



Consulting
Structural
Engineers

Structural Calculations for Tchou Solar Panels

Job Number: 161034

Codes: 2012 IBC Amended by Oregon Structural Specialty Code with 2014 revisions.

Date: 11-08-2016

Location: 1304 NE 77th Ave, Portland, OR

Client: Elemental Energy
3123 Belmont St
Portland, OR 97214
Phone: 503-967-5786

Engineer: Cameron Carroll P.E.
Brad Kheyri, E.I.
MSC Engineers, Inc.
3470 Pipebend Place NE, Suite 120
Salem, OR 97301
Phone: 503-399-1399



Scope of Services: Anchorage design of proposed solar panels on new structure roof along with framing review.

Contents:

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12/20/2016	Revision to Risa model
12/30/2016	Revision to Risa model

LIMITATIONS: Engineer was retained in a limited capacity for this project. Design is based upon the information provided by the client, who is solely responsible for accuracy of same. No responsibility and/or liability is assumed by, or is to be assigned to the Engineer for items beyond those shown on these sheets.

GRAVITY ANALYSIS

MAX JOINT REACTION W/O SOLAR PANELS = 675 lbs @ N124

" " " W/ SOLAR PANELS = 684 lbs @ N124

$$\text{CHANGE} = (684 - 675) / 675 = 1.3\% < 5\% \rightarrow \underline{\text{O.K.}}$$

MEMBER STRESSES: (MEMBERS ABOVE 100% UTILIZATION)

M58 W/ SOLAR PANELS = 1.079
M58 W/O SOLAR PANELS = 1.079 } $\rightarrow$ NO CHANGE

M59 W/ SOLAR PANELS = 1.025 = 2.5% OVER < 5% $\rightarrow$ O.K.

M105 W/ SOLAR PANELS = 1.019
M105 W/O SOLAR PANELS = 1.012 } $\Rightarrow$ CHANGE = 0.7% < 5% $\rightarrow$ O.K.

ROOF FRAMING IS O.K.



FILE NO. 161034 SHEET NO. 3.2

MADE BY BK DATE 12/30/16

CLIENT ELEMENTAL ENERGY

PROJECT TCHCU SOLAR PANELS

Wood Material Properties

	Label	Type	Databa...	Species	Grade	Cm	Emod	Nu	Ther...	Dens[k...
1	DF	Solid S...	Visuall...	Douglas Fir-Larch	Select Structural		1	.3	.3	.035
2	DF - 2	Solid S...	Visuall...	Douglas Fir-Larch	No.2		1	.3	.3	.035
3	OLD DF	Solid S...	Visuall...	Douglas Fir-Larch	No.1		1	.3	.3	.035
4	SPF	Solid S...	Visuall...	Spruce-Pine-fir	No.1		1	.3	.3	.035
5	24F-1.8E DF Balanced	Glulam	NDS T...	24F-1.8E DF BAL	na		1	.3	.3	.035
6	24F-1.8E DF Unbalanced	Glulam	NDS T...	24F-1.8E DF UNBAL	na		1	.3	.3	.035
7	24F-1.8E SP Balanced	Glulam	NDS T...	24F-1.8E SP BAL	na		1	.3	.3	.035
8	1940's Wood	Custom	N/A	1944's WOOD	na		1	.3	.3	.035
9	1970's Wood	Custom	N/A	1970's Wood	na		1	.3	.3	.035

Wood Section Sets

	Label	Shape	Type	Design List	Material	Design Ru...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Rafter	2X4	Beam	None	DF	Typical	5.25	.984	5.359	2.877
2	Ridge	2X6	Beam	None	DF	Typical	8.25	1.547	20.797	5.125
3	Valley	2X4	Beam	None	DF	Typical	5.25	.984	5.359	2.877
4	Joist	2X6	Beam	None	DF	Typical	8.25	1.547	20.797	5.125
5	Sole PL	2X4	Beam	None	DF	Typical	5.25	.984	5.359	2.877
6	Top PL	2X4	Beam	None	DF	Typical	5.25	.984	5.359	2.877
7	Post	2X4	Column	None	DF	Typical	5.25	.984	5.359	2.877
8	DBL Top ...	2-2X4	Column	None	DF	Typical	10.5	7.875	10.719	15.255

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N16	27.5	0	0	0	
2	N32	27.5	0	21.5	0	
3	N45	27.5	0	.75	0	
4	N46	27.5	0	2.75	0	
5	N47	27.5	0	4.75	0	
6	N48	27.5	0	6.75	0	
7	N49	27.5	0	8.75	0	
8	N50	27.5	0	10.75	0	
9	N51	27.5	0	12.75	0	
10	N52	27.5	0	14.75	0	
11	N53	27.5	0	16.75	0	
12	N54	27.5	0	18.75	0	
13	N55	27.5	0	20.75	0	
14	N15	26.75	0	0	0	
15	N31	26.75	0	21.5	0	
16	N70	26.75	.5	.75	0	
17	N76	26.75	.5	20.75	0	
18	N14	24.75	0	0	0	
19	N30	24.75	0	21.5	0	
20	N71	24.75	1.833333	2.75	0	
21	N77	24.75	1.833333	18.75	0	
22	N13	22.75	0	0	0	
23	N29	22.75	0	21.5	0	
24	N72	22.75	3.166667	4.75	0	
25	N78	22.75	3.166667	16.75	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
26	N12	20.75	0	0	0	
27	N28	20.75	0	21.5	0	
28	N73	20.75	4.5	6.75	0	
29	N96	20.75	4.5	14.75	0	
30	N105	20.75	4.5	8.75	0	
31	N106	20.75	4.5	10.75	0	
32	N107	20.75	4.5	12.75	0	
33	N11	18.75	0	0	0	
34	N27	18.75	0	21.5	0	
35	N74	18.75	5.833333	8.75	0	
36	N80	18.75	5.833333	12.75	0	
37	N87	18.75	4.5	6.75	0	
38	N95	18.75	4.5	14.75	0	
39	N109	18.75	0	9	0	
40	N117	18.75	0	12.5	0	
41	N125	18.75	0	8.75	0	
42	N126	18.75	0	10.75	0	
43	N127	18.75	0	12.75	0	
44	N128	18.75	0	6.75	0	
45	N129	18.75	0	14.75	0	
46	N131	17.5	0	12.75	0	
47	N132	17.5	0	14.75	0	
48	N133	17.5	0	16.75	0	
49	N134	17.5	0	18.75	0	
50	N135	17.5	0	20.75	0	
51	N133A	17.5	0	10.75	0	
52	N143	17.5	0	8.75	0	
53	N10	16.75	0	0	0	
54	N26	16.75	0	21.5	0	
55	N75	16.75	7.166667	10.75	0	
56	N86	16.75	4.5	6.75	0	
57	N94	16.75	4.5	14.75	0	
58	N108	16.75	0	8.75	0	
59	N116	16.75	0	12.75	0	
60	N9	14.75	0	0	0	
61	N25	14.75	0	21.5	0	
62	N83	14.75	7.166667	10.75	0	
63	N85	14.75	4.5	6.75	0	
64	N93	14.75	4.5	14.75	0	
65	N107A	14.75	0	8.75	0	
66	N115	14.75	0	12.75	0	
67	N124	14.167	0	.75	0	
68	N125A	14.167	0	2.75	0	
69	N126A	14.167	0	4.75	0	
70	N127A	14.167	0	6.75	0	
71	N128A	14.167	0	8.75	0	
72	N130	12.91	0	12.75	0	
73	N131A	12.91	0	14.75	0	
74	N132A	12.91	0	16.75	0	
75	N133B	12.91	0	18.75	0	
76	N134A	12.91	0	20.75	0	
77	N135A	12.91	0	10.75	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
78	N8	12.75	0	0	0	
79	N24	12.75	0	21.5	0	
80	N82	12.75	7.167	10.75	0	
81	N84	12.75	4.5	6.75	0	
82	N92	12.75	4.5	14.75	0	
83	N106A	12.75	0	8.75	0	
84	N114	12.75	0	12.75	0	
85	N7	10.75	0	0	0	
86	N23	10.75	0	21.5	0	
87	N63	10.75	7.166667	10.75	0	
88	N89	10.75	4.5	6.75	0	
89	N97	10.75	4.5	14.75	0	
90	N111	10.75	0	8.75	0	
91	N119	10.75	0	12.75	0	
92	N6	8.75	0	0	0	
93	N22	8.75	0	21.5	0	
94	N62	8.75	5.833333	8.75	0	
95	N68	8.75	5.833333	12.75	0	
96	N90	8.75	4.5	6.75	0	
97	N98	8.75	4.5	14.75	0	
98	N99	8.75	0	14.75	0	
99	N100	8.75	0	6.75	0	
100	N112	8.75	0	9	0	
101	N120	8.75	0	12.5	0	
102	N122	8.75	0	10.75	0	
103	N123	8.75	0	12.75	0	
104	N129A	8.75	0	8.75	0	
105	N136	7	0	12.75	0	
106	N141	7	0	10.75	0	
107	N142	7	0	14.75	0	
108	N5	6.75	0	0	0	
109	N21	6.75	0	21.5	0	
110	N67	6.75	4.5	14.75	0	
111	N91	6.75	4.5	6.75	0	
112	N101	6.75	4.5	8.75	0	
113	N102	6.75	4.5	10.75	0	
114	N103	6.75	4.5	12.75	0	
115	N137	5.5	0	14.75	0	
116	N138	5.5	0	16.75	0	
117	N139	5.5	0	18.75	0	
118	N140	5.5	0	20.75	0	
119	N4	4.75	0	0	0	
120	N20	4.75	0	21.5	0	
121	N60	4.75	3.166667	4.75	0	
122	N66	4.75	3.166667	16.75	0	
123	N3	2.75	0	0	0	
124	N19	2.75	0	21.5	0	
125	N59	2.75	1.833333	2.75	0	
126	N65	2.75	1.833333	18.75	0	
127	N2	.75	0	0	0	
128	N18	.75	0	21.5	0	
129	N58	.75	.5	.75	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
130	N64	.75	.5	20.75	0	
131	N1	0	0	0	0	
132	N33	0	0	.75	0	
133	N34	0	0	2.75	0	
134	N35	0	0	4.75	0	
135	N36	0	0	6.75	0	
136	N37	0	0	8.75	0	
137	N38	0	0	10.75	0	
138	N39	0	0	12.75	0	
139	N40	0	0	14.75	0	
140	N41	0	0	16.75	0	
141	N42	0	0	18.75	0	
142	N43	0	0	20.75	0	
143	N44	0	0	21.5	0	
144	N144	8.75	0	4.75	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N1		Reaction				
2	N2		Reaction				
3	N3		Reaction				
4	N4		Reaction				
5	N5		Reaction				
6	N6		Reaction				
7	N7		Reaction				
8	N8		Reaction				
9	N9		Reaction				
10	N10		Reaction				
11	N11		Reaction				
12	N12		Reaction				
13	N13		Reaction				
14	N14		Reaction				
15	N15		Reaction				
16	N16		Reaction				
17	N18	Reaction	Reaction	Reaction			
18	N19	Reaction	Reaction	Reaction			
19	N20	Reaction	Reaction	Reaction			
20	N21	Reaction	Reaction	Reaction			
21	N22	Reaction	Reaction	Reaction			
22	N23	Reaction	Reaction	Reaction			
23	N24	Reaction	Reaction	Reaction			
24	N25	Reaction	Reaction	Reaction			
25	N26	Reaction	Reaction	Reaction			
26	N27	Reaction	Reaction	Reaction			
27	N28	Reaction	Reaction	Reaction			
28	N29	Reaction	Reaction	Reaction			
29	N30	Reaction	Reaction	Reaction			
30	N31		Reaction				
31	N32		Reaction				
32	N33	Reaction	Reaction	Reaction			

Joint Boundary Conditions (Continued)

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
33	N34	Reaction	Reaction	Reaction			
34	N35	Reaction	Reaction	Reaction			
35	N36	Reaction	Reaction	Reaction			
36	N37	Reaction	Reaction	Reaction			
37	N38	Reaction	Reaction	Reaction			
38	N39	Reaction	Reaction	Reaction			
39	N40	Reaction	Reaction	Reaction			
40	N41	Reaction	Reaction	Reaction			
41	N42	Reaction	Reaction	Reaction			
42	N43	Reaction	Reaction	Reaction			
43	N44		Reaction				
44	N45		Reaction				
45	N46		Reaction				
46	N47		Reaction				
47	N48		Reaction				
48	N49		Reaction				
49	N50		Reaction				
50	N51		Reaction				
51	N52		Reaction				
52	N53		Reaction				
53	N54		Reaction				
54	N55		Reaction				
55	N58						
56	N59						
57	N60						
58	N62						
59	N63						
60	N64						
61	N65						
62	N66						
63	N67						
64	N68						
65	N70						
66	N71						
67	N72						
68	N73						
69	N74						
70	N75						
71	N76						
72	N77						
73	N78						
74	N80						
75	N82						
76	N83						
77	N84						
78	N85						
79	N86						
80	N87						
81	N89						
82	N90						
83	N91						
84	N92						

Joint Boundary Conditions (Continued)

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
85	N93						
86	N94						
87	N95						
88	N96						
89	N97						
90	N98						
91	N99						
92	N100						
93	N101						
94	N102						
95	N103						
96	N105						
97	N106						
98	N107						
99	N106A						
100	N107A						
101	N108						
102	N109						
103	N111						
104	N112						
105	N114						
106	N115						
107	N116						
108	N117						
109	N119						
110	N120						
111	N122						
112	N123						
113	N125		Reaction				
114	N126						
115	N127						
116	N128						
117	N129						
118	N124	Reaction	Reaction	Reaction			
119	N125A	Reaction	Reaction	Reaction			
120	N126A	Reaction	Reaction	Reaction			
121	N127A		Reaction				
122	N128A	Reaction	Reaction	Reaction			
123	N131		Reaction				
124	N132		Reaction				
125	N133		Reaction	Reaction			
126	N134		Reaction	Reaction			
127	N135		Reaction	Reaction			
128	N133A		Reaction				
129	N140	Reaction	Reaction	Reaction			
130	N139		Reaction				
131	N138		Reaction				
132	N137		Reaction				
133	N142		Reaction				
134	N136		Reaction				
135	N141		Reaction				
136	N134A		Reaction				

Joint Boundary Conditions (Continued)

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
137	N133B		Reaction				
138	N132A		Reaction				
139	N131A		Reaction				
140	N135A		Reaction				
141	N130	Reaction	Reaction	Reaction			
142	N143		Reaction				
143	N144						

Wood Design Parameters

	Label	Shape	Length[...]	le2[ft]	le1[ft]	le-bend top[ft]	le-bend bot[ft]	Kyy	Kzz	CV	Cr	y sway	z sway
1	M1	Valley	16.807	Segment	Segment	Segment	Segment						
2	M2	Valley	16.807	Segment	Segment	Segment	Segment						
3	M3	Valley	16.807	Segment	Segment	Segment	Segment						
4	M4	Valley	16.807	Segment	Segment	Segment	Segment						
5	M5	Rafter	.901	1	Segment	1	Segment						
6	M6	Rafter	.901	1	Segment	1	Segment						
7	M7	Rafter	3.305	1	Segment	1	Segment						
8	M8	Rafter	3.305	1	Segment	1	Segment						
9	M9	Rafter	5.709	1	Segment	1	Segment						
10	M10	Rafter	5.709	1	Segment	1	Segment						
11	M11	Rafter	8.112	1	Segment	1	Segment						
12	M12	Rafter	8.112	1	Segment	1	Segment						
13	M13	Rafter	10.516	1	Segment	1	Segment						
14	M14	Rafter	12.92	1	Segment	1	Segment						
15	M15	Rafter	12.92	1	Segment	1	Segment						
16	M16	Rafter	10.516	1	Segment	1	Segment						
17	M17	Rafter	12.92	1	Segment	1	Segment						
18	M18	Rafter	10.516	1	Segment	1	Segment						
19	M19	Rafter	10.516	1	Segment	1	Segment						
20	M22	Rafter	5.709	1	Segment	1	Segment						
21	M23	Rafter	5.709	1	Segment	1	Segment						
22	M24	Rafter	3.305	1	Segment	1	Segment						
23	M25	Rafter	3.305	1	Segment	1	Segment						
24	M26	Rafter	.901	1	Segment	1	Segment						
25	M27	Rafter	.901	1	Segment	1	Segment						
26	M28	Rafter	12.92	1	Segment	1	Segment						
27	M29	Rafter	12.92	1	Segment	1	Segment						
28	M30	Rafter	12.92	1	Segment	1	Segment						
29	M31	Rafter	12.92	1	Segment	1	Segment						
30	M32	Rafter	12.92	1	Segment	1	Segment						
31	M33	Rafter	12.92	1	Segment	1	Segment						
32	M34	Rafter	10.516	1	Segment	1	Segment						
33	M35	Rafter	10.516	1	Segment	1	Segment						
34	M36	Rafter	8.112	1	Segment	1	Segment						
35	M37	Rafter	8.112	1	Segment	1	Segment						
36	M38	Rafter	5.709	1	Segment	1	Segment						
37	M39	Rafter	5.709	1	Segment	1	Segment						
38	M40	Rafter	3.305	1	Segment	1	Segment						
39	M41	Rafter	3.305	1	Segment	1	Segment						
40	M42	Rafter	.901	1	Segment	1	Segment						

Wood Design Parameters (Continued)

	Label	Shape	Length[...]	le2[ft]	le1[ft]	le-bend top[ft]	le-bend bot[ft]	Kyy	Kzz	CV	Cr	y sway	z sway
41	M43	Rafter	.901	1	Segment	1	Segment						
42	M44	Rafter	12.92	1	Segment	1	Segment						
43	M45	Rafter	10.516	1	Segment	1	Segment						
44	M46	Rafter	10.516	1	Segment	1	Segment						
45	M47	Rafter	8.112	1	Segment	1	Segment						
46	M48	Rafter	8.112	1	Segment	1	Segment						
47	M49	Rafter	5.709	1	Segment	1	Segment						
48	M50	Rafter	5.709	1	Segment	1	Segment						
49	M51	Rafter	3.305	1	Segment	1	Segment						
50	M52	Rafter	3.305	1	Segment	1	Segment						
51	M53	Rafter	.901	1	Segment	1	Segment						
52	M54	Rafter	.901	1	Segment	1	Segment						
53	M55	Ridge	6	Segment	Segment	2	Segment						
54	M58	Sole PL	8	2	Segment	2	Segment						
55	M59	Sole PL	8	2	Segment	2	Segment						
56	M60	Top PL	10	2	Segment	2	Segment						
57	M61	Top PL	10	2	Segment	2	Segment						
58	M62	Top PL	8	2	Segment	2	Segment						
59	M63	Top PL	8	2	Segment	2	Segment						
60	M64	Post	4.924	Segment	Segment	Segment	Segment						
61	M65	Post	4.924	Segment	Segment	Segment	Segment						
62	M66	Post	4.924	Segment	Segment	Segment	Segment						
63	M67	Post	4.924	Segment	Segment	Segment	Segment						
64	M68	Post	4.924	Segment	Segment	Segment	Segment						
65	M69	Post	4.924	Segment	Segment	Segment	Segment						
66	M70	Post	4.924	Segment	Segment	Segment	Segment						
67	M71	Post	4.924	Segment	Segment	Segment	Segment						
68	M72	Post	4.924	Segment	Segment	Segment	Segment						
69	M73	Post	4.924	Segment	Segment	Segment	Segment						
70	M74	Post	4.924	Segment	Segment	Segment	Segment						
71	M75	Post	5.031	Segment	Segment	Segment	Segment						
72	M76	Post	4.924	Segment	Segment	Segment	Segment						
73	M77	Post	4.924	Segment	Segment	Segment	Segment						
74	M78	Post	4.924	Segment	Segment	Segment	Segment						
75	M79	Post	4.924	Segment	Segment	Segment	Segment						
76	M80	Post	4.924	Segment	Segment	Segment	Segment						
77	M81	Post	4.924	Segment	Segment	Segment	Segment						
78	M80A	Post	4.924	Segment	Segment	Segment	Segment						
79	M81A	Post	4.924	Segment	Segment	Segment	Segment						
80	M82	Post	4.924	Segment	Segment	Segment	Segment						
81	M83	Post	4.924	Segment	Segment	Segment	Segment						
82	M95	Rafter	8.112	1	Segment	1	Segment						
83	M85	Joist	14.167	1	Segment	1	Segment						
84	M86	Joist	13.333	1	Segment	1	Segment						
85	M87	Joist	13.333	1	Segment	1	Segment						
86	M88	Joist	14.167	1	Segment	1	Segment						
87	M89	Joist	14.167	1	Segment	1	Segment						
88	M90	Joist	13.333	1	Segment	1	Segment						
89	M91	Joist	13.333	1	Segment	1	Segment						
90	M92	Joist	14.167	1	Segment	1	Segment						
91	M93	Joist	14.167	1	Segment	1	Segment						
92	M94	Joist	13.333	1	Segment	1	Segment						

Wood Design Parameters (Continued)

	Label	Shape	Length[...]	le2[ft]	le1[ft]	le-bend top[ft]	le-bend bot[ft]	Kyy	Kzz	CV	Cr	y sway	z sway
93	M95A	Joist	10	1	Segment	1	Segment						
94	M96	Joist	17.5	1	Segment	1	Segment						
95	M97	Joist	17.5	1	Segment	1	Segment						
96	M98	Joist	10	1	Segment	1	Segment						
97	M99	Joist	10	1	Segment	1	Segment						
98	M100	Joist	17.5	1	Segment	1	Segment						
99	M101	Joist	17.5	1	Segment	1	Segment						
100	M102	Joist	10	1	Segment	1	Segment						
101	M103	Joist	10	1	Segment	1	Segment						
102	M104	Joist	17.5	1	Segment	1	Segment						
103	M105	Joist	12.91	1	Segment	1	Segment						
104	M106	Joist	14.59	1	Segment	1	Segment						
105	M107	Rafter	8.112	1	Segment	1	Segment				Yes		
106	M106A	DBL Top ...	27.5	12	12	12	12						
107	M107A	DBL Top ...	21.5	12	12	12	12						
108	M108	DBL Top ...	27.5	12	12	12	12						
109	M109	DBL Top ...	21.5	12	12	12	12						

Member Distributed Loads (BLC 1 : DL)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M5	Y	-.016	-.016	0	0
2	M6	Y	-.016	-.016	0	0
3	M7	Y	-.016	-.016	0	0
4	M8	Y	-.016	-.016	0	0
5	M9	Y	-.016	-.016	0	0
6	M10	Y	-.016	-.016	0	0
7	M11	Y	-.016	-.016	0	0
8	M12	Y	-.016	-.016	0	0
9	M13	Y	-.016	-.016	0	0
10	M14	Y	-.016	-.016	0	0
11	M15	Y	-.016	-.016	0	0
12	M16	Y	-.016	-.016	0	0
13	M17	Y	-.016	-.016	0	0
14	M18	Y	-.016	-.016	0	0
15	M19	Y	-.016	-.016	0	0
16	M22	Y	-.016	-.016	0	0
17	M23	Y	-.016	-.016	0	0
18	M24	Y	-.016	-.016	0	0
19	M25	Y	-.016	-.016	0	0
20	M26	Y	-.016	-.016	0	0
21	M27	Y	-.016	-.016	0	0
22	M28	Y	-.016	-.016	0	0
23	M29	Y	-.016	-.016	0	0
24	M30	Y	-.016	-.016	0	0
25	M31	Y	-.016	-.016	0	0
26	M32	Y	-.016	-.016	0	0
27	M33	Y	-.016	-.016	0	0
28	M34	Y	-.016	-.016	0	0
29	M35	Y	-.016	-.016	0	0
30	M36	Y	-.016	-.016	0	0

Member Distributed Loads (BLC 1 : DL) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
31	M37	Y	-.016	-.016	0	0
32	M38	Y	-.016	-.016	0	0
33	M39	Y	-.016	-.016	0	0
34	M40	Y	-.016	-.016	0	0
35	M41	Y	-.016	-.016	0	0
36	M42	Y	-.016	-.016	0	0
37	M44	Y	-.016	-.016	0	0
38	M45	Y	-.016	-.016	0	0
39	M46	Y	-.016	-.016	0	0
40	M47	Y	-.016	-.016	0	0
41	M48	Y	-.016	-.016	0	0
42	M49	Y	-.016	-.016	0	0
43	M50	Y	-.016	-.016	0	0
44	M51	Y	-.016	-.016	0	0
45	M52	Y	-.016	-.016	0	0
46	M53	Y	-.016	-.016	0	0
47	M54	Y	-.016	-.016	0	0
48	M95	Y	-.016	-.016	0	0
49	M107	Y	-.016	-.016	0	0
50	M85	Y	-.014	-.014	0	0
51	M86	Y	-.014	-.014	0	0
52	M87	Y	-.014	-.014	0	0
53	M88	Y	-.014	-.014	0	0
54	M89	Y	-.014	-.014	0	0
55	M90	Y	-.014	-.014	0	0
56	M91	Y	-.014	-.014	0	0
57	M92	Y	-.014	-.014	0	0
58	M93	Y	-.014	-.014	0	0
59	M94	Y	-.014	-.014	0	0
60	M95A	Y	-.014	-.014	0	0
61	M96	Y	-.014	-.014	0	0
62	M97	Y	-.014	-.014	0	0
63	M98	Y	-.014	-.014	0	0
64	M99	Y	-.014	-.014	0	0
65	M100	Y	-.014	-.014	0	0
66	M101	Y	-.014	-.014	0	0
67	M102	Y	-.014	-.014	0	0
68	M103	Y	-.014	-.014	0	0
69	M104	Y	-.014	-.014	0	0
70	M105	Y	-.014	-.014	0	0
71	M106	Y	-.014	-.014	0	0

Member Distributed Loads (BLC 2 : SL)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M5	Y	-.04	-.04	0	0
2	M6	Y	-.04	-.04	0	0
3	M7	Y	-.04	-.04	0	0
4	M8	Y	-.04	-.04	0	0
5	M9	Y	-.04	-.04	0	0
6	M10	Y	-.04	-.04	0	0
7	M11	Y	-.04	-.04	0	0

Member Distributed Loads (BLC 2 : SL) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
8	M12	Y	-.04	-.04	0	0
9	M13	Y	-.04	-.04	0	0
10	M14	Y	-.04	-.04	0	0
11	M15	Y	-.04	-.04	0	0
12	M16	Y	-.04	-.04	0	0
13	M17	Y	-.04	-.04	0	0
14	M18	Y	-.04	-.04	0	0
15	M19	Y	-.04	-.04	0	0
16	M22	Y	-.04	-.04	0	0
17	M23	Y	-.04	-.04	0	0
18	M24	Y	-.04	-.04	0	0
19	M25	Y	-.04	-.04	0	0
20	M26	Y	-.04	-.04	0	0
21	M27	Y	-.04	-.04	0	0
22	M28	Y	-.04	-.04	0	0
23	M29	Y	-.04	-.04	0	0
24	M30	Y	-.04	-.04	0	0
25	M31	Y	-.04	-.04	0	0
26	M32	Y	-.04	-.04	0	0
27	M33	Y	-.04	-.04	0	0
28	M34	Y	-.04	-.04	0	0
29	M35	Y	-.04	-.04	0	0
30	M36	Y	-.04	-.04	0	0
31	M37	Y	-.04	-.04	0	0
32	M38	Y	-.04	-.04	0	0
33	M39	Y	-.04	-.04	0	0
34	M40	Y	-.04	-.04	0	0
35	M41	Y	-.04	-.04	0	0
36	M42	Y	-.04	-.04	0	0
37	M44	Y	-.04	-.04	0	0
38	M45	Y	-.04	-.04	0	0
39	M46	Y	-.04	-.04	0	0
40	M47	Y	-.04	-.04	0	0
41	M48	Y	-.04	-.04	0	0
42	M49	Y	-.04	-.04	0	0
43	M50	Y	-.04	-.04	0	0
44	M51	Y	-.04	-.04	0	0
45	M52	Y	-.04	-.04	0	0
46	M53	Y	-.04	-.04	0	0
47	M54	Y	-.04	-.04	0	0
48	M95	Y	-.04	-.04	0	0
49	M107	Y	-.04	-.04	0	0

Member Distributed Loads (BLC 3 : ML)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M17	Y	-.006	-.006	0	0
2	M29	Y	-.006	-.006	0	0
3	M31	Y	-.006	-.006	0	0
4	M33	Y	-.006	-.006	0	0
5	M45	Y	-.006	-.006	0	0
6	M19	Y	-.006	-.006	0	0

Member Distributed Loads (BLC 3 : ML) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
7	M22	Y	-.006	-.006	0	0
8	M107	Y	-.006	-.006	0	0
9	M18	Y	-.006	-.006	0	0
10	M14	Y	-.006	-.006	0	0
11	M13	Y	-.006	-.006	0	0
12	M11	Y	-.006	-.006	0	0
13	M9	Y	-.006	-.006	0	0

Basic Load Cases

	BLC Description	Category	X Gravi...	Y Gravi...	Z Gravity	Joint	Point	Distrib...	Area(M...	Surfac...
1	DL	DL						71		
2	SL	SL						49		
3	ML	OL1						13		

Load Combinations

	Description	Solve P...	S...	B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...
1	DL	Yes	Y	1	1										
2	DL + SL	Yes	Y	1	1	2	1								
3	DL + SL + ML	Yes	Y	1	1	2	1	3	1						

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N1	max	0	1	-.549	1	0	1	0	1	0	1	0	1
2		min	0	1	-1.577	2	0	1	0	1	0	1	0	1
3	N2	max	0	1	.915	3	0	1	0	1	0	1	0	1
4		min	0	1	.314	1	0	1	0	1	0	1	0	1
5	N3	max	0	1	.124	3	0	1	0	1	0	1	0	1
6		min	0	1	.027	1	0	1	0	1	0	1	0	1
7	N4	max	0	1	.422	3	0	1	0	1	0	1	0	1
8		min	0	1	.125	1	0	1	0	1	0	1	0	1
9	N5	max	0	1	.352	3	0	1	0	1	0	1	0	1
10		min	0	1	.14	1	0	1	0	1	0	1	0	1
11	N6	max	0	1	.377	2	0	1	0	1	0	1	0	1
12		min	0	1	.12	1	0	1	0	1	0	1	0	1
13	N7	max	0	1	-.139	1	0	1	0	1	0	1	0	1
14		min	0	1	-.323	3	0	1	0	1	0	1	0	1
15	N8	max	0	1	.401	3	0	1	0	1	0	1	0	1
16		min	0	1	.128	1	0	1	0	1	0	1	0	1
17	N9	max	0	1	.297	2	0	1	0	1	0	1	0	1
18		min	0	1	.085	1	0	1	0	1	0	1	0	1
19	N10	max	0	1	.113	3	0	1	0	1	0	1	0	1
20		min	0	1	.028	1	0	1	0	1	0	1	0	1
21	N11	max	0	1	.12	2	0	1	0	1	0	1	0	1
22		min	0	1	.027	1	0	1	0	1	0	1	0	1
23	N12	max	0	1	.151	2	0	1	0	1	0	1	0	1
24		min	0	1	.061	1	0	1	0	1	0	1	0	1
25	N13	max	0	1	.398	3	0	1	0	1	0	1	0	1

Envelope Joint Reactions (Continued)

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
26		min	0	1	.108	1	0	1	0	1	0	1	0	1
27	N14	max	0	1	.191	3	0	1	0	1	0	1	0	1
28		min	0	1	.052	1	0	1	0	1	0	1	0	1
29	N15	max	0	1	.576	3	0	1	0	1	0	1	0	1
30		min	0	1	.174	1	0	1	0	1	0	1	0	1
31	N16	max	0	1	-.272	1	0	1	0	1	0	1	0	1
32		min	0	1	-.921	3	0	1	0	1	0	1	0	1
33	N18	max	-.204	1	.18	2	-.014	1	0	1	0	1	0	1
34		min	-.694	2	.052	1	-.056	3	0	1	0	1	0	1
35	N19	max	0	1	.306	2	-.104	1	0	1	0	1	0	1
36		min	0	2	.087	1	-.368	3	0	1	0	1	0	1
37	N20	max	0	1	.474	3	-.135	1	0	1	0	1	0	1
38		min	0	2	.136	1	-.47	3	0	1	0	1	0	1
39	N21	max	0	1	.196	3	.086	2	0	1	0	1	0	1
40		min	0	2	.062	1	.013	1	0	1	0	1	0	1
41	N22	max	0	3	.193	3	.032	2	0	1	0	1	0	1
42		min	0	1	.046	1	.009	1	0	1	0	1	0	1
43	N23	max	0	3	.142	3	.092	3	0	1	0	1	0	1
44		min	0	1	.023	1	.044	1	0	1	0	1	0	1
45	N24	max	0	3	.497	3	-.14	1	0	1	0	1	0	1
46		min	0	1	.144	1	-.452	3	0	1	0	1	0	1
47	N25	max	0	1	.241	3	-.001	1	0	1	0	1	0	1
48		min	0	3	.054	1	-.052	3	0	1	0	1	0	1
49	N26	max	0	3	-.151	1	.781	3	0	1	0	1	0	1
50		min	0	1	-.311	2	.309	1	0	1	0	1	0	1
51	N27	max	0	3	.204	3	.017	2	0	1	0	1	0	1
52		min	0	1	.059	1	-.009	1	0	1	0	1	0	1
53	N28	max	0	3	.329	3	-.086	2	0	1	0	1	0	1
54		min	0	1	.164	1	-.126	1	0	1	0	1	0	1
55	N29	max	0	3	.544	3	-.229	1	0	1	0	1	0	1
56		min	0	1	.159	1	-.746	3	0	1	0	1	0	1
57	N30	max	-.11	1	.2	2	.117	3	0	1	0	1	0	1
58		min	-.309	3	.047	1	.07	1	0	1	0	1	0	1
59	N31	max	0	1	.363	3	0	1	0	1	0	1	0	1
60		min	0	1	.113	1	0	1	0	1	0	1	0	1
61	N32	max	0	1	-.153	1	0	1	0	1	0	1	0	1
62		min	0	1	-.49	3	0	1	0	1	0	1	0	1
63	N33	max	-.198	1	.976	2	.323	3	0	1	0	1	0	1
64		min	-.564	3	.4	1	.098	1	0	1	0	1	0	1
65	N34	max	-.069	1	.226	2	.002	2	0	1	0	1	0	1
66		min	-.15	2	.127	1	0	1	0	1	0	1	0	1
67	N35	max	.423	3	.555	3	0	3	0	1	0	1	0	1
68		min	.126	1	.237	1	0	1	0	1	0	1	0	1
69	N36	max	.391	3	.758	3	0	1	0	1	0	1	0	1
70		min	.172	1	.292	1	0	2	0	1	0	1	0	1
71	N37	max	.192	2	.452	2	0	3	0	1	0	1	0	1
72		min	.075	1	.184	1	0	1	0	1	0	1	0	1
73	N38	max	.21	3	.643	3	0	1	0	1	0	1	0	1
74		min	.062	1	.222	1	-.002	2	0	1	0	1	0	1
75	N39	max	-.027	1	.139	3	0	1	0	1	0	1	0	1
76		min	-.1	2	.066	1	-.001	2	0	1	0	1	0	1
77	N40	max	-.058	3	.467	3	0	1	0	1	0	1	0	1

REACTION CHANGE w/ SOLAR PANELS = $(684 - 675) / 675 = 1.3\% < 5\% \rightarrow O.K.$

Envelope Joint Reactions (Continued)

