civil & structural
engineering & planning

STRUCTURAL CALCULATIONS

Monahan Residence

Second Story Addition

2424 67th Ave SE
Mercer Island, WA 98040

8/26/22

250 4th Ave S Ste 200
Edmonds, WA 98020
Phone: (425) 778-8500
Fax: (425) 778-5536

CG Project No.: 22139.10

Project Description

This project is a second story addition to an existing 1-story home with a partial daylight basement. The addition will be framed with pre-manufactured roof trusses and the floor will be framed with TJI floor joists. A new waterproof deck will be framed with LVL joists. Upgrades are required to the main and upper floor framing to support the added load. The lateral system will consist of plywood shear walls. Upgrades to the existing shear walls are required. Upgrades to the existing foundation at the garage are required to install a new cast-in-place hold-down.

Scope of Work

We will provide stamped structural calculations in accordance with the current building code.

Basis of Design

Roof	Dead	15 psf
	Live	25 psf (snow)
Floor	Dead	15 psf
	Live	40 psf
Deck	Dead	15 psf
	Live	60 psf

Wind Parameters

Wind Speed, 3-Sec Gust	110	MPH
Exposure Category	B	
Importance Factor, I_w	1	(Non-Essential Facility)
Mean Height	29.21	(FT Above Grade Elevation)

Seismic Parameters

V = Wp*[Sds/(R/Ie)] = Sds/(6.5/1) = Cs*Wp

Sds	0.93	
Importance Factor, Ie	1	(Non-Essential Facility)

Wp = Seismic Dead Weight of Structure

ENGINEERING
250 4th Ave South
Suite 200
Edmonds, WA 98020

Description: Project Summary		By: JDM	Date: 8/25/2022
		Checked	Date
		Scale: NTS	Sheet No.: 1
Project: Monahan Residence		Job No.: 22139.10	

Gravity Design Loads

Roof DL

Roofing Material		2.5	psf
3/4 Sheathing		2.3	psf
Insulation		1.0	psf
5/8 Gypsum		2.8	psf
Trusses @ 24" OC		2.2	psf
M/E		1.0	psf
Misc		1.5	psf
		13.3	psf
	USE	15.0	psf

Floor DL

Flooring Material		2.0	psf
3/4 Sheathing		2.3	psf
Insulation		1.0	psf
5/8 Gypsum		2.8	psf
2x12 @ 16" OC		3.5	psf
M/E		1.0	psf
Misc		1.5	psf
		14.1	psf
	USE	15.0	psf

Exterior Walls

Siding		2.0	psf
1/2 Sheathing		1.5	psf
Insulation		1.0	psf
5/8 Gypsum		2.8	psf
2x6 @ 16" OC		1.7	psf
Misc		1.0	psf
		10.0	psf
	USE	10.0	psf

Roof LL (Snow)	25.0	psf
Floor LL	40.0	psf
Deck LL	60.0	psf

ENGINEERING
250 4th Ave. South
Suite 200
Edmonds, WA 98020

Description	Gravity Design Loads	By JDM	Date 06/15/22
		Checked	Date
		Scale	Sheet No. 2
Project	Monahan Residence	Job No. 22139.10	

Beam Span Table - Roof Beams

Allowable Uniform Distributed Load in Pounds Per Lineal Foot (PLF)																	
	Span Length in Feet																
Beam	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
4x6 HF #2	937	600	417	306	234	185	150	124	104	-	-	-	-	-	-	-	-
3 1/2 x 5 1/2 LSL	1541	986	685	503	369	259	189	142	109	-	-	-	-	-	-	-	-
4x8 HF #2	1461	1038	721	529	405	320	259	214	180	154	132	115	101	-	-	-	-
3 1/2 x 7 1/4 LSL	2616	1674	1163	854	654	517	419	321	247	195	156	127	104	-	-	-	-
6x8 DF #2	2162	1384	961	706	541	427	346	286	240	205	176	154	135	120	107	-	-
2 11/16 x 9 1/4 PSL	2405	1924	1603	1374	1193	942	763	631	530	452	378	307	253	211	178	151	130
4x10 HF #2	1863	1490	1084	796	610	482	390	322	271	231	199	173	152	135	120	108	-
4x12 HF #2	2266	1812	1469	1080	827	653	529	437	367	313	270	235	207	183	163	147	132
5 1/4 x 9 1/4 PSL	5399	4319	3600	3085	2677	2115	1713	1416	1183	931	745	606	499	416	351	298	256
2 11/16 x 9 1/2 PSL	2470	1976	1647	1411	1235	991	802	663	557	475	409	334	275	229	193	164	141
3 1/2 x 9 1/2 LSL	3634	2907	2423	1893	1449	1145	927	766	643	506	405	329	271	226	191	162	139
3 1/2 x 9 1/2 PSL	3700	2960	2467	2114	1850	1482	1201	992	834	674	540	439	362	302	254	216	185
6x10 DF #2	3404	2219	1541	1132	867	685	555	458	385	328	283	247	217	192	171	154	139
5 1/4 x 9 1/2 PSL	5545	4436	3697	3169	2773	2224	1802	1489	1251	1011	810	658	543	452	381	324	278
7 x 9 1/2 PSL	7390	5912	4927	4223	3695	2966	2402	1985	1668	1349	1080	878	723	603	508	432	370
2 11/16 x 11 1/4 PSL	2925	2340	1950	1671	1463	1300	1104	912	767	653	563	491	431	382	325	276	237
3 1/2 x 11 1/4 LSL	4301	3441	2867	2458	2001	1581	1281	1058	889	758	653	547	450	375	316	269	231
3 1/2 x 11 1/4 PSL	4382	3505	2921	2504	2191	1947	1653	1366	1148	978	843	729	600	501	422	359	307
6x12 DF #2	4123	3253	2259	1660	1271	1004	813	672	565	481	415	361	318	281	251	225	203
5 1/4 x 11 1/4 PSL	6567	5253	4378	3752	3283	2918	2480	2050	1722	1468	1265	1097	904	754	635	540	463
2 11/16 x 11 7/8 PSL	3085	2468	2057	1763	1543	1371	1222	1010	849	723	624	543	478	423	377	324	278
3 1/2 x 11 7/8 LSL	4543	3634	3028	2596	2220	1754	1420	1174	986	841	725	631	530	441	372	316	271
3 1/2 x 11 7/8 PSL	4623	3698	3082	2642	2312	2055	1831	1513	1271	1083	934	814	709	591	498	423	363
5 1/4 x 11 7/8 PSL	-	5548	4623	3963	3467	3082	2747	2270	1908	1626	1402	1221	1063	887	747	635	544
7 x 11 7/8 PSL	-	-	6160	5280	4620	4107	3663	3027	2543	2167	1869	1628	1411	1176	991	842	722

Notes:

1. **This table is applicable for Simple Span beams with uniformly distributed loads (no point loads)**
2. **Table values are based on the limiting beam shear & moment capacities, as well as deflection**
3. **The deflection limit used in the above table is (L/180 Total Load) and (L/240 Snow Load)**
4. **This table is applicable for W_{LL}/W_{DL} <= 3.0**
5. **Table values include the Size Factor (C_F) and the Load Duration Factor (C_D)**

CG ENGINEERING
250 4th Ave. South
Suite 200
Edmonds, WA 98020

Description: Beam Span Table		By: JDM	Date: 06/15/22
		Checked	Date
		Scale	Sheet No. 3
Project: Monahan Residence		Job No.: 22139.10	

Beam Span Table - Floor Beams

Allowable Uniform Distributed Load in Pounds Per Lineal Foot (PLF)																	
	Span Length in Feet																
Beam	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
4x6 HF #2	815	522	362	266	204	160	117	-	-	-	-	-	-	-	-	-	-
3 1/2 x 5 1/2 LSL	1340	858	546	344	230	162	118	-	-	-	-	-	-	-	-	-	-
4x8 HF #2	1270	902	627	460	353	279	226	186	155	122	-	-	-	-	-	-	-
3 1/2 x 7 1/4 LSL	2275	1456	1011	743	522	367	267	201	155	122	-	-	-	-	-	-	-
6x8 DF #2	1880	1203	836	614	470	371	301	249	209	178	153	134	114	-	-	-	-
2 11/16 x 9 1/4 PSL	2405	1924	1603	1374	1193	889	648	487	375	295	236	192	158	132	111	-	-
4x10 HF #2	1620	1296	942	692	530	419	339	280	236	201	173	151	133	113	-	-	-
3 1/2 x 9 1/4 PSL	3130	2504	2087	1789	1553	1169	852	640	493	388	310	252	208	173	146	124	106
5 1/4 x 9 1/4 PSL	4695	3756	3130	2683	2328	1753	1278	960	739	582	466	379	312	260	219	186	160
2 11/16 x 9 1/2 PSL	2470	1976	1647	1411	1235	965	704	529	407	320	256	209	172	143	121	103	-
3 1/2 x 9 1/2 LSL	3160	2528	2107	1646	1260	953	694	522	402	316	253	206	170	141	119	101	-
3 1/2 x 9 1/2 PSL	3215	2572	2143	1837	1608	1270	926	696	536	421	337	274	226	188	159	135	116
6x10 DF #2	2960	1930	1340	984	754	596	482	399	335	285	246	214	188	167	149	134	118
5 1/4 x 9 1/2 PSL	4825	3860	3217	2757	2413	1905	1389	1043	804	632	506	412	339	283	238	202	174
7 x 9 1/2 PSL	6430	5144	4287	3674	3215	2540	1852	1391	1072	843	675	549	452	377	318	270	231
2 11/16 x 11 1/4 PSL	2925	2340	1950	1671	1463	1300	1104	890	686	539	432	351	289	241	203	173	148
3 1/2 x 11 1/4 LSL	3740	2992	2493	2137	1740	1375	1114	866	667	525	420	342	281	235	198	168	144
3 1/2 x 11 1/4 PSL	3810	3048	2540	2177	1905	1693	1438	1155	889	700	560	455	375	313	264	224	192
6x12 DF #2	3585	2829	1964	1443	1105	873	707	584	491	418	361	314	276	245	218	196	177
5 1/4 x 11 1/4 PSL	5710	4568	3807	3263	2855	2538	2157	1739	1340	1054	844	686	565	471	397	337	289
2 11/16 x 11 7/8 PSL	3085	2468	2057	1763	1543	1371	1222	1010	804	632	506	412	339	283	238	202	174
3 1/2 x 11 7/8 LSL	3950	3160	2633	2257	1930	1525	1235	1018	784	617	494	402	331	276	232	198	169
3 1/2 x 11 7/8 PSL	4020	3216	2680	2297	2010	1787	1592	1316	1050	826	661	538	443	369	311	265	227
5 1/4 x 11 7/8 PSL	-	4824	4020	3446	3015	2680	2389	1974	1575	1239	992	807	665	554	467	397	340
7 x 11 7/8 PSL	-	-	5357	4591	4018	3571	3185	2632	2090	1644	1316	1070	882	735	619	526	451

Notes:

1. **This table is applicable for Simple Span beams with uniformly distributed loads (no point loads)**
2. **Table values are based on the limiting beam shear & moment capacities, as well as deflection**
3. **The deflection limit used in the above table is (L/240 Total Load) and (L/360 Live Load)**
4. **This table is applicable for W_{LL}/W_{DL} <= 4.0**
5. **Table values include the Size Factor (C_F)**

ENGINEERING
250 4th Ave. South
Suite 200
Edmonds, WA 98020

Description: Beam Span Table		By: JDM	Date: 06/15/22
		Checked	Date
		Scale	Sheet No. 4
Project: Monahan Residence		Job No. 22139.10	

BEARING WALL TABLE

IBC 2018, NDS 2018

	ALLOWABLE LOAD (PLF)									
	8ft			9ft			10ft			
STUD	8" O.C.	12" O.C.	16" O.C.	8" O.C.	12" O.C.	16" O.C.	8" O.C.	12" O.C.	16" O.C.	
2x4 HF Stud Grade	3191	2127	1596	2640	1760	1320	2203	1469	1101	
2x4 HF #2	3704	2469	1852	2991	1994	1496	2458	1639	1229	
2x4 HF #1	***3987***	***2658***	***1993***	3465	2310	1733	2855	1903	1427	
2x4 DF Stud Grade	3620	2413	1810	3014	2010	1507	2525	1683	1263	
2x4 DF #2	4474	2983	2237	3635	2424	1818	2999	1999	1499	
2x4 DF #1	4808	3205	2404	3901	2601	1950	3215	2143	1607	
3x4 HF Stud Grade	5318	3546	2659	4401	2934	2200	3672	2448	1836	
3x4 HF #2	***6113***	***4075***	***3056***	4986	3324	2493	4097	2732	2049	
3x4 HF #1	***6113***	***4075***	***3056***	5775	3850	2888	4758	3172	2379	
3x4 DF Stud Grade	6033	4022	3016	5024	3349	2512	4209	2806	2104	
3x4 DF #2	7457	4971	3728	6059	4039	3030	4998	3332	2499	
3x4 DF #1	8013	5342	4007	6501	4334	3251	5358	3572	2679	
2x6 HF Stud Grade	***6265***	***4177***	***3132***	***6265***	***4177***	***3132***	***6265***	***4177***	***3132***	
2x6 HF #2	***6265***	***4177***	***3132***	***6265***	***4177***	***3132***	***6265***	***4177***	***3132***	
2x6 HF #1	***6265***	***4177***	***3132***	***6265***	***4177***	***3132***	***6265***	***4177***	***3132***	
2x6 DF Stud Grade	8701	5800	4350	8084	5390	4042	7396	4930	3698	
2x6 DF #2	***9668***	***6445***	***4834***	***9668***	***6445***	***4834***	***9668***	***6445***	***4834***	
2x6 DF #1	***9668***	***6445***	***4834***	***9668***	***6445***	***4834***	***9668***	***6445***	***4834***	

Notes:

1. This table assumes that the studs are braced by either sheathing or gypsum wall board.
2. Values shown are in plf and represent 100% bearing capacity based on the February 2018 report by American Wood Council for "Fire-Resistance-Rated Wood-Frame Wall and Floor/Ceiling Assemblies"
3. ***Bold*** and ***italicized*** values are controlled by bottom plate bearing capacity.
4. All DF studs assume a DF bottom plate.
5. All appropriate C_F and C_b factors have been included.
6. Engineer should apply the Ci factor to the allowable loads shown when pressure treated studs are necessary.
7. Engineer should consider out of Plane loads where appropriate.

ENGINEERING
250 4th Ave. South
Suite 200
Edmonds, WA 98020

Description		By JDM	Date 06/15/22
	Bearing Wall Capacity Table	Checked	Date
		Scale	Sheet No.
Project	Monahan Residence	Job No. 22139.10	5

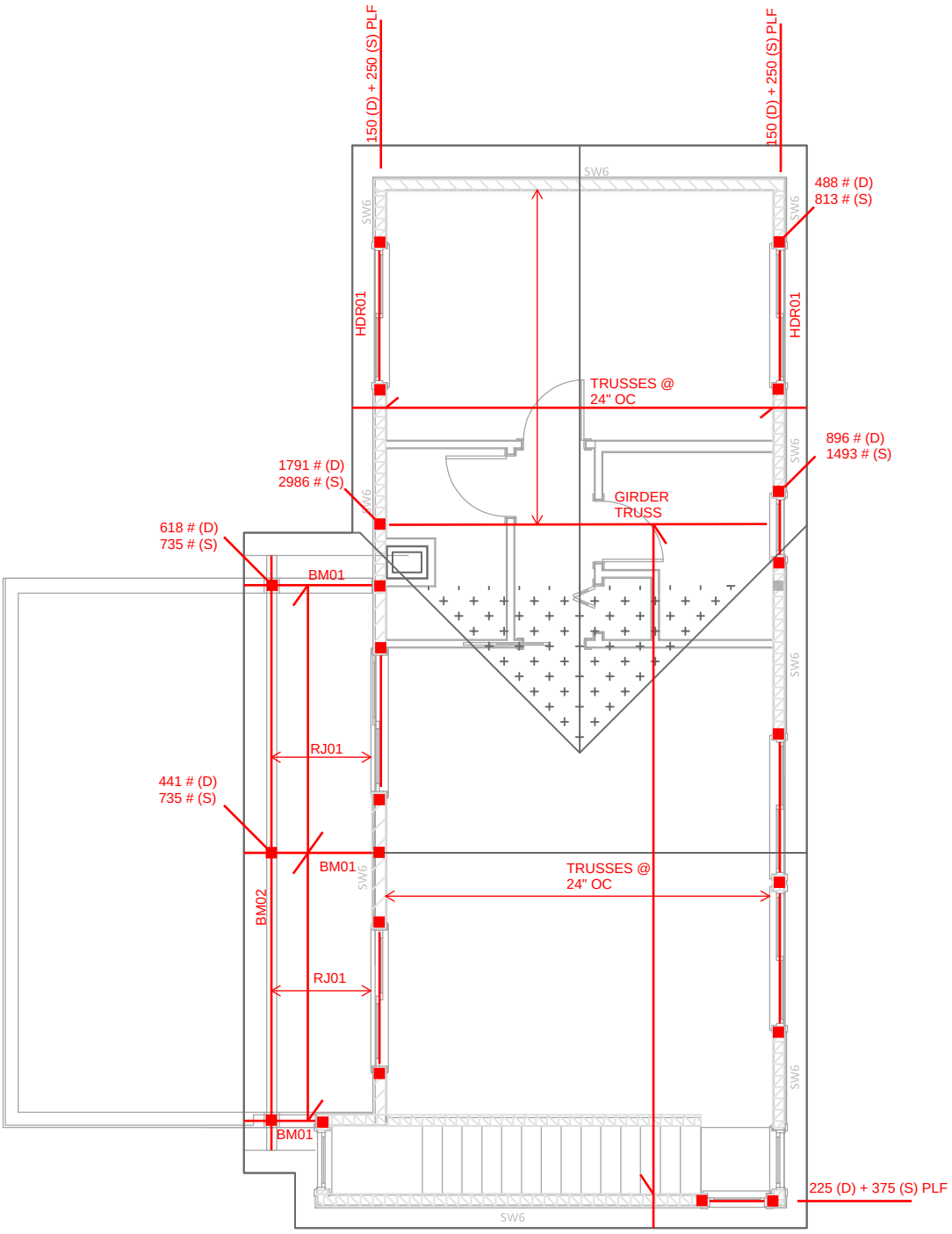
HF Column & HF Sill Plate Capacity TABLE

IBC 2018, NDS 2018

	6	7	8	9	10	11	12	13	14	15	16
(2) 2x4 HF Stud	5,149	**4,121**	**3,311**	**2,693**	**2,224**	**1,862**	**1,579**	**1,355**	**1,175**	**1,028**	**906**
P_{SILL}	**4,784**	-	-	-	-	-	-	-	-	-	-
(3) 2x4 HF Stud	9,220	7,723	**6,382**	**5,281**	**4,406**	**3,715**	**3,166**	**2,726**	**2,369**	**2,076**	**1,834**
P_{SILL}	**6,910**	**6,910**	-	-	-	-	-	-	-	-	-
(4) 2x4 HF Stud	12,294	10,298	8,510	**7,041**	**5,875**	**4,953**	**4,221**	**3,635**	**3,159**	**2,769**	**2,445**
P_{SILL}	**8,505**	**8,505**	**8,505**	-	-	-	-	-	-	-	-
(2) 3x4 HF Stud	10,245	8,581	**7,091**	**5,868**	**4,896**	**4,128**	**3,518**	**3,029**	**2,632**	**2,307**	**2,038**
P_{SILL}	**7,619**	**7,619**	-	-	-	-	-	-	-	-	-
(3) 3x4 HF Stud	15,367	12,872	10,637	**8,802**	**7,343**	**6,191**	**5,277**	**4,543**	**3,948**	**3,461**	**3,057**
P_{SILL}	**10,631**	**10,631**	**10,631**	-	-	-	-	-	-	-	-
(2) 2x6 HF Stud	7,951	**6,405**	**5,164**	**4,210**	**3,481**	**2,917**	**2,476**	**2,125**	**1,843**	**1,613**	**1,423**
P_{SILL}	**7,518**	-	-	-	-	-	-	-	-	-	-
(3) 2x6 HF Stud	16,730	15,297	13,636	11,927	**10,333**	**8,934**	**7,746**	**6,750**	**5,918**	**5,221**	**4,634**
P_{SILL}	**10,859**	**10,859**	**10,859**	**10,859**	-	-	-	-	-	-	-
(4) 2x6 HF Stud	23,902	22,755	21,314	19,614	17,764	15,903	14,146	**12,558**	**11,158**	**9,942**	**8,891**
P_{SILL}	**13,365**	**13,365**	**13,365**	**13,365**	**13,365**	**13,365**	**13,365**	-	-	-	-
4x6 HF #2	14,409	11,327	9,009	**7,286**	**5,993**	**5,006**	**4,239**	**3,633**	**3,147**	**2,751**	**2,425**
P_{SILL}	**8,328**	**8,328**	**8,328**	-	-	-	-	-	-	-	-
4x8 HF #2	18,744	14,808	11,809	**9,566**	**7,876**	**6,583**	**5,577**	**4,782**	**4,142**	**3,622**	**3,193**
P_{SILL}	**10,277**	**10,277**	**10,277**	-	-	-	-	-	-	-	-
4x10 HF #2	23,562	18,717	14,972	**12,150**	**10,015**	**8,377**	**7,101**	**6,090**	**5,277**	**4,615**	**4,069**
P_{SILL}	**13,112**	**13,112**	**13,112**	-	-	-	-	-	-	-	-
6x6 DF #2	19,595	18,889	17,995	16,908	15,659	14,315	**12,960**	**11,665**	**10,475**	**9,407**	**8,463**
P_{SILL}	**13,087**	**13,087**	**13,087**	**13,087**	**13,087**	**13,087**	-	-	-	-	-
6x8 DF #2	25,830	24,899	23,721	22,288	20,642	18,870	17,083	**15,377**	**13,808**	**12,400**	**11,156**
P_{SILL}	**16,149**	**16,149**	**16,149**	**16,149**	**16,149**	**16,149**	**16,149**	-	-	-	-
6x10 DF #2	28,621	27,790	26,739	25,450	23,929	22,224	**20,420**	**18,614**	**16,885**	**15,285**	**13,835**
P_{SILL}	**20,604**	**20,604**	**20,604**	**20,604**	**20,604**	**20,604**	-	-	-	-	-

