

STRUCTURAL CALCS

Imani Residence
2728 63rd Ave SE
Mercer Island, WA



Javid Abdi, PE, SE
6810 NE 149th St.
Kenmore, WA – 98028
Atlas.CSE@gmail.com
206-427-7233

Project: Imani Residence

By: JDA

Proj No: 270-2024

Date: 02/03/25

Summary

The project consists of a new single-family residence (SFR) located at the above address in Mercer Island, WA. The two-story SFR will have a partial basement level (1020 SF); main floor level consisting of gathering spaces (1300 SF) and garage (440 SF); and upper floor level space with bedrooms (1370 SF) and two deck areas (500 SF)

The structure is comprised of the following: reinforced concrete strip and spread footings; reinforced concrete foundation walls; reinforced concrete slab on grade basement level and garage; and wood framed main floor, upper floor, and roof level (TJI or connector plate floor trusses) supported on interior and exterior wood framed load bearing walls, beams, and posts. The lateral systems will consist of wood sheathed diaphragms and shear walls (tongue & groove plywood floor sheathing, plywood roof and plywood wall sheathing), and Simpson StrongTie holdowns.

See page 2 for lateral designs. Site seismic variables are shown on pages 3 - 4; seismic tributary areas and shear wall lengths are shown on pages 5 - 8; wind load derivation is shown on pages 9 - 11; and wind areas are shown on page 12. Seismic and wind loads were determined using ASCE 7-22 procedures. As shown on page 2, shearwalls with 10d nails spaced at 6" o.c. (SW-6), 4" o.c. (SW-4), 3" oc (SW-3), and 33" oc at each side (SW-33) are required. Shearwalls have been detailed to meet the ASD shearwall capacity values as listed in 1/S6.6. LTP4 and A34 clips have an ASD capacity of 540# and 550# per clip; SDS screws have an ASD capacity of 400# per screws; 5/8" and 3/4" diameter anchor bolts have an ASD capacity of 1485# and 2039# with Doug Fir plates. The required spacing of these connectors is shown in the shearwall table in the plans. Each shearwall will have a different uplift demand, as shown on page 2. Use strapped shearwalls to minimize amount and magnitude of holdowns; see pages 67 - 69. Extend straps above and below opening a sufficient distance to ensure strap has capacity and shearwall capacity is not exceeded. Note that sheathing above and below opening is not accounted for in shearwall design, only to transfer shear forces to piers. Simpson holdowns will be used as shown in the plans, sized to ensure ASD uplift capacity. Anchorage of the HDU's into concrete were designed for worst case LRFD load when including the seismic overstrength factor. To preclude breakout, additional reinforcing hairpins are detailed to transfer shear force into new foundation walls.

Gravity system was designed for 25 psf roof snow load, 15 psf roof dead load, 40 psf floor live load (60 psf at decks), and 25 psf floor dead load. See pages 13 - 15 for framing key; and pages 16 - 59 for member designs. Uplift for each member considering $0.6D+0.6W$ will be resisted by straps at headers/beams; and H2.5a hurricane ties at rafters. Where holdowns occur over a beam, ensure beam flexural/shear/bearing capacity is sufficient when including overstrength.

Footings were sized using an allowable bearing pressure of 1500 psf (2000 psf for seismic); seismic overcharge of 7H; and horizontal design pressure of 55 pcf. Foundation walls were sized and detailed as retaining walls--see pages 60-66. Per ACI Table 11.6-1, provide minimum longitudinal reinforcing of 0.0012 and transverse reinforcing of 0.002 in the walls; and 0.0018 per ACI Table 7.6.1.1 in footing.

Project: 2728 63rd (Mercer Island)
Proj No: 270-2024

By: JDA
Date: 2/3/2025

R	6.5	ASCE 7-16 Table 12.2-1
Ω_w	2.5	
C _d	4	
Soil Class	CD	
V	0.65	= C _w W - ASCE 7-22 (12.8-1)
C _v	0.178	
		= S ₁ / (R _W) - ASCE 7-22 (12.8-2) Method 1
	0.178	= S ₁ / (R _W) - ASCE 7-22 (12.8-2) Method 2
	0.405	= S ₁ / (T ₁ (R _W) - # T < T ₁ ASCE 7-22 (12.8-4)
	0.008	= 0.05 S ₁ / (T ₁ (R _W) - # T < T ₁ ASCE 7-22 (12.8-5)
	0.049	= 0.5 S ₁ / (R _W) - if S ₁ > 0.5 ASCE 7-22 (12.8-7)
W	95	Kips
I _e	1	ASCE 7-22 Table 1.5-2
S _s	-	ASCE 7 Hazard Tool
S ₁	1.55	ASCE 7 Hazard Tool
S ₂	0.64	ASCE 7 Hazard Tool
S ₃	1.74	ASCE 7 Hazard Tool
S ₄	1.09	ASCE 7 Hazard Tool
S ₅	1.16	= 2.0 S ₁ - ASCE 7-22 (11.4-1)
S ₆	0.73	= 2.0 S ₁ - ASCE 7-22 (11.4-2)
T ₁	6	ASCE 7 Hazard Tool
PGA _s	0.72	ASCE 7 Hazard Tool
V ₅₀	365	ASCE 7 Hazard Tool
S _{DC}	D	ASCE 7 Hazard Tool
C _t	0.025	ASCE 7-22 Table 12.8-2
h _n	20.25	feet
x	0.8	ASCE 7-22 Table 12.8-2
T	0.277	seconds = C _t h _n ^{0.75} ASCE 7-22 (12.8-8)