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
78		min	-.062	1	.155	1	-.001	2	0	1	0	1	0	1
79	N41	max	-.019	1	.499	3	0	2	0	1	0	1	0	1
80		min	-.042	3	.163	1	0	1	0	1	0	1	0	1
81	N42	max	.184	2	.332	3	0	2	0	1	0	1	0	1
82		min	.068	1	.114	1	0	1	0	1	0	1	0	1
83	N43	max	.056	3	.206	3	.694	2	0	1	0	1	0	1
84		min	.014	1	.078	1	.204	1	0	1	0	1	0	1
85	N44	max	0	1	-.197	1	0	1	0	1	0	1	0	1
86		min	0	1	-.674	2	0	1	0	1	0	1	0	1
87	N45	max	0	1	.645	3	0	1	0	1	0	1	0	1
88		min	0	1	.262	1	0	1	0	1	0	1	0	1
89	N46	max	0	1	.288	2	0	1	0	1	0	1	0	1
90		min	0	1	.147	1	0	1	0	1	0	1	0	1
91	N47	max	0	1	.523	3	0	1	0	1	0	1	0	1
92		min	0	1	.208	1	0	1	0	1	0	1	0	1
93	N48	max	0	1	.456	3	0	1	0	1	0	1	0	1
94		min	0	1	.144	1	0	1	0	1	0	1	0	1
95	N49	max	0	1	.243	3	0	1	0	1	0	1	0	1
96		min	0	1	.098	1	0	1	0	1	0	1	0	1
97	N50	max	0	1	.628	3	0	1	0	1	0	1	0	1
98		min	0	1	.214	1	0	1	0	1	0	1	0	1
99	N51	max	0	1	.36	3	0	1	0	1	0	1	0	1
100		min	0	1	.148	1	0	1	0	1	0	1	0	1
101	N52	max	0	1	.635	3	0	1	0	1	0	1	0	1
102		min	0	1	.24	1	0	1	0	1	0	1	0	1
103	N53	max	0	1	.617	3	0	1	0	1	0	1	0	1
104		min	0	1	.224	1	0	1	0	1	0	1	0	1
105	N54	max	0	1	.278	2	0	1	0	1	0	1	0	1
106		min	0	1	.12	1	0	1	0	1	0	1	0	1
107	N55	max	0	1	.435	3	0	1	0	1	0	1	0	1
108		min	0	1	.185	1	0	1	0	1	0	1	0	1
109	N125	max	0	1	1.846	3	0	1	0	1	0	1	0	1
110		min	0	1	.763	1	0	1	0	1	0	1	0	1
111	N124	max	684	3	.192	1	0	1	0	1	0	1	0	1
112		min	.22	1	.192	1	0	3	0	1	0	1	0	1
113	N125A	max	-.035	1	.192	1	0	3	0	1	0	1	0	1
114		min	-.133	2	.192	1	0	1	0	1	0	1	0	1
115	N126A	max	-.087	1	.193	1	0	3	0	1	0	1	0	1
116		min	-.347	3	.193	1	0	1	0	1	0	1	0	1
117	N127A	max	0	1	.331	3	0	1	0	1	0	1	0	1
118		min	0	1	.148	1	0	1	0	1	0	1	0	1
119	N128A	max	.194	3	.985	2	-.111	1	0	1	0	1	0	1
120		min	.072	1	.332	1	-.381	2	0	1	0	1	0	1
121	N131	max	0	1	.821	3	0	1	0	1	0	1	0	1
122		min	0	1	.258	1	0	1	0	1	0	1	0	1
123	N132	max	0	1	.445	3	0	1	0	1	0	1	0	1
124		min	0	1	.146	1	0	1	0	1	0	1	0	1
125	N133	max	0	1	.09	1	0	3	0	1	0	1	0	1
126		min	0	1	.09	1	0	1	0	1	0	1	0	1
127	N134	max	0	1	.09	1	0	3	0	1	0	1	0	1
128		min	0	1	.09	1	0	1	0	1	0	1	0	1
129	N135	max	0	1	.09	1	0	1	0	1	0	1	0	1

Envelope Joint Reactions (Continued)

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
130		min	0	1	.09	1	0	3	0	1	0	1	0	1
131	N133A	max	0	1	.33	3	0	1	0	1	0	1	0	1
132		min	0	1	.134	1	0	1	0	1	0	1	0	1
133	N140	max	.165	3	.103	1	0	2	0	1	0	1	0	1
134		min	.064	1	.103	1	0	1	0	1	0	1	0	1
135	N139	max	0	1	.103	1	0	1	0	1	0	1	0	1
136		min	0	1	.103	1	0	1	0	1	0	1	0	1
137	N138	max	0	1	.103	1	0	1	0	1	0	1	0	1
138		min	0	1	.103	1	0	1	0	1	0	1	0	1
139	N137	max	0	1	.023	1	0	1	0	1	0	1	0	1
140		min	0	1	-.117	3	0	1	0	1	0	1	0	1
141	N142	max	0	1	.477	3	0	1	0	1	0	1	0	1
142		min	0	1	.138	1	0	1	0	1	0	1	0	1
143	N136	max	0	1	.487	3	0	1	0	1	0	1	0	1
144		min	0	1	.195	1	0	1	0	1	0	1	0	1
145	N141	max	0	1	1.404	3	0	1	0	1	0	1	0	1
146		min	0	1	.559	1	0	1	0	1	0	1	0	1
147	N134A	max	0	1	.095	1	0	1	0	1	0	1	0	1
148		min	0	1	.095	1	0	1	0	1	0	1	0	1
149	N133B	max	0	1	.095	1	0	1	0	1	0	1	0	1
150		min	0	1	.095	1	0	1	0	1	0	1	0	1
151	N132A	max	0	1	.095	1	0	1	0	1	0	1	0	1
152		min	0	1	.095	1	0	1	0	1	0	1	0	1
153	N131A	max	0	1	.174	3	0	1	0	1	0	1	0	1
154		min	0	1	.105	1	0	1	0	1	0	1	0	1
155	N135A	max	0	1	.321	2	0	1	0	1	0	1	0	1
156		min	0	1	.141	1	0	1	0	1	0	1	0	1
157	N130	max	-.06	1	1.372	3	.495	3	0	1	0	1	0	1
158		min	-.106	3	.403	1	.125	1	0	1	0	1	0	1
159	N143	max	0	1	.363	3	0	1	0	1	0	1	0	1
160		min	0	1	.048	1	0	1	0	1	0	1	0	1
161	Totals:	max	0	3	25.013	3	0	2						
162		min	0	1	9.941	1	0	3						

Envelope Wood Code Checks

Member	Shape	Code Check	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	Fc' [k...Ft' [ksi]	Fb1' [...Fb2' [...Fv' [k...	Eqn
1	M1	2X4	.514	1.226	3	.759	7.528	y	2	.818 1.725 2.56 2.846 .207	3.9-3
2	M2	2X4	.345	9.279	3	.201	6.303	y	2	.818 1.725 2.56 2.846 .207	3.9-3
3	M3	2X4	.410	3.151	3	.813	3.151	z	3	.818 1.725 2.56 2.846 .207	3.6.3
4	M4	2X4	.174	16.807	2	.263	0	y	2	2.057 1.725 2.578 2.846 .207	3.9-1
5	M5	2X4	.131	0	3	1.401	0	y	3	2.116 1.725 2.58 2.846 .207	3.9-1
6	M6	2X4	.198	.901	3	1.475	.901	y	3	2.116 1.725 2.58 2.846 .207	3.9-3
7	M7	2X4	.083	1.79	3	.557	0	y	3	1.945 1.725 2.58 2.846 .207	3.9-3
8	M8	2X4	.085	1.549	2	.647	3.305	y	3	1.945 1.725 2.58 2.846 .207	3.9-3
9	M9	2X4	.322	2.914	3	.261	0	y	3	1.208 1.725 2.58 2.846 .207	3.9-3
10	M10	2X4	.318	2.914	2	.205	5.709	y	3	1.208 1.725 2.58 2.846 .207	3.9-3
11	M11	2X4	.555	4.394	3	.507	0	y	3	.679 1.725 2.58 2.846 .207	3.9-3
12	M12	2X4	.527	3.718	2	.437	8.112	y	3	.679 1.725 2.58 2.846 .207	3.9-1
13	M13	2X4	.627	8.216	3	.546	8.106	y	3	2.107 1.725 2.567 2.846 .207	3.9-1
14	M14	2X4	.602	8.075	3	.742	8.21	y	3	.679 1.725 2.485 2.846 .207	3.9-3

M58 EXPERIENCES NO CHANCE

M59: 1.025 = 2.5x OVER < 5x → O.K.

Envelope Wood Code Checks (Continued)

Member	Shape	Code Check	Loc(ft)	LC	Shear ...	Loc(ft)	Dir	LC	Fc' [k...Ft' [ksi]	Fb1' [...Fb2' [...Fv' [k...	Eqn
15	M15	2X4	.475	4.845	3	.431	4.71	y	3	.679 1.725 2.485 2.846	.207 3.9-1
16	M16	2X4	.615	2.3	3	.352	2.3	y	3	2.107 1.725 2.567 2.846	.207 3.9-1
17	M17	2X4	.543	9.421	3	.383	4.845	y	3	.679 1.725 2.58 2.846	.207 3.9-1
18	M18	2X4	.465	8.216	3	.901	8.216	y	3	2.107 1.725 2.567 2.846	.207 3.9-1
19	M19	2X4	.452	6.792	3	.426	2.41	y	3	.679 1.725 2.58 2.846	.207 3.9-1
20	M22	2X4	.357	2.854	3	.433	0	y	3	1.208 1.725 2.58 2.846	.207 3.9-3
21	M23	2X4	.354	3.033	3	.437	0	y	3	1.208 1.725 2.58 2.846	.207 3.9-3
22	M24	2X4	.126	1.412	3	.418	3.305	y	3	1.945 1.725 2.58 2.846	.207 3.9-3
23	M25	2X4	.133	1.928	3	.150	0	y	2	1.945 1.725 2.58 2.846	.207 3.9-3
24	M26	2X4	.057	0	3	.791	0	y	3	2.116 1.725 2.58 2.846	.207 3.9-3
25	M27	2X4	.062	.901	3	.686	.901	y	3	2.116 1.725 2.58 2.846	.207 3.9-3
26	M28	2X4	.462	8.075	2	.549	8.21	y	3	.679 1.725 2.485 2.846	.207 3.9-3
27	M29	2X4	.468	4.845	3	.496	4.845	y	3	.679 1.725 2.485 2.846	.207 3.9-3
28	M30	2X4	.511	3.365	2	1.062	8.21	y	2	.679 1.725 2.58 2.846	.207 3.9-3
29	M31	2X4	.591	4.845	3	.407	4.845	y	3	.679 1.725 2.485 2.846	.207 3.9-3
30	M32	2X4	.607	3.634	2	.594	8.075	y	2	.679 1.725 2.58 2.846	.207 3.9-1
31	M33	2X4	.508	4.845	3	.380	4.845	y	3	.679 1.725 2.485 2.846	.207 3.9-1
32	M34	2X4	.615	3.724	2	.389	8.106	y	3	.679 1.725 2.58 2.846	.207 3.9-3
33	M35	2X4	.467	6.901	2	.983	2.41	y	2	.679 1.725 2.58 2.846	.207 3.9-3
34	M36	2X4	.584	4.056	2	.340	0	y	2	.679 1.725 2.58 2.846	.207 3.9-3
35	M37	2X4	.582	3.803	3	.814	8.112	y	2	.679 1.725 2.58 2.846	.207 3.9-3
36	M38	2X4	.303	2.854	2	.673	0	y	2	1.208 1.725 2.58 2.846	.207 3.9-3
37	M39	2X4	.260	2.617	3	.250	5.709	y	3	1.208 1.725 2.58 2.846	.207 3.9-3
38	M40	2X4	.184	0	3	1.391	0	y	2	1.945 1.725 2.558 2.846	.207 3.9-3
39	M41	2X4	.170	3.305	2	1.064	3.305	y	3	1.945 1.725 2.558 2.846	.207 3.9-3
40	M42	2X4	.288	0	3	2.470	0	y	3	2.116 1.725 2.58 2.846	.207 3.9-3
41	M43	2X4	.230	.901	3	2.274	0	y	3	2.116 1.725 2.58 2.846	.207 3.9-1
42	M44	2X4	.659	9.69	3	.739	4.845	y	2	.679 1.725 2.58 2.846	.207 3.9-3
43	M45	2X4	.525	8.106	3	.407	8.106	y	3	.679 1.725 2.485 2.846	.207 3.9-3
44	M46	2X4	.463	2.41	2	.373	2.41	y	3	.679 1.725 2.485 2.846	.207 3.9-1
45	M47	2X4	.494	4.479	3	.362	0	y	3	.679 1.725 2.58 2.846	.207 3.9-1
46	M48	2X4	.547	3.803	3	.316	8.112	y	3	.679 1.725 2.58 2.846	.207 3.9-3
47	M49	2X4	.332	2.735	3	.218	5.709	y	3	1.208 1.725 2.58 2.846	.207 3.9-3
48	M50	2X4	.336	2.973	3	.225	0	y	3	1.208 1.725 2.58 2.846	.207 3.9-3
49	M51	2X4	.160	1.205	3	.144	3.305	y	2	1.945 1.725 2.58 2.846	.207 3.9-3
50	M52	2X4	.162	2.1	3	.186	0	y	3	1.945 1.725 2.58 2.846	.207 3.9-3
51	M53	2X4	.071	0	3	.202	.901	y	3	2.116 1.725 2.58 2.846	.207 3.9-3
52	M54	2X4	.073	.901	3	.223	0	y	3	2.116 1.725 2.58 2.846	.207 3.9-3
53	M55	2X6	.192	2	3	.261	2	y	3	1.512 1.495 2.222 2.579	.207 3.9-3
54	M58	2X4	1.079	4	3	2.082	2.25	y	3	1.547 1.725 2.573 2.846	.207 3.9-3
55	M59	2X4	1.025	2	3	1.215	4	y	3	1.547 1.725 2.571 2.846	.207 3.9-3
56	M60	2X4	.438	6.042	3	.283	4.063	y	3	1.547 1.725 2.571 2.846	.207 3.9-3
57	M61	2X4	.805	4.063	2	.523	4.063	y	2	1.547 1.725 2.571 2.846	.207 3.9-3
58	M62	2X4	.913	4	3	1.113	6	y	2	1.547 1.725 2.571 2.846	.207 3.9-1
59	M63	2X4	.790	6	3	.817	2	y	3	1.547 1.725 2.571 2.846	.207 3.9-1
60	M64	2X4	.270	0	3	.058	0	z	2	.354 1.725 2.538 2.846	.207 3.6.3
61	M65	2X4	.133	0	3	.191	0	z	2	.354 1.725 2.538 2.846	.207 3.6.3
62	M66	2X4	.412	0	3	.276	0	z	2	.354 1.725 2.538 2.846	.207 3.6.3
63	M67	2X4	.122	0	3	.487	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
64	M68	2X4	.260	0	3	.153	0	z	2	.354 1.725 2.538 2.846	.207 3.6.3
65	M69	2X4	.209	0	3	.497	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
66	M70	2X4	.288	0	3	.253	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3

Envelope Wood Code Checks (Continued)

Member	Shape	Code Check	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	Fc' [k...Ft' [ksi]	Fb1' [...Fb2' [...Fv' [k...	Eqn
67	M71	2X4	.062	0	3	.358	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
68	M72	2X4	.466	0	2	.487	0	z	2	.354 1.725 2.538 2.846	.207 3.6.3
69	M73	2X4	.143	0	3	.125	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
70	M74	2X4	.065	0	3	.258	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
71	M75	2X4	.216	0	3	.524	0	z	3	.34 1.725 2.537 2.846	.207 3.6.3
72	M76	2X4	.159	0	3	.208	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
73	M77	2X4	.192	0	3	.178	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
74	M78	2X4	.467	0	3	.042	0	z	2	.354 1.725 2.538 2.846	.207 3.6.3
75	M79	2X4	.047	0	2	.560	0	z	2	.354 1.725 2.538 2.846	.207 3.6.3
76	M80	2X4	.439	0	3	.422	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
77	M81	2X4	.147	0	2	.099	0	z	2	.354 1.725 2.538 2.846	.207 3.6.3
78	M80A	2X4	.111	0	2	.522	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
79	M81A	2X4	.196	0	2	.061	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
80	M82	2X4	.199	0	3	.065	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
81	M83	2X4	.157	0	3	.103	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
82	M95	2X4	.523	3.803	3	.688	8.112	y	3	.679 1.725 2.58 2.846	.207 3.9-3
83	M85	2X6	.287	7.083	1	.101	0	y	1	.551 1.3 1.943 2.243	.18 3.9-3
84	M86	2X6	.270	6.667	3	.095	13.333	y	1	.623 1.495 2.233 2.579	.207 3.9-3
85	M87	2X6	.256	6.667	1	.095	13.333	y	1	.614 1.3 1.943 2.243	.18 3.9-1
86	M88	2X6	.287	7.083	1	.101	0	y	1	.551 1.3 1.943 2.243	.18 3.9-3
87	M89	2X6	.287	7.083	1	.100	0	y	1	1.172 1.3 1.943 2.243	.18 3.9-3
88	M90	2X6	.261	6.667	1	.094	13.333	y	1	.614 1.3 1.943 2.243	.18 3.9-1
89	M91	2X6	.247	6.944	3	.373	13.333	y	3	1.234 1.495 2.233 2.579	.207 3.9-1
90	M92	2X6	.779	5.313	3	.756	14.167	y	2	1.846 1.495 2.233 2.579	.207 3.9-3
91	M93	2X6	.607	12.691	3	.824	0	y	2	2.031 1.495 2.233 2.579	.207 3.9-3
92	M94	2X6	.631	.556	2	1.019	0	y	2	2.031 1.495 2.233 2.579	.207 3.9-3
93	M95A	2X6	.144	5	1	.071	0	y	1	.982 1.3 1.943 2.243	.18 3.9-3
94	M96	2X6	.051	12.031	1	.052	11.849	y	1	1.639 1.3 1.895 2.243	.18 3.9-3
95	M97	2X6	.058	5.469	3	.051	5.651	y	1	1.834 1.495 2.164 2.579	.207 3.9-1
96	M98	2X6	.146	5	1	.071	0	y	1	.982 1.3 1.943 2.243	.18 3.9-1
97	M99	2X6	.165	5	3	.071	0	y	1	1.016 1.495 2.233 2.579	.207 3.9-1
98	M100	2X6	.084	12.031	3	.051	11.849	y	1	1.834 1.495 2.164 2.579	.207 3.9-1
99	M101	2X6	.220	8.75	3	.298	7.109	y	3	2.031 1.495 2.233 2.579	.207 3.9-1
100	M102	2X6	.420	1.25	3	.410	0	y	3	2.031 1.495 2.233 2.579	.207 3.9-1
101	M103	2X6	.868	8.75	3	.510	10	y	3	1.234 1.495 2.233 2.579	.207 3.9-1
102	M104	2X6	.697	4.557	3	1.024	4.74	y	3	2.031 1.495 2.224 2.579	.207 3.9-3
103	M105	2X6	<u>1.019</u>	8.741	3	1.551	7.127	y	3	2.031 1.495 2.233 2.579	.207 3.9-1
104	M106	2X6	.236	4.559	3	.772	4.711	y	3	1.948 1.495 2.183 2.579	.207 3.9-1
105	M107	2X4	.475	3.887	3	.597	8.112	y	3	.679 1.725 2.965 3.273	.207 3.9-3
106	M106A	2-2X4	.966	0	3	3.381	0	z	3	.145 1.725 2.561 2.846	.207 3.9-1
107	M107A	2-2X4	.620	0	3	2.191	0	y	3	.145 1.725 2.561 2.846	.207 3.9-1
108	M108	2-2X4	.447	26.927	2	1.236	4.87	y	3	.145 1.725 2.561 2.846	.207 3.6.3
109	M109	2-2X4	.946	21.5	3	3.366	20.828	z	3	.145 1.725 2.561 2.846	.207 3.9-1

M105: 1.019 - 1.012 = 0.7% INCREASE → CIC

Member Distributed Loads (BLC 3 : ML) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
7	M22	Y	-.006	-.006	0	0
8	M107	Y	-.006	-.006	0	0
9	M18	Y	-.006	-.006	0	0
10	M14	Y	-.006	-.006	0	0
11	M13	Y	-.006	-.006	0	0
12	M11	Y	-.006	-.006	0	0
13	M9	Y	-.006	-.006	0	0

Basic Load Cases

	BLC Description	Category	X Gravi...	Y Gravi...	Z Gravity	Joint	Point	Distrib...	Area(M...	Surfac...
1	DL	DL						71		
2	SL	SL						49		
3	ML	OL1						13		

Load Combinations

	Description	Solve P...	S...	B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac...
1	DL	Yes	Y		1	1									
2	DL + SL	Yes	Y		1	1	2	1							
3	DL + SL + ML	Yes	Y		1	1	2	1	3	1					

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	N1	0	-1.577	0	0	0	0
2	2	N2	0	.914	0	0	0	0
3	2	N3	0	.124	0	0	0	0
4	2	N4	0	.422	0	0	0	0
5	2	N5	0	.35	0	0	0	0
6	2	N6	0	.377	0	0	0	0
7	2	N7	0	-.32	0	0	0	0
8	2	N8	0	.399	0	0	0	0
9	2	N9	0	.297	0	0	0	0
10	2	N10	0	.103	0	0	0	0
11	2	N11	0	.12	0	0	0	0
12	2	N12	0	.151	0	0	0	0
13	2	N13	0	.385	0	0	0	0
14	2	N14	0	.189	0	0	0	0
15	2	N15	0	.556	0	0	0	0
16	2	N16	0	-.891	0	0	0	0
17	2	N18	-.694	.18	-.054	0	0	0
18	2	N19	0	.306	-.367	0	0	0
19	2	N20	0	.474	-.468	0	0	0
20	2	N21	0	.191	.086	0	0	0
21	2	N22	0	.157	.032	0	0	0
22	2	N23	0	.13	.078	0	0	0
23	2	N24	0	.458	-.42	0	0	0
24	2	N25	0	.209	-.033	0	0	0
25	2	N26	0	-.311	.759	0	0	0

Joint Reactions (Continued)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
26	2	N27	0	.171	.017	0	0	0
27	2	N28	0	.329	-.086	0	0	0
28	2	N29	0	.525	-.708	0	0	0
29	2	N30	-.297	.2	.103	0	0	0
30	2	N31	0	.348	0	0	0	0
31	2	N32	0	-.466	0	0	0	0
32	2	N33	-.558	.976	.318	0	0	0
33	2	N34	-.15	.226	.002	0	0	0
34	2	N35	.423	.555	0	0	0	0
35	2	N36	.384	.755	0	0	0	0
36	2	N37	.192	.452	0	0	0	0
37	2	N38	.209	.633	-.002	0	0	0
38	2	N39	-.1	.138	-.001	0	0	0
39	2	N40	-.061	.461	-.001	0	0	0
40	2	N41	-.02	.498	0	0	0	0
41	2	N42	.184	.331	0	0	0	0
42	2	N43	.054	.204	.694	0	0	0
43	2	N44	0	-.674	0	0	0	0
44	2	N45	0	.633	0	0	0	0
45	2	N46	0	.288	0	0	0	0
46	2	N47	0	.494	0	0	0	0
47	2	N48	0	.422	0	0	0	0
48	2	N49	0	.226	0	0	0	0
49	2	N50	0	.588	0	0	0	0
50	2	N51	0	.324	0	0	0	0
51	2	N52	0	.595	0	0	0	0
52	2	N53	0	.581	0	0	0	0
53	2	N54	0	.278	0	0	0	0
54	2	N55	0	.424	0	0	0	0
55	2	N125	0	1.767	0	0	0	0
56	2	N124	675	.192	0	0	0	0
57	2	N125A	-.133	.192	0	0	0	0
58	2	N126A	-.33	.193	0	0	0	0
59	2	N127A	0	.329	0	0	0	0
60	2	N128A	.17	.985	-.381	0	0	0
61	2	N131	0	.762	0	0	0	0
62	2	N132	0	.418	0	0	0	0
63	2	N133	0	.09	0	0	0	0
64	2	N134	0	.09	0	0	0	0
65	2	N135	0	.09	0	0	0	0
66	2	N133A	0	.288	0	0	0	0
67	2	N140	.155	.103	0	0	0	0
68	2	N139	0	.103	0	0	0	0
69	2	N138	0	.103	0	0	0	0
70	2	N137	0	-.115	0	0	0	0
71	2	N142	0	.474	0	0	0	0
72	2	N136	0	.47	0	0	0	0
73	2	N141	0	1.391	0	0	0	0
74	2	N134A	0	.095	0	0	0	0
75	2	N133B	0	.095	0	0	0	0
76	2	N132A	0	.095	0	0	0	0
77	2	N131A	0	.173	0	0	0	0

Joint Reactions (Continued)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
78	2	N135A	0	321	0	0	0	0
79	2	N130	-104	1.253	.43	0	0	0
80	2	N143	0	346	0	0	0	0
81	2	Totals:	0	24.207	0			
82	2	COG (ft):	X: 13.778	Y: 2.203	Z: 10.771			

Member Wood Code Checks

	LC	Member	Shape	UC Max	Loc[ft]	Shear	Loc[ft]	Dir	Fc[ksi]	Ft[ksi]	Fb[ksi]	Fb[ksi]	Fv[ksi]	RB	CL	CP	Eqn
1	2	M1	2X4	.513	1.226	.759	7.528	y	.818	1.725	2.56	2.846	.207	7.64	.989	.364	3.9-3
2	2	M2	2X4	.328	9.279	.201	6.303	y	.818	1.725	2.56	2.846	.207	7.64	.989	.364	3.9-3
3	2	M3	2X4	.395	3.151	.729	3.151	z	.818	1.725	2.56	2.846	.207	7.64	.989	.364	3.6-3
4	2	M4	2X4	.174	16.807	.263	0	y	2.057	1.725	2.578	2.846	.207	4.679	.996	.915	3.9-1
5	2	M5	2X4	.131	0	1.364	0	y	2.116	1.725	2.58	2.846	.207	4.102	.997	.941	3.9-1
6	2	M6	2X4	.191	.901	1.429	.901	y	2.116	1.725	2.58	2.846	.207	4.102	.997	.941	3.9-3
7	2	M7	2X4	.078	1.825	.542	0	y	1.945	1.725	2.58	2.846	.207	4.32	.997	.865	3.9-3
8	2	M8	2X4	.085	1.549	.628	3.305	y	1.945	1.725	2.58	2.846	.207	4.32	.997	.865	3.9-3
9	2	M9	2X4	.289	2.914	.241	0	y	1.208	1.725	2.58	2.846	.207	4.32	.997	.537	3.9-3
10	2	M10	2X4	.318	2.914	.200	5.709	y	1.208	1.725	2.58	2.846	.207	4.32	.997	.537	3.9-3
11	2	M11	2X4	.500	4.394	.472	0	y	.679	1.725	2.58	2.846	.207	4.32	.997	.302	3.9-3
12	2	M12	2X4	.527	3.718	.424	8.112	y	.679	1.725	2.58	2.846	.207	4.32	.997	.302	3.9-1
13	2	M13	2X4	.579	8.216	.510	8.106	y	2.107	1.725	2.567	2.846	.207	6.698	.992	.937	3.9-1
14	2	M14	2X4	.543	8.075	.693	8.21	y	.679	1.725	2.485	2.846	.207	12.306	.96	.302	3.9-3
15	2	M15	2X4	.462	4.845	.417	4.71	y	.679	1.725	2.485	2.846	.207	12.306	.96	.302	3.9-1
16	2	M16	2X4	.568	2.3	.343	2.41	y	2.107	1.725	2.567	2.846	.207	6.698	.992	.937	3.9-1
17	2	M17	2X4	.500	4.845	.361	4.71	y	.679	1.725	2.485	2.846	.207	12.306	.96	.302	3.9-1
18	2	M18	2X4	.422	8.216	.821	8.216	y	2.107	1.725	2.567	2.846	.207	6.698	.992	.937	3.9-1
19	2	M19	2X4	.408	7.011	.392	2.41	y	.679	1.725	2.58	2.846	.207	4.32	.997	.302	3.9-1
20	2	M22	2X4	.322	2.854	.389	0	y	1.208	1.725	2.58	2.846	.207	4.32	.997	.537	3.9-3
21	2	M23	2X4	.345	2.973	.411	0	y	1.208	1.725	2.58	2.846	.207	4.32	.997	.537	3.9-3
22	2	M24	2X4	.119	1.48	.392	3.305	y	1.945	1.725	2.58	2.846	.207	4.32	.997	.865	3.9-3
23	2	M25	2X4	.131	1.928	.150	0	y	1.945	1.725	2.58	2.846	.207	4.32	.997	.865	3.9-3
24	2	M26	2X4	.057	0	.756	0	y	2.116	1.725	2.58	2.846	.207	4.102	.997	.941	3.9-3
25	2	M27	2X4	.058	.901	.659	.901	y	2.116	1.725	2.58	2.846	.207	4.102	.997	.941	3.9-3
26	2	M28	2X4	.462	8.075	.517	8.21	y	.679	1.725	2.485	2.846	.207	12.306	.96	.302	3.9-3
27	2	M29	2X4	.428	4.845	.430	4.845	y	.679	1.725	2.485	2.846	.207	12.306	.96	.302	3.9-3
28	2	M30	2X4	.511	3.365	1.062	8.21	y	.679	1.725	2.58	2.846	.207	4.32	.997	.302	3.9-3
29	2	M31	2X4	.532	4.845	.372	4.845	y	.679	1.725	2.485	2.846	.207	12.306	.96	.302	3.9-3
30	2	M32	2X4	.607	3.634	.594	8.075	y	.679	1.725	2.58	2.846	.207	4.32	.997	.302	3.9-1
31	2	M33	2X4	.466	4.845	.325	4.845	y	.679	1.725	2.485	2.846	.207	12.306	.96	.302	3.9-1
32	2	M34	2X4	.615	3.724	.382	8.106	y	.679	1.725	2.58	2.846	.207	4.32	.997	.302	3.9-3
33	2	M35	2X4	.467	6.901	.983	2.41	y	.679	1.725	2.58	2.846	.207	4.32	.997	.302	3.9-3
34	2	M36	2X4	.584	4.056	.340	0	y	.679	1.725	2.58	2.846	.207	4.32	.997	.302	3.9-3
35	2	M37	2X4	.580	3.718	.814	8.112	y	.679	1.725	2.58	2.846	.207	4.32	.997	.302	3.9-3
36	2	M38	2X4	.303	2.854	.673	0	y	1.208	1.725	2.58	2.846	.207	4.32	.997	.537	3.9-3
37	2	M39	2X4	.260	2.617	.247	5.709	y	1.208	1.725	2.58	2.846	.207	4.32	.997	.537	3.9-3
38	2	M40	2X4	.183	0	1.391	0	y	1.945	1.725	2.558	2.846	.207	7.855	.988	.865	3.9-3
39	2	M41	2X4	.170	3.305	1.062	3.305	y	1.945	1.725	2.558	2.846	.207	7.855	.988	.865	3.9-3
40	2	M42	2X4	.287	0	2.469	0	y	2.116	1.725	2.58	2.846	.207	4.102	.997	.941	3.9-3
41	2	M43	2X4	.230	.901	2.272	0	y	2.116	1.725	2.58	2.846	.207	4.102	.997	.941	3.9-1
42	2	M44	2X4	.651	9.69	.739	4.845	y	.679	1.725	2.58	2.846	.207	4.32	.997	.302	3.9-3

Member Wood Code Checks (Continued)

	LC	Member	Shape	UC Max	Loc[ft]	Shear	Loc[ft]	Dir	Fc[ksi]	Ft[ksi]	Fb[ksi]	Fb[ksi]	Fv[ksi]	RB	CL	CP	Eqn
43	2	M45	2X4	.507	8.106	.376	8.106	y	.679	1.725	2.485	2.846	.207	12.306	.96	.302	3.9-1
44	2	M46	2X4	.463	2.41	.372	2.41	y	.679	1.725	2.485	2.846	.207	12.306	.96	.302	3.9-1
45	2	M47	2X4	.488	4.479	.361	0	y	.679	1.725	2.58	2.846	.207	4.32	.997	.302	3.9-1
46	2	M48	2X4	.545	3.803	.313	8.112	y	.679	1.725	2.58	2.846	.207	4.32	.997	.302	3.9-3
47	2	M49	2X4	.327	2.795	.215	5.709	y	1.208	1.725	2.58	2.846	.207	4.32	.997	.537	3.9-3
48	2	M50	2X4	.336	2.973	.222	0	y	1.208	1.725	2.58	2.846	.207	4.32	.997	.537	3.9-3
49	2	M51	2X4	.158	1.205	.144	3.305	y	1.945	1.725	2.58	2.846	.207	4.32	.997	.865	3.9-3
50	2	M52	2X4	.162	2.1	.185	0	y	1.945	1.725	2.58	2.846	.207	4.32	.997	.865	3.9-3
51	2	M53	2X4	.070	0	.202	.901	y	2.116	1.725	2.58	2.846	.207	4.32	.997	.941	3.9-3
52	2	M54	2X4	.073	.901	.222	0	y	2.116	1.725	2.58	2.846	.207	4.32	.997	.941	3.9-3
53	2	M55	2X6	.186	2	.260	2	y	1.512	1.495	2.222	2.579	.207	7.659	.991	.703	3.9-3
54	2	M58	2X4	1.079	4	2.069	2.25	y	1.547	1.725	2.573	2.846	.207	5.715	.994	.688	3.9-3
55	2	M59	2X4	.974	2	1.161	4	y	1.547	1.725	2.571	2.846	.207	6.11	.994	.688	3.9-3
56	2	M60	2X4	.367	6.042	.250	4.063	y	1.547	1.725	2.571	2.846	.207	6.11	.994	.688	3.9-3
57	2	M61	2X4	.805	4.063	.523	4.063	y	1.547	1.725	2.571	2.846	.207	6.11	.994	.688	3.9-3
58	2	M62	2X4	.908	4	1.113	6	y	1.547	1.725	2.571	2.846	.207	6.11	.994	.688	3.9-1
59	2	M63	2X4	.764	6	.735	2	y	1.547	1.725	2.571	2.846	.207	6.11	.994	.688	3.9-1
60	2	M64	2X4	.251	0	.058	0	z	.354	1.725	2.538	2.846	.207	9.588	.981	.158	3.6.3
61	2	M65	2X4	.124	0	.191	0	z	.354	1.725	2.538	2.846	.207	9.588	.981	.158	3.6.3
62	2	M66	2X4	.367	0	.276	0	z	.354	1.725	2.538	2.846	.207	9.588	.981	.158	3.6.3
63	2	M67	2X4	.105	0	.383	0	z	.354	1.725	2.538	2.846	.207	9.588	.981	.158	3.6.3
64	2	M68	2X4	.247	0	.153	0	z	.354	1.725	2.538	2.846	.207	9.588	.981	.158	3.6.3
65	2	M69	2X4	.195	0	.469	0	z	.354	1.725	2.538	2.846	.207	9.588	.981	.158	3.6.3
66	2	M70	2X4	.281	0	.233	0	z	.354	1.725	2.538	2.846	.207	9.588	.981	.158	3.6.3
67	2	M71	2X4	.048	0	.271	0	z	.354	1.725	2.538	2.846	.207	9.588	.981	.158	3.6.3
68	2	M72	2X4	.466	0	.487	0	z	.354	1.725	2.538	2.846	.207	9.588	.981	.158	3.6.3
69	2	M73	2X4	.141	0	.076	0	z	.354	1.725	2.538	2.846	.207	9.588	.981	.158	3.6.3
70	2	M74	2X4	.062	0	.216	0	z	.354	1.725	2.538	2.846	.207	9.588	.981	.158	3.6.3
71	2	M75	2X4	.211	0	.518	0	z	.34	1.725	2.537	2.846	.207	9.691	.98	.151	3.6.3
72	2	M76	2X4	.141	0	.196	0	z	.354	1.725	2.538	2.846	.207	9.588	.981	.158	3.6.3
73	2	M77	2X4	.169	0	.174	0	z	.354	1.725	2.538	2.846	.207	9.588	.981	.158	3.6.3
74	2	M78	2X4	.437	0	.042	0	z	.354	1.725	2.538	2.846	.207	9.588	.981	.158	3.6.3
75	2	M79	2X4	.047	0	.560	0	z	.354	1.725	2.538	2.846	.207	9.588	.981	.158	3.6.3
76	2	M80	2X4	.437	0	.410	0	z	.354	1.725	2.538	2.846	.207	9.588	.981	.158	3.6.3
77	2	M81	2X4	.147	0	.099	0	z	.354	1.725	2.538	2.846	.207	9.588	.981	.158	3.6.3
78	2	M80A	2X4	.111	0	.510	0	z	.354	1.725	2.538	2.846	.207	9.588	.981	.158	3.6.3
79	2	M81A	2X4	.196	0	.043	0	z	.354	1.725	2.538	2.846	.207	9.588	.981	.158	3.6.3
80	2	M82	2X4	.184	0	.033	0	z	.354	1.725	2.538	2.846	.207	9.588	.981	.158	3.6.3
81	2	M83	2X4	.149	0	.090	0	z	.354	1.725	2.538	2.846	.207	9.588	.981	.158	3.6.3
82	2	M95	2X4	.512	3.803	.651	8.112	y	.679	1.725	2.58	2.846	.207	4.32	.997	.302	3.9-3
83	2	M85	2X6	.250	7.083	.089	0	y	.558	1.495	2.233	2.579	.207	5.416	.996	.259	3.9-3
84	2	M86	2X6	.269	6.667	.084	13.333	y	.623	1.495	2.233	2.579	.207	5.416	.996	.29	3.9-3
85	2	M87	2X6	.231	6.667	.083	13.333	y	.623	1.495	2.233	2.579	.207	5.416	.996	.29	3.9-1
86	2	M88	2X6	.250	7.083	.088	0	y	.558	1.495	2.233	2.579	.207	5.416	.996	.259	3.9-3
87	2	M89	2X6	.250	7.083	.087	0	y	1.234	1.495	2.233	2.579	.207	5.416	.996	.574	3.9-3
88	2	M90	2X6	.247	6.667	.082	13.333	y	.623	1.495	2.233	2.579	.207	5.416	.996	.29	3.9-1
89	2	M91	2X6	.236	6.805	.372	13.333	y	1.234	1.495	2.233	2.579	.207	5.416	.996	.574	3.9-1
90	2	M92	2X6	.772	5.313	.756	14.167	y	1.846	1.495	2.233	2.579	.207	5.416	.996	.858	3.9-3
91	2	M93	2X6	.601	12.691	.824	0	y	2.031	1.495	2.233	2.579	.207	5.416	.996	.944	3.9-3
92	2	M94	2X6	.631	.556	1.019	0	y	2.031	1.495	2.233	2.579	.207	5.416	.996	.944	3.9-3
93	2	M95A	2X6	.127	5	.062	0	y	1.016	1.495	2.233	2.579	.207	5.416	.996	.473	3.9-3
94	2	M96	2X6	.044	12.031	.045	11.849	y	1.834	1.495	2.164	2.579	.207	12.702	.965	.853	3.9-3

Member Wood Code Checks (Continued)

	LC	Member	Shape	UC Max	Loc[ft]	Shear ...	Loc[ft]	Dir	Fc'[ksi]	Ft'[ksi]	Fb'[ksi]	Fb'[ksi]	Fv'[ksi]	RB	CL	CP	Eqn
95	2	M97	2X6	.058	5.469	.045	5.651	y	1.834	1.495	2.164	2.579	.207	12.702	.965	.853	3.9-1
96	2	M98	2X6	.139	5	.062	0	y	1.016	1.495	2.233	2.579	.207	5.416	.996	.473	3.9-1
97	2	M99	2X6	.164	5	.062	0	y	1.016	1.495	2.233	2.579	.207	5.416	.996	.473	3.9-1
98	2	M100	2X6	.083	12.031	.045	11.849	y	1.834	1.495	2.164	2.579	.207	12.702	.965	.853	3.9-1
99	2	M101	2X6	.219	6.927	.292	7.109	y	2.031	1.495	2.228	2.579	.207	6.633	.993	.944	3.9-1
100	2	M102	2X6	.391	1.25	.381	0	y	2.031	1.495	2.233	2.579	.207	5.416	.996	.944	3.9-1
101	2	M103	2X6	.819	8.75	.475	10	y	1.234	1.495	2.233	2.579	.207	5.416	.996	.574	3.9-1
102	2	M104	2X6	.602	4.557	.940	4.74	y	2.031	1.495	2.224	2.579	.207	7.347	.992	.944	3.9-3
103	2	M105	2X6	(1.012)	8.741	1.542	7.127	y	2.031	1.495	2.233	2.579	.207	5.416	.996	.944	3.9-1
104	2	M106	2X6	.211	4.559	.732	4.711	y	1.948	1.495	2.183	2.579	.207	11.603	.973	.906	3.9-1
105	2	M107	2X4	.427	3.887	.534	8.112	y	.679	1.725	2.965	3.273	.207	4.32	.996	.302	3.9-3
106	2	M106A	2-2X4	.964	0	3.380	0	z	.145	1.725	2.561	2.846	.207	7.483	.99	.065	3.9-1
107	2	M107A	2-2X4	.604	0	2.124	0	y	.145	1.725	2.561	2.846	.207	7.483	.99	.065	3.9-1
108	2	M108	2-2X4	.447	26.927	1.142	4.87	y	.145	1.725	2.561	2.846	.207	7.483	.99	.065	3.6.3
109	2	M109	2-2X4	.945	21.5	3.365	20.828	z	.145	1.725	2.561	2.846	.207	7.483	.99	.065	3.9-1



Consulting
Structural
Engineers

Structural Calculations for Tchou Solar Panels

Job Number: 161034

Codes: 2012 IBC Amended by Oregon Structural Specialty Code with 2014 revisions.