ENGINEERING
250 4th Ave. South
Suite 200

Description		By JDM	Date 06/15/22
Wood Column Capacity Table		Checked	Date
		Scale	Sheet No.
Project	Monahan Residence	Job No. 22139.10	6

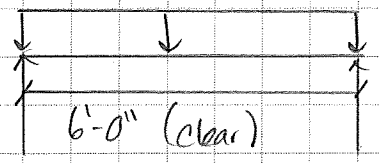


ROOF FRAMING KEY PLAN

Roof Framing

HDR01

$W = \begin{cases} D = 150 \text{ plf} \\ L = 250 \text{ plf} \end{cases}$

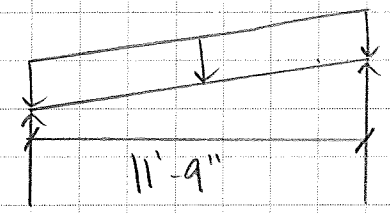


Per Beam Span Table,

Use 4x8 HF #2 min

RJO1

$W = 2' \times \begin{cases} D = 15 \text{ psf} \\ L = 25 \text{ psf} \end{cases}$



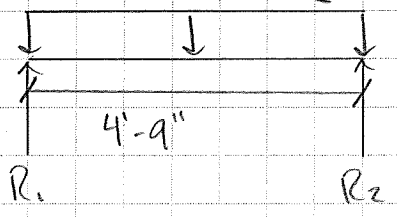
Per Woodworks,

M: 1427 #-ft (97%)
V: 424 # (34%)
Δ: L/202 (89%)

Use 2x8 HF #2 min @ 24" OC

BM01

$W = 11.75' \times \begin{cases} D = 15 \text{ psf} \\ L = 25 \text{ psf} \end{cases}$



Per Beam Span Table,

Use 4x6 HF #2 min

$R_1 = R_2 = \begin{cases} D = 441 \text{ \#} \\ L = 735 \text{ \#} \end{cases}$

CG ENGINEERING
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Description: Gravity Design		By: JDM	Date: 8/17/22
		Checked	Date
		Scale	Sheet No.: 8
Project: Manahan Residence		Job No.: 2213A.10	

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
	Aug. 17, 2022 15:51	RJ01

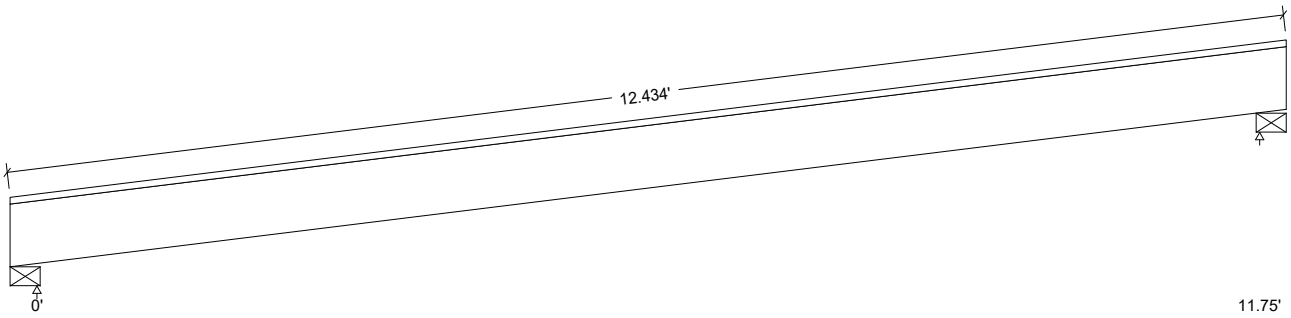
Design Check Calculation Sheet

WoodWorks Sizer 2019 (Update 2)

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				15.00(24.0")		psf
Load2	Snow	Full Area				25.00(24.0")		psf
Self-weight	Dead	Full UDL				2.2		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	200		200
Snow	307		307
Factored:			
Total	506		506
Bearing:			
F'theta	413		413
Capacity			
Joist	2170		2170
Support	2658		2658
Des ratio			
Joist	0.23		0.23
Support	0.19		0.19
Load comb	#2		#2
Length	3.50		3.50
Min req'd	0.82		0.82
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.25		1.25
Fcp sup	405		405

RJ01

Lumber-soft, Hem-Fir, No.2, 2x8 (1-1/2"x7-1/4")

Supports: All - Lumber-soft Beam, Hem-Fir No.2

Roof joist spaced at 24.0" c/c; Total length: 12.56'; Clear span(horz): 11.688'; Volume = 0.9 cu.ft.; Pitch: 2/12

Lateral support: top = continuous, bottom = at supports; Repetitive factor: applied where permitted (refer to online help);

This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 59	Fv' = 172	psi	fv/Fv' = 0.34
Bending(+)	fb = 1303	Fb' = 1349	psi	fb/Fb' = 0.97
Live Defl'n	0.36 = L/401	0.60 = L/240	in	0.60
Total Defl'n	0.70 = L/202	0.79 = L/180	in	0.89

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	150	1.15	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	850	1.15	1.00	1.00	1.000	1.200	-	1.15	1.00	1.00	-	2
Fcp'	405	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.3 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2
Emin'	0.47 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

```
 Shear     : LC #2  = D + S
 Bending(+): LC #2  = D + S
 Deflection: LC #2  = D + S  (live)
             LC #2  = D + S  (total)
 Bearing   : Support 1 - LC #2 = D + S
             Support 2 - LC #2 = D + S
 D=dead S=snow
 All LC's are listed in the Analysis output
 Load combinations:
```

CALCULATIONS:

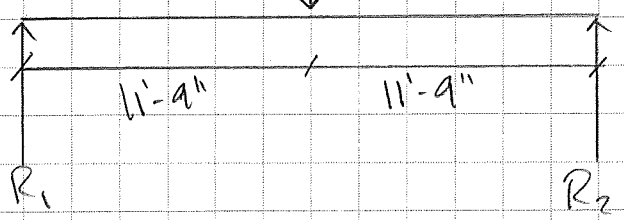
```
 V max = 479, V design = 428 lbs; M(+) = 1427 lbs-ft
   EIy = 61.92 lb-in^2
 "Live" deflection is due to all non-dead loads (live, wind, snow…)
 Total deflection = 1.5 dead + "live"
 Bearing: Allowable bearing at an angle F'theta  calculated for each support
 as per NDS 3.10.3
```

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.
4. SLOPED BEAMS: level bearing is required for all sloped beams.

BM02

$P = \begin{cases} D = 441\ \# \\ L = 735\ \# \end{cases}$



Per Woodworks,

M : 7946 #-ft (80%)
V : 750 # (9%)
Δ : L/316 (57%)

Use 6x12 DF #2

$R_1 = R_2 = \begin{cases} D = 397\ \# \\ L = 366\ \# \end{cases}$

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		Checked	Date
		Scale	Sheet No.: 10
	Project: Monahan Residence	Job No.: 2213A.10	

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
	Aug. 17, 2022 16:03	BM02

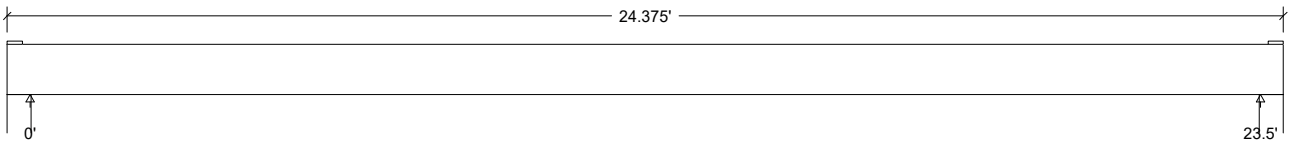
Design Check Calculation Sheet

WoodWorks Sizer 2019 (Update 2)

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	Location [ft] End	Magnitude Start	Magnitude End	Unit
Load1	Dead	Point		12.19		441		lbs
Load2	Snow	Point		12.19		735		lbs
Self-weight	Dead	Full UDL				15.0		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	397		397
Snow	368		368
Factored:			
Total	765		765
Bearing:			
Capacity			
Beam	18906		18906
Support	20003		20003
Des ratio			
Beam	0.04		0.04
Support	0.04		0.04
Load comb	#2		#2
Length	5.50		5.50
Min req'd	0.50*		0.50*
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	-		-
Fc sup	575		575

*Minimum bearing length setting used: 1/2" for end supports

BM02

Timber-soft, D.Fir-L, No.2, 6x12 (5-1/2"x11-1/2")

Supports: All - Timber-soft Column, Hem-Fir No.2

Total length: 24.38'; Clear span: 23.438'; Volume = 10.7 cu.ft.; Beam or stringer

Lateral support: top = at supports, bottom = at supports;

This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 18	Fv' = 195	psi	fv/Fv' = 0.09
Bending(+)	fb = 787	Fb' = 981	psi	fb/Fb' = 0.80
Live Defl'n	0.38 = L/744	1.17 = L/240	in	0.32
Total Defl'n	0.89 = L/316	1.57 = L/180	in	0.57

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	170	1.15	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	875	1.15	1.00	1.00	0.975	1.000	-	1.00	1.00	1.00	-	2
Fcp'	625	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.3 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2
Emin'	0.47 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D + S

Bending(+): LC #2 = D + S

Deflection: LC #2 = D + S (live)

LC #2 = D + S (total)

Bearing : Support 1 - LC #2 = D + S

Support 2 - LC #2 = D + S

D=dead S=snow

All LC's are listed in the Analysis output

Load combinations:

CALCULATIONS:

V max = 765, V design = 750 lbs; M(+) = 7946 lbs-ft

EIy = 906.17 lb-in^2

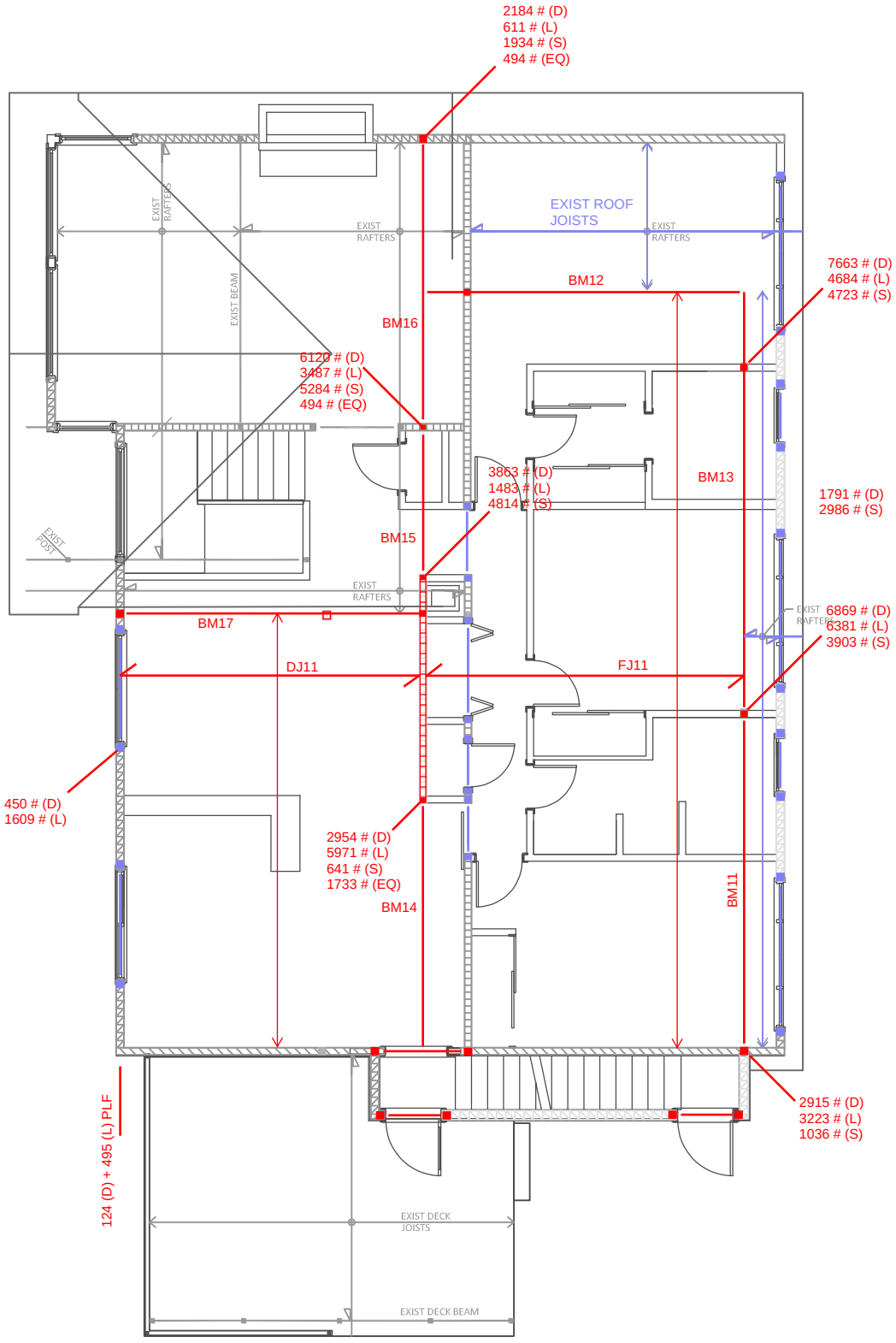
"Live" deflection is due to all non-dead loads (live, wind, snow…)

Total deflection = 1.5 dead + "live"

Lateral stability(+): Lu = 23.50' Le = 43.25' RB = 14.0

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

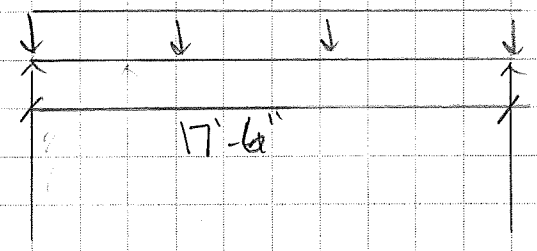


UPPER FLOOR FRAMING PLAN

Upper Floor Framing

FJ11

$W = (16''/12) \times \begin{cases} D = 15 \text{ psf} \\ L = 40 \text{ psf} \end{cases}$



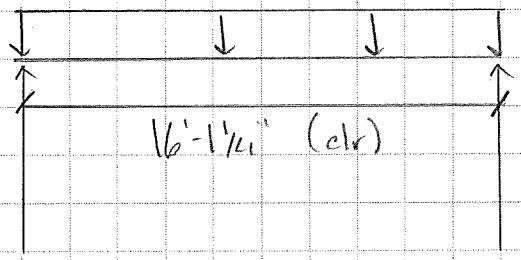
Per Forte,

M: 2728 #-ft (64%)
V: 626 # (29%)
Δ: L/804
Pro Rtg: 53

Use 16" TJI 110 @ 16" OC

PJ11

$W = (16''/12) \times \begin{cases} D = 15 \text{ psf} \\ L = 40 \text{ psf} \end{cases}$



Per Forte,

M: 4047 #-ft (41%)
V: 714 # (20%)
Δ: L/508

Use 1 3/4" x 16" LVL @ 16" OC w/ 11" min depth

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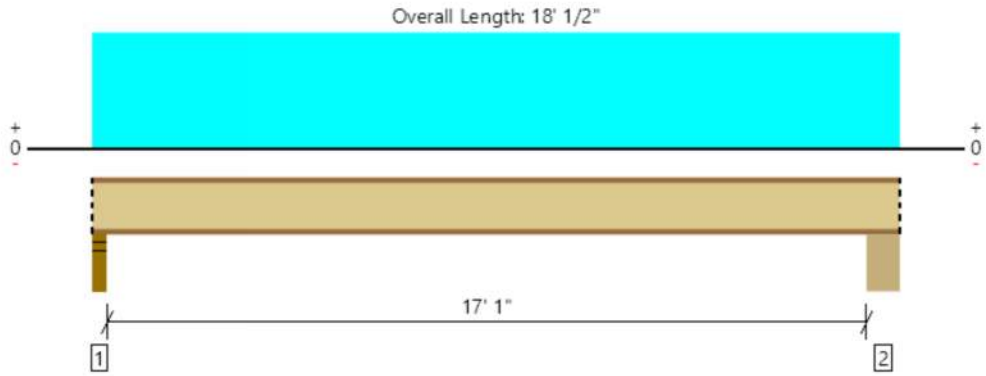
		Scale	Sheet No.: 13
	Project: Manahan Residence	Job No.: 2213.10	

Level, FJ11

1 piece(s) 16" TJI® 110 @ 16" OC



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	675 @ 17' 5 1/2"	1375 (3.50")	Passed (49%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	626 @ 3 1/2"	2145	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2728 @ 8' 10"	4280	Passed (64%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.187 @ 8' 10"	0.575	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.258 @ 8' 10"	0.863	Passed (L/804)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	53	45	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 1/2" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.75"	177	471	648	Blocking
2 - Beam - PSL	8.00"	8.00"	1.75"	184	491	675	Blocking

• Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' o/c	
Bottom Edge (Lu)	18' 1" o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.
•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 18' 1/2"	16"	15.0	40.0	Default Load

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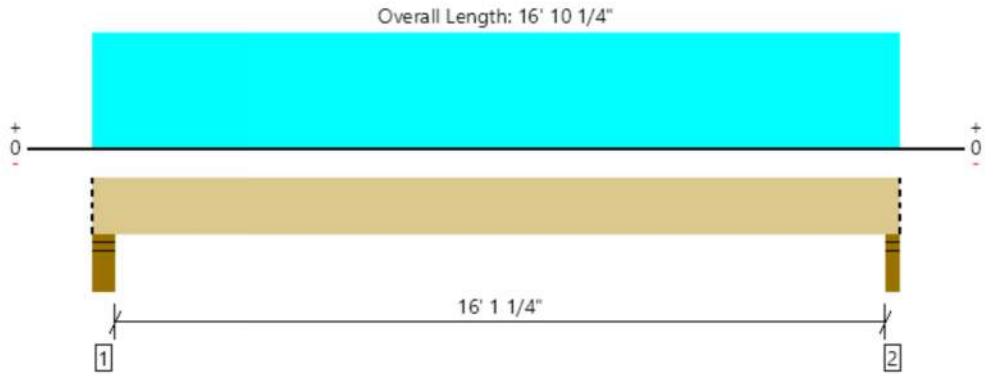
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Joshua Madison CG Engineering (425) 273-1187 joshm@cgengineering.com	

Level, DJ11

1 piece(s) 1 3/4" x 11" 2.0E Microllam® LVL @ 16" OC



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	834 @ 16' 7 3/4"	2481 (3.50")	Passed (34%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	714 @ 1' 4 1/2"	3658	Passed (20%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3309 @ 8' 6 1/8"	8047	Passed (41%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.307 @ 8' 6 1/8"	0.542	Passed (L/635)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.384 @ 8' 6 1/8"	0.814	Passed (L/508)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	54	45	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- A 4% increase in the moment capacity has been added to account for repetitive member usage.
- A structural analysis of the deck has not been performed.
- Resawn products must maintain manufacturing stamps.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 1/2" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	5.50"	5.50"	1.50"	170	681	851	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.50"	167	668	834	Blocking

• Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	Continuous	
Bottom Edge (Lu)	End Bearing Points	

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 16' 10 1/4"	16"	15.0	60.0	Default Load

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
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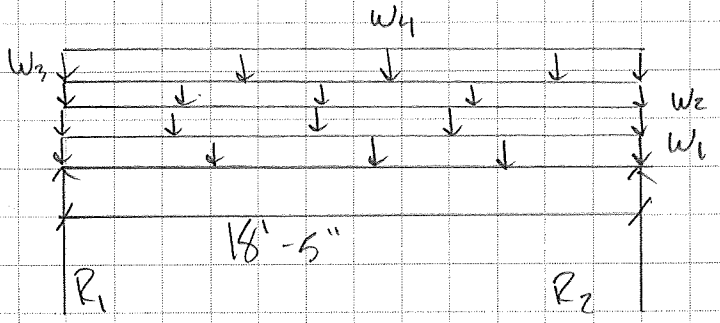
BM11



$W_1 = 8.75' \times \begin{cases} D = 15\ psf \\ L = 40\ psf \end{cases}$ (floor)

$W_2 = 2.25' \times \begin{cases} D = 15\ psf \\ S = 25\ psf \end{cases}$ (low roof)

$W_3 = 2.25' \times \begin{cases} D = 15\ psf \\ S = 25\ psf \end{cases}$ (upper roof)

$W_4 = 9.167' \times \{ D = 10\ psf$ (wall)

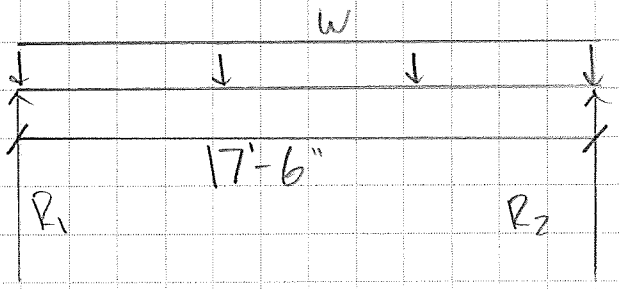
Per ENERCALC,
Use W14 x 26

$R_1 = R_2 = \begin{cases} D = 2915\ \# \\ L = 3223\ \# \\ S = 1086\ \# \end{cases}$

BM12

$W = 2.75' \times \begin{cases} D = 15\ psf \\ S = 25\ psf \end{cases}$

$+ 9.167' \times \{ D = 10\ psf$



Per Beam Span Tables,
Use 3½" x 11¼" PSL

$R_1 = R_2 = \begin{cases} D = 1271\ \# \\ S = 602\ \# \end{cases}$

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		Checked	Date
		Scale	Sheet No. 16
	Project: Manahan Residence	Job No. 2212A.10	

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: Monahan Residence Calculations.ec6

LIC# : KW-06015244, Build:20.22.2.9 CG ENGINEERING (c) ENERCALC INC 1983-2022

DESCRIPTION: BM11

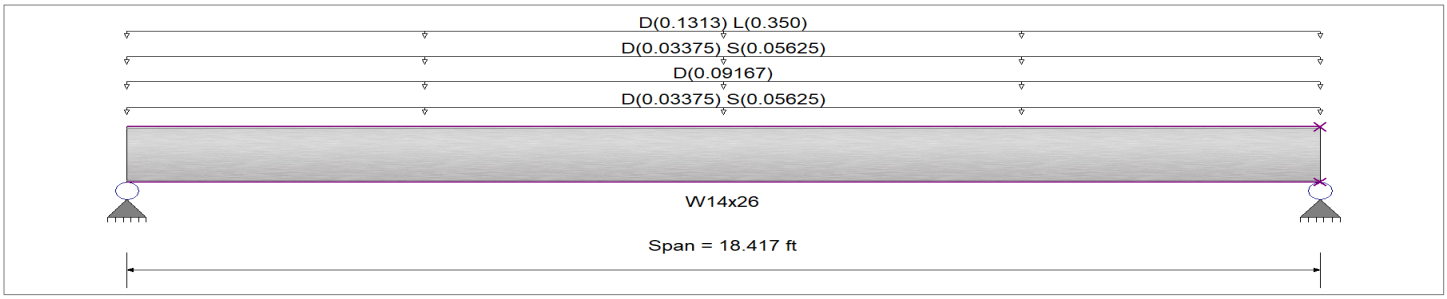
CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 2.250 ft

Uniform Load : D = 0.010 ksf, Tributary Width = 9.167 ft

Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 2.250 ft

Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 8.750 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.282 : 1	Maximum Shear Stress Ratio =	0.087 : 1
Section used for this span	W14x26	Section used for this span	W14x26
Ma : Applied	28.262 k-ft	Va : Applied	6.138 k
Mn / Omega : Allowable	100.299 k-ft	Vn/Omega : Allowable	70.890 k
Load Combination	+D+L	Load Combination	+D+L
		Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

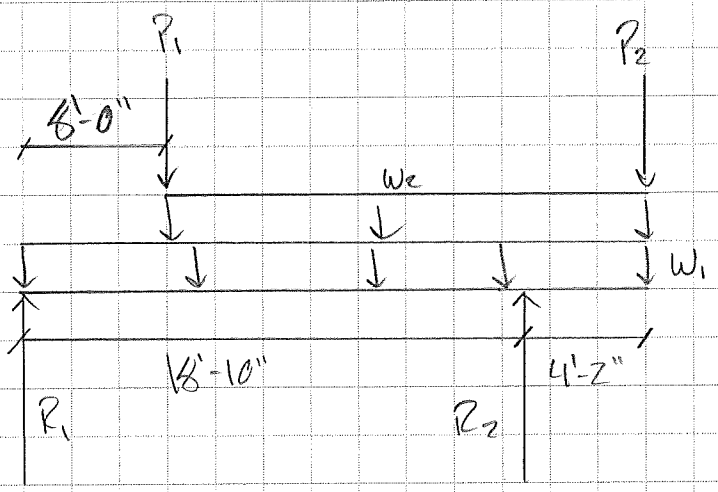
Max Downward Transient Deflection	0.128 in	Ratio =	1,725	>=360	
Max Upward Transient Deflection	0.000 in	Ratio =	0	<360	Span: 1 : L Only
Max Downward Total Deflection	0.244 in	Ratio =	906	>=240.	Span: 1 : +D+L
Max Upward Total Deflection	0.000 in	Ratio =	0	<240.0	

Vertical Reactions

Support notation : Far left is #' Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	6.138	6.138
Overall MINimum	1.036	1.036
D Only	2.915	2.915
+D+L	6.138	6.138
+D+S	3.951	3.951
+D+0.750L	5.333	5.333
+D+0.750L+0.750S	6.109	6.109
+0.60D	1.749	1.749
L Only	3.223	3.223
S Only	1.036	1.036

BM13



$W_1 = 8.75' \times \begin{cases} D = 15\ psf \\ L = 40\ psf \end{cases}$ (floor)

$+ 9.25' \times \begin{cases} D = 15\ psf \\ S = 25\ psf \end{cases}$ (low roof)

$+ 9.167' \times \{ D = 10\ psf$ (wall)

$W_2 = \begin{cases} D = 150\ plf \\ S = 250\ plf \end{cases}$

$P_1 = \begin{cases} D = 1791\ \# \\ S = 2986\ \# \end{cases}$

$P_2 = \begin{cases} D = 1271\ \# \\ S = 602\ \# \end{cases}$

Per ENERCALC,

Use W14x48

$R_1 = \begin{cases} D = 3454\ \# \\ L = 3156\ \# \\ S = 2867\ \# \end{cases}$

$R_2 = \begin{cases} D = 7663\ \# \\ L = 4684\ \# \\ S = 4723\ \# \end{cases}$

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Description: Gravity Design		By: JDM	Date: 6/18/22
		Checked	Date
		Scale	Sheet No.: 18
Project: Manahan Residence		Job No.: 2213a.10	

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: Monahan Residence Calculations.ec6

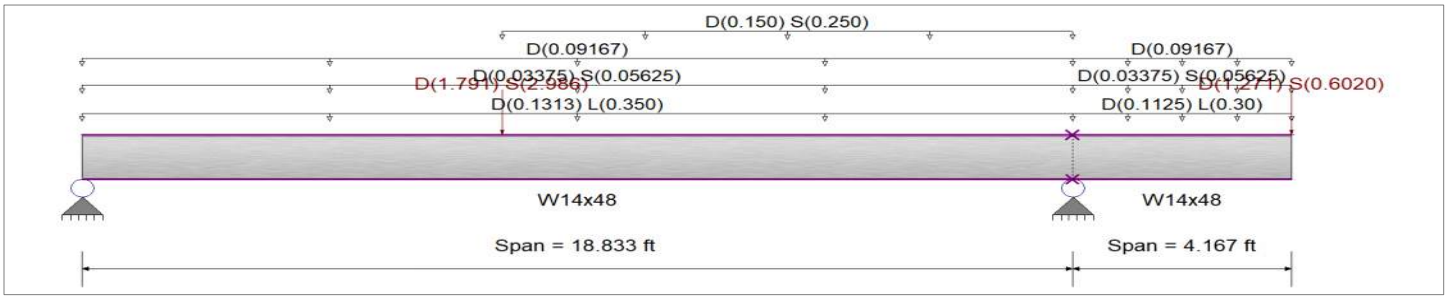
DESCRIPTION: BM13

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 8.750 ft

Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 2.250 ft

Uniform Load : D = 0.010 ksf, Tributary Width = 9.167 ft

Uniform Load : D = 0.150, S = 0.250 k/ft, Extent = 8.0 -->> 18.833 ft, Tributary Width = 1.0 ft

Point Load : D = 1.791, S = 2.986 k @ 8.0 ft

Load for Span Number 2
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 7.50 ft

Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 2.250 ft

Uniform Load : D = 0.010 ksf, Tributary Width = 9.167 ft

Point Load : D = 1.271, S = 0.6020 k @ 4.167 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.247** : 1	Maximum Shear Stress Ratio =	**0.114** : 1
Section used for this span	**W14x48**	Section used for this span	**W14x48**
Ma : Applied	48.249 k-ft	Va : Applied	10.691 k
Mn / Omega : Allowable	195.609 k-ft	Vn/Omega : Allowable	93.840 k
Load Combination	+D+0.750L+0.750S	Load Combination	+D+0.750L+0.750S
		Location of maximum on span	18.833 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.084 in	Ratio =	2,676	>=360	Span: 2 : S Only
Max Upward Transient Deflection	-0.052 in	Ratio =	1,929	>=360	Span: 2 : S Only
Max Downward Total Deflection	0.201 in	Ratio =	1127	>=240.	Span: 2 : +D+0.750L+0.750S
Max Upward Total Deflection	-0.116 in	Ratio =	864	>=240.	Span: 2 : +D+0.750L+0.750S

Steel Beam

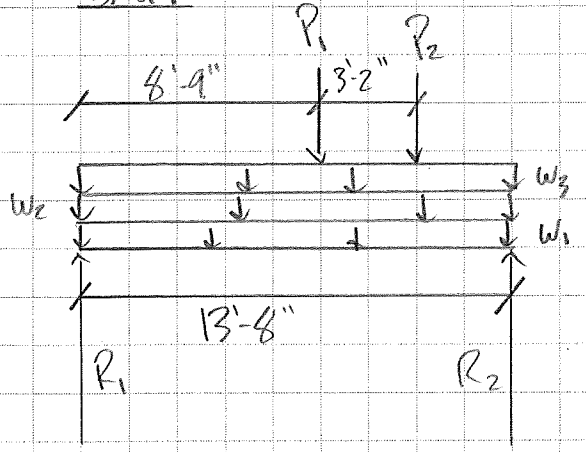
DESCRIPTION: BM13

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	8.472	14.718	
Overall MINimum	2.372	4.598	
D Only	3.954	7.663	
+D+L	7.111	12.347	
+D+S	6.821	12.386	
+D+0.750L	6.322	11.176	
+D+0.750L+0.750S	8.472	14.718	
+0.60D	2.372	4.598	
L Only	3.158	4.684	
S Only	2.867	4.723	

BM14



$W_1 = \frac{1}{2}(16.5') \times \begin{cases} D = 15\ psf \\ L = 60\ psf \end{cases}$ (deck)

$W_2 = \frac{1}{2}(17.5') \times \begin{cases} D = 15\ psf \\ L = 40\ psf \end{cases}$ (floor)

$W_3 = 9.167' \times \{ D = 10\ psf$ (wall)

$P_1 = (758\#/0.7)(2.5) = 2707$ (EQ w/ overstrength)

$P_2 = \begin{cases} D = 441\# \\ S = 735\# \end{cases}$

$R_1 = \begin{cases} D = 2542\# \\ L = 5486\# \\ S = 94\# \\ EQ = 974\# \end{cases}$ (8460#)

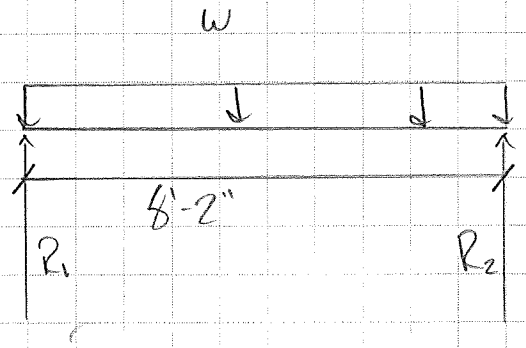
$R_2 = \begin{cases} D = 2454\# \\ L = 5271\# \\ S = 641\# \\ EQ = 1733\# \end{cases}$ (4925#)

Per Woodworks,

M: 28618 #-ft (82%)
V: 6865 # (63%)
Δ: L/346 (62%)

Use 3½" x 16" PSL

BM15



$W = 4.75' \times \begin{cases} D = 15\ psf \\ L = 40\ psf \end{cases}$ (floor)

$+ \frac{1}{2}(19') \times \begin{cases} D = 15\ psf \\ S = 25\ psf \end{cases}$ (roof)

$+ \begin{cases} D = 150\ plf \\ S = 250\ plf \end{cases} + (9.167') \times \{ D = 10\ psf$

$= \begin{cases} D = 515\ plf \\ L = 350\ plf \\ S = 488\ plf \end{cases}$

Per Beam Span Table,

Use 3½" x 9¼" PSL

CG ENGINEERING 250 4th Ave. South Suite 200 Edmonds, WA 98020 425.778.8500 www.cgengineering.com	Description: Gravity Design	By: JDM	Date: 8/18/22
		Checked	Date
		Scale	Sheet No.: 21
	Project: Manahan Residence	Job No.: 2213A.10	

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
	Aug. 23, 2022 15:16	BM14

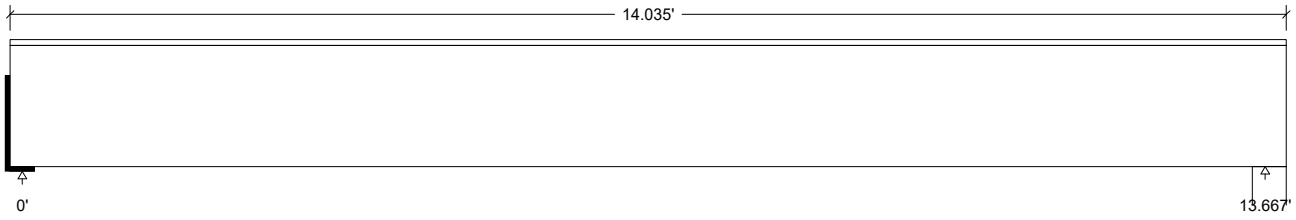
Design Check Calculation Sheet

WoodWorks Sizer 2019 (Update 2)

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				15.00(8.25')		psf
Load2	Live	Full Area				60.00(8.25')		psf
Load3	Dead	Full Area				15.00(8.75')		psf
Load4	Live	Full Area				40.00(8.75')		psf
Load5	Dead	Full Area				10.00(9.17')		psf
Load6	Dead	Point		12.05		441		lbs
Load7	Snow	Point		12.05		735		lbs
Load8	Earthquake	Point		8.88		2707		lbs
Self-weight	Dead	Full UDL				17.5		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	2592		2954
Live	5888		5971
Snow	94		641
Earthquake	974		1733
Factored:			
Total	8480		8925
Bearing:			
Capacity			
Beam	8480		11813
Support	-		12600
Des ratio			
Beam	1.00		0.76
Support	-		0.71
Load comb	#2		#2
Length	3.23		4.50
Min req'd	3.23		3.40
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	-		-
Fc sup	-		800

BM14

PSL, PSL, 2.2E, 3-1/2"x16"

Supports: 1 - Hanger; 2 - Lumber n-ply Column, Hem-Fir Stud;
Total length: 14.06'; Clear span: 13.375'; Volume = 5.5 cu.ft.
Lateral support: top = continuous, bottom = at supports;
This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 184	Fv' = 290	psi	fv/Fv' = 0.63
Bending(+)	fb = 2300	Fb' = 2810	psi	fb/Fb' = 0.82
Live Defl'n	0.25 = L/649	0.46 = L/360	in	0.55
Total Defl'n	0.42 = L/386	0.68 = L/240	in	0.62

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	290	1.00	-	1.00	-	-	-	-	1.00	-	1.00	2
Fb'+	2900	1.00	-	1.00	1.000	0.969	-	1.00	1.00	-	-	2
Fcp'	750	-	-	1.00	-	-	-	-	1.00	-	-	-
E'	2.2 million		-	1.00	-	-	-	-	1.00	-	-	2
Eminy'	1.14 million		-	1.00	-	-	-	-	1.00	-	-	2

CRITICAL LOAD COMBINATIONS:
- Shear : LC #2 = D + L
- Bending(+): LC #2 = D + L
- Deflection: LC #2 = D + L (live)
  LC #2 = D + L (total)
- Bearing : Support 1 - LC #2 = D + L
  Support 2 - LC #2 = D + L

D=dead L=live S=snow E=earthquake
All LC's are listed in the Analysis output
Load combinations:

CALCULATIONS:
V max = 8647, V design = 6865 lbs; M(+) = 28618 lbs-ft
EIy = 2628.27 lb-in^2 Apparent E approximates the effect of shear deflection.
"Live" deflection is due to all non-dead loads (live, wind, snow…)
Total deflection = 1.5 dead + "live"

Design Notes:

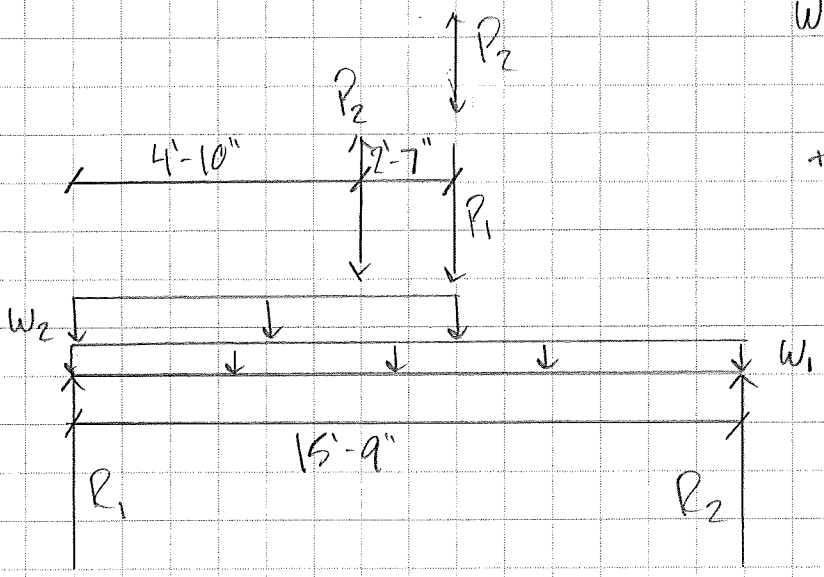
1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. FIRE RATING: LVL, PSL and LSL are not rated for fire endurance.
4. SCL: Structural composite lumber design has assumed: - dry service conditions - no preservative or fire-retardant treatment - no notches
5. SCL: Deflection is calculated using an apparent modulus of elasticity E that incorporates the effect of shear deflection.

