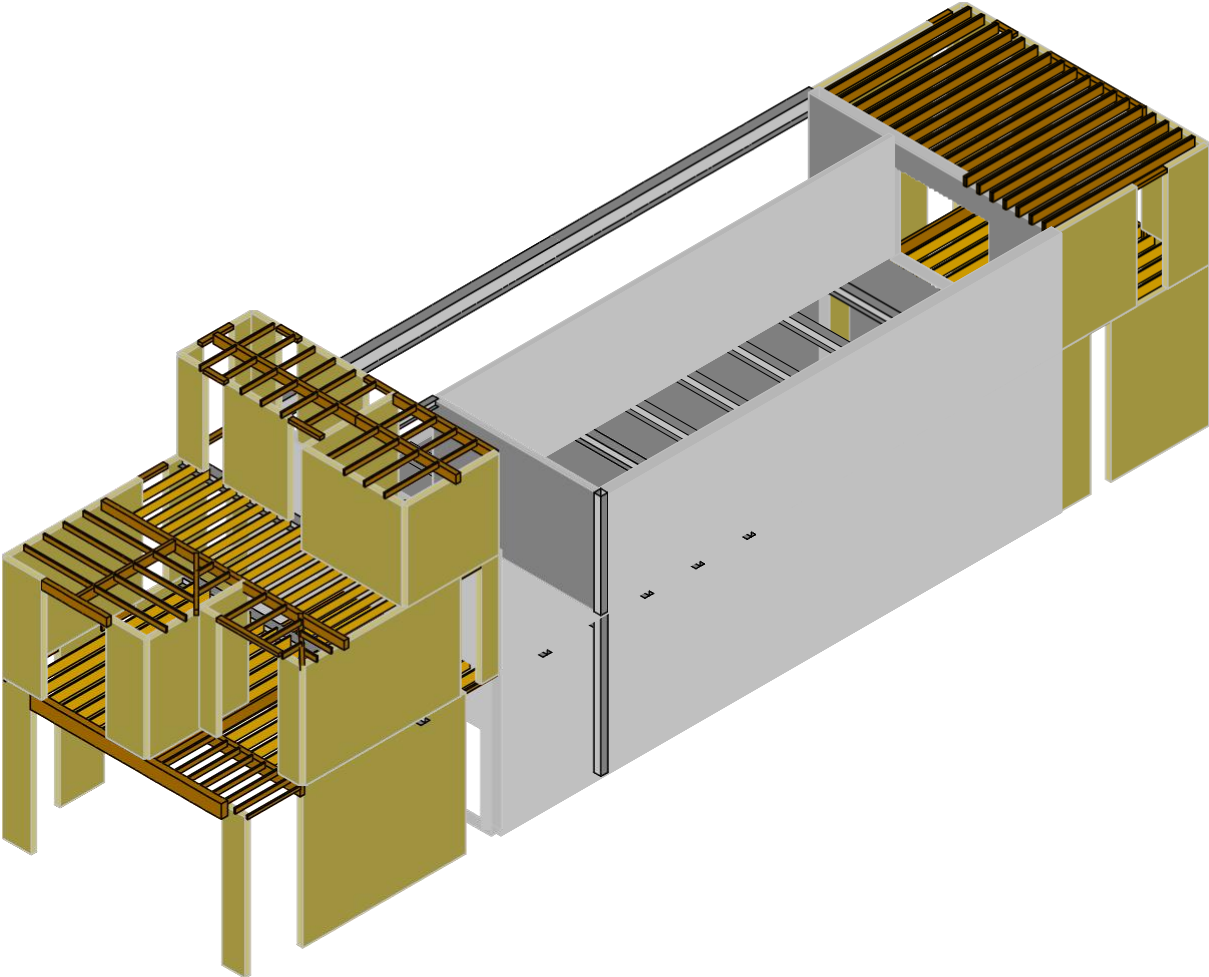


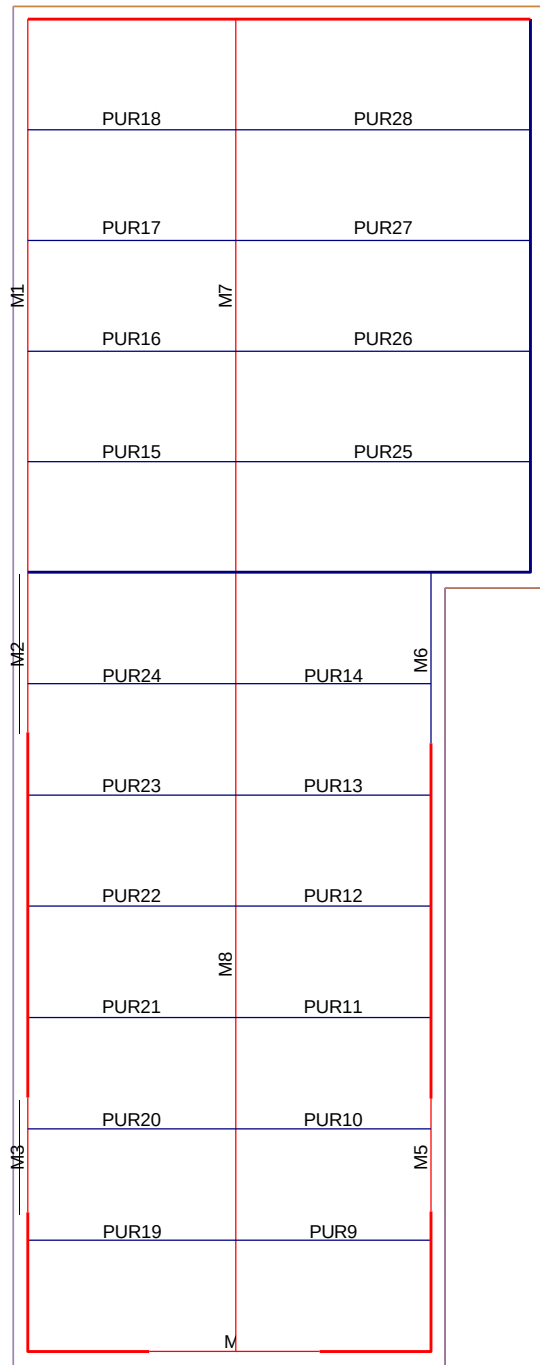
STRUCTURAL CALCULATIONS
FOR

NEW RESIDENTIAL



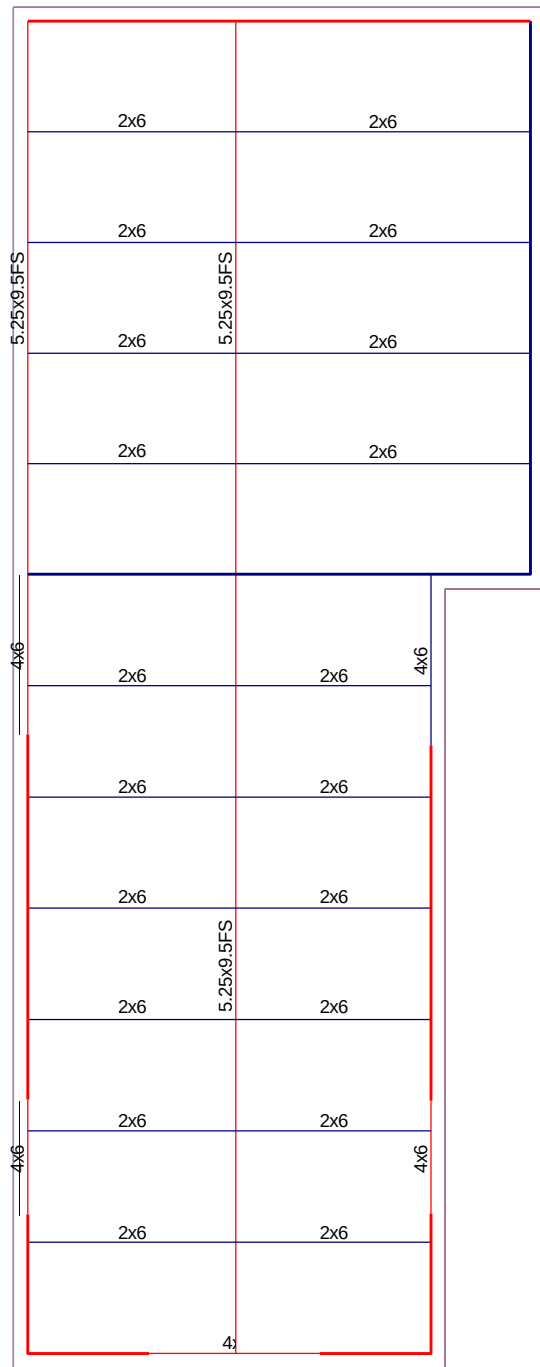
Results for LC 1, Service Dead

BSE	Full Model 3D View	SK - 1
SK		Sept 11, 2020 at 1:51 PM
19155		Model_20200908.rfl



Loads: DL PreComp - PreComposite Dead Load
Results for LC 1, Service Dead

BSE	Upper Roof Upper Roof Framing Labels	SK - 2
SK		Sept 11, 2020 at 1:52 PM
19155		Model_20200908.rfl



Loads: DL PreComp - PreComposite Dead Load
Results for LC 1, Service Dead

BSE	Upper Roof Upper Roof Framing Sizes	SK - 3
SK		Sept 11, 2020 at 1:53 PM
19155		Model_20200908.rfl

Area Load
or Default

Floor

Floor

Floor

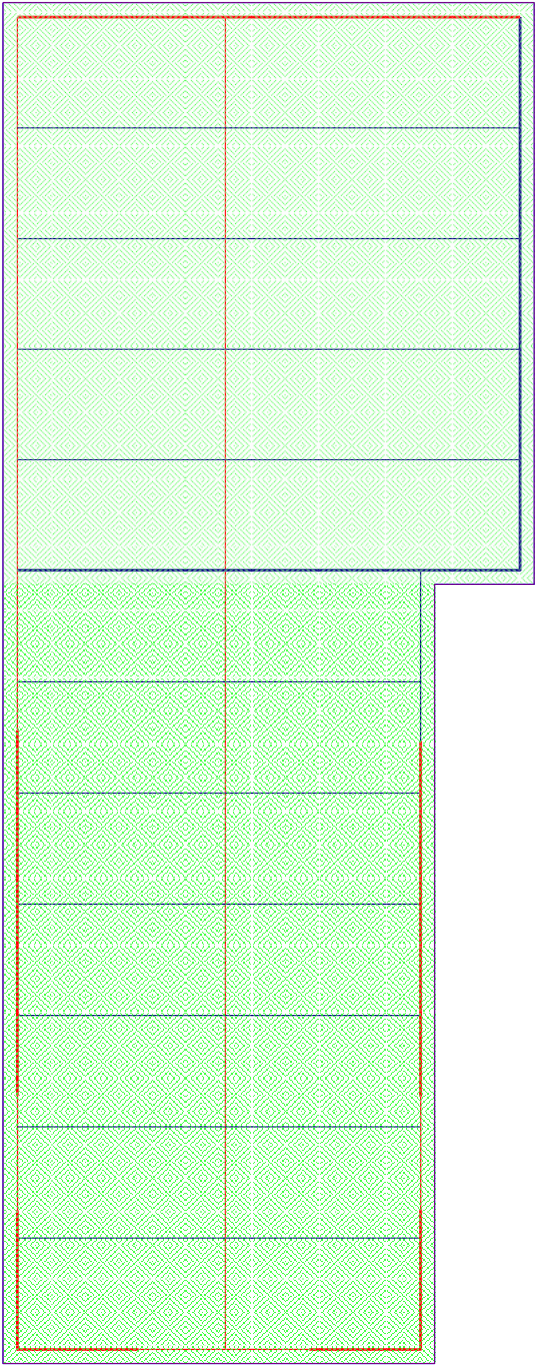
Roof Deck

6 Inch Pool W...

12" Pool Bas...

7 Inch Deck

Lateral
Gravity

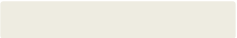


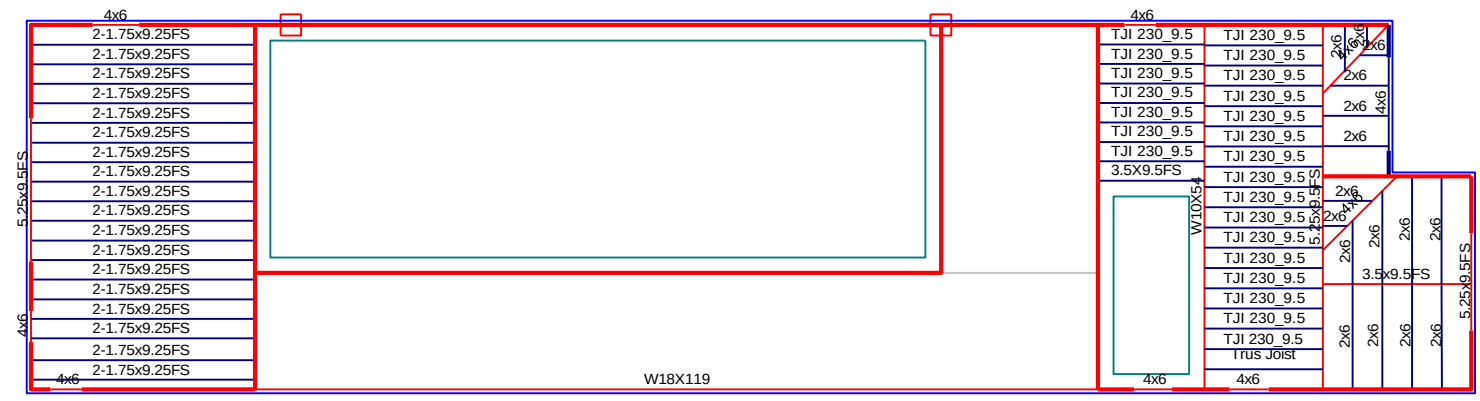
Loads: DL PreComp - PreComposite Dead Load
Results for LC 1, Service Dead

BSE	Upper Roof Upper Roof Loadings	SK - 4
SK		Sept 11, 2020 at 1:53 PM
19155		Model_20200908.rfl



Loads: DL PreComp - PreComposite Dead Load
Results for LC 1, Service Dead

BSE	Roof Deck  Roof Deck Farming Labels	SK - 5
SK		Sept 11, 2020 at 1:55 PM
19155		Model_20200908.rfl



Loads: DL PreComp - PreComposite Dead Load
Results for LC 1, Service Dead

BSE	Roof Deck Roof Deck Framing Sizes	SK - 6
SK		Sept 11, 2020 at 1:56 PM
19155		Model_20200908.rfl



Area Load
w/ Default

Floor

Roof

Roof Deck

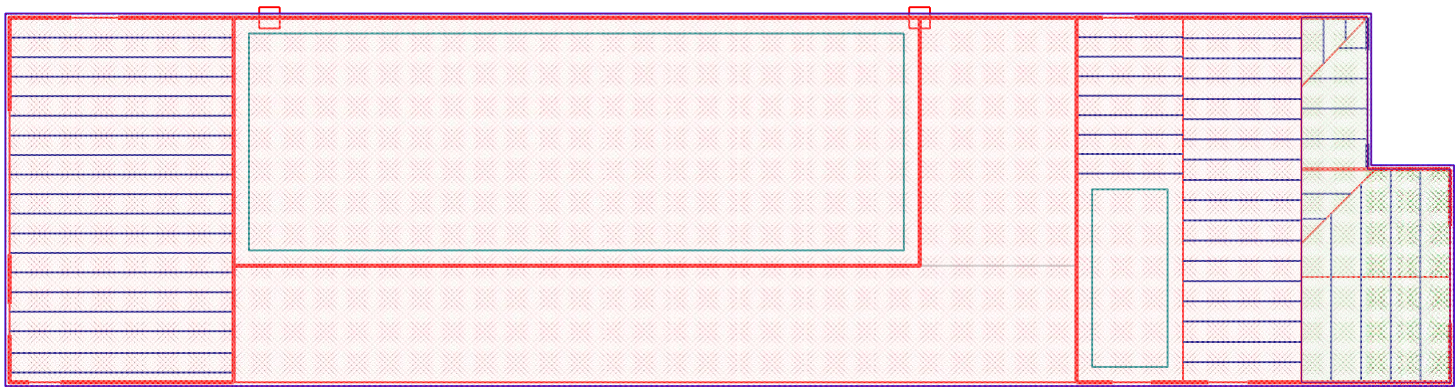
6 feet Pool W...

12" Pool Bas...

Floor Deck

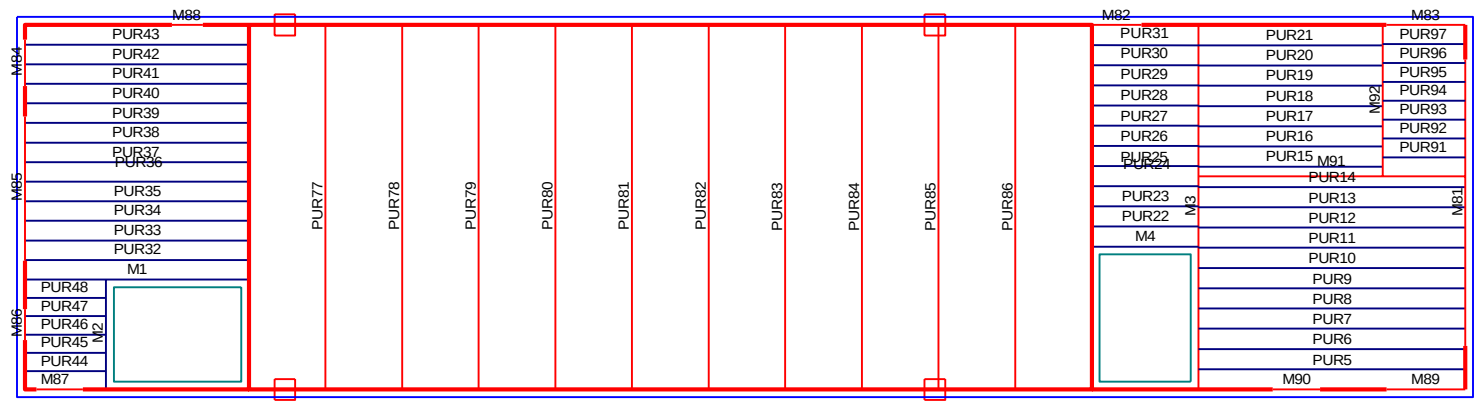
Lateral

Gravity



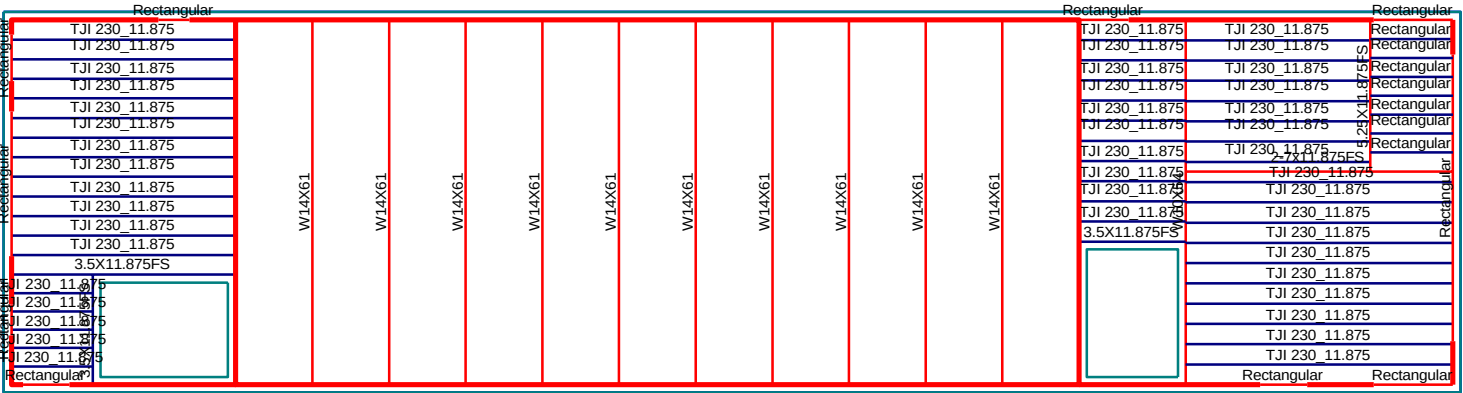
Loads: DL PreComp - PreComposite Dead Load
Results for LC 1, Service Dead

BSE	Roof Deck Roof Deck Level Loadings	SK - 7
SK		Sept 11, 2020 at 1:57 PM
19155		Model_20200908.rfl



Loads: DL PreComp - PreComposite Dead Load
Results for LC 1, Service Dead

BSE	Second Floor Second Floor Framing Labels	SK - 8
SK		Sept 11, 2020 at 1:58 PM
19155		Model_20200908.rfl



Loads: DL PreComp - PreComposite Dead Load

BSE	Second Floor Seconf Floor Framing Sizes	SK - 9
SK		Nov 13, 2020 at 9:32 AM
19155		Model_20200908.rfl



Area Load
w/ Default

Floor

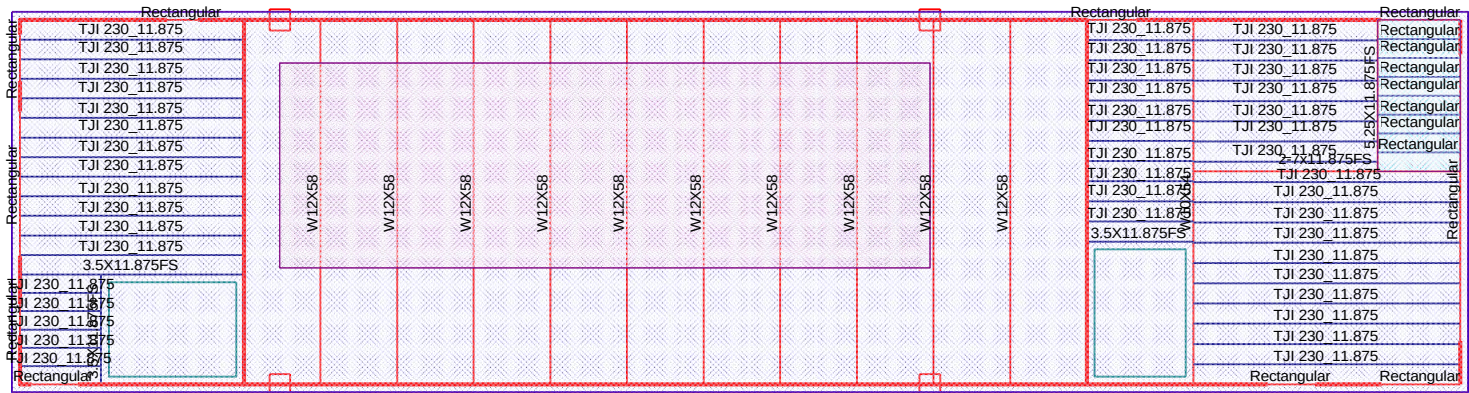
Roof

Roof Deck

6 feet Pool W...

12" Pool Bas...

