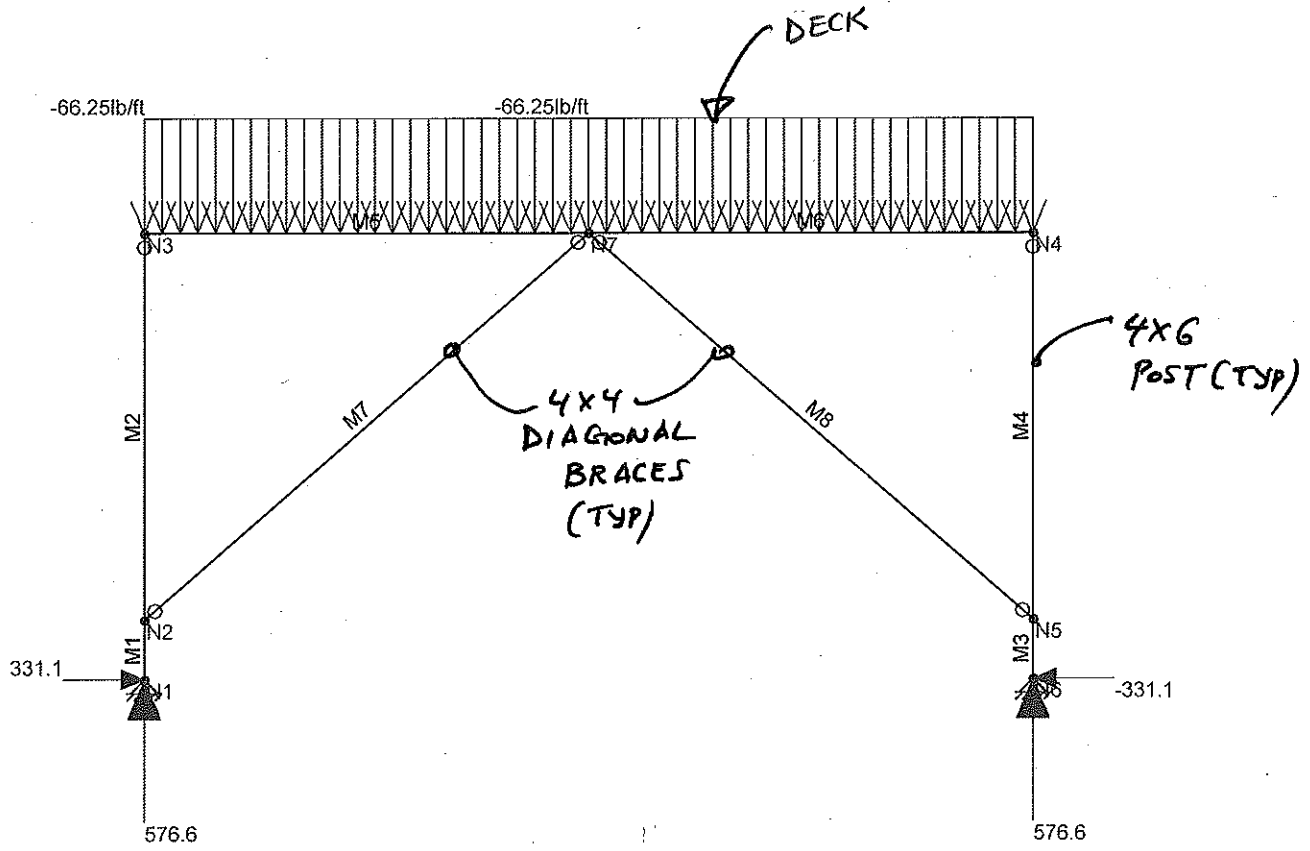


**LOAD CASE**

Lloads: LC 3, DL+W  
 Results for LC 3, DL+W  
 Reaction and Moment Units are lb and k-ft

Tri State Engineering, Inc.	Knee Brace	SK - 3
Elisee Ilunga		
		DIAG. BRACE TRANS