BM16

$W_1 = \frac{1}{2}(12.33') \times \begin{cases} D = 15\ psf \\ S = 25\ psf \end{cases}$

$W_2 = 8.75' \times \begin{cases} D = 15\ psf \\ L = 40\ psf \end{cases}$

$+ \begin{cases} D = 150\ plf \\ S = 250\ plf \end{cases} + (9.167') \begin{cases} D = 10\ psf \end{cases}$



$P_1 = \begin{cases} D = 1271\ \# \\ S = 602\ \# \end{cases}$

$P_2 = \pm\left(443\ \#/0.7\right)(2.5)\ (EQ\ w/\ \Omega)$

Per ENERCALC, Use W14×26

$R_1 = \begin{cases} D = 3722\ \# \\ L = 1945\ \# \\ S = 2950\ \# \\ EQ = \pm 494\ \# \end{cases}$

$(6034\ \#)$

$R_2 = \begin{cases} D = 2184\ \# \\ L = 611\ \# \\ S = 1934\ \# \\ EQ = \pm 494\ \# \end{cases}$

$(3922\ \#)$

C.G ENGINEERING
250 4th Ave. South
Suite 200
Edmonds, WA 98020
425.778.8500
www.cgengineering.com

Description	By	Date
Gravity Design	JDM	4/15/22
	Checked	Date
	Scale	Sheet No.
Project: Marahan Residence	Job No. 2213.10	23

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: Monahan Residence Calculations.ec6

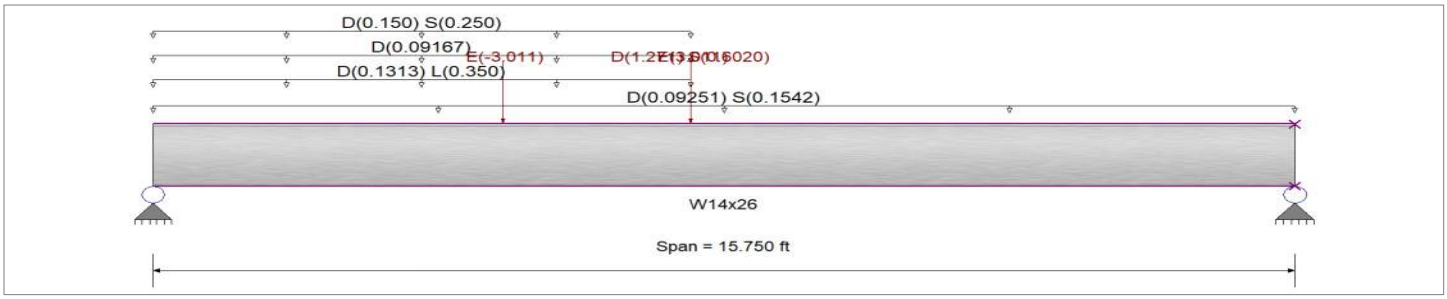
DESCRIPTION: BM16

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading

Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 6.167 ft

Uniform Load : D = 0.0150, L = 0.040 ksf, Extent = 0.0 -->> 7.417 ft, Tributary Width = 8.750 ft

Uniform Load : D = 0.010 ksf, Extent = 0.0 -->> 7.417 ft, Tributary Width = 9.167 ft

Uniform Load : D = 0.150, S = 0.250 k/ft, Extent = 0.0 -->> 7.417 ft, Tributary Width = 1.0 ft

Point Load : D = 1.271, S = 0.6020 k @ 7.417 ft

Point Load : E = -3.011 k @ 4.833 ft

Point Load : E = 3.011 k @ 7.417 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.280** : 1	Maximum Shear Stress Ratio =	**0.105** : 1
Section used for this span	**W14x26**	Section used for this span	**W14x26**
Ma : Applied	28.117 k-ft	Va : Applied	7.423 k
Mn / Omega : Allowable	100.299 k-ft	Vn/Omega : Allowable	70.890 k
Load Combination	+D+0.750L+0.750S+0.5250E	Load Combination	+D+0.750L+0.750S
		Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.064 in	Ratio =	2,934	>=360	
Max Upward Transient Deflection	0.000 in	Ratio =	0	<360	Span: 1 : S Only
Max Downward Total Deflection	0.159 in	Ratio =	1187	>=240.	Span: 1 : +D+0.750L+0.750S+0.5250E
Max Upward Total Deflection	0.000 in	Ratio =	0	<240.0	

Vertical Reactions

Support notation : Far left is #' Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	7.423	4.353
Overall MINimum	-0.494	0.494
D Only	3.722	2.184
+D+L	5.706	2.796
+D+S	6.672	4.119
+D+0.750L	5.210	2.643
+D+0.750L+0.750S	7.423	4.093
+0.60D	2.233	1.311

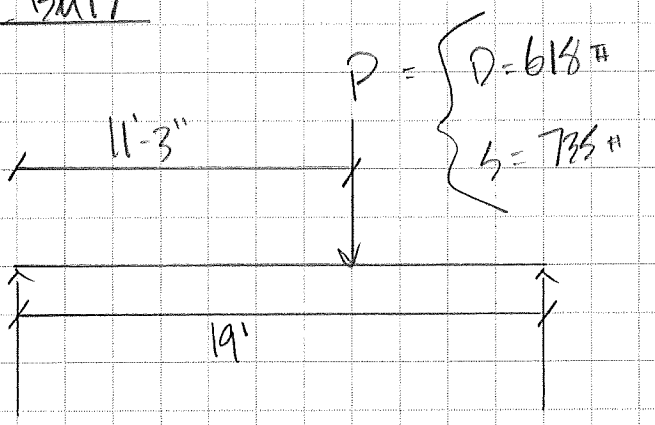
DESCRIPTION: BM16

Vertical Reactions

Support notation : Far left is #' Values in KIPS

Load Combination	Support 1	Support 2
+D+0.70E	3.376	2.530
+D+0.750L+0.750S+0.5250E	7.164	4.353
+0.60D+0.70E	1.887	1.656
L Only	1.985	0.611
S Only	2.950	1.934
E Only	-0.494	0.494

BM17



Per Woodworks

M: 665 # (47%)
V: 449 # (12%)
Δ: L/266 (90%)

Use 3½" x 9¼" PSL

CG ENGINEERING 250 4th Ave. South Suite 200 Edmonds, WA 98020 425.778.8500 www.cgengineering.com	Description: Gravity Design	By: JDM	Date: 8/16/22
		Checked	Date
		Scale	Sheet No.: 26
	Project: Monahan Residence	Job No.: 2213A.10	

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
	Aug. 18, 2022 13:33	BM17

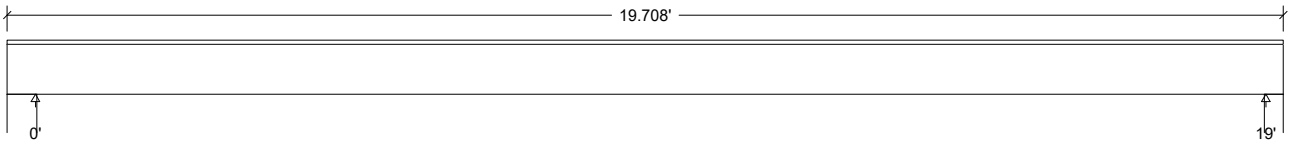
Design Check Calculation Sheet

WoodWorks Sizer 2019 (Update 2)

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	Location [ft] End	Magnitude Start	Magnitude End	Unit
Load1	Dead	Point		11.69		618		lbs
Load2	Snow	Point		11.69		735		lbs
Self-weight	Dead	Full UDL				10.1		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	348		462
Snow	300		435
Factored:			
Total	648		897
Bearing:			
Capacity			
Beam	14438		9188
Support	17710		11833
Des ratio			
Beam	0.04		0.10
Support	0.04		0.08
Load comb	#2		#2
Length	5.50		3.50
Min req'd	0.50*		0.50*
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	-		-
Fc sup	800		800

*Minimum bearing length setting used: 1/2" for end supports

BM17

PSL, PSL, 2.2E, 3-1/2"x9-1/4"

Supports: All - Lumber n-ply Column, Hem-Fir Stud
Total length: 19.69'; Clear span: 18.938'; Volume = 4.4 cu.ft.
Lateral support: top = continuous, bottom = at supports;
This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 41	Fv' = 334	psi	fv/Fv' = 0.12
Bending(+)	fb = 1599	Fb' = 3432	psi	fb/Fb' = 0.47
Live Defl'n	0.34 = L/667	0.63 = L/360	in	0.54
Total Defl'n	0.86 = L/265	0.95 = L/240	in	0.90

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	290	1.15	-	1.00	-	-	-	-	1.00	-	1.00	2
Fb'+	2900	1.15	-	1.00	1.000	1.029	-	1.00	1.00	-	-	2
Fcp'	750	-	-	1.00	-	-	-	-	1.00	-	-	-
E'	2.2 million		-	1.00	-	-	-	-	1.00	-	-	2
Eminy'	1.14 million		-	1.00	-	-	-	-	1.00	-	-	2

CRITICAL LOAD COMBINATIONS:

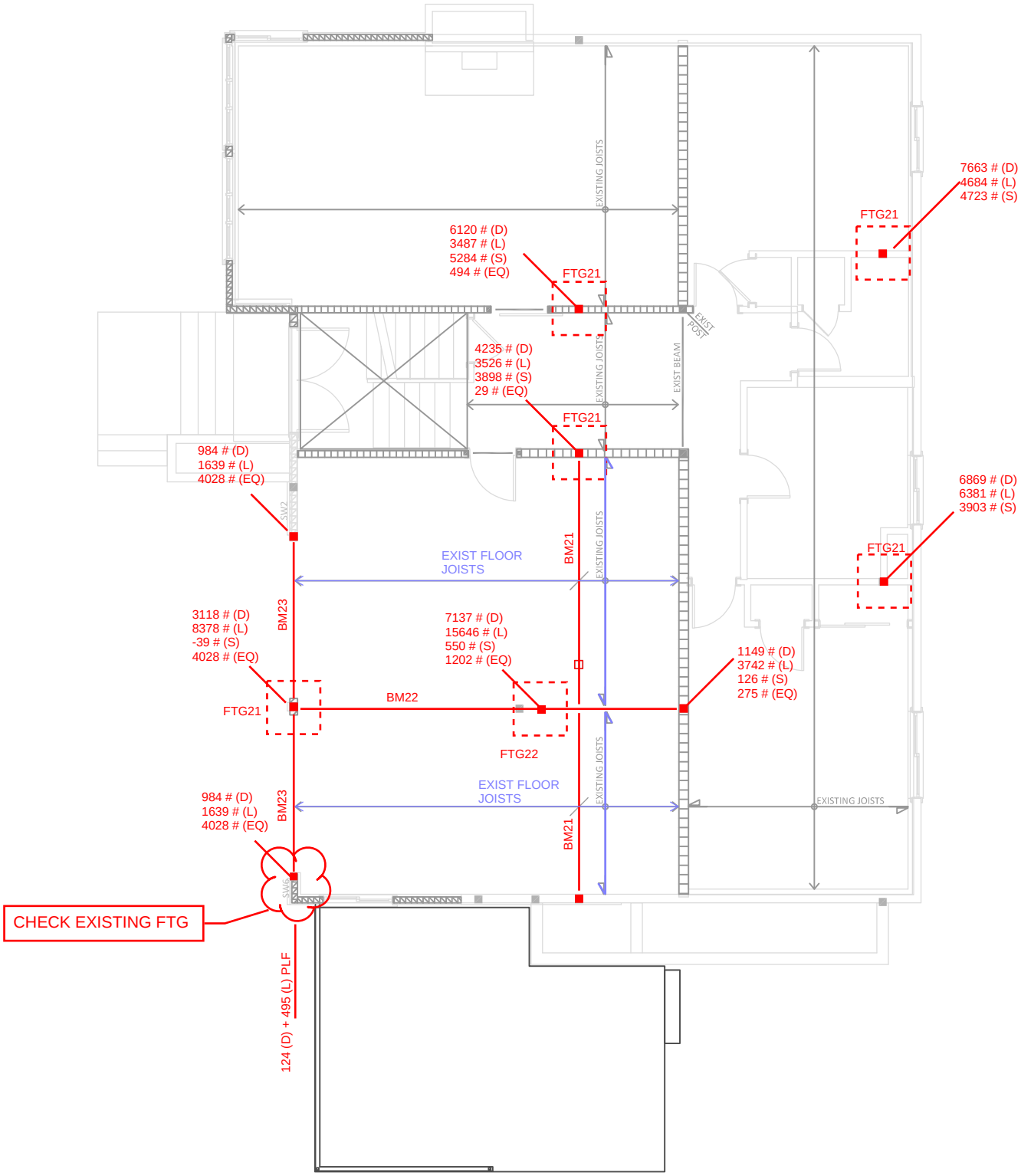
```
 Shear     : LC #2  = D + S
 Bending(+): LC #2  = D + S
 Deflection: LC #2  = D + S  (live)
             LC #2  = D + S  (total)
 Bearing   : Support 1 - LC #2 = D + S
             Support 2 - LC #2 = D + S
 D=dead S=snow
 All LC's are listed in the Analysis output
 Load combinations:
```

CALCULATIONS:

```
 V max = 897, V design = 889 lbs; M(+) = 6650 lbs-ft
   EIy = 507.85 lb-in^2 Apparent E approximates the effect of shear deflection.
 "Live" deflection is due to all non-dead loads (live, wind, snow…)
 Total deflection = 1.5 dead + "live"
```

Design Notes:

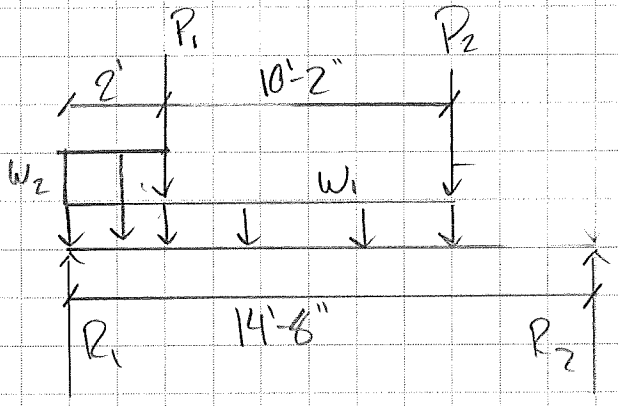
1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. FIRE RATING: LVL, PSL and LSL are not rated for fire endurance.
4. SCL: Structural composite lumber design has assumed: - dry service conditions - no preservative or fire-retardant treatment - no notches
5. SCL: Deflection is calculated using an apparent modulus of elasticity E that incorporates the effect of shear deflection.



MAIN FLOOR FRAMING KEY PLAN

Main Floor Framing

BM21



$W_2 = \begin{cases} D = 150 \text{ plf} \\ S = 250 \text{ plf} \end{cases}$

$+ (9.167') \times \{ D = 10 \text{ psf}$

$+ \frac{1}{2}(19') \times \begin{cases} D = 15 \text{ psf} \\ S = 25 \text{ psf} \end{cases}$

$R_1 = \begin{cases} D = 4293\# \\ L = 7034\# \\ S = 1393\# \\ EQ = 295\# \end{cases}$ (11327#)

$R_2 = \begin{cases} D = 4521\# \\ L = 9218\# \\ S = 658\# \\ EQ = 1438\# \end{cases}$ (13739#)

$P_1 = \begin{cases} D = 462\# \\ S = 435\# \end{cases}$

$P_2 = \begin{cases} D = 2954\# \\ S = 641\# \\ L = 5971\# \\ EQ = 1733\# \end{cases}$

$W_1 = \frac{1}{2}(16.5') \times \begin{cases} D = 15 \text{ psf} & \text{(deck)} \\ L = 60 \text{ psf} \end{cases}$

$+ 8.75' \times \begin{cases} D = 15 \text{ psf} & \text{(floor)} \\ L = 40 \text{ psf} \end{cases}$

$+ (9.167') \times \{ D = 10 \text{ psf}$

Per ENERCALC,
Use W16 x 26

CG ENGINEERING 250 4th Ave. South Suite 200 Edmonds, WA 98020 425.778.8500 www.cgengineering.com	Description: Gravity Design	By: JDM	Date: 8/18/17
		Checked	Date
		Scale	Sheet No.: 29
	Project: Manahan Residence	Job No.: 2213A.10	

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: Monahan Residence Calculations.ec6

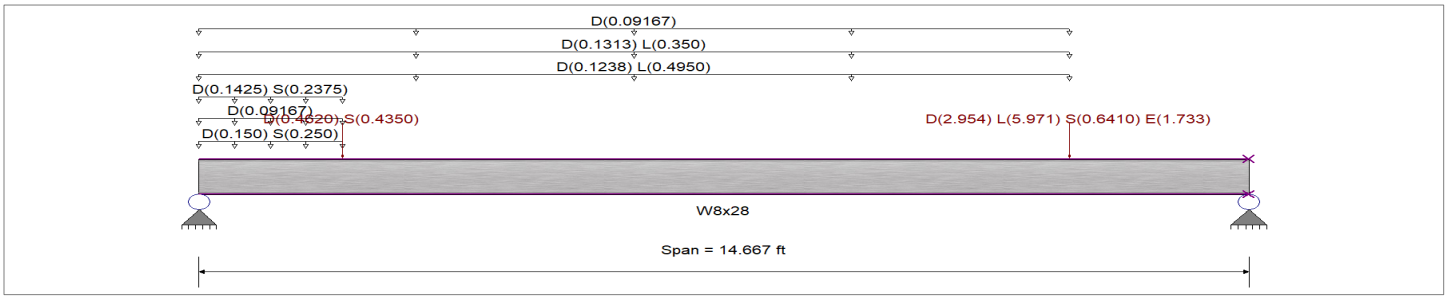
DESCRIPTION: BM21

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1

Uniform Load : D = 0.150, S = 0.250 k/ft, Extent = 0.0 -->> 2.0 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.010 ksf, Extent = 0.0 -->> 2.0 ft, Tributary Width = 9.167 ft

Uniform Load : D = 0.0150, S = 0.0250 ksf, Extent = 0.0 -->> 2.0 ft, Tributary Width = 9.50 ft

Uniform Load : D = 0.0150, L = 0.060 ksf, Extent = 0.0 -->> 12.167 ft, Tributary Width = 8.250 ft

Uniform Load : D = 0.0150, L = 0.040 ksf, Extent = 0.0 -->> 12.167 ft, Tributary Width = 8.750 ft

Uniform Load : D = 0.010 ksf, Extent = 0.0 -->> 12.167 ft, Tributary Width = 9.167 ft

Point Load : D = 0.4620, S = 0.4350 k @ 2.0 ft

Point Load : D = 2.954, L = 5.971, S = 0.6410, E = 1.733 k @ 12.167 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.641 : 1	Maximum Shear Stress Ratio =	0.299 : 1
Section used for this span	W8x28	Section used for this span	W8x28
Ma : Applied	43.482 k-ft	Va : Applied	13.739 k
Mn / Omega : Allowable	67.864 k-ft	Vn/Omega : Allowable	45.942 k
Load Combination	+D+L	Load Combination	+D+L
		Location of maximum on span	14.667 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.408 in	Ratio =	431	>=360	
Max Upward Transient Deflection	0.000 in	Ratio =	0	<360	Span: 1 : L Only
Max Downward Total Deflection	0.609 in	Ratio =	289	>=240.	Span: 1 : +D+L
Max Upward Total Deflection	0.000 in	Ratio =	0	<240.0	

Vertical Reactions

Support notation : Far left is #' Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	11.327	13.739
Overall MINimum	0.295	0.658
D Only	4.293	4.521
+D+L	11.327	13.739

Steel Beam

DESCRIPTION: BM21

Vertical Reactions

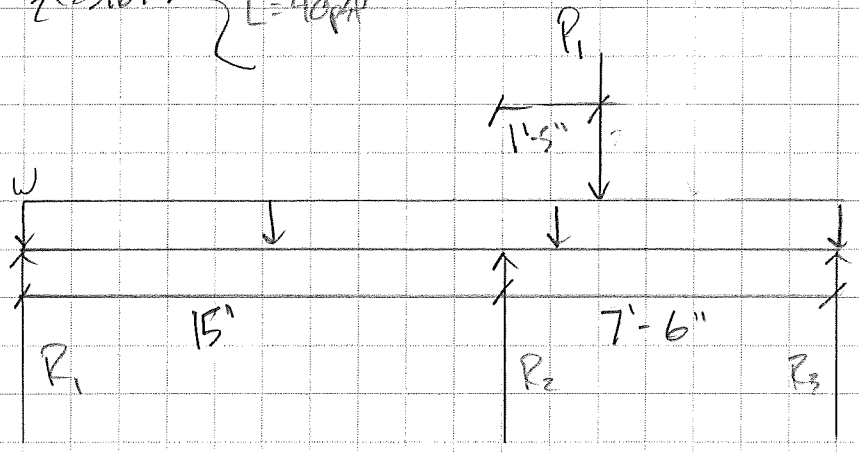
Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
+D+S	5.686	5.179
+D+0.750L	9.568	11.434
+D+0.750L+0.750S	10.614	11.927
+0.60D	2.576	2.713
+D+0.70E	4.499	5.527
+D+0.750L+0.750S+0.5250E	10.769	12.682
+0.60D+0.70E	2.782	3.719
L Only	7.034	9.218
S Only	1.393	0.658
E Only	0.295	1.438