Date: 11-08-2016

Location: 1304 NE 77th Ave, Portland, OR

Client: Elemental Energy
3123 Belmont St
Portland, OR 97214
Phone: 503-967-5786

Engineer: Cameron Carroll P.E.
Brad Kheyri, E.I.
MSC Engineers, Inc.
3470 Pipebend Place NE, Suite 120
Salem, OR 97301
Phone: 503-399-1399

Scope of Services: Anchorage design of proposed solar panels on new structure roof along with framing review.

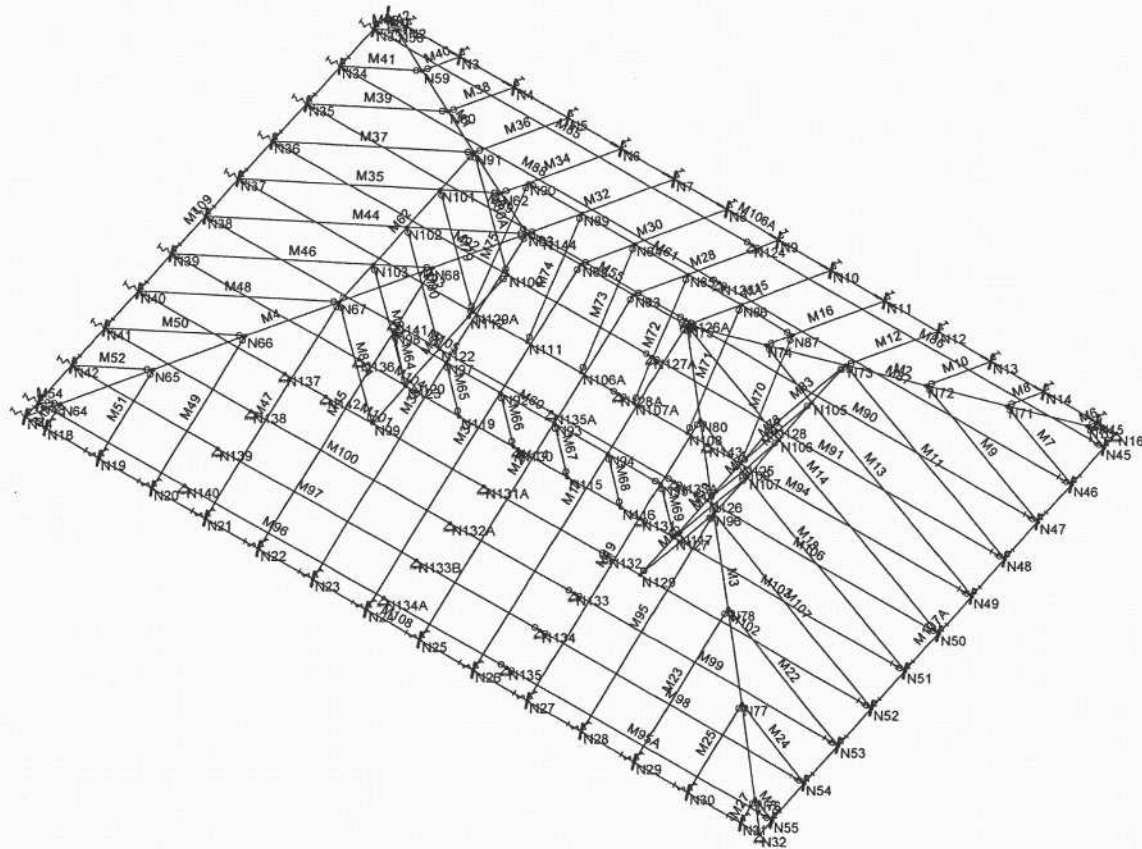
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Appendix	App.1



12/20/2016 Revision to Risa model

LIMITATIONS: Engineer was retained in a limited capacity for this project. Design is based upon the information provided by the client, who is solely responsible for accuracy of same. No responsibility and/or liability is assumed by, or is to be assigned to the Engineer for items beyond those shown on these sheets.



BK

161034

Tchou Solar Panels

R 2

Dec 20, 2016 at 4:13 PM

Tchou Solar Panel Whole Roof CB...

R.1

Wood Material Properties

	Label	Type	Databa...	Species	Grade	Cm	Emod	Nu	Ther...	Dens[k...
1	DF	Solid S...	Visual...	Douglas Fir-Larch	Select Structural		1	.3	.3	.035
2	DF-2	Solid S...	Visual...	Douglas Fir-Larch	No.2		1	.3	.3	.035
3	OLD DF	Solid S...	Visual...	Douglas Fir-Larch	No.1		1	.3	.3	.035
4	SPF	Solid S...	Visual...	Spruce-Pine-fir	No.1		1	.3	.3	.035
5	24F-1.8E DF Balanced	Glulam	NDS T...	24F-1.8E DF BAL	na		1	.3	.3	.035
6	24F-1.8E DF Unbalanced	Glulam	NDS T...	24F-1.8E DF UNBAL	na		1	.3	.3	.035
7	24F-1.8E SP Balanced	Glulam	NDS T...	24F-1.8E SP BAL	na		1	.3	.3	.035
8	1940's Wood	Custom	N/A	1944's Wood	na		1	.3	.3	.035
9	1970's Wood	Custom	N/A	1970's Wood	na		1	.3	.3	.035

Wood Section Sets

	Label	Shape	Type	Design List	Material	Design Ru...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Rafter	2X4	Beam	None	DF	Typical	5.25	.984	5.359	2.877
2	Ridge	2X4	Beam	None	DF	Typical	5.25	.984	5.359	2.877
3	Valley	2X4	Beam	None	DF	Typical	5.25	.984	5.359	2.877
4	Joist	2X6	Beam	None	DF	Typical	8.25	1.547	20.797	5.125
5	Sole PL	2X4	Beam	None	DF	Typical	5.25	.984	5.359	2.877
6	Top PL	2X4	Beam	None	DF	Typical	5.25	.984	5.359	2.877
7	Post	2X4	Column	None	DF	Typical	5.25	.984	5.359	2.877
8	DBL Top	2-2X4	Column	None	DF	Typical	10.5	7.875	10.719	15.255

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N16	27.5	0	0	0	
2	N32	27.5	0	21.5	0	
3	N45	27.5	0	.75	0	
4	N46	27.5	0	2.75	0	
5	N47	27.5	0	4.75	0	
6	N48	27.5	0	6.75	0	
7	N49	27.5	0	8.75	0	
8	N50	27.5	0	10.75	0	
9	N51	27.5	0	12.75	0	
10	N52	27.5	0	14.75	0	
11	N53	27.5	0	16.75	0	
12	N54	27.5	0	18.75	0	
13	N55	27.5	0	20.75	0	
14	N15	26.75	0	0	0	
15	N31	26.75	0	21.5	0	
16	N70	26.75	.5	.75	0	
17	N76	26.75	.5	20.75	0	
18	N14	24.75	0	0	0	
19	N30	24.75	0	21.5	0	
20	N71	24.75	1.833333	2.75	0	
21	N77	24.75	1.833333	18.75	0	
22	N13	22.75	0	0	0	
23	N29	22.75	0	21.5	0	
24	N72	22.75	3.166667	4.75	0	
25	N78	22.75	3.166667	16.75	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
26	N12	20.75	0	0	0	
27	N28	20.75	0	21.5	0	
28	N73	20.75	4.5	6.75	0	
29	N96	20.75	4.5	14.75	0	
30	N105	20.75	4.5	8.75	0	
31	N106	20.75	4.5	10.75	0	
32	N107	20.75	4.5	12.75	0	
33	N11	18.75	0	0	0	
34	N27	18.75	0	21.5	0	
35	N74	18.75	5.833333	8.75	0	
36	N80	18.75	5.833333	12.75	0	
37	N87	18.75	4.5	6.75	0	
38	N95	18.75	4.5	14.75	0	
39	N109	18.75	0	9	0	
40	N117	18.75	0	12.5	0	
41	N125	18.75	0	8.75	0	
42	N126	18.75	0	10.75	0	
43	N127	18.75	0	12.75	0	
44	N128	18.75	0	6.75	0	
45	N129	18.75	0	14.75	0	
46	N131	17.5	0	12.75	0	
47	N132	17.5	0	14.75	0	
48	N133	17.5	0	16.75	0	
49	N134	17.5	0	18.75	0	
50	N135	17.5	0	20.75	0	
51	N133A	17.5	0	10.75	0	
52	N143	17.5	0	8.75	0	
53	N10	16.75	0	0	0	
54	N26	16.75	0	21.5	0	
55	N75	16.75	7.166667	10.75	0	
56	N86	16.75	4.5	6.75	0	
57	N94	16.75	4.5	14.75	0	
58	N108	16.75	0	8.75	0	
59	N116	16.75	0	12.75	0	
60	N9	14.75	0	0	0	
61	N25	14.75	0	21.5	0	
62	N83	14.75	7.166667	10.75	0	
63	N85	14.75	4.5	6.75	0	
64	N93	14.75	4.5	14.75	0	
65	N107A	14.75	0	8.75	0	
66	N115	14.75	0	12.75	0	
67	N124	14.167	0	.75	0	
68	N125A	14.167	0	2.75	0	
69	N126A	14.167	0	4.75	0	
70	N127A	14.167	0	6.75	0	
71	N128A	14.167	0	8.75	0	
72	N130	12.91	0	12.75	0	
73	N131A	12.91	0	14.75	0	
74	N132A	12.91	0	16.75	0	
75	N133B	12.91	0	18.75	0	
76	N134A	12.91	0	20.75	0	
77	N135A	12.91	0	10.75	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
78	N8	12.75	0	0	0	
79	N24	12.75	0	21.5	0	
80	N82	12.75	7.167	10.75	0	
81	N84	12.75	4.5	6.75	0	
82	N92	12.75	4.5	14.75	0	
83	N106A	12.75	0	8.75	0	
84	N114	12.75	0	12.75	0	
85	N7	10.75	0	0	0	
86	N23	10.75	0	21.5	0	
87	N63	10.75	7.166667	10.75	0	
88	N89	10.75	4.5	6.75	0	
89	N97	10.75	4.5	14.75	0	
90	N111	10.75	0	8.75	0	
91	N119	10.75	0	12.75	0	
92	N6	8.75	0	0	0	
93	N22	8.75	0	21.5	0	
94	N62	8.75	5.833333	8.75	0	
95	N68	8.75	5.833333	12.75	0	
96	N90	8.75	4.5	6.75	0	
97	N98	8.75	4.5	14.75	0	
98	N99	8.75	0	14.75	0	
99	N100	8.75	0	6.75	0	
100	N112	8.75	0	9	0	
101	N120	8.75	0	12.5	0	
102	N122	8.75	0	10.75	0	
103	N123	8.75	0	12.75	0	
104	N129A	8.75	0	8.75	0	
105	N136	7	0	12.75	0	
106	N141	7	0	10.75	0	
107	N142	7	0	14.75	0	
108	N5	6.75	0	0	0	
109	N21	6.75	0	21.5	0	
110	N67	6.75	4.5	14.75	0	
111	N91	6.75	4.5	6.75	0	
112	N101	6.75	4.5	8.75	0	
113	N102	6.75	4.5	10.75	0	
114	N103	6.75	4.5	12.75	0	
115	N137	5.5	0	14.75	0	
116	N138	5.5	0	16.75	0	
117	N139	5.5	0	18.75	0	
118	N140	5.5	0	20.75	0	
119	N4	4.75	0	0	0	
120	N20	4.75	0	21.5	0	
121	N60	4.75	3.166667	4.75	0	
122	N66	4.75	3.166667	16.75	0	
123	N3	2.75	0	0	0	
124	N19	2.75	0	21.5	0	
125	N59	2.75	1.833333	2.75	0	
126	N65	2.75	1.833333	18.75	0	
127	N2	.75	0	0	0	
128	N18	.75	0	21.5	0	
129	N58	.75	.5	.75	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
130	N64	7.5	5	20.75	0	
131	N1	0	0	0	0	
132	N33	0	0	7.5	0	
133	N34	0	0	2.75	0	
134	N35	0	0	4.75	0	
135	N36	0	0	6.75	0	
136	N37	0	0	8.75	0	
137	N38	0	0	10.75	0	
138	N39	0	0	12.75	0	
139	N40	0	0	14.75	0	
140	N41	0	0	16.75	0	
141	N42	0	0	18.75	0	
142	N43	0	0	20.75	0	
143	N44	0	0	21.5	0	
144	N144	8.75	0	4.75	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N1		Reaction				
2	N2	Reaction	Reaction	S3.1			
3	N3	Reaction	Reaction	S3.1			
4	N4	Reaction	Reaction	S3.1			
5	N5		Reaction	S3.1			
6	N6	Reaction	Reaction	S3.1			
7	N7	Reaction	Reaction	S3.1			
8	N8	Reaction	Reaction	S3.1			
9	N9	Reaction	Reaction	S3.1			
10	N10	Reaction	Reaction	S3.1			
11	N11	Reaction	Reaction	S3.1			
12	N12		Reaction	S3.1			
13	N13	Reaction	Reaction	S3.1			
14	N14	Reaction	Reaction	S3.1			
15	N15	Reaction	Reaction	S3.1			
16	N16	Reaction	Reaction	Reaction			
17	N18	S1	Reaction	S1			
18	N19	S1	Reaction	S1			
19	N20	S1	Reaction	S1			
20	N21	S1	Reaction	S1			
21	N22	S1	Reaction	S1			
22	N23	S1	Reaction	S1			
23	N24	S1	Reaction	S1			
24	N25	S1	Reaction	S1			
25	N26	S1	Reaction	S1			
26	N27	S1	Reaction	S1			
27	N28	S1	Reaction	S1			
28	N29	S1	Reaction	S1			
29	N30	S1	Reaction	S1			
30	N31	S1	Reaction	S1			
31	N32	Reaction	Reaction	Reaction			
32	N33	S1.5	Reaction	S1.5			

Joint Boundary Conditions (Continued)

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
33	N34	S1.5	Reaction	S1.5			
34	N35	S1.5	Reaction	S1.5			
35	N36	S1.5	Reaction	S1.5			
36	N37	S1.5	Reaction	S1.5			
37	N38	S1.5	Reaction	S1.5			
38	N39	S1.5	Reaction	S1.5			
39	N40	S1.5	Reaction	S1.5			
40	N41	S1.5	Reaction	S1.5			
41	N42	S1.5	Reaction	S1.5			
42	N43	S1.5	Reaction	S1.5			
43	N44	S1.5	Reaction	S1.5			
44	N45	S1.5	Reaction	S1.5			
45	N46	S1.5	Reaction	S1.5			
46	N47	S1.5	Reaction	S1.5			
47	N48	S1.5	Reaction	S1.5			
48	N49	S1.5	Reaction	S1.5			
49	N50	S1.5	Reaction	S1.5			
50	N51	S1.5	Reaction	S1.5			
51	N52	S1.5	Reaction	S1.5			
52	N53	S1.5	Reaction	S1.5			
53	N54	S1.5	Reaction	S1.5			
54	N55	S1.5	Reaction	S1.5			
55	N58						
56	N59						
57	N60						
58	N62						
59	N63						
60	N64						
61	N65						
62	N66						
63	N67						
64	N68						
65	N70						
66	N71						
67	N72						
68	N73						
69	N74						
70	N75						
71	N76						
72	N77						
73	N78						
74	N80						
75	N82						
76	N83						
77	N84						
78	N85						
79	N86						
80	N87						
81	N89						
82	N90						
83	N91						
84	N92						

Joint Boundary Conditions (Continued)

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
85	N93						
86	N94						
87	N95						
88	N96						
89	N97						
90	N98						
91	N99						
92	N100						
93	N101						
94	N102						
95	N103						
96	N105						
97	N106						
98	N107						
99	N106A						
100	N107A						
101	N108						
102	N109						
103	N111						
104	N112						
105	N114						
106	N115						
107	N116						
108	N117						
109	N119						
110	N120						
111	N122						
112	N123						
113	N125						
114	N126						
115	N127						
116	N128						
117	N129						
118	N124	Reaction	Reaction	Reaction			
119	N125A	Reaction	Reaction	Reaction			
120	N126A	Reaction	Reaction	Reaction			
121	N127A	Reaction	Reaction	Reaction			
122	N128A	Reaction	Reaction	Reaction			
123	N131	Reaction	Reaction	Reaction			
124	N132	Reaction	Reaction	Reaction			
125	N133	Reaction	Reaction	Reaction			
126	N134	Reaction	Reaction	Reaction			
127	N135	Reaction	Reaction	Reaction			
128	N133A	Reaction	Reaction	Reaction			
129	N140	Reaction	Reaction	Reaction			
130	N139	Reaction	Reaction	Reaction			
131	N138	Reaction	Reaction	Reaction			
132	N137	Reaction	Reaction	Reaction			
133	N142	Reaction	Reaction	Reaction			
134	N136	Reaction	Reaction	Reaction			
135	N141	Reaction	Reaction	Reaction			
136	N134A	Reaction	Reaction	Reaction			

Joint Boundary Conditions (Continued)

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
137	N133B	Reaction	Reaction	Reaction			
138	N132A	Reaction	Reaction	Reaction			
139	N131A	Reaction	Reaction	Reaction			
140	N135A	Reaction	Reaction	Reaction			
141	N130	Reaction	Reaction	Reaction			
142	N143	Reaction	Reaction	Reaction			
143	N144						

Wood Design Parameters

	Label	Shape	Length[...]	le2[ft]	le1[ft]	le-bend top[ft]	le-bend bot[ft]	Kyy	Kzz	CV	Cr	y sway	z sway
1	M1	Valley	16.807	Segment	Segment	Segment	Segment						
2	M2	Valley	16.807	Segment	Segment	Segment	Segment						
3	M3	Valley	16.807	Segment	Segment	Segment	Segment						
4	M4	Valley	16.807	Segment	Segment	Segment	Segment						
5	M5	Rafter	.901	1	Segment	1	Segment						
6	M6	Rafter	.901	1	Segment	1	Segment						
7	M7	Rafter	3.305	1	Segment	1	Segment						
8	M8	Rafter	3.305	1	Segment	1	Segment						
9	M9	Rafter	5.709	1	Segment	1	Segment						
10	M10	Rafter	5.709	1	Segment	1	Segment						
11	M11	Rafter	8.112	1	Segment	1	Segment						
12	M12	Rafter	8.112	1	Segment	1	Segment						
13	M13	Rafter	10.516	1	Segment	1	Segment						
14	M14	Rafter	12.92	1	Segment	1	Segment						
15	M15	Rafter	12.92	1	Segment	1	Segment						
16	M16	Rafter	10.516	1	Segment	1	Segment						
17	M17	Rafter	12.92	1	Segment	1	Segment						
18	M18	Rafter	10.516	1	Segment	1	Segment						
19	M19	Rafter	10.516	1	Segment	1	Segment						
20	M22	Rafter	5.709	1	Segment	1	Segment						
21	M23	Rafter	5.709	1	Segment	1	Segment						
22	M24	Rafter	3.305	1	Segment	1	Segment						
23	M25	Rafter	3.305	1	Segment	1	Segment						
24	M26	Rafter	.901	1	Segment	1	Segment						
25	M27	Rafter	.901	1	Segment	1	Segment						
26	M28	Rafter	12.92	1	Segment	1	Segment						
27	M29	Rafter	12.92	1	Segment	1	Segment						
28	M30	Rafter	12.92	1	Segment	1	Segment						
29	M31	Rafter	12.92	1	Segment	1	Segment						
30	M32	Rafter	12.92	1	Segment	1	Segment						
31	M33	Rafter	12.92	1	Segment	1	Segment						
32	M34	Rafter	10.516	1	Segment	1	Segment						
33	M35	Rafter	10.516	1	Segment	1	Segment						
34	M36	Rafter	8.112	1	Segment	1	Segment						
35	M37	Rafter	8.112	1	Segment	1	Segment						
36	M38	Rafter	5.709	1	Segment	1	Segment						
37	M39	Rafter	5.709	1	Segment	1	Segment						
38	M40	Rafter	3.305	1	Segment	1	Segment						
39	M41	Rafter	3.305	1	Segment	1	Segment						
40	M42	Rafter	.901	1	Segment	1	Segment						

Wood Design Parameters (Continued)

	Label	Shape	Length[...]	le2[ft]	le1[ft]	le-bend top[ft]	le-bend bot[ft]	Kyy	Kzz	CV	Cr	y sway	z sway
41	M43	Rafter	.901	1	Segment	1	Segment						
42	M44	Rafter	12.92	1	Segment	1	Segment						
43	M45	Rafter	10.516	1	Segment	1	Segment						
44	M46	Rafter	10.516	1	Segment	1	Segment						
45	M47	Rafter	8.112	1	Segment	1	Segment						
46	M48	Rafter	8.112	1	Segment	1	Segment						
47	M49	Rafter	5.709	1	Segment	1	Segment						
48	M50	Rafter	5.709	1	Segment	1	Segment						
49	M51	Rafter	3.305	1	Segment	1	Segment						
50	M52	Rafter	3.305	1	Segment	1	Segment						
51	M53	Rafter	.901	1	Segment	1	Segment						
52	M54	Rafter	.901	1	Segment	1	Segment						
53	M55	Ridge	6	Segment	Segment	2	Segment						
54	M58	Sole PL	8	2	Segment	2	Segment						
55	M59	Sole PL	8	2	Segment	2	Segment						
56	M60	Top PL	10	2	Segment	2	Segment						
57	M61	Top PL	10	2	Segment	2	Segment						
58	M62	Top PL	8	2	Segment	2	Segment						
59	M63	Top PL	8	2	Segment	2	Segment						
60	M64	Post	4.924	Segment	Segment	Segment	Segment						
61	M65	Post	4.924	Segment	Segment	Segment	Segment						
62	M66	Post	4.924	Segment	Segment	Segment	Segment						
63	M67	Post	4.924	Segment	Segment	Segment	Segment						
64	M68	Post	4.924	Segment	Segment	Segment	Segment						
65	M69	Post	4.924	Segment	Segment	Segment	Segment						
66	M70	Post	4.924	Segment	Segment	Segment	Segment						
67	M71	Post	4.924	Segment	Segment	Segment	Segment						
68	M72	Post	4.924	Segment	Segment	Segment	Segment						
69	M73	Post	4.924	Segment	Segment	Segment	Segment						
70	M74	Post	4.924	Segment	Segment	Segment	Segment						
71	M75	Post	5.031	Segment	Segment	Segment	Segment						
72	M76	Post	4.924	Segment	Segment	Segment	Segment						
73	M77	Post	4.924	Segment	Segment	Segment	Segment						
74	M78	Post	4.924	Segment	Segment	Segment	Segment						
75	M79	Post	4.924	Segment	Segment	Segment	Segment						
76	M80	Post	4.924	Segment	Segment	Segment	Segment						
77	M81	Post	4.924	Segment	Segment	Segment	Segment						
78	M80A	Post	4.924	Segment	Segment	Segment	Segment						
79	M81A	Post	4.924	Segment	Segment	Segment	Segment						
80	M82	Post	4.924	Segment	Segment	Segment	Segment						
81	M83	Post	4.924	Segment	Segment	Segment	Segment						
82	M95	Rafter	8.112	1	Segment	1	Segment						
83	M85	Joist	14.167	1	Segment	1	Segment						
84	M86	Joist	13.333	1	Segment	1	Segment						
85	M87	Joist	13.333	1	Segment	1	Segment						
86	M88	Joist	14.167	1	Segment	1	Segment						
87	M89	Joist	14.167	1	Segment	1	Segment						
88	M90	Joist	13.333	1	Segment	1	Segment						
89	M91	Joist	13.333	1	Segment	1	Segment						
90	M92	Joist	14.167	1	Segment	1	Segment						
91	M93	Joist	14.167	1	Segment	1	Segment						
92	M94	Joist	13.333	1	Segment	1	Segment						

Wood Design Parameters (Continued)

	Label	Shape	Length[...]	le2[ft]	le1[ft]	le-bend top[ft]	le-bend bot[ft]	Kyy	Kzz	CV	Cr	y sway	z sway
93	M95A	Joist	10	1	Segment	1	Segment						
94	M96	Joist	17.5	1	Segment	1	Segment						
95	M97	Joist	17.5	1	Segment	1	Segment						
96	M98	Joist	10	1	Segment	1	Segment						
97	M99	Joist	10	1	Segment	1	Segment						
98	M100	Joist	17.5	1	Segment	1	Segment						
99	M101	Joist	17.5	1	Segment	1	Segment						
100	M102	Joist	10	1	Segment	1	Segment						
101	M103	Joist	10	1	Segment	1	Segment						
102	M104	Joist	17.5	1	Segment	1	Segment						
103	M105	Joist	17.5	1	Segment	1	Segment						
104	M106	Joist	10	1	Segment	1	Segment						
105	M107	Rafter	8.112	1	Segment	1	Segment				Yes		
106	M106A	DBL Top	27.5	12	12	12	12						
107	M107A	DBL Top ...	21.5	12	12	12	12						
108	M108	DBL Top	27.5	12	12	12	12						
109	M109	DBL Top ...	21.5	12	12	12	12						

Member Distributed Loads (BLC 1 : DL)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M5	Y	-.016	-.016	0	0
2	M6	Y	-.016	-.016	0	0
3	M7	Y	-.016	-.016	0	0
4	M8	Y	-.016	-.016	0	0
5	M9	Y	-.016	-.016	0	0
6	M10	Y	-.016	-.016	0	0
7	M11	Y	-.016	-.016	0	0
8	M12	Y	-.016	-.016	0	0
9	M13	Y	-.016	-.016	0	0
10	M14	Y	-.016	-.016	0	0
11	M15	Y	-.016	-.016	0	0
12	M16	Y	-.016	-.016	0	0
13	M17	Y	-.016	-.016	0	0
14	M18	Y	-.016	-.016	0	0
15	M19	Y	-.016	-.016	0	0
16	M22	Y	-.016	-.016	0	0
17	M23	Y	-.016	-.016	0	0
18	M24	Y	-.016	-.016	0	0
19	M25	Y	-.016	-.016	0	0
20	M26	Y	-.016	-.016	0	0
21	M27	Y	-.016	-.016	0	0
22	M28	Y	-.016	-.016	0	0
23	M29	Y	-.016	-.016	0	0
24	M30	Y	-.016	-.016	0	0
25	M31	Y	-.016	-.016	0	0
26	M32	Y	-.016	-.016	0	0
27	M33	Y	-.016	-.016	0	0
28	M34	Y	-.016	-.016	0	0
29	M35	Y	-.016	-.016	0	0
30	M36	Y	-.016	-.016	0	0

Member Distributed Loads (BLC 1 : DL) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
31	M37	Y	-.016	-.016	0	0
32	M38	Y	-.016	-.016	0	0
33	M39	Y	-.016	-.016	0	0
34	M40	Y	-.016	-.016	0	0
35	M41	Y	-.016	-.016	0	0
36	M42	Y	-.016	-.016	0	0
37	M44	Y	-.016	-.016	0	0
38	M45	Y	-.016	-.016	0	0
39	M46	Y	-.016	-.016	0	0
40	M47	Y	-.016	-.016	0	0
41	M48	Y	-.016	-.016	0	0
42	M49	Y	-.016	-.016	0	0
43	M50	Y	-.016	-.016	0	0
44	M51	Y	-.016	-.016	0	0
45	M52	Y	-.016	-.016	0	0
46	M53	Y	-.016	-.016	0	0
47	M54	Y	-.016	-.016	0	0
48	M95	Y	-.016	-.016	0	0
49	M107	Y	-.016	-.016	0	0
50	M85	Y	-.014	-.014	0	0
51	M86	Y	-.014	-.014	0	0
52	M87	Y	-.014	-.014	0	0
53	M88	Y	-.014	-.014	0	0
54	M89	Y	-.014	-.014	0	0
55	M90	Y	-.014	-.014	0	0
56	M91	Y	-.014	-.014	0	0
57	M92	Y	-.014	-.014	0	0
58	M93	Y	-.014	-.014	0	0
59	M94	Y	-.014	-.014	0	0
60	M95A	Y	-.014	-.014	0	0
61	M96	Y	-.014	-.014	0	0
62	M97	Y	-.014	-.014	0	0
63	M98	Y	-.014	-.014	0	0
64	M99	Y	-.014	-.014	0	0
65	M100	Y	-.014	-.014	0	0
66	M101	Y	-.014	-.014	0	0
67	M102	Y	-.014	-.014	0	0
68	M103	Y	-.014	-.014	0	0
69	M104	Y	-.014	-.014	0	0
70	M105	Y	-.014	-.014	0	0
71	M106	Y	-.014	-.014	0	0

Member Distributed Loads (BLC 2 : SL)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M5	Y	-.04	-.04	0	0
2	M6	Y	-.04	-.04	0	0
3	M7	Y	-.04	-.04	0	0
4	M8	Y	-.04	-.04	0	0
5	M9	Y	-.04	-.04	0	0
6	M10	Y	-.04	-.04	0	0
7	M11	Y	-.04	-.04	0	0

Member Distributed Loads (BLC 2 : SL) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
8	M12	Y	- .04	- .04	0	0
9	M13	Y	- .04	- .04	0	0
10	M14	Y	- .04	- .04	0	0
11	M15	Y	- .04	- .04	0	0
12	M16	Y	- .04	- .04	0	0
13	M17	Y	- .04	- .04	0	0
14	M18	Y	- .04	- .04	0	0
15	M19	Y	- .04	- .04	0	0
16	M22	Y	- .04	- .04	0	0
17	M23	Y	- .04	- .04	0	0
18	M24	Y	- .04	- .04	0	0
19	M25	Y	- .04	- .04	0	0
20	M26	Y	- .04	- .04	0	0
21	M27	Y	- .04	- .04	0	0
22	M28	Y	- .04	- .04	0	0
23	M29	Y	- .04	- .04	0	0
24	M30	Y	- .04	- .04	0	0
25	M31	Y	- .04	- .04	0	0
26	M32	Y	- .04	- .04	0	0
27	M33	Y	- .04	- .04	0	0
28	M34	Y	- .04	- .04	0	0
29	M35	Y	- .04	- .04	0	0
30	M36	Y	- .04	- .04	0	0
31	M37	Y	- .04	- .04	0	0
32	M38	Y	- .04	- .04	0	0
33	M39	Y	- .04	- .04	0	0
34	M40	Y	- .04	- .04	0	0
35	M41	Y	- .04	- .04	0	0
36	M42	Y	- .04	- .04	0	0
37	M44	Y	- .04	- .04	0	0
38	M45	Y	- .04	- .04	0	0
39	M46	Y	- .04	- .04	0	0
40	M47	Y	- .04	- .04	0	0
41	M48	Y	- .04	- .04	0	0
42	M49	Y	- .04	- .04	0	0
43	M50	Y	- .04	- .04	0	0
44	M51	Y	- .04	- .04	0	0
45	M52	Y	- .04	- .04	0	0
46	M53	Y	- .04	- .04	0	0
47	M54	Y	- .04	- .04	0	0
48	M95	Y	- .04	- .04	0	0
49	M107	Y	- .04	- .04	0	0

Member Distributed Loads (BLC 3 : ML)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M17	Y	- .006	- .006	0	0
2	M29	Y	- .006	- .006	0	0
3	M31	Y	- .006	- .006	0	0
4	M33	Y	- .006	- .006	0	0
5	M45	Y	- .006	- .006	0	0
6	M19	Y	- .006	- .006	0	0

Member Distributed Loads (BLC 3 : ML) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
7	M22	Y	-.006	-.006	0	0
8	M107	Y	-.006	-.006	0	0
9	M18	Y	-.006	-.006	0	0
10	M14	Y	-.006	-.006	0	0
11	M13	Y	-.006	-.006	0	0
12	M11	Y	-.006	-.006	0	0
13	M9	Y	-.006	-.006	0	0

Basic Load Cases

	BLC Description	Category	X Gravi..	Y Gravi..	Z Gravity	Joint	Point	Distrib...	Area(M...Surfac...
1	DL	DL						71	
2	SL	SL						49	
3	ML	OL1						13	

Load Combinations

	Description	Solve P...	S...	B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...
1	DL	Yes	Y	1	1									
2	DL + SL	Yes	Y	1	1	2	1							
3	DL + SL + ML	Yes	Y	1	1	2	1	3	1					

MAX REACTION = 427 lbs

Envelope Joint Reactions

 (E) MAX. (3) NAKS: Value = 141 (1.15) (3) = 486 ≈ 427 → C.K.