**LOAD CASE**

Loads: LC 1, DL+.75 (SL+LL)  
 Results for LC 1, DL+.75 (SL+LL)  
 Reaction and Moment Units are lb and k-ft

Tri State Engineering, Inc.	Knee Brace	SK - 1
Elisee Ilunga		
		DIAG. BRACE TRANS

### Wood Material Properties

	Label	Type	Database	Species	Grade	Cm Emod	Nu	Ther...	Densf...
1	WOOD 1	Solid Sa...	Visually Grad..	Hem-Fir	No.2		1	.3	.035
2	Wood 2	Solid Sa...	Visually Grad..	Douglas Fir-Larch	No.2		1	.3	.035

### Wood Section Sets

	Label	Shape	Type	Design List	Material	Design Rul...	A [in <sup>2</sup> ]	I (90,270)...	I (0,180) [...
1	Beam	2X6	Beam	Rectangular	Wood 2	Typical	8.25	1.547	20.797
2	post	4X6	Column	Rectangular	WOOD 1	Typical	19.25	19.651	48.526
3	Knee Brace	4X4	VBrace	Rectangular	Wood 2	Typical	12.25	12.505	12.505

### Wood Design Parameters

	Label	Shape	Length...	Le-out[ft]	Le-in[ft]	le-bend top[ft]	le-bend b...	K-out	K-in	CV	Cr	Out sw...	In sway
1	M1	post	1			Lb out							
2	M2	post	6.5			Lb out							
3	M3	post	1			Lb out							
4	M4	post	6.5			Lb out							
5	M5	Beam	7.5	2		Lb out							
6	M6	Beam	7.5	2		Lb out							
7	M7	Knee Brace	9.925			Lb out							
8	M8	Knee Brace	9.925			Lb out							

### Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Temp [F]
1	N1	0	0	0
2	N2	0	1	0
3	N3	0	7.5	0
4	N4	15	7.5	0
5	N5	15	1	0
6	N6	15	0	0
7	N7	7.5	7.5	0

### Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Rotation[k-ft/rad]
1	N1	Reaction	Reaction	
2	N6	Reaction	Reaction	

### Member Distributed Loads (BLC 1 : DEAD)

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,F...	Start Location[ft.%]	End Location[ft.%]
1	M5	Y	-25	-25	0	0
2	M6	Y	-25	-25	0	0

### Member Distributed Loads (BLC 2 : LIVE)

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,F...	Start Location[ft.%]	End Location[ft.%]
1	M5	Y	-55	-55	0	0
2	M6	Y	-55	-55	0	0

### Member Distributed Loads (BLC 4 : SEISMIC)

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,F...	Start Location[ft.%]	End Location[ft.%]
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Company : Tri State Engineering, Inc.  
 Designer : Elisee Ilunga  
 Job Number :  
 Model Name : Knee Brace

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**Member Distributed Loads (BLC 4 : SEISMIC) (Continued)**

	Member Label	Direction	Start Magnitude[lb/ft....]	End Magnitude[lb/ft.F...]	Start Location[ft.%]	End Location[ft.%]
1	M5	X	100	100	0	0
2	M6	X	100	100	0	0

**Member Distributed Loads (BLC 5 : WIND)**

	Member Label	Direction	Start Magnitude[lb/ft....]	End Magnitude[lb/ft.F...]	Start Location[ft.%]	End Location[ft.%]
1	M5	X	80	80	0	0
2	M6	X	80	80	0	0

**Basic Load Cases**

	BLC Description	Category	X Gravity	Y Gravity	Joint	Point	Distributed
1	DEAD	None					2
2	LIVE	None					2
3	SNOW	None					
4	SEISMIC	None					2
5	WIND	None					2

**Load Combinations**

	Description	Solve	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	DL+.75(SL+LL)	Yes	Y		Y	-1	1	1	2	.75	3	.75								
2	DL+E	Yes	Y		Y	-1	1	1	4	1										
3	DL+W	Yes	Y		Y	-1	1	1	5	1										
4	DL+0.75(SL+LL+E)		Y		Y	-1	1	1	2	.75	3	.75	4	.75						