BM22

$W = \frac{1}{2}(25.67') \times \begin{cases} D = 15 \text{ psf} \\ L = 40 \text{ psf} \end{cases}$

$P_1 = \begin{cases} D = 4521\# \\ L = 9218\# \\ S = 648\# \\ EQ = 1436\# \end{cases}$



$R_1 = \begin{cases} D = 1242\# \\ L = 3424\# \\ S = -18\# \\ EQ = -39\# \end{cases}$ (4766)

$R_2 = \begin{cases} D = 7137\# \\ L = 15646\# \\ S = 550\# \\ EQ = 1202\# \end{cases}$ (22783#)

$R_3 = \begin{cases} D = 1149\# \\ L = 3742\# \\ S = 126\# \\ EQ = 275\# \end{cases}$ (4891#)

Per Woodworks

M: 20987 #-ft (54%)
V: 15073 # (99%)
Δ: L/929 (39%)

Use 7" x 11 1/4" PSL
min

CG ENGINEERING 250 4th Ave. South Suite 200 Edmonds, WA 98020 425.778.8500 www.cgengineering.com	Description: Gravity Design	By: JPM	Date: 8/14/17
		Checked	Date
		Scale	Sheet No. 32
	Project: Manahan Residence	Job No. 2213A.10	

COMPANY	PROJECT
Aug. 24, 2022 16:51	BM22 Exist Post Position

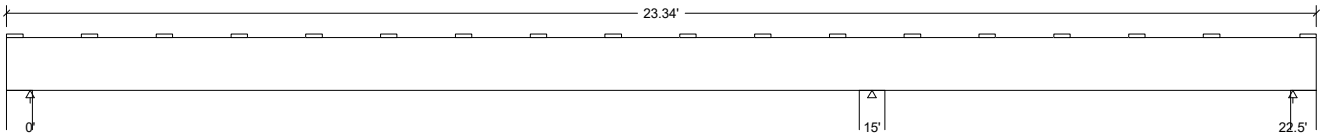
Design Check Calculation Sheet

WoodWorks Sizer 2019 (Update 2)

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area	No			15.00(12.83')		psf
Load2	Live	Full Area	Yes			40.00(12.83')		psf
Load3	Dead	Point	No	17.26		4521		lbs
Load4	Live	Point	Yes	17.26		9218		lbs
Load5	Snow	Point	Yes	17.26		658		lbs
Load6	Earthquake	Point	No	17.26		1438		lbs
Self-weight	Dead	Full UDL	No			24.6		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	1282	7137	1149
Live	3424	15646	3742
Snow	-18	550	126
Earthquake	-39	1202	275
Factored:			
Total	4706	22783	4891
Bearing:			
Capacity			
Beam	28875	30844	28875
Support	51974	51974	51974
Des ratio			
Beam	0.16	0.74	0.17
Support	0.09	0.44	0.09
Load comb	#10	#2	#11
Length	5.50	5.50	5.50
Min req'd	0.90	3.96	0.93
Cb	1.00	1.07	1.00
Cb min	1.00	1.09	1.00
Cb support	-	-	-
Fc sup	1350	1350	1350

BM22

PSL, PSL, 2.2E, 7"x11-1/4"

Supports: All - Lumber Post Column, D.Fir-L No.2
Total length: 23.31'; Clear span: 14.75', 7.25'; Volume = 12.8 cu.ft.
Lateral support: top = 1'-4 bottom = at end supports; (in);
This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 287	Fv' = 290	psi	fv/Fv' = 0.99
Bending(+)	fb = 1163	Fb' = 2918	psi	fb/Fb' = 0.40
Bending(-)	fb = 1706	Fb' = 2875	psi	fb/Fb' = 0.59
Live Defl'n	0.19 = L/929	0.50 = L/360	in	0.39
Total Defl'n	0.27 = L/663	0.75 = L/240	in	0.36

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	290	1.00	-	1.00	-	-	-	-	1.00	-	1.00	2
Fb'+	2900	1.00	-	1.00	0.999	1.007	-	1.00	1.00	-	-	11
Fb'-	2900	1.00	-	1.00	0.984	1.007	-	1.00	1.00	-	-	2
Fcp'	750	-	-	1.00	-	-	-	-	1.00	-	-	-
E'	2.2 million		-	1.00	-	-	-	-	1.00	-	-	10
Eminy'	1.14 million		-	1.00	-	-	-	-	1.00	-	-	10

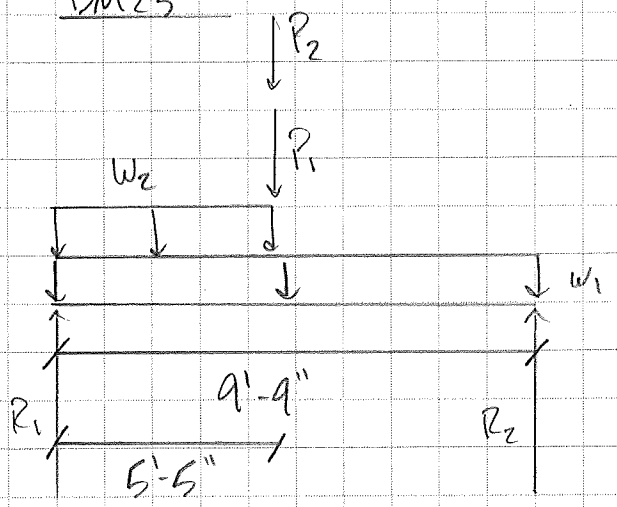
CRITICAL LOAD COMBINATIONS:
Shear : LC #2 = D + L
Bending(+): LC #11 = D + L (pattern: _L)
Bending(-): LC #2 = D + L
Deflection: LC #10 = (live)
LC #10 = (total)
Bearing : Support 1 - LC #10 = D + L (pattern: L_)
Support 2 - LC #2 = D + L
Support 3 - LC #11 = D + L (pattern: _L)
D=dead L=live S=snow E=earthquake
All LC's are listed in the Analysis output
Load Patterns: s=S/2, X=L+S or L+Lr, _=no pattern load in this span
Load combinations:

CALCULATIONS:
V max = 15906, V design = 15073 lbs; M(+) = 14307 lbs-ft; M(-) = 20987 lbs-ft
EIy = 1827.25 lb-in^2 Apparent E approximates the effect of shear deflection.
"Live" deflection is due to all non-dead loads (live, wind, snow…)
Total deflection = 1.5 dead + "live"
Lateral stability(+): Lu = 1.31' Le = 2.75' RB = 2.8
Lateral stability(-): Lu = 22.50' Le = 41.38' RB = 10.7; Lu based on full span

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. FIRE RATING: LVL, PSL and LSL are not rated for fire endurance.
4. SCL: Structural composite lumber design has assumed: - dry service conditions - no preservative or fire-retardant treatment - no notches
5. SCL: Deflection is calculated using an apparent modulus of elasticity E that incorporates the effect of shear deflection.

BM23



$w_1 = (9.4167') \times \begin{cases} D = 10 \text{ plf} \end{cases}$

$w_2 = \begin{cases} D = 124 \text{ plf} \\ L = 495 \text{ plf} \end{cases}$

$P_1 = \begin{cases} D = 450 \text{ \#} \\ L = 1609 \text{ \#} \end{cases}$

$P_2 = (2030\text{\#}/0.7)(2.5) = 7250 \text{ \#}$ (EQ w/ Ω)

Per Woodworks

M: 17630 #-ft (61%)
V: 3162 # (42%)
Δ: 4/5 12 (70%)

Use 3½" x 11¼" 24F

$R_1 = \begin{cases} D = 1234 \text{ \#} \\ L = 2652 \text{ \#} \\ EQ = 3222 \text{ \#} \end{cases}$

$R_2 = \begin{cases} D = 984 \text{ \#} \\ L = 1629 \text{ \#} \\ EQ = 4028 \text{ \#} \end{cases}$

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Description	By	Date
Gravity Design	JDM	8/16/22
	Checked	Date
	Scale	Sheet No.
Project: Manahan Residence	Job No. 2218.10	34

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
	Aug. 18, 2022 14:43	BM23

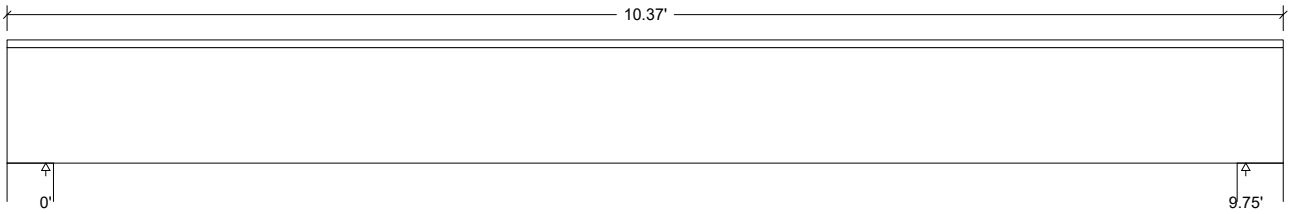
Design Check Calculation Sheet

WoodWorks Sizer 2019 (Update 2)

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				10.00(9.42')		psf
Load2	Dead	Partial UDL		0.31	5.73	124.0	124.0	plf
Load3	Live	Partial UDL		0.31	5.73	495.0	495.0	plf
Load4	Dead	Point		5.73		450		lbs
Load5	Live	Point		5.73		1609		lbs
Load6	Earthquake	Point		5.73		7250		lbs
Self-weight	Dead	Full UDL				12.3		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	1234		984
Live	2652		1639
Earthquake	3222		4028
Factored:			
Total	4914		4328
Bearing:			
Capacity			
Beam	11813		11813
Support	12600		20160
Des ratio			
Beam	0.33		0.37
Support	0.31		0.21
Load comb	#3		#3
Length	4.50		4.50
Min req'd	1.48		1.65
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	-		-
Fc sup	800		800

BM23

PSL, PSL, 2.2E, 3-1/2"x11-1/4"

Supports: All - Lumber n-ply Column, Hem-Fir Stud
Total length: 10.38'; Clear span: 9.625'; Volume = 2.8 cu.ft.
Lateral support: top = continuous, bottom = at supports;
This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 120	Fv' = 290	psi	fv/Fv' = 0.42
Bending(+)	fb = 2866	Fb' = 4672	psi	fb/Fb' = 0.61
Live Defl'n	0.23 = L/512	0.32 = L/360	in	0.70
Total Defl'n	0.31 = L/374	0.49 = L/240	in	0.64

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	290	1.00	-	1.00	-	-	-	-	1.00	-	1.00	2
Fb'+	2900	1.60	-	1.00	1.000	1.007	-	1.00	1.00	-	-	3
Fcp'	750	-	-	1.00	-	-	-	-	1.00	-	-	-
E'	2.2 million		-	1.00	-	-	-	-	1.00	-	-	3
Eminy'	1.14 million		-	1.00	-	-	-	-	1.00	-	-	3

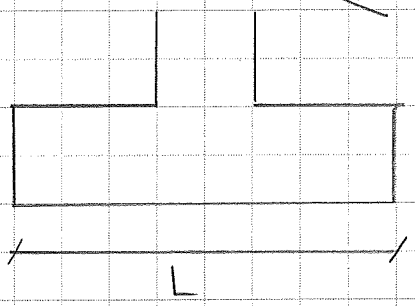
CRITICAL LOAD COMBINATIONS:
Shear : LC #2 = D + L
Bending(+): LC #3 = D + 0.75(L + 0.7E)
Deflection: LC #3 = D + 0.75(L + 0.7E) (live)
LC #3 = D + 0.75(L + 0.7E) (total)
Bearing : Support 1 - LC #3 = D + 0.75(L + 0.7E)
Support 2 - LC #3 = D + 0.75(L + 0.7E)
D=dead L=live E=earthquake
All LC's are listed in the Analysis output
Load combinations:
CALCULATIONS:
V max = 3856, V design = 3162 lbs; M(+) = 17630 lbs-ft
EIy = 913.62 lb-in^2 Apparent E approximates the effect of shear deflection.
"Live" deflection is due to all non-dead loads (live, wind, snow…)
Total deflection = 1.5 dead + "live"

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. FIRE RATING: LVL, PSL and LSL are not rated for fire endurance.
4. SCL: Structural composite lumber design has assumed: - dry service conditions - no preservative or fire-retardant treatment - no notches
5. SCL: Deflection is calculated using an apparent modulus of elasticity E that incorporates the effect of shear deflection.

FTG21

$P = \begin{cases} D = 6469\ \# \\ L = 6361\ \# \\ S = 3903\ \# \end{cases} = 14582\ \#$ $(D + 0.75(L+S))$



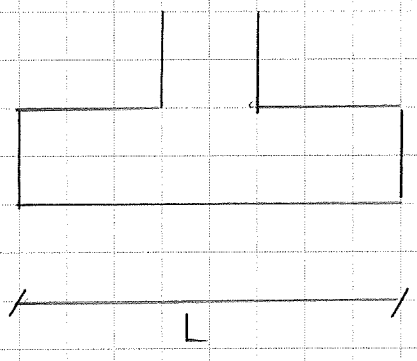
$\frac{P}{A} = \frac{14582\ \#}{L^2} < 2000\ psf$

$\Rightarrow L > 2.70'$

Use 3'-0" x 3'-0" x 10" deep ftg w/ (4) #4 bot bars ea way

FTG22

$P = 22743\ \#$ $(D+S - BM\ 22)$



$\frac{P}{A} = \frac{22743\ \#}{L^2} < 2000\ psf$

$L > 3.38'$

Use 3'-6" x 3'-6" x 12" deep ftg w/ (5) #4 bot bars ea way

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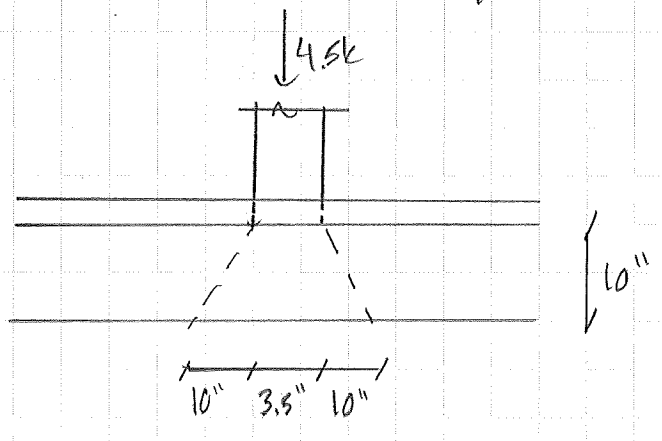
Description: Gravity Design		By: JDM	Date: 6/16/22
		Checked	Date
		Scale	Sheet No. 36
Project: Monahan Residence		Job No. 2219.10	

Existing FTG Check

Assume 10" deep, 16" wide Continuous ftg:

$P_{max} = \begin{cases} D = 948\# \\ L = 1639\# \\ EQ = 4024\# \end{cases} = 4328\#$ $(D + 0.75L + 0.525E)$

↳ Say 4.5k



$q = \frac{4.5k}{(23.5"/12)(16"/12)} = 1723\ psf < 2000\ psf$ OK

CG ENGINEERING 250 4th Ave. South Suite 200 Edmonds, WA 98020 425.778.8500 www.cgengineering.com	Description: Gravity Design	By: JDM	Date: 6/25/22
		Checked	Date
		Scale	Sheet No.: 37
	Project: Manahan Residence	Job No.: 2213A.10	

Seismic Analysis

Design Per 2018 IBC & ASCE 7-16

Seismic Coefficients

Soil Site Class	D (per Geotech)			
Occupancy Category	II (non-essential facility)			
Seismic Design Category	D			
				From Computer Program:
S_S =	1.395	Lat. =	47.588	Short & 1-Sec Period Mapped
S_1 =	0.486	Long. =	-122.246	Acceleration Parameters (MCE)
$S_{MS} = F_aS_S$ =	1.395	F_a =	1.000	ASCE 7-16 (Eq. 11.4-1)
$S_{M1} = F_vS_1$ =	0.882	F_v =	1.814	ASCE 7-16 (Eq. 11.4-2)
$S_{DS} = (2/3)S_{MS}$ =	0.930			ASCE 7-16 (Eq. 11.4-3)
$S_{D1} = (2/3)S_{M1}$ =	0.588			ASCE 7-16 (Eq. 11.4-4)
$T_a = C_th_n^x$ =	0.25	C_t =	0.02	ASCE 7-16 (Table 12.8-2)
		h_n =	29.21	
		x =	0.75	ASCE 7-16 (Table 12.8-2)
R Factor =	6.5	(Wood shear walls)		ASCE 7-16 (Table 12.2-1)
I_E Factor =	1.0			ASCE 7-16 (Table 1.5-2)

Seismic Base Shear

$V = 0.044S_{DS}I$ =	0.041 W	(Minimum Force)	ASCE 7-16 (Eq. 12.8-5)
$V = (S_{DS}IW)/R$ =	**0.143 W**	**(Governing Force)**	ASCE 7-16 (Eq. 12.8-2)
$V = (S_{D1}IW)/RT_a$ =	0.360 W	(Maximum Force)	ASCE 7-16 (Eq. 12.8-3)

Hazards by Location

Search Information

Address:	2424 67th Ave SE, Mercer Island, WA 98040, USA
Coordinates:	47.5884558, -122.2458394
Elevation:	214 ft
Timestamp:	2022-06-15T16:46:21.185Z
Hazard Type:	Seismic
Reference Document:	ASCE7-16
Risk Category:	II
Site Class:	D

Basic Parameters

Name	Value	Description
S_S	1.395	MCE_R ground motion (period=0.2s)
S_1	0.486	MCE_R ground motion (period=1.0s)
S_{MS}	1.395	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	0.93	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA

* See Section 11.4.8

Additional Information

Name	Value	Description
SDC	* null	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s
CR_S	0.902	Coefficient of risk (0.2s)
CR_1	0.896	Coefficient of risk (1.0s)
PGA	0.596	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.656	Site modified peak ground acceleration
T_L	6	Long-period transition period (s)
SsRT	1.395	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.545	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	3.168	Factored deterministic acceleration value (0.2s)
S1RT	0.486	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.542	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.297	Factored deterministic acceleration value (1.0s)
PGAd	1.096	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

Seismic Forces - Vertical Distribution

Refer to ASCE 7-16 Section 12.8.3 k = 1.0

Diaphragm Level	DL (psf)	Area (ft^2)	w_{DL} (kips)	Story Elev. (h)	$w_i * h_i^k$ (k-ft)	$w_x * h_x^k$ / $\Sigma w_i * h_i^k$	Shear F_x	Sum F_x
Roof Framing	20	1105	22.1	27.29	603	0.39	**2.9**	2.9
2nd Framing	-	-	51.9	18.2	944	0.61	**4.6**	7.6
		Σ =	73.95	-	1547	1.00	**7.6**	-