Story	Weight (Kips)	Height (ft)	Story H (ft)	W _h (Kip-ft)	C _u	F _{uE} , Kips	Σ F _{uE} , Kips	F _{uE} , Kips	Σ F _{uE} , Kips	F _{uW} , Kips	Σ F _{uW} , Kips	F _{uW} , Kips	Σ F _{uW} , Kips	F _{uW} , Kips	Σ F _{uW} , Kips	F _{uW} , Kips	Σ F _{uW} , Kips
Roof	36.64	20.25	9.00	742	0.54	8.8	6.194	8.8	6.194	3.232	3.232	3.069	3.069	6.194	6.194	3.069	6.194
Upper	58.12	11.00	10.00	639	0.46	7.6	16.5	5.337	11.531	8.136	11.368	6.707	9.776	6.194	9.438		
Σ W	94.76																

LEFT-to-RIGHT RUNNING WALLS																	
Upper Floor-to-Roof																	
	%	Length (ft)	# in Wall	SEISMIC PLF	Chord F (#)	# in Wall	WIND PLF	Chord F (#)	Wall W (#)	Snow	GRAVITY LOADING (psf) Dead	Live	Uplift	Comp			
E	27.3%	10.46	1,689	161	1,453	881	84	758	1,130	0	0	0	1,206	2,110	6	OK	MSTC28
478.51	100.0%																
M	20.1%	8.42	1,242	148	1,328	648	77	693	568	0	0	0	1,206	1,852	6	OK	MSTC28*
351.94	61.4%	5.17	762	148	1,328	398	77	693	351	0	0	0	1,251	1,532	6	OK	MSTC28*
	38.6%	3.25	480	148	1,328	250											
W	52.7%	6.83	3,263	478	4,298	1,703	249	2,242	738	0	0	0	4,235	4,465	3	OK	HDU4*
924.66	39.0%	2.67	1,274	478	4,298	664	249	2,242	288	0	0	0	4,200	4,560	3	OK	HDU4*
	61.0%	4.17	1,990	478	4,298	1,038	249	2,242	450								
Main Floor-to-Upper Floor																	
E	28.2%	6.02	3,195			4,090											
526.62	66.0%	3.97	2,108	531	5,311	2,698	680	6,799	905	0	0	0	6,527	7,251	2	OK	HDU8
	34.0%	2.05	1,087	531	5,311	1,392	680	6,799	467	0	0	0	6,659	7,032	2	OK	HDU8
M	46.7%	11.79	5,109	433	4,333	6,675	566	5,661	2,689	0	0	0	4,855	7,005	3	OK	HDU5*
871.59	100.0%																
WL	25.1%	5.00	3,674			4,067											
467.48	50.0%	2.50	1,837	735	7,348	2,034	813	8,135	570	0	0	0	7,964	8,420	33	OK	HDU11
	50.0%	2.50	1,837	735	7,348	2,034	813	8,135	570	0	0	0	7,964	8,420	33	OK	HDU11

UP-to-DOWN RUNNING WALLS																	
Upper Floor-to-Roof																	
	%	Length (ft)	# in Wall	SEISMIC PLF	Chord F (#)	# in Wall	WIND PLF	Chord F (#)	Wall W (#)	Snow	GRAVITY LOADING (psf) Dead	Live	Uplift	Comp			
N	100.0%	27.54	2,207			1,093											
35.6%	100.0%	29.54	2,207	75	672	1,093	37	333	3,191	0	0	0	0	2,527		None	OK
625.25	86.2%	23.75	1,903	80		943	40							6	OK		
	13.8%	3.79	304	80		151	40							6	OK		
M1	12.0%	2.19	746			369											
211.27	100.0%	2.19	746	341	3,068	369	169	1,520	236	0	0	0	3,016	3,205	3	OK	HDU2*
M2	45.7%	24.92	1,056			523											
655.21	54.3%	13.54	574	42	381	284	21	189	1,463	0	0	0	61	1,231	6	OK	MSTC28*
	45.7%	11.38	482	42	381	239	21	189	1,229	0	0	0	113	1,095	6	OK	MSTC28
S	15.0%	17.65	930			344											
263.37	74.7%	21.19	695	33	295	257	12	109	2,288	0	0	0	0	1,625		None	OK
	15.6%	2.76	145	53		54	20							6	OK		
	39.5%	6.97	367	53		136	20							6	OK		
	19.6%	3.46	182	53		67	20							6	OK		
	25.3%	4.46	235	53	474	87	20	176	482	0	0	0	369	754	6	OK	MSTC28
Main Floor-to-Upper Floor																	
N	100.0%	42.00	3,670			3,194											
31.2%	50.0%	21.00	1,935	92	922	1,592	76	758	4,788	0	0	0	0	3,704	6	OK	None
581.60	50.0%	21.00	1,935	92	922	1,592	76	758	4,788	0	0	0	0	3,704	6	OK	None
M1	10.5%	4.81	1,306			1,074											
195.88	100.0%	4.81	1,306	271	2,714	1,074	223	2,231	1,097	0	0	0	2,474	3,351	4	OK	HDU2
M2	25.3%	7.00	2,407			2,222											
472.56	100.0%	7.00	2,407	344	3,439	2,222	317	3,174	1,596	0	0	0	3,090	4,367	2	OK	HDU5
S	100.0%	18.19	2,691			2,558											
33.0%	100.0%	23.94	2,891	112	1,124	2,558	107	1,068	5,458	0	0	0	0	4,296	6	OK	None
615.66	20.7%	3.76	556	148		529	141							6	OK		
	79.3%	14.43	2,134	148		2,029	141							6	OK		