**Joint Deflections**

	LC	Joint Label	X [in]	Y [in]	Rotation [rad]
1	1	N1	0	0	1.773e-03
2	1	N2	-.02	0	1.394e-03
3	1	N3	0	0	-3.043e-03
4	1	N4	0	0	3.043e-03
5	1	N5	.02	0	-1.394e-03
6	1	N6	0	0	-1.773e-03
7	1	N7	0	-.028	0
8	2	N1	0	0	-3.978e-03
9	2	N2	.045	0	-3.283e-03
10	2	N3	.066	0	-1.223e-03
11	2	N4	.066	0	1.215e-03
12	2	N5	.062	0	-4.482e-03
13	2	N6	0	0	-5.503e-03
14	2	N7	.063	-.012	-3.999e-06
15	3	N1	0	0	-3.036e-03
16	3	N2	.034	0	-2.511e-03
17	3	N3	.053	0	-1.221e-03
18	3	N4	.053	0	1.214e-03
19	3	N5	.051	0	-3.701e-03
20	3	N6	0	0	-4.549e-03
21	3	N7	.05	-.012	-3.199e-06

### Joint Reactions (By Combination)

LC	Joint Label	X [lb]	Y [lb]	MZ [k-ft]
1	N1	331.141	576.555	0
2	N6	-331.141	576.555	0
3	Totals:	0	1153.111	
4	COG (ft):	X: 7.5	Y: 7.105	
5	N1	-610.723	-482.955	0
6	N6	-889.277	1017.316	0
7	Totals:	-1500	534.361	
8	COG (ft):	X: 7.5	Y: 6.648	
9	N1	-460.524	-332.928	0
10	N6	-739.476	867.289	0
11	Totals:	-1200	534.361	
12	COG (ft):	X: 7.5	Y: 6.648	

### Beam Deflections

LC	Member Label	Span	Location [ft]	y' [in]	(n) L/y' Ratio
1	M5	1	3.214	-.065	1375
2	M6	1	4.286	-.065	1375
3	M5	1	3.214	-.026	3456
4	M6	1	4.286	-.026	3456
5	M5	1	3.214	-.026	3458
6	M6	1	4.286	-.026	3458

### Member Section Forces

LC	Member Label	Sec	Axial[lb]	Shear[lb]	Moment[k-ft]
1	M1	1	576.555	-332.083	0
2		2	574.216	-332.083	.166
3		3	571.877	-332.083	.332
4	M2	1	226.069	51.09	.332
5		2	210.863	51.09	.166
6		3	195.657	51.09	0
7	M3	1	576.555	332.083	0
8		2	574.216	332.083	-.166
9		3	571.877	332.083	-.332
10	M4	1	226.069	-51.09	-.332
11		2	210.863	-51.09	-.166
12		3	195.657	-51.09	0
13	M5	1	-51.037	195.642	0
14		2	-51.037	60.316	-.254
15		3	-51.037	-316.273	.452
16	M6	1	-51.037	316.273	.452
17		2	-51.037	60.316	-.254
18		3	-51.037	-195.642	0
19	M7	1	515.288	11.165	0
20		2	505.611	0	-.028
21		3	495.935	-11.165	0
22	M8	1	515.288	-11.165	0
23		2	505.611	0	.028
24		3	495.935	11.165	0
25	M1	1	-482.955	608.905	0
26		2	-485.294	608.905	-.304
27		3	-487.634	608.905	-.609
28	M2	1	107.877	-93.678	-.609
29		2	92.67	-93.678	-.304
30		3	77.464	-93.678	0