Base Shear (ULT) 10.6 kips

Base Shear (ASD) **7.6 kips** * note that all table forces are ASD

Seismic Forces - Vertical Distribution Including Rho

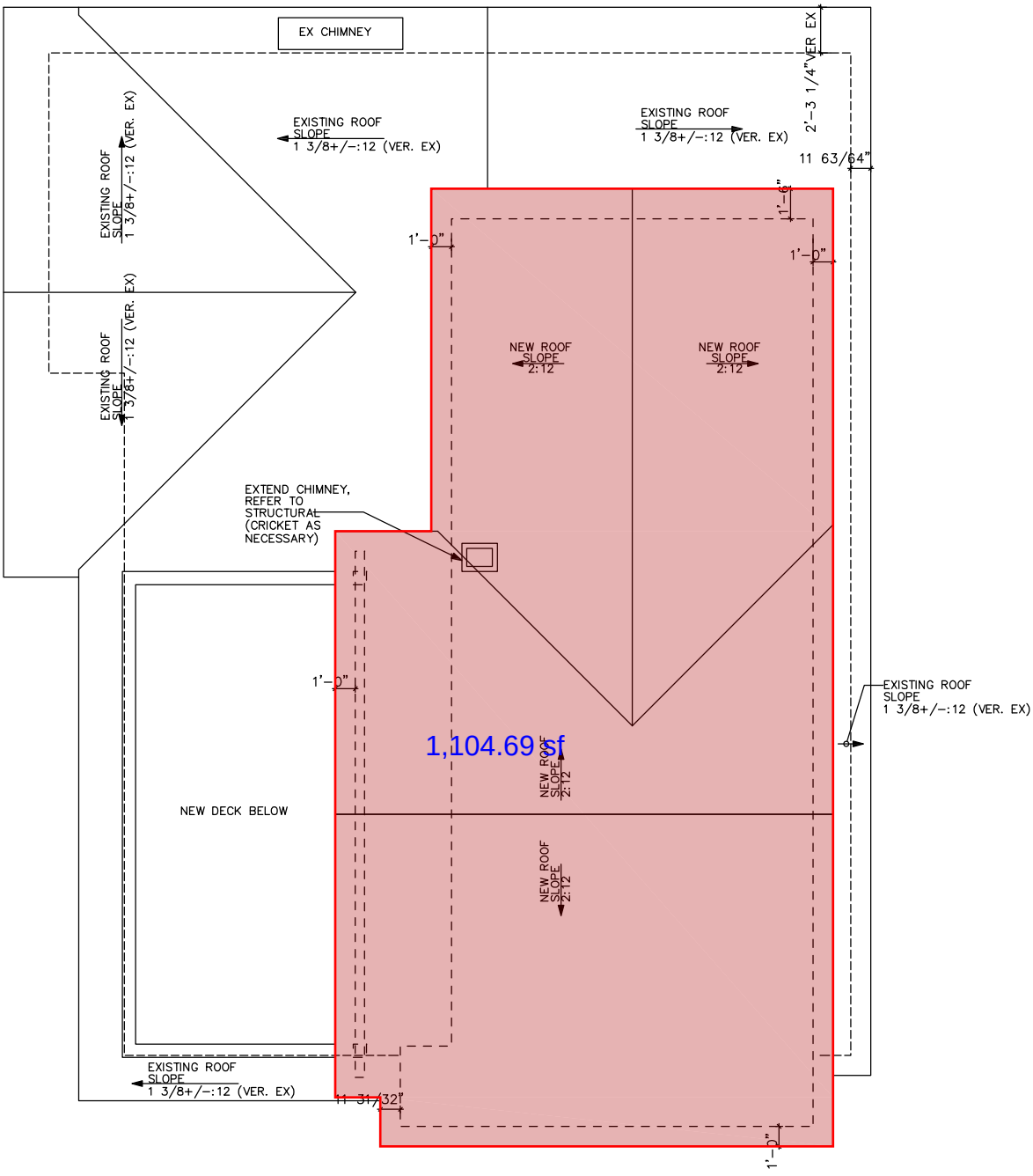
Refer to ASCE 7-16 Section 12.3.4.2

Diaphragm Level	Rho ρ	Shear F_x	Sum F_x
Roof Framing	1.0	**2.9**	2.9
2nd Framing	1.0	**4.6**	7.6
	Σ =	**7.6**	-

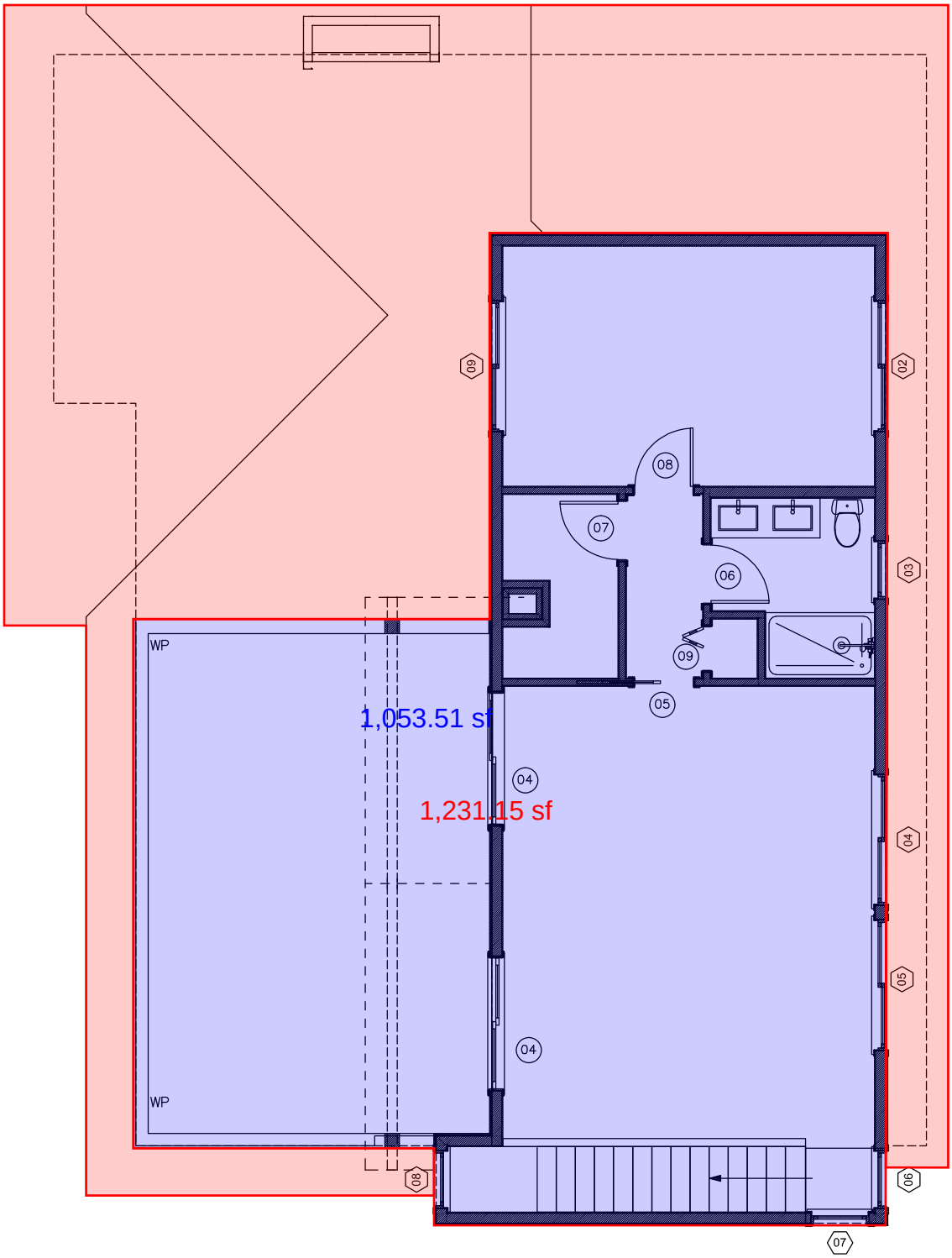
Diaphragm Forces - Vertical Distribution

Refer to ASCE 7-16 Section 12.10.1.1

Diaphragm Level	w_i (kips)	Σ w_i (kips)	F_i (kips)	Σ F_i (kips)	Σ $F_i * w_{px}$ / Σ w_i	F_{px} (Min) $0.2S_{DS}Iw_{px}$	F_{px} (Max) $0.4S_{DS}Iw_{px}$	F_{px} Govern
Roof Framing	22.1	22.1	2.9	2.9	2.9	2.9	5.9	**2.9**
2nd Framing	51.9	74.0	4.6	7.6	5.3	6.9	13.8	**6.9**



UPPER ROOF SEISMIC AREA



LOWER ROOF AND UPPER FLOOR SEISMIC AREA

Wind Design (ASCE 28.5 Enclosed Simple Diaphragm) **2018 IBC** **ASCE 7-16**

Building Exposure	Exp.= B	Section 1609.4	Section 26.7.3
Basic Wind Speed	V= 110		Per Jurisdiction
Risk Category	I_W= II		Table 1.5-1
Top of Roof Height (feet)	h= 31.125		
Mean Roof Height (feet)	h_{mean}= 29.21		
Building Length (feet)	L= 53.5		
Building Width (feet)	W= 40		
End Zone Width, a (feet)	a= 4		Figure 28.6-1
Roof Angle	Angle= 9.5		
Design Wind Pressure, p_{s3}	p_{s30A}= 21.3		Figure 28.6-1
Design Wind Pressure, p_{s3}	p_{s30B}= -9.1		Figure 28.6-1
Design Wind Pressure, p_{s3}	p_{s30C}= 14.2		Figure 28.6-1
Design Wind Pressure, p_{s3}	p_{s30D}= -5.3		Figure 28.6-1
Height/Exposure Adjustm	λ_{max}= 1.00		
Topo. Effect Coeff., K_{zt}	K_{zt}= 1.60		

$V_{asd} = V_{ult}*\sqrt{0.6}$ Section 1609.3.1

	ULT	ASD	Min. ASD
	$p_s=\lambda*Kzt*p_{s30}$	$p_s=\lambda*Kzt*ps30*0.6$	Per ASCE 28.5.4
p_{s30A}=	34.1	20.5	9.6
p_{s30B}=	-14.6	-8.7	4.8
p_{s30C}=	22.7	13.6	9.6
p_{s30D}=	-8.4	-5.1	4.8

X-Direction			**ASD**	**Min. ASD**
Area,A =	100.8	Roof =	***4673***	3103
Area,B =	13.8			
Area,C =	206.6			
Area,D =	18.0			
Area,A =	133.5	2nd =	***6571***	4420
Area,B =	18.8			
Area,C =	303.5			
Area,D =	28.0			

Y-Direction			**ASD**	**Min. ASD**
Area,A =	94.9	Roof =	***1755***	1499
Area,B =	55.8			
Area,C =	26.8			
Area,D =	13.2			
Area,A =	114.3	2nd =	***4238***	2931
Area,B =	24.6			
Area,C =	165.0			
Area,D =	27.5			

ENGINEERING
250 4th Ave South
Suite 200
Edmonds, WA 98020

Description: Wind Summary

By: JDM | Date: 8/17/2022

Checked | Date

Scale: NTS | Sheet No.: 43

Project: Monahan Residence

Job No.: 22139.10

City Facility and Program Information

Search Our Site

Climatic and Geographic Design Criteria

IRC TABLE R301.2 (1)
Climatic and Geographic Design Criteria

Roof Snow Load[a]	Wind Design[b]		Seismic Design Category[c]	Subject to Damage From:			Outside Design Temp–Heat/Cool	Ice Barrier Under-layment Required	Flood Hazards[e]	Air Freezing Index	Mean Annual Temp
	Speed	Topographic Effects		Weathering[d]	Frost Line Depth	Termite Decay					
25 psf	110 mph	See footnote[b]	D2	Moderate	12"	Slight to Moderate	24°F/83°F	No	NA	113	53°F

A. When using this roof snow load it will be left to the engineer's judgment whether to consider drift or sliding snow. However, rain on snow surcharge of 5 psf must be considered for roof slopes less than 5 degrees.
B. Wind exposure category and Topographic effects (Wind Speed-up Kzt factor) shall be determined on a site-specific basis by the Engineer of Record (components and cladding need not consider topographic effects unless otherwise determined by the engineer of record).
C. From IRC Table 301.2(1).
D. Weathering may require a higher strength concrete or grade of masonry than necessary to satisfy the structural requirements of this code. The grade of masonry units shall be determined from ASTM C 34, C 55, C 62, C 73, C 90, C 129, C 145, C 216 or C 652.
E. The City of Mercer Island participates in the National Flood Insurance Program (NFIP); Regular Program (No Special Flood Hazard Area). Further NFIP participation information: CID 530083, Initial FHBM Identified 06/28/74, Initial FIRM Identified 05/16/95, Current Effective Map Date (NSFHA), Reg-Emer Date 06/30/97.

Community Planning & Development

UPCOMING EVENTS

Virtual Community Workshop on Economic Development
06/30/2022 - 6:00pm

View the Community Planning & Development Calendar

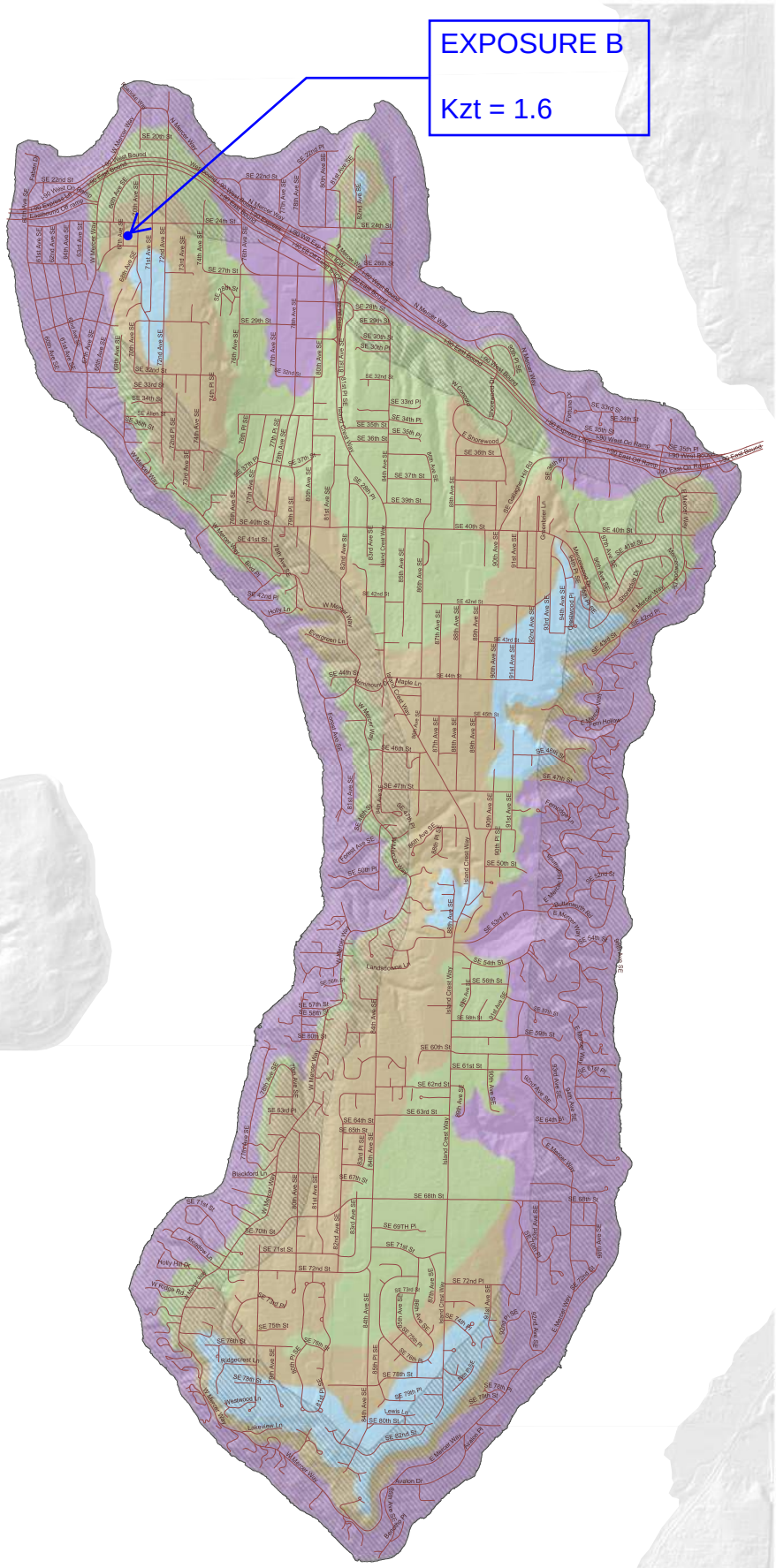
CONTACT INFORMATION

Follow this link for the latest facility and program information.

Mercer Island Wind Exposure and Wind Speed-Up (Topographic Effect)

by Development Services Group (DSG), City of Mercer Island
April 2009

0 0.5 1 Kilometers 1:12,000
0 0.5 1 Miles
T N



WIND EXPOSURE CATEGORIES & WIND SPEED-UP FACTORS
(ICC Section 1609 & ASCE 7-05 Chapter 6)

It is the responsibility of the Owner (or their Design Professional) to review site conditions and determine the Kzt factor to be utilized for each specific project. The Kzt factors and wind exposure categories indicated on this map are the minimum values accepted by the City of Mercer Island without requiring the design professional to submit additional calculations and supporting topographic documentation (to verify the values utilized in their wind load determination).

Please note – The Kzt values indicated on this map are approximations based upon periodic calculations of representative samplings around Mercer Island. These values are intended for City of Mercer Island's plan review purposes only.

WIND EXPOSURE CATEGORIES:

Wind Exposure Category	
	Exposure 'C' (1500 feet from Lake)
	Exposure 'B' (all other areas)

WIND SPEED-UP (TOPOGRAPHIC EFFECT) - K_zt Factor :

K_zt Factor	
	$K_zt = 1.0$
	$K_zt = 1.3$
	$K_zt = 1.6$
	$K_zt = 1.9$

GENERAL NOTES FOR WIND EXPOSURE AND WIND SPEED-UP MAP

This map is the Wind Exposure Category and Wind Speed-up (Topographic Effects) Map for the City of Mercer island. This map shows the minimum wind exposure category and the minimum wind speed-up, "K_zt" factor, which will be accepted without site specific documentation and calculation.

Other wind speed phenomena may occur on Mercer Island that is not specifically indentified on this map. It is the responsibility of the Owner (or their Design Professional) to review site conditions and determine the appropriate design wind speed and exposure category for their specific project and location.

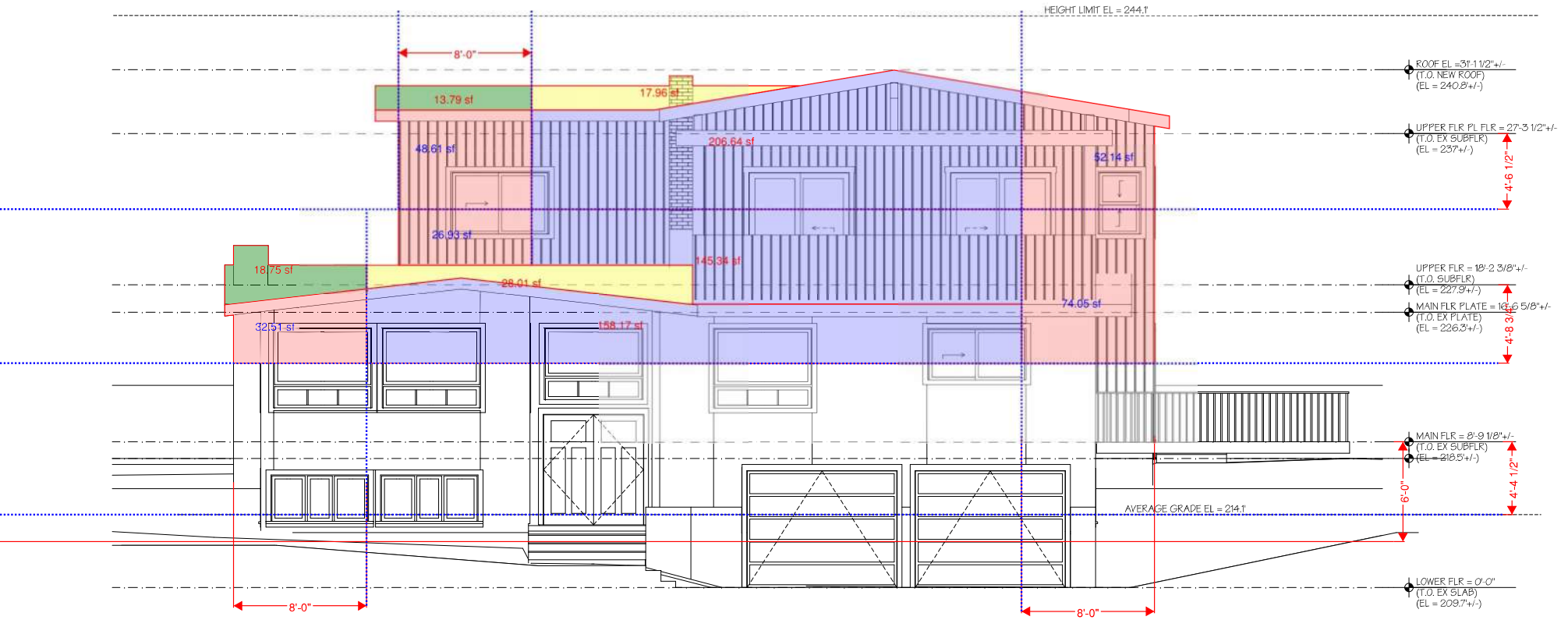
This map is for the sole use of the staff of the City of Mercer Island's Development Services Group (DSG) for the purposes of permit application evaluation. This map provides DSG staff a general assessment of Wind Exposure Category and Wind Speed-up (Topographic Effects). All areas have not been specifically evaluated and there may be locations that are not correctly represented on this map. It is the responsibility of individual property owners and map users to evaluate risk associated with their proposed development. No site-specific assessment of risk is implied or otherwise indicated by the City of Mercer Island with this map.

Information about data used for the map, references, and data limitation are all described the associated "Read Me" document. The digital version of this map is accompanied by a meta data file containing pertinent information about map construction. This data map is available on the City of Mercer Island website.