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N1	max	0	1	-.414	1	0	1	0	1	0	1	0	1
2		min	0	1	-1.224	3	0	1	0	1	0	1	0	1
3	N2	max	-.085	1	.486	3	-.028	1	0	1	0	1	0	1
4		min	-.211	3	.156	1	-.07	3	0	1	0	1	0	1
5	N3	max	.003	2	.222	2	.203	2	0	1	0	1	0	1
6		min	0	1	.061	1	.066	1	0	1	0	1	0	1
7	N4	max	0	2	.499	3	.462	2	0	1	0	1	0	1
8		min	0	1	.154	1	.17	1	0	1	0	1	0	1
9	N5	max	0	1	.75	2	.497	2	0	1	0	1	0	1
10		min	0	1	.296	1	.2	1	0	1	0	1	0	1
11	N6	max	0	1	.37	2	.229	2	0	1	0	1	0	1
12		min	-.001	3	.124	1	.094	1	0	1	0	1	0	1
13	N7	max	-.001	1	-.063	1	-.017	1	0	1	0	1	0	1
14		min	-.003	2	-.103	3	-.033	3	0	1	0	1	0	1
15	N8	max	.002	3	.316	3	.002	2	0	1	0	1	0	1
16		min	0	1	.091	1	-.014	1	0	1	0	1	0	1
17	N9	max	0	1	.343	3	.048	3	0	1	0	1	0	1
18		min	-.001	3	.096	1	.004	1	0	1	0	1	0	1
19	N10	max	0	1	.051	3	.008	2	0	1	0	1	0	1
20		min	0	3	.004	1	.002	1	0	1	0	1	0	1
21	N11	max	.001	3	.2	2	.08	3	0	1	0	1	0	1
22		min	0	1	.063	1	.04	1	0	1	0	1	0	1
23	N12	max	0	1	.428	3	.238	3	0	1	0	1	0	1
24		min	0	1	.167	1	.098	1	0	1	0	1	0	1
25	N13	max	.001	3	.464	3	.313	3	0	1	0	1	0	1

Envelope Joint Reactions (Continued)

Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
26		min	0	1	.134	1	.107	1	0	1	0	1	1
27	N14	max	0	1	.247	3	.208	3	0	1	0	1	1
28		min	0	3	.07	1	.064	1	0	1	0	1	1
29	N15	max	-.002	1	.401	3	.036	3	0	1	0	1	1
30		min	-.008	3	.117	1	.01	1	0	1	0	1	1
31	N16	max	.179	3	-.278	1	-.119	1	0	1	0	1	1
32		min	.071	1	-.897	3	-.326	3	0	1	0	1	1
33	N18	max	.005	3	.386	3	-.019	1	0	1	0	1	1
34		min	.002	1	.109	1	.054	3	0	1	0	1	1
35	N19	max	.004	3	.234	2	-.035	1	0	1	0	1	1
36		min	.001	1	.068	1	-.11	3	0	1	0	1	1
37	N20	max	.004	3	.394	3	-.038	1	0	1	0	1	1
38		min	.001	1	.111	1	-.121	3	0	1	0	1	1
39	N21	max	.004	3	.158	2	-.027	1	0	1	0	1	1
40		min	.001	1	.055	1	-.075	3	0	1	0	1	1
41	N22	max	.003	3	.222	3	-.021	1	0	1	0	1	1
42		min	.001	1	.053	1	-.058	3	0	1	0	1	1
43	N23	max	.003	3	.217	3	-.026	1	0	1	0	1	1
44		min	0	1	.068	1	-.078	3	0	1	0	1	1
45	N24	max	.003	3	.391	3	-.028	1	0	1	0	1	1
46		min	0	1	.104	1	-.098	3	0	1	0	1	1
47	N25	max	.002	3	.3	3	-.017	1	0	1	0	1	1
48		min	0	1	.076	1	-.067	3	0	1	0	1	1
49	N26	max	.002	3	.09	3	-.006	1	0	1	0	1	1
50		min	0	1	.012	1	-.019	3	0	1	0	1	1
51	N27	max	.002	3	.235	3	-.013	1	0	1	0	1	1
52		min	0	1	.069	1	-.024	3	0	1	0	1	1
53	N28	max	.001	3	.197	2	-.03	1	0	1	0	1	1
54		min	0	1	.077	1	-.074	3	0	1	0	1	1
55	N29	max	0	3	.43	3	-.041	1	0	1	0	1	1
56		min	0	1	.119	1	-.123	3	0	1	0	1	1
57	N30	max	0	3	.22	3	-.028	1	0	1	0	1	1
58		min	0	1	.062	1	-.092	3	0	1	0	1	1
59	N31	max	0	3	.465	3	-.005	1	0	1	0	1	1
60		min	0	1	.136	1	-.017	3	0	1	0	1	1
61	N32	max	-.062	1	-.195	1	-.084	1	0	1	0	1	1
62		min	-.218	3	-.673	3	-.274	3	0	1	0	1	1
63	N33	max	-.002	1	.552	3	-.022	1	0	1	0	1	1
64		min	-.006	3	.245	1	-.06	3	0	1	0	1	1
65	N34	max	.003	2	.324	2	-.022	1	0	1	0	1	1
66		min	0	1	.161	1	-.059	3	0	1	0	1	1
67	N35	max	.008	3	.599	3	-.022	1	0	1	0	1	1
68		min	.003	1	.253	1	-.058	3	0	1	0	1	1
69	N36	max	.007	3	.69	3	-.021	1	0	1	0	1	1
70		min	.003	1	.264	1	-.058	3	0	1	0	1	1
71	N37	max	.003	3	.407	3	-.021	1	0	1	0	1	1
72		min	.001	1	.173	1	-.057	3	0	1	0	1	1
73	N38	max	.004	3	.461	3	-.021	1	0	1	0	1	1
74		min	.001	1	.154	1	-.057	3	0	1	0	1	1
75	N39	max	0	1	.163	2	-.021	1	0	1	0	1	1
76		min	0	3	.071	1	-.057	3	0	1	0	1	1
77	N40	max	0	1	.157	3	-.021	1	0	1	0	1	1

Envelope Joint Reactions (Continued)

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
78		min	.001	2	.036	1	-.057	3	0	1	0	1	0	1
79	N41	max	.002	3	.423	3	-.021	1	0	1	0	1	0	1
80		min	0	1	.138	1	-.057	3	0	1	0	1	0	1
81	N42	max	.001	2	.266	3	-.021	1	0	1	0	1	0	1
82		min	0	1	.096	1	-.057	3	0	1	0	1	0	1
83	N43	max	0	1	.411	3	-.021	1	0	1	0	1	0	1
84		min	0	2	.135	1	-.058	3	0	1	0	1	0	1
85	N44	max	.008	3	-.12	1	-.021	1	0	1	0	1	0	1
86		min	.002	1	-.496	2	-.058	3	0	1	0	1	0	1
87	N45	max	.003	3	.479	3	0	1	0	1	0	1	0	1
88		min	0	1	.208	1	0	3	0	1	0	1	0	1
89	N46	max	0	1	.339	2	0	1	0	1	0	1	0	1
90		min	-.003	3	.163	1	0	2	0	1	0	1	0	1
91	N47	max	-.002	1	.576	3	0	1	0	1	0	1	0	1
92		min	-.007	3	.228	1	0	2	0	1	0	1	0	1
93	N48	max	-.001	1	.531	3	0	1	0	1	0	1	0	1
94		min	-.004	3	.187	1	0	2	0	1	0	1	0	1
95	N49	max	0	1	.377	3	0	1	0	1	0	1	0	1
96		min	-.001	3	.153	1	0	2	0	1	0	1	0	1
97	N50	max	-.001	1	.612	3	0	1	0	1	0	1	0	1
98		min	-.004	3	.206	1	0	2	0	1	0	1	0	1
99	N51	max	0	1	.402	3	0	1	0	1	0	1	0	1
100		min	0	3	.164	1	0	2	0	1	0	1	0	1
101	N52	max	0	1	.419	3	0	1	0	1	0	1	0	1
102		min	0	3	.148	1	0	2	0	1	0	1	0	1
103	N53	max	-.001	1	.514	3	0	1	0	1	0	1	0	1
104		min	-.004	3	.188	1	0	2	0	1	0	1	0	1
105	N54	max	0	1	.293	2	0	1	0	1	0	1	0	1
106		min	-.002	3	.133	1	0	3	0	1	0	1	0	1
107	N55	max	.004	3	.526	3	0	1	0	1	0	1	0	1
108		min	.001	1	.204	1	0	3	0	1	0	1	0	1
109	N124	max	-.061	1	.192	1	0	3	0	1	0	1	0	1
110		min	-.16	2	.192	1	0	1	0	1	0	1	0	1
111	N125A	max	-.021	1	.192	1	0	1	0	1	0	1	0	1
112		min	-.061	3	.192	1	0	3	0	1	0	1	0	1
113	N126A	max	.078	2	.193	1	0	1	0	1	0	1	0	1
114		min	.031	1	.193	1	0	3	0	1	0	1	0	1
115	N127A	max	.238	2	.215	3	0	3	0	1	0	1	0	1
116		min	.1	1	.104	1	0	1	0	1	0	1	0	1
117	N128A	max	.176	3	.621	2	-.089	1	0	1	0	1	0	1
118		min	.083	1	.173	1	-.316	3	0	1	0	1	0	1
119	N131	max	.045	3	.1	3	.251	3	0	1	0	1	0	1
120		min	-.002	1	.326	1	.071	1	0	1	0	1	0	1
121	N132	max	.129	3	.505	3	.007	3	0	1	0	1	0	1
122		min	.04	1	.189	1	.002	1	0	1	0	1	0	1
123	N133	max	-.099	1	.09	1	0	1	0	1	0	1	0	1
124		min	-.372	3	.09	1	0	3	0	1	0	1	0	1
125	N134	max	-.05	1	.09	1	0	1	0	1	0	1	0	1
126		min	-.181	3	.09	1	0	3	0	1	0	1	0	1
127	N135	max	.38	3	.09	1	0	1	0	1	0	1	0	1
128		min	.113	1	.09	1	0	3	0	1	0	1	0	1
129	N133A	max	-.073	1	.236	3	.023	3	0	1	0	1	0	1

Envelope Joint Reactions (Continued)

Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
130		min	-238	3	.083	1	.005	1	0	0	1	0	1
131	N140	max	-.019	1	.103	1	0	1	0	0	1	0	1
132		min	-.122	2	.103	1	-.001	3	0	0	1	0	1
133	N139	max	.186	2	.103	1	0	1	0	0	1	0	1
134		min	.053	1	.103	1	-.001	3	0	0	1	0	1
135	N138	max	.339	3	.103	1	0	1	0	0	1	0	1
136		min	.092	1	.103	1	-.001	3	0	0	1	0	1
137	N137	max	-.093	1	0	1	.009	2	0	0	1	0	1
138		min	-.183	2	-.188	3	-.001	1	0	0	1	0	1
139	N142	max	-.037	1	.65	3	-.006	1	0	0	1	0	1
140		min	-.143	3	.193	1	-.028	2	0	0	1	0	1
141	N136	max	-.033	1	.509	3	-.008	1	0	0	1	0	1
142		min	-.099	3	.204	1	-.029	2	0	0	1	0	1
143	N141	max	.265	3	1.177	3	-.006	1	0	0	1	0	1
144		min	.068	1	.471	1	-.025	2	0	0	1	0	1
145	N134A	max	0	3	.095	1	0	3	0	0	1	0	1
146		min	0	1	.095	1	0	1	0	0	1	0	1
147	N133B	max	0	1	.095	1	0	3	0	0	1	0	1
148		min	0	3	.095	1	0	1	0	0	1	0	1
149	N132A	max	0	1	.095	1	0	3	0	0	1	0	1
150		min	0	3	.095	1	0	1	0	0	1	0	1
151	N131A	max	-.016	1	.208	3	-.001	1	0	0	1	0	1
152		min	-.06	3	.115	1	-.006	2	0	0	1	0	1
153	N135A	max	-.027	1	.559	3	0	1	0	0	1	0	1
154		min	-.08	2	.238	1	-.004	2	0	0	1	0	1
155	N130	max	-.009	1	1.337	3	.458	3	0	0	1	0	1
156		min	-.033	2	.394	1	.116	1	0	0	1	0	1
157	N143	max	.109	3	1.918	3	-.086	1	0	0	1	0	1
158		min	.023	1	.716	1	-.271	2	0	0	1	0	1
159	Totals:	max	0	2	25.013	3	0	1					
160		min	0	1	9.941	1	0	3					

Envelope Wood Code Checks

Member	Shape	Code Check	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	Fc' [k...Ft' [ksi]	Fb1' [...Fb2' [...Fv' [k... Egn
1	M1	2X4	.341	10.68	3	.408	10.68	y	3	.818 1.725 2.56 2.846 .207 3.9-3
2	M2	2X4	.213	16.807	3	.127	3.151	y	3	2.057 1.725 2.578 2.846 .207 3.9-1
3	M3	2X4	.293	9.279	3	.663	6.303	y	3	.818 1.725 2.56 2.846 .207 3.9-3
4	M4	2X4	.281	9.279	3	.199	0	y	3	.818 1.725 2.56 2.846 .207 3.9-3
5	M5	2X4	.029	0	2	.805	0	y	3	2.116 1.725 2.58 2.846 .207 3.9-3
6	M6	2X4	.053	.901	3	.825	.901	y	3	2.116 1.725 2.58 2.846 .207 3.9-3
7	M7	2X4	.119	1.48	3	.409	3.305	y	3	1.945 1.725 2.58 2.846 .207 3.9-3
8	M8	2X4	.112	1.756	2	.413	0	y	3	1.945 1.725 2.58 2.846 .207 3.9-3
9	M9	2X4	.346	2.854	3	.244	0	y	3	1.208 1.725 2.58 2.846 .207 3.9-3
10	M10	2X4	.325	2.914	3	.188	5.709	y	2	1.208 1.725 2.58 2.846 .207 3.9-3
11	M11	2X4	.590	4.31	3	.386	0	y	3	.679 1.725 2.58 2.846 .207 3.9-3
12	M12	2X4	.552	3.803	3	.430	8.112	y	3	.679 1.725 2.58 2.846 .207 3.9-3
13	M13	2X4	.498	8.106	3	.426	8.106	y	3	.679 1.725 2.485 2.846 .207 3.9-3
14	M14	2X4	.548	3.23	3	.483	8.21	y	3	.679 1.725 2.58 2.846 .207 3.9-3
15	M15	2X4	.489	4.845	3	.391	4.845	y	3	.679 1.725 2.485 2.846 .207 3.9-1
16	M16	2X4	.438	2.41	2	.380	2.41	y	3	.679 1.725 2.485 2.846 .207 3.9-3

Envelope Wood Code Checks (Continued)

Member	Shape	Code Check	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	Fc' [k...Ft' [ksi]	Fb1' [...Fb2' [...Fv' [k...	Eqn
17	M17	2X4	.502	4.845	3	.357	4.845	y	3	.679 1.725 2.485 2.846 .207	3.9-1
18	M18	2X4	.469	3.505	3	.651	8.216	y	3	.679 1.725 2.58 2.846 .207	3.9-3
19	M19	2X4	.469	7.011	3	.465	2.41	y	3	.679 1.725 2.58 2.846 .207	3.9-3
20	M22	2X4	.333	2.854	3	.365	0	y	3	1.208 1.725 2.58 2.846 .207	3.9-3
21	M23	2X4	.338	2.973	3	.448	5.709	y	3	1.208 1.725 2.58 2.846 .207	3.9-3
22	M24	2X4	.103	1.618	3	.544	3.305	y	3	1.945 1.725 2.58 2.846 .207	3.9-3
23	M25	2X4	.100	1.653	3	.351	0	y	3	1.945 1.725 2.58 2.846 .207	3.9-3
24	M26	2X4	.082	0	3	1.088	0	y	3	2.116 1.725 2.58 2.846 .207	3.9-3
25	M27	2X4	.120	.901	3	1.017	.901	y	3	2.116 1.725 2.58 2.846 .207	3.9-3
26	M28	2X4	.518	8.075	3	.526	8.075	y	3	.679 1.725 2.485 2.846 .207	3.9-3
27	M29	2X4	.532	4.845	3	.421	4.71	y	3	.679 1.725 2.485 2.846 .207	3.9-3
28	M30	2X4	.450	3.365	2	.848	8.21	y	3	.679 1.725 2.58 2.846 .207	3.9-3
29	M31	2X4	.535	4.845	3	.347	4.845	y	3	.679 1.725 2.485 2.846 .207	3.9-3
30	M32	2X4	.504	3.634	3	.401	8.075	y	2	.679 1.725 2.58 2.846 .207	3.9-1
31	M33	2X4	.482	4.845	3	.365	4.845	y	3	.679 1.725 2.485 2.846 .207	3.9-3
32	M34	2X4	.524	3.505	2	.398	8.106	y	3	.679 1.725 2.58 2.846 .207	3.9-3
33	M35	2X4	.449	6.901	3	.643	2.41	y	3	.679 1.725 2.58 2.846 .207	3.9-3
34	M36	2X4	.730	4.225	2	.393	0	y	3	.679 1.725 2.58 2.846 .207	3.9-3
35	M37	2X4	.585	3.803	3	.376	8.112	y	3	.679 1.725 2.58 2.846 .207	3.9-3
36	M38	2X4	.318	2.854	2	.375	0	y	3	1.208 1.725 2.58 2.846 .207	3.9-3
37	M39	2X4	.306	2.795	2	.358	5.709	y	3	1.208 1.725 2.58 2.846 .207	3.9-3
38	M40	2X4	.111	1.549	2	.638	3.305	y	3	1.945 1.725 2.58 2.846 .207	3.9-3
39	M41	2X4	.099	1.653	2	.589	3.305	y	3	1.945 1.725 2.58 2.846 .207	3.9-3
40	M42	2X4	.088	0	3	1.174	0	y	3	2.116 1.725 2.58 2.846 .207	3.9-3
41	M43	2X4	.057	.901	3	1.122	0	y	3	2.116 1.725 2.58 2.846 .207	3.9-1
42	M44	2X4	.525	9.69	3	.601	4.845	y	2	.679 1.725 2.58 2.846 .207	3.9-3
43	M45	2X4	.444	3.396	3	.364	8.106	y	3	.679 1.725 2.58 2.846 .207	3.9-3
44	M46	2X4	.444	2.41	2	.376	2.3	y	3	.679 1.725 2.485 2.846 .207	3.9-1
45	M47	2X4	.528	4.394	3	.448	0	y	2	.679 1.725 2.58 2.846 .207	3.9-1
46	M48	2X4	.524	3.718	2	.313	8.112	y	2	.679 1.725 2.58 2.846 .207	3.9-1
47	M49	2X4	.339	2.676	3	.330	5.709	y	3	1.208 1.725 2.58 2.846 .207	3.9-3
48	M50	2X4	.314	2.914	3	.232	0	y	2	1.208 1.725 2.58 2.846 .207	3.9-3
49	M51	2X4	.115	1.515	3	.319	3.305	y	3	1.945 1.725 2.58 2.846 .207	3.9-3
50	M52	2X4	.115	1.79	3	.348	0	y	3	1.945 1.725 2.58 2.846 .207	3.9-3
51	M53	2X4	.068	0	2	.777	0	y	2	2.116 1.725 2.58 2.846 .207	3.9-3
52	M54	2X4	.057	.901	3	.769	.901	y	2	2.116 1.725 2.58 2.846 .207	3.9-3
53	M55	2X4	.239	4	3	.147	4	y	2	1.547 1.725 2.571 2.846 .207	3.9-3
54	M58	2X4	.828	4	3	1.444	2.25	y	3	1.547 1.725 2.573 2.846 .207	3.9-3
55	M59	2X4	.400	2	3	.725	2	y	3	1.547 1.725 2.571 2.846 .207	3.9-3
56	M60	2X4	.396	6.042	3	.434	0	y	3	1.547 1.725 2.571 2.846 .207	3.9-3
57	M61	2X4	.564	4.063	2	.373	4.063	y	2	1.547 1.725 2.571 2.846 .207	3.9-3
58	M62	2X4	.660	4	3	.792	6	y	2	1.547 1.725 2.571 2.846 .207	3.9-3
59	M63	2X4	.371	6	3	.654	2	y	3	1.547 1.725 2.571 2.846 .207	3.9-3
60	M64	2X4	.254	0	3	.020	0	z	2	.354 1.725 2.538 2.846 .207	3.6.3
61	M65	2X4	.131	0	3	.122	0	z	2	.354 1.725 2.538 2.846 .207	3.6.3
62	M66	2X4	.403	0	3	.085	0	z	3	.354 1.725 2.538 2.846 .207	3.6.3
63	M67	2X4	.068	0	3	.124	0	z	3	.354 1.725 2.538 2.846 .207	3.6.3
64	M68	2X4	.370	0	3	.518	0	z	3	.354 1.725 2.538 2.846 .207	3.6.3
65	M69	2X4	.161	0	3	.221	0	z	3	.354 1.725 2.538 2.846 .207	3.6.3
66	M70	2X4	.194	0	2	.214	0	z	3	.354 1.725 2.538 2.846 .207	3.6.3
67	M71	2X4	.203	0	3	.310	0	z	3	.354 1.725 2.538 2.846 .207	3.6.3
68	M72	2X4	.362	0	2	.371	0	z	3	.354 1.725 2.538 2.846 .207	3.6.3

Envelope Wood Code Checks (Continued)

Member	Shape	Code Check	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	Fc' [k...Ft' [ksi]	Fb1' [...Fb2' [...Fv' [k...	Eqn
69	M73	2X4	.143	0	3	.047	0	z	1	.354 1.725 2.538 2.846 .207	3.6.3
70	M74	2X4	.105	0	3	.382	0	z	3	.354 1.725 2.538 2.846 .207	3.6.3
71	M75	2X4	.241	0	3	.309	0	z	3	.34 1.725 2.537 2.846 .207	3.6.3
72	M76	2X4	.188	0	3	.070	0	z	3	.354 1.725 2.538 2.846 .207	3.6.3
73	M77	2X4	.207	0	3	.094	0	z	3	.354 1.725 2.538 2.846 .207	3.6.3
74	M78	2X4	.335	0	3	.099	0	z	2	.354 1.725 2.538 2.846 .207	3.6.3
75	M79	2X4	.005	0	1	.175	0	z	2	.352 1.5 2.214 2.475 .18	3.9-1
76	M80	2X4	.422	0	3	.278	0	z	3	.354 1.725 2.538 2.846 .207	3.6.3
77	M81	2X4	.149	0	2	.035	0	z	3	.354 1.725 2.538 2.846 .207	3.6.3
78	M80A	2X4	.014	0	1	.023	0	z	2	.352 1.5 2.214 2.475 .18	3.9-1
79	M81A	2X4	.267	0	3	.024	0	z	2	.354 1.725 2.538 2.846 .207	3.6.3
80	M82	2X4	.271	0	3	.038	0	z	3	.354 1.725 2.538 2.846 .207	3.6.3
81	M83	2X4	.056	0	3	.006	0	z	3	.354 1.725 2.538 2.846 .207	3.6.3
82	M95	2X4	.530	3.803	3	.757	8.112	y	3	.679 1.725 2.58 2.846 .207	3.9-1
83	M85	2X6	.295	7.083	1	.100	0	y	1	.551 1.3 1.943 2.243 .18	3.9-3
84	M86	2X6	.257	6.667	1	.095	13.333	y	1	.614 1.3 1.943 2.243 .18	3.9-3
85	M87	2X6	.259	6.667	1	.094	13.333	y	1	.614 1.3 1.943 2.243 .18	3.9-1
86	M88	2X6	.290	7.083	1	.100	0	y	1	.551 1.3 1.943 2.243 .18	3.9-1
87	M89	2X6	.298	7.083	1	.100	0	y	1	1.172 1.3 1.943 2.243 .18	3.9-1
88	M90	2X6	.265	6.667	1	.094	13.333	y	1	.614 1.3 1.943 2.243 .18	3.9-1
89	M91	2X6	.202	6.111	3	.075	0	y	3	1.234 1.495 2.233 2.579 .207	3.9-1
90	M92	2X6	.422	5.313	3	.125	0	y	3	1.846 1.495 2.233 2.579 .207	3.9-1
91	M93	2X6	.601	12.691	3	.535	14.167	y	3	2.031 1.495 2.233 2.579 .207	3.9-1
92	M94	2X6	.993	3.333	3	1.293	3.333	y	3	2.031 1.495 2.23 2.579 .207	3.9-3
93	M95A	2X6	.145	5	1	.071	0	y	1	.982 1.3 1.943 2.243 .18	3.9-3
94	M96	2X6	.054	12.031	1	.052	11.849	y	1	1.639 1.3 1.895 2.243 .18	3.9-3
95	M97	2X6	.065	5.469	3	.051	5.651	y	1	1.834 1.495 2.164 2.579 .207	3.9-1
96	M98	2X6	.147	5	1	.071	0	y	1	.982 1.3 1.943 2.243 .18	3.9-1
97	M99	2X6	.154	5	3	.071	0	y	1	1.016 1.495 2.233 2.579 .207	3.9-1
98	M100	2X6	.077	12.031	3	.051	11.849	y	1	1.834 1.495 2.164 2.579 .207	3.9-1
99	M101	2X6	.281	6.927	2	.356	7.109	y	3	2.031 1.495 2.228 2.579 .207	3.9-3
100	M102	2X6	.461	1.25	3	.448	0	y	3	2.031 1.495 2.233 2.579 .207	3.9-3
101	M103	2X6	.503	8.75	3	.506	10	y	3	1.234 1.495 2.233 2.579 .207	3.9-1
102	M104	2X6	.633	7.29	3	.953	4.74	y	3	2.031 1.495 2.233 2.579 .207	3.9-3
103	M105	2X6	.906	8.75	2	1.241	8.75	y	3	2.031 1.495 2.233 2.579 .207	3.9-1
104	M106	2X6	.370	1.25	3	.621	0	y	3	2.031 1.495 2.233 2.579 .207	3.9-1
105	M107	2X4	.430	3.972	3	.469	8.112	y	3	.679 1.725 2.965 3.273 .207	3.9-3
106	M106A	2-2X4	.534	0	3	1.840	0	z	3	.145 1.725 2.561 2.846 .207	3.9-3
107	M107A	2-2X4	.458	21.5	3	1.641	20.828	y	3	.145 1.725 2.561 2.846 .207	3.9-3
108	M108	2-2X4	.466	0	3	1.589	0	z	3	.145 1.725 2.561 2.846 .207	3.9-1
109	M109	2-2X4	.633	21.5	3	1.833	20.828	z	3	.145 1.725 2.561 2.846 .207	3.9-3



Consulting
Structural
Engineers

Structural Calculations for Tchou Solar Panels

Job Number: 161034

Codes: 2012 IBC Amended by Oregon Structural Specialty Code with 2014 revisions.

Date: 11-08-2016

Location: 1304 NE 77th Ave, Portland, OR

Client: Elemental Energy
3123 Belmont St
Portland, OR 97214
Phone: 503-967-5786

Engineer: Cameron Carroll P.E.
Brad Kheyri, E.I.
MSC Engineers, Inc.
3470 Pipebend Place NE, Suite 120
Salem, OR 97301
Phone: 503-399-1399



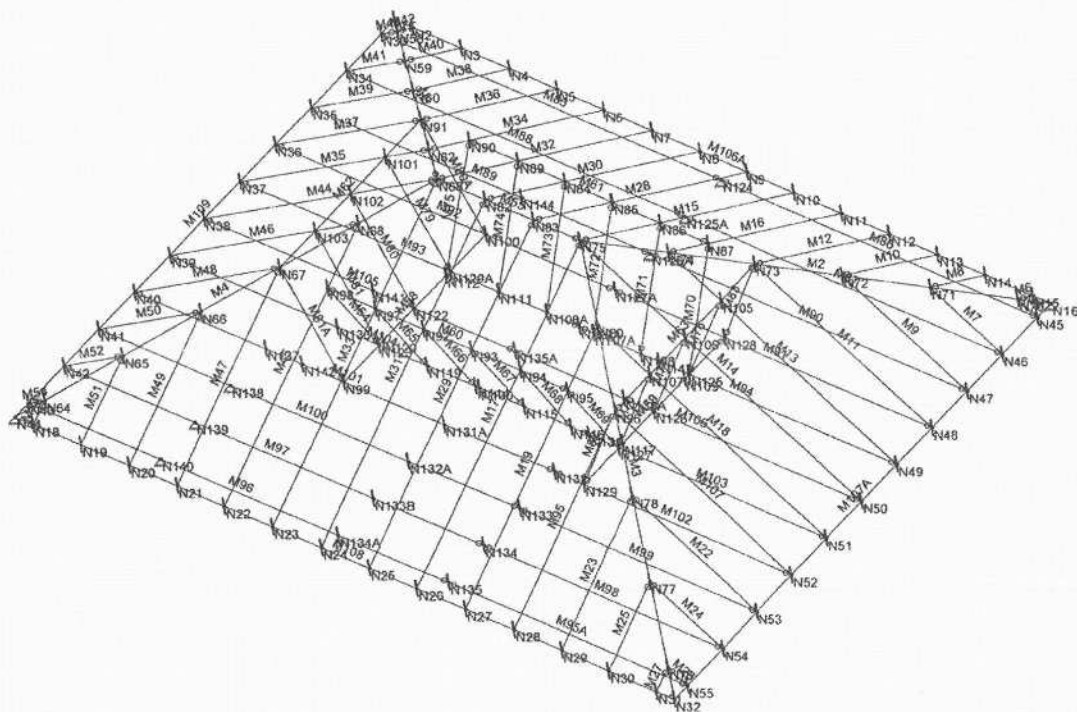
Scope of Services: Anchorage design of proposed solar panels on new structure roof along with framing review.

<u>Contents:</u>	Site Specific Info.	0.1 – 0.2
	Basic Design Loads	1.1 – 1.2
	Solar Panel Anchorage	2.1
	Gravity Analysis	3.1
	Risa	R.1
	Sketches	SK.1 – SK.4
	Appendix	App.1



1	12/20/2016	Revision to Risa model
2	12/30/2016	Revision to Risa model
3	01/16/2017	Revision to Risa model

LIMITATIONS: Engineer was retained in a limited capacity for this project. Design is based upon the information provided by the client, who is solely responsible for accuracy of same. No responsibility and/or liability is assumed by, or is to be assigned to the Engineer for items beyond those shown on these sheets.



3 ENTIRE PAGE

Envelope Only Solution

MSC Engineers, Inc.	Tchou Solar Panels	SK-T
BK		Jan 16, 2017 at 8:17 AM
161034		Tchou Solar Panel Whole Roof BK ...