Floor Deck

LateralGravity

Loads: DL PreComp - PreComposite Dead Load
Results for LC 1, Service Dead

BSE	Second Floor Second Floor Loading	SK - 10
SK		Sept 11, 2020 at 1:59 PM
19155		Model_20200908.rfl

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1E...	Density[k/ft...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	.3	.65	.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	.3	.65	.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	.3	.65	.49	35	1.6	60	1.2
7	A1085	29000	11154	.3	.65	.49	50	1.4	65	1.3

Wood Material Properties

	Label	Type	Database	Species	Grade	Cm	Emod	Nu	Therm (/1E5 F)	Dens[k/ft^3]
1	DF	Solid Sawn	Visually Graded	Douglas Fir-Larch	No.2		1	.3	.3	.035
2	PSL	Custom	N/A	PSL_Parallam_2.0...	na		1	.3	.3	.035
3	LVL	Custom	N/A	LVL_PRL_1.5E_2...	na		1	.3	.3	.035

Concrete Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1E...	Density[k/ft...	f'c[ksi]	Lambda	Flex Steel[...	Shear Stee...
1	Conc3000NW	3156	1372	.15	.6	.145	3	1	60	60
2	Conc3500NW	3409	1482	.15	.6	.145	3.5	1	60	60
3	Conc4000NW	3644	1584	.15	.6	.145	4	1	60	60
4	Conc3000LW	2085	907	.15	.6	.11	3	.75	60	60
5	Conc3500LW	2252	979	.15	.6	.11	3.5	.75	60	60
6	Conc4000LW	2408	1047	.15	.6	.11	4	.75	60	60
7	CONC4500NW	3824	1593	.15	.6	.145	4.5	1	60	60

Deck General Properties

	Label	Material Type	Deck	Unbraced[ft]	Max Span[ft]
1	Concrete Deck	Conc4000NW	5 in	3	10
2	Composite Deck	Concrete Deck	5" NW Concrete Deck, Conc4000NW, 2in, .7...	2	5
3	Metal Deck	Verco Steel Roof Deck	22ga PLB-36	2	8
4	Wood	Wood Deck	1 in	1	4

Wood Diaphragm Parameters

	Label	Database	Panel Grade	Min. Panel T...	Max. Panel T...	Min. Nail Spa...	Max. Nail Sp...	Nail Spacing ...
1	Roof	C1/3U_2_RS_19/32_...	Structural-I	.35	.75	2-in	6-in	1
2	Deck/ Floor	C1/3B_2_RS_19/32_...	Structural-I	.375	.469	2-in	3-in	1

Floors

	Label	Elevation[ft]	Floor Type	Area Load Default	Inactive	Splice Dis...	Splice Ty...	No Wind/...	Parapet Hei...
1	Second Floor	13.5	Floor Beam	Floor		13.5	Moment		0
2	Roof Deck	23.5	Floor Beam	Roof Deck		10	Moment		0
3	Upper Roof	32	Floor Beam	Roof		8.5	Moment		0

Beam Floors

	Label	Deck Default	Deck Angle Default (deg)	Parent
1	Second Floor	Wood	0	None
2	Roof Deck	Wood	90	None
3	Upper Roof	Wood	90	None

Uniform Area Loads

	Label	Additive	PreDL[ksf]	PostDL[ksf]	LL[ksf]	LL Type	VL[ksf]	Dyn Load[ksf]
1	Floor			.025	.04	LL-Reduce	.004	.025
2	Roof			.018	.02	RLL-Redu..	.011	.018
3	Roof Deck			.022	.1	LL-Reduce	.011	.022

Uniform Area Loads (Continued)

	Label	Additive	PreDL[ksf]	PostDL[ksf]	LL[ksf]	LL Type	VL[ksf]	Dyn Load[ksf]
4	6 feet Pool Water/ Deck			.375	.06	LL-Non	.011	.375
5	12" Pool Base slab	Yes		.15		LL-Non	.011	.15
6	Floor Deck			.025	.06	LL-Reduce	.011	.025

Hot Rolled : Second Floor

	Label	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp To...	Lcomp Bot...	L-torqu...	Cb	Composite	Camber[in]	B-eff Left[...	B-eff Righ...
1	M3	23.542			Framing							
2	PUR77	23.542			Framing				Yes			
3	PUR78	23.542			Framing				Yes			
4	PUR79	23.542			Framing				Yes			
5	PUR80	23.542			Framing				Yes			
6	PUR81	23.542			Framing				Yes			
7	PUR82	23.542			Framing				Yes			
8	PUR83	23.542			Framing				Yes			
9	PUR84	23.542			Framing				Yes			
10	PUR85	23.542			Framing				Yes			
11	PUR86	23.542			Framing				Yes			

Hot Rolled : Roof Deck

	Label	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp To...	Lcomp Bot...	L-torqu...	Cb	Composite	Camber[in]	B-eff Left[...	B-eff Righ...
1	M3	23.542			Framing							
2	M94	54.458			Framing				Yes			
3	M80	10.143			Framing				Yes			

Hot Rolled : Upper Roof

Label	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp To...	Lcomp Bot...	L-torqu...	Cb	Composite	Camber[in]	B-eff Left[...	B-eff Righ...
No Data to Print ...											

Wood : Second Floor

	Label	Length[ft]	Le2[ft]	Le1[ft]	le-bend Top[ft]	le-bend Bot[ft]	CV	Repetitive
1	M1	14.458			Framing			No
2	M2	7.097			Framing			No
3	M4	6.88			Framing			No
4	M81	18.5			Framing			No
5	M82	3.199			Framing			No
6	M83	5.104			Framing			No
7	M84	3			Framing			No
8	M85	9.333			Framing			No
9	M86	2			Framing			No
10	M87	2.989			Framing			No
11	M88	2			Framing			No
12	M89	5.099			Framing			No
13	M90	3.046			Framing			No
14	M91	17.245			Framing			No
15	M92	9.774			Framing			No
16	PUR91	5.333			Framing			Yes
17	PUR92	5.333			Framing			Yes
18	PUR93	5.333			Framing			Yes
19	PUR94	5.333			Framing			Yes
20	PUR95	5.333			Framing			Yes
21	PUR96	5.333			Framing			Yes
22	PUR97	5.333			Framing			Yes

Wood : Roof Deck

	Label	Length[ft]	Le2[ft]	Le1[ft]	le-bend Top[ft]	le-bend Bot[ft]	CV	Repetitive
1	M4	6.88			Framing			No
2	M97	2.009			Framing			No
3	M60	2.462			Framing			No
4	M61	2.525			Framing			No
5	M62	6.279			Framing			No
6	M64	23.542			Framing			No
7	M65	6			Framing			No
8	M66	6.766			Framing			No
9	M67	9.593			Framing			No
10	M68	6.155			Framing			No
11	PUR91	6.813			Framing			Yes
12	PUR92	6.813			Framing			Yes
13	PUR93	6.813			Framing			Yes
14	PUR94	6.813			Framing			Yes
15	PUR95	4.089			Framing			Yes
16	PUR96	6.008			Framing			Yes
17	PUR97	6.955			Framing			Yes
18	PUR98	6.955			Framing			Yes
19	PUR99	4.26			Framing			Yes
20	PUR143	4.26			Framing			Yes
21	PUR144	3.749			Framing			Yes
22	PUR145	1.874			Framing			Yes
23	PUR146	1.595			Framing			Yes
24	PUR147	3.19			Framing			Yes
25	PUR148	2.962			Framing			Yes
26	PUR149	1.481			Framing			Yes
27	PUR100	14.458			Framing			Yes
28	PUR101	14.458			Framing			Yes
29	PUR102	14.458			Framing			Yes
30	PUR103	14.458			Framing			Yes
31	PUR104	14.458			Framing			Yes
32	PUR105	14.458			Framing			Yes
33	PUR106	14.458			Framing			Yes
34	PUR107	14.458			Framing			Yes
35	PUR108	14.458			Framing			Yes
36	PUR109	14.458			Framing			Yes
37	PUR110	14.458			Framing			Yes
38	PUR111	14.458			Framing			Yes
39	M101	9.25			Framing			No
40	M102	2			Framing			No
41	M103	1.996			Framing			No
42	M104	3			Framing			No
43	M96	14.458			Framing			Yes
44	M98	14.458			Framing			Yes
45	M99	14.458			Framing			Yes
46	M100	14.458			Framing			Yes
47	M105	14.458			Framing			Yes
48	M106	14.458			Framing			Yes

Wood : Upper Roof

	Label	Length[ft]	Le2[ft]	Le1[ft]	le-bend Top[ft]	le-bend Bot[ft]	CV	Repetitive
1	M1	9.774			Framing			No
2	M2	2.83			Framing			No
3	M3	2.032			Framing			No
4	M4	3.011			Framing			No
5	M5	1.992			Framing			No

Wood : Upper Roof (Continued)

	Label	Length[ft]	Le2[ft]	Le1[ft]	le-bend Top[ft]	le-bend Bot[ft]	CV	Repetitive
6	M6	3.022			Framing			No
7	M7	9.774			Framing			No
8	M8	13.768			Framing			No
9	PUR9	3.449			Framing			Yes
10	PUR10	3.449			Framing			Yes
11	PUR11	3.449			Framing			Yes
12	PUR12	3.449			Framing			Yes
13	PUR13	3.449			Framing			Yes
14	PUR14	3.449			Framing			Yes
15	PUR15	3.673			Framing			Yes
16	PUR16	3.673			Framing			Yes
17	PUR17	3.673			Framing			Yes
18	PUR18	3.673			Framing			Yes
19	PUR19	3.673			Framing			Yes
20	PUR20	3.673			Framing			Yes
21	PUR21	3.673			Framing			Yes
22	PUR22	3.673			Framing			Yes
23	PUR23	3.673			Framing			Yes
24	PUR24	3.673			Framing			Yes
25	PUR25	5.208			Framing			Yes
26	PUR26	5.208			Framing			Yes
27	PUR27	5.208			Framing			Yes
28	PUR28	5.208			Framing			Yes

Diaphragm Parameters : Second Floor

	Floor	Diaphragm	Type	Region	Design Rule	SGAF	Material Offset	Thickness...
1	Second Floor	D4	Semi-Rigid	DR3	N/A	N/A	gen_Conc4NW	1.5
2				DR4	N/A	N/A		
3	Roof Deck	D3	Semi-Rigid		N/A	N/A	gen_Conc4NW	1.5
4	Upper Roof	D5	Flexible		N/A	N/A	N/A	N/A

Diaphragm Parameters : Roof Deck

	Floor	Diaphragm	Type	Region	Design Rule	SGAF	Material Offset	Thickness...
1	Second Floor	D4	Semi-Rigid	DR3	N/A	N/A	gen_Conc4NW	1.5
2				DR4	N/A	N/A		
3	Roof Deck	D3	Semi-Rigid		N/A	N/A	gen_Conc4NW	1.5
4	Upper Roof	D5	Flexible		N/A	N/A	N/A	N/A

Diaphragm Parameters : Upper Roof

	Floor	Diaphragm	Type	Region	Design Rule	SGAF	Material Offset	Thickness...
1	Second Floor	D4	Semi-Rigid	DR3	N/A	N/A	gen_Conc4NW	1.5
2				DR4	N/A	N/A		
3	Roof Deck	D3	Semi-Rigid		N/A	N/A	gen_Conc4NW	1.5
4	Upper Roof	D5	Flexible		N/A	N/A	N/A	N/A

Line Loads : Second Floor

	Start Point	End Point	Start Pre...	End Pre...	Start Post...	End Post...	Start LL[...	End LL[k...	LL Type	St Dyn Load[k/ft]	End Dyn Loa...
1	N206	N207			1.1	1.1			LL-Non		
2	N207	N208			1.1	1.1			LL-Non		
3	N208	N209			1.1	1.1			LL-Non		
4	N209	N206			1.1	1.1			LL-Non		

Beam Code Summary for Wood : Second Floor (Continued)

	Label	Size	Explicit	Material	Bending ...	Loc[ft]	LC	Defl Check	Loc[ft]	Cat	Shear Ch...	Loc[ft]	LC
13	M90	2X12	No	PSL	.081	.761	2	.048	0	LL	.907	0	2
14	M91	2-7x11.875FS	Yes	PSL	.632	9.52	2	.796	8.622	DL+LL	.249	0	2
15	M92	5.25X11.875...	Yes	PSL	.289	4.887	2	.221	4.887	DL+LL	.288	9.774	2
16	PUR91	2X6	No	DF	.461	2.667	2	.301	2.667	LL	.295	5.333	2
17	PUR92	2X6	No	DF	.461	2.667	2	.301	2.667	LL	.295	5.333	2
18	PUR93	2X6	No	DF	.461	2.667	2	.301	2.667	LL	.295	5.333	2
19	PUR94	2X6	No	DF	.461	2.667	2	.301	2.667	LL	.295	5.333	2
20	PUR95	2X6	No	DF	.461	2.667	2	.301	2.667	LL	.295	5.333	2
21	PUR96	2X6	No	DF	.461	2.667	2	.301	2.667	LL	.295	5.333	2
22	PUR97	2X6	No	DF	.461	2.667	2	.301	2.667	LL	.295	5.333	2

Beam Code Summary for Wood : Roof Deck

	Label	Size	Explicit	Material	Bending ...	Loc[ft]	LC	Defl Check	Loc[ft]	Cat	Shear Ch...	Loc[ft]	LC
1	M4	3.5X9.5FS	Yes	PSL	.227	3.655	2	.191	3.44	LL	.199	6.88	2
2	M97	4x6	Yes	DF	.057	1.13	1	.036	0	LL	.263	2.009	2
3	M60	4x6	Yes	DF	.106	1.231	2	.04	1.231	LL	.086	2.462	2
4	M61	4x6	Yes	DF	.082	1.262	2	.036	0	LL	.064	2.525	2
5	M62	5.25x9.5FS	Yes	PSL	.066	3.27	1	.057	3.205	DL+LL	.053	6.279	2
6	M64	5.25x9.5FS	Yes	PSL	.577	9.809	2	.806	17.166	LL	.49	9.809	2
7	M65	4x6	Yes	DF	.305	3.438	2	.362	3	DL+LL	.119	6	2
8	M66	4x6	Yes	DF	.223	3.383	1	.204	3.454	DL+LL	.102	6.766	1
9	M67	3.5x9.5FS	Yes	PSL	.147	5.696	1	.218	4.797	DL+LL	.104	9.593	1
10	M68	4x6	Yes	DF	.128	2.949	1	.104	3.013	DL+LL	.073	0	1
11	PUR91	2x6	Yes	DF	.323	3.406	1	.346	3.406	DL+LL	.162	6.813	1
12	PUR92	2x6	Yes	DF	.323	3.406	1	.346	3.406	DL+LL	.162	6.813	1
13	PUR93	2x6	Yes	DF	.322	3.406	1	.345	3.406	DL+LL	.162	6.813	1
14	PUR94	2x6	Yes	DF	.322	3.406	1	.345	3.406	DL+LL	.162	6.813	1
15	PUR95	2x6	Yes	DF	.108	1.917	1	.069	2.045	DL+LL	.094	0	1
16	PUR96	2x6	Yes	DF	.243	3.004	1	.228	3.004	DL+LL	.14	0	1
17	PUR97	2x6	Yes	DF	.335	3.478	1	.366	3.478	DL+LL	.165	0	1
18	PUR98	2x6	Yes	DF	.336	3.478	1	.367	3.478	DL+LL	.165	6.955	1
19	PUR99	2x6	Yes	DF	.128	2.13	1	.086	2.13	DL+LL	.103	4.26	1
20	PUR143	2x6	Yes	DF	.128	2.13	1	.086	2.13	DL+LL	.103	4.26	1
21	PUR144	2x6	Yes	DF	.092	1.953	1	.053	1.874	DL+LL	.087	3.749	1
22	PUR145	2x6	Yes	DF	.019	.937	1	.036	0	LL	.038	1.874	1
23	PUR146	2x6	Yes	DF	.011	.797	1	.036	0	LL	.027	0	1
24	PUR147	2x6	Yes	DF	.055	1.528	1	.036	0	LL	.061	0	1
25	PUR148	2x6	Yes	DF	.042	1.542	1	.036	0	LL	.051	2.962	1
26	PUR149	2x6	Yes	DF	.009	.74	1	.036	0	LL	.022	1.481	1
27	PUR100	2-1.75x9.25FS	Yes	LVL	.446	7.229	2	.994	7.229	LL	.253	14.458	2
28	PUR101	2-1.75x9.25FS	Yes	LVL	.446	7.229	2	.994	7.229	LL	.253	14.458	2
29	PUR102	2-1.75x9.25FS	Yes	LVL	.446	7.229	2	.994	7.229	LL	.253	14.458	2
30	PUR103	2-1.75x9.25FS	Yes	LVL	.446	7.229	2	.994	7.229	LL	.253	14.458	2
31	PUR104	2-1.75x9.25FS	Yes	LVL	.446	7.229	2	.994	7.229	LL	.253	14.458	2
32	PUR105	2-1.75x9.25FS	Yes	LVL	.446	7.229	2	.994	7.229	LL	.253	14.458	2
33	PUR106	2-1.75x9.25FS	Yes	LVL	.446	7.229	2	.994	7.229	LL	.253	14.458	2
34	PUR107	2-1.75x9.25FS	Yes	LVL	.446	7.229	2	.994	7.229	LL	.253	14.458	2
35	PUR108	2-1.75x9.25FS	Yes	LVL	.446	7.229	2	.994	7.229	LL	.253	14.458	2
36	PUR109	2-1.75x9.25FS	Yes	LVL	.446	7.229	2	.994	7.229	LL	.253	14.458	2
37	PUR110	2-1.75x9.25FS	Yes	LVL	.446	7.229	2	.994	7.229	LL	.253	14.458	2
38	PUR111	2-1.75x9.25FS	Yes	LVL	.446	7.229	2	.994	7.229	LL	.253	14.458	2
39	M101	5.25x9.5FS	Yes	PSL	.554	4.143	2	.72	4.625	LL	.53	9.25	2
40	M102	4x6	Yes	DF	.468	.521	2	.19	.979	LL	.631	2	2
41	M103	4x6	Yes	DF	.032	.998	2	.048	0	LL	.032	1.996	2
42	M104	4x6	Yes	DF	.113	1.5	2	.068	1.5	LL	.075	3	2
43	M96	2-1.75x9.25FS	Yes	LVL	.47	7.229	2	1.049	7.229	LL	.266	14.458	2

Beam Code Summary for Wood : Roof Deck (Continued)

	Label	Size	Explicit	Material	Bending ...	Loc[ft]	LC	Defl Check	Loc[ft]	Cat	Shear Ch...	Loc[ft]	LC
44	M98	2-1.75x9.25FS	Yes	LVL	.446	7.229	2	.994	7.229	LL	.253	14.458	2
45	M99	2-1.75x9.25FS	Yes	LVL	.448	7.229	2	.998	7.229	LL	.254	14.458	2
46	M100	2-1.75x9.25FS	Yes	LVL	.448	7.229	2	.998	7.229	LL	.254	14.458	2
47	M105	2-1.75x9.25FS	Yes	LVL	.338	7.229	2	.741	7.229	LL	.191	14.458	2
48	M106	2-1.75x9.25FS	Yes	LVL	.47	7.229	2	1.049	7.229	LL	.266	14.458	2

Beam Code Summary for Wood : Upper Roof

	Label	Size	Explicit	Material	Bending ...	Loc[ft]	LC	Defl Check	Loc[ft]	Cat	Shear Ch...	Loc[ft]	LC
1	M1	5.25x9.5FS	Yes	PSL	.039	4.887	1	.055	4.887	DL+LL	.028	9.774	1
2	M2	4x6	Yes	DF	.054	1.946	1	.036	0	LL	.033	2.83	1
3	M3	4x6	Yes	DF	.035	.571	1	.036	0	LL	.033	0	1
4	M4	4x6	Yes	DF	.385	3.011	1	1.966	3.011	DL+LL	.086	0	1
5	M5	4x6	Yes	DF	.032	1.453	1	.036	0	LL	.031	1.992	1
6	M6	4x6	Yes	DF	.059	1.952	1	.036	0	LL	.031	3.022	1
7	M7	5.25x9.5FS	Yes	PSL	.074	4.887	1	.11	4.887	DL+LL	.051	9.774	1
8	M8	5.25x9.5FS	Yes	PSL	.123	6.884	1	.251	6.884	DL+LL	.063	13.768	1
9	PUR9	2x6	Yes	DF	.085	1.724	1	.046	1.724	DL+LL	.084	3.449	1
10	PUR10	2x6	Yes	DF	.085	1.724	1	.046	1.724	DL+LL	.084	3.449	1
11	PUR11	2x6	Yes	DF	.085	1.724	1	.046	1.724	DL+LL	.084	3.449	1
12	PUR12	2x6	Yes	DF	.085	1.724	1	.046	1.724	DL+LL	.084	3.449	1
13	PUR13	2x6	Yes	DF	.085	1.724	1	.046	1.724	DL+LL	.084	3.449	1
14	PUR14	2x6	Yes	DF	.085	1.724	1	.046	1.724	DL+LL	.084	3.449	1
15	PUR15	2x6	Yes	DF	.095	1.837	1	.055	1.837	DL+LL	.089	3.673	1
16	PUR16	2x6	Yes	DF	.095	1.837	1	.055	1.837	DL+LL	.089	3.673	1
17	PUR17	2x6	Yes	DF	.095	1.837	1	.055	1.837	DL+LL	.089	3.673	1
18	PUR18	2x6	Yes	DF	.095	1.837	1	.055	1.837	DL+LL	.089	3.673	1
19	PUR19	2x6	Yes	DF	.096	1.837	1	.055	1.837	DL+LL	.089	3.673	1
20	PUR20	2x6	Yes	DF	.096	1.837	1	.055	1.837	DL+LL	.089	3.673	1
21	PUR21	2x6	Yes	DF	.096	1.837	1	.055	1.837	DL+LL	.089	3.673	1
22	PUR22	2x6	Yes	DF	.096	1.837	1	.055	1.837	DL+LL	.089	3.673	1
23	PUR23	2x6	Yes	DF	.096	1.837	1	.055	1.837	DL+LL	.089	3.673	1
24	PUR24	2x6	Yes	DF	.096	1.837	1	.055	1.837	DL+LL	.089	3.673	1
25	PUR25	2x6	Yes	DF	.192	2.604	1	.157	2.604	DL+LL	.126	5.208	1
26	PUR26	2x6	Yes	DF	.192	2.604	1	.157	2.604	DL+LL	.126	5.208	1
27	PUR27	2x6	Yes	DF	.192	2.604	1	.157	2.604	DL+LL	.126	5.208	1
28	PUR28	2x6	Yes	DF	.192	2.604	1	.157	2.604	DL+LL	.126	5.208	1

LATERAL DESIGN

Wind Generation Input

Wind Code: **ASCE 7-16**
 Wind Speed, V(mph): **95**
 Exposure Category: **B**
 Base Elevation(ft): **0**

Topographic Factor K1: **0**
 Topographic Factor K2: **0**
 Topographic Factor K3: **0**
 Directionality Factor Kd: **.85**
 Parapet Height(ft): **0**

Wind Generation Detail Results

Exposure Constant Alpha: **7**
 Exposure Constant zg: **1200**
 Gust Effect Factor, G: **.85**

Kzt: **1**
 h (ft): **32**
 Kh: **.714**
 Windward Cp: **.8**
 qh (ksf): **.012**
 GCpn (windward): **+1.5**
 GCpn (leeward): **-1.0**