**Member Section Forces (Continued)**

	LC	Member Label	Sec	Axial[lb]	Shear[lb]	Moment[k-ft]
31	2	M3	1	1017.316	894.517	0
32			2	1014.976	894.517	-447
33			3	1012.637	894.517	-895
34	2	M4	1	108.002	-137.618	-895
35			2	92.796	-137.618	-447
36			3	77.589	-137.618	0
37	2	M5	1	93.703	77.526	0
38			2	468.703	-23.744	-101
39			3	843.703	-125.013	.178
40	2	M6	1	-887.623	125.013	.178
41			2	-512.623	23.744	-101
42			3	-137.623	-77.526	0
43	2	M7	1	-922.345	11.165	0
44			2	-932.022	0	-.028
45			3	-941.698	-11.165	0
46	2	M8	1	1368.49	-11.165	0
47			2	1358.814	0	.028
48			3	1349.137	11.165	0
49	3	M1	1	-332.928	459.565	0
50			2	-335.267	459.565	-.23
51			3	-337.607	459.565	-.46
52	3	M2	1	107.881	-70.702	-.46
53			2	92.674	-70.702	-.23
54			3	77.468	-70.702	0
55	3	M3	1	867.289	743.166	0
56			2	864.949	743.166	-.372
57			3	862.61	743.166	-.743
58	3	M4	1	107.98	-114.333	-.743
59			2	92.774	-114.333	-.372
60			3	77.568	-114.333	0
61	3	M5	1	70.724	77.517	0
62			2	370.724	-23.753	-.101
63			3	670.724	-125.022	.178
64	3	M6	1	-714.336	125.022	.178
65			2	-414.336	23.753	-.101
66			3	-114.336	-77.517	0
67	3	M7	1	-693.222	11.165	0
68			2	-702.899	0	-.028
69			3	-712.576	-11.165	0
70	3	M8	1	1139.446	-11.165	0
71			2	1129.769	0	.028
72			3	1120.093	11.165	0

**Member Section Stresses**

	LC	Member Label	Sec	Axial[ksi]	Shear[ksi]	Top Bending[ksi]	Bot Bending[ksi]
1	1	M1	1	.03	-.026	0	0
2			2	.03	-.026	-.113	.113
3			3	.03	-.026	-.226	.226
4	1	M2	1	.012	.004	-.226	.226
5			2	.011	.004	-.113	.113
6			3	.01	.004	0	0
7	1	M3	1	.03	.026	0	0
8			2	.03	.026	.113	-.113
9			3	.03	.026	.226	-.226
10	1	M4	1	.012	-.004	.226	-.226

**Member Section Stresses (Continued)**

LC	Member Label	Sec	Axial[ksi]	Shear[ksi]	Top Bending[ksi]	Bot Bending[ksi]
11		2	.011	-.004	.113	-.113
12		3	.01	-.004	0	0
13	1	1	-.006	.036	0	0
14		2	-.006	-.011	.403	-.403
15		3	-.006	-.058	-.718	.718
16	1	1	-.006	.058	-.718	.718
17		2	-.006	.011	.403	-.403
18		3	-.006	-.036	0	0
19	1	1	.042	.001	0	0
20		2	.041	0	.047	-.047
21		3	.04	-.001	0	0
22	1	1	.042	-.001	0	0
23		2	.041	0	-.047	.047
24		3	.04	.001	0	0
25	2	1	-.025	.047	0	0
26		2	-.025	.047	.207	-.207
27		3	-.025	.047	.414	-.414
28	2	1	.006	-.007	.414	-.414
29		2	.005	-.007	.207	-.207
30		3	.004	-.007	0	0
31	2	1	.053	.07	0	0
32		2	.053	.07	.304	-.304
33		3	.053	.07	.608	-.608
34	2	1	.006	-.011	.608	-.608
35		2	.005	-.011	.304	-.304
36		3	.004	-.011	0	0
37	2	1	.011	.014	0	0
38		2	.057	-.004	.16	-.16
39		3	.102	-.023	-.283	.283
40	2	1	-.108	.023	-.283	.283
41		2	-.062	.004	.16	-.16
42		3	-.017	-.014	0	0
43	2	1	-.075	.001	0	0
44		2	-.076	0	.047	-.047
45		3	-.077	-.001	0	0
46	2	1	.112	-.001	0	0
47		2	.111	0	-.047	.047
48		3	.11	.001	0	0
49	3	1	-.017	.036	0	0
50		2	-.017	.036	.156	-.156
51		3	-.018	.036	.313	-.313
52	3	1	.006	-.006	.313	-.313
53		2	.005	-.006	.156	-.156
54		3	.004	-.006	0	0
55	3	1	.045	.058	0	0
56		2	.045	.058	.253	-.253
57		3	.045	.058	.505	-.505
58	3	1	.006	-.009	.505	-.505
59		2	.005	-.009	.253	-.253
60		3	.004	-.009	0	0
61	3	1	.009	.014	0	0
62		2	.045	-.004	.16	-.16
63		3	.081	-.023	-.283	.283
64	3	1	-.087	.023	-.283	.283
65		2	-.05	.004	.16	-.16
66		3	-.014	-.014	0	0
67	3	1	-.057	.001	0	0