R.1



Company : MSC Engineers, Inc.
 Designer : BK
 Job Number : 161034
 Model Name : Tchou Solar Panels

Jan 16, 2017
 8:10 AM
 Checked By: CBS

Wood Section Sets

	Label	Shape	Type	Design List	Material	Design R...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Rafter	2X4	Beam	None	DF	Typical	5.25	.984	5.359	2.877
2	Ridge	2X6	Beam	None	DF	Typical	8.25	1.547	20.797	5.125
3	Valley	2X4	Beam	None	DF	Typical	5.25	.984	5.359	2.877
4	Joist	2X6	Beam	None	DF	Typical	8.25	1.547	20.797	5.125
5	Sole PL	2X4	Beam	None	DF	Typical	5.25	.984	5.359	2.877
6	Top PL	2X4	Beam	None	DF	Typical	5.25	.984	5.359	2.877
7	Post	2X4	Column	None	DF	Typical	5.25	.984	5.359	2.877
8	DBL Top PL	2-2X4	Column	None	DF	Typical	10.5	7.875	10.719	15.255

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N1		Reaction				
2	N2		Reaction				
3	N3		Reaction				
4	N4		Reaction				
5	N5		Reaction				
6	N6		Reaction				
7	N7		Reaction				
8	N8		Reaction				
9	N9		Reaction				
10	N10		Reaction				
11	N11		Reaction				
12	N12		Reaction				
13	N13		Reaction				
14	N14		Reaction				
15	N15		Reaction				
16	N16	Reaction	Reaction	Reaction			
17	N18		Reaction				
18	N19		Reaction				
19	N20		Reaction				
20	N21		Reaction				
21	N22		Reaction				
22	N23		Reaction				
23	N24		Reaction				
24	N25		Reaction				
25	N26		Reaction				
26	N27		Reaction				
27	N28		Reaction				
28	N29		Reaction				
29	N30		Reaction				
30	N31		Reaction				
31	N32		Reaction				
32	N33		Reaction				
33	N34		Reaction				
34	N35		Reaction				
35	N36		Reaction				
36	N37		Reaction				
37	N38		Reaction				
38	N39		Reaction				

Joint Boundary Conditions (Continued)

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
39	N40		Reaction				
40	N41		Reaction				
41	N42		Reaction				
42	N43		Reaction				
43	N44	Reaction	Reaction	Reaction			
44	N45		Reaction				
45	N46		Reaction				
46	N47		Reaction				
47	N48		Reaction				
48	N49		Reaction				
49	N50		Reaction				
50	N51		Reaction				
51	N52		Reaction				
52	N53		Reaction				
53	N54		Reaction				
54	N55		Reaction				
55	N58		Reaction				
56	N59		Reaction				
57	N60		Reaction				
58	N62		Reaction				
59	N63		Reaction				
60	N64		Reaction				
61	N65		Reaction				
62	N66		Reaction				
63	N67		Reaction				
64	N68		Reaction				
65	N70		Reaction				
66	N71		Reaction				
67	N72		Reaction				
68	N73		Reaction				
69	N74		Reaction				
70	N75		Reaction				
71	N76		Reaction				
72	N77		Reaction				
73	N78		Reaction				
74	N80		Reaction				
75	N82		Reaction				
76	N83		Reaction				
77	N84		Reaction				
78	N85		Reaction				
79	N86		Reaction				
80	N87		Reaction				
81	N89		Reaction				
82	N90		Reaction				
83	N91		Reaction				
84	N92		Reaction				
85	N93		Reaction				
86	N94		Reaction				
87	N95		Reaction				
88	N96		Reaction				
89	N97		Reaction				
90	N98		Reaction				



Company : MSC Engineers, Inc.
 Designer : BK
 Job Number : 161034
 Model Name : Tchou Solar Panels

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Joint Boundary Conditions (Continued)

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
91	N99		Reaction				
92	N100		Reaction				
93	N101		Reaction				
94	N102		Reaction				
95	N103		Reaction				
96	N105		Reaction				
97	N106		Reaction				
98	N107		Reaction				
99	N106A		Reaction				
100	N107A		Reaction				
101	N108		Reaction				
102	N109		Reaction				
103	N111		Reaction				
104	N112		Reaction				
105	N114		Reaction				
106	N115		Reaction				
107	N116		Reaction				
108	N117		Reaction				
109	N119		Reaction				
110	N120		Reaction				
111	N122		Reaction				
112	N123		Reaction				
113	N125		Reaction				
114	N126		Reaction				
115	N127		Reaction				
116	N128		Reaction				
117	N129		Reaction				
118	N124	Reaction	Reaction	Reaction			
119	N125A	Reaction	Reaction	Reaction			
120	N126A	Reaction	Reaction	Reaction			
121	N127A		Reaction				
122	N128A		Reaction				
123	N131		Reaction				
124	N132		Reaction				
125	N133		Reaction				
126	N134		Reaction				
127	N135		Reaction				
128	N133A		Reaction				
129	N140	Reaction	Reaction	Reaction			
130	N139	Reaction	Reaction	Reaction			
131	N138	Reaction	Reaction	Reaction			
132	N137		Reaction				
133	N142		Reaction				
134	N136		Reaction				
135	N141		Reaction				
136	N134A		Reaction				
137	N133B		Reaction				
138	N132A		Reaction				
139	N131A		Reaction				
140	N135A		Reaction				
141	N130		Reaction				
142	N143		Reaction				



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Joint Boundary Conditions (Continued)

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
143	N144		Reaction				
144	N129A		Reaction				

Wood Design Parameters

	Label	Shape	Length[...]	le2[ft]	le1[ft]	le-bend top[ft]	le-bend bot[ft]	Kyy	Kzz	CV	Cr	y sway	z sway
1	M1	Valley	16.807	Segment	Segment	Segment	Segment						
2	M2	Valley	16.807	Segment	Segment	Segment	Segment						
3	M3	Valley	16.807	Segment	Segment	Segment	Segment						
4	M4	Valley	16.807	Segment	Segment	Segment	Segment						
5	M5	Rafter	.901	1	Segment	1	Segment						
6	M6	Rafter	.901	1	Segment	1	Segment						
7	M7	Rafter	3.305	1	Segment	1	Segment						
8	M8	Rafter	3.305	1	Segment	1	Segment						
9	M9	Rafter	5.709	1	Segment	1	Segment						
10	M10	Rafter	5.709	1	Segment	1	Segment						
11	M11	Rafter	8.112	1	Segment	1	Segment						
12	M12	Rafter	8.112	1	Segment	1	Segment						
13	M13	Rafter	10.516	1	Segment	1	Segment						
14	M14	Rafter	12.92	1	Segment	1	Segment						
15	M15	Rafter	12.92	1	Segment	1	Segment						
16	M16	Rafter	10.516	1	Segment	1	Segment						
17	M17	Rafter	12.92	1	Segment	1	Segment						
18	M18	Rafter	10.516	1	Segment	1	Segment						
19	M19	Rafter	10.516	1	Segment	1	Segment						
20	M22	Rafter	5.709	1	Segment	1	Segment						
21	M23	Rafter	5.709	1	Segment	1	Segment						
22	M24	Rafter	3.305	1	Segment	1	Segment						
23	M25	Rafter	3.305	1	Segment	1	Segment						
24	M26	Rafter	.901	1	Segment	1	Segment						
25	M27	Rafter	.901	1	Segment	1	Segment						
26	M28	Rafter	12.92	1	Segment	1	Segment						
27	M29	Rafter	12.92	1	Segment	1	Segment						
28	M30	Rafter	12.92	1	Segment	1	Segment						
29	M31	Rafter	12.92	1	Segment	1	Segment						
30	M32	Rafter	12.92	1	Segment	1	Segment						
31	M33	Rafter	12.92	1	Segment	1	Segment						
32	M34	Rafter	10.516	1	Segment	1	Segment						
33	M35	Rafter	10.516	1	Segment	1	Segment						
34	M36	Rafter	8.112	1	Segment	1	Segment						
35	M37	Rafter	8.112	1	Segment	1	Segment						
36	M38	Rafter	5.709	1	Segment	1	Segment						
37	M39	Rafter	5.709	1	Segment	1	Segment						
38	M40	Rafter	3.305	1	Segment	1	Segment						
39	M41	Rafter	3.305	1	Segment	1	Segment						
40	M42	Rafter	.901	1	Segment	1	Segment						
41	M43	Rafter	.901	1	Segment	1	Segment						
42	M44	Rafter	12.92	1	Segment	1	Segment						
43	M45	Rafter	10.516	1	Segment	1	Segment						
44	M46	Rafter	10.516	1	Segment	1	Segment						
45	M47	Rafter	8.112	1	Segment	1	Segment						



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Wood Design Parameters (Continued)

	Label	Shape	Length[...]	le2[ft]	le1[ft]	le-bend top[ft]	le-bend bot[ft]	Kyy	Kzz	CV	Cr	y sway	z sway
46	M48	Rafter	8.112	1	Segment	1	Segment						
47	M49	Rafter	5.709	1	Segment	1	Segment						
48	M50	Rafter	5.709	1	Segment	1	Segment						
49	M51	Rafter	3.305	1	Segment	1	Segment						
50	M52	Rafter	3.305	1	Segment	1	Segment						
51	M53	Rafter	.901	1	Segment	1	Segment						
52	M54	Rafter	.901	1	Segment	1	Segment						
53	M55	Ridge	6	Segment	Segment	2	Segment						
54	M58	Sole PL	8	2	Segment	2	Segment						
55	M59	Sole PL	8	2	Segment	2	Segment						
56	M60	Top PL	10	2	Segment	2	Segment						
57	M61	Top PL	10	2	Segment	2	Segment						
58	M62	Top PL	8	2	Segment	2	Segment						
59	M63	Top PL	8	2	Segment	2	Segment						
60	M64	Post	4.924	Segment	Segment	Segment	Segment						
61	M65	Post	4.924	Segment	Segment	Segment	Segment						
62	M66	Post	4.924	Segment	Segment	Segment	Segment						
63	M67	Post	4.924	Segment	Segment	Segment	Segment						
64	M68	Post	4.924	Segment	Segment	Segment	Segment						
65	M69	Post	4.924	Segment	Segment	Segment	Segment						
66	M70	Post	4.924	Segment	Segment	Segment	Segment						
67	M71	Post	4.924	Segment	Segment	Segment	Segment						
68	M72	Post	4.924	Segment	Segment	Segment	Segment						
69	M73	Post	4.924	Segment	Segment	Segment	Segment						
70	M74	Post	4.924	Segment	Segment	Segment	Segment						
71	M75	Post	5.031	Segment	Segment	Segment	Segment						
72	M76	Post	4.924	Segment	Segment	Segment	Segment						
73	M77	Post	4.924	Segment	Segment	Segment	Segment						
74	M78	Post	4.924	Segment	Segment	Segment	Segment						
75	M79	Post	4.924	Segment	Segment	Segment	Segment						
76	M80	Post	4.924	Segment	Segment	Segment	Segment						
77	M81	Post	4.924	Segment	Segment	Segment	Segment						
78	M80A	Post	4.924	Segment	Segment	Segment	Segment						
79	M81A	Post	4.924	Segment	Segment	Segment	Segment						
80	M82	Post	4.924	Segment	Segment	Segment	Segment						
81	M83	Post	4.924	Segment	Segment	Segment	Segment						
82	M95	Rafter	8.112	1	Segment	1	Segment						
83	M85	Joist	14.167	1	Segment	1	Segment						
84	M86	Joist	13.333	1	Segment	1	Segment						
85	M87	Joist	13.333	1	Segment	1	Segment						
86	M88	Joist	14.167	1	Segment	1	Segment						
87	M89	Joist	14.167	1	Segment	1	Segment						
88	M90	Joist	13.333	1	Segment	1	Segment						
89	M91	Joist	13.333	1	Segment	1	Segment						
90	M92	Joist	14.167	1	Segment	1	Segment						
91	M93	Joist	14.167	1	Segment	1	Segment						
92	M94	Joist	13.333	1	Segment	1	Segment						
93	M95A	Joist	10	1	Segment	1	Segment						
94	M96	Joist	17.5	1	Segment	1	Segment						
95	M97	Joist	17.5	1	Segment	1	Segment						
96	M98	Joist	10	1	Segment	1	Segment						
97	M99	Joist	10	1	Segment	1	Segment						



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Wood Design Parameters (Continued)

	Label	Shape	Length[...]	le2[ft]	le1[ft]	le-bend top[ft]	le-bend bot[ft]	Kyy	Kzz	CV	Cr	y sway	z sway
98	M100	Joist	17.5	1	Segment	1	Segment						
99	M101	Joist	17.5	1	Segment	1	Segment						
100	M102	Joist	10	1	Segment	1	Segment						
101	M103	Joist	10	1	Segment	1	Segment						
102	M104	Joist	17.5	1	Segment	1	Segment						
103	M105	Joist	12.91	1	Segment	1	Segment						
104	M106	Joist	14.59	1	Segment	1	Segment						
105	M107	Rafter	8.112	1	Segment	1	Segment				Yes		
106	M106A	DBL Top ...	27.5	12	12	12	12						
107	M107A	DBL Top ...	21.5	12	12	12	12						
108	M108	DBL Top ...	27.5	12	12	12	12						
109	M109	DBL Top ...	21.5	12	12	12	12						

Member Distributed Loads (BLC 1 : DL)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M5	Y	-016	-016	0	0
2	M6	Y	-016	-016	0	0
3	M7	Y	-016	-016	0	0
4	M8	Y	-016	-016	0	0
5	M9	Y	-016	-016	0	0
6	M10	Y	-016	-016	0	0
7	M11	Y	-016	-016	0	0
8	M12	Y	-016	-016	0	0
9	M13	Y	-016	-016	0	0
10	M14	Y	-016	-016	0	0
11	M15	Y	-016	-016	0	0
12	M16	Y	-016	-016	0	0
13	M17	Y	-016	-016	0	0
14	M18	Y	-016	-016	0	0
15	M19	Y	-016	-016	0	0
16	M22	Y	-016	-016	0	0
17	M23	Y	-016	-016	0	0
18	M24	Y	-016	-016	0	0
19	M25	Y	-016	-016	0	0
20	M26	Y	-016	-016	0	0
21	M27	Y	-016	-016	0	0
22	M28	Y	-016	-016	0	0
23	M29	Y	-016	-016	0	0
24	M30	Y	-016	-016	0	0
25	M31	Y	-016	-016	0	0
26	M32	Y	-016	-016	0	0
27	M33	Y	-016	-016	0	0
28	M34	Y	-016	-016	0	0
29	M35	Y	-016	-016	0	0
30	M36	Y	-016	-016	0	0
31	M37	Y	-016	-016	0	0
32	M38	Y	-016	-016	0	0
33	M39	Y	-016	-016	0	0
34	M40	Y	-016	-016	0	0
35	M41	Y	-016	-016	0	0

Member Distributed Loads (BLC 1 : DL) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
36	M42	Y	-.016	-.016	0	0
37	M44	Y	-.016	-.016	0	0
38	M45	Y	-.016	-.016	0	0
39	M46	Y	-.016	-.016	0	0
40	M47	Y	-.016	-.016	0	0
41	M48	Y	-.016	-.016	0	0
42	M49	Y	-.016	-.016	0	0
43	M50	Y	-.016	-.016	0	0
44	M51	Y	-.016	-.016	0	0
45	M52	Y	-.016	-.016	0	0
46	M53	Y	-.016	-.016	0	0
47	M54	Y	-.016	-.016	0	0
48	M95	Y	-.016	-.016	0	0
49	M107	Y	-.016	-.016	0	0
50	M85	Y	-.014	-.014	0	0
51	M86	Y	-.014	-.014	0	0
52	M87	Y	-.014	-.014	0	0
53	M88	Y	-.014	-.014	0	0
54	M89	Y	-.014	-.014	0	0
55	M90	Y	-.014	-.014	0	0
56	M91	Y	-.014	-.014	0	0
57	M92	Y	-.014	-.014	0	0
58	M93	Y	-.014	-.014	0	0
59	M94	Y	-.014	-.014	0	0
60	M95A	Y	-.014	-.014	0	0
61	M96	Y	-.014	-.014	0	0
62	M97	Y	-.014	-.014	0	0
63	M98	Y	-.014	-.014	0	0
64	M99	Y	-.014	-.014	0	0
65	M100	Y	-.014	-.014	0	0
66	M101	Y	-.014	-.014	0	0
67	M102	Y	-.014	-.014	0	0
68	M103	Y	-.014	-.014	0	0
69	M104	Y	-.014	-.014	0	0
70	M105	Y	-.014	-.014	0	0
71	M106	Y	-.014	-.014	0	0

Member Distributed Loads (BLC 2 : SL)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M5	Y	-.04	-.04	0	0
2	M6	Y	-.04	-.04	0	0
3	M7	Y	-.04	-.04	0	0
4	M8	Y	-.04	-.04	0	0
5	M9	Y	-.04	-.04	0	0
6	M10	Y	-.04	-.04	0	0
7	M11	Y	-.04	-.04	0	0
8	M12	Y	-.04	-.04	0	0
9	M13	Y	-.04	-.04	0	0
10	M14	Y	-.04	-.04	0	0
11	M15	Y	-.04	-.04	0	0
12	M16	Y	-.04	-.04	0	0

Member Distributed Loads (BLC 2 : SL) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
13	M17	Y	-.04	-.04	0	0
14	M18	Y	-.04	-.04	0	0
15	M19	Y	-.04	-.04	0	0
16	M22	Y	-.04	-.04	0	0
17	M23	Y	-.04	-.04	0	0
18	M24	Y	-.04	-.04	0	0
19	M25	Y	-.04	-.04	0	0
20	M26	Y	-.04	-.04	0	0
21	M27	Y	-.04	-.04	0	0
22	M28	Y	-.04	-.04	0	0
23	M29	Y	-.04	-.04	0	0
24	M30	Y	-.04	-.04	0	0
25	M31	Y	-.04	-.04	0	0
26	M32	Y	-.04	-.04	0	0
27	M33	Y	-.04	-.04	0	0
28	M34	Y	-.04	-.04	0	0
29	M35	Y	-.04	-.04	0	0
30	M36	Y	-.04	-.04	0	0
31	M37	Y	-.04	-.04	0	0
32	M38	Y	-.04	-.04	0	0
33	M39	Y	-.04	-.04	0	0
34	M40	Y	-.04	-.04	0	0
35	M41	Y	-.04	-.04	0	0
36	M42	Y	-.04	-.04	0	0
37	M44	Y	-.04	-.04	0	0
38	M45	Y	-.04	-.04	0	0
39	M46	Y	-.04	-.04	0	0
40	M47	Y	-.04	-.04	0	0
41	M48	Y	-.04	-.04	0	0
42	M49	Y	-.04	-.04	0	0
43	M50	Y	-.04	-.04	0	0
44	M51	Y	-.04	-.04	0	0
45	M52	Y	-.04	-.04	0	0
46	M53	Y	-.04	-.04	0	0
47	M54	Y	-.04	-.04	0	0
48	M95	Y	-.04	-.04	0	0
49	M107	Y	-.04	-.04	0	0

Member Distributed Loads (BLC 3 : ML)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M17	Y	-.006	-.006	0	0
2	M29	Y	-.006	-.006	0	0
3	M31	Y	-.006	-.006	0	0
4	M33	Y	-.006	-.006	0	0
5	M45	Y	-.006	-.006	0	0
6	M19	Y	-.006	-.006	0	0
7	M22	Y	-.006	-.006	0	0
8	M107	Y	-.006	-.006	0	0
9	M18	Y	-.006	-.006	0	0
10	M14	Y	-.006	-.006	0	0
11	M13	Y	-.006	-.006	0	0



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Member Distributed Loads (BLC 3 : ML) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
12	M11	Y	-.006	-.006	0	0
13	M9	Y	-.006	-.006	0	0

Basic Load Cases

	BLC Description	Category	X Gravi...	Y Gravi...	Z Gravity	Joint	Point	Distrib...	Area(M...	Surfac...
1	DL	DL						71		
2	SL	SL						49		
3	ML	OL1						13		

Load Combinations

	Description	Solve P...	S...	B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac..B...	Fac...
1	DL	Yes	Y		1	1								
2	DL + SL	Yes	Y		1	1	2	1						
3	DL + SL + ML	Yes	Y		1	1	2	1	3	1				

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N1	max	0	1	-.015	1	0	1	0	1	0	1	0	1
2		min	0	1	-.054	3	0	1	0	1	0	1	0	1
3	N2	max	0	1	-.004	1	0	1	0	1	0	1	0	1
4		min	0	1	-.014	3	0	1	0	1	0	1	0	1
5	N3	max	0	1	.068	2	0	1	0	1	0	1	0	1
6		min	0	1	.019	1	0	1	0	1	0	1	0	1
7	N4	max	0	1	.159	3	0	1	0	1	0	1	0	1
8		min	0	1	.045	1	0	1	0	1	0	1	0	1
9	N5	max	0	1	.247	2	0	1	0	1	0	1	0	1
10		min	0	1	.071	1	0	1	0	1	0	1	0	1
11	N6	max	0	1	.183	3	0	1	0	1	0	1	0	1
12		min	0	1	.052	1	0	1	0	1	0	1	0	1
13	N7	max	0	1	.184	3	0	1	0	1	0	1	0	1
14		min	0	1	.053	1	0	1	0	1	0	1	0	1
15	N8	max	0	1	.184	3	0	1	0	1	0	1	0	1
16		min	0	1	.053	1	0	1	0	1	0	1	0	1
17	N9	max	0	1	.184	2	0	1	0	1	0	1	0	1
18		min	0	1	.053	1	0	1	0	1	0	1	0	1
19	N10	max	0	1	.183	2	0	1	0	1	0	1	0	1
20		min	0	1	.052	1	0	1	0	1	0	1	0	1
21	N11	max	0	1	.183	3	0	1	0	1	0	1	0	1
22		min	0	1	.052	1	0	1	0	1	0	1	0	1
23	N12	max	0	1	.247	2	0	1	0	1	0	1	0	1
24		min	0	1	.07	1	0	1	0	1	0	1	0	1
25	N13	max	0	1	.159	3	0	1	0	1	0	1	0	1
26		min	0	1	.045	1	0	1	0	1	0	1	0	1
27	N14	max	0	1	.068	2	0	1	0	1	0	1	0	1
28		min	0	1	.019	1	0	1	0	1	0	1	0	1
29	N15	max	0	1	-.004	1	0	1	0	1	0	1	0	1
30		min	0	1	-.013	2	0	1	0	1	0	1	0	1



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Envelope Joint Reactions (Continued)

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
31	N16	max	0	1	-.015	1	0	3	0	1	0	1	0	1
32		min	-.002	3	-.056	3	0	1	0	1	0	1	0	1
33	N18	max	0	1	-.004	1	0	1	0	1	0	1	0	1
34		min	0	1	-.014	3	0	1	0	1	0	1	0	1
35	N19	max	0	1	.068	2	0	1	0	1	0	1	0	1
36		min	0	1	.019	1	0	1	0	1	0	1	0	1
37	N20	max	0	1	.158	2	0	1	0	1	0	1	0	1
38		min	0	1	.045	1	0	1	0	1	0	1	0	1
39	N21	max	0	1	.247	2	0	1	0	1	0	1	0	1
40		min	0	1	.071	1	0	1	0	1	0	1	0	1
41	N22	max	0	1	.205	3	0	1	0	1	0	1	0	1
42		min	0	1	.052	1	0	1	0	1	0	1	0	1
43	N23	max	0	1	.204	3	0	1	0	1	0	1	0	1
44		min	0	1	.052	1	0	1	0	1	0	1	0	1
45	N24	max	0	1	.204	3	0	1	0	1	0	1	0	1
46		min	0	1	.053	1	0	1	0	1	0	1	0	1
47	N25	max	0	1	.205	3	0	1	0	1	0	1	0	1
48		min	0	1	.053	1	0	1	0	1	0	1	0	1
49	N26	max	0	1	.205	3	0	1	0	1	0	1	0	1
50		min	0	1	.053	1	0	1	0	1	0	1	0	1
51	N27	max	0	1	.196	3	0	1	0	1	0	1	0	1
52		min	0	1	.05	1	0	1	0	1	0	1	0	1
53	N28	max	0	1	.246	2	0	1	0	1	0	1	0	1
54		min	0	1	.07	1	0	1	0	1	0	1	0	1
55	N29	max	0	1	.163	2	0	1	0	1	0	1	0	1
56		min	0	1	.047	1	0	1	0	1	0	1	0	1
57	N30	max	0	1	.069	2	0	1	0	1	0	1	0	1
58		min	0	1	.02	1	0	1	0	1	0	1	0	1
59	N31	max	0	1	-.004	1	0	1	0	1	0	1	0	1
60		min	0	1	-.016	2	0	1	0	1	0	1	0	1
61	N32	max	0	1	-.015	1	0	1	0	1	0	1	0	1
62		min	0	1	-.056	3	0	1	0	1	0	1	0	1
63	N33	max	0	1	.088	1	0	1	0	1	0	1	0	1
64		min	0	1	.06	3	0	1	0	1	0	1	0	1
65	N34	max	0	1	.167	2	0	1	0	1	0	1	0	1
66		min	0	1	.119	1	0	1	0	1	0	1	0	1
67	N35	max	0	1	.208	3	0	1	0	1	0	1	0	1
68		min	0	1	.095	1	0	1	0	1	0	1	0	1
69	N36	max	0	1	.296	2	0	1	0	1	0	1	0	1
70		min	0	1	.12	1	0	1	0	1	0	1	0	1
71	N37	max	0	1	.231	2	0	1	0	1	0	1	0	1
72		min	0	1	.101	1	0	1	0	1	0	1	0	1
73	N38	max	0	1	.226	2	0	1	0	1	0	1	0	1
74		min	0	1	.093	1	0	1	0	1	0	1	0	1
75	N39	max	0	1	.222	2	0	1	0	1	0	1	0	1
76		min	0	1	.091	1	0	1	0	1	0	1	0	1
77	N40	max	0	1	.277	3	0	1	0	1	0	1	0	1
78		min	0	1	.101	1	0	1	0	1	0	1	0	1
79	N41	max	0	1	.185	2	0	1	0	1	0	1	0	1
80		min	0	1	.072	1	0	1	0	1	0	1	0	1
81	N42	max	0	1	.095	2	0	1	0	1	0	1	0	1
82		min	0	1	.047	1	0	1	0	1	0	1	0	1

Envelope Joint Reactions (Continued)

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
83	N43	max	0	1	.024	1	0	1	0	1	0	1	0	1
84		min	0	1	.015	2	0	1	0	1	0	1	0	1
85	N44	max	0	1	-.016	1	0	1	0	1	0	1	0	1
86		min	-.001	3	-.056	3	0	3	0	1	0	1	0	1
87	N45	max	0	1	.09	1	0	1	0	1	0	1	0	1
88		min	0	1	.076	3	0	1	0	1	0	1	0	1
89	N46	max	0	1	.161	2	0	1	0	1	0	1	0	1
90		min	0	1	.113	1	0	1	0	1	0	1	0	1
91	N47	max	0	1	.268	3	0	1	0	1	0	1	0	1
92		min	0	1	.138	1	0	1	0	1	0	1	0	1
93	N48	max	0	1	.323	3	0	1	0	1	0	1	0	1
94		min	0	1	.12	1	0	1	0	1	0	1	0	1
95	N49	max	0	1	.252	3	0	1	0	1	0	1	0	1
96		min	0	1	.1	1	0	1	0	1	0	1	0	1
97	N50	max	0	1	.253	3	0	1	0	1	0	1	0	1
98		min	0	1	.101	1	0	1	0	1	0	1	0	1
99	N51	max	0	1	.262	3	0	1	0	1	0	1	0	1
100		min	0	1	.103	1	0	1	0	1	0	1	0	1
101	N52	max	0	1	.296	3	0	1	0	1	0	1	0	1
102		min	0	1	.112	1	0	1	0	1	0	1	0	1
103	N53	max	0	1	.24	3	0	1	0	1	0	1	0	1
104		min	0	1	.114	1	0	1	0	1	0	1	0	1
105	N54	max	0	1	.14	2	0	1	0	1	0	1	0	1
106		min	0	1	.09	1	0	1	0	1	0	1	0	1
107	N55	max	0	1	.068	1	0	1	0	1	0	1	0	1
108		min	0	1	.058	3	0	1	0	1	0	1	0	1
109	N58	max	0	1	.161	3	0	1	0	1	0	1	0	1
110		min	0	1	.046	1	0	1	0	1	0	1	0	1
111	N59	max	0	1	.229	3	0	1	0	1	0	1	0	1
112		min	0	1	.065	1	0	1	0	1	0	1	0	1
113	N60	max	0	1	.33	2	0	1	0	1	0	1	0	1
114		min	0	1	.094	1	0	1	0	1	0	1	0	1
115	N62	max	0	1	-.048	1	0	1	0	1	0	1	0	1
116		min	0	1	-.168	2	0	1	0	1	0	1	0	1
117	N63	max	0	1	.206	3	0	1	0	1	0	1	0	1
118		min	0	1	.057	1	0	1	0	1	0	1	0	1
119	N64	max	0	1	.186	3	0	1	0	1	0	1	0	1
120		min	0	1	.053	1	0	1	0	1	0	1	0	1
121	N65	max	0	1	.23	3	0	1	0	1	0	1	0	1
122		min	0	1	.065	1	0	1	0	1	0	1	0	1
123	N66	max	0	1	.332	3	0	1	0	1	0	1	0	1
124		min	0	1	.095	1	0	1	0	1	0	1	0	1
125	N67	max	0	1	.41	3	0	1	0	1	0	1	0	1
126		min	0	1	.117	1	0	1	0	1	0	1	0	1
127	N68	max	0	1	-.048	1	0	1	0	1	0	1	0	1
128		min	0	1	-.177	3	0	1	0	1	0	1	0	1
129	N70	max	0	1	.19	3	0	1	0	1	0	1	0	1
130		min	0	1	.053	1	0	1	0	1	0	1	0	1
131	N71	max	0	1	.233	3	0	1	0	1	0	1	0	1
132		min	0	1	.066	1	0	1	0	1	0	1	0	1
133	N72	max	0	1	.344	3	0	1	0	1	0	1	0	1
134		min	0	1	.093	1	0	1	0	1	0	1	0	1

Envelope Joint Reactions (Continued)

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
135	N73	max	0	1	.441	3	0	1	0	1	0	1	0	1
136		min	0	1	.119	1	0	1	0	1	0	1	0	1
137	N74	max	0	1	-.047	1	0	1	0	1	0	1	0	1
138		min	0	1	-.174	3	0	1	0	1	0	1	0	1
139	N75	max	0	1	.213	3	0	1	0	1	0	1	0	1
140		min	0	1	.057	1	0	1	0	1	0	1	0	1
141	N76	max	0	1	.189	3	0	1	0	1	0	1	0	1
142		min	0	1	.052	1	0	1	0	1	0	1	0	1
143	N77	max	0	1	.226	3	0	1	0	1	0	1	0	1
144		min	0	1	.063	1	0	1	0	1	0	1	0	1
145	N78	max	0	1	.366	3	0	1	0	1	0	1	0	1
146		min	0	1	.099	1	0	1	0	1	0	1	0	1
147	N80	max	0	1	-.057	1	0	1	0	1	0	1	0	1
148		min	0	1	-.218	3	0	1	0	1	0	1	0	1
149	N82	max	0	1	.131	3	0	1	0	1	0	1	0	1
150		min	0	1	.035	1	0	1	0	1	0	1	0	1
151	N83	max	0	1	.132	3	0	1	0	1	0	1	0	1
152		min	0	1	.036	1	0	1	0	1	0	1	0	1
153	N84	max	0	1	.477	3	0	1	0	1	0	1	0	1
154		min	0	1	.136	1	0	1	0	1	0	1	0	1
155	N85	max	0	1	.476	2	0	1	0	1	0	1	0	1
156		min	0	1	.136	1	0	1	0	1	0	1	0	1
157	N86	max	0	1	.475	2	0	1	0	1	0	1	0	1
158		min	0	1	.136	1	0	1	0	1	0	1	0	1
159	N87	max	0	1	.47	2	0	1	0	1	0	1	0	1
160		min	0	1	.134	1	0	1	0	1	0	1	0	1
161	N89	max	0	1	.476	2	0	1	0	1	0	1	0	1
162		min	0	1	.136	1	0	1	0	1	0	1	0	1
163	N90	max	0	1	.478	2	0	1	0	1	0	1	0	1
164		min	0	1	.137	1	0	1	0	1	0	1	0	1
165	N91	max	0	1	.409	3	0	1	0	1	0	1	0	1
166		min	0	1	.117	1	0	1	0	1	0	1	0	1
167	N92	max	0	1	.529	3	0	1	0	1	0	1	0	1
168		min	0	1	.137	1	0	1	0	1	0	1	0	1
169	N93	max	0	1	.525	3	0	1	0	1	0	1	0	1
170		min	0	1	.136	1	0	1	0	1	0	1	0	1
171	N94	max	0	1	.525	3	0	1	0	1	0	1	0	1
172		min	0	1	.136	1	0	1	0	1	0	1	0	1
173	N95	max	0	1	.518	3	0	1	0	1	0	1	0	1
174		min	0	1	.134	1	0	1	0	1	0	1	0	1
175	N96	max	0	1	.463	3	0	1	0	1	0	1	0	1
176		min	0	1	.125	1	0	1	0	1	0	1	0	1
177	N97	max	0	1	.525	3	0	1	0	1	0	1	0	1
178		min	0	1	.136	1	0	1	0	1	0	1	0	1
179	N98	max	0	1	.525	3	0	1	0	1	0	1	0	1
180		min	0	1	.136	1	0	1	0	1	0	1	0	1
181	N99	max	0	1	.047	1	0	1	0	1	0	1	0	1
182		min	0	1	.044	3	0	1	0	1	0	1	0	1
183	N100	max	0	1	.128	1	0	1	0	1	0	1	0	1
184		min	0	1	.125	2	0	1	0	1	0	1	0	1
185	N101	max	0	1	.48	2	0	1	0	1	0	1	0	1
186		min	0	1	.137	1	0	1	0	1	0	1	0	1

Envelope Joint Reactions (Continued)

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
187	N102	max	0	1	.454	2	0	1	0	1	0	1	0	1
188		min	0	1	.13	1	0	1	0	1	0	1	0	1
189	N103	max	0	1	.481	2	0	1	0	1	0	1	0	1
190		min	0	1	.138	1	0	1	0	1	0	1	0	1
191	N105	max	0	1	.518	3	0	1	0	1	0	1	0	1
192		min	0	1	.134	1	0	1	0	1	0	1	0	1
193	N106	max	0	1	.517	3	0	1	0	1	0	1	0	1
194		min	0	1	.133	1	0	1	0	1	0	1	0	1
195	N107	max	0	1	.531	3	0	1	0	1	0	1	0	1
196		min	0	1	.137	1	0	1	0	1	0	1	0	1
197	N106A	max	0	1	.046	1	0	1	0	1	0	1	0	1
198		min	0	1	.046	3	0	1	0	1	0	1	0	1
199	N107A	max	0	1	.023	1	0	1	0	1	0	1	0	1
200		min	0	1	.023	3	0	1	0	1	0	1	0	1
201	N108	max	0	1	.06	3	0	1	0	1	0	1	0	1
202		min	0	1	.059	1	0	1	0	1	0	1	0	1
203	N109	max	0	1	0	1	0	1	0	1	0	1	0	1
204		min	0	1	0	3	0	1	0	1	0	1	0	1
205	N111	max	0	1	-.051	3	0	1	0	1	0	1	0	1
206		min	0	1	-.052	1	0	1	0	1	0	1	0	1
207	N112	max	0	1	.012	3	0	1	0	1	0	1	0	1
208		min	0	1	.003	1	0	1	0	1	0	1	0	1
209	N114	max	0	1	.011	1	0	1	0	1	0	1	0	1
210		min	0	1	.011	3	0	1	0	1	0	1	0	1
211	N115	max	0	1	.028	1	0	1	0	1	0	1	0	1
212		min	0	1	.028	3	0	1	0	1	0	1	0	1
213	N116	max	0	1	.025	3	0	1	0	1	0	1	0	1
214		min	0	1	.024	1	0	1	0	1	0	1	0	1
215	N117	max	0	1	0	1	0	1	0	1	0	1	0	1
216		min	0	1	0	3	0	1	0	1	0	1	0	1
217	N119	max	0	1	.041	3	0	1	0	1	0	1	0	1
218		min	0	1	.04	1	0	1	0	1	0	1	0	1
219	N120	max	0	1	0	3	0	1	0	1	0	1	0	1
220		min	0	1	0	1	0	1	0	1	0	1	0	1
221	N122	max	0	1	.026	3	0	1	0	1	0	1	0	1
222		min	0	1	.017	1	0	1	0	1	0	1	0	1
223	N123	max	0	1	-.002	3	0	1	0	1	0	1	0	1
224		min	0	1	-.021	1	0	1	0	1	0	1	0	1
225	N125	max	0	1	.233	3	0	1	0	1	0	1	0	1
226		min	0	1	.207	1	0	1	0	1	0	1	0	1
227	N126	max	0	1	.175	3	0	1	0	1	0	1	0	1
228		min	0	1	.164	1	0	1	0	1	0	1	0	1
229	N127	max	0	1	.207	3	0	1	0	1	0	1	0	1
230		min	0	1	.184	1	0	1	0	1	0	1	0	1
231	N128	max	0	1	.125	1	0	1	0	1	0	1	0	1
232		min	0	1	.122	3	0	1	0	1	0	1	0	1
233	N129	max	0	1	.178	2	0	1	0	1	0	1	0	1
234		min	0	1	.177	1	0	1	0	1	0	1	0	1
235	N124	max	0	1	.192	1	0	2	0	1	0	1	0	1
236		min	0	3	.192	1	0	1	0	1	0	1	0	1
237	N125A	max	0	1	.192	1	0	1	0	1	0	1	0	1
238		min	0	3	.192	1	0	3	0	1	0	1	0	1

Envelope Joint Reactions (Continued)

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
239	N126A	max	.002	3	.112	1	0	3	0	1	0	1	0	1
240		min	0	1	.112	1	0	1	0	1	0	1	0	1
241	N127A	max	0	1	.029	3	0	1	0	1	0	1	0	1
242		min	0	1	.029	1	0	1	0	1	0	1	0	1
243	N128A	max	0	1	0	1	0	1	0	1	0	1	0	1
244		min	0	1	0	3	0	1	0	1	0	1	0	1
245	N131	max	0	1	-.083	3	0	1	0	1	0	1	0	1
246		min	0	1	-.083	1	0	1	0	1	0	1	0	1
247	N132	max	0	1	-.059	3	0	1	0	1	0	1	0	1
248		min	0	1	-.059	1	0	1	0	1	0	1	0	1
249	N133	max	0	1	.09	1	0	1	0	1	0	1	0	1
250		min	0	1	.09	1	0	1	0	1	0	1	0	1
251	N134	max	0	1	.09	1	0	1	0	1	0	1	0	1
252		min	0	1	.09	1	0	1	0	1	0	1	0	1
253	N135	max	0	1	.09	1	0	1	0	1	0	1	0	1
254		min	0	1	.09	1	0	1	0	1	0	1	0	1
255	N133A	max	0	1	-.031	3	0	1	0	1	0	1	0	1
256		min	0	1	-.031	1	0	1	0	1	0	1	0	1
257	N140	max	0	1	.103	1	0	1	0	1	0	1	0	1
258		min	0	3	.103	1	0	3	0	1	0	1	0	1
259	N139	max	0	2	.103	1	0	1	0	1	0	1	0	1
260		min	0	1	.103	1	0	3	0	1	0	1	0	1
261	N138	max	.002	3	.103	1	0	3	0	1	0	1	0	1
262		min	0	1	.103	1	0	1	0	1	0	1	0	1
263	N137	max	0	1	.089	3	0	1	0	1	0	1	0	1
264		min	0	1	.089	1	0	1	0	1	0	1	0	1
265	N142	max	0	1	-.021	1	0	1	0	1	0	1	0	1
266		min	0	1	-.021	3	0	1	0	1	0	1	0	1
267	N136	max	0	1	.117	1	0	1	0	1	0	1	0	1
268		min	0	1	.117	3	0	1	0	1	0	1	0	1
269	N141	max	0	1	.103	3	0	1	0	1	0	1	0	1
270		min	0	1	.103	2	0	1	0	1	0	1	0	1
271	N134A	max	0	1	.095	1	0	1	0	1	0	1	0	1
272		min	0	1	.095	1	0	1	0	1	0	1	0	1
273	N133B	max	0	1	.095	1	0	1	0	1	0	1	0	1
274		min	0	1	.095	1	0	1	0	1	0	1	0	1
275	N132A	max	0	1	.095	1	0	1	0	1	0	1	0	1
276		min	0	1	.095	1	0	1	0	1	0	1	0	1
277	N131A	max	0	1	.072	3	0	1	0	1	0	1	0	1
278		min	0	1	.072	1	0	1	0	1	0	1	0	1
279	N135A	max	0	1	.053	1	0	1	0	1	0	1	0	1
280		min	0	1	.053	3	0	1	0	1	0	1	0	1
281	N130	max	0	1	.015	1	0	1	0	1	0	1	0	1
282		min	0	1	.015	3	0	1	0	1	0	1	0	1
283	N143	max	0	1	-.138	3	0	1	0	1	0	1	0	1
284		min	0	1	-.138	1	0	1	0	1	0	1	0	1
285	N144	max	0	1	.13	1	0	1	0	1	0	1	0	1
286		min	0	1	.13	1	0	1	0	1	0	1	0	1
287	N129A	max	0	1	.168	3	0	1	0	1	0	1	0	1
288		min	0	1	.157	1	0	1	0	1	0	1	0	1
289	Totals:	max	0	3	25.013	3	0	1						
290		min	0	1	9.941	1	0	3						