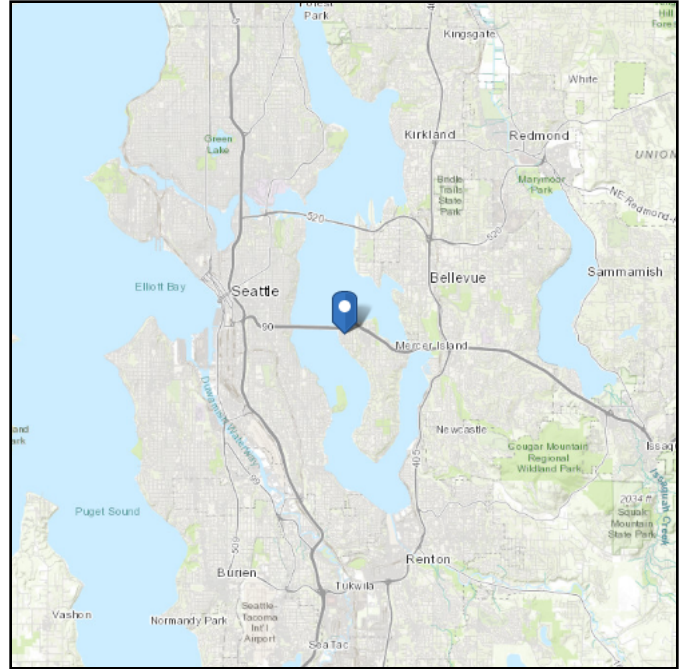
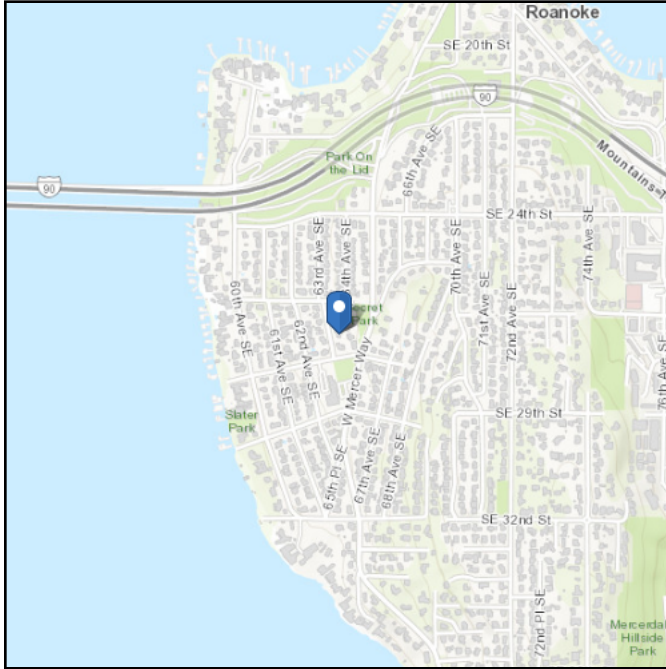


ASCE Hazards Report

Address:
2728 63rd Ave SE
Mercer Island, Washington
98040

Standard: ASCE/SEI 7-22
Risk Category: II
Soil Class: CD

Latitude: 47.586267
Longitude: -122.249297
Elevation: 108.419018807335 ft (NAVD 88)

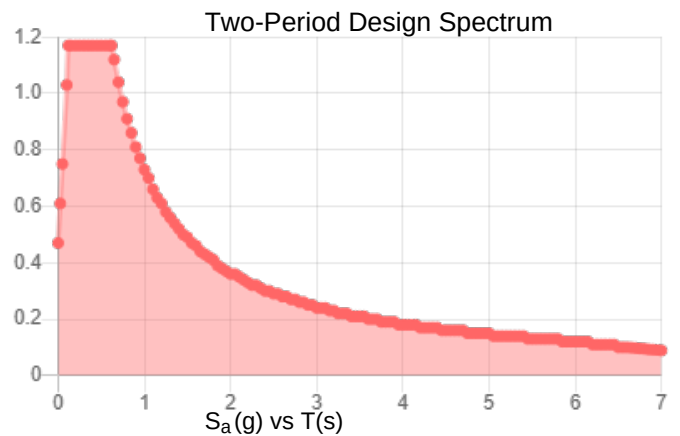
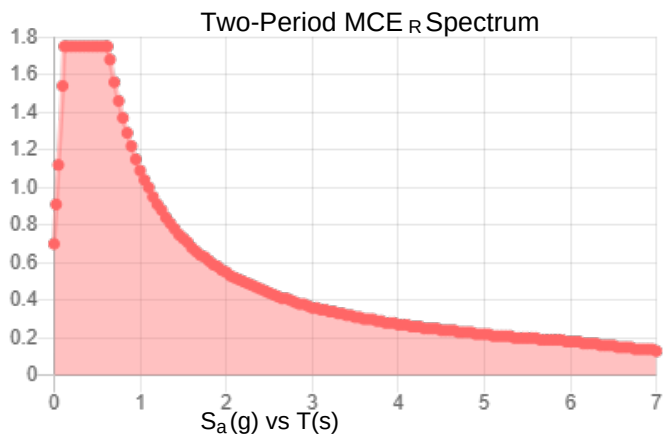
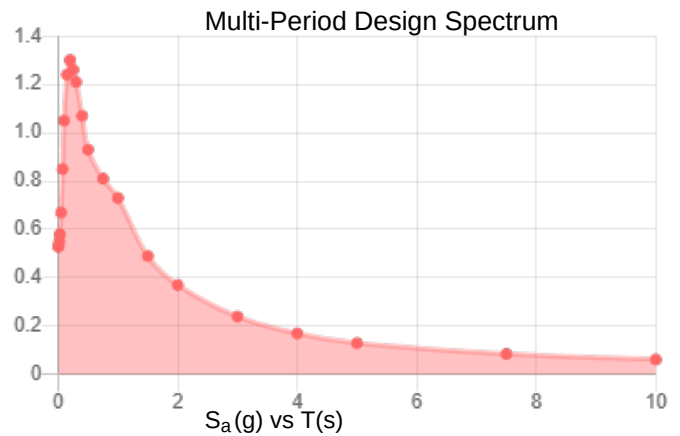
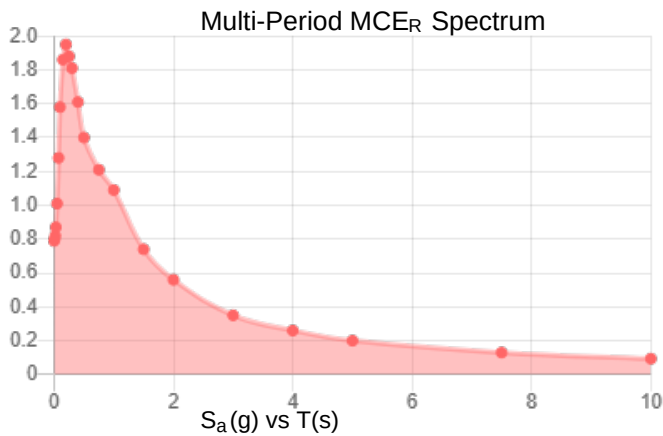