The City of Mercer Island is using guidance provided within ICC Section 1609 & ASCE 7-05 Chapter 6 regarding definitions used when creating this map.

DEFINITIONS:

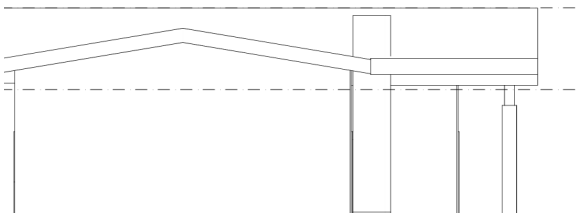
K_zt factor:	The topographic effect of wind speed-up at isolated hills, ridges, and escarpments constituting abrupt changes in the general topography, located in any exposure category, that meet all of the conditions noted in ASCE 7-05 Minimum Design Loads for Buildings and Other Structures, Section 6.5.7.
Exposure B:	The wind exposure category that applies where the site in question is located a minimum of 1500 feet from the shoreline and the mean roof height is less than or equal to 30 feet per IBC 2006 section 1609.4.3.
Exposure C:	The wind exposure category that applies where the site in question is located within 1500 feet from the shoreline per IBC 2006 section 1609.4.3.
Wind Speed:	Minimum 85 mph 3-second gust per IRC Figure R301.2(4)



WEST ELEVATION

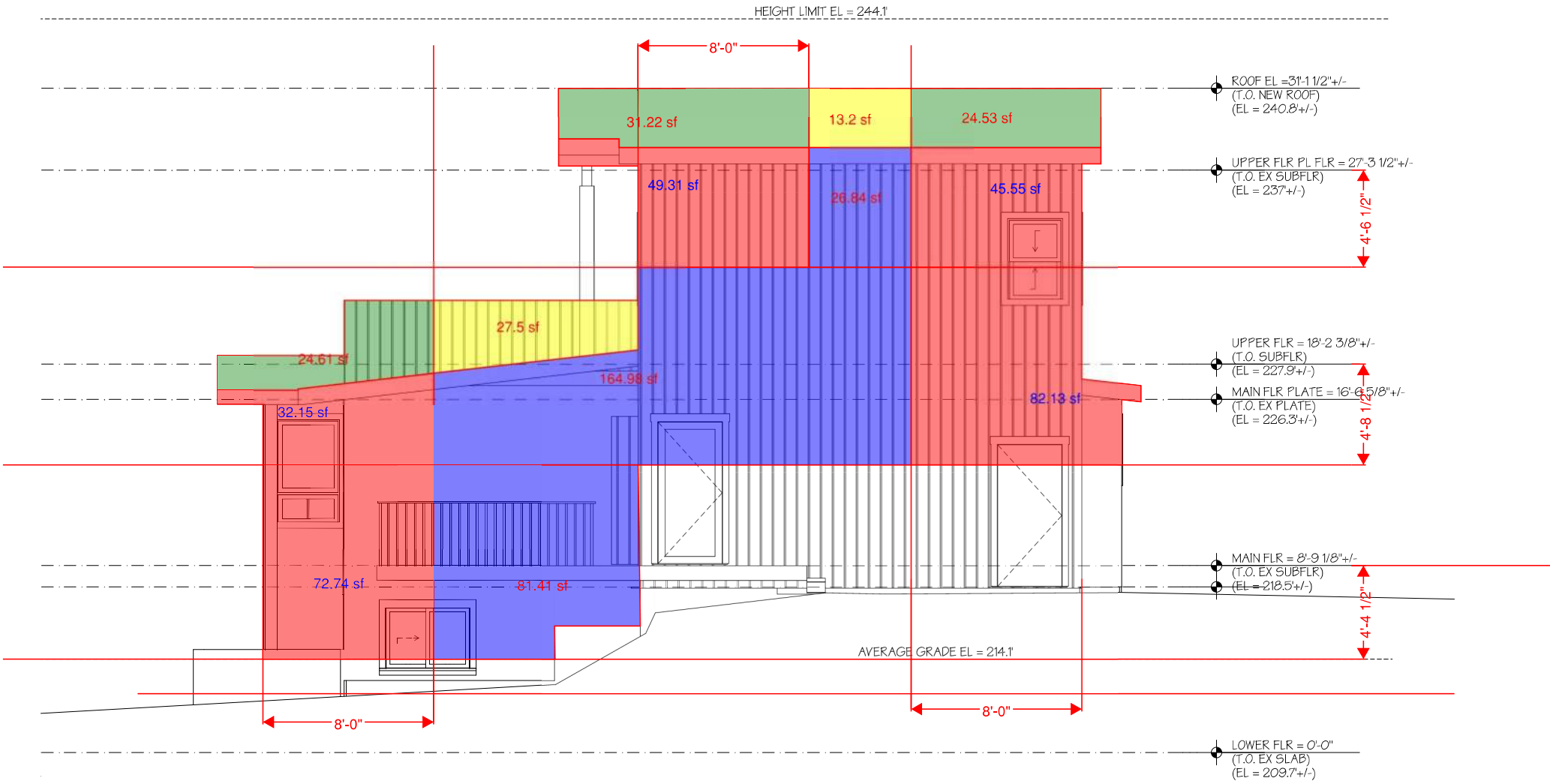
SCALE: 1/4" = 1'-0"

X-DIRECTION WIND AREAS



LOWER FLOOR WIND LOAD TO WALL LINE 1:

Fw1 = [(72.74 SF) * (20.5 PSF) + (81.41 SF) * (13.6 PSF)] = 2598 #

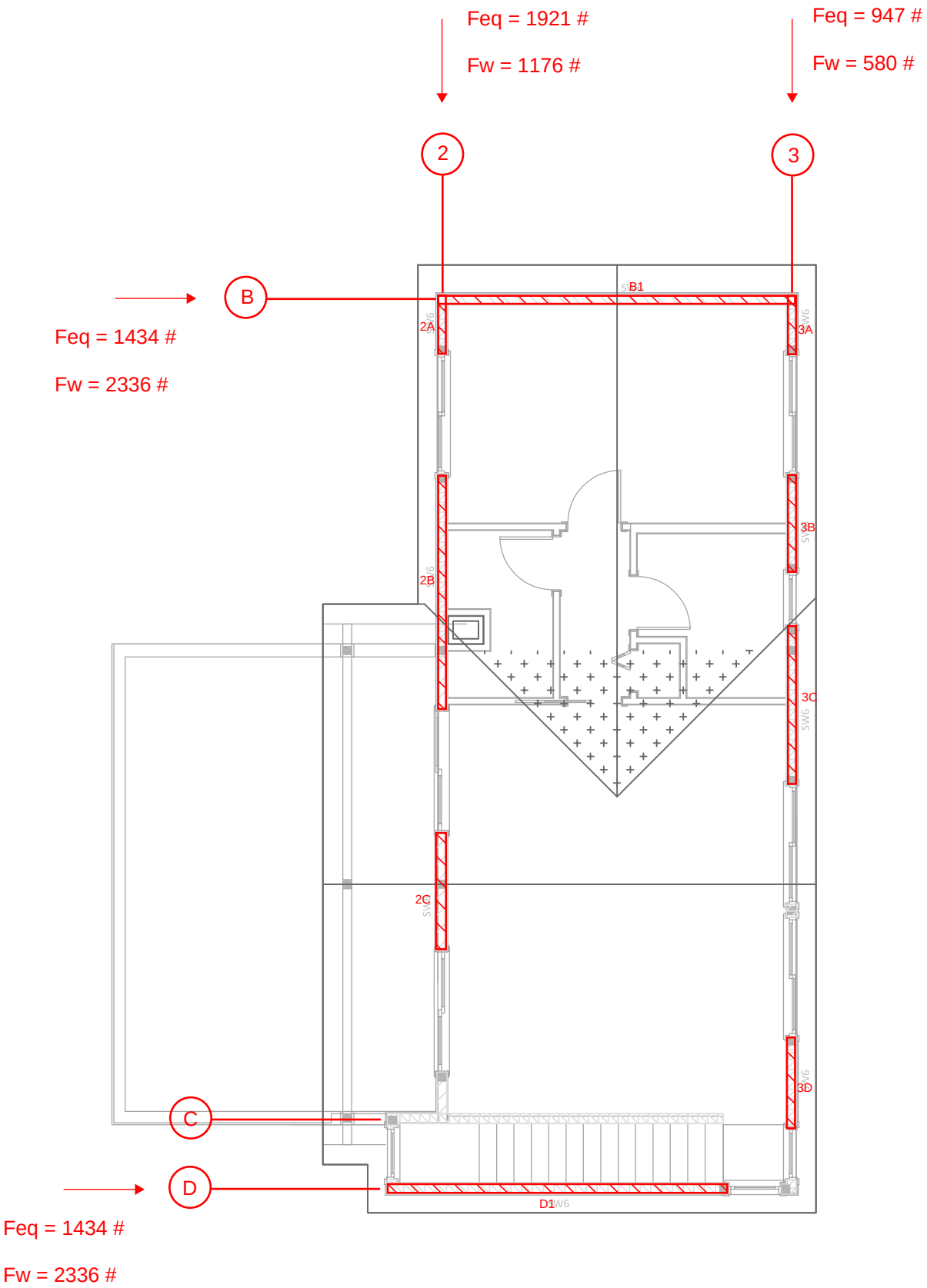


SOUTH

~~NORTH~~ ELEVATION

SCALE: 1/4" = 1'-0"

Y-DIRECTION WIND AREAS



UPPER LATERAL KEY PLAN

Upper Floor Shear Walls - Walls Below the Roof Framing

X - Direction Walls

Fx (EQ) =	2.9	kips (Story Shear)
Fx (wind) =	4.7	kips (Story Shear)

Wx =	65.8	PLF	seismic
Wx =	104.4	PLF	wind

Story HT =	9.083
Wall HT =	9.083
Max h/w	3.5
S_{DS} =	0.93

Wall Line	Wall Mark	SW Length	Trib Width	EQ, WL 2w/h	EQ Shear	Wind Shear	SW Callout	Reduced HD Length	EQ Gross Uplift	Wind Gross Uplift	EQ $(0.6-0.14S_{DS})$DL End i	EQ $(0.6-0.14S_{DS})$DL End j	Wind 0.6 * DL End i	Wind 0.6 * DL End j	Governing Net Uplift End i	Governing Net Uplift End j	Hold-down End i	Hold-down End j	EQ Line Load	Wind Line Load	DL Trib
A		0	0					-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
B	1	18	22.375	1.0	82	93	SW6	17.5	0.8	1.2	0.6	0.6	0.7	0.7	0.5	0.5	None	None	1.5	2.3	3.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
C		0	0					-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
D	1	17.167	22.375	1.0	86	97	SW6	16.7	0.8	1.3	1.2	1.2	1.5	1.5	0.0	0.0	None	None	1.5	2.3	13.5
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0	0					-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		Σ	44.8																2.9	4.7	

Shearwalls: 1/2" sheathing w/ HF studs			
Nil	-	0	plf
SW6	8d@6"o.c.	242	plf
SW4	8d@4"o.c.	350	plf
SW3	8d@3"o.c.	455	plf
SW2	8d@2"o.c.	595	plf
2SW4	8d@4"o.c.	706	plf
2SW3	8d@3"o.c.	910	plf
2SW2	8d@2"o.c.	1190	plf
Re-Calc	-	1200	plf

Holdown Table (Floor Clear Span = 16")			
Nil	-	0	kips
None	-	0.5	kips
MST37	(2)-2x HF	2.345	kips
MST48	(2)-2x HF	3.640	kips
MST60	(2)-2x HF	5.405	kips
MST72	(2)-2x HF	6.475	kips
			kips
			kips
			kips
			kips
Re-Calc	-	6.5	kips

Input Cell
Input Cell w/ Formula

C G ENGINEERING

250 4th Ave. South
Suite 200
Edmonds, WA 98020

Description	Upper Floor Shear Walls	By	JDM	Date	08/24/22
	X-Direction	Checked		Date	
		Scale	NTS	Sheet No.	
Project	Monahan Residence	Job No.	22139.10		49

Upper Floor Shear Walls - Walls Below the Roof Framing

Y - Direction Walls

Fy (EQ) =	2.9	kips (Story Shear)
Fy (wind) =	1.8	kips (Story Shear)

Story HT =	9.083
Wall HT =	9.083
Max h/w	3.5
S_{DS} =	0.93

Wy =	129 PLF	seismic
Wy =	77 PLF	wind

Wall Line	Wall Mark	SW Length	Trib Width	EQ, WL 2w/h	EQ Shear	Wind Shear	SW Callout	Reduced HD Length	EQ Gross Uplift	Wind Gross Uplift	EQ $(0.6-0.14S_{DS})$DL End i	EQ $(0.6-0.14S_{DS})$DL End j	Wind 0.6 * DL End i	Wind 0.6 * DL End j	Governing Net Uplift End i	Governing Net Uplift End j	Hold-down End i	Hold-down End j	EQ Line Load	Wind Line Load	DL Trib
1		0	0					-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
2	A	3	15.29167	0.7	145	62	SW6	2.5	1.0	0.6	0.2	0.2	0.2	0.2	0.9	0.9	MST37	MST37	2.0	1.2	10.0
	B	11.833	-	1.0	95	41	SW6	11.3	0.9	0.5	0.7	0.7	0.9	0.9	0.2	0.2	None	None	-	-	10.0
	C	5.833	-	1.0	95	41	SW6	5.3	0.9	0.6	0.2	0.2	0.2	0.2	0.8	0.8	MST37	MST37	-	-	2.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
3	A	3	7.54167	0.7	72	31	SW6	2.5	0.5	0.3	0.2	0.2	0.2	0.2	0.3	0.3	None	None	1.0	0.6	10.0
	B	5	-	1.0	48	20	SW6	4.5	0.5	0.3	0.3	0.3	0.4	0.4	0.2	0.2	None	None	-	-	10.0
	C	8	-	1.0	48	20	SW6	7.5	0.5	0.3	0.2	0.2	0.3	0.3	0.2	0.2	None	None	-	-	2.0
	D	4.4167	-	1.0	49	21	SW6	3.9	0.5	0.3	0.1	0.1	0.2	0.2	0.4	0.4	None	None	-	-	2.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0	0					-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0	0					-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		0						-0.5			0.0	0.0	0.0	0.0							0.0
		Σ	22.8																2.9	1.8	

Input Cell

Input Cell w/ Formula

ENGINEERING
250 4th Ave. South
Suite 200
Edmonds, WA 98020

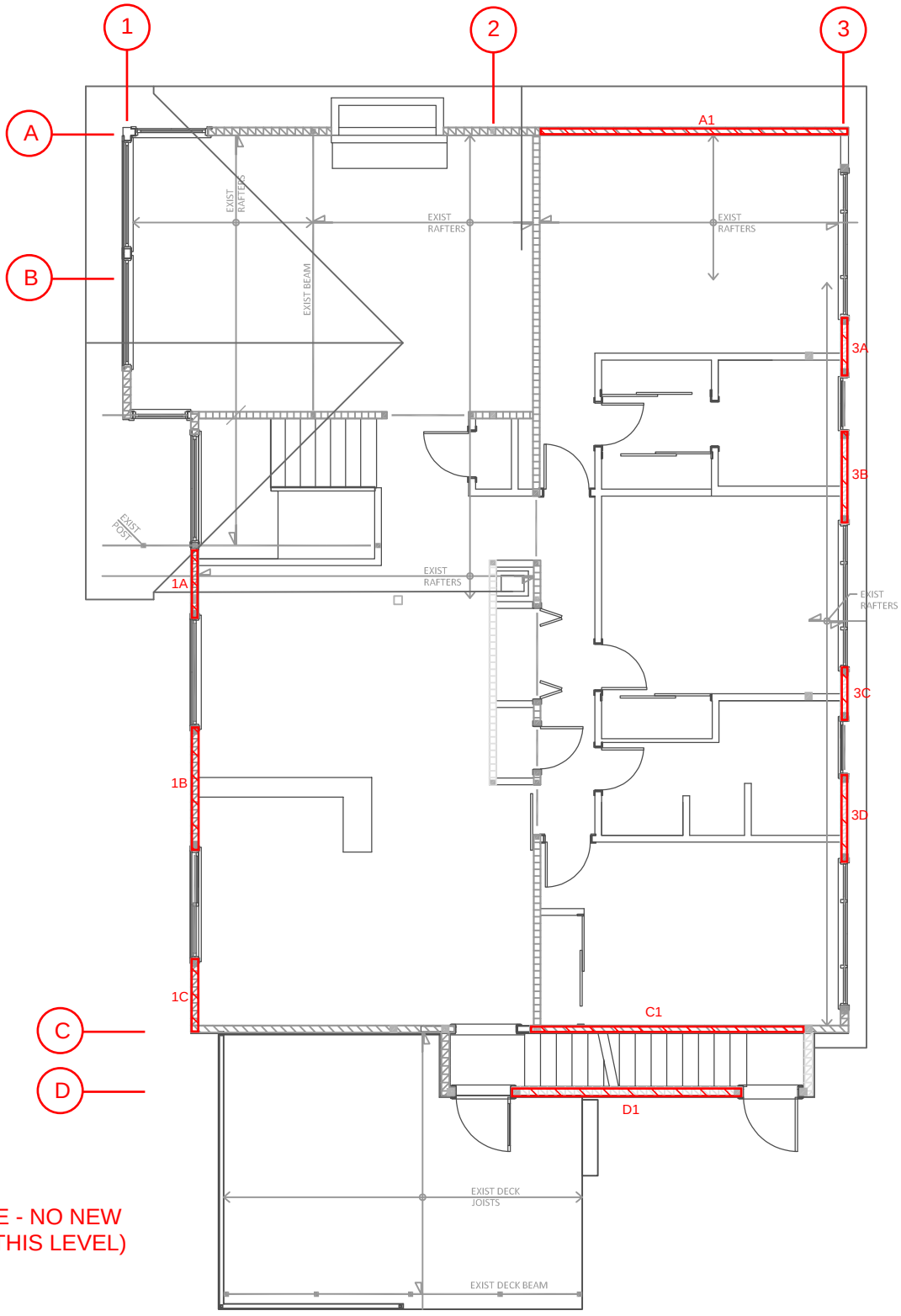
Description	Upper Floor Shear Walls	By JDM	Date 08/24/22
	Y-Direction	Checked	Date
		Scale NTS	Sheet No.
Project	Monahan Residence	Job No. 22139.10	50

Feq = 3405 #

Fw = 2788 #

Feq = 4087 #

Fw = 3206 #



Feq = 3318 #

Fw = 5187 #

Feq = 2579 #

Fw = 3721 #

Feq = 1434 #

Fw = 2336 #

(FROM ABOVE - NO NEW LOAD FROM THIS LEVEL)

MAIN LATERAL KEY PLAN

Main Floor Shear Walls - Walls Below the Upper Floor Framing

X - Direction Walls

Fx (EQ) =	4.6	kips (Story Shear)
Fx (wind) =	6.6	kips (Story Shear)

Story HT =	9.4167
Wall HT =	8.0833
Max h/w	3.5
S_{DS} =	0.93

Wx =	93 PLF	seismic
Wx =	132 PLF	wind

Wall Line	Wall Mark	SW Length	Trib Width	Line Load From Above EQ	Line Load From Above Wind	EQ, WL 2w/h	EQ Shear	Wind Shear	SW Callout	Reduced HD Length	EQ Gross Uplift	Wind Gross Uplift	EQ $(0.6-0.14S_{DS})$DL End i	EQ $(0.6-0.14S_{DS})$DL End j	Wind 0.6 * DL End i	Wind 0.6 * DL End j	Net Uplift From Above End i	Net Uplift From Above End j	Governing Net Uplift End i	Governing Net Uplift End j	Hold-down End i	Hold-down End j	EQ Line Load	Wind Line Load	DL Trib
A	1	17.4167	24.875	1.0	1.9	1.0	192	213	SW6	16.9	1.9	2.9	0.3	0.3	0.4	0.4	0.0	0.0	2.5	2.5	HDU2	HDU2	3.3	5.2	0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5															0.0
		0								-0.5															0.0
		0								-0.5															0.0
		0								-0.5															0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0	0	1.5	2.3					-0.5			0.0	0.0	0.0	0.0	0.5	0.5							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
C	1	15.167	24.875	0.3	0.4	1.0	170	175	SW6	14.7	1.7	2.4	0.3	0.3	0.4	0.4	0.0	0.0	2.0	2.0	HDU2	HDU2	2.6	3.7	0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
D	1	12.75	0	1.5	2.3	1.0	116	131	SW6	12.3	1.1	1.8	0.2	0.2	0.3	0.3	0.0	0.0	1.5	1.5	HDU2	HDU2	1.5	2.3	0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0	0	0.0	0.0					-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		Σ	49.8	4.3	7.0																		8.9	13.6	