Company : MSC Engineers, Inc.
Designer : BK
Job Number : 161034
Model Name : Tchou Solar Panels

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Envelope Wood Code Checks

	Member	Shape	Code Check	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	Fc' [k...	Ft' [ksi]	Fb1' [...	Fb2' [...	Fv' [k...	Eqn
1	M1	2X4	.022	10.505	2	.045	10.68	y	3	.818	1.725	2.56	2.846	.207	3.9-3
2	M2	2X4	.018	6.303	3	.119	3.151	y	3	.818	1.725	2.56	2.846	.207	3.9-3
3	M3	2X4	.133	6.303	3	.878	3.151	y	3	.818	1.725	2.56	2.846	.207	3.9-3
4	M4	2X4	.022	6.303	3	.031	6.303	y	3	.818	1.725	2.56	2.846	.207	3.9-3
5	M5	2X4	.079	0	3	.116	.901	y	3	2.116	1.725	2.58	2.846	.207	3.9-1
6	M6	2X4	.074	.901	3	.109	0	y	3	2.116	1.725	2.58	2.846	.207	3.9-1
7	M7	2X4	.161	1.171	3	.155	3.305	y	3	1.945	1.725	2.58	2.846	.207	3.9-3
8	M8	2X4	.151	2.066	2	.152	0	y	3	1.945	1.725	2.58	2.846	.207	3.9-3
9	M9	2X4	.327	2.795	3	.240	5.709	y	3	1.208	1.725	2.58	2.846	.207	3.9-3
10	M10	2X4	.297	2.914	3	.219	0	y	3	1.208	1.725	2.58	2.846	.207	3.9-3
11	M11	2X4	.527	4.479	3	.366	0	y	3	.679	1.725	2.58	2.846	.207	3.9-3
12	M12	2X4	.477	3.634	3	.339	8.112	y	3	.679	1.725	2.58	2.846	.207	3.9-3
13	M13	2X4	.532	8.106	3	.348	8.106	y	3	.679	1.725	2.485	2.846	.207	3.9-3
14	M14	2X4	.492	8.075	3	.378	8.21	y	3	.679	1.725	2.485	2.846	.207	3.9-3
15	M15	2X4	.446	4.845	3	.332	4.71	y	3	.679	1.725	2.485	2.846	.207	3.9-3
16	M16	2X4	.476	2.41	3	.328	2.41	y	3	.679	1.725	2.485	2.846	.207	3.9-3
17	M17	2X4	.492	4.845	3	.419	4.71	y	3	.679	1.725	2.485	2.846	.207	3.9-3
18	M18	2X4	.517	8.216	3	.867	8.216	y	3	2.107	1.725	2.567	2.846	.207	3.9-3
19	M19	2X4	.523	2.41	3	.478	2.41	y	3	.679	1.725	2.485	2.846	.207	3.9-3
20	M22	2X4	.317	2.914	3	.477	0	y	3	1.208	1.725	2.58	2.846	.207	3.9-1
21	M23	2X4	.300	2.914	3	.447	0	y	3	1.208	1.725	2.58	2.846	.207	3.9-3
22	M24	2X4	.154	1.205	3	.280	3.305	y	3	1.945	1.725	2.58	2.846	.207	3.9-3
23	M25	2X4	.153	2.066	3	.285	0	y	3	1.945	1.725	2.58	2.846	.207	3.9-3
24	M26	2X4	.075	0	3	.177	.901	y	3	2.116	1.725	2.58	2.846	.207	3.9-1
25	M27	2X4	.075	.901	3	.173	0	y	3	2.116	1.725	2.58	2.846	.207	3.9-1
26	M28	2X4	.445	8.075	3	.308	8.075	y	3	.679	1.725	2.485	2.846	.207	3.9-3
27	M29	2X4	.491	4.845	3	.341	4.845	y	3	.679	1.725	2.485	2.846	.207	3.9-3
28	M30	2X4	.445	8.075	3	.308	8.075	y	3	.679	1.725	2.485	2.846	.207	3.9-3
29	M31	2X4	.491	4.845	3	.340	4.845	y	3	.679	1.725	2.485	2.846	.207	3.9-3
30	M32	2X4	.446	8.075	3	.308	8.075	y	3	.679	1.725	2.485	2.846	.207	3.9-3
31	M33	2X4	.492	4.845	3	.340	4.845	y	3	.679	1.725	2.485	2.846	.207	3.9-3
32	M34	2X4	.476	8.106	2	.313	8.106	y	3	.679	1.725	2.485	2.846	.207	3.9-3
33	M35	2X4	.484	2.41	3	.315	2.41	y	3	.679	1.725	2.485	2.846	.207	3.9-3
34	M36	2X4	.477	4.479	2	.301	0	y	2	.679	1.725	2.58	2.846	.207	3.9-3
35	M37	2X4	.476	3.634	3	.292	8.112	y	2	.679	1.725	2.58	2.846	.207	3.9-3
36	M38	2X4	.297	2.795	3	.192	5.709	y	2	1.208	1.725	2.58	2.846	.207	3.9-3
37	M39	2X4	.296	2.914	3	.195	0	y	2	1.208	1.725	2.58	2.846	.207	3.9-3
38	M40	2X4	.151	1.239	3	.138	3.305	y	2	1.945	1.725	2.58	2.846	.207	3.9-3
39	M41	2X4	.151	2.066	2	.136	0	y	2	1.945	1.725	2.58	2.846	.207	3.9-3
40	M42	2X4	.074	0	3	.103	.901	y	2	2.116	1.725	2.58	2.846	.207	3.9-1
41	M43	2X4	.077	.901	3	.078	0	y	2	2.116	1.725	2.58	2.846	.207	3.9-1
42	M44	2X4	.448	4.845	3	.308	4.845	y	3	.679	1.725	2.485	2.846	.207	3.9-3
43	M45	2X4	.522	8.106	3	.349	8.106	y	3	.679	1.725	2.485	2.846	.207	3.9-3
44	M46	2X4	.483	2.41	2	.315	2.41	y	2	.679	1.725	2.485	2.846	.207	3.9-3
45	M47	2X4	.482	4.394	3	.302	0	y	2	.679	1.725	2.58	2.846	.207	3.9-3
46	M48	2X4	.476	3.634	3	.293	8.112	y	3	.679	1.725	2.58	2.846	.207	3.9-3
47	M49	2X4	.300	2.795	3	.194	5.709	y	3	1.208	1.725	2.58	2.846	.207	3.9-3
48	M50	2X4	.296	2.914	2	.196	0	y	3	1.208	1.725	2.58	2.846	.207	3.9-3
49	M51	2X4	.153	1.239	3	.139	3.305	y	3	1.945	1.725	2.58	2.846	.207	3.9-3
50	M52	2X4	.151	2.066	3	.137	0	y	3	1.945	1.725	2.58	2.846	.207	3.9-3
51	M53	2X4	.075	0	3	.104	.901	y	3	2.116	1.725	2.58	2.846	.207	3.9-1



Company : MSC Engineers, Inc.
 Designer : BK
 Job Number : 161034
 Model Name : Tchou Solar Panels

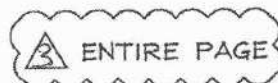
Jan 16, 2017
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 Checked By: CBS

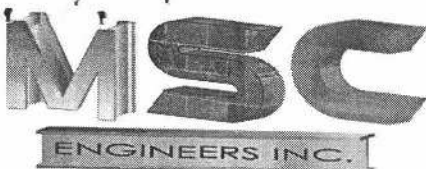
Envelope Wood Code Checks (Continued)

Member	Shape	Code Check	Loc(ft)	LC	Shear ...	Loc(ft)	Dir	LC	Fc' [k...Ft' [ksi]	Fb1' [...Fb2' [...Fv' [k...	Eqn
52	M54	2X4	.073	.901	3	.104	0	y	3	2.116 1.725 2.58 2.846	.207 3.9-1
53	M55	2X6	.001	2	3	.030	2	z	3	1.512 1.495 2.222 2.579	.207 3.9-1
54	M58	2X4	.001	6	3	.077	2	z	1	1.547 1.725 2.571 2.846	.207 3.9-3
55	M59	2X4	.002	6	3	.040	2	z	1	1.547 1.725 2.586 2.846	.207 3.9-3
56	M60	2X4	.008	2.083	3	.088	0	y	3	1.547 1.725 2.571 2.846	.207 3.9-3
57	M61	2X4	.005	2.083	3	.077	0	y	3	1.547 1.725 2.571 2.846	.207 3.9-3
58	M62	2X4	.027	0	3	.546	6	y	3	1.547 1.725 2.571 2.846	.207 3.9-3
59	M63	2X4	.032	2	3	.887	2	y	3	1.547 1.725 2.571 2.846	.207 3.9-1
60	M64	2X4	.008	0	3	.002	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
61	M65	2X4	.001	0	3	.000	0	z	2	.354 1.725 2.538 2.846	.207 3.6.3
62	M66	2X4	.000	0	3	.000	0	z	3	.354 1.725 2.538 2.846	.207 3.9-1
63	M67	2X4	.000	0	3	.001	0	z	3	.354 1.725 2.538 2.846	.207 3.9-1
64	M68	2X4	.001	0	3	.005	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
65	M69	2X4	.012	0	3	.036	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
66	M70	2X4	.012	0	3	.009	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
67	M71	2X4	.001	0	3	.003	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
68	M72	2X4	.000	0	3	.001	0	z	3	.354 1.725 2.538 2.846	.207 3.9-1
69	M73	2X4	.000	0	3	.000	0	z	1	.354 1.725 2.538 2.846	.207 3.9-1
70	M74	2X4	.000	0	3	.002	0	z	1	.354 1.725 2.538 2.846	.207 3.6.3
71	M75	2X4	.008	0	3	.007	0	z	1	.34 1.725 2.537 2.846	.207 3.6.3
72	M76	2X4	.006	0	3	.011	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
73	M77	2X4	.009	0	3	.001	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
74	M78	2X4	.010	0	3	.002	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
75	M79	2X4	.009	0	3	.001	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
76	M80	2X4	.008	0	3	.000	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
77	M81	2X4	.008	0	3	.001	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
78	M80A	2X4	.001	0	2	.000	0	z	2	.354 1.725 2.538 2.846	.207 3.9-1
79	M81A	2X4	.001	0	3	.000	0	z	3	.354 1.725 2.538 2.846	.207 3.9-1
80	M82	2X4	.001	0	2	.019	0	z	3	.354 1.725 2.538 2.846	.207 3.6.3
81	M83	2X4	.001	0	3	.001	0	z	3	.354 1.725 2.538 2.846	.207 3.9-1
82	M95	2X4	.482	3.718	3	.712	8.112	y	3	.679 1.725 2.58 2.846	.207 3.9-3
83	M85	2X6	.287	7.083	1	.100	0	y	1	.551 1.3 1.943 2.243	.18 3.9-3
84	M86	2X6	.254	6.667	1	.094	13.333	y	1	.614 1.3 1.943 2.243	.18 3.9-3
85	M87	2X6	.254	6.667	1	.094	13.333	y	1	.614 1.3 1.943 2.243	.18 3.9-3
86	M88	2X6	.287	7.083	1	.100	0	y	1	.551 1.3 1.943 2.243	.18 3.9-3
87	M89	2X6	.086	8.707	1	.073	8.707	y	1	1.172 1.3 1.831 2.243	.18 3.9-3
88	M90	2X6	.254	6.667	1	.094	13.333	y	1	.614 1.3 1.943 2.243	.18 3.9-3
89	M91	2X6	.087	8.75	1	.074	8.75	y	1	1.172 1.3 1.831 2.243	.18 3.9-3
90	M92	2X6	.086	5.46	1	.073	5.46	y	1	1.172 1.3 1.831 2.243	.18 3.9-3
91	M93	2X6	.094	8.707	1	.078	8.854	y	1	1.172 1.3 1.831 2.243	.18 3.9-3
92	M94	2X6	.101	4.583	1	.122	4.444	y	1	1.172 1.3 1.831 2.243	.18 3.9-3
93	M95A	2X6	.143	5	1	.071	0	y	1	.982 1.3 1.943 2.243	.18 3.9-3
94	M96	2X6	.051	12.031	1	.051	11.849	y	1	1.639 1.3 1.895 2.243	.18 3.9-3
95	M97	2X6	.051	5.469	1	.051	5.651	y	1	1.639 1.3 1.895 2.243	.18 3.9-3
96	M98	2X6	.143	5	1	.071	0	y	1	.982 1.3 1.943 2.243	.18 3.9-3
97	M99	2X6	.143	5	1	.071	0	y	1	.982 1.3 1.943 2.243	.18 3.9-3
98	M100	2X6	.051	12.031	1	.051	11.849	y	1	1.639 1.3 1.895 2.243	.18 3.9-3
99	M101	2X6	.034	5.469	1	.046	5.469	y	1	1.639 1.3 1.895 2.243	.18 3.9-3
100	M102	2X6	.095	1.25	1	.104	1.25	y	1	1.781 1.3 1.941 2.243	.18 3.9-3
101	M103	2X6	.101	8.75	1	.103	8.75	y	1	1.172 1.3 1.831 2.243	.18 3.9-3
102	M104	2X6	.056	10.573	1	.059	10.573	y	1	1.449 1.3 1.87 2.243	.18 3.9-3
103	M105	2X6	.057	6.993	1	.059	6.993	y	1	1.449 1.3 1.87 2.243	.18 3.9-3

Envelope Wood Code Checks (Continued)

	Member	Shape	Code Check	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	Fc' [k...Ft' [ksi]	Fb1' [...Fb2' [...Fv' [k...	Eqn			
104	M106	2X6	.094	5.927	1	.085	5.775	y	1	1.172	1.3	1.831	2.243	18	3.9-3
105	M107	2X4	.387	3.972	3	.691	8.112	y	3	.679	1.725	2.965	3.273	.207	3.9-3
106	M106A	2-2X4	.014	27.5	3	1.196	20.911	y	3	.145	1.725	2.561	2.846	.207	3.9-3
107	M107A	2-2X4	.015	21.5	3	1.317	4.927	z	3	.145	1.725	2.561	2.846	.207	3.9-1
108	M108	2-2X4	.013	27.5	2	1.259	4.87	z	3	.145	1.725	2.561	2.846	.207	3.9-1
109	M109	2-2X4	.013	0	3	1.190	4.927	y	3	.145	1.725	2.561	2.846	.207	3.9-1





Consulting
Structural
Engineers

2

Structural Calculations for Tchou Solar Panels

Job Number: 161034

Codes: 2012 IBC Amended by Oregon Structural Specialty Code with 2014 revisions.

Date: 11-08-2016

Location: 1304 NE 77th Ave, Portland, OR

Client: Elemental Energy
3123 Belmont St
Portland, OR 97214
Phone: 503-967-5786

Engineer: Cameron Carroll P.E.
Brad Kheyri, E.I.
MSC Engineers, Inc.
3470 Pipebend Place NE, Suite 120
Salem, OR 97301
Phone: 503-399-1399

Scope of Services: Anchorage design of proposed solar panels on new structure roof along with framing review.

Contents:

Site Specific Info.	0.1 – 0.2
Basic Design Loads	1.1 – 1.2
Solar Panel Anchorage	2.1
Gravity Analysis	3.1
Risa	R.1 – R.16
Sketches	SK.1 – SK.4
Appendix	App.1



LIMITATIONS: Engineer was retained in a limited capacity for this project. Design is based upon the information provided by the client, who is solely responsible for accuracy of same. No responsibility and/or liability is assumed by, or is to be assigned to the Engineer for items beyond those shown on these sheets.

16-218581 Rev 01 RS

SITE SPECIFIC INFORMATION

SITE LOCATION

UNIT: SW 285 L = 66 in A = 17.41 ft² Support = MCN RIDGE XR-1G
D = 38 in WT = 0.7 psl
WT = 39.5 lbs WT = 2.3 psl TOTAL WT = 3 psl

WIND LEAD

120 mph, Exposure "B" < 120 mph, Exp "C" : o.k.

$$\left. \begin{array}{l} \theta = 35.7^\circ \\ A_{eff} = 10.75^2/3 = 40 \end{array} \right\} CN = 2.6 < 2.7 \quad \therefore O.K.$$

$$Q_h = 0.00256 K_2 K_{z1} K_d v^2$$

$$P_{A30} = q_n G C_u = 13 \text{ psi} < 43 \text{ psi} \therefore \text{O.K.}$$

BASIC DESIGN IS OK.

SEISMIC LAB

$$SO_5 = 0.728 < 0.730 \quad \therefore \text{O.K.}$$

OCC. CAT II & OCC CAT II $\therefore$ o.k.

BASIC DESIGN IS O.K.

BASIC DESIGN IS SUFFICIENT FOR THIS UNIT @ THIS LOCATION



FILE NO. 161034 SHEET NO. 0.1

MADE BY BIC DATE 11/07/15

CLIENT ELEMENTAL ENERGY

PROJECT TCHOU SOLAR PANELS

USGS Design Maps Summary Report

User-Specified Input

Report Title 161034

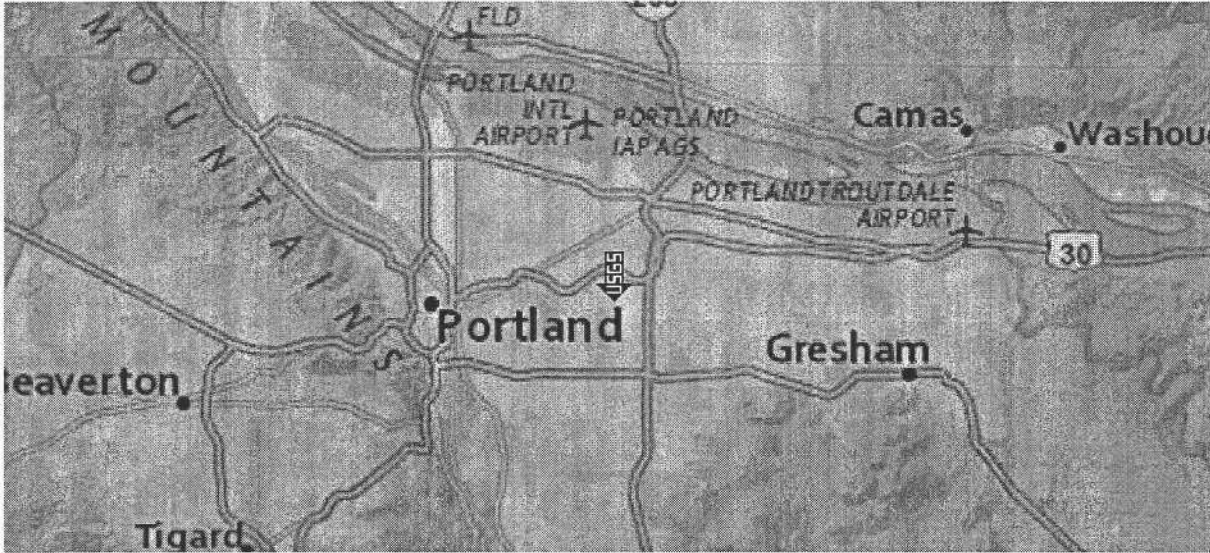
Tue November 8, 2016 00:30:29 UTC

Building Code Reference Document 2012/2015 International Building Code
(which utilizes USGS hazard data available in 2008)

Site Coordinates 45.53228°N, 122.58359°W

Site Soil Classification Site Class D – "Stiff Soil"

Risk Category I/II/III

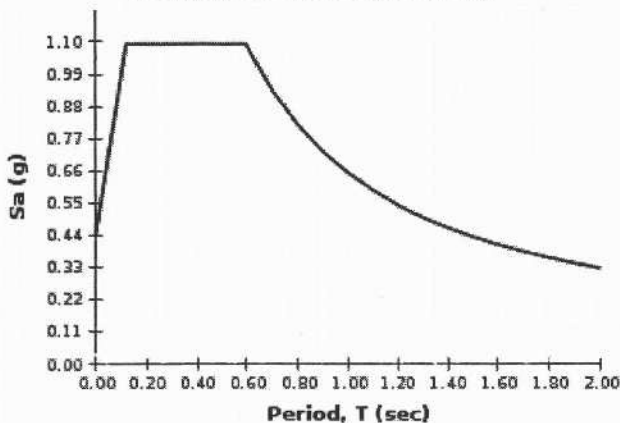


USGS-Provided Output

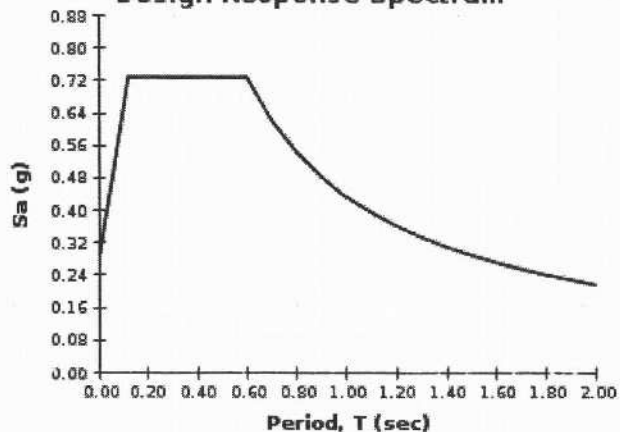
$S_s = 0.988 \text{ g}$	$S_{MS} = 1.091 \text{ g}$	$S_{DS} = 0.728 \text{ g}$
$S_1 = 0.410 \text{ g}$	$S_{M1} = 0.652 \text{ g}$	$S_{D1} = 0.434 \text{ g}$

For information on how the S_s and S_1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.

MCE_R Response Spectrum



Design Response Spectrum



Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.

BASIC DESIGN

WIND UPLIFT

$$q_z = 0.00256 K_z k_{zt} K_d V^2$$

$$q_z = 26.5 \text{ psf}$$

$$P = G q_z C_u$$

$$P_{ASD} = (0.6)(31 \text{ psf})(2.7) = 43 \text{ psf}$$

$$V = 120 \text{ MPH}$$

$$K_z = 0.85$$

$$k_{zt} = 1$$

$$K_d = 0.85$$

$$G = 0.85$$

A_{eff} :

Assum 6' LONG

MEMBERS

$$\Rightarrow A_{eff} = (6)(6) = 12 \text{ ft}^2$$

$$a_{MW} = 3$$

$$\Rightarrow A_{eff} < 4a_{MW}^2 \Rightarrow C_u = \underline{\underline{2.7}}$$

SEISMIC LOAD

$$F_p = \frac{0.4 q_p S_{DS} W_p}{\left(\frac{R_p}{I_p}\right)} \left(1 + 2 \frac{Z}{n}\right)$$

$$F_p = 0.73 W_p$$

$$F_{pMIN} = 0.3 S_{DS} I_p W_p = 0.27 W_p$$

$$F_{pMAX} = 1.6 S_{DS} I_p W_p = 1.45 W_p$$

$$\left. \begin{array}{l} F_{pMIN} = 0.27 W_p \\ F_{pMAX} = 1.45 W_p \end{array} \right\} \Rightarrow F_{pASD} = (0.7)(0.73) W_p$$

$$F_{ASD} = \underline{\underline{0.51 W_p}}$$

$$\frac{Z}{n} = 1$$

$$q_p = 1$$

$$R_p = 1.5$$

$$I = 1.25$$

$$S_{DS} = 0.730$$

$$E_v = 0.2 S_{DS} W_p$$

$$E_{vASD} = (0.2)(0.725) W_p (0.7) = \underline{\underline{0.1 W_p}}$$

USGS Design Maps Summary Report

User-Specified Input

Report Title 160729

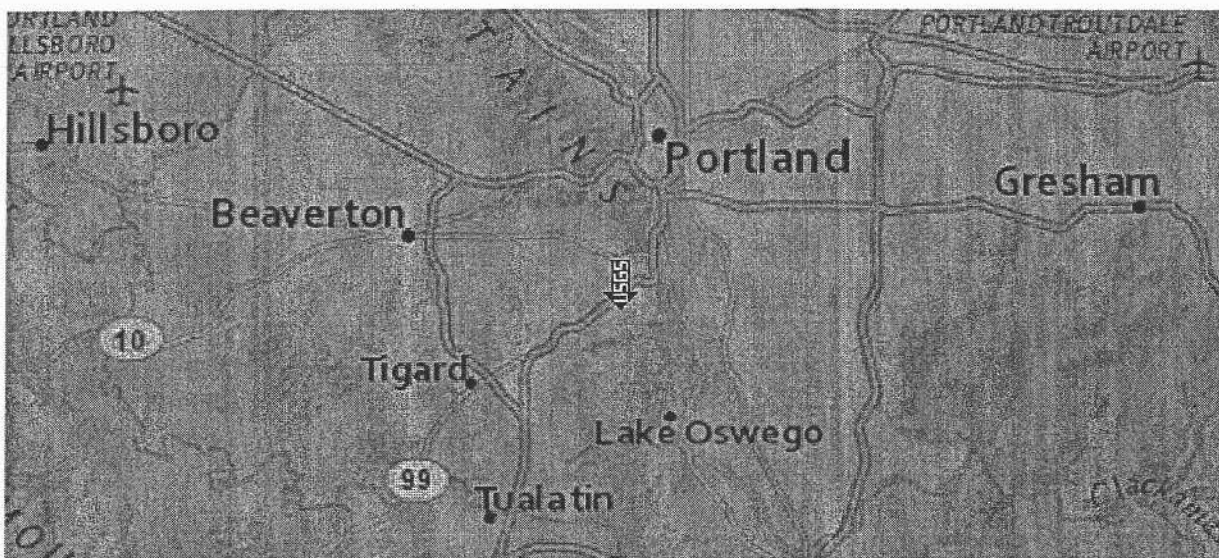
Tue July 26, 2016 00:22:46 UTC

Building Code Reference Document 2012/2015 International Building Code
(which utilizes USGS hazard data available in 2008)

Site Coordinates 45.46853°N, 122.69599°W

Site Soil Classification Site Class D - "Stiff Soil"

Risk Category I/II/III

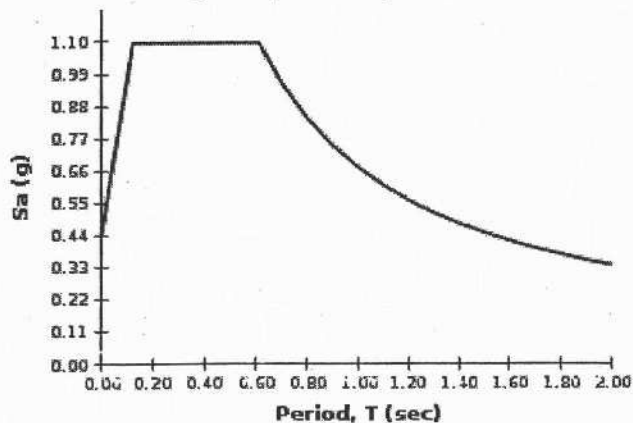


USGS-Provided Output

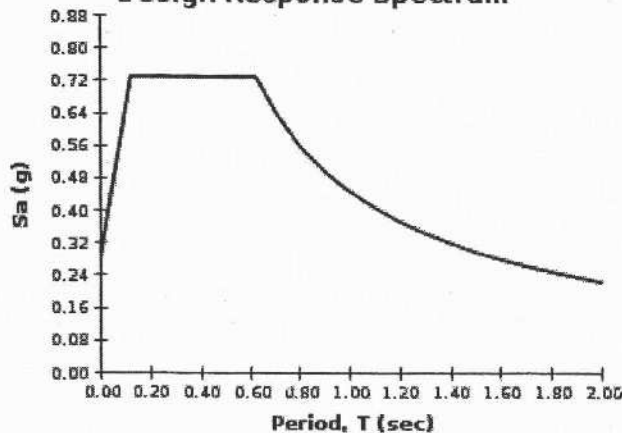
$S_s = 0.993 \text{ g}$	$S_{MS} = 1.095 \text{ g}$	$S_{DS} = 0.730 \text{ g}$
$S_1 = 0.427 \text{ g}$	$S_{M1} = 0.671 \text{ g}$	$S_{D1} = 0.448 \text{ g}$

For information on how the S_s and S_1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.

MCE_R Response Spectrum



Design Response Spectrum



Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.

ANCHORAGE DESIGN

WIND

$$\text{UPLIFT: } W = [43 \text{ psf} - 0.6(3)] 17.2 \text{ ft}^2 = 709 \text{ lbs} / 2 \text{ supp} = 354 \text{ lbs}$$

SEISMIC

$$V = 0.51 (3 \text{ psf}) (17.2 \text{ ft}^2) = 26 \text{ lbs} / 2 \text{ supp} = 13 \text{ lbs.}$$

$$E_v = 0.1 (3 \text{ psf}) (17.2 \text{ ft}^2) = 6 \text{ lbs} / 2 \text{ supp} = 3 \text{ lbs}$$

→ WIND CONTROLS

PROPOSED :

$5/16" \phi \times 3" \text{ LAG SCREW:}$

$$V_{\text{allow}} = 160 \text{ lbs} (1.6) = 256 \text{ lbs EA} > 254 \text{ lbs}$$

$$T_{\text{allow}} = 266 \text{ lbs/in} (1.6) (2.5) = 1064 \text{ lbs EA} > 3 \text{ lbs}$$

} ⇒ O.K.

USE MIN (2) SUPPORT LEG FOR EA PANEL

USE MIN (1) $5/16" \phi$ LAG EA LEG

GRAVITY ANALYSIS.

DL: (2) 2.5 psf	ASPHALT	
1.5 psf	1/2 Plywood	}
1.0 psf	1x FLAT @ 12" O.C.	
0.7 psf	2x4 @ 24" O.C.	

6.2 psf $\approx$ 8 psf

DL: 1.7 psf	2x6 @ 16" O.C.
6(0.2) psf	INSULATION
4 psf	CEILING

6.9 psf $\sim$ 7 psf

SL = 20 psf

ML = 3 psf

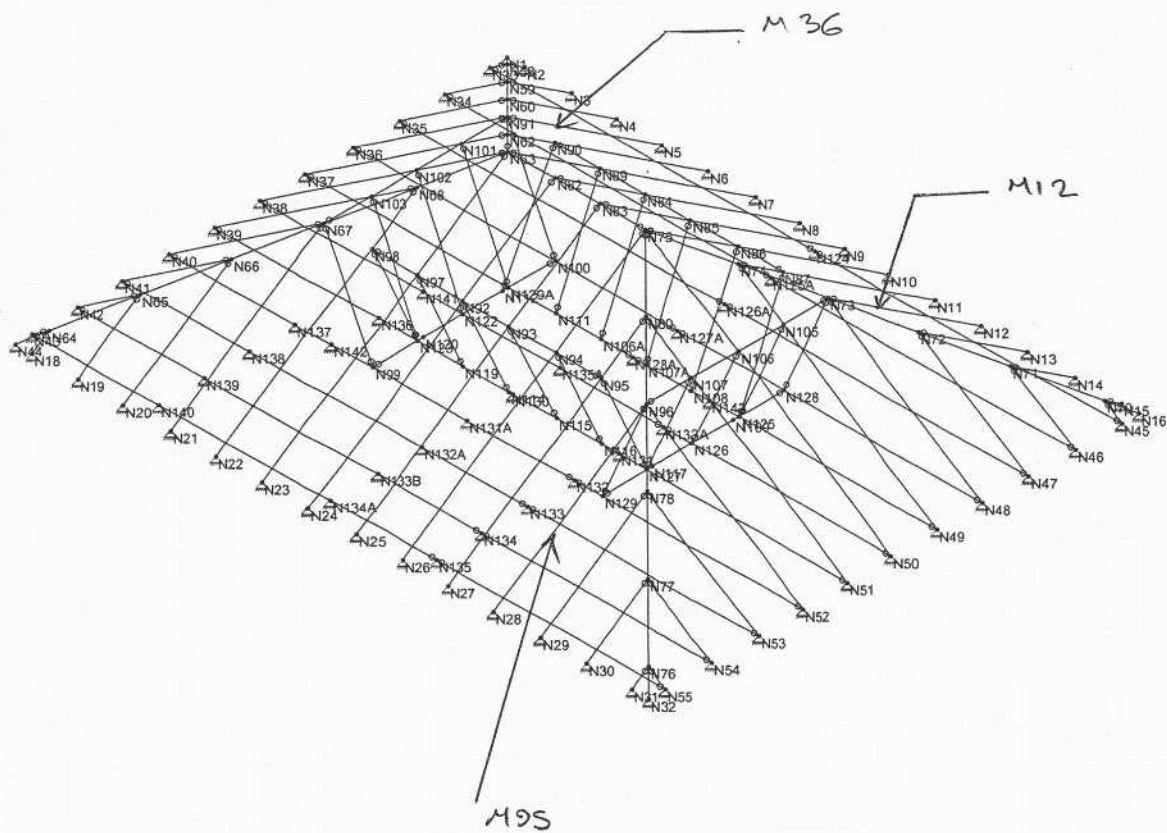
BASED ON AGE OF THE HOUSE (BUILT 1944) 1949 UBC OF WOOD VALUES HAVE BEEN USED IN THIS ANALYSIS.

ROOF FRAMING IS O.K.

(SEE RISA)



FILE NO. 161034 SHEET NO. 3.1
MADE BY ML DATE 11/10/16
CLIENT ELEMENTA ENERGY
PROJECT TCHOU SOLAR PANEL



The members shown above and on page R.16 are shown to be overstressed. This is due to the way the framing has been modeled and the boundary conditions used. These members are not stressed any more than the adjacent members which are only approximately 50% stressed.

Envelope Only Solution

MSC Engineers, Inc.

BK

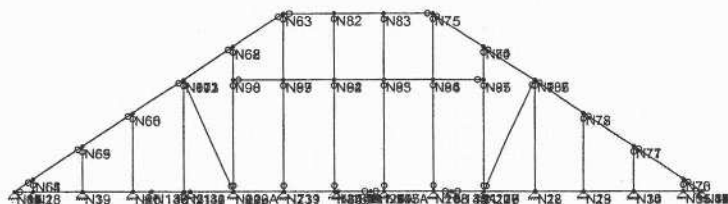
161034

Tchou Solar Panels

R.1

Nov 7, 2016 at 3:22 PM

Tchou Solar Panel Whole Roof 3.r3d



Envelope Only Solution

MSC Engineers, Inc.