Wind Generation Floor Geometry Results

Floor Level	Height (ft)	Kz	Width (X) (ft)	Length (Z) (ft)	Leeward Cp(X)	Leeward Cp(Z)
Upper Roof	32	.714	24.042	9.381	.272	.5
Roof Deck	23.5	.653	24.042	93.542	.5	.205
Second Floor	13.5	.575	24.542	94.042	.5	.208

Wind Force in Z Direction Governed by 10Psf Minimum (Forces Scaled Up)**Wind Generation Floor Force Results**

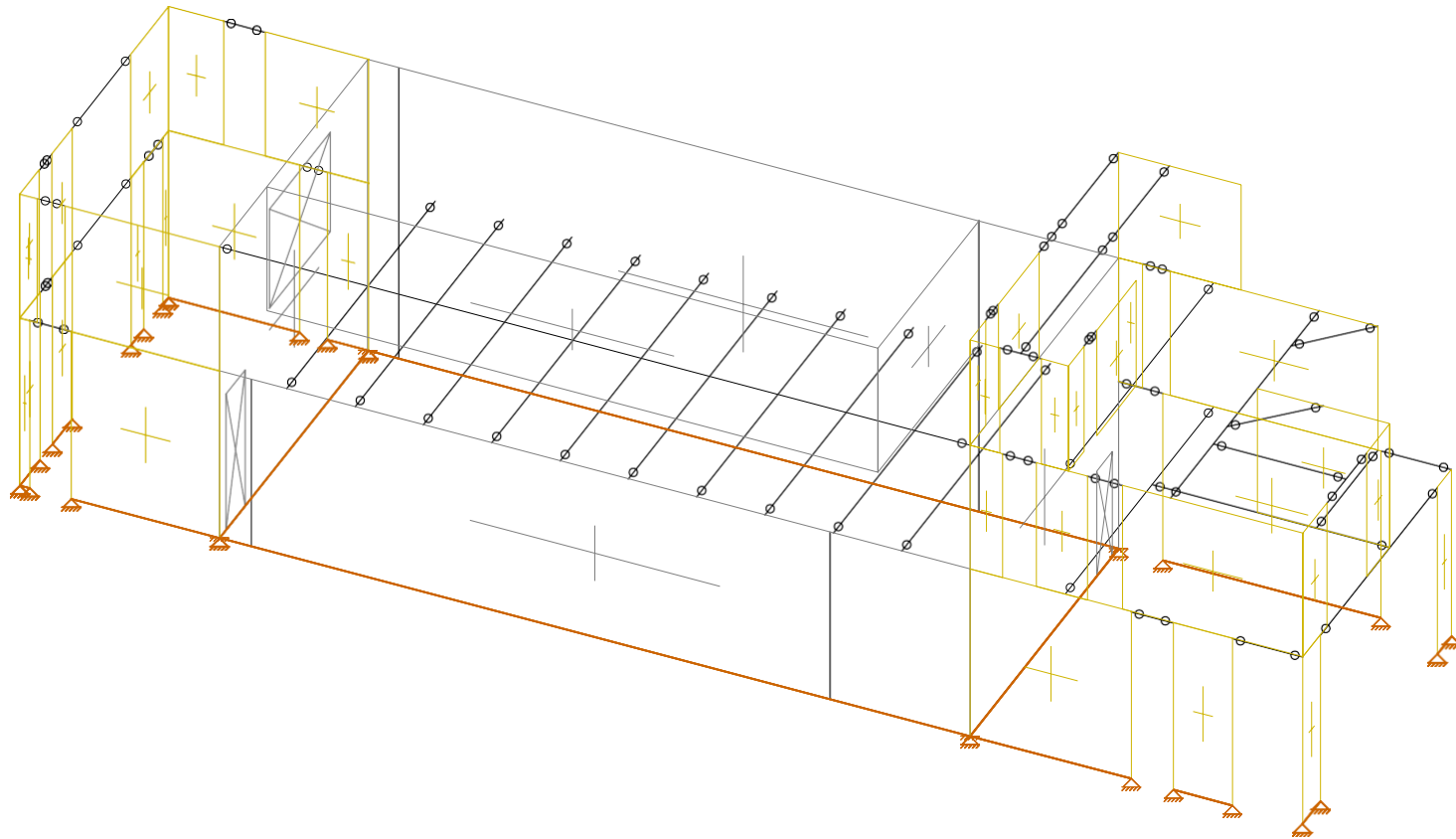
Floor Level	qz (ksf)	Windward Pres. (ksf)	Leeward Pres. X (ksf)	Leeward Pres. Z (ksf)	Force X (k)	Force Z (k)
Upper Roof	.012	.008	.003	.005	.433	1.345
Total					.433	1.386
Roof Deck	.011	.007	.005	.002	10.798	2.112
Total					10.798	2.177
Second Floor	.01	.007	.005	.002	12.803	2.49
Total					12.803	2.566

Seismic Generation InputSeismic Code: **ASCE 7-16**Ct_X: **.02**T_X (sec): **Not Entered**R_X: **5**Ct_Z: **.02**T_Z (sec): **Not Entered**R_Z: **5**Ct Exp. X: **.75**Ct Exp. Z: **.75**Risk Cat **I or II**TL (sec): **8**SD1 (g): **.739**SDS (g): **1.218**S1 (g): **.718**Base Elev (ft): **0**Parapet Ht (ft): **0****Seismic Generation Detail Results**T_X Used (sec): **.269**T_X Method A: **.269**T_X Upper Limit: **.377**T_Z Used (sec): **.269**T_Z Method A: **.269**T_Z Upper Limit: **.377**Importance Fac.: **1**Design Cat.: **D**V_X (k): **210.529**Gov. Eqn. **ASCE Eqn 12.8-2**Cs_X: **0.244**V_Z (k): **210.529**Gov. Eqn. **ASCE Eqn 12.8-2**Cs_Z: **0.244****Seismic Generation Force Results**

Floor Level	Height (ft)	Weight (k)	Force X (k)	Force Z (k)	CG X (ft)	CG Z (ft)
Upper Roof	32	5.862	2.904	2.904	270.251	310.762
Roof Deck	23.5	182.366	66.345	66.345	270.613	282.975
Second Floor	13.5	676.013	141.28	141.28	271.417	278.87
Totals		864.241	210.529	210.529		

Seismic Generation Diaphragm Results

Floor Level	Width (X) (ft)	Length (Z) (ft)	X Plus (ft)	X Minus (ft)	Z Plus (ft)	Z Minus (ft)
Upper Roof	24.042	9.381	1.202	1.202	.469	.469
Roof Deck	24.042	93.542	1.202	1.202	4.677	4.677
Second Floor	24.542	94.042	1.227	1.227	4.702	4.702



BSE

SK

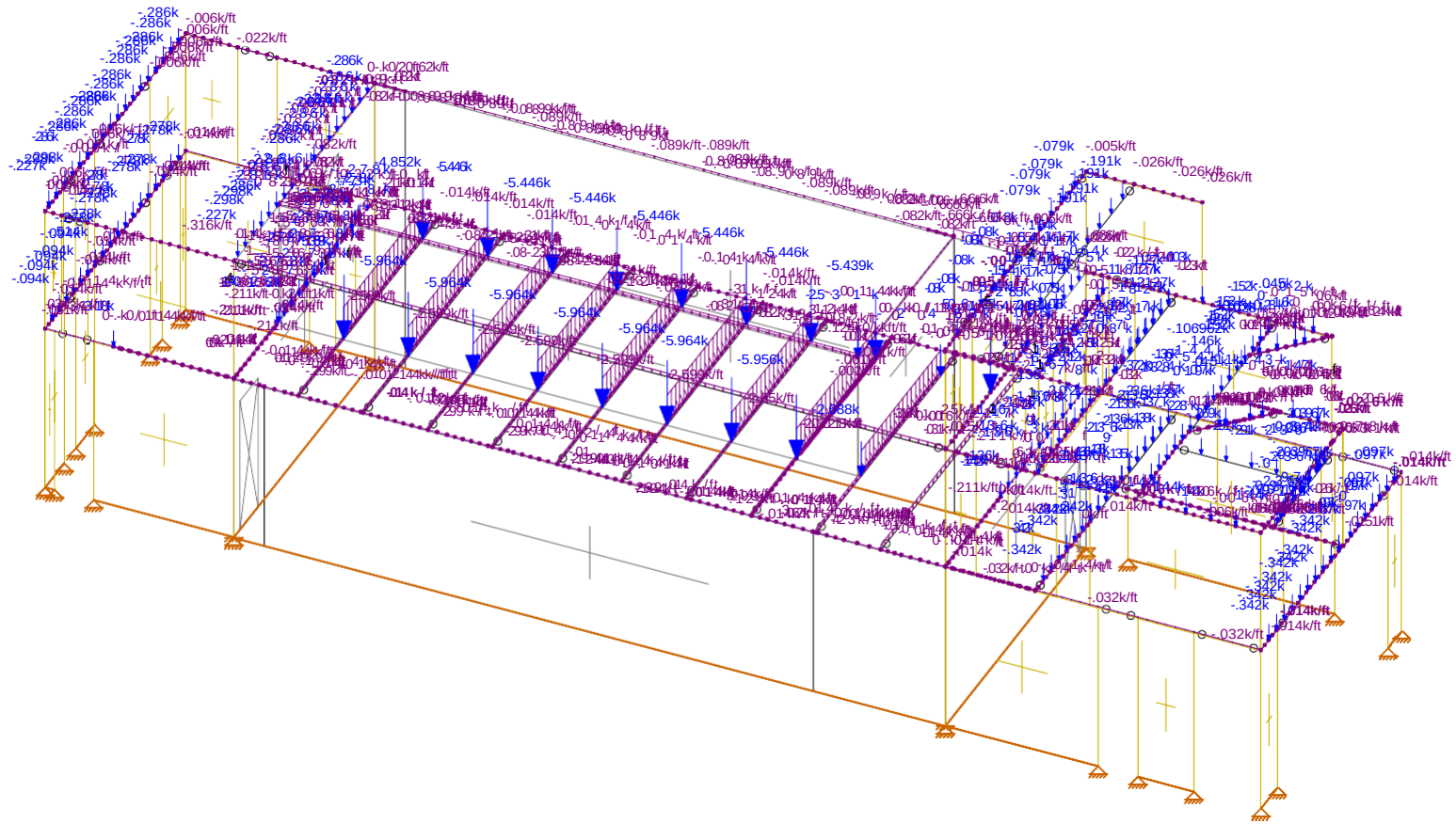
19155

RISA 3D Model for Lateral Design

SK - 11

Sept 11, 2020 at 2:27 PM

Model_20200908.rfl



Loads: BLC 1, Dead Load

BSE

SK

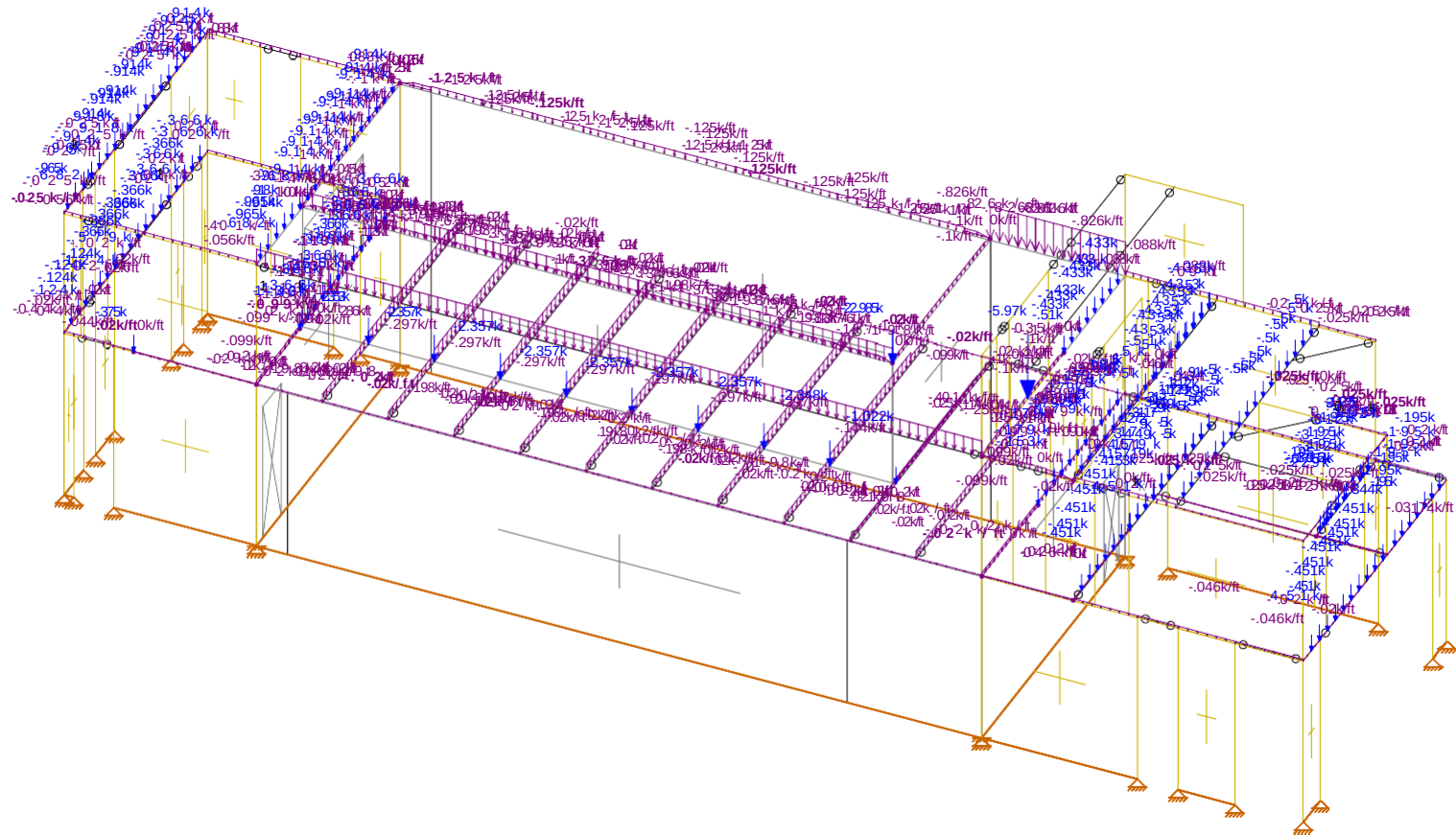
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Deda Loads