NOTE: UPGRADE EXISTING SHEAR WALL

Shearwalls: 1/2" sheathing w/ HF studs			
Nil	-	0	plf
SW6	8d@6"o.c.	242	plf
SW4	8d@4"o.c.	350	plf
SW3	8d@3"o.c.	455	plf
SW2	8d@2"o.c.	595	plf
2SW4	8d@4"o.c.	706	plf
2SW3	8d@3"o.c.	910	plf
2SW2	8d@2"o.c.	1190	plf
Re-Calc	-	1200	plf

Holdown Table (Floor Clear Span = 16")			
Nil	-	0	kips
None	-	0.5	kips
MST37	(2)-2x HF	2.345	kips
MST48	(2)-2x HF	3.640	kips
MST60	(2)-2x HF	5.405	kips
MST72	(2)-2x HF	6.475	kips
			kips
			kips
			kips
			kips
Re-Calc	-	6.5	kips

Input Cell

Input Cell w/ Formula

ENGINEERING
250 4th Ave. South
Suite 200
Edmonds, WA 98020

Description: Main Floor Shear Walls	By: JDM	Date: 08/24/22	
X-Direction	Checked	Date	
	Scale: NTS	Sheet No.	
Project: Monahan Residence	Job No. 22139.10	52	

Main Floor Shear Walls - Walls Below the Upper Floor Framing

Y - Direction Walls

Fy (EQ) =	4.6	kips (Story Shear)
Fy (wind) =	4.2	kips (Story Shear)

Story HT =	9.4167
Wall HT =	8.0833
Max h/w	3.5
S_{DS} =	0.93

Wy =	128	PLF	seismic
Wy =	118	PLF	wind

Wall Line	Wall Mark	SW Length	Trib Width	Line Load From Above EQ	Line Load From Above Wind	EQ, WL 2w/h	EQ Shear	Wind Shear	SW Callout	Reduced HD Length	EQ Gross Uplift	Wind Gross Uplift	EQ $(0.6-0.14S_{DS})DL$ End i	EQ $(0.6-0.14S_{DS})DL$ End j	Wind 0.6 * DL End i	Wind 0.6 * DL End j	Net Uplift From Above End i	Net Uplift From Above End j	Governing Net Uplift End i	Governing Net Uplift End j	Hold-down End i	Hold-down End j	EQ Line Load	Wind Line Load	DL Trib
1	A	4	18	1.1	0.7	1.0	236	137	SW6	3.5	2.5	2.0	0.2	0.2	0.2	0.2	0.0	0.0	2.3	2.3	MST37	MST37	3.4	2.8	8.3
	B	6.8333	-	-	-	1.0	234	136	SW6	6.3	2.4	1.9	0.3	0.3	0.4	0.4	0.0	0.0	2.0	2.0	MST37	MST37	-	-	8.3
	C	3.833	-	-	-	0.9	246	143	SW4	3.3	2.5	2.1	0.2	0.2	0.2	0.2	0.0	0.0	2.3	2.3	MST48	MST48	-	-	8.3
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0	0	2.0	1.2					-0.5			0.0	0.0	0.0	0.0	0.9	0.9							0.0
		0								-0.5			0.0	0.0	0.0	0.0	0.2	0.2							0.0
		0								-0.5			0.0	0.0	0.0	0.0	0.8	0.8							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
3	A	3.33	18	1.8	1.1	0.8	310	172	SW4	2.8	2.8	2.2	0.1	0.1	0.1	0.1	0.0	0.0	2.7	2.7	HDU4	HDU4	4.1	3.2	2.0
	B	5.0833	-	-	-	1.0	255	142	SW4	4.6	2.7	2.1	0.1	0.1	0.2	0.2	0.0	0.0	2.5	2.5	HDU4	HDU4	-	-	2.0
	C	2.9167	-	-	-	0.7	354	196	SW3	2.4	2.9	2.3	0.1	0.1	0.1	0.1	0.0	0.0	2.8	2.8	HDU4	HDU4	-	-	2.0
	D	4.8333	-	-	-	1.0	255	142	SW4	4.3	2.7	2.1	0.1	0.1	0.2	0.2	0.0	0.0	2.6	2.6	HDU4	HDU4	-	-	2.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0	0	0.0	0.0					-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0	0	0.0	0.0					-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		0								-0.5			0.0	0.0	0.0	0.0	#####	#####							0.0
		Σ	36.0	4.9	2.9																		9.5	7.2	

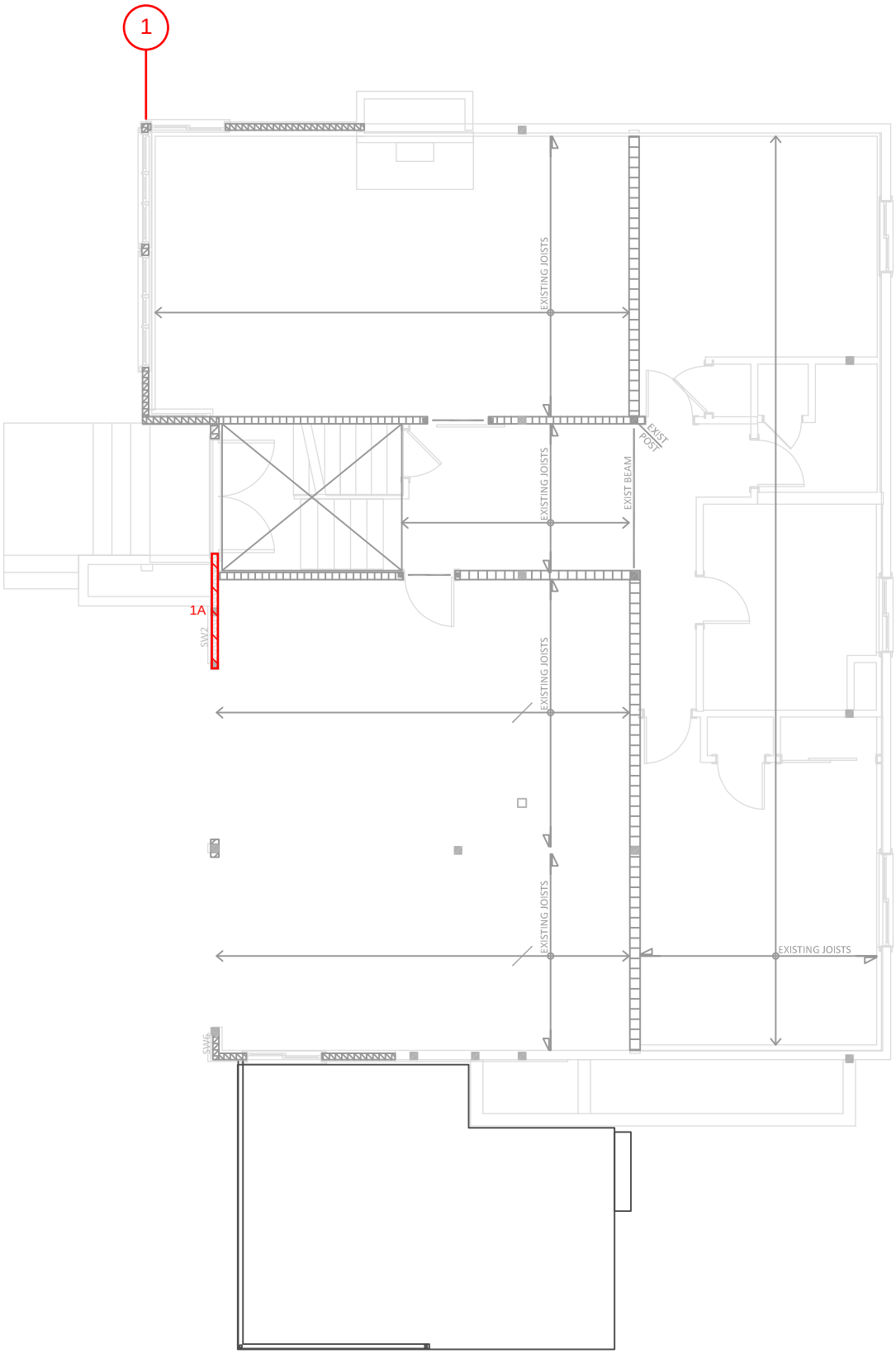
Input Cell
Input Cell w/ Formula

Description: Main Floor Shear Walls		By: JDM	Date: 08/24/22
Y-Direction		Checked:	Date:
		Scale: NTS	Sheet No. 53
Project: Monahan Residence		Job No. 22139.10	

CG ENGINEERING
250 4th Ave. South
Suite 200
Edmonds, WA 98020

Feq = 3405 #

Fw = 2788 # + 2385 #



LOWER LATERAL KEY PLAN

Lower Floor Shear Walls - Walls Below the Main Floor Framing

Y - Direction Walls

Fy (EQ) =		kips (Story Shear)
Fy (wind) =	2.6	kips (Story Shear)

Story HT =	8.75
Wall HT =	7.75
Max h/w	3.5
S_{DS} =	0.93

Wy =	0	PLF	seismic
Wy =	2598	PLF	wind

MAX SEISMIC UPLIFT = 7669 # (ASD); 10956 # (ULT)

MAX WIND UPLIFT = 10260 # (ASD); 17100 # (ULT)

Wall Line	Wall Mark	SW Length	Trib Width	Line Load From Above EQ	Line Load From Above Wind	EQ, WL 2w/h	EQ Shear	Wind Shear	SW Callout	Reduced HD Length	EQ Gross Uplift	Wind Gross Uplift	EQ $(0.6-0.14S_{DS})$DL End i	EQ $(0.6-0.14S_{DS})$DL End j	Wind 0.6 * DL End i	Wind 0.6 * DL End j	Net Uplift From Above End i	Net Uplift From Above End j	Governing Net Uplift End i	Governing Net Uplift End j	Hold-down End i	Hold-down End j	EQ Line Load	Wind Line Load	DL Trib
1	A	6	1	3.4	2.8	1.0	571	641	2SW4	5.5	5.5	8.6	0.1	0.1	0.1	0.1	2.3	2.3	10.8	10.8	HDU14	HDU14	3.4	5.4	0.0
		0								-0.5			0.0	0.0	0.0	0.0	2.0	2.0							0.0
		0								-0.5			0.0	0.0	0.0	0.0	2.3	2.3							0.0
		0														0.0	#####	#####							0.0
		0														0.0	#####	#####							0.0
		0														0.0	#####	#####							0.0
		0															#####	#####							0.0
		0														0.0	#####	#####							0.0
		0														0.0	#####	#####							0.0
		0														0.0	#####	#####							0.0
		5	0	2.0	1.2					4.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		7								6.5			0.1	0.1	0.2	0.2	#####	#####							0.0
		9.5								9.0			0.2	0.2	0.2	0.2	#####	#####							0.0
		3								2.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		3								2.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		3								2.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		3								2.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		3								2.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		3								2.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
3		5	0	4.1	3.2					4.5			0.1	0.1	0.1	0.1	2.7	2.7							0.0
		6.5								6.0			0.1	0.1	0.2	0.2	2.5	2.5							0.0
		8								7.5			0.1	0.1	0.2	0.2	2.8	2.8							0.0
		8								7.5			0.1	0.1	0.2	0.2	2.6	2.6							0.0
		6.5								6.0			0.1	0.1	0.2	0.2	#####	#####							0.0
		5								4.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		6								5.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4	0	0.0	0.0					3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4	0	0.0	0.0					3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		4								3.5			0.1	0.1	0.1	0.1	#####	#####							0.0
		Σ	1.0	9.5	7.2																		9.5	9.8	

Input Cell

Input Cell w/ Formula

C.G ENGINEERING 250 4th Ave. South Suite 200 Edmonds, WA 98020	Description: Lower Floor Shear Walls Y-Direction	By: JDM Checked: Scale: NTS	Date: 08/25/22 Date:
	Project: Monahan Residence	Job No.: 22139.10	Sheet No.: 55

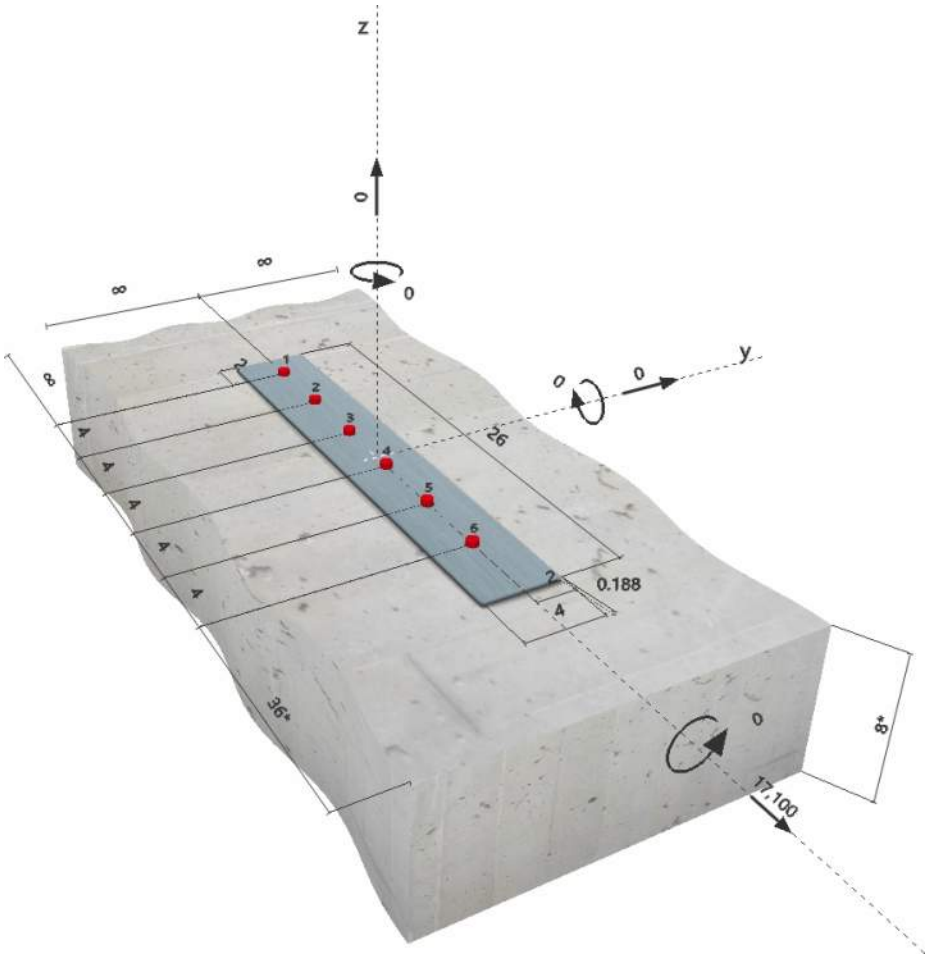
Company:		Page:	1
Specifier:		Project:	
Address:		Sub-Project I Pos. No.:	
Phone I Fax:	|	Date:	8/25/2022
E-Mail:			

Specifier's comments:

1 Input data

Anchor type and diameter:	**HIT-HY 200 + HAS 5/8**
Effective embedment depth:	$h_{ef,act}$ = 4.500 in. ($h_{ef,limit}$ = - in.)
Material:	5.8
Evaluation Service Report:	ESR-3187
Issued I Valid:	3/1/2016 | 3/1/2018
Proof:	Design method ACI 318-14 / Chem
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.188 in.
Anchor plate:	l_x x l_y x t = 26.000 in. x 4.000 in. x 0.188 in.; (Recommended plate thickness: not calculated
Profile:	no profile
Base material:	cracked concrete, 2500, f_c' = 2500 psi; h = 8.000 in., Temp. short/long: 32/32 °F
Installation:	**hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: condition A, shear: condition A; no supplemental splitting reinforcement present edge reinforcement: > No. 4 bar

Geometry [in.] & Loading [lb, in.lb]



Company:
Specifier:
Address:
Phone I Fax: |
E-Mail:

2 Proof I Utilization (Governing Cases)

		Design values [lb]		Utilization	
Loading	**Proof**	**Load**	**Capacity**	**β_N / β_V [%]**	**Status**
Tension	-	-	-	- / -	-
Shear	Pryout Strength (Bond Strength controls)	17100	26796	- / 64	OK

Loading	**β_N**	**β_V**	**ζ**	**Utilization $\beta_{N,V}$ [%]**	**Status**
Combined tension and shear loads	-	-	-	-	-

3 Warnings

- Please consider all details and hints/warnings given in the detailed report!

Fastening meets the design criteria!

4 Remarks; Your Cooperation Duties

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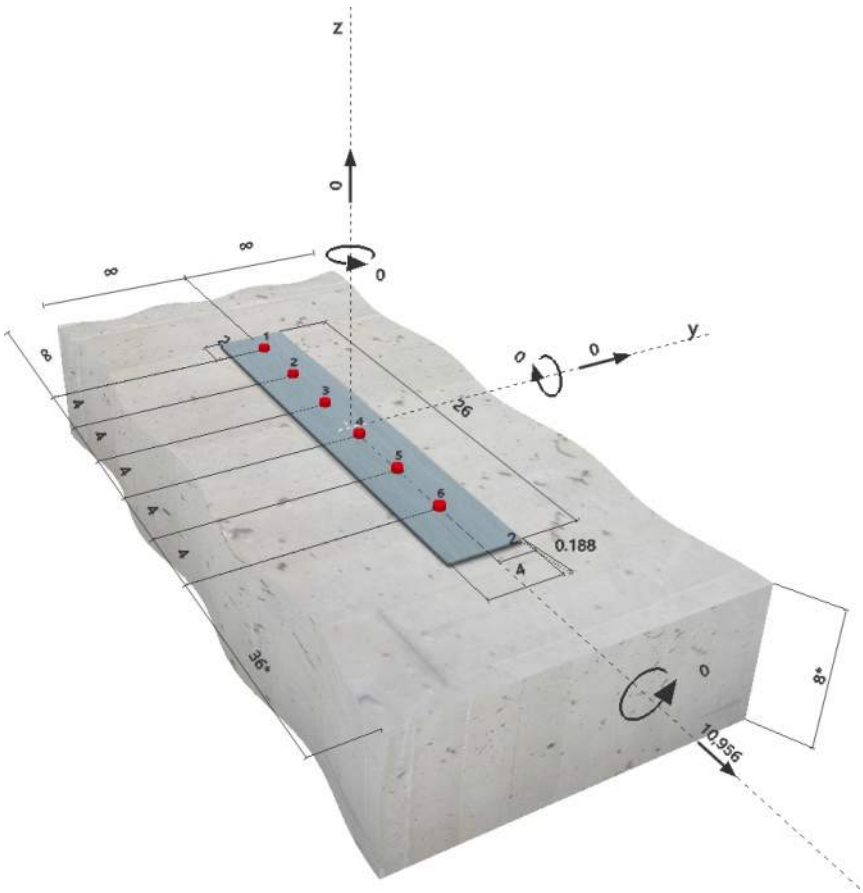
Company:		Page:	1
Specifier:		Project:	
Address:		Sub-Project I Pos. No.:	
Phone I Fax:	|	Date:	8/25/2022
E-Mail:			

Specifier's comments:

1 Input data

Anchor type and diameter:	**HIT-HY 200 + HAS 5/8**
Effective embedment depth:	$h_{ef,act}$ = 4.500 in. ($h_{ef,limit}$ = - in.)
Material:	5.8
Evaluation Service Report:	ESR-3187
Issued I Valid:	3/1/2016 | 3/1/2018
Proof:	Design method ACI 318-14 / Chem
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.188 in.
Anchor plate:	l_x x l_y x t = 26.000 in. x 4.000 in. x 0.188 in.; (Recommended plate thickness: not calculated
Profile:	no profile
Base material:	cracked concrete, 2500, f_c' = 2500 psi; h = 8.000 in., Temp. short/long: 32/32 °F
Installation:	**hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: condition A, shear: condition A; no supplemental splitting reinforcement present edge reinforcement: > No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.2.3.4.3 (c)) Shear load: yes (17.2.3.5.3 (b))

Geometry [in.] & Loading [lb, in.lb]



Company:
Specifier:
Address:
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E-Mail:

2 Proof I Utilization (Governing Cases)

		Design values [lb]		Utilization	
Loading	**Proof**	**Load**	**Capacity**	**β_N / β_V [%]**	**Status**
Tension	-	-	-	- / -	-
Shear	Pryout Strength (Bond Strength controls)	10956	21436	- / 52	OK

Loading	**β_N**	**β_V**	**ζ**	**Utilization $\beta_{N,V}$ [%]**	**Status**
Combined tension and shear loads	-	-	-	-	-

3 Warnings

- Please consider all details and hints/warnings given in the detailed report!

Fastening meets the design criteria!

4 Remarks; Your Cooperation Duties

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