Site Soil Class: CD

Results:

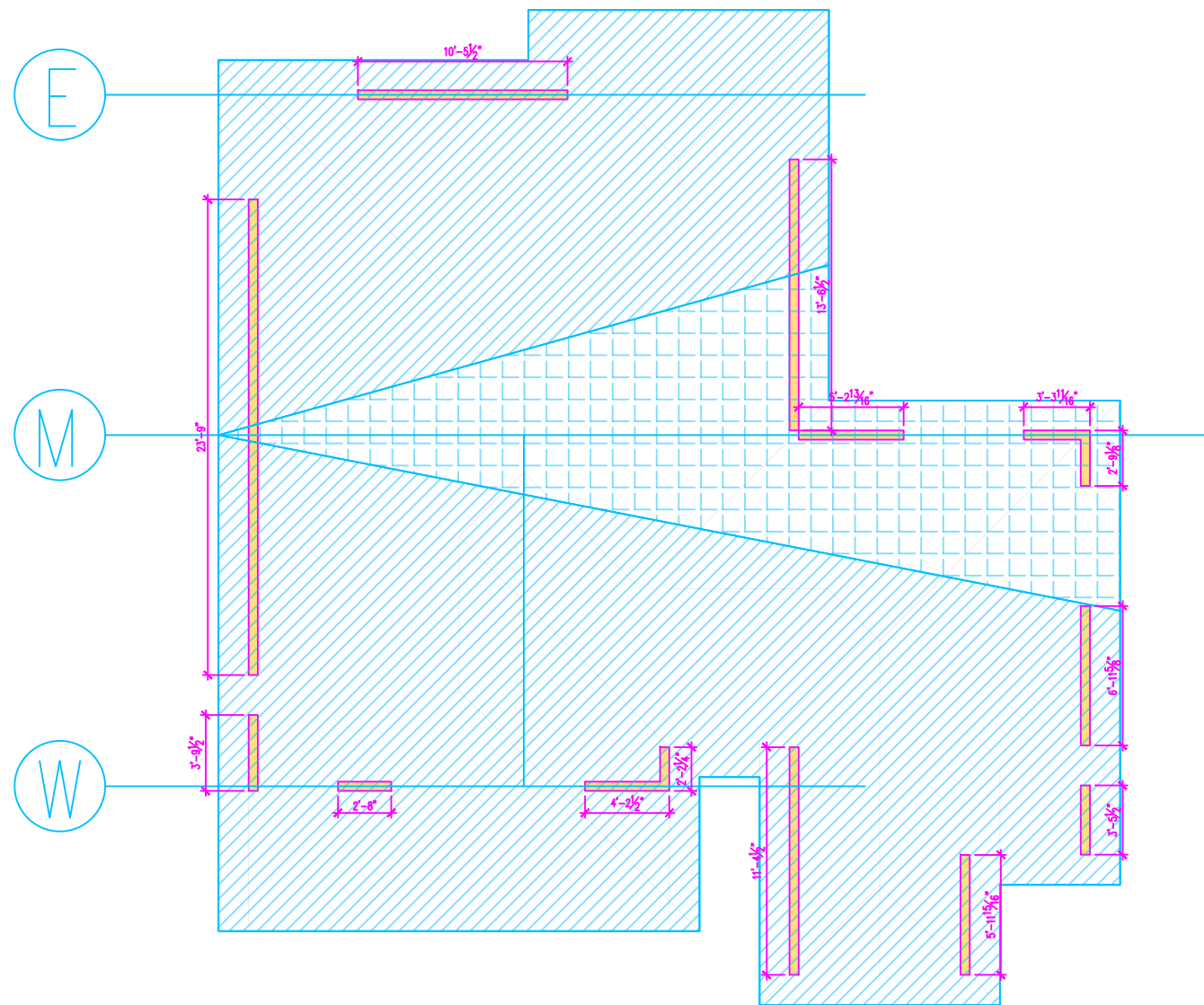
PGA _M :	0.73	T _L :	6
S _{MS} :	1.75	S _S :	1.56
S _{M1} :	1.09	S ₁ :	0.64
S _{DS} :	1.17	V _{S30} :	365
S _{D1} :	0.73		