SK - 12

Sept 11, 2020 at 2:28 PM

Model_20200908.rfl



Loads: BLC 2, Live Load

BSE

SK

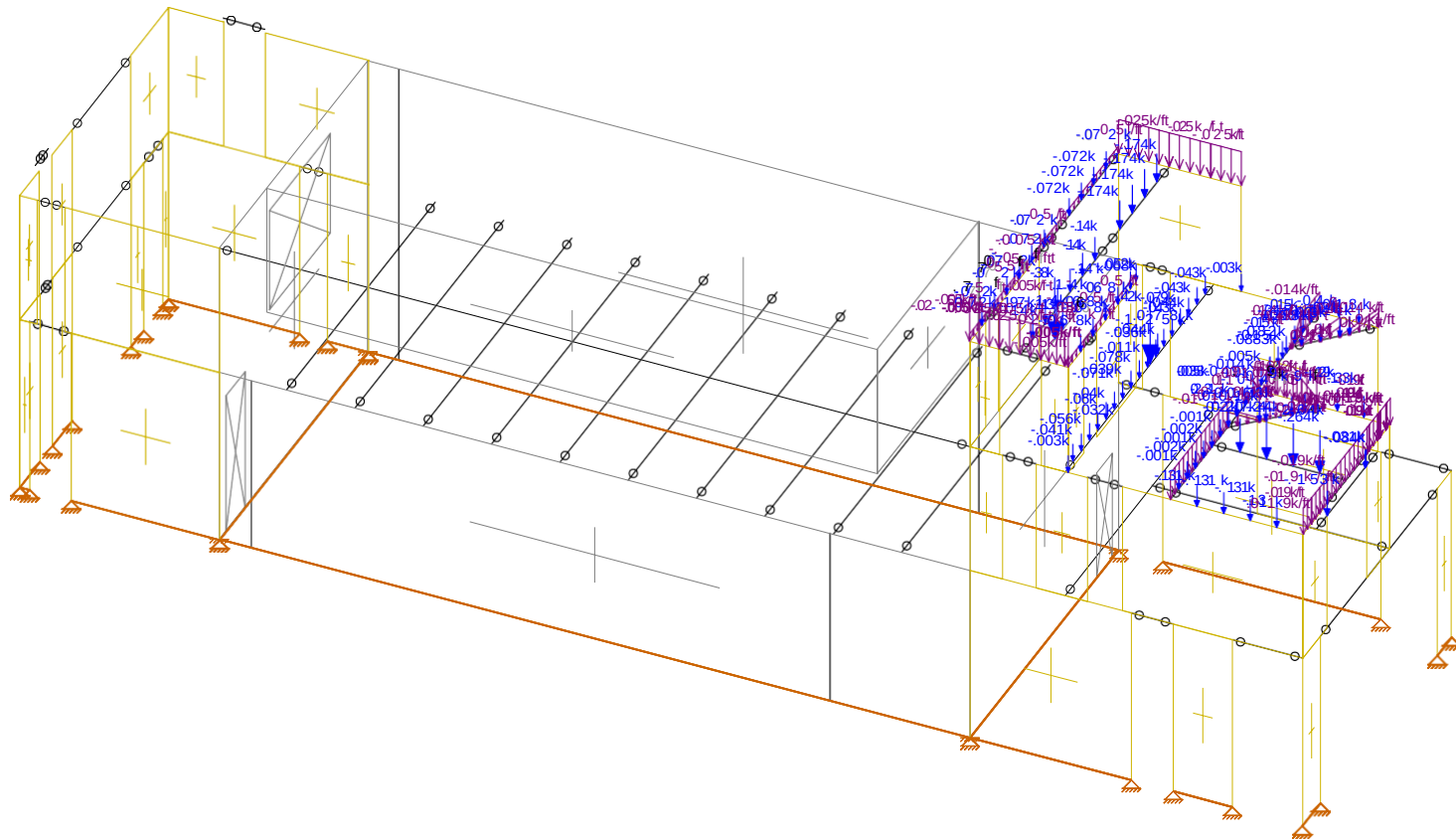
19155

Live Loads

SK - 13

Sept 11, 2020 at 2:28 PM

Model_20200908.rfl



Loads: BLC 4, Roof Live Load

BSE

SK

19155

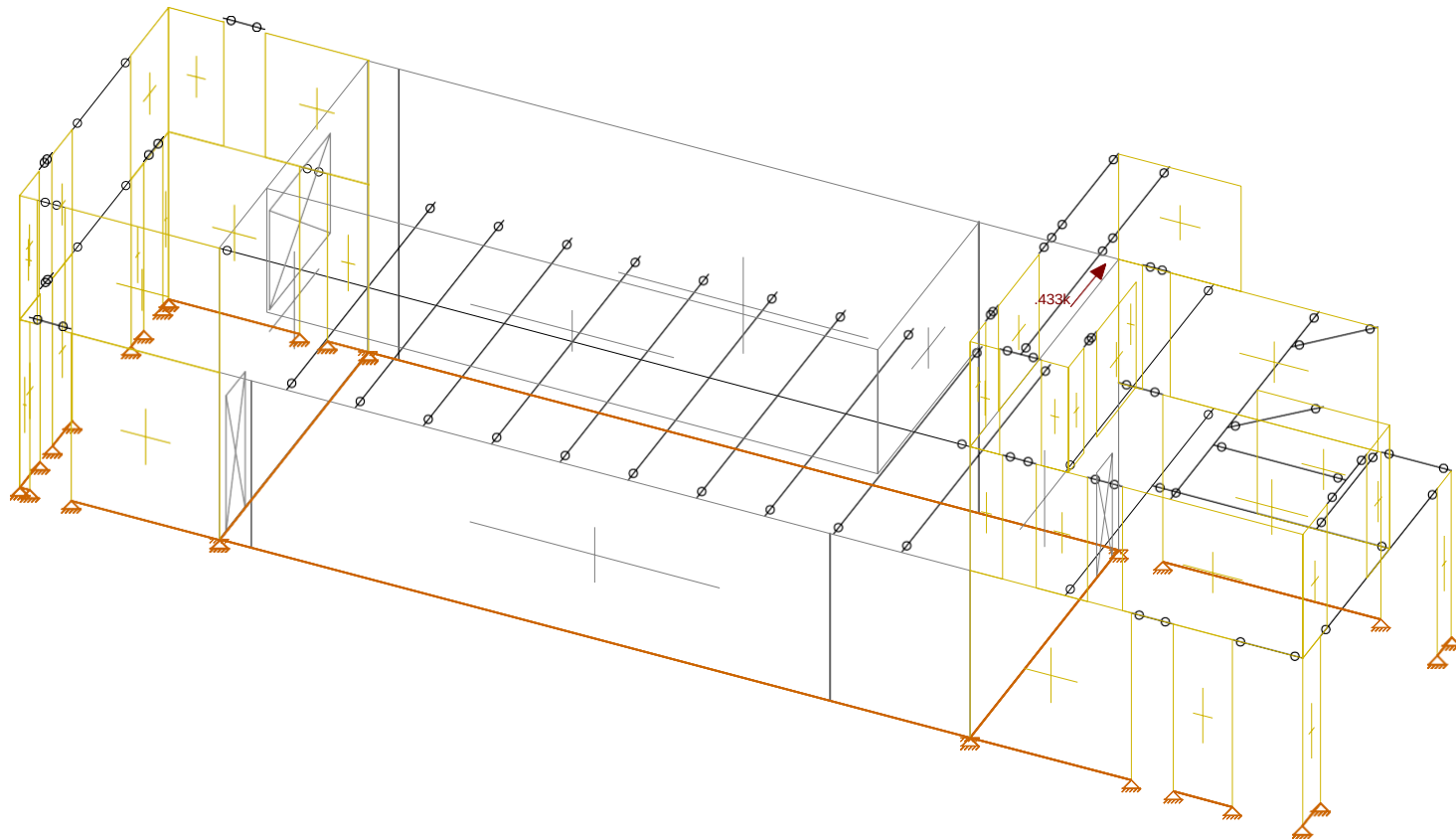


ROOF Live Loads

SK - 14

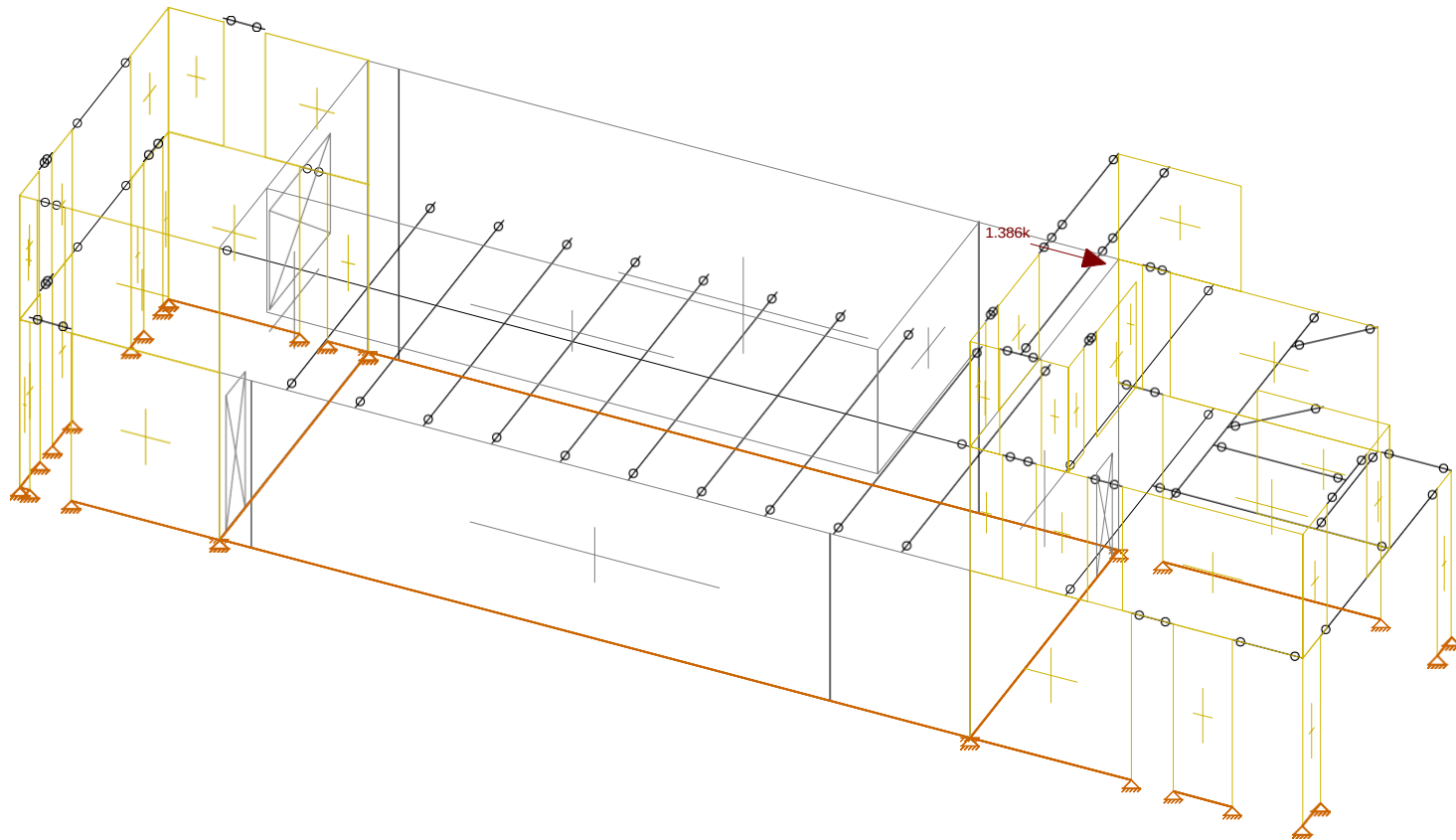
Sept 11, 2020 at 2:29 PM

Model_20200908.rfl



Loads: BLC 8, Wind Load X

BSE	Wind Load - X	SK - 15
SK		Sept 11, 2020 at 2:29 PM
19155		Model_20200908.rfl



Loads: BLC 11, Wind Load Z

BSE

SK

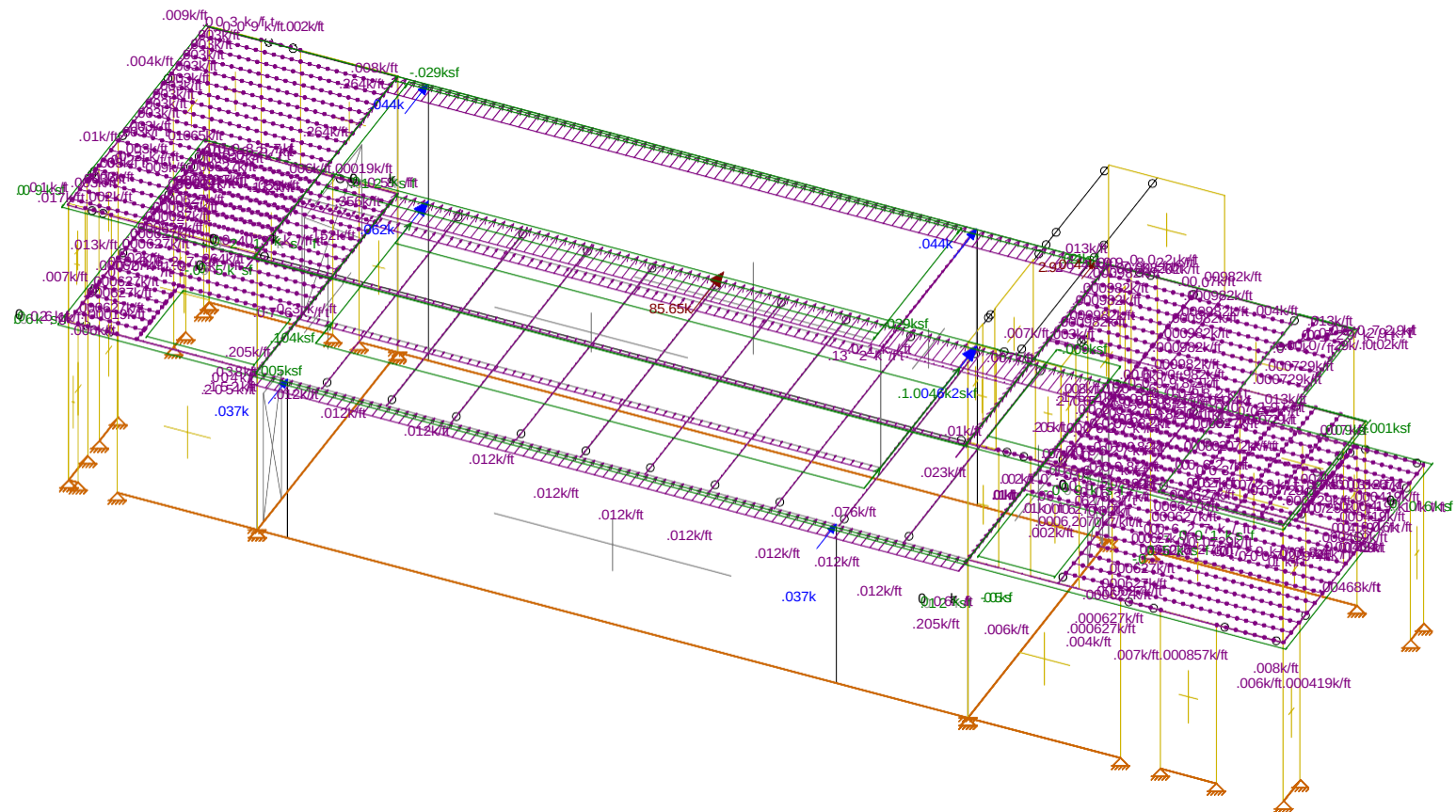
19155

Wind Load - Z

SK - 16

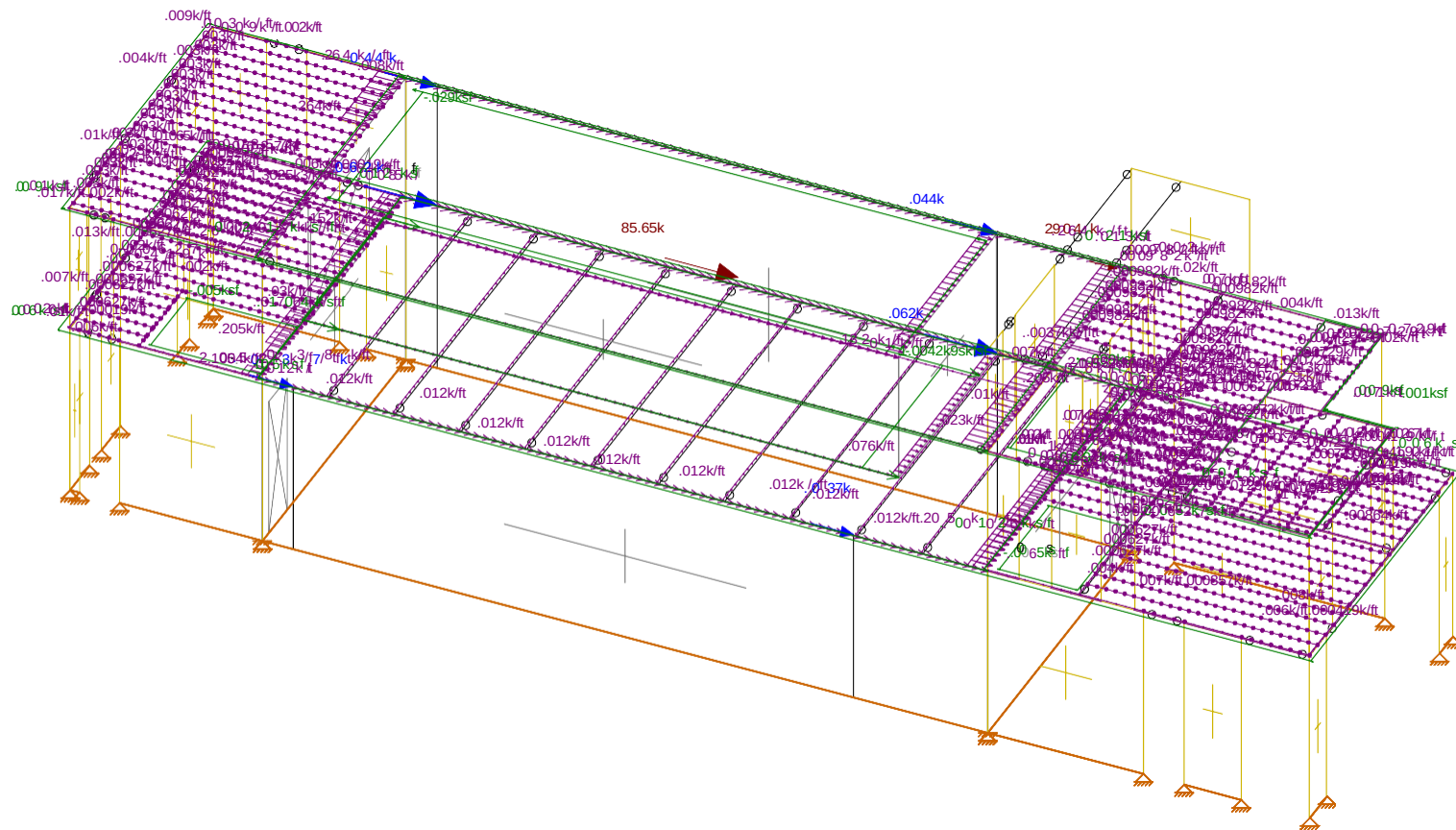
Sept 11, 2020 at 2:30 PM

Model_20200908.rfl



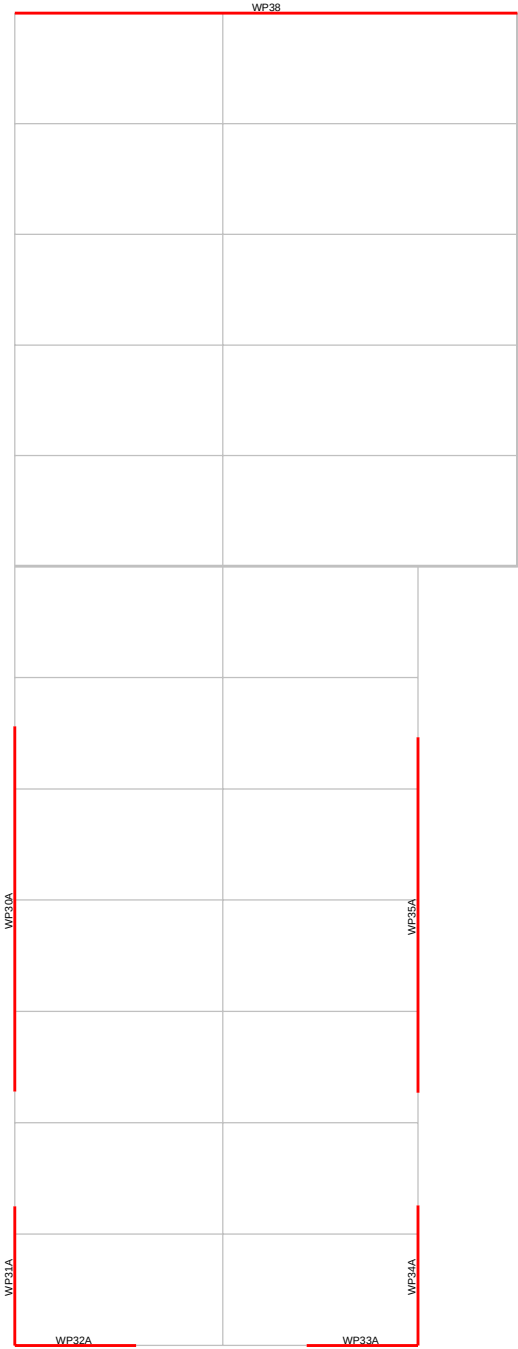
Loads: BLC 14, Earthquake Load X

BSE		SK - 17
SK		Sept 11, 2020 at 2:30 PM
19155		Model_20200908.rfl



Loads: BLC 17, Earthquake Load Z

BSE		SK - 18
SK		Sept 11, 2020 at 2:31 PM
19155		Model_20200908.rfl



Loads: DL PreComp - PreComposite Dead Load
Results for LC 1, Service Dead

BSE

SK

19155

Upper Roof

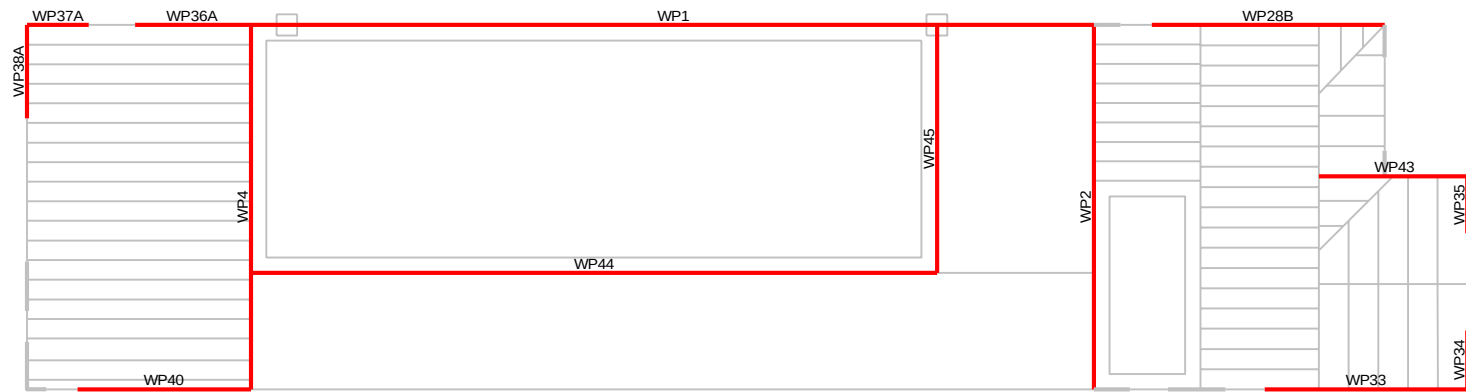


Upper Roof Shearwalls

SK - 19

Sept 11, 2020 at 2:39 PM

Model_20200908.rfl



BSE	Roof Deck	SK - 21
SK		Sept 11, 2020 at 2:40 PM
19155	Lower Level Shearwalls	Model_20200908.rfl



Loads: DL PreComp - PreComposite Dead Load
Results for LC 1, Service Dead

BSE	Second Floor Lower Level Shearwalls	SK - 21
SK		Sept 11, 2020 at 2:41 PM
19155		Model_20200908.rfl

Wall Panel ACI 318-14: Concrete Code Checks (In Plane)

	Wall Panel	Region	Max UC	LC	Shear UC	LC	Pn*phi[k]	Mn*phi[k-ft]	Vn*phi[k]
1	WP1	R2	.112	95	.223	93	NC	32047.754	1659.535
2		R3	.045	92	.152	93	NC	31990.689	1554.851
3	WP2	R2	.658	91	.47	89	NC	4466.206	663.932
4		R3	.257	86	.825	89	NC	4466.206	595.825
5		R6	.87	89	.946	89	-55.692	51.847	68.205
6		R5	.97	89	.648	89	-49.686	20.45	62.424
7		R9	.9	92	.986	89	-48.806	8.423	23.977
8		R8	1.144	89	.601	89	-54.882	5.562	33.352
9	WP3	R2	.126	92	.213	92	NC	32047.754	1554.851
10	WP4	R2	.532	91	.386	91	-92.946	219.142	179.67
11		R3	.368	90	.226	90	NC	282.895	172.497
12		R4	.058	66	.19	66	NC	1073.811	275.598
13		R5	.231	90	.578	90	NC	1073.811	301.591
14		R8	.203	93	.565	89	1025.212	619.591	114.375
15		R7	.791	90	.374	90	-73.726	107.305	111.46
16		R11	.152	90	.509	89	NC	94.141	89.188
17		R10	.274	89	.5	89	NC	94.141	94.69
18		R14	.282	89	.457	89	286.941	41.201	41.866
19		R13	.263	90	.657	89	-55.222	5.4	40.582
20	WP44	R1	.404	93	.456	92	-1027.301	721.92	634.491
21	WP45	R1	.267	92	1.314	92	NC	1178.885	437.722

Wall Panel ACI 318-14: Concrete Code Checks (Out Plane)

	Wall Panel	Region	Max UC	LC	Shear UC	LC	Pn*phi[k/ft]	Mn*phi[k-ft/ft]	Vn*phi[k/ft]
1	WP1	R2	.305 (Int)	91	.063	92	NC	10.745	13.451
2		R3	.339 (Int)	89	.071	92	NC	10.745	13.23
3	WP2	R2	.067 (Int)	91	.032	93	NC	11.032	13.497
4		R3	.116 (Int)	89	.019	93	NC	11.032	13.403
5		R6	.757 (Int)	89	.223	92	-30.232	1.753	10.55
6		R5	.994 (Int)	92	.314	92	-20.534	2.95	9.247
7		R9	.765 (Int)	92	.494	92	-57.371	4.368	12.905
8		R8	.948 (Int)	89	.595	92	-66.268	NC	8.127
9	WP3	R2	.139 (Ext)	91	.03	89	NC	10.745	13.366
10	WP4	R2	.458 (Int)	91	.09	93	-21.937	NC	13.145
11		R3	.169 (Int)	93	.187	92	NC	10.483	12.951
12		R4	.049 (Ext)	89	.104	89	NC	11.432	12.953
13		R5	.13 (Int)	89	.066	93	NC	11.432	13.08
14		R8	.354 (Int)	93	.507	89	NC	12.245	12.986
15		R7	.44 (Int)	90	.269	93	-34.45	NC	15.418
16		R11	.208 (Int)	89	.069	92	NC	10.553	13.935
17		R10	.171 (Int)	72	.118	89	NC	10.553	13.721
18		R14	.255 (Int)	89	.59	89	317.562	34.422	14.152
19		R13	.298 (Int)	90	.867	89	-48.719	2.053	15.979
20	WP44	R1	.928 (Int)	92	.135	92	-9.908	3.444	3.388
21	WP45	R1	.161 (Ext)	93	.248	92	NC	2.697	3.184

Wood Wall Panel Axial Code Checks (AWC NDS-18: ASD)

	Wall Panel	Region	Stud Size	Stud Spaci...	Axial Check	Gov LC	Chord Size	Chord Axial Ch...	Gov LC
1	WP22A	R1	2X6	16	0	N/A	4X6	NC	NC
2	WP23	R1	2X6	16	0	N/A	4X6	NC	NC
3	WP23A	R1	2X6	16	.548	2	4X6	.409	2
4	WP20	R1	2X6	16	0	N/A	4X6	NC	NC
5	WP21	R1	2X6	16	.198	2	4X6	.217	2
6	WP22B	R1	2X6	16	0	N/A	4X6	NC	NC
7	WP23B	R1	2X6	16	0	N/A	4X6	NC	NC
8	WP24A	R1	2X6	16	0	N/A	4X6	NC	NC
9	WP25A	R1	2X6	16	0	N/A	4X6	NC	NC
10	WP26A	R1	2X6	16	0	N/A	4X6	NC	NC
11	WP27A	R1	2X6	16	.067	2	4X6	.115	10
12	WP28A	R1	2X6	16	.542	2	4X6	.336	2
13	WP29	R1	2X6	16	.376	2	4X6	.161	2
14	WP27B	R1	2X6	16	0	N/A	4X6	NC	NC
15	WP28B	R1	2X6	16	.188	2	4X6	.205	2
16	WP31	R1	2X6	16	0	N/A	4X6	NC	NC
17	WP32	R1	2X6	16	.375	2	4X6	.186	16
18	WP33	R1	2X6	16	.087	2	4X6	.102	2
19	WP34	R1	2X6	16	.057	3	4X6	.264	2
20	WP35	R1	2X6	16	.041	4	4X6	.051	2
21	WP30A	R1	2X6	16	.029	3	4X6	.078	7
22	WP31A	R1	2X6	16	.013	2	4X6	.107	13
23	WP32A	R1	2X6	16	0	N/A	4X6	NC	NC
24	WP33A	R1	2X6	16	0	N/A	4X6	NC	NC
25	WP34A	R1	2X6	16	.087	2	4X6	.22	2
26	WP35A	R1	2X6	16	.019	3	4X6	.067	9
27	WP38	R1	2X6	16	.029	3	4X6	.088	14
28	WP36A	R1	2X6	16	.015	2	4X6	.02	2
29	WP37A	R1	2X6	16	.104	2	4X6	.057	2
30	WP38A	R1	2X6	16	.215	2	4X6	.264	2
31	WP39	R1	2X6	16	.398	2	4X6	.311	2
32	WP40	R1	2X6	16	.024	2	4X6	.097	10
33	WP41	R1	2X6	16	0	N/A	4X6	NC	NC
34	WP42	R1	2X6	16	.177	2	4X6	.137	2
35	WP43	R1	2X6	16	.097	4	4X6	.169	2

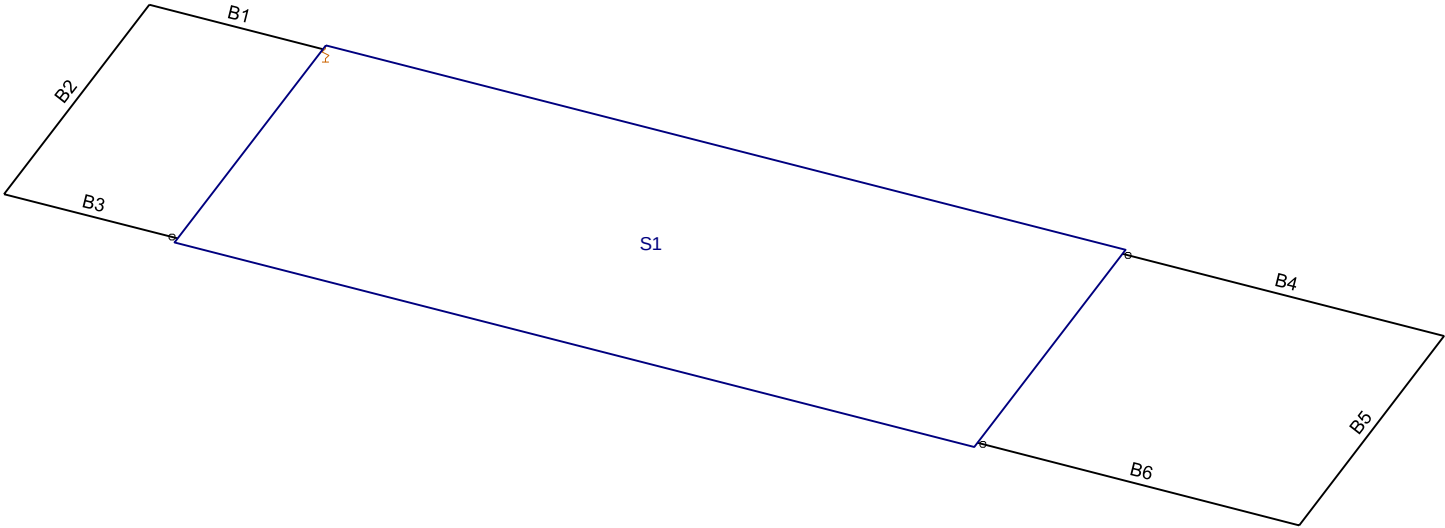
Wood Wall Panel In Plane Code Checks (AWC NDS-18: ASD)