Company : Tri State Engineering, Inc.  
 Designer : Elisee Ilunga  
 Job Number :  
 Model Name : Knee Brace

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ME

**Member Section Stresses (Continued)**

LC	Member Label	Sec	Axial[ksil]	Shear[ksil]	Top Bending[ksil]	Bot Bending[ksil]
68		2	-.057	0	.047	-.047
69		3	-.058	-.001	0	0
70	3 M8	1	.093	-.001	0	0
71		2	.092	0	-.047	.047
72		3	.091	.001	0	0

**Member Section Deflections Strength**

LC	Member Label	Sec	x [in]	y [in]	(n) L/Y Ratio
1	M1	1	0	0	NC
2		2	0	.01	NC
3		3	0	.02	NC
4	1 M2	1	0	.02	NC
5		2	0	.034	3247
6		3	0	0	NC
7	1 M3	1	0	0	NC
8		2	0	-.01	NC
9		3	0	-.02	NC
10	1 M4	1	0	-.02	NC
11		2	0	-.034	3247
12		3	0	0	NC
13	1 M5	1	0	0	NC
14		2	0	-.078	1418
15		3	0	-.028	NC
16	1 M6	1	0	-.028	NC
17		2	0	-.078	1418
18		3	0	0	NC
19	1 M7	1	-.015	.013	NC
20		2	-.017	-.029	4851
21		3	-.018	-.021	NC
22	1 M8	1	-.015	-.013	NC
23		2	-.017	.029	4851
24		3	-.018	.021	NC
25	2 M1	1	0	0	NC
26		2	0	-.024	NC
27		3	0	-.045	NC
28	2 M2	1	0	-.045	NC
29		2	0	-.1	1771
30		3	0	-.066	NC
31	2 M3	1	0	0	NC
32		2	0	-.033	7835
33		3	0	-.062	NC
34	2 M4	1	0	-.062	NC
35		2	0	-.129	1205
36		3	0	-.066	NC
37	2 M5	1	.066	0	NC
38		2	.065	-.031	3562
39		3	.063	-.012	NC
40	2 M6	1	.063	-.012	NC
41		2	.065	-.032	3562
42		3	.066	0	NC
43	2 M7	1	.034	-.029	NC
44		2	.037	-.064	4851
45		3	.04	-.05	NC
46	2 M8	1	-.047	-.04	NC
47		2	-.051	-.012	4851



Company : Tri State Engineering, Inc.  
 Designer : Elisee Ilunga  
 Job Number :  
 Model Name : Knee Brace