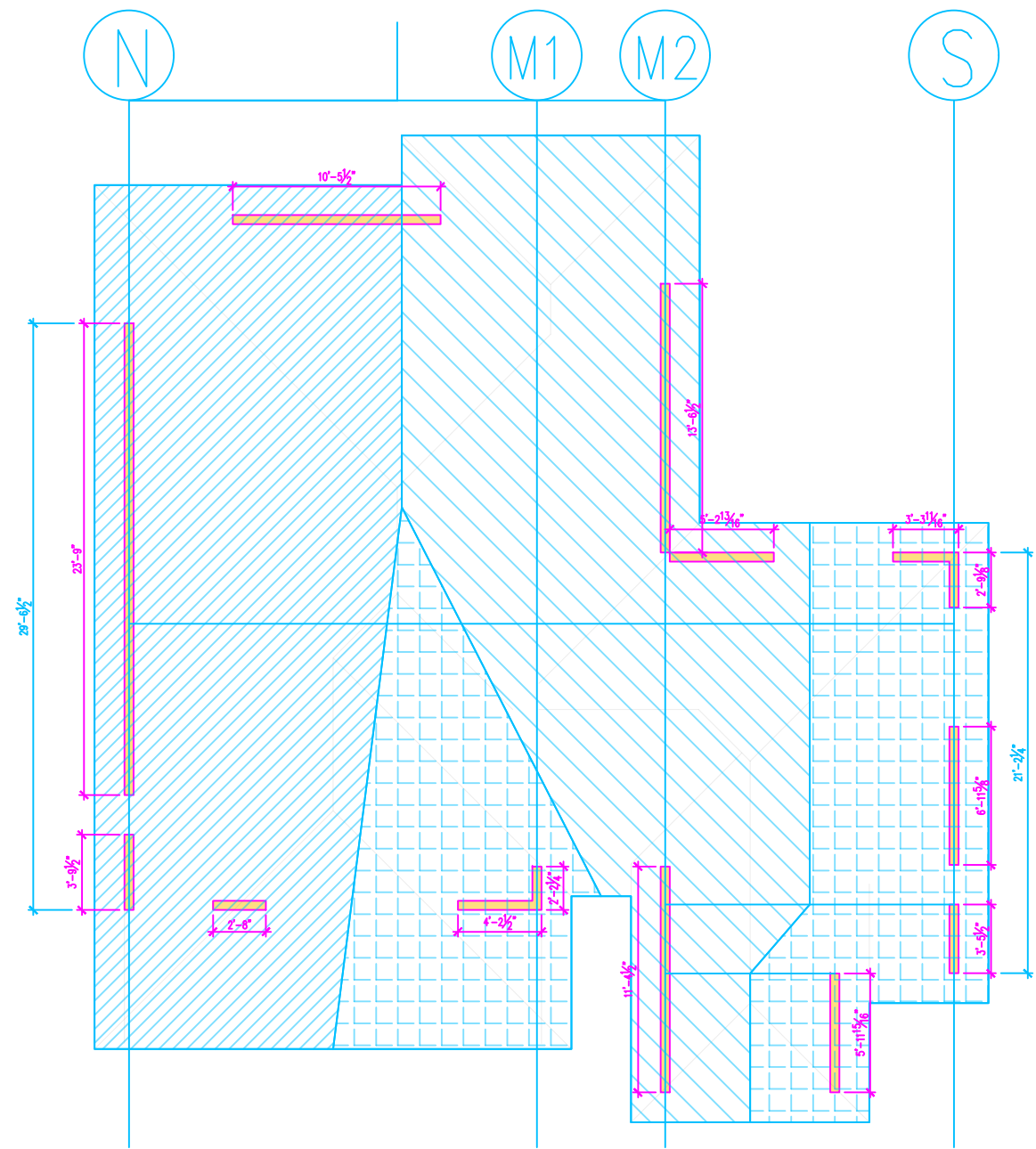
Seismic Design Category: D

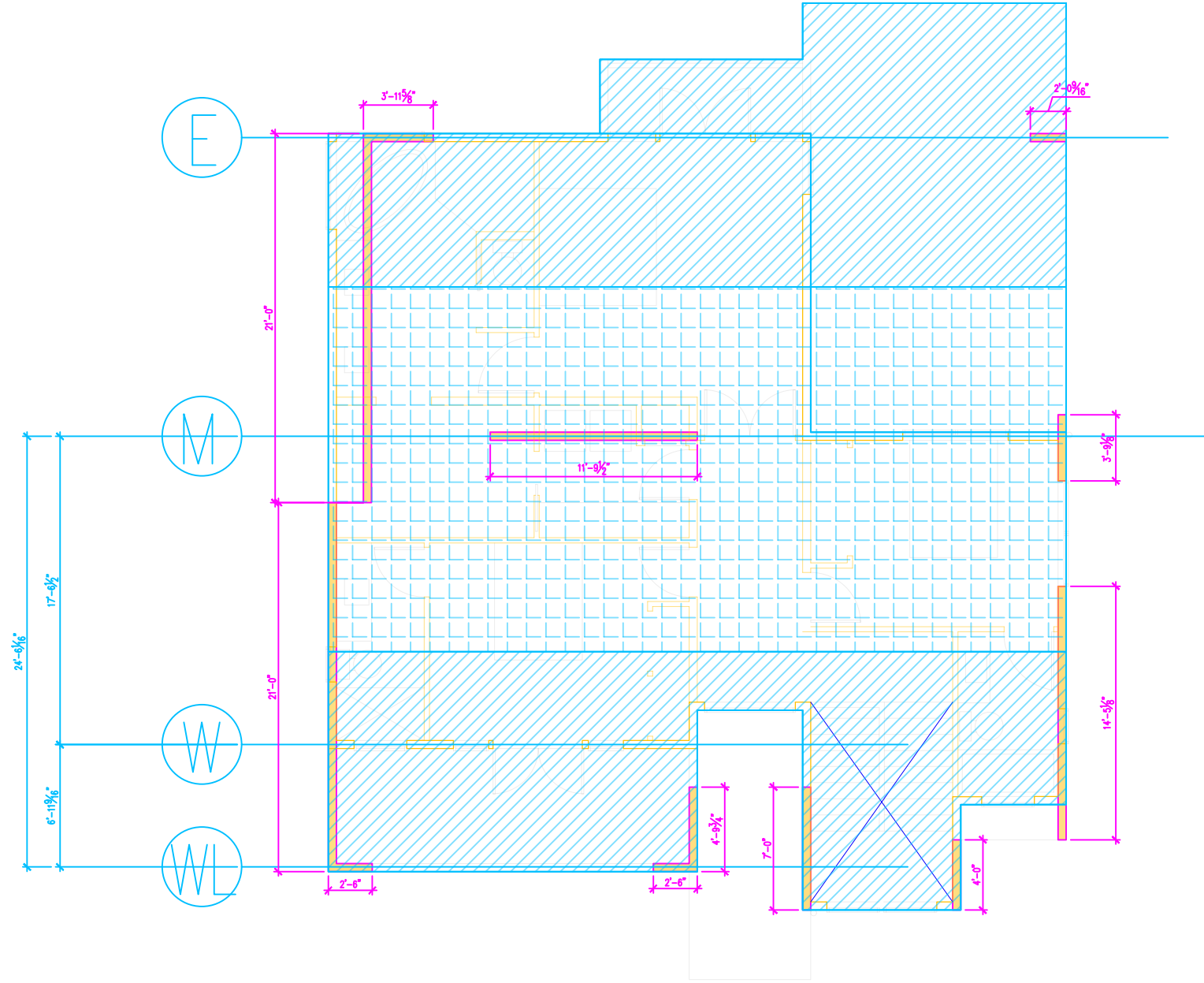


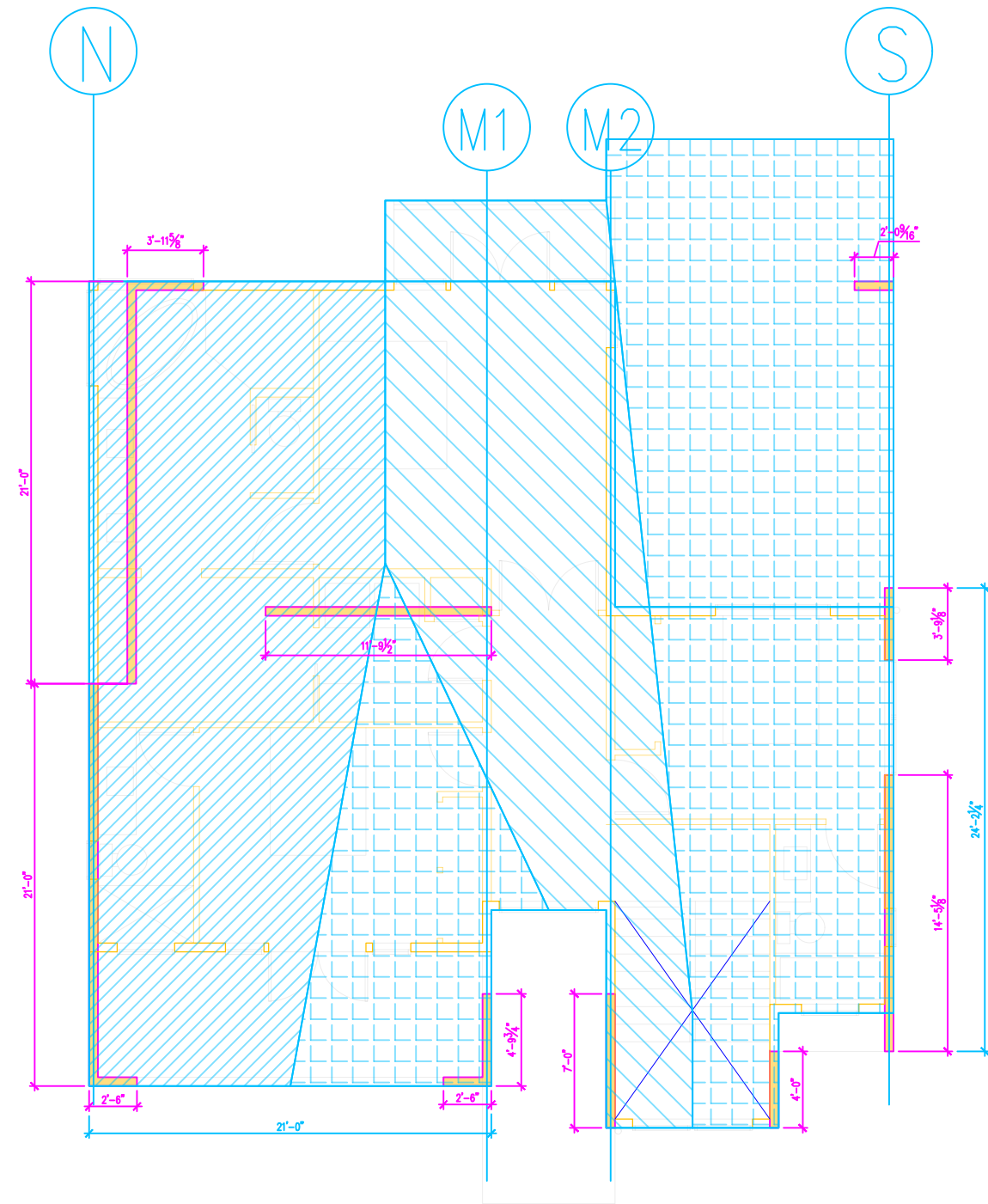
MCE_R Vertical Response Spectrum
Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum
Vertical ground motion data has not yet been made available by USGS.