	Wall Panel	Shear Panel Label	Region	Shear Che...	Shear For...	Gov LC	Hold-Dow...	Chord Str...	Tension C...	Tie-Do...	Gov LC
1	WP22A	S1_15/32_10d@6	R1	0	0	N/A		NC	NC	NC	NC
2	WP23	S1_15/32_10d@6	R1	0	0	N/A		NC	NC	NC	NC
3	WP23A	S1_15/32_10d@6	R1	.018	.006	14	Not Req'd	NC	NC	NC	NC
4	WP20	S1_15/32_10d@6	R1	0	0	N/A		NC	NC	NC	NC
5	WP21	S1_15/32_10d@6	R1	.098	.033	2	Not Req'd	NC	NC	NC	NC
6	WP22B	S1_15/32_10d@6	R1	0	0	N/A		NC	NC	NC	NC
7	WP23B	S1_15/32_10d@6	R1	0	0	N/A		NC	NC	NC	NC
8	WP24A	S1_15/32_10d@6	R1	0	0	N/A		NC	NC	NC	NC
9	WP25A	S1_15/32_10d@6	R1	0	0	N/A		NC	NC	NC	NC
10	WP26A	S1_15/32_10d@6	R1	0	0	N/A		NC	NC	NC	NC
11	WP27A	S1_15/32_10d@6	R1	.22	.075	14	HDU2-SD...	NC	.032	.061	11
12	WP28A	S1_15/32_10d@6	R1	.19	.065	5	Not Req'd	NC	NC	NC	NC
13	WP29	S1_15/32_10d@6	R1	.053	.011	14	Not Req'd	NC	NC	NC	NC
14	WP27B	S1_15/32_10d@6	R1	0	0	N/A	NC	NC	NC	NC	NC
15	WP28B	S1_15/32_10d@6	R1	.096	.033	10	NC	Not Req'd	NC	NC	NC
16	WP31	S1_15/32_10d@6	R1	0	0	N/A	NC	NC	NC	NC	NC

Wood Wall Panel In Plane Code Checks (AWC NDS-18: ASD) (Continued)

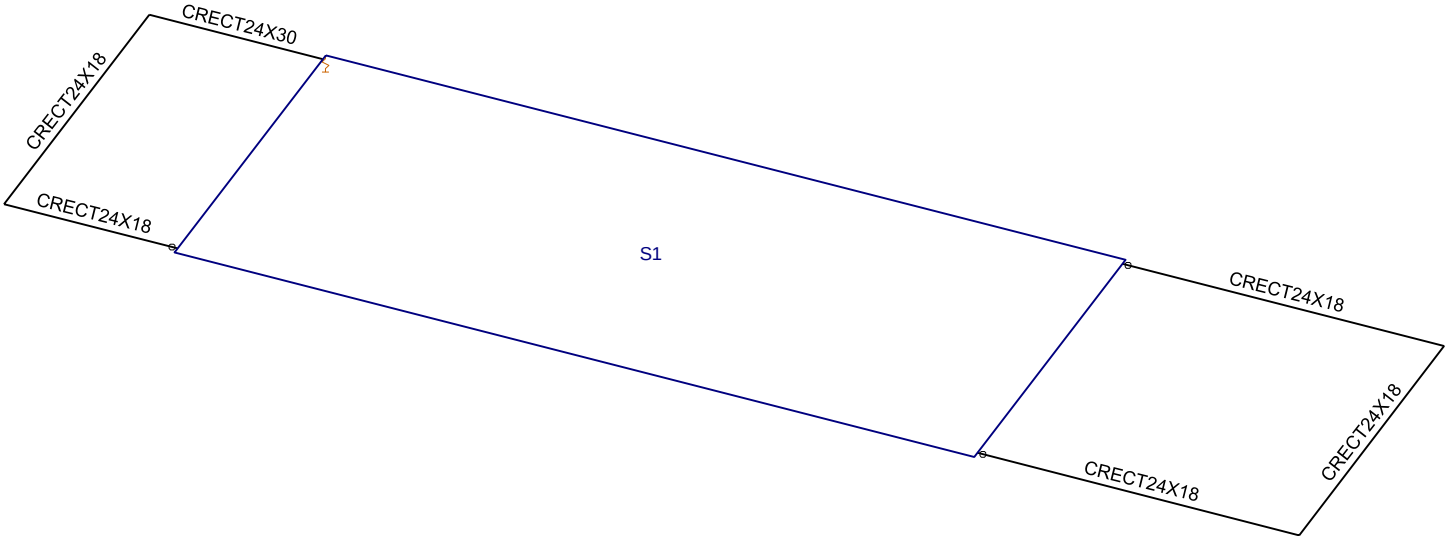
	Wall Panel	Shear Panel Label	Region	Shear Che...	Shear For...	Gov LC	Hold-Dow...	Chord Str...	Tension C...	Tie-Do...	Gov LC
17	WP32	S1_15/32_10d@6	R1	.413	.104	14	NC	Not Req'd	NC	NC	NC
18	WP33	S1_15/32_10d@6	R1	.324	.11	15	NC	Not Req'd	NC	NC	NC
19	WP34	S1_15/32_10d@3	R1	.769	.511	2	NC	MST60_2...	.982	3.216	2
20	WP35	S1_15/32_10d@3	R1	.72	.479	2	NC	MSTC28_...	.136	.098	1
21	WP30A	S1_15/32_10d@6	R1	.444	.151	8	NC	MST37_2...	.969	1.042	11
22	WP31A	S1_15/32_10d@3	R1	.998	.384	15	NC	MST37_1...	.896	1.378	13
23	WP32A	S1_15/32_10d@6	R1	0	0	N/A	NC	NC	NC	NC	NC
24	WP33A	S1_15/32_10d@6	R1	0	0	N/A	NC	NC	NC	NC	NC
25	WP34A	S1_15/32_10d@2	R1	.644	.56	2	NC	MSTC66_...	.966	2.883	2
26	WP35A	S1_15/32_10d@6	R1	.4	.136	9	NC	MSTC28_...	.852	.817	9
27	WP38	S1_15/32_10d@6	R1	.47	.16	13	NC	MSTC40_...	.952	1.142	18
28	WP36A	S1_15/32_10d@6	R1	.891	.303	9	NC	Not Req'd	NC	NC	NC
29	WP37A	S1_15/32_10d@6	R1	.342	.116	2	NC	Not Req'd	NC	NC	NC
30	WP38A	S1_15/32_10d@6	R1	.786	.267	2	NC	Not Req'd	NC	NC	NC
31	WP39	S1_15/32_10d@4	R1	.621	.317	2	NC	Not Req'd	NC	NC	NC
32	WP40	S1_15/32_10d@3	R1	.992	.66	15	NC	MST27_D...	.969	1.311	13
33	WP41	S1_15/32_10d@6	R1	0	0	N/A	NC	NC	NC	NC	NC
34	WP42	S1_15/32_10d@6	R1	.545	.185	2	NC	MSTC28_...	.003	.002	12
35	WP43	S1_15/32_10d@6	R1	.907	.309	2	NC	Not Req'd	NC	NC	NC

FOUNDATION DESIGN



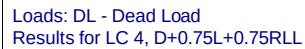
Results for LC 4, D+0.75L+0.75RLL

BSE	 Beam/ Slabs Label	SK - 23
SK		July 13, 2020 at 3:34 PM
19155		M0del_20200515_LateralPool Base @ Deck_C...

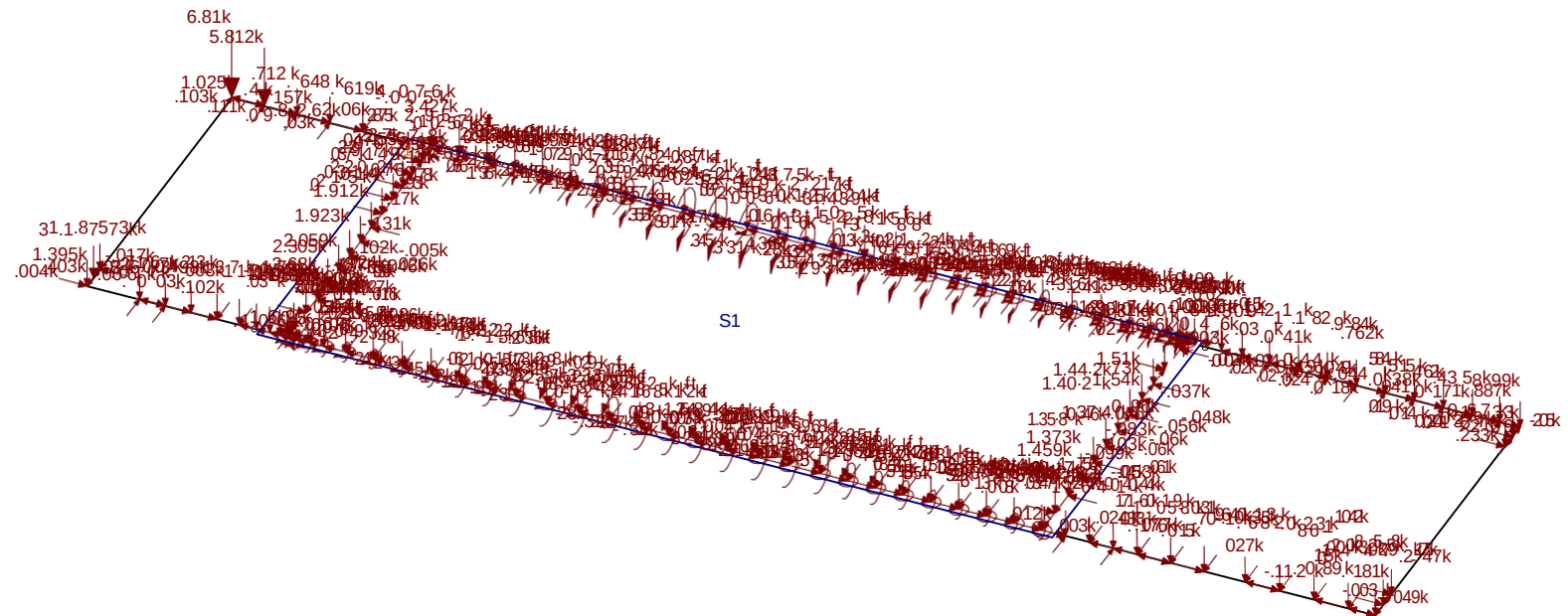


Results for LC 4, D+0.75L+0.75RLL

BSE	 Grade Beam Sizes	SK - 24
SK		July 13, 2020 at 3:35 PM
19155		M0del_20200515_LateralPool Base @ Deck_C...

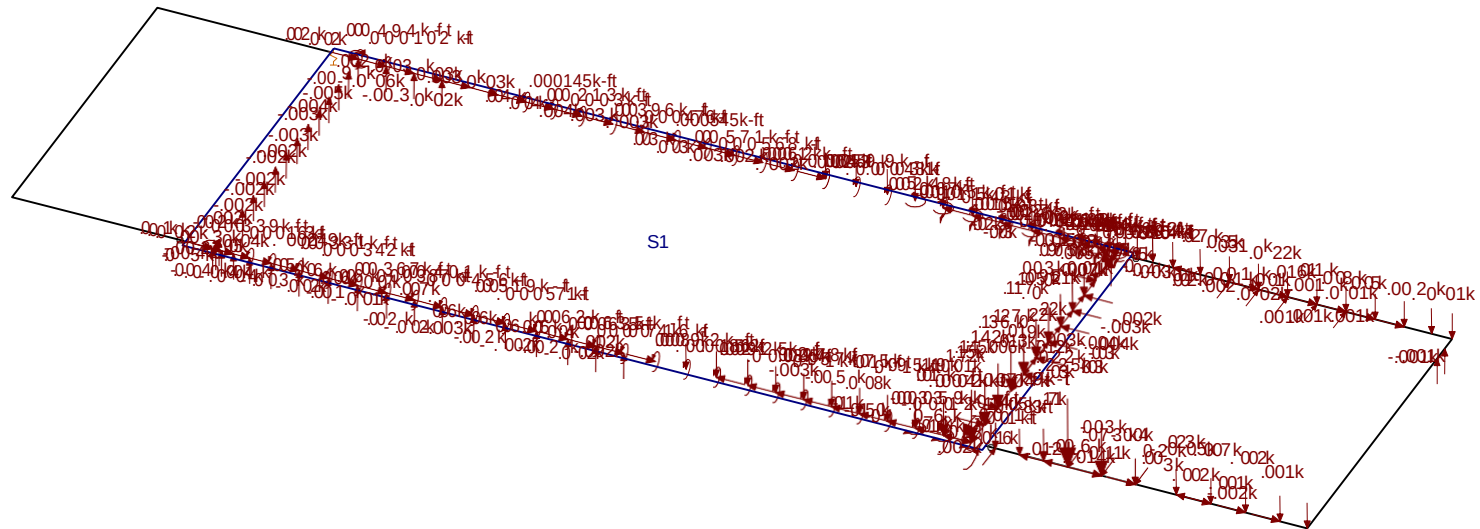


BSE	 Dead Loads	SK - 25
SK		July 13, 2020 at 3:37 PM
19155		M0del_20200515_LateralPool Base @ Deck_C...



Loads: LL - Live Load
Results for LC 4, D+0.75L+0.75RLL

BSE	Live Loads	SK - 26
SK		July 13, 2020 at 3:37 PM
19155		M0del_20200515_LateralPool Base @ Deck_C...



Loads: RLL - Roof Live Load
Results for LC 4, D+0.75L+0.75RLL

BSE

SK

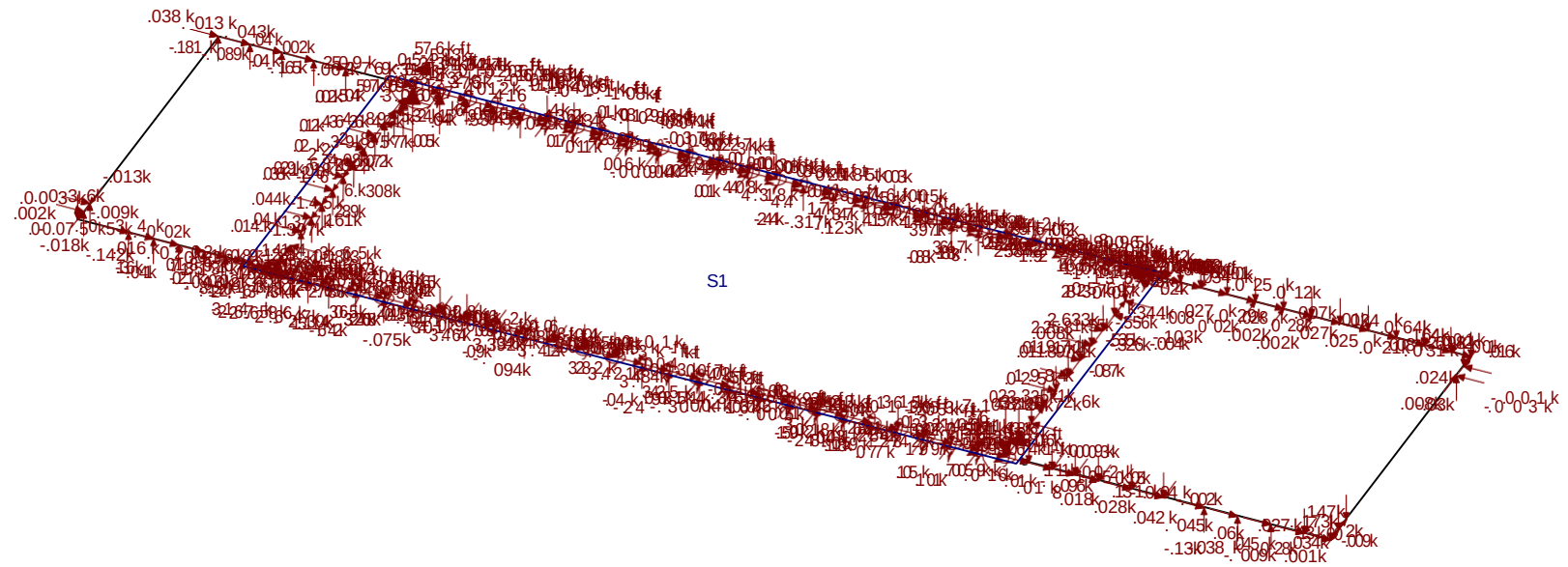
19155

SK - 27

July 13, 2020 at 3:37 PM

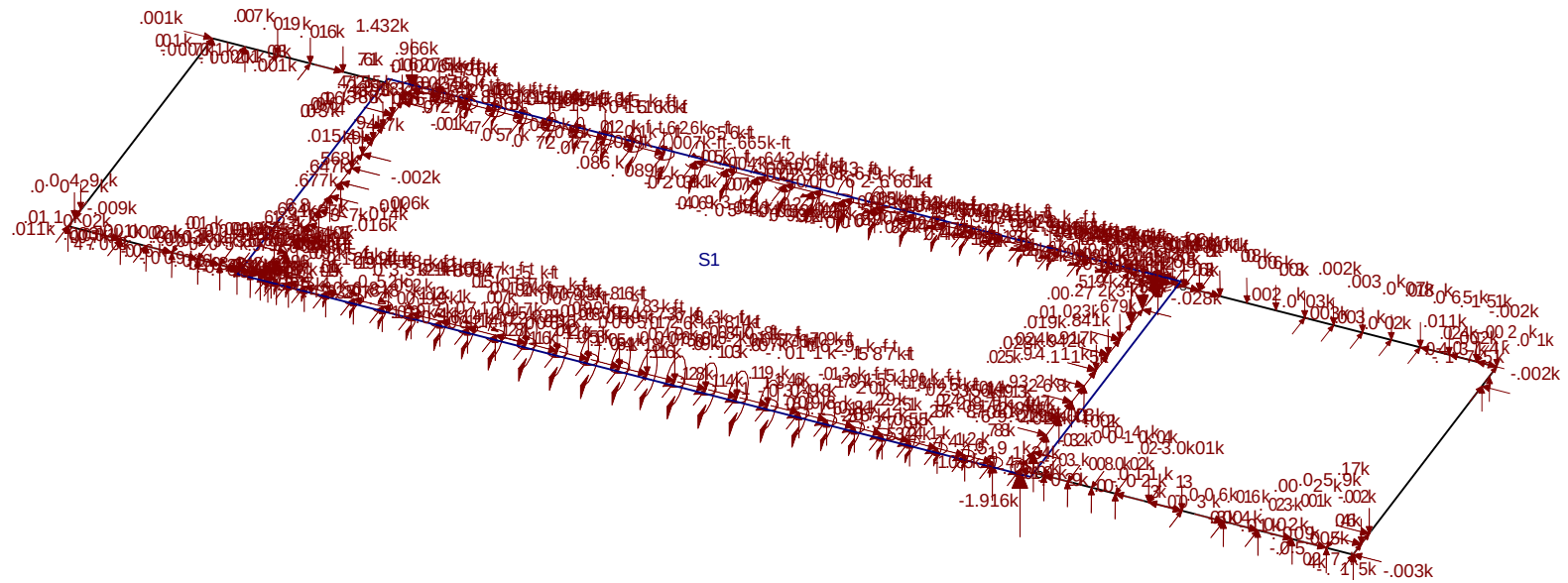
M0del_20200515_LateralPool Base @ Deck_C...

Roof Live Loads



Loads: ELZ - Earthquake Load Z
Results for LC 4, D+0.75L+0.75RLL

BSE	 EL-Z	SK - 29
SK		July 13, 2020 at 3:37 PM
19155		Model_20200515_LateralPool Base @ Deck_C...



Loads: WL+X - Wind Load +X
Results for LC 4, D+0.75L+0.75RLL

BSE		SK - 30
SK		July 13, 2020 at 3:38 PM
19155		M0del_20200515_LateralPool Base @ Deck_C...