BK

161034

Tchou Solar Panels

KIA

Nov 7, 2016 at 3:22 PM

Tchou Solar Panel Whole Roof 3.r3d

Wood Section Sets

	Label	Shape	Type	Design List	Material	Design Ru...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Rafter	2X4	Beam	None	1940's Wood	Typical	5.25	.984	5.359	2.877
2	Ridge	2X4	Beam	None	1940's Wood	Typical	5.25	.984	5.359	2.877
3	Valley	2X4	Beam	None	1940's Wood	Typical	5.25	.984	5.359	2.877
4	Joist	2X6	Beam	None	1940's Wood	Typical	8.25	1.547	20.797	5.125
5	Sole PL	2X4	Beam	None	1940's Wood	Typical	5.25	.984	5.359	2.877
6	Top PL	2X4	Beam	None	1940's Wood	Typical	5.25	.984	5.359	2.877
7	Post	2X4	Column	None	1940's Wood	Typical	5.25	.984	5.359	2.877

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0	0	0	
2	N2	.75	0	0	0	
3	N3	2.75	0	0	0	
4	N4	4.75	0	0	0	
5	N5	6.75	0	0	0	
6	N6	8.75	0	0	0	
7	N7	10.75	0	0	0	
8	N8	12.75	0	0	0	
9	N9	14.75	0	0	0	
10	N10	16.75	0	0	0	
11	N11	18.75	0	0	0	
12	N12	20.75	0	0	0	
13	N13	22.75	0	0	0	
14	N14	24.75	0	0	0	
15	N15	26.75	0	0	0	
16	N16	27.5	0	0	0	
17	N18	.75	0	21.5	0	
18	N19	2.75	0	21.5	0	
19	N20	4.75	0	21.5	0	
20	N21	6.75	0	21.5	0	
21	N22	8.75	0	21.5	0	
22	N23	10.75	0	21.5	0	
23	N24	12.75	0	21.5	0	
24	N25	14.75	0	21.5	0	
25	N26	16.75	0	21.5	0	
26	N27	18.75	0	21.5	0	
27	N28	20.75	0	21.5	0	
28	N29	22.75	0	21.5	0	
29	N30	24.75	0	21.5	0	
30	N31	26.75	0	21.5	0	
31	N32	27.5	0	21.5	0	
32	N33	0	0	.75	0	
33	N34	0	0	2.75	0	
34	N35	0	0	4.75	0	
35	N36	0	0	6.75	0	
36	N37	0	0	8.75	0	
37	N38	0	0	10.75	0	
38	N39	0	0	12.75	0	
39	N40	0	0	14.75	0	
40	N41	0	0	16.75	0	
41	N42	0	0	18.75	0	
42	N43	0	0	20.75	0	
43	N44	0	0	21.5	0	
44	N45	27.5	0	.75	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
45	N46	27.5	0	2.75	0	
46	N47	27.5	0	4.75	0	
47	N48	27.5	0	6.75	0	
48	N49	27.5	0	8.75	0	
49	N50	27.5	0	10.75	0	
50	N51	27.5	0	12.75	0	
51	N52	27.5	0	14.75	0	
52	N53	27.5	0	16.75	0	
53	N54	27.5	0	18.75	0	
54	N55	27.5	0	20.75	0	
55	N58	.75	.5	.75	0	
56	N59	2.75	1.833333	2.75	0	
57	N60	4.75	3.166667	4.75	0	
58	N62	8.75	5.833333	8.75	0	
59	N63	10.75	7.166667	10.75	0	
60	N64	.75	.5	20.75	0	
61	N65	2.75	1.833333	18.75	0	
62	N66	4.75	3.166667	16.75	0	
63	N67	6.75	4.5	14.75	0	
64	N68	8.75	5.833333	12.75	0	
65	N70	26.75	.5	.75	0	
66	N71	24.75	1.833333	2.75	0	
67	N72	22.75	3.166667	4.75	0	
68	N73	20.75	4.5	6.75	0	
69	N74	18.75	5.833333	8.75	0	
70	N75	16.75	7.166667	10.75	0	
71	N76	26.75	.5	20.75	0	
72	N77	24.75	1.833333	18.75	0	
73	N78	22.75	3.166667	16.75	0	
74	N80	18.75	5.833333	12.75	0	
75	N82	12.75	7.167	10.75	0	
76	N83	14.75	7.166667	10.75	0	
77	N84	12.75	4.5	6.75	0	
78	N85	14.75	4.5	6.75	0	
79	N86	16.75	4.5	6.75	0	
80	N87	18.75	4.5	6.75	0	
81	N89	10.75	4.5	6.75	0	
82	N90	8.75	4.5	6.75	0	
83	N91	6.75	4.5	6.75	0	
84	N92	12.75	4.5	14.75	0	
85	N93	14.75	4.5	14.75	0	
86	N94	16.75	4.5	14.75	0	
87	N95	18.75	4.5	14.75	0	
88	N96	20.75	4.5	14.75	0	
89	N97	10.75	4.5	14.75	0	
90	N98	8.75	4.5	14.75	0	
91	N99	8.75	0	14.75	0	
92	N100	8.75	0	6.75	0	
93	N101	6.75	4.5	8.75	0	
94	N102	6.75	4.5	10.75	0	
95	N103	6.75	4.5	12.75	0	
96	N105	20.75	4.5	8.75	0	
97	N106	20.75	4.5	10.75	0	
98	N107	20.75	4.5	12.75	0	
99	N106A	12.75	0	8.75	0	
100	N107A	14.75	0	8.75	0	
101	N108	16.75	0	8.75	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
102	N109	18.75	0	9	0	
103	N111	10.75	0	8.75	0	
104	N112	8.75	0	9	0	
105	N114	12.75	0	12.75	0	
106	N115	14.75	0	12.75	0	
107	N116	16.75	0	12.75	0	
108	N117	18.75	0	12.5	0	
109	N119	10.75	0	12.75	0	
110	N120	8.75	0	12.5	0	
111	N122	8.75	0	10.75	0	
112	N123	8.75	0	12.75	0	
113	N125	18.75	0	8.75	0	
114	N126	18.75	0	10.75	0	
115	N127	18.75	0	12.75	0	
116	N128	18.75	0	6.75	0	
117	N129	18.75	0	14.75	0	
118	N124	14.167	0	75	0	
119	N125A	14.167	0	2.75	0	
120	N126A	14.167	0	4.75	0	
121	N127A	14.167	0	6.75	0	
122	N128A	14.167	0	8.75	0	
123	N131	17.5	0	12.75	0	
124	N132	17.5	0	14.75	0	
125	N133	17.5	0	16.75	0	
126	N134	17.5	0	18.75	0	
127	N135	17.5	0	20.75	0	
128	N133A	17.5	0	10.75	0	
129	N129A	8.75	0	8.75	0	
130	N130	12.91	0	12.75	0	
131	N131A	12.91	0	14.75	0	
132	N132A	12.91	0	16.75	0	
133	N133B	12.91	0	18.75	0	
134	N134A	12.91	0	20.75	0	
135	N135A	12.91	0	10.75	0	
136	N136	7	0	12.75	0	
137	N137	5.5	0	14.75	0	
138	N138	5.5	0	16.75	0	
139	N139	5.5	0	18.75	0	
140	N140	5.5	0	20.75	0	
141	N141	7	0	10.75	0	
142	N142	7	0	14.75	0	
143	N143	17.5	0	8.75	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N1	Reaction	Reaction	Reaction			
2	N2	Reaction	Reaction	Reaction			
3	N3	Reaction	Reaction	Reaction			
4	N4	Reaction	Reaction	Reaction			
5	N5	Reaction	Reaction	Reaction			
6	N6	Reaction	Reaction	Reaction			
7	N7	Reaction	Reaction	Reaction			
8	N8	Reaction	Reaction	Reaction			
9	N9	Reaction	Reaction	Reaction			
10	N10	Reaction	Reaction	Reaction			

Joint Boundary Conditions (Continued)

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
11	N11	Reaction	Reaction	Reaction			
12	N12	Reaction	Reaction	Reaction			
13	N13	Reaction	Reaction	Reaction			
14	N14	Reaction	Reaction	Reaction			
15	N15	Reaction	Reaction	Reaction			
16	N16	Reaction	Reaction	Reaction			
17	N18	Reaction	Reaction	Reaction			
18	N19	Reaction	Reaction	Reaction			
19	N20	Reaction	Reaction	Reaction			
20	N21	Reaction	Reaction	Reaction			
21	N22	Reaction	Reaction	Reaction			
22	N23	Reaction	Reaction	Reaction			
23	N24	Reaction	Reaction	Reaction			
24	N25	Reaction	Reaction	Reaction			
25	N26	Reaction	Reaction	Reaction			
26	N27	Reaction	Reaction	Reaction			
27	N28	Reaction	Reaction	Reaction			
28	N29	Reaction	Reaction	Reaction			
29	N30	Reaction	Reaction	Reaction			
30	N31	Reaction	Reaction	Reaction			
31	N32	Reaction	Reaction	Reaction			
32	N33	Reaction	Reaction	Reaction			
33	N34	Reaction	Reaction	Reaction			
34	N35	Reaction	Reaction	Reaction			
35	N36	Reaction	Reaction	Reaction			
36	N37	Reaction	Reaction	Reaction			
37	N38	Reaction	Reaction	Reaction			
38	N39	Reaction	Reaction	Reaction			
39	N40	Reaction	Reaction	Reaction			
40	N41	Reaction	Reaction	Reaction			
41	N42	Reaction	Reaction	Reaction			
42	N43	Reaction	Reaction	Reaction			
43	N44	Reaction	Reaction	Reaction			
44	N45	Reaction	Reaction	Reaction			
45	N46	Reaction	Reaction	Reaction			
46	N47	Reaction	Reaction	Reaction			
47	N48	Reaction	Reaction	Reaction			
48	N49	Reaction	Reaction	Reaction			
49	N50	Reaction	Reaction	Reaction			
50	N51	Reaction	Reaction	Reaction			
51	N52	Reaction	Reaction	Reaction			
52	N53	Reaction	Reaction	Reaction			
53	N54	Reaction	Reaction	Reaction			
54	N55	Reaction	Reaction	Reaction			
55	N58						
56	N59						
57	N60						
58	N62						
59	N63						
60	N64						
61	N65						
62	N66						
63	N67						
64	N68						
65	N70						
66	N71						
67	N72						

Joint Boundary Conditions (Continued)

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
68	N73						
69	N74						
70	N75						
71	N76						
72	N77						
73	N78						
74	N80						
75	N82						
76	N83						
77	N84						
78	N85						
79	N86						
80	N87						
81	N89						
82	N90						
83	N91						
84	N92						
85	N93						
86	N94						
87	N95						
88	N96						
89	N97						
90	N98						
91	N99						
92	N100						
93	N101						
94	N102						
95	N103						
96	N105						
97	N106						
98	N107						
99	N106A						
100	N107A						
101	N108						
102	N109						
103	N111						
104	N112						
105	N114						
106	N115						
107	N116						
108	N117						
109	N119						
110	N120						
111	N122						
112	N123						
113	N125						
114	N126						
115	N127						
116	N128						
117	N129						
118	N124	Reaction	Reaction	Reaction			
119	N125A	Reaction	Reaction	Reaction			
120	N126A	Reaction	Reaction	Reaction			
121	N127A	Reaction	Reaction	Reaction			
122	N128A	Reaction	Reaction	Reaction			
123	N131	Reaction	Reaction	Reaction			
124	N132	Reaction	Reaction	Reaction			

Joint Boundary Conditions (Continued)

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
125	N133	Reaction	Reaction	Reaction			
126	N134	Reaction	Reaction	Reaction			
127	N135	Reaction	Reaction	Reaction			
128	N133A	Reaction	Reaction	Reaction			
129	N140	Reaction	Reaction	Reaction			
130	N139	Reaction	Reaction	Reaction			
131	N138	Reaction	Reaction	Reaction			
132	N137	Reaction	Reaction	Reaction			
133	N142	Reaction	Reaction	Reaction			
134	N136	Reaction	Reaction	Reaction			
135	N141	Reaction	Reaction	Reaction			
136	N134A	Reaction	Reaction	Reaction			
137	N133B	Reaction	Reaction	Reaction			
138	N132A	Reaction	Reaction	Reaction			
139	N131A	Reaction	Reaction	Reaction			
140	N135A	Reaction	Reaction	Reaction			
141	N130	Reaction	Reaction	Reaction			
142	N143	Reaction	Reaction	Reaction			

Wood Design Parameters

	Label	Shape	Length[...]	le2[ft]	le1[ft]	le-bend top[ft]	le-bend bot[ft]	Kyy	Kzz	CV	Cr	y sway	z sway
1	M1	Valley	16.807	Segment	Segment	Segment	Segment						
2	M2	Valley	16.807	Segment	Segment	Segment	Segment						
3	M3	Valley	16.807	Segment	Segment	Segment	Segment						
4	M4	Valley	16.807	Segment	Segment	Segment	Segment						
5	M5	Rafter	.901	1	Segment	1	Segment						
6	M6	Rafter	.901	1	Segment	1	Segment						
7	M7	Rafter	3.305	1	Segment	1	Segment						
8	M8	Rafter	3.305	1	Segment	1	Segment						
9	M9	Rafter	5.709	1	Segment	1	Segment						
10	M10	Rafter	5.709	1	Segment	1	Segment						
11	M11	Rafter	8.112	1	Segment	1	Segment						
12	M12	Rafter	8.112	1	Segment	1	Segment						
13	M13	Rafter	10.516	1	Segment	1	Segment						
14	M14	Rafter	12.92	1	Segment	1	Segment						
15	M15	Rafter	12.92	1	Segment	1	Segment						
16	M16	Rafter	10.516	1	Segment	1	Segment						
17	M17	Rafter	12.92	1	Segment	1	Segment						
18	M18	Rafter	10.516	1	Segment	1	Segment						
19	M19	Rafter	10.516	1	Segment	1	Segment						
20	M22	Rafter	5.709	1	Segment	1	Segment						
21	M23	Rafter	5.709	1	Segment	1	Segment						
22	M24	Rafter	3.305	1	Segment	1	Segment						
23	M25	Rafter	3.305	1	Segment	1	Segment						
24	M26	Rafter	.901	1	Segment	1	Segment						
25	M27	Rafter	.901	1	Segment	1	Segment						
26	M28	Rafter	12.92	1	Segment	1	Segment						
27	M29	Rafter	12.92	1	Segment	1	Segment						
28	M30	Rafter	12.92	1	Segment	1	Segment						
29	M31	Rafter	12.92	1	Segment	1	Segment						
30	M32	Rafter	12.92	1	Segment	1	Segment						
31	M33	Rafter	12.92	1	Segment	1	Segment						
32	M34	Rafter	10.516	1	Segment	1	Segment						
33	M35	Rafter	10.516	1	Segment	1	Segment						
34	M36	Rafter	8.112	1	Segment	1	Segment						

Wood Design Parameters (Continued)

	Label	Shape	Length[...]	le2[ft]	le1[ft]	le-bend top[ft]	le-bend bot[ft]	Kyy	Kzz	CV	Cr	y sway	z sway
35	M37	Rafter	8.112	1	Segment	1	Segment						
36	M38	Rafter	5.709	1	Segment	1	Segment						
37	M39	Rafter	5.709	1	Segment	1	Segment						
38	M40	Rafter	3.305	1	Segment	1	Segment						
39	M41	Rafter	3.305	1	Segment	1	Segment						
40	M42	Rafter	.901	1	Segment	1	Segment						
41	M43	Rafter	.901	1	Segment	1	Segment						
42	M44	Rafter	12.92	1	Segment	1	Segment						
43	M45	Rafter	10.516	1	Segment	1	Segment						
44	M46	Rafter	10.516	1	Segment	1	Segment						
45	M47	Rafter	8.112	1	Segment	1	Segment						
46	M48	Rafter	8.112	1	Segment	1	Segment						
47	M49	Rafter	5.709	1	Segment	1	Segment						
48	M50	Rafter	5.709	1	Segment	1	Segment						
49	M51	Rafter	3.305	1	Segment	1	Segment						
50	M52	Rafter	3.305	1	Segment	1	Segment						
51	M53	Rafter	.901	1	Segment	1	Segment						
52	M54	Rafter	.901	1	Segment	1	Segment						
53	M55	Ridge	6	Segment	Segment	2	Segment						
54	M58	Sole PL	8	2	Segment	2	Segment						
55	M59	Sole PL	8	2	Segment	2	Segment						
56	M60	Top PL	10	2	Segment	2	Segment						
57	M61	Top PL	10	2	Segment	2	Segment						
58	M62	Top PL	8	2	Segment	2	Segment						
59	M63	Top PL	8	2	Segment	2	Segment						
60	M64	Post	4.924	Segment	Segment	Segment	Segment						
61	M65	Post	4.924	Segment	Segment	Segment	Segment						
62	M66	Post	4.924	Segment	Segment	Segment	Segment						
63	M67	Post	4.924	Segment	Segment	Segment	Segment						
64	M68	Post	4.924	Segment	Segment	Segment	Segment						
65	M69	Post	4.924	Segment	Segment	Segment	Segment						
66	M70	Post	4.924	Segment	Segment	Segment	Segment						
67	M71	Post	4.924	Segment	Segment	Segment	Segment						
68	M72	Post	4.924	Segment	Segment	Segment	Segment						
69	M73	Post	4.924	Segment	Segment	Segment	Segment						
70	M74	Post	4.924	Segment	Segment	Segment	Segment						
71	M75	Post	5.031	Segment	Segment	Segment	Segment						
72	M76	Post	4.924	Segment	Segment	Segment	Segment						
73	M77	Post	4.924	Segment	Segment	Segment	Segment						
74	M78	Post	4.924	Segment	Segment	Segment	Segment						
75	M79	Post	4.924	Segment	Segment	Segment	Segment						
76	M80	Post	4.924	Segment	Segment	Segment	Segment						
77	M81	Post	4.924	Segment	Segment	Segment	Segment						
78	M80A	Post	4.924	Segment	Segment	Segment	Segment						
79	M81A	Post	4.924	Segment	Segment	Segment	Segment						
80	M82	Post	4.924	Segment	Segment	Segment	Segment						
81	M83	Post	4.924	Segment	Segment	Segment	Segment						
82	M95	Rafter	8.112	1	Segment	1	Segment						
83	M85	Joist	14.167	1	Segment	1	Segment						
84	M86	Joist	13.333	1	Segment	1	Segment						
85	M87	Joist	13.333	1	Segment	1	Segment						
86	M88	Joist	14.167	1	Segment	1	Segment						
87	M89	Joist	14.167	1	Segment	1	Segment						
88	M90	Joist	13.333	1	Segment	1	Segment						
89	M91	Joist	13.333	1	Segment	1	Segment						
90	M92	Joist	14.167	1	Segment	1	Segment						
91	M93	Joist	14.167	1	Segment	1	Segment						

Wood Design Parameters (Continued)

	Label	Shape	Length[ft]	le2[ft]	le1[ft]	le-bend top[ft]	le-bend bot[ft]	Kyy	Kzz	CV	Cr	y sway	z sway
92	M94	Joist	13.333	1	Segment	1	Segment						
93	M95A	Joist	10	1	Segment	1	Segment						
94	M96	Joist	17.5	1	Segment	1	Segment						
95	M97	Joist	17.5	1	Segment	1	Segment						
96	M98	Joist	10	1	Segment	1	Segment						
97	M99	Joist	10	1	Segment	1	Segment						
98	M100	Joist	17.5	1	Segment	1	Segment						
99	M101	Joist	17.5	1	Segment	1	Segment						
100	M102	Joist	10	1	Segment	1	Segment						
101	M103	Joist	10	1	Segment	1	Segment						
102	M104	Joist	17.5	1	Segment	1	Segment						
103	M105	Joist	17.5	1	Segment	1	Segment						
104	M106	Joist	10	1	Segment	1	Segment						
105	M107	Rafter	8.112	1	Segment	1	Segment				Yes		

Member Distributed Loads (BLC 1 : DL)

	Member Label	Direction	Start Magnitude[k/ft.F]	End Magnitude[k/ft.F]	Start Location[ft.%]	End Location[ft.%]
1	M5	Y	-0.16	-0.16	0	0
2	M6	Y	-0.16	-0.16	0	0
3	M7	Y	-0.16	-0.16	0	0
4	M8	Y	-0.16	-0.16	0	0
5	M9	Y	-0.16	-0.16	0	0
6	M10	Y	-0.16	-0.16	0	0
7	M11	Y	-0.16	-0.16	0	0
8	M12	Y	-0.16	-0.16	0	0
9	M13	Y	-0.16	-0.16	0	0
10	M14	Y	-0.16	-0.16	0	0
11	M15	Y	-0.16	-0.16	0	0
12	M16	Y	-0.16	-0.16	0	0
13	M17	Y	-0.16	-0.16	0	0
14	M18	Y	-0.16	-0.16	0	0
15	M19	Y	-0.16	-0.16	0	0
16	M22	Y	-0.16	-0.16	0	0
17	M23	Y	-0.16	-0.16	0	0
18	M24	Y	-0.16	-0.16	0	0
19	M25	Y	-0.16	-0.16	0	0
20	M26	Y	-0.16	-0.16	0	0
21	M27	Y	-0.16	-0.16	0	0
22	M28	Y	-0.16	-0.16	0	0
23	M29	Y	-0.16	-0.16	0	0
24	M30	Y	-0.16	-0.16	0	0
25	M31	Y	-0.16	-0.16	0	0
26	M32	Y	-0.16	-0.16	0	0
27	M33	Y	-0.16	-0.16	0	0
28	M34	Y	-0.16	-0.16	0	0
29	M35	Y	-0.16	-0.16	0	0
30	M36	Y	-0.16	-0.16	0	0
31	M37	Y	-0.16	-0.16	0	0
32	M38	Y	-0.16	-0.16	0	0
33	M39	Y	-0.16	-0.16	0	0
34	M40	Y	-0.16	-0.16	0	0
35	M41	Y	-0.16	-0.16	0	0
36	M42	Y	-0.16	-0.16	0	0
37	M44	Y	-0.16	-0.16	0	0
38	M45	Y	-0.16	-0.16	0	0

Member Distributed Loads (BLC 1 : DL) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft, %]	End Location[ft, %]
39	M46	Y	-016	-016	0	0
40	M47	Y	-016	-016	0	0
41	M48	Y	-016	-016	0	0
42	M49	Y	-016	-016	0	0
43	M50	Y	-016	-016	0	0
44	M51	Y	-016	-016	0	0
45	M52	Y	-016	-016	0	0
46	M53	Y	-016	-016	0	0
47	M54	Y	-016	-016	0	0
48	M95	Y	-016	-016	0	0
49	M107	Y	-016	-016	0	0
50	M85	Y	-014	-014	0	0
51	M86	Y	-014	-014	0	0
52	M87	Y	-014	-014	0	0
53	M88	Y	-014	-014	0	0
54	M89	Y	-014	-014	0	0
55	M90	Y	-014	-014	0	0
56	M91	Y	-014	-014	0	0
57	M92	Y	-014	-014	0	0
58	M93	Y	-014	-014	0	0
59	M94	Y	-014	-014	0	0
60	M95A	Y	-014	-014	0	0
61	M96	Y	-014	-014	0	0
62	M97	Y	-014	-014	0	0
63	M98	Y	-014	-014	0	0
64	M99	Y	-014	-014	0	0
65	M100	Y	-014	-014	0	0
66	M101	Y	-014	-014	0	0
67	M102	Y	-014	-014	0	0
68	M103	Y	-014	-014	0	0
69	M104	Y	-014	-014	0	0
70	M105	Y	-014	-014	0	0
71	M106	Y	-014	-014	0	0

Member Distributed Loads (BLC 2 : SL)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft, %]	End Location[ft, %]
1	M5	Y	-04	-04	0	0
2	M6	Y	-04	-04	0	0
3	M7	Y	-04	-04	0	0
4	M8	Y	-04	-04	0	0
5	M9	Y	-04	-04	0	0
6	M10	Y	-04	-04	0	0
7	M11	Y	-04	-04	0	0
8	M12	Y	-04	-04	0	0
9	M13	Y	-04	-04	0	0
10	M14	Y	-04	-04	0	0
11	M15	Y	-04	-04	0	0
12	M16	Y	-04	-04	0	0
13	M17	Y	-04	-04	0	0
14	M18	Y	-04	-04	0	0
15	M19	Y	-04	-04	0	0
16	M22	Y	-04	-04	0	0
17	M23	Y	-04	-04	0	0
18	M24	Y	-04	-04	0	0
19	M25	Y	-04	-04	0	0
20	M26	Y	-04	-04	0	0

Member Distributed Loads (BLC 2 : SL) (Continued)

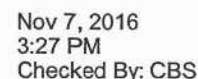
	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
21	M27	Y	-04	-04	0	0
22	M28	Y	-04	-04	0	0
23	M29	Y	-04	-04	0	0
24	M30	Y	-04	-04	0	0
25	M31	Y	-04	-04	0	0
26	M32	Y	-04	-04	0	0
27	M33	Y	-04	-04	0	0
28	M34	Y	-04	-04	0	0
29	M35	Y	-04	-04	0	0
30	M36	Y	-04	-04	0	0
31	M37	Y	-04	-04	0	0
32	M38	Y	-04	-04	0	0
33	M39	Y	-04	-04	0	0
34	M40	Y	-04	-04	0	0
35	M41	Y	-04	-04	0	0
36	M42	Y	-04	-04	0	0
37	M44	Y	-04	-04	0	0
38	M45	Y	-04	-04	0	0
39	M46	Y	-04	-04	0	0
40	M47	Y	-04	-04	0	0
41	M48	Y	-04	-04	0	0
42	M49	Y	-04	-04	0	0
43	M50	Y	-04	-04	0	0
44	M51	Y	-04	-04	0	0
45	M52	Y	-04	-04	0	0
46	M53	Y	-04	-04	0	0
47	M54	Y	-04	-04	0	0
48	M95	Y	-04	-04	0	0
49	M107	Y	-04	-04	0	0

Member Distributed Loads (BLC 3 : ML)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M17	Y	-006	-006	0	0
2	M29	Y	-006	-006	0	0
3	M31	Y	-006	-006	0	0
4	M33	Y	-006	-006	0	0
5	M45	Y	-006	-006	0	0
6	M19	Y	-006	-006	0	0
7	M22	Y	-006	-006	0	0
8	M107	Y	-006	-006	0	0
9	M18	Y	-006	-006	0	0
10	M14	Y	-006	-006	0	0
11	M13	Y	-006	-006	0	0
12	M11	Y	-006	-006	0	0
13	M9	Y	-006	-006	0	0

Basic Load Cases

	BLC Description	Category	X Gravi...	Y Gravi...	Z Gravity	Joint	Point	Distrib...	Area(M...	Surfac...
1	DL	DL						71		
2	SL	SL						49		
3	ML	OL1						13		



1.12

Envelope Joint Reactions (Continued)

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
49	N26	max	0	3	.308	3	-.019	1	0	1	0	1	0	1
50		min	0	1	.066	1	-.152	3	0	1	0	1	0	1
51	N27	max	0	3	.231	3	-.023	3	0	1	0	1	0	1
52		min	0	1	.075	1	-.026	1	0	1	0	1	0	1
53	N28	max	0	1	.842	3	-.425	1	0	1	0	1	0	1
54		min	0	3	.348	1	-.923	3	0	1	0	1	0	1
55	N29	max	0	1	.52	3	-.157	1	0	1	0	1	0	1
56		min	0	3	.15	1	-.541	3	0	1	0	1	0	1
57	N30	max	0	1	.277	3	-.075	1	0	1	0	1	0	1
58		min	0	3	.077	1	-.278	3	0	1	0	1	0	1
59	N31	max	0	1	.079	2	-.024	1	0	1	0	1	0	1
60		min	0	3	.023	1	-.081	2	0	1	0	1	0	1
61	N32	max	.572	3	-.133	1	.573	3	0	1	0	1	0	1
62		min	.198	1	-.383	3	.198	1	0	1	0	1	0	1
63	N33	max	.049	3	.132	3	0	1	0	1	0	1	0	1
64		min	.015	1	.109	1	0	2	0	1	0	1	0	1
65	N34	max	.264	3	.367	3	0	3	0	1	0	1	0	1
66		min	.07	1	.172	1	0	1	0	1	0	1	0	1
67	N35	max	.54	2	.618	2	0	3	0	1	0	1	0	1
68		min	.169	1	.258	1	0	1	0	1	0	1	0	1
69	N36	max	.32	3	.472	3	0	1	0	1	0	1	0	1
70		min	.154	1	.202	1	0	2	0	1	0	1	0	1
71	N37	max	.071	2	.309	2	.002	3	0	1	0	1	0	1
72		min	.041	1	.137	1	0	1	0	1	0	1	0	1
73	N38	max	.083	3	.216	3	.001	2	0	1	0	1	0	1
74		min	.011	1	.079	1	0	1	0	1	0	1	0	1
75	N39	max	-.011	1	.171	2	.001	2	0	1	0	1	0	1
76		min	-.044	3	.077	1	0	1	0	1	0	1	0	1
77	N40	max	-.159	1	.024	3	0	1	0	1	0	1	0	1
78		min	-.359	2	-.01	1	0	2	0	1	0	1	0	1
79	N41	max	.449	3	.486	3	0	1	0	1	0	1	0	1
80		min	.128	1	.158	1	0	3	0	1	0	1	0	1
81	N42	max	.296	2	.317	2	0	1	0	1	0	1	0	1
82		min	.084	1	.11	1	0	3	0	1	0	1	0	1
83	N43	max	.079	3	.105	3	0	1	0	1	0	1	0	1
84		min	.023	1	.049	1	-.002	3	0	1	0	1	0	1
85	N44	max	-.054	1	-.037	1	.277	2	0	1	0	1	0	1
86		min	-.276	2	-.187	2	.054	1	0	1	0	1	0	1
87	N45	max	-.023	1	.171	2	0	2	0	1	0	1	0	1
88		min	-.079	2	.116	1	0	1	0	1	0	1	0	1
89	N46	max	-.079	1	.378	3	0	2	0	1	0	1	0	1
90		min	-.288	3	.173	1	0	1	0	1	0	1	0	1
91	N47	max	-.142	1	.604	3	0	3	0	1	0	1	0	1
92		min	-.501	3	.234	1	0	1	0	1	0	1	0	1
93	N48	max	.061	3	.258	3	0	3	0	1	0	1	0	1
94		min	.027	1	.088	1	0	1	0	1	0	1	0	1
95	N49	max	-.004	2	.324	3	0	3	0	1	0	1	0	1
96		min	-.015	1	.136	1	0	1	0	1	0	1	0	1
97	N50	max	.004	1	.395	3	0	3	0	1	0	1	0	1
98		min	-.075	3	.135	1	0	1	0	1	0	1	0	1
99	N51	max	-.014	3	.36	3	0	3	0	1	0	1	0	1
100		min	-.025	1	.156	1	0	1	0	1	0	1	0	1
101	N52	max	-.014	1	.33	3	.001	3	0	1	0	1	0	1
102		min	-.037	3	.127	1	0	1	0	1	0	1	0	1
103	N53	max	-.152	1	.597	3	0	3	0	1	0	1	0	1
104		min	-.526	3	.217	1	0	1	0	1	0	1	0	1
105	N54	max	-.077	1	.35	3	0	3	0	1	0	1	0	1

Envelope Joint Reactions (Continued)

Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
106		min	-.282	3	.148	1	0	1	0	1	0	1	0
107	N55	max	-.023	1	.147	2	.002	3	0	1	0	1	0
108		min	-.078	2	.092	1	0	1	0	1	0	1	0
109	N124	max	0	1	.192	1	0	2	0	1	0	1	0
110		min	0	2	.192	1	0	1	0	1	0	1	0
111	N125A	max	0	1	.192	1	0	1	0	1	0	1	0
112		min	0	3	.192	1	0	3	0	1	0	1	0
113	N126A	max	0	2	.192	1	0	1	0	1	0	1	0
114		min	0	3	.192	1	0	3	0	1	0	1	0
115	N127A	max	.047	3	.058	3	0	3	0	1	0	1	0
116		min	.018	1	.042	1	0	1	0	1	0	1	0
117	N128A	max	.01	1	.621	2	-.086	1	0	1	0	1	0
118		min	0	2	.175	1	-.31	3	0	1	0	1	0
119	N131	max	.103	3	.937	3	.237	3	0	1	0	1	0
120		min	.022	1	.298	1	.066	1	0	1	0	1	0
121	N132	max	-.03	2	.1	3	.002	3	0	1	0	1	0
122		min	-.044	1	.021	1	0	1	0	1	0	1	0
123	N133	max	0	1	.09	1	0	3	0	1	0	1	0
124		min	0	3	.09	1	0	1	0	1	0	1	0
125	N134	max	0	1	.09	1	0	1	0	1	0	1	0
126		min	0	3	.09	1	0	3	0	1	0	1	0
127	N135	max	0	1	.09	1	0	3	0	1	0	1	0
128		min	0	2	.09	1	0	1	0	1	0	1	0
129	N133A	max	.167	3	.356	3	.025	3	0	1	0	1	0
130		min	.04	1	.13	1	.006	1	0	1	0	1	0
131	N140	max	0	3	.103	1	0	1	0	1	0	1	0
132		min	0	1	.103	1	0	3	0	1	0	1	0
133	N139	max	0	2	.103	1	0	1	0	1	0	1	0
134		min	0	1	.103	1	0	3	0	1	0	1	0
135	N138	max	0	3	.103	1	0	1	0	1	0	1	0
136		min	0	1	.103	1	0	3	0	1	0	1	0
137	N137	max	0	1	.08	1	.016	2	0	1	0	1	0
138		min	0	2	.039	3	.004	1	0	1	0	1	0
139	N142	max	.011	1	.099	3	-.009	1	0	1	0	1	0
140		min	-.005	3	.001	1	-.037	2	0	1	0	1	0
141	N136	max	-.022	1	.564	3	-.008	1	0	1	0	1	0
142		min	-.081	2	.225	1	-.029	2	0	1	0	1	0
143	N141	max	-.056	1	1.044	3	-.007	1	0	1	0	1	0
144		min	-.171	2	.416	1	-.028	2	0	1	0	1	0
145	N134A	max	0	3	.095	1	0	3	0	1	0	1	0
146		min	0	1	.095	1	0	1	0	1	0	1	0
147	N133B	max	0	2	.095	1	0	3	0	1	0	1	0
148		min	0	1	.095	1	0	1	0	1	0	1	0
149	N132A	max	0	2	.095	1	0	3	0	1	0	1	0
150		min	0	3	.095	1	0	1	0	1	0	1	0
151	N131A	max	.005	1	.098	3	-.002	1	0	1	0	1	0
152		min	-.002	3	.077	1	-.008	2	0	1	0	1	0
153	N135A	max	-.024	1	.501	3	-.001	1	0	1	0	1	0
154		min	-.072	2	.214	1	-.004	2	0	1	0	1	0
155	N130	max	-.009	1	1.361	3	.46	3	0	1	0	1	0
156		min	-.034	2	.403	1	.116	1	0	1	0	1	0
157	N143	max	.178	3	1.564	3	-.077	1	0	1	0	1	0
158		min	.049	1	.57	1	-.245	2	0	1	0	1	0
159	Totals:	max	0	1	25.013	3	0	2					
160		min	0	3	9.941	1	0	1					