Project:	2728 63rd Ave SE (Mercer Island)	Designed By:	JDA	Date:	2/3/2025
Project No.:	270-2024	Client:	CenterLine	Sheet:	1 of 2

ASCE 7-16 Chapter 27 Part 2:

ASD MWFRS Design Pressures

Inputs		
Risk Category	II	Table 1.5-1
Wind Speed, V	110	mph
Exposure	C	Section 26.7
K _{zt}	1	-
Enclosure	Enclosed Building	Table 26.13-1
h (mean roof height)	23.75	ft
L (least dimension)	40.01	ft
B (larger dimension)	45.69	ft
L/B	0.88	
P _h	16.24	psf
P _o	15.73	psf
Zone 1	-12.59	psf
Zone 2	-10.155	psf
Zone 3	-15.62	psf
Zone 4	-13.89	psf
Zone 5	-11.40	psf
Exposure Adjustment	1	

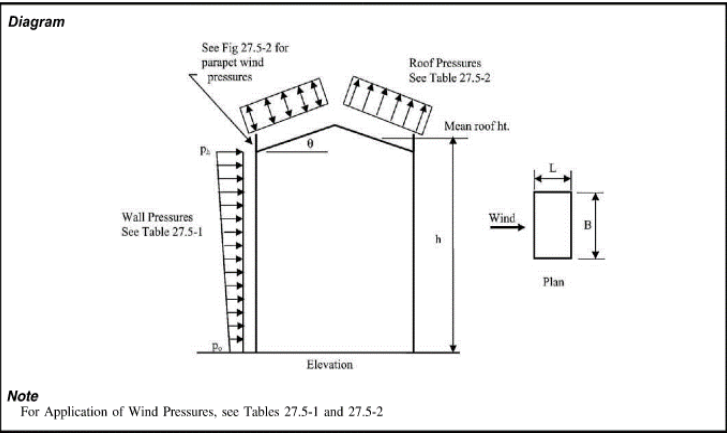
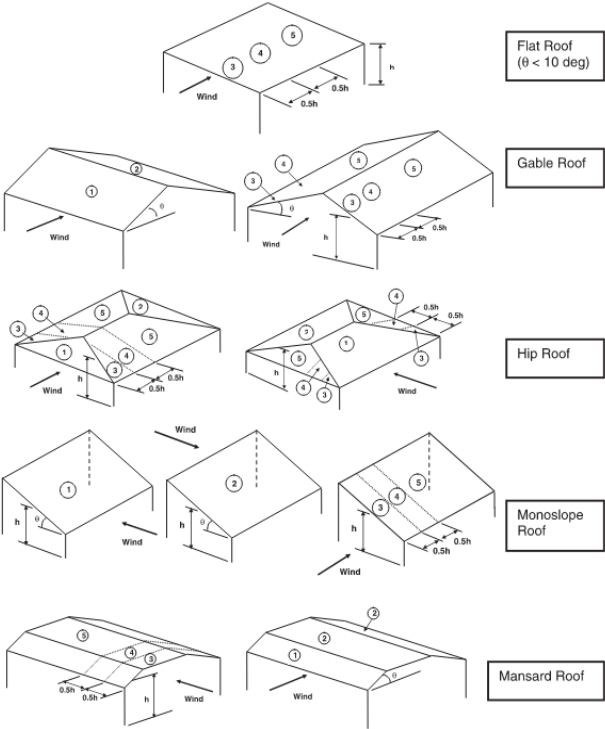


FIGURE 27.5-1 Main Wind Force Resisting System, Part 2 [$h \leq 160$ ft ($h \leq 48.8$ m)]: Enclosed Simple Diaphragm Buildings, Wind Pressures, Walls and Roof

Table 27.5-2 (Continued). Main Wind Force Resisting System, Part 2 [$h \leq 160$ ft ($h \leq 48.8$ m)]: Enclosed Simple Diaphragm Buildings—Wind Pressures—Roofs

Parameters for Application of Roof Pressures



Project: 2728 63rd Ave SE (Mercer Island)
Project No.: 270-2024

Designed By: JDA Date: 2/3/2025
Client: CenterLine Sheet: 2 of 2

Table 27-4.1 Steps to Determine MWFRS Wind Loads for Enclosed Simple Diaphragm Buildings, $h \leq 160$ ft ($h \leq 48.8$ m)

- Step 1: Determine Risk Category of building, see Table 1-5.1.
Step 2: Determine the basic wind speed, V , for applicable Risk Category, see Figs. 26.5-1 and 26.5-2.
Step 3: Determine wind load parameters:
• Exposure category B, C, or D, see Section 26.7.
• Topographic factor, K_{zt} , see Section 26.8 and Fig. 26.8-1.
• Enclosure classification, see Section 26.12.
Step 4: Enter table to determine net pressures on walls at top and base of building respectively, p_u , p_s , Table 27-5.1.
Step 5: Enter table to determine net roof pressures, p_r , Table 27-5.2.
Step 6: Determine topographic factor, K_{zt} , and apply factor to wall and roof pressures (if applicable), see Section 26.8.
Step 7: Apply loads to walls and roofs simultaneously.

Surface Roughness B: Urban and suburban areas, wooded areas, or other terrain with numerous, closely spaced obstructions that have the size of single-family dwellings or larger.
Surface Roughness C: Open terrain with scattered obstructions that have heights generally less than 30 ft (9.1 m). This category includes flat, open country and grasslands.
Surface Roughness D: Flat, unobstructed areas and water surfaces. This category includes smooth mud flats, salt flats, and unbroken ice.