Concrete Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1...	Density[k/...	f'c[ksi]	Lambda	Flex Stee...	Shear St...
1	Conc3000NW	3156	1372	.15	.6	.145	3	1	60	60
2	Conc3500NW	3409	1482	.15	.6	.145	3.5	1	60	60
3	Conc4000NW	3644	1584	.15	.6	.145	4	1	60	60
4	Conc3000LW	2085	907	.15	.6	.11	3	.75	60	60
5	Conc3500LW	2252	979	.15	.6	.11	3.5	.75	60	60
6	Conc4000LW	2408	1047	.15	.6	.11	4	.75	60	60
7	Conc4500NW	3824	1593	.15	.6	.145	4.5	1	60	60
8	RIGID	1e+6		.3	0	0	0	0	0	0

Beams

	Label	Start ...	End ...	Shape	Material	Design ...	Start R...	End Re...	Flexural Layout	Shear Layout	Anal...
1	B1	N138	R3D...	CRECT24X30	Conc4500NW	Roof	Fixed	Fixed	4 T&B	Shear Layou..	0
2	B2	R3D...	R3D...	CRECT24X18	Conc4500NW	Roof	Fixed	Fixed	2 T&B	Shear Layou..	0
3	B3	R3D...	N139	CRECT24X18	Conc4500NW	Roof	Fixed	Pinned	2 T&B	Shear Layou..	0
4	B4	N140	R3D...	CRECT24X18	Conc4500NW	Roof	Pinned	Fixed	2 T&B	Shear Layou..	0
5	B5	R3D...	R3D...	CRECT24X18	Conc4500NW	Roof	Fixed	Fixed	2 T&B	Shear Layou..	0
6	B6	R3D...	N141	CRECT24X18	Conc4500NW	Roof	Fixed	Pinned	2 T&B	Shear Layou..	0

Slabs

	Label	Thickness [in]	Material	Local Axis Angle ...	Analysis Offset [in]	Passive Pressur...	Soil Over...
1	S1	14	Conc4500NW	0	0	0	0

Design Strips

	Label	Rebar Angle from Pl...	No. of Design Cuts	Design Rule
1	DS1	0	50	Mat Slab EW
2	DS2	90	50	Mat Slab NS

General Design Parameters

	Label	Max Bending Chk	Max Shear Chk	Top Cover[in]	Bottom Cover[in]
1	Roof	1	1	1.5	3
2	Floor	1	1	1.5	3
3	Mat Slab EW	1	1	2	3.5
4	Mat Slab NS	1	1	1.5	3

Beam Rebar Parameters

	Label	Optimize Rebar	Min Flex Bar	Max Flex Bar	Shear Bar	Legs per Stirr...	Side Cover[in]	Top/Bottom B...	Shear Bar Sp...
1	Roof	Optimize	#6	#10	#4	2	1.5	2	12
2	Floor	Optimize	#5	#10	#4	2	1.5	2	12
3	Mat SLa...	Optimize	#5	#10	#4	2	1.5	2	12
4	Mat SLa...	Optimize	#5	#10	#4	2	1.5	2	12

Slab Rebar Parameters

	Label	Top Bar	Bottom Bar	Max Top Bar Spac...	Min Top Bar Spa...	Max Bot B...	Min Bot Ba...	Spacing ...	Rebar Options
1	Roof	#5	#5	18	8	18	8	1	Optimize
2	Floor	#5	#5	18	8	18	8	1	Optimize
3	Mat SL...	#6	#6	18	12	18	12	2	Optimize
4	Mat SL...	#6	#6	18	12	18	12	2	Optimize

Soil Definitions

	Label	Subgrade Modulus[k/ft^3]	Allowable Bearing[ksf]	Depth Properties	Default?
1	Default	50	2	None	Yes

Load Combinations

	Label	S...	Service	A...	SF	Ca...	Fa...	Ca...	Fa...	Ca...	Fa...	Ca...	Fa...	Ca...	Fa...	Ca...	Fa...	Ca...	Fa...	Ca...	Fa...
1	D	Y...	Yes			DL	1														
2	D+L	Y...	Yes			DL	1	LL	1												
3	D+RLL	Y...	Yes			DL	1			RLL	1										
4	D+0.75L+0.75RLL	Y...	Yes			DL	1	LL	.75	RLL	.75										
5	D+L+RLL	Y...	Yes			DL	1	LL	1	RLL	1										
6	L+RLL	Y...	Yes					LL	1	RLL	1										
7																					
8	(1+0.14Sds)D+0....	Y...	Yes	1...		DL	1....					ELX	.7								
9	(1+0.14Sds)D-0.7...	Y...	Yes	1...		DL	1....					ELX	-.7								
10	(1+0.105Sds)D+0...	Y...	Yes	1...		DL	1....	LL	.75			ELX	.525								
11	(1+0.105Sds)D+0...	Y...	Yes	1...		DL	1....	LL	.75			ELX	-.5...								
12	(0.6-0.14Sds)D+0...	Y...	Yes	1...		DL	.429					ELX	.7								
13	(0.6-0.14Sds)D-0...	Y...	Yes	1...		DL	.429					ELX	-.7								
14	(1+0.14Sds)D+0....	Y...	Yes	1...		DL	1....					ELZ	.7								
15	(1+0.14Sds)D-0.7...	Y...	Yes	1...		DL	1....					ELZ	-.7								
16	(1+0.105Sds)D+0...	Y...	Yes	1...		DL	1....	LL	.75			ELZ	.525								
17	(1+0.105Sds)D+0...	Y...	Yes	1...		DL	1....	LL	.75			ELZ	-.5...								
18	(0.6-0.14Sds)D+0...	Y...	Yes	1...		DL	.429					ELZ	.7								
19	(0.6-0.14Sds)D-0...	Y...	Yes	1...		DL	.429					ELZ	-.7								
20																					
21	D+0.6WX	Y...	Yes	1...		DL	1					W...	.6								
22	D-0.6WX	Y...	Yes	1...		DL	1					W...	-.6								
23	D+0.75L+0.75RL...	Y...	Yes	1...		DL	1	LL	.75	RLL	.75		W...	.45							
24	D+0.75L+0.75RL...	Y...	Yes	1...		DL	1	LL	.75	RLL	.75		W...	-.45							
25	0.6D+0.6WX	Y...	Yes	1...		DL	.6					W...	.6								
26	0.6D-0.6WX	Y...	Yes	1...		DL	.6					W...	-.6								
27	D+0.6WZ	Y...	Yes	1...		DL	1					W...	.6								
28	D-0.6WZ	Y...	Yes	1...		DL	1					W...	-.6								
29	D+0.75L+0.75RL...	Y...	Yes	1...		DL	1	LL	.75	RLL	.75		W...	.45							
30	D+0.75L+0.75RL...	Y...	Yes	1...		DL	1	LL	.75	RLL	.75		W...	-.45							
31	0.6D+0.6WZ	Y...	Yes	1...		DL	.6					W...	.6								
32	0.6D-0.6WZ	Y...	Yes	1...		DL	.6					W...	-.6								
33																					
34	(1.0+0.14Sds)D+...		Yes	1...		DL	1....					ELX	1.75								
35	(1.0+0.14Sds)D-0...		Yes	1...		DL	1....					ELX	-1....								
36	(1.0+0.105Sds)D...		Yes	1...		DL	1....	LL	.75			ELX	1....								
37	(1.0+0.105Sds)D...		Yes	1...		DL	1....	LL	.75			ELX	-1....								
38	(0.6-.14Sds)D+0....		Yes	1...		DL	.429					ELX	1.75								
39	(0.6-.14Sds)D-0.7...		Yes	1...		DL	.429					ELX	-1....								
40	(1.0+0.14Sds)D+...		Yes	1...		DL	1....					ELZ	1.75								
41	(1.0+0.14Sds)D-0...		Yes	1...		DL	1....					ELZ	-1....								
42	(1.0+0.105Sds)D...		Yes	1...		DL	1....	LL	.75			ELZ	1....								
43	(1.0+0.105Sds)D...		Yes	1...		DL	1....	LL	.75			ELZ	-1....								
44	(0.6-.14Sds)D+0....		Yes	1...		DL	.429					ELZ	1.75								
45	(0.6-.14Sds)D-0.7...		Yes	1...		DL	.429					ELZ	-1....								
46																					
47	1.4D	Y...				DL	1.4														
48	1.2D+1.6L+0.5RLL	Y...				DL	1.2	LL	1.6	RLL	.5										
49	1.2D+0.5L+1.6RLL	Y...				DL	1.2	LL	.5	RLL	1.6										
50	D+L	Y...	Yes			DL	1	LL	1												
51	D+0.75L+0.75RLL	Y...	Yes			DL	1	LL	.75	RLL	.75										
52	D+RLL	Y...	Yes			DL	1			RLL	1										
53	L+RLL	Y...	Yes					LL	1	RLL	1										
54																					
55	(1.2+0.2Sds)D+0....	Y...				DL	1....	LL	.5			ELX	1								
56	(1.2+0.2Sds)D+0....	Y...				DL	1....	LL	.5			ELX	-1								
57	(0.9-0.2Sds)D+p...	Y...				DL	.656					ELX	1								

Load Combinations (Continued)

Label	S...	Service	A...	SF	Ca...	Fa...	Ca...	Fa...	Ca...	Fa...	Ca...	Fa...	Ca...	Fa...	Ca...	Fa...	Ca...	Fa...	Ca...	Fa...
58	(0.9-0.2Sds)D-pE...	Y...			DL	.656					ELX	-1								
59	(1.2+0.2Sds)D+0....	Y...			DL	1....	LL	.5			ELZ	1								
60	(1.2+0.2Sds)D+0....	Y...			DL	1....	LL	.5			ELZ	-1								
61	(0.9-0.2Sds)D+p...	Y...			DL	.656					ELZ	1								
62	(0.9-0.2Sds)D-pE...	Y...			DL	.656					ELZ	-1								
63																				
64	1.2D+1.6RLL+0.5..	Y...			DL	1.2			RLL	1.6			W...	.5						
65	1.2D+1.6RLL-0.5...	Y...			DL	1.2			RLL	1.6			W...	-.5						
66	1.2D+0.5L+0.5RL...	Y...			DL	1.2	LL	.5	RLL	.5			W...	1						
67	1.2D+0.5L+0.5RL...	Y...			DL	1.2	LL	.5	RLL	.5			W...	-1						
68	0.9D+WX	Y...			DL	.9							W...	1						
69	0.9D-WX	Y...			DL	.9							W...	-1						
70	1.2D+1.6RLL+0.5..	Y...			DL	1.2			RLL	1.6			W...	.5						
71	1.2D+1.6RLL-0.5...	Y...			DL	1.2			RLL	1.6			W...	-.5						
72	1.2D+0.5L+0.5RL...	Y...			DL	1.2	LL	.5	RLL	.5			W...	1						
73	1.2D+0.5L+0.5RL...	Y...			DL	1.2	LL	.5	RLL	.5			W...	-1						
74	0.9D+WZ	Y...			DL	.9							W...	1						
75	0.9D-WZ	Y...			DL	.9							W...	-1						
76	D+0.75L+0.75RL...	Y...	Yes	1...	DL	1	LL	.75	RLL	.75			W...	-.45						
77	0.6D+0.6WZ	Y...	Yes	1...	DL	.6							W...	.6						
78	0.6D-0.6WZ	Y...	Yes	1...	DL	.6							W...	-.6						
79																				
80																				
81																				
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96																				

Beam Design Results (Envelope)

	Beam	Shape	UC Max Top	Loc[ft]	LC	UC Max Bot	Loc[ft]	LC	Shear ...	Loc[ft]	LC	Phi*Mn...	Phi*Mn...	Phi*Vn...
1	B1	CRECT24...	.311	8.306	55	.953	0	55	.555	0	55	136.494	114.467	64.416
2	B2	CRECT24...	1.003	2.207	55	.231	0	58	.197	0	48	67.457	58.616	41.849
3	B3	CRECT24...	.821	6.229	56	.568	0	57	.474	12.459	56	67.457	58.616	39.059
4	B4	CRECT24...	.791	8.431	55	.553	9.395	58	.38	0	55	67.457	58.616	39.059
5	B5	CRECT24...	.658	12.752	48	.257	23.542	57	.13	19.373	48	67.457	58.616	41.849
6	B6	CRECT24...	.905	12.767	56	.637	12.526	57	.43	23.125	56	67.457	58.616	39.059

Beam Bending Reinforcement

Beam	Shape	Span	Left Top	Left Bot	Mid Top	Mid Bot	Right Top	Right Bot
1	B1	CRECT24X30	1	CUSTOM	CUSTOM	CUSTOM	CUSTOM	CUSTOM
2	B2	CRECT24X18	1	CUSTOM	CUSTOM	CUSTOM	CUSTOM	CUSTOM
3	B3	CRECT24X18	1	CUSTOM	CUSTOM	CUSTOM	CUSTOM	CUSTOM
4	B4	CRECT24X18	1	CUSTOM	CUSTOM	CUSTOM	CUSTOM	CUSTOM
5	B5	CRECT24X18	1	CUSTOM	CUSTOM	CUSTOM	CUSTOM	CUSTOM

Beam Bending Reinforcement (Continued)

	Beam	Shape	Span	Left Top	Left Bot	Mid Top	Mid Bot	Right Top	Right Bot
6	B6	CRECT24X18	1	CUSTOM	CUSTOM	CUSTOM	CUSTOM	CUSTOM	CUSTOM

Beam Shear Reinforcement

	Beam	Span	Region 1	Region 2	Region 3	Region 4
1	B1	1	CUSTOM	CUSTOM	CUSTOM	CUSTOM
2	B2	1	CUSTOM	CUSTOM	CUSTOM	CUSTOM
3	B3	1	CUSTOM	CUSTOM	CUSTOM	CUSTOM
4	B4	1	CUSTOM	CUSTOM	CUSTOM	CUSTOM
5	B5	1	CUSTOM	CUSTOM	CUSTOM	CUSTOM
6	B6	1	CUSTOM	CUSTOM	CUSTOM	CUSTOM

Strip Reinforcing

	Label	UC Top	LC	Top Bars	Governin...	UC Bot	LC	Bot Bars/...	Governin...	UC Shear	LC	Governin...
1	DS1	.771	60	#6@18in	DS1-X13	.541	55	#6@18in	DS1-X3	.343	60	DS1-X4
2	DS2	1.304	55	#6@12in	DS2-X33	.036	57	#6@16in	DS2-X1	.433	55	DS2-X50

BUILDING WALLS DESIGN

RetainPro (c) 1987-2018. Build 11.18.07.31

Cantilevered Retaining Wall

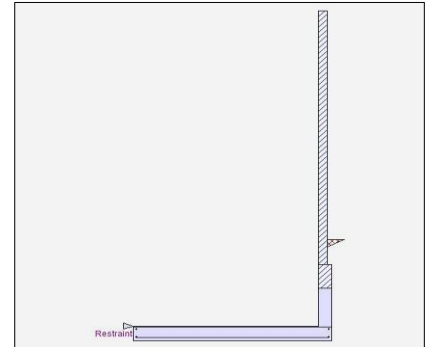
Code: IBC 2012,ACI 318-11,ACI 530-11

Criteria

Retained Height	=	7.50 ft
Wall height above soil	=	19.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	160.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing Soil Friction	=	0.450
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	1,990.0 lbs
Axial Live Load	=	2,000.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Seismic (E)
		(Strength Level)
Wind on Exposed Stem	=	0.0 psf
		(Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Line Load
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Design Summary

Wall Stability Ratios

Overturning	=	5.24 OK
Slab Resists All Sliding !		

Total Bearing Load	=	9,555 lbs
...resultant ecc.	=	38.89 in

Soil Pressure @ Toe	=	0 psf OK
Soil Pressure @ Heel	=	1,496 psf OK
Allowable	=	2,000 psf

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	0 psf
ACI Factored @ Heel	=	2,094 psf
Footing Shear @ Toe	=	55.4 psi OK
Footing Shear @ Heel	=	1.3 psi OK
Allowable	=	75.0 psi

Sliding Calcs

Lateral Sliding Force	=	6,008.9 lbs
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Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	IBC 2012,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

ft =	5.33	3.33	0.00
Wall Material Above "Ht"	Masonry	Masonry	Concrete
Design Method	ASD	ASD	LRFD
Thickness	8.00	12.00	12.00
Rebar Size	# 5	# 5	# 7
Rebar Spacing	32.00	16.00	16.00
Rebar Placed at	Edge	Edge	Edge

Design Data

fb/FB + fa/Fa	=	-3.000	-3.000	0.984
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Total Force @ Section

Service Level	lbs =	376.7	1,391.1	
Strength Level	lbs =			7,200.0

Moment.... Actual

Service Level	ft-# =	272.5	1,933.6	
Strength Level	ft-# =			18,000.0

Moment. ... Allowable

ft-# =	1,494.8	3,820.4	18,288.8
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Shear. ... Actual

Service Level	psi =	4.1	10.0	
Strength Level	psi =			62.7

Shear Allowable

psi =	64.9	58.3	75.0
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Anet (Masonry)

in2 =	91.50	139.50	
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Rebar Depth 'd'

in =	5.25	9.00	9.56
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Masonry Data

f'm	psi =	1,500	1,500	
Fs	psi =	32,000	24,000	
Solid Grouting	=	Yes	Yes	
Modular Ratio 'n'	=	21.48	21.48	
Wall Weight	psf =	84.0	133.0	150.0
Short Term Factor	=	1.000	1.000	
Equiv. Solid Thick.	in =	7.60	11.60	

Masonry Block Type

Masonry Design Method

Concrete Data

f'c	psi =		2,500.0	
Fy	psi =		60,000.0	

RetainPro (c) 1987-2018, Build 11.18.07.31

Cantilevered Retaining Wall

Code: IBC 2012,ACI 318-11,ACI 530-11

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.4327 in2/ft	
(4/3) * As :	0.577 in2/ft	Min Stem T&S Reinf Area 0.959 in2
200bd/fy : 200(12)(9.5625)/60000 :	0.3825 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.288 in2/ft
0.0018bh : 0.0018(12)(12) :	0.2592 in2/ft	Horizontal Reinforcing Options :
	=====	One layer of : Two layers of :
Required Area :	0.4327 in2/ft	#4@ 8.33 in #4@ 16.67 in
Provided Area :	0.45 in2/ft	#5@ 12.92 in #5@ 25.83 in
Maximum Area :	1.2954 in2/ft	#6@ 18.33 in #6@ 36.67 in

Footing Dimensions & Strengths

Toe Width	=	14.00 ft
Heel Width	=	1.00
Total Footing Width	=	15.00
Footing Thickness	=	14.00 in
Key Width	=	12.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.== 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	0	2,094 psf
Mu' : Upward	=	44,618	0 ft-#
Mu' : Downward	=	20,580	0 ft-#
Mu: Design	=	24,038	0 ft-#
Actual 1-Way Shear	=	55.42	1.28 psi
Allow 1-Way Shear	=	75.00	40.00 psi

Toe Reinforcing	=	# 6 @ 18.00 in
Heel Reinforcing	=	None Spec'd
Key Reinforcing	=	None Spec'd

Other Acceptable Sizes & Spacings

Toe: #4@ 4.57 in, #5@ 7.09 in, #6@ 10.06 in, #7@ 13.72 in, #8@ 18.07 in, #9@ 22.

Heel: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm

Key: Slab Resists Sliding - No Force on Key

Min footing T&S reinf Area	4.54	in2
Min footing T&S reinf Area per foot	0.30	in2 /ft
If one layer of horizontal bars:	If two layers of horizontal bars:	
#4@ 7.94 in	#4@ 15.87 in	
#5@ 12.30 in	#5@ 24.60 in	
#6@ 17.46 in	#6@ 34.92 in	

Summary of Overturning & Resisting Forces & Moments

.....OVERTURNING.....				RESISTING.....			
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	6,008.9	2.89	17,359.0	Soil Over Heel	=	275.0 14.83 4,079.2
Surcharge over Heel	=				Sloped Soil Over Hee	=	
Surcharge Over Toe	=				Surcharge Over Heel	=	
Adjacent Footing Load	=				Adjacent Footing Load	=	
Added Lateral Load	=				Axial Dead Load on Stem	=	1,990.0 14.50 28,855.0
Load @ Stem Above Soil	=				* Axial Live Load on Stem	=	2,000.0 14.50 29,000.0
	=				Soil Over Toe	=	
	=				Surcharge Over Toe	=	
	=				Stem Weight(s)	=	2,585.8 14.38 37,190.4
	=				Earth @ Stem Transitions	=	79.6 14.83 1,180.2
	=				Footing Weight	=	2,625.0 7.50 19,687.5
	=				Key Weight	=	0.50
	=				Vert. Component	=	
Total	6,008.9	O.T.M.	17,359.0		Total =	7,555.3 lbs	R.M.= 90,992.3
Resisting/Overturning Ratio			= 5.24				
Vertical Loads used for Soil Pressure	=	9,555.3	lbs				

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

RetainPro (c) 1987-2018, Build 11.18.07.31

Cantilevered Retaining Wall

Code: IBC 2012,ACI 318-11,ACI 530-11

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci

Horizontal Defl @ Top of Wall (approximate only) 0.036 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

RetainPro (c) 1987-2018 Build 11.18.07.31

Cantilevered Retaining Wall

Code: IBC 2012,ACI 318-11,ACI 530-11

Rebar Lap & Embedment Lengths Information

Stem Design Segment: 3rd

Stem Design Height: 5.33 ft above top of footing

Calculated Rebar Stress, f_s = 5833.50

Lap Splice length for #5 bar specified in this stem design segment = 25.00 in

Lap Splice length for #5 bar extending up into this stem design segment from below = 25.00 in

Development length for #5 bar specified in this stem design segment = 12.00 in

Development length for #5 bar extending up into this stem design segment from below = 12.00 in

Stem Design Segment: 2nd

Stem Design Height: 3.33 ft above top of footing

Calculated Rebar Stress, f_s = 12147.33

Lap Splice length for #5 bar extending down into this stem design segment from above = 25.00 in

Lap Splice length for #5 bar specified in this stem design segment = 25.00 in

Lap Splice length for #7 bar extending up into this stem design segment from below = 35.00 in

Development length for #5 bar extending down into this stem design segment from above = 14.82 in

Development length for #5 bar specified in this stem design segment = 15.18 in

Development length for #7 bar extending up into this stem design segment from below = 21.91 in

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar extending down into this stem design segment from above = 23.40 in

Lap Splice length for #7 bar specified in this stem design segment = 40.95 in

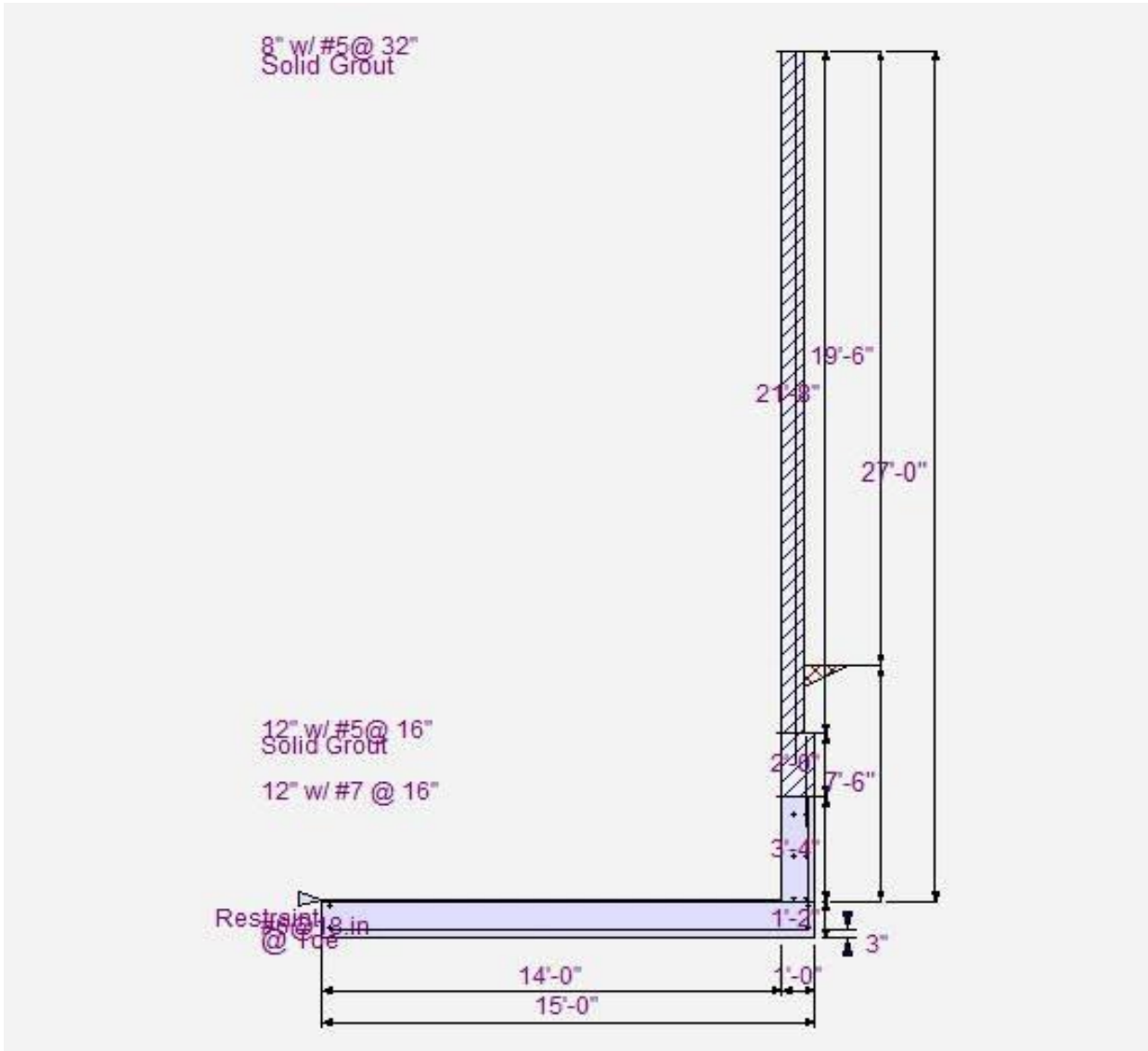
Development length for #5 bar extending down into this stem design segment from above = 18.00 in