Envelope Wood Code Checks

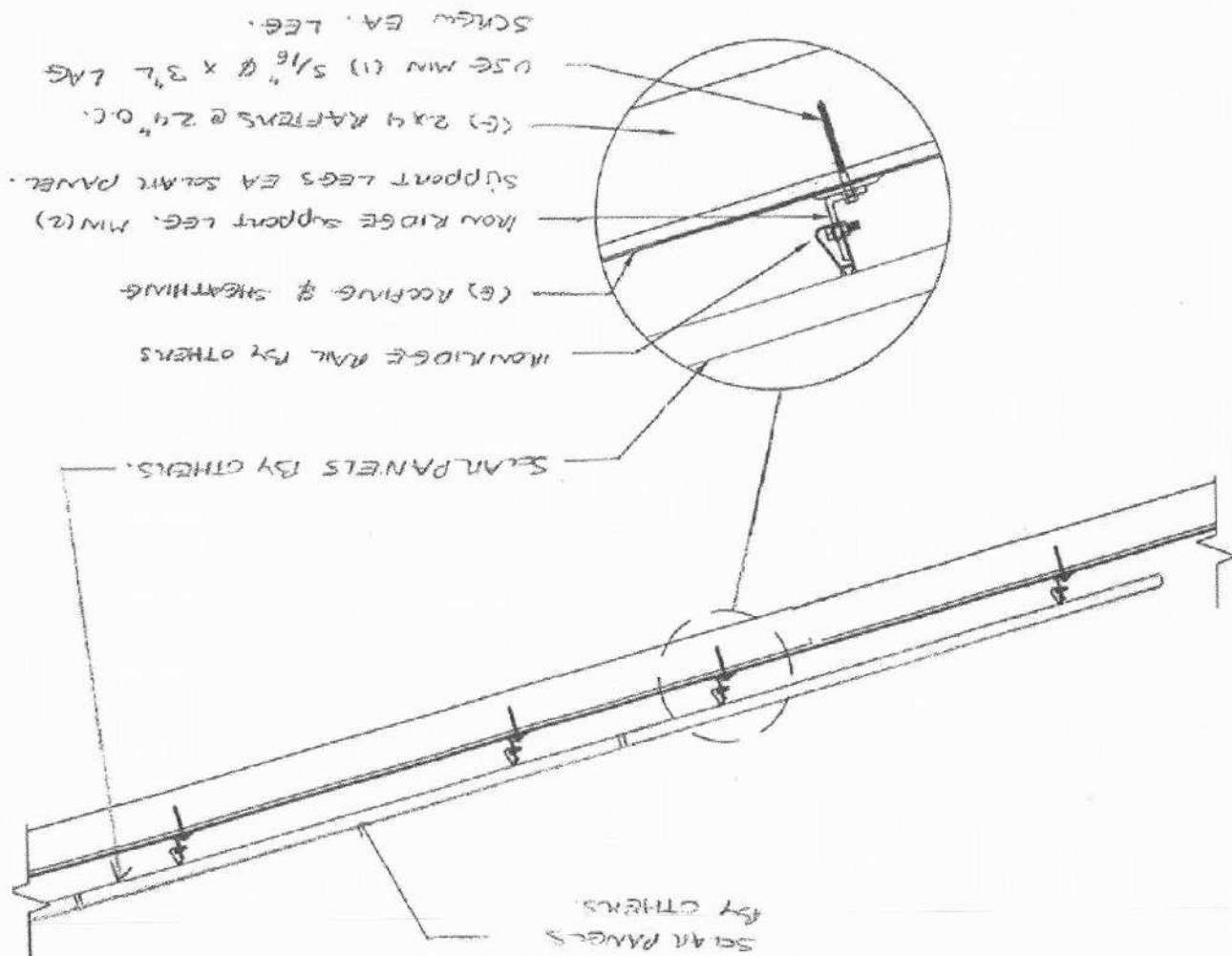
Member	Shape	Code Check	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	Fc' [k...]	Ft' [ksi]	Fb1' [...]	Fb2' [...]	Fv' [k...]	Eqn
1	M1	2X4	.234	13.831	3	.569	10.68	y	3	.645	2.501	2.467	2.751	.138 3.6.3
2	M2	2X4	.171	6.303	3	.296	3.151	y	3	.645	2.501	2.467	2.751	.138 3.6.3
3	M3	2X4	.187	6.303	3	1.627	3.151	y	3	.645	2.501	2.467	2.751	.138 3.9-3
4	M4	2X4	.254	6.303	3	.367	3.151	y	3	.645	2.501	2.467	2.751	.138 3.6.3
5	M5	2X4	.013	0	2	.052	.901	y	2	1.651	2.501	2.493	2.751	.138 3.6.3
6	M6	2X4	.013	.901	2	.043	0	y	2	1.651	2.501	2.493	2.751	.138 3.6.3
7	M7	2X4	.104	1.653	2	.166	3.305	y	2	1.52	2.501	2.492	2.751	.138 3.9-3
8	M8	2X4	.104	1.653	3	.159	3.305	y	2	1.52	2.501	2.492	2.751	.138 3.9-3
9	M9	2X4	.381	2.795	3	.316	0	y	3	.95	2.501	2.492	2.751	.138 3.9-3
10	M10	2X4	.346	2.914	3	.275	5.709	y	3	.95	2.501	2.492	2.751	.138 3.9-3
11	M11	2X4	.673	4.056	3	.468	0	y	3	.535	2.501	2.492	2.751	.138 3.9-1
12	M12	2X4	1.009 ★	4.225	3	.391	0	y	2	.535	2.501	2.492	2.751	.138 3.9-3
13	M13	2X4	.479	8.106	3	.521	8.106	y	3	.535	2.501	2.361	2.751	.138 3.9-3
14	M14	2X4	.489	3.365	3	.764	8.21	y	3	.535	2.501	2.492	2.751	.138 3.9-3
15	M15	2X4	.468	4.845	3	.694	4.71	y	3	.535	2.501	2.361	2.751	.138 3.9-3
16	M16	2X4	.436	2.41	2	.458	2.41	y	2	.535	2.501	2.361	2.751	.138 3.9-3
17	M17	2X4	.489	4.845	3	.753	4.71	y	3	.535	2.501	2.361	2.751	.138 3.9-3
18	M18	2X4	.501	3.396	3	1.424	8.216	y	3	.535	2.501	2.492	2.751	.138 3.9-3
19	M19	2X4	.501	7.12	3	.494	2.41	y	3	.535	2.501	2.492	2.751	.138 3.9-3
20	M22	2X4	.387	2.795	3	.421	0	y	3	.95	2.501	2.492	2.751	.138 3.9-3
21	M23	2X4	.351	2.914	3	.275	5.709	y	2	.95	2.501	2.492	2.751	.138 3.9-3
22	M24	2X4	.107	1.618	3	.264	3.305	y	3	1.52	2.501	2.492	2.751	.138 3.9-3
23	M25	2X4	.104	1.653	3	.159	3.305	y	2	1.52	2.501	2.492	2.751	.138 3.9-3
24	M26	2X4	.012	0	2	.156	0	y	3	1.651	2.501	2.493	2.751	.138 3.6.3
25	M27	2X4	.013	.901	2	.043	.901	y	3	1.651	2.501	2.493	2.751	.138 3.6.3
26	M28	2X4	.506	8.075	3	.725	8.21	y	3	.535	2.501	2.361	2.751	.138 3.9-3
27	M29	2X4	.502	4.845	3	.511	4.71	y	3	.535	2.501	2.361	2.751	.138 3.9-3
28	M30	2X4	.490	3.365	3	.982	8.21	y	2	.535	2.501	2.492	2.751	.138 3.9-3
29	M31	2X4	.578	4.845	3	.511	4.845	y	3	.535	2.501	2.361	2.751	.138 3.9-3
30	M32	2X4	.475	3.634	2	.487	8.21	y	3	.535	2.501	2.492	2.751	.138 3.9-1
31	M33	2X4	.546	9.69	3	.529	4.71	y	3	.535	2.501	2.492	2.751	.138 3.9-3
32	M34	2X4	.532	3.505	2	.434	8.106	y	3	.535	2.501	2.492	2.751	.138 3.9-3
33	M35	2X4	.486	7.011	2	.437	2.41	y	2	.535	2.501	2.492	2.751	.138 3.9-3
34	M36	2X4	1.849 ★	3.803	2	.391	0	y	3	.535	2.501	2.492	2.751	.138 3.9-3
35	M37	2X4	.692	4.225	3	.439	0	y	2	.535	2.501	2.492	2.751	.138 3.9-3
36	M38	2X4	.352	2.795	2	.275	5.709	y	3	.95	2.501	2.492	2.751	.138 3.9-3
37	M39	2X4	.351	2.914	2	.289	0	y	2	.95	2.501	2.492	2.751	.138 3.9-3
38	M40	2X4	.103	1.653	3	.159	3.305	y	3	1.52	2.501	2.492	2.751	.138 3.9-3
39	M41	2X4	.104	1.653	2	.166	0	y	2	1.52	2.501	2.492	2.751	.138 3.9-3
40	M42	2X4	.009	0	3	.043	.901	y	2	1.651	2.501	2.493	2.751	.138 3.6.3
41	M43	2X4	.007	0	3	.008	0	z	2	1.651	2.501	2.493	2.751	.138 3.6.3
42	M44	2X4	.441	9.555	3	.516	4.71	y	2	.535	2.501	2.492	2.751	.138 3.9-3
43	M45	2X4	.483	8.106	3	.507	8.106	y	3	.535	2.501	2.361	2.751	.138 3.9-3
44	M46	2X4	.428	2.41	2	.665	2.3	y	3	.535	2.501	2.361	2.751	.138 3.9-3
45	M47	2X4	.910	3.887	3	.391	0	y	2	.535	2.501	2.492	2.751	.138 3.9-3
46	M48	2X4	.634	4.056	2	.424	0	y	3	.535	2.501	2.492	2.751	.138 3.9-1
47	M49	2X4	.340	2.795	3	.275	0	y	3	.95	2.501	2.492	2.751	.138 3.9-3
48	M50	2X4	.342	2.914	3	.392	5.709	y	3	.95	2.501	2.492	2.751	.138 3.9-3
49	M51	2X4	.104	1.653	2	.159	3.305	y	3	1.52	2.501	2.492	2.751	.138 3.9-3
50	M52	2X4	.107	1.687	3	.264	3.305	y	3	1.52	2.501	2.492	2.751	.138 3.9-3
51	M53	2X4	.013	0	3	.043	.901	y	2	1.651	2.501	2.493	2.751	.138 3.6.3
52	M54	2X4	.013	.901	3	.156	0	y	3	1.651	2.501	2.493	2.751	.138 3.6.3
53	M55	2X4	.056	2.063	3	.043	4	y	3	1.213	2.501	2.481	2.751	.138 3.6.3
54	M58	2X4	.930	2	2	1.563	2.25	y	3	1.213	2.501	2.481	2.751	.138 3.9-3
55	M59	2X4	.318	6	3	1.369	6	y	3	1.213	2.501	2.481	2.751	.138 3.9-3
56	M60	2X4	.399	6.042	3	.611	0	y	3	1.213	2.501	2.481	2.751	.138 3.9-3

Envelope Wood Code Checks (Continued)

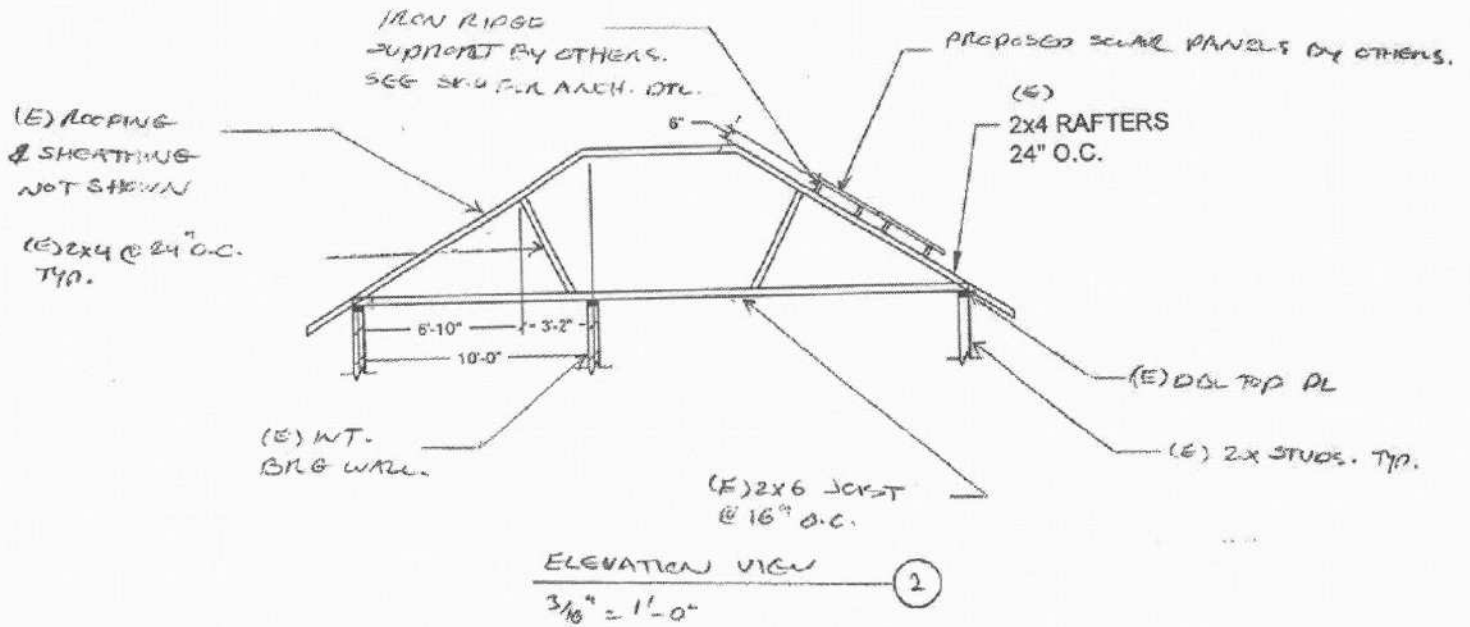
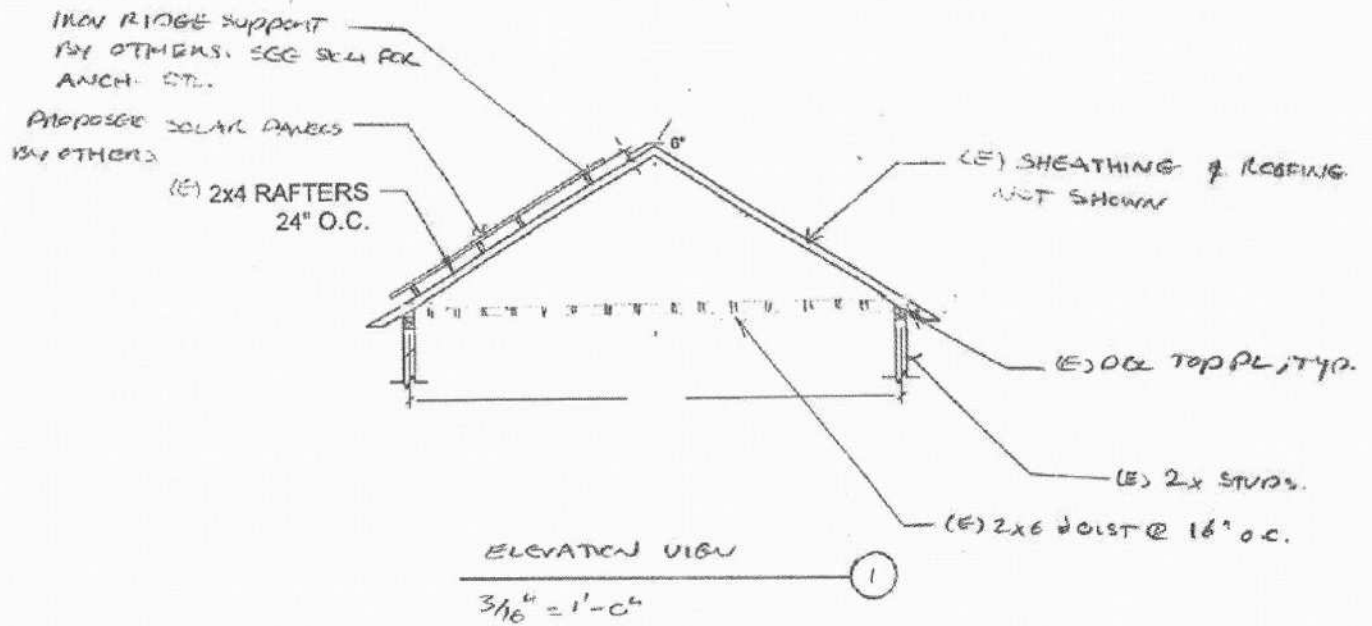
Member	Shape	Code Check	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	Fc' [k...	Ft' [ksi]	Fb1' [...]	Fb2' [...]	Fv' [k...	Eqn
57	M61	2X4	.461	4.063	2	.616	8.021	y	2	1.213	2.501	2.481	2.751	.138 3.9-3
58	M62	2X4	.786	6	2	1.440	6	y	2	1.213	2.501	2.481	2.751	.138 3.9-3
59	M63	2X4	.328	2	3	1.742	0	y	3	1.213	2.501	2.481	2.751	.138 3.9-3
60	M64	2X4	.336	0	3	.015	0	z	3	.28	2.501	2.438	2.751	.138 3.6.3
61	M65	2X4	.155	0	3	.127	0	z	2	.28	2.501	2.438	2.751	.138 3.6.3
62	M66	2X4	.518	0	3	.150	0	z	2	.28	2.501	2.438	2.751	.138 3.6.3
63	M67	2X4	.096	0	3	.352	0	z	3	.28	2.501	2.438	2.751	.138 3.6.3
64	M68	2X4	.439	0	3	.683	0	z	3	.28	2.501	2.438	2.751	.138 3.6.3
65	M69	2X4	.229	0	3	.317	0	z	3	.28	2.501	2.438	2.751	.138 3.6.3
66	M70	2X4	.256	0	2	.201	0	z	3	.28	2.501	2.438	2.751	.138 3.6.3
67	M71	2X4	.233	0	3	.430	0	z	3	.28	2.501	2.438	2.751	.138 3.6.3
68	M72	2X4	.439	0	2	.525	0	z	3	.28	2.501	2.438	2.751	.138 3.6.3
69	M73	2X4	.178	0	3	.241	0	z	2	.28	2.501	2.438	2.751	.138 3.6.3
70	M74	2X4	.164	0	3	.569	0	z	3	.28	2.501	2.438	2.751	.138 3.6.3
71	M75	2X4	.301	0	3	.156	0	z	3	.268	2.501	2.436	2.751	.138 3.6.3
72	M76	2X4	.217	0	3	.062	0	z	3	.28	2.501	2.438	2.751	.138 3.6.3
73	M77	2X4	.303	0	3	.144	0	z	3	.28	2.501	2.438	2.751	.138 3.6.3
74	M78	2X4	.331	0	3	.102	0	z	3	.28	2.501	2.438	2.751	.138 3.6.3
75	M79	2X4	.005	0	1	.274	0	z	3	.278	2.175	2.13	2.393	.12 3.9-1
76	M80	2X4	.492	0	3	.248	0	z	3	.28	2.501	2.438	2.751	.138 3.6.3
77	M81	2X4	.194	0	2	.097	0	z	3	.28	2.501	2.438	2.751	.138 3.6.3
78	M80A	2X4	.027	0	2	.109	0	z	3	.28	2.501	2.438	2.751	.138 3.9-1
79	M81A	2X4	.011	0	2	.214	0	z	3	.28	2.501	2.438	2.751	.138 3.6.3
80	M82	2X4	.011	0	1	.315	0	z	3	.278	2.175	2.13	2.393	.12 3.9-1
81	M83	2X4	.010	0	1	.132	0	z	3	.278	2.175	2.13	2.393	.12 3.9-1
82	M95	2X4	1.104*	4.225	3	.391	0	y	3	.535	2.501	2.492	2.751	.138 3.9-3
83	M85	2X6	.297	7.083	1	.151	0	y	1	.435	1.885	1.876	2.168	.12 3.9-3
84	M86	2X6	.263	6.667	1	.143	13.333	y	1	.484	1.885	1.876	2.168	.12 3.9-3
85	M87	2X6	.263	6.667	1	.142	13.333	y	1	.484	1.885	1.876	2.168	.12 3.9-3
86	M88	2X6	.297	7.083	1	.151	0	y	1	.435	1.885	1.876	2.168	.12 3.9-3
87	M89	2X6	.297	7.083	1	.153	0	y	1	.435	1.885	1.876	2.168	.12 3.9-3
88	M90	2X6	.263	6.667	1	.144	13.333	y	1	.484	1.885	1.876	2.168	.12 3.9-3
89	M91	2X6	.084	3.75	1	.115	8.75	y	1	.92	1.885	1.876	2.168	.12 3.9-3
90	M92	2X6	.105	9.592	2	.115	14.167	y	2	.97	2.168	2.156	2.493	.138 3.9-3
91	M93	2X6	.581	12.691	3	.495	14.167	y	3	1.584	2.168	2.156	2.493	.138 3.9-3
92	M94	2X6	.855	3.333	3	1.328	3.333	y	3	1.584	2.168	2.153	2.493	.138 3.9-3
93	M95A	2X6	.148	5	1	.172	0	y	3	.772	1.885	1.876	2.168	.12 3.9-3
94	M96	2X6	.053	12.031	1	.147	11.849	y	3	1.28	1.885	1.812	2.168	.12 3.9-3
95	M97	2X6	.053	5.469	1	.141	5.651	y	3	1.28	1.885	1.812	2.168	.12 3.9-3
96	M98	2X6	.148	5	1	.167	0	y	3	.772	1.885	1.876	2.168	.12 3.9-3
97	M99	2X6	.148	5	1	.175	0	y	3	.772	1.885	1.876	2.168	.12 3.9-3
98	M100	2X6	.053	12.031	1	.149	11.849	y	3	1.28	1.885	1.812	2.168	.12 3.9-3
99	M101	2X6	.089	6.927	2	.144	12.76	y	3	1.584	2.168	2.15	2.493	.138 3.9-3
100	M102	2X6	.158	4.479	3	.248	10	y	3	.97	2.168	2.156	2.493	.138 3.9-3
101	M103	2X6	.492	8.75	3	.645	10	y	3	.97	2.168	2.156	2.493	.138 3.9-3
102	M104	2X6	.653	4.557	3	1.382	4.74	y	3	1.584	2.168	2.145	2.493	.138 3.9-3
103	M105	2X6	.838	8.75	2	1.517	8.75	y	3	1.584	2.168	2.156	2.493	.138 3.9-1
104	M106	2X6	.449	1.25	3	.895	0	y	3	1.584	2.168	2.156	2.493	.138 3.9-3
105	M107	2X4	.517	3.718	3	.675	8.112	y	3	.535	2.501	2.864	3.164	.138 3.9-3

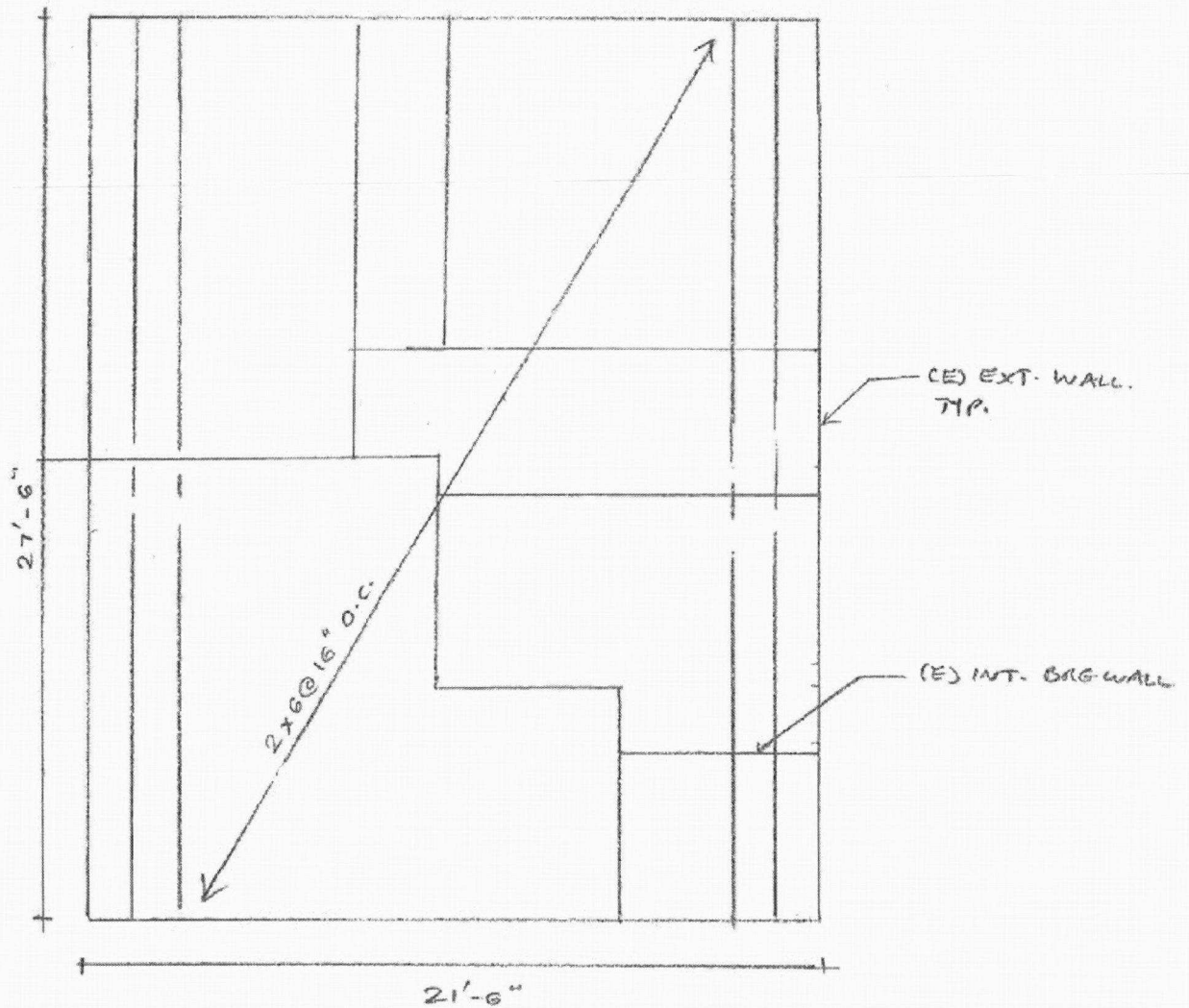
N.T.S.

ANCHORAGE ON



NOTE: WATER DRAINING & FLASHING BY OTHERS.



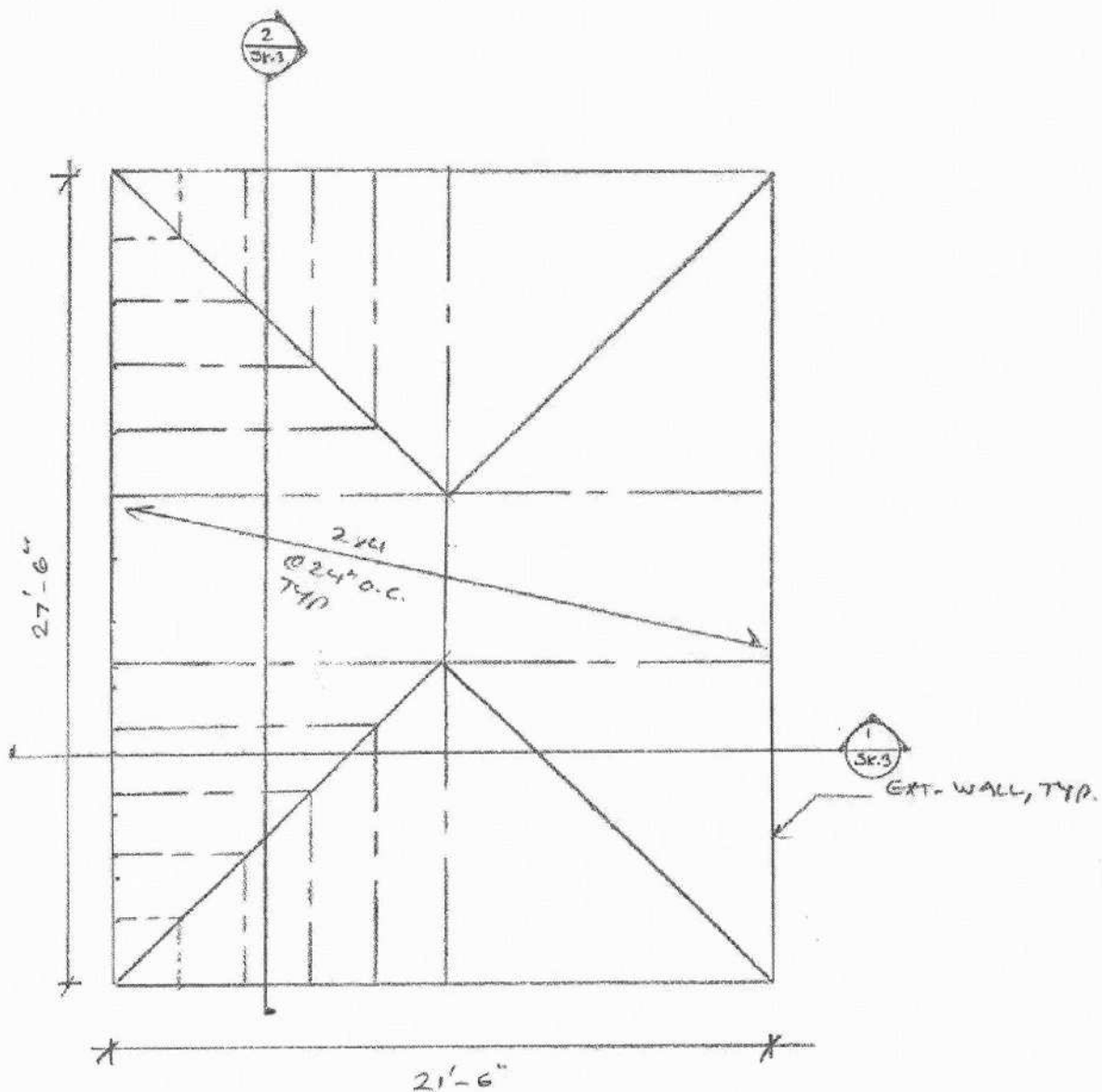


CEILING PLAN

$\frac{3}{16}'' = 1'-0''$



FILE NO. 161034 SHEET NO. SK.2
 MADE BY SK DATE 10/27/16
 CLIENT ELEMENTAL ENERGY
 PROJECT TCHOU SOLAR PANELS



ACCF FRAMING PLAN

3/16" = 1'-0"



FILE NO. 161034 SHEET NO. Sk. 1

MADE BY BK DATE 10/27/16

CLIENT ELEMENTAL ENERGY

PROJECT TCHN SOLAR PANELS

TABLE NO. 25-A—ALLOWABLE UNIT STRESSES FOR STRESS-GRADE LUMBER

Normal Loading—See also Section 2503(b),(c)

SPECIES AND COMMERCIAL GRADE		ALLOWABLE UNIT STRESSES, POUNDS PER SQ. INCH					Rules under which Graded
		Com- pression Parallel to Grain (Short Columns $L/d=$ 11 or less)	Com- pression Perpen- dicular to Grain	Extreme Fiber in Bending (and Tension Parallel to Grain)	Maximum Horizontal Shear	Modulus of Elasticity	
SYMBOL:		c or p	q	f	H	E	
CYPRESS, TIDEWATER RED:	1700 f Grade	J.&P.-B.&S.	1,425		1,700		U.B.C. Standard No. 25-4
	1300 f Grade	J.&P.-B.&S.	1,125		1,300		
	1450 c Grade	P.&T.	1,450			1,200,000	
	1200 c Grade	P.&T.	1,200				
DOUGLAS FIR, COAST REGION	Dense Select Structural	J.&P.-B.&S.	1,550	455	2,150	145	U.B.C. Standard No. 25-5
	Select Structural	J.&P.-B.&S.	1,450	415	1,900	120	
	1700 f.—Dense No. 1	J.&P.-B.&S.	1,325	455	1,700	145	
	1450 f.—No. 1	J.&P.-B.&S.	1,200	390	1,450	120	
	1100 f.—No. 2	J.&P.	1,075	390	1,100	110	
	Dense Select Structural	P.&T.	1,550	455			
	Select Structural	P.&T.	1,450	415			
	Dense No. 1	P.&T.	1,400	455			
	No. 1	P.&T.	1,200	390			
HEMLOCK, EASTERN:	Select Structural	J.&P.-B.&S.	850		1,300	85	U.B.C. Standard No. 25-6
	Prime Structural	J.&P.	775		1,200	60	
	Common Structural	J.&P.	650	360	1,100	60	
	Utility Structural	J.&P.	600		950	60	
	Select Structural	P.&T.	850				
HEMLOCK, WEST COAST:	1600 f.—Select Structural	J.&P.	1,100		1,600	100	U.B.C. Standard No. 25-7
	1450 f.—No. 1	J.&P.-B.&S.	1,075	360	1,450	100	
	1100 f.—No. 2	J.&P.	850		1,100	90	
	No. 1 Hemlock Timbers	P.&T.	1,075				
DOUGLAS FIR, INLAND REGION:	Select Structural	J.&P.	1,750	455	2,150	145	U.B.C. Standard No. 25-8
	Structural	J.&P.	1,400	400	1,900	100	
	Common Structural	J.&P.	1,250	380	1,450	95	
	Select Structural	P.&T.	1,750	455			
	Structural	P.&T.	1,400	400			
	Common Structural	P.&T.	1,250	380			

LARCH:	Select Structural	J.&P.	1,750	455	2,150	145	U.B.C. Standard No. 25-9
	Structural	J.&P.	1,450	415	1,900	120	
	Common Structural	J.&P.	1,325	390	1,450	120	
	Select Structural	P.&T.	1,750	455			
	Structural	P.&T.	1,450	415			
	Common Structural	P.&T.	1,325	390			
OAK, RED AND WHITE:	2150 f Grade	J.&P.	1,550		2,150	145	U.B.C. Standard No. 25-10
	1900 f Grade	J.&P.-B.&S.	1,375		1,900	145	
	1700 f Grade	J.&P.-B.&S.	1,200		1,700	145	
	1450 f Grade	J.&P.-B.&S.	1,050	600	1,450	120	
	1300 f Grade	B.&S.	950		1,300	120	
	1325 c Grade	P.&T.	1,325				
	1200 c Grade	P.&T.	1,200				
	1075 c Grade	P.&T.	1,075				
PINE, SOUTHERN:	Dense Select Structural	J.&P.-B.&S.	1,750	455	2,400	120	U.B.C. Standard No. 25-11
	Dense Structural	J.&P.-B.&S.	1,400	455	2,000	120	
	Dense Structural S.E.&S.	J.&P.-B.&S.	1,300	455	1,800	120	
	Dense No. 1 Structural	J.&P.-B.&S.	1,150	455	1,600	120	
	No. 1 Dense	J.&P.	1,400	455	1,700	150	
	No. 1	J.&P.	1,200	390	1,450	125	
	No. 2 Dense	J.&P.	1,025	455	1,250	100	
	No. 2	J.&P.	875	390	1,100	85	
	Dense Select Structural	P.&T.	1,750	455			
	Dense Structural	P.&T.	1,400	455			
	Dense Structural S.E.&S.	P.&T.	1,300	455			
	Dense No. 1 Structural	P.&T.	1,150	455			
PINE, SOUTHERN LONGLEAF:	Select Structural Longleaf	J.&P.-B.&S.	1,750		2,400	120	U.B.C. Standard No. 25-12
	Prime Structural Longleaf	J.&P.-B.&S.	1,400		2,000	120	
	Merchantable Structural						
	Longleaf	J.&P.-B.&S.	1,300		1,800	120	
	Structural S.E.&S. Longleaf	J.&P.-B.&S.	1,300		1,800	120	
	No. 1 Structural Longleaf	J.&P.-B.&S.	1,150		1,600	120	
	No. 1 Longleaf	J.&P.	1,400		1,700	150	
	No. 2 Longleaf	J.&P.	1,025	455	1,250	100	
	Select Structural Longleaf	P.&T.	1,750				
	Prime Structural Longleaf	P.&T.	1,400				
	Merchantable Structural						
	Longleaf	P.&T.	1,300				
	Structural S.E.&S. Longleaf	P.&T.	1,300				
	No. 1 Structural Longleaf	P.&T.	1,150				
REDWOOD:	Dense Structural	J.&P.-B.&S.	1,450		1,700	110	U.B.C. Standard No. 25-13
	Heart Structural	J.&P.-B.&S.	1,100	320	1,300	95	
	Dense Structural	P.&T.	1,450				
	Heart Structural	P.&T.	1,100				

ABBREVIATIONS:

J.&P.: Joists and Planks
B.&S.: Beams and Stringers
P.&T.: Posts and Timbers

1949 UBC

APP. 1