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 Checked By: \_\_\_\_\_

**Member Section Deflections Strength (Continued)**

LC	Member Label	Sec	x [in]	y [in]	(n) L/y Ratio
48		3	-.055	-.032	NC
49	3 M1	1	0	0	NC
50		2	0	-.018	NC
51		3	0	-.034	NC
52	3 M2	1	0	-.034	NC
53		2	0	-.077	2346
54		3	0	-.053	NC
55	3 M3	1	0	0	NC
56		2	0	-.027	9431
57		3	0	-.051	NC
58	3 M4	1	0	-.051	NC
59		2	0	-.106	1451
60		3	0	-.053	NC
61	3 M5	1	.053	0	NC
62		2	.052	-.031	3564
63		3	.05	-.012	NC
64	3 M6	1	.05	-.012	NC
65		2	.052	-.032	3564
66		3	.053	0	NC
67	3 M7	1	.026	-.022	NC
68		2	.028	-.057	4851
69		3	.03	-.042	NC
70	3 M8	1	-.039	-.033	NC
71		2	-.042	-.004	4851
72		3	-.046	-.024	NC

**Member Wood Code Checks**

LC	Member	Shape	UC Max	Loc[ft]	Shear	Loc[ft]	Fc' [ksi]	Ft' [ksi]	Fb' [ksi]	Fv' [ksi]	RB	CL	CP	Eqn
1	1 M1	4X6	.178	1	.150	0	1.628	.785	1.27	.172	2.321	.999	.99	3.9-3
2	1 M2	4X6	.180	0	.023	0	.687	.785	1.265	.172	5.918	.996	.418	3.9-3
3	1 M3	4X6	.178	1	.150	0	1.628	.785	1.27	.172	2.321	.999	.99	3.9-3
4	1 M4	4X6	.180	0	.023	0	.687	.785	1.265	.172	5.918	.996	.418	3.9-3
5	1 M5	2X6	.552	7.5	.278	7.5	1.209	.86	1.301	.207	14.832	.967	.708	3.9-3
6	1 M6	2X6	.552	0	.278	0	1.209	.86	1.301	.207	14.832	.967	.708	3.9-3
7	1 M7	4X4	.107	0	.007	0	.393	.992	1.552	.207	5.833	1	.22	3.6.3
8	1 M8	4X4	.107	0	.007	0	.393	.992	1.552	.207	5.833	1	.22	3.6.3
9	2 M1	4X6	.257	1	.198	0	2.255	1.092	1.766	.24	2.321	.999	.986	3.9-1
10	2 M2	4X6	.236	0	.030	0	.72	1.092	1.757	.24	5.918	.994	.315	3.9-3
11	2 M3	4X6	.345	1	.290	0	2.255	1.092	1.766	.24	2.321	.999	.986	3.9-3
12	2 M4	4X6	.347	0	.045	0	.72	1.092	1.757	.24	5.918	.994	.315	3.9-3
13	2 M5	2X6	.175	7.5	.079	7.5	1.396	1.196	1.763	.288	14.832	.942	.588	3.9-3
14	2 M6	2X6	.241	0	.079	0	1.396	1.196	1.763	.288	14.832	.942	.588	3.9-1
15	2 M7	4X4	.077	5.064	.005	0	.4	1.38	2.16	.288	5.833	1	.161	3.9-1
16	2 M8	4X4	.280	0	.005	9.925	.4	1.38	2.16	.288	5.833	1	.161	3.6.3
17	3 M1	4X6	.193	1	.149	0	2.255	1.092	1.766	.24	2.321	.999	.986	3.9-1
18	3 M2	4X6	.178	0	.023	0	.72	1.092	1.757	.24	5.918	.994	.315	3.9-3
19	3 M3	4X6	.287	1	.241	0	2.255	1.092	1.766	.24	2.321	.999	.986	3.9-3
20	3 M4	4X6	.288	0	.037	0	.72	1.092	1.757	.24	5.918	.994	.315	3.9-3
21	3 M5	2X6	.171	7.5	.079	7.5	1.396	1.196	1.763	.288	14.832	.942	.588	3.9-3
22	3 M6	2X6	.223	0	.079	0	1.396	1.196	1.763	.288	14.832	.942	.588	3.9-1
23	3 M7	4X4	.063	5.064	.005	0	.4	1.38	2.16	.288	5.833	1	.161	3.9-1
24	3 M8	4X4	.233	0	.005	9.925	.4	1.38	2.16	.288	5.833	1	.161	3.6.3

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