Development length for #7 bar specified in this stem design segment = 31.50 in

Hooked embedment length into footing for #7 bar specified in this stem design segment = 14.14 in

As Provided = 0.4500 in²/ft

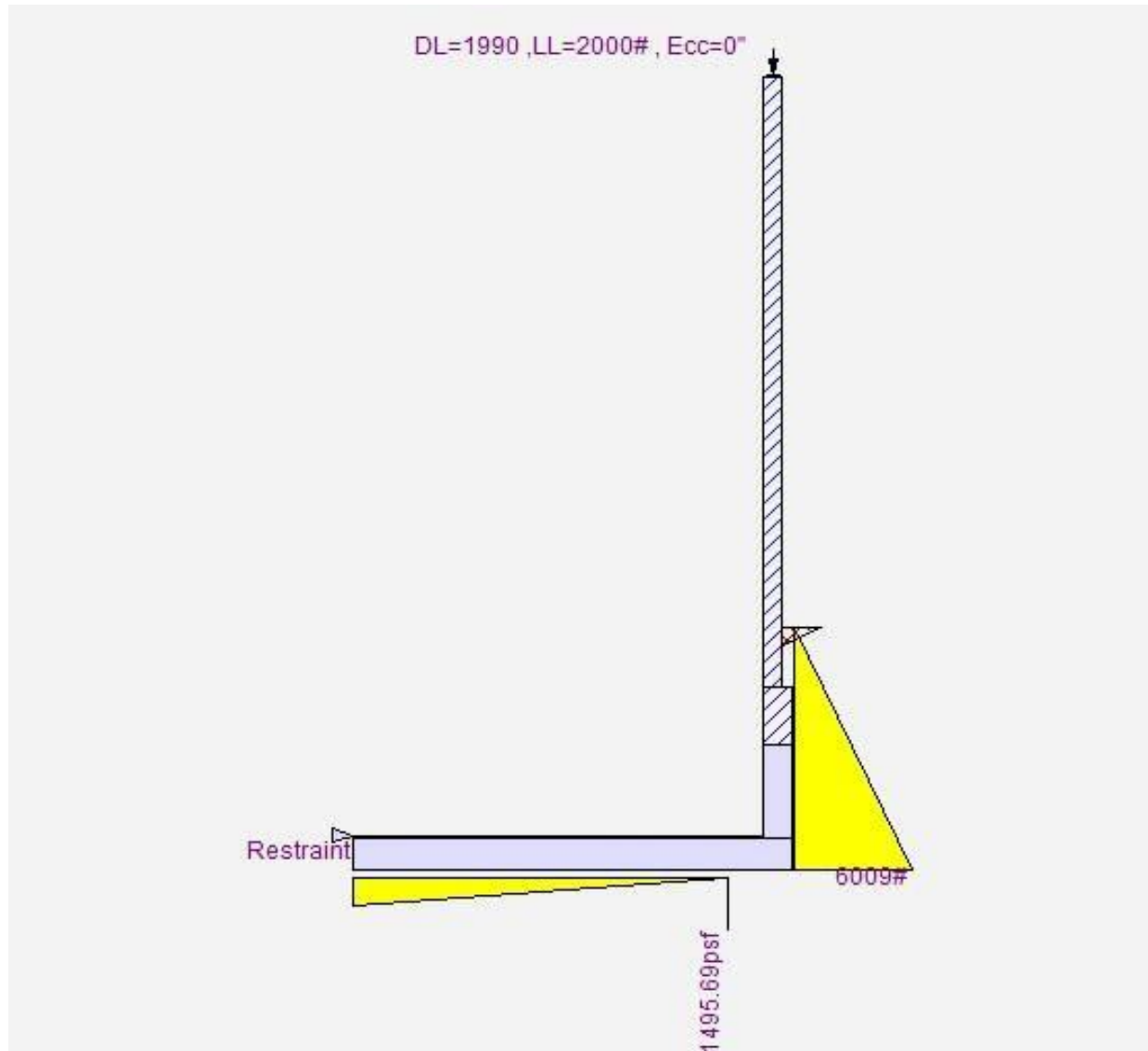
As Required = 0.4327 in²/ft

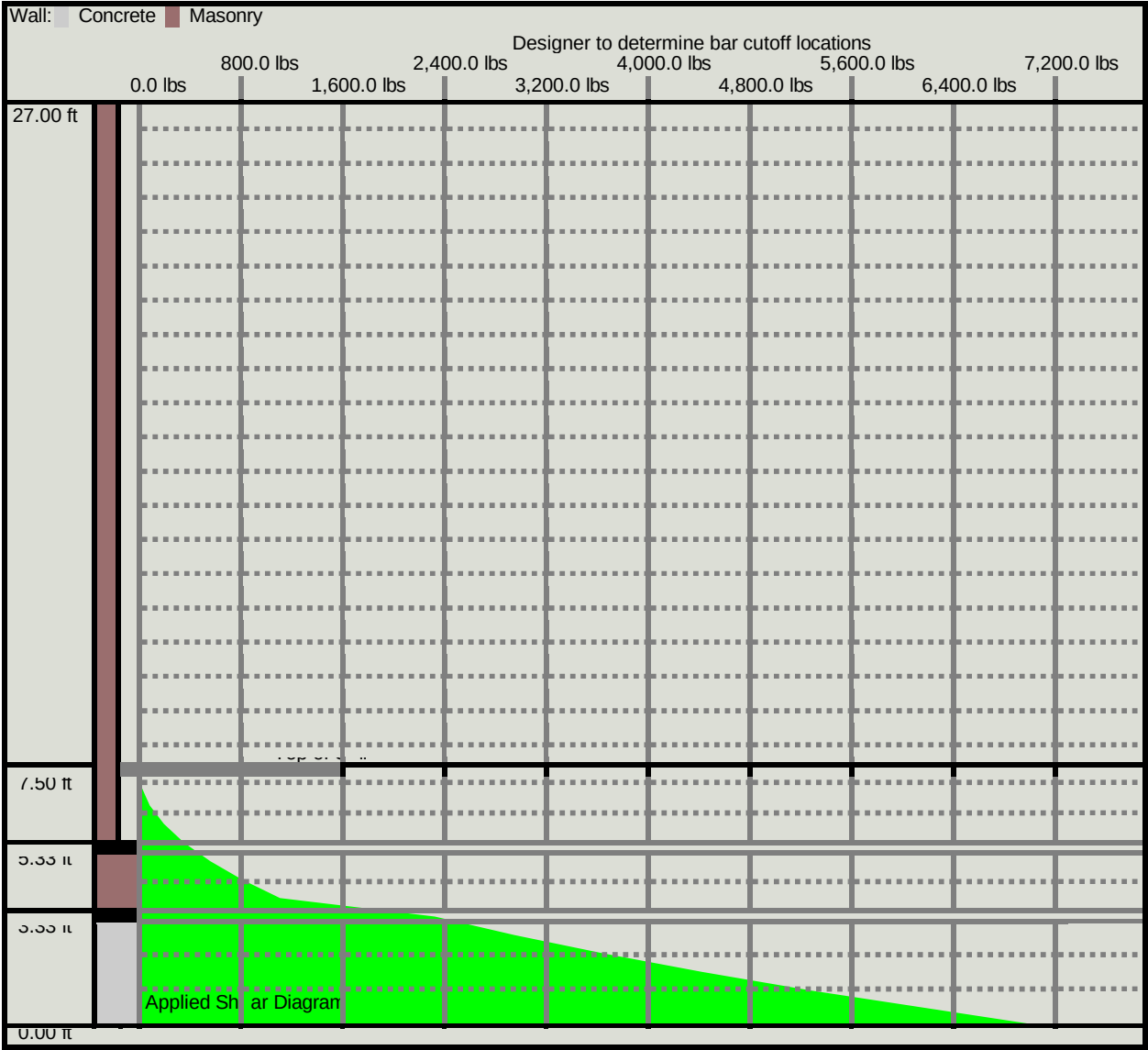


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Cantilevered Retaining Wall

Code: IBC 2012,ACI 318-11,ACI 530-11

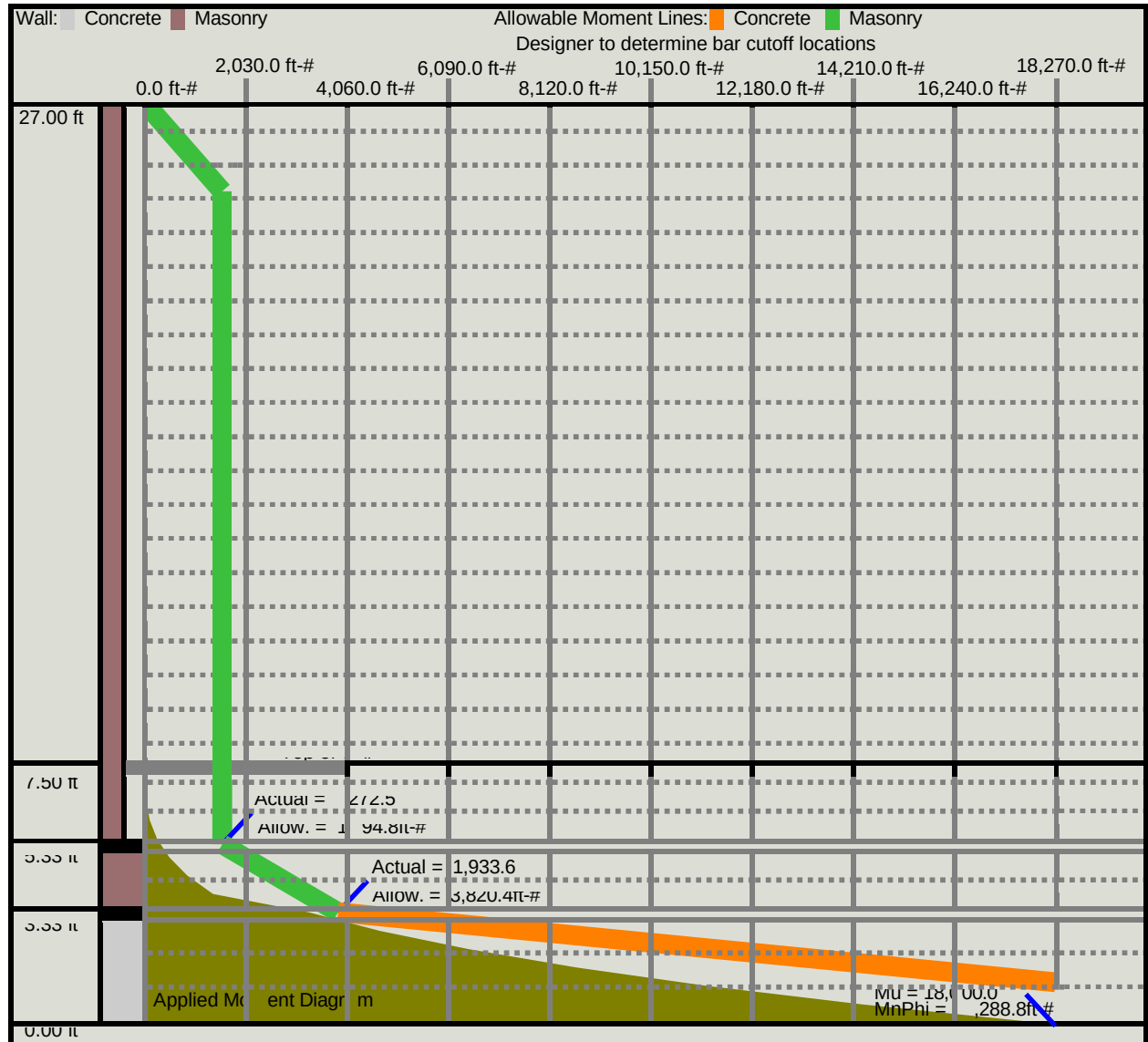




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Cantilevered Retaining Wall

Code: IBC 2012,ACI 318-11,ACI 530-11



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Restrained Retaining Wall

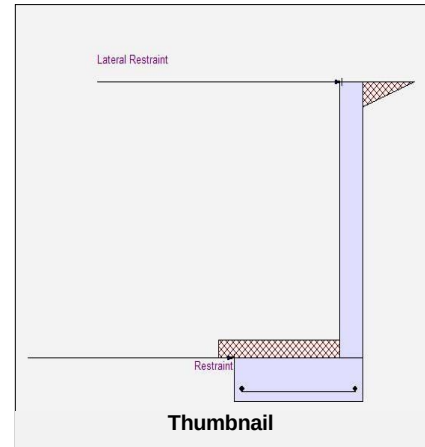
Code: IBC 2012,ACI 318-11,ACI 530-11

Criteria

Retained Height	=	7.50 ft
Wall height above soil	=	0.00 ft
Total Wall Height	=	7.50 ft
Top Support Height	=	7.50 ft
Slope Behind Wal	=	0.00
Height of Soil over Toe	=	6.00 in

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
At-rest Heel Pressure	=	160.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density	=	110.00 pcf
Footing Soil Frictio	=	0.450
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
>>>Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Earth Pressure Seismic Load

Stem Weight Seismic Load

Uniform Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft

Load Type	=	Seismic (E) (Service Level)
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Wind on Exposed Stem	=	0.0 psf
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K_h Soil Density Multiplier	=	0.200 g	Added seismic per unit area	=	0.0 psf
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F_p / W_p Weight Multiplier	=	0.000 g	Added seismic per unit area	=	0.0 psf
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Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in

Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Line Load

Base Above/Below Soil	=	0.0 ft
at Back of Wall	=	0.0 ft

Poisson's Ratio	=	0.300
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Design Summary

Total Bearing Load	=	1,672 lbs
...resultant ecc.	=	0.00 in
Soil Pressure @ Toe	=	401 psf OK
Soil Pressure @ Heel	=	401 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	481 psf
ACI Factored @ Heel	=	481 psf
Footing Shear @ Toe	=	4.3 psi OK
Footing Shear @ Heel	=	0.0 psi OK
Allowable	=	100.6 psi
Reaction at Top	=	898.9 lbs
Reaction at Bottom	=	5,108.9 lbs

Sliding Calcs

Lateral Sliding Force	=	5,108.9 lbs
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Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	IBC 2012,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Concrete Stem Construction

Thickness	=	8.00 in	F_y	=	60,000 psi
Wall Weight	=	100.0 psf	f_c	=	4,500 psi
Stem is FIXED to top of footing					

	@ Top Support	Mmax Between Top & Base	@ Base of Wall
	Stem OK	Stem OK	Stem OK
Design Height Above Ftg	= 7.50 ft	4.19 ft	0.00 ft
Rebar Size	= # 5	# 5	# 5
Rebar Spacing	= 8.00 in	8.00 in	8.00 in
Rebar Placed at	= Edge	Edge	Edge
Rebar Depth 'd'	= 5.50 in	6.00 in	5.50 in
Design Data			
$f_b / F_b + f_a / F_a$	= 0.000	0.270	0.662
Mu ... Actual	= 0.0 ft-#	3,219.9 ft-#	7,200.1 ft-#
Mn * Phi.....Allowable	= 10,870.9 ft-#	11,917.1 ft-#	10,870.9 ft-#
Shear Force @ this height	= 1,440.0 lbs		5,760.0 lbs
ShearActual	= 21.82 psi		87.27 psi
ShearAllowable	= 100.62 psi		100.62 psi

Other Acceptable Sizes & Spacings:

Toe: # 5 @ 18.00 in	-or-	Not req'd: $\mu < \phi * 5 * \lambda * \sqrt{f_c} * S_m$
Heel: None Spec'd	-or-	Not req'd: $\mu < \phi * 5 * \lambda * \sqrt{f_c} * S_m$
Key: Slab Resists Sliding	-or-	Slab Resists Sliding - No Force on

RetainPro (c) 1987-2018, Build 11.18.07.31

Restrained Retaining Wall

Code: IBC 2012,ACI 318-11,ACI 530-11

Concrete Stem Rebar Area Details

Top Support	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0 in2/ft	
(4/3) * As :	0 in2/ft	
$3\sqrt{f_c}bd/f_y : 3\sqrt{4500}(12)(5.5)/60000$:	0.2214 in2/ft	Min Stem T&S Reinf Area 1.440 in2
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft
	=====	Horizontal Reinforcing Options :
Required Area :	0.1728 in2/ft	One layer of : Two layers of :
Provided Area :	0.465 in2/ft	#4@ 12.50 in #4@ 25.00 in
Maximum Area :	1.3017 in2/ft	#5@ 19.38 in #5@ 38.75 in
		#6@ 27.50 in #6@ 55.00 in

Mmax Between Ends	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.1257 in2/ft	
(4/3) * As :	0.1677 in2/ft	
$3\sqrt{f_c}bd/f_y : 3\sqrt{4500}(12)(6)/60000$:	0.2415 in2/ft	Min Stem T&S Reinf Area 0.636 in2
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft
	=====	Horizontal Reinforcing Options :
Required Area :	0.1728 in2/ft	One layer of : Two layers of :
Provided Area :	0.465 in2/ft	#4@ 12.50 in #4@ 25.00 in
Maximum Area :	1.42 in2/ft	#5@ 19.38 in #5@ 38.75 in
		#6@ 27.50 in #6@ 55.00 in

Base Support	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.3083 in2/ft	
(4/3) * As :	0.411 in2/ft	
$3\sqrt{f_c}bd/f_y : 3\sqrt{4500}(12)(5.5)/60000$:	0.2214 in2/ft	Min Stem T&S Reinf Area 0.804 in2
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft
	=====	Horizontal Reinforcing Options :
Required Area :	0.3083 in2/ft	One layer of : Two layers of :
Provided Area :	0.465 in2/ft	#4@ 12.50 in #4@ 25.00 in
Maximum Area :	1.3017 in2/ft	#5@ 19.38 in #5@ 38.75 in
		#6@ 27.50 in #6@ 55.00 in

Footing Strengths & Dimensions

Toe Width	=	3.50 ft
Heel Width	=	0.67
Total Footing Width	=	4.17
Footing Thickness	=	14.00 in
Key Width	=	12.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'_c =	4,500 psi	F_y = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	=	2.00 in @ Btm.= 3.00 in

Footing Design Results

	Toe	Heel
Factored Pressure	= 481	481 psf
μ_u' : Upward	= 0	0 ft-#
μ_u' : Downward	= 0	0 ft-#
μ_u : Design	= 768	0 ft-#
Actual 1-Way Shear	= 4.28	0.00 psi
Allow 1-Way Shear	= 100.62	0.00 psi
Min footing T&S reinf Area	1.26	in2
Min footing T&S reinf Area per foot	0.30	in2 /ft
If one layer of horizontal bars:	If two layers of horizontal bars:	
#4@ 7.94 in	#4@ 15.87 in	
#5@ 12.30 in	#5@ 24.60 in	
#6@ 17.46 in	#6@ 34.92 in	

RetainPro (c) 1987-2018, Build 11.18.07.31

Restrained Retaining Wall

Code: IBC 2012,ACI 318-11,ACI 530-11

Summary of Forces on Footing : Slab RESISTS sliding, stem is FIXED at footing

Forces acting on footing for soil pressure

>>> Sliding Forces are restrained by the adjacent slab

Load & Moment Summary For Footing : For Soil Pressure Calcs

Moment @ Top of Footing Applied from Stem	=		-4,500.1 ft-#
Surcharge Over Heel	=	lbs ft	ft-#
Adjacent Footing Load	=	lbs ft	ft-#
Axial Dead Load on Stem	=	lbs 0.01 ft	ft-#
Soil Over Toe	=	192.5 lbs 1.75 ft	336.9 ft-#
Surcharge Over Toe	=	lbs ft	ft-#
Stem Weight	=	750.0 lbs 3.83 ft	2,875.0 ft-#
Soil Over Heel	=	lbs 4.17 ft	ft-#
Footing Weight	=	729.2 lbs 2.08 ft	1,519.6 ft-#
Total Vertical Force	=	1,671.7 lbs	Base Moment = 231.4 ft-#

Soil Pressure Resulting Moment = 0.0ft-#

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

RetainPro (c) 1987-2018, Build 11.18.07.31

Restrained Retaining Wall

Code: IBC 2012,ACI 318-11,ACI 530-11

Rebar Lap & Embedment Lengths Information

Stem Design Segment Near Top Support

Stem Design Height: 7.50 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment =	17.44 in
Lap Splice length for #5 bar extending up into this stem design segment from below =	17.44 in
Development length for #5 bar specified in this stem design segment =	13.42 in
Development length for #5 bar extending up into this stem design segment from below =	13.42 in

Stem Design Segment at Mmax Between Ends

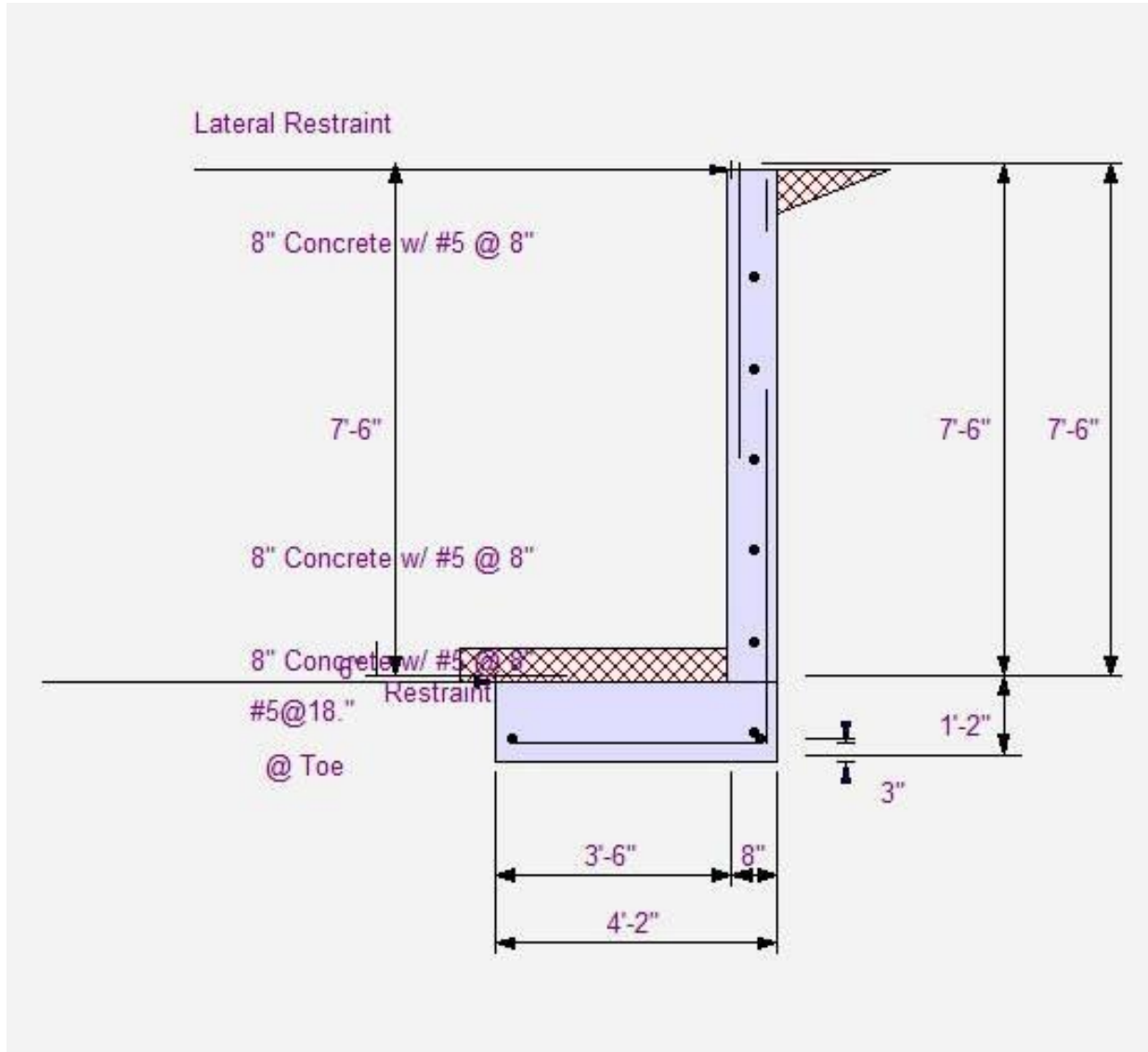
Stem Design Height: 4.19 ft above top of footing

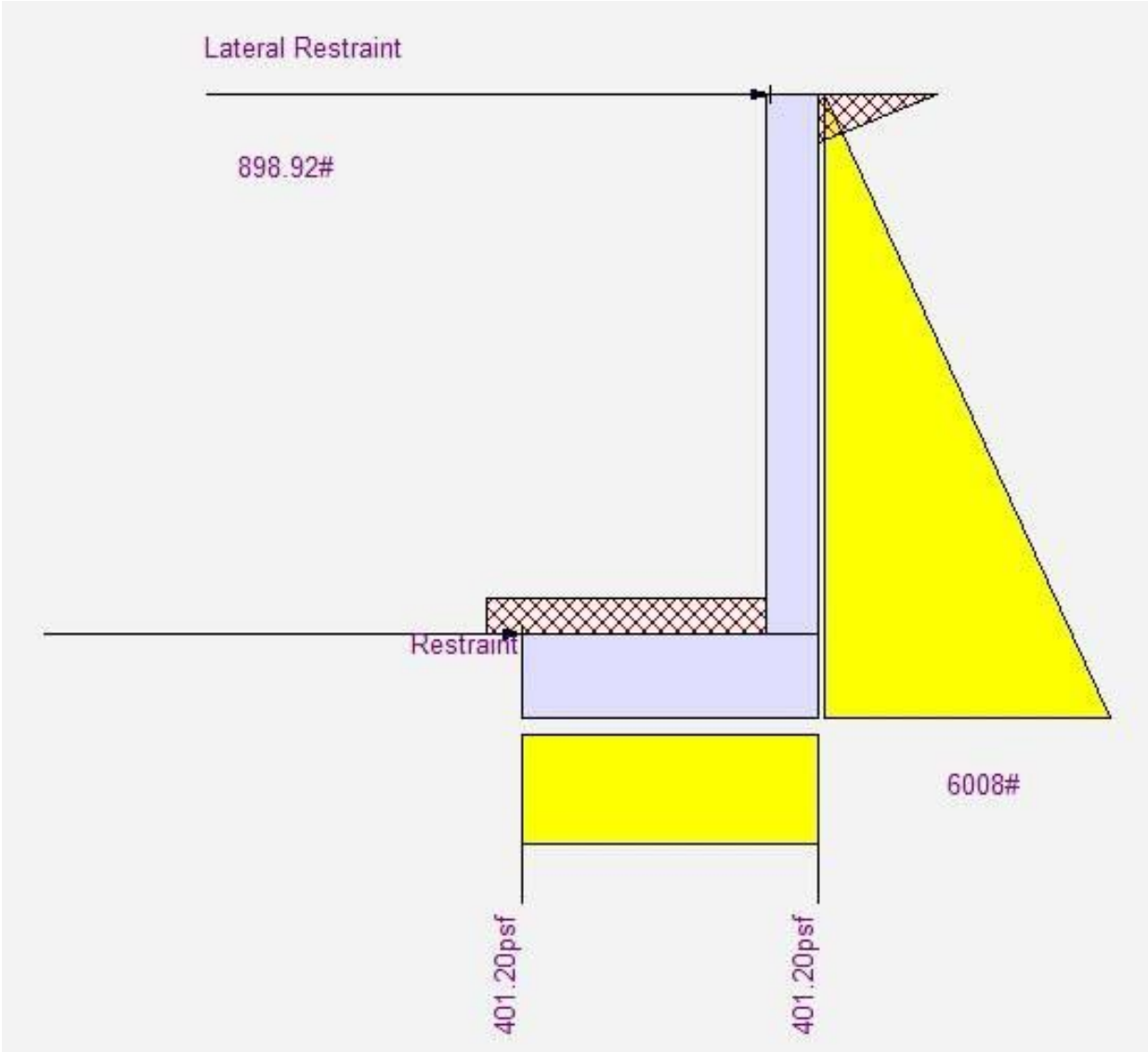
Lap Splice length for #5 bar extending down into this stem design segment from above =	17.44 in
Lap Splice length for #5 bar specified in this stem design segment =	17.44 in
Lap Splice length for #5 bar extending up into this stem design segment from below =	17.44 in
Development length for #5 bar extending down into this stem design segment from above =	13.42 in
Development length for #5 bar specified in this stem design segment =	13.42 in
Development length for #5 bar extending up into this stem design segment from below =	13.42 in

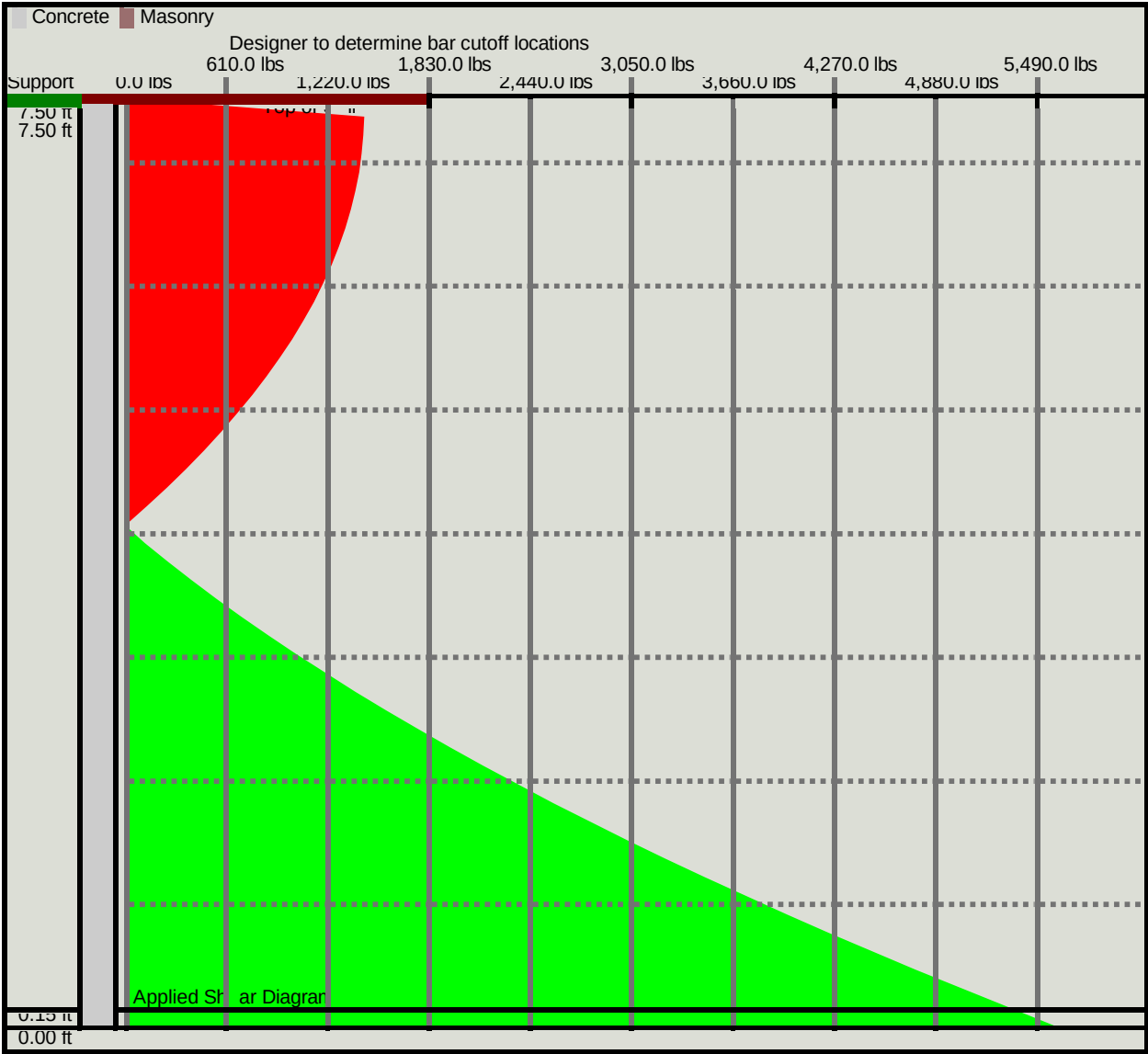
Stem Design Segment at Base Support

Stem Design Height: 0.00 ft above top of footing

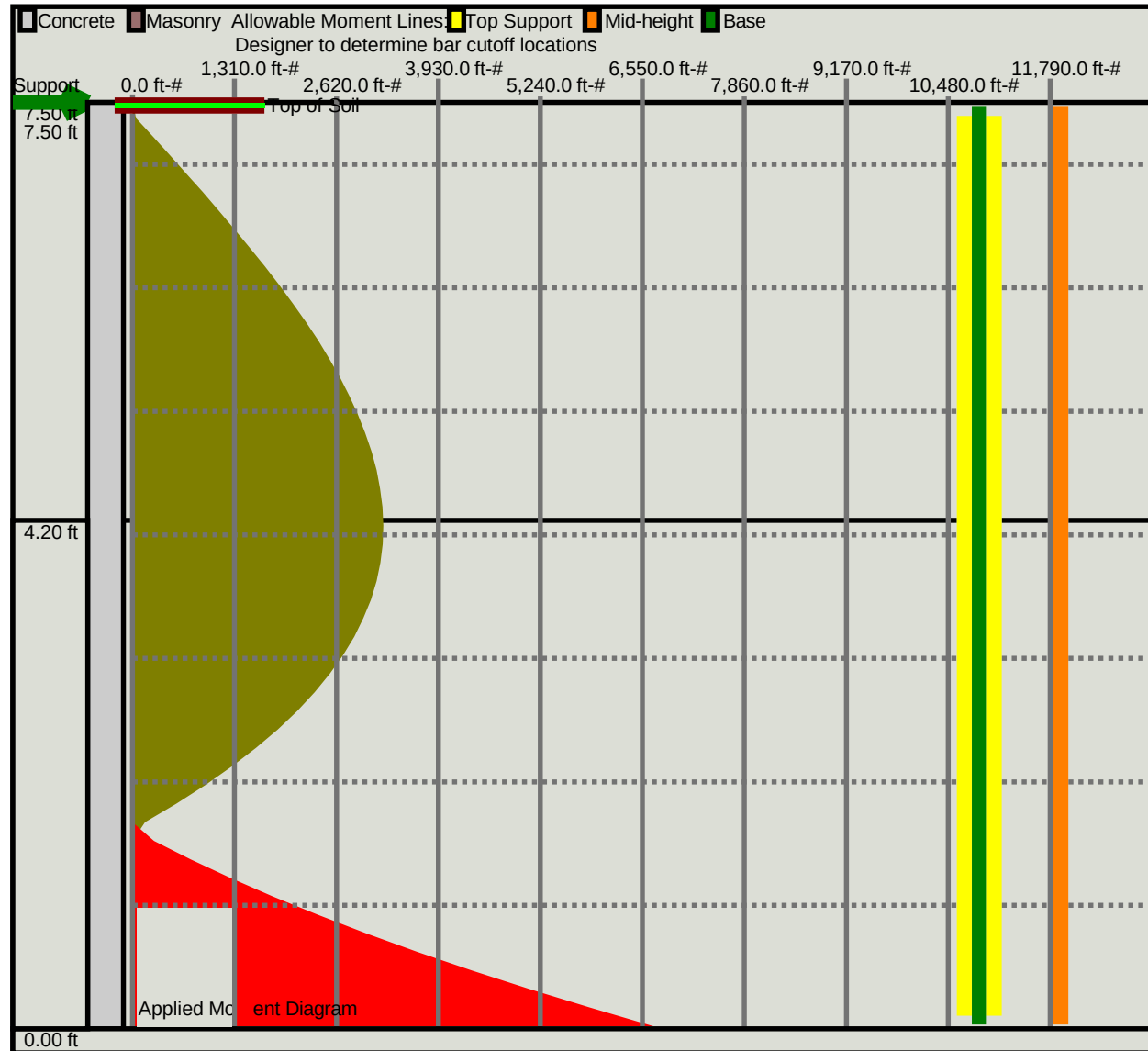
Lap Splice length for #5 bar extending down into this stem design segment from above =	17.44 in
Lap Splice length for #5 bar specified in this stem design segment =	17.44 in
Development length for #5 bar extending down into this stem design segment from above =	13.42 in
Development length for #5 bar specified in this stem design segment =	13.42 in
Hooked embedment length into footing for #5 bar specified in this stem design segment =	6.00 in
As Provided =	0.4650 in ² /ft
As Required =	0.3083 in ² /ft







Code: IBC 2012,ACI 318-11,ACI 530-11



RetainPro (c) 1987-2018, Build 11.18.07.31

Cantilevered Retaining Wall

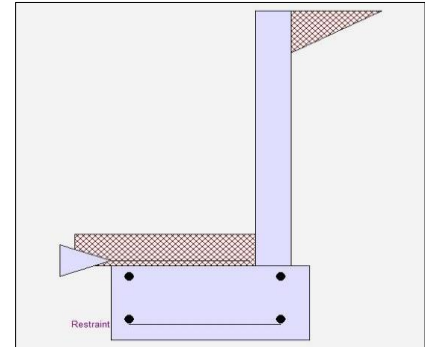
Code: CBC 2019,ACI 318-14,TMS 402-16

Criteria

Retained Height	=	4.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	6.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	45.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing Soil Friction	=	0.450
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W)
		(Service Level)
Wind on Exposed Stem	=	0.0 psf
	=	
(Service Level)		

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Line Load
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Design Summary

Wall Stability Ratios

Overturning	=	1.57 OK
Slab Resists All Sliding !		

Total Bearing Load	=	891 lbs
...resultant ecc.	=	8.54 in
Soil Pressure @ Toe	=	896 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,254 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	4.7 psi OK
Footing Shear @ Heel	=	1.3 psi OK
Allowable	=	75.0 psi

Sliding Calcs

Lateral Sliding Force	=	600.6 lbs
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Stem Construction

Design Height Above Ftg	ft =	0.00
Wall Material Above "Ht"	=	Concrete
Design Method	=	LRFD
Thickness	=	6.00
Rebar Size	=	# 4
Rebar Spacing	=	16.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.274
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Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	576.0

Moment.... Actual

Service Level	ft-# =	
Strength Level	ft-# =	768.0
Moment. ... Allowable	=	2,802.4

Shear. ... Actual

Service Level	psi =	
Strength Level	psi =	11.3
Shear Allowable	psi =	100.6
Anet (Masonry)	in2 =	
Rebar Depth 'd'	in =	4.25

Masonry Data

fm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Wall Weight	psf =	75.0
Short Term Factor	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	Medium Weight
Masonry Design Method	=	ASD

Concrete Data

fc	psi =	4,500.0
Fy	psi =	60,000.0

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	CBC 2019,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

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Cantilevered Retaining Wall

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Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.0433 in2/ft	
(4/3) * As :	0.0577 in2/ft	Min Stem T&S Reinf Area 0.576 in2
$3\sqrt{f'c}bd/f_y : 3\sqrt{4500}(12)(4.25)/60000$:	0.1711 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.144 in2/ft
0.0018bh : 0.0018(12)(6) :	0.1296 in2/ft	Horizontal Reinforcing Options :
	=====	One layer of : Two layers of :
Required Area :	0.1296 in2/ft	#4@ 16.67 in #4@ 33.33 in
Provided Area :	0.15 in2/ft	#5@ 25.83 in #5@ 51.67 in
Maximum Area :	1.0059 in2/ft	#6@ 36.67 in #6@ 73.33 in

Footing Dimensions & Strengths

Toe Width	=	2.00 ft
Heel Width	=	0.75
Total Footing Width	=	2.75
Footing Thickness	=	14.00 in
Key Width	=	12.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm. = 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>
Factored Pressure	= 1,254	0 psf
Mu' : Upward	= 1,668	0 ft-#
Mu' : Downward	= 552	23 ft-#
Mu: Design	= 1,116	23 ft-#
Actual 1-Way Shear	= 4.70	1.28 psi
Allow 1-Way Shear	= 40.00	40.00 psi
Toe Reinforcing	= # 4 @ 12.00 in	
Heel Reinforcing	= None Spec'd	
Key Reinforcing	= None Spec'd	
Other Acceptable Sizes & Spacings		

Toe: Not req'd: $\mu < \phi * 5 * \lambda * \sqrt{f'c} * S_m$
 Heel: Not req'd: $\mu < \phi * 5 * \lambda * \sqrt{f'c} * S_m$
 Key: Slab Resists Sliding - No Force on Key

Min footing T&S reinf Area	0.83	in2
Min footing T&S reinf Area per foot	0.30	in2 /ft
If one layer of horizontal bars:		
#4@	7.94 in	
#5@	12.30 in	
#6@	17.46 in	
If two layers of horizontal bars:		
#4@	15.87 in	
#5@	24.60 in	
#6@	34.92 in	

Summary of Overturning & Resisting Forces & Moments

Item	OVERTURNING.....			RESISTING.....		
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	= 600.6	1.72	1,034.4	Soil Over Heel	= 110.0	2.63 288.8
Surcharge over Heel	=			Sloped Soil Over Hee	=	
Surcharge Over Toe	=			Surcharge Over Heel	=	
Adjacent Footing Load	=			Adjacent Footing Load	=	
Added Lateral Load	=			Axial Dead Load on Stem	=	
Load @ Stem Above Soil	=			* Axial Live Load on Stem	=	
	=			Soil Over Toe	=	1.00
				Surcharge Over Toe	=	
Total	600.6	O.T.M.	1,034.4	Stem Weight(s)	= 300.0	2.25 675.0
				Earth @ Stem Transitions	=	
				Footing Weight	= 481.3	1.38 661.7
				Key Weight	=	0.50
				Vert. Component	=	
Resisting/Overturning Ratio		=	1.57	Total =	891.3 lbs	R.M. = 1,625.5
Vertical Loads used for Soil Pressure =			891.3 lbs	* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.		

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

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Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci

Horizontal Defl @ Top of Wall (approximate only) 0.036 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,
because the wall would then tend to rotate into the retained soil.

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

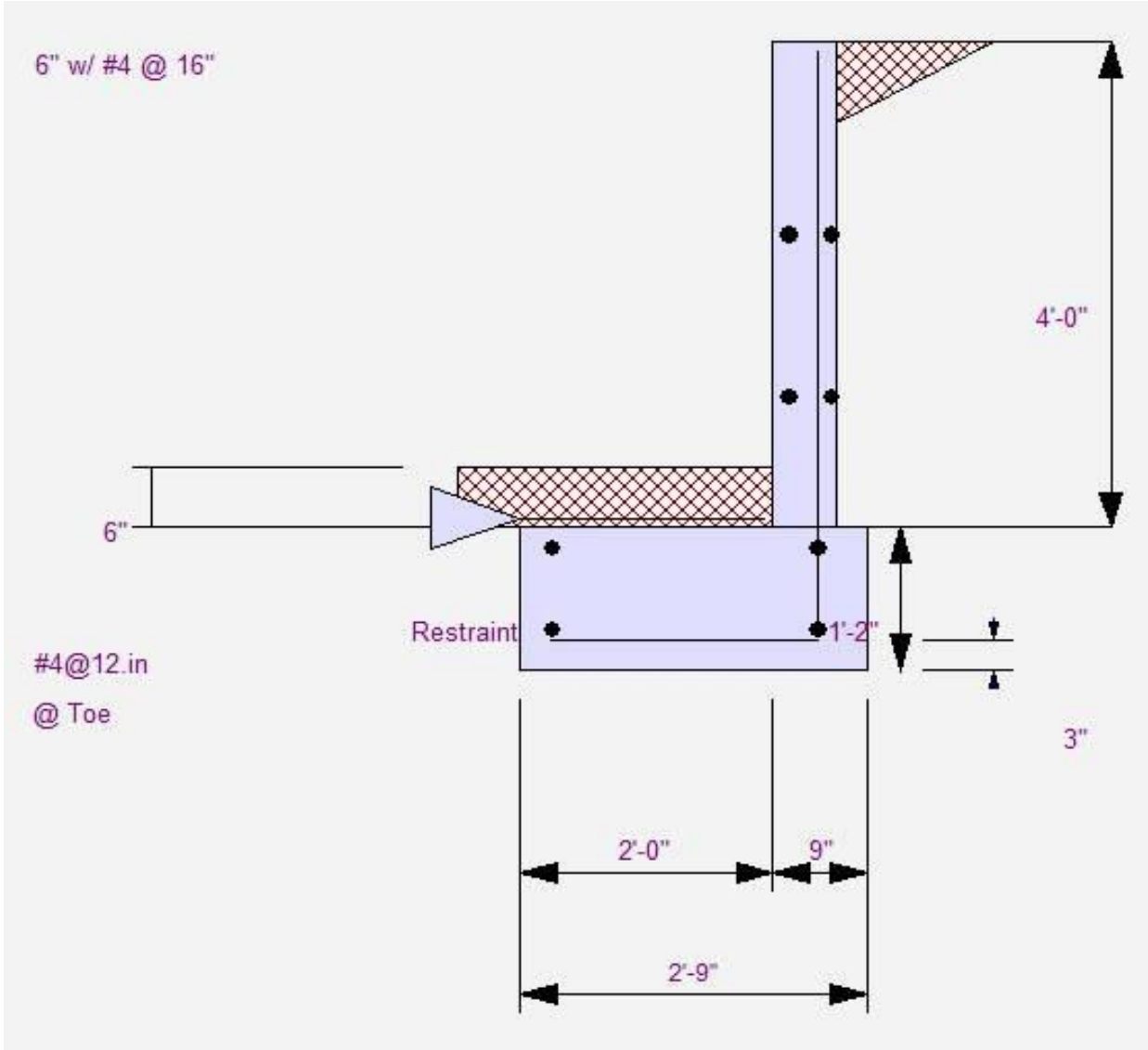
Lap Splice length for #4 bar specified in this stem design segment = 15.60 in

Development length for #4 bar specified in this stem design segment = 12.00 in

Hooked embedment length into footing for #4 bar specified in this stem design segment = 7.26 in

As Provided = 0.1500 in²/ft

As Required = 0.1296 in²/ft



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