Table 27-5.1 (Continued). Main Wind Force Resisting System, Part 2 ($h \leq 160$ ft ($h \leq 48.8$ m)): Enclosed Simple Diaphragm Buildings—Wind Pressures—Walls

h (ft)	Along-Wind Net Wall Pressure	Exposure C																							
		110						115						120						130					
		Zone 1						Zone 2						Zone 3						Zone 4					
		L/W	1	2	0.5	1	2	L/W	1	2	0.5	1	2	L/W	1	2	0.5	1	2	L/W	1	2	0.5	1	2
160	p_u	49.2	48.7	43.7	54.5	53.8	48.3	60.0	59.3	53.3	72.2	71.1	64.1	85.8	84.3	76.1	117.4	115.0	103.9	155.4	151.8	137.2	200.2	195.0	176.2
	p_s	36.1	35.7	30.0	40.0	39.5	33.2	44.1	43.6	36.6	50.0	52.2	44.0	62.9	61.9	52.2	86.2	84.4	71.5	114.1	111.4	94.3	146.0	143.1	121.1
150	p_u	48.0	47.5	42.6	53.0	52.4	47.1	58.4	57.7	51.9	70.1	69.2	62.3	83.3	82.0	74.0	113.8	111.7	101.0	150.6	147.3	133.3	198.8	195.0	171.0
	p_s	35.2	34.7	29.1	39.1	38.7	32.4	43.3	42.8	35.8	49.2	47.2	41.3	60.1	59.1	50.4	83.4	81.7	69.0	113.5	109.1	92.7	145.1	140.3	118.9
140	p_u	46.8	46.2	41.4	51.5	51.0	45.8	56.7	56.1	50.4	68.1	67.2	60.3	80.7	79.6	71.8	110.3	108.3	98.0	146.8	143.4	129.2	197.2	193.9	168.7
	p_s	34.0	33.6	28.1	38.1	37.7	32.2	42.4	42.0	35.3	50.9	50.3	42.8	60.4	59.5	50.6	82.4	81.0	68.9	109.9	106.7	92.9	140.0	136.8	116.6
130	p_u	45.3	45.0	40.2	50.0	49.6	44.5	55.0	54.5	48.9	65.9	65.2	58.7	77.1	76.1	68.6	106.4	104.7	94.8	140.4	137.7	124.9	190.4	187.5	160.1
	p_s	33.3	33.0	27.7	37.7	37.3	31.7	41.6	41.2	34.9	49.9	49.3	41.9	58.1	57.3	48.6	80.5	79.2	67.6	106.2	104.1	89.1	136.4	133.4	114.2
120	p_u	43.8	43.6	39.0	48.5	48.1	43.1	53.3	52.8	47.4	63.8	63.1	56.8	75.4	74.6	67.3	102.6	101.1	91.5	135.1	132.7	120.5	173.3	169.8	154.3
	p_s	33.0	32.4	26.7	37.1	36.8	31.1	40.7	40.4	34.3	48.8	48.1	41.1	57.7	57.1	48.7	78.5	77.3	66.2	103.3	101.5	87.1	132.0	129.0	111.6
110	p_u	42.5	42.3	37.7	46.9	46.6	41.6	51.5	51.1	45.8	61.5	61.0	54.8	72.7	72.0	64.8	98.6	97.3	88.1	129.6	127.6	115.8	166.0	163.0	148.2
	p_s	32.8	32.6	26.4	36.4	36.1	30.4	39.8	39.5	34.0	47.8	47.4	40.6	56.8	56.4	47.8	76.4	75.4	64.8	102.4	100.5	86.1	128.4	125.4	108.9
100	p_u	41.1	40.9	36.4	45.2	45.0	40.1	49.8	49.3	44.1	59.2	58.7	52.7	68.8	68.3	62.3	94.5	93.5	84.5	123.9	122.1	111.0	158.5	155.9	141.9
	p_s	32.3	32.1	27.2	36.5	36.3	30.0	39.0	38.8	33.0	46.5	46.2	39.4	54.9	54.4	46.6	74.2	73.4	63.2	97.4	96.0	82.6	124.5	122.5	106.1
90	p_u	39.8	39.4	35.0	43.3	43.0	38.5	47.7	47.3	42.3	56.8	56.5	50.5	60.9	60.5	54.7	90.3	89.4	80.8	118.1	116.7	105.9	150.6	148.5	132.2
	p_s	31.6	31.5	26.6	34.7	34.6	29.4	38.1	37.9	32.3	45.4	45.1	38.5	53.4	53.1	45.5	72.1	71.4	61.6	94.9	93.2	80.7	120.3	118.6	103.0
80	p_u	38.0	37.9	33.5	41.8	41.6	36.9	45.8	45.6	40.5	54.4	54.2	48.3	63.9	63.6	56.9	85.9	85.3	76.8	112.0	111.0	100.5	142.6	140.9	128.1
	p_s	30.9	30.8	26.1	33.9	33.8	28.7	37.2	37.1	31.5	44.2	44.0	37.6	52.0	51.7	44.3	69.8	69.3	60.8	91.0	90.2	78.3	115.0	114.5	99.8
70	p_u	36.4	36.3	32.0	39.9	39.8	35.2	43.7	43.6	38.6	51.9	51.7	45.9	60.8	60.6	54.0	81.4	81.0	72.7	105.8	105.0	94.9	134.2	133.0	120.7
	p_s	29.4	29.3	24.6	32.4	32.3	27.4	35.8	35.7	30.2	43.0	42.8	36.4	50.6	50.4	43.6	67.0	66.7	58.4	89.0	88.4	78.4	111.4	110.4	97.9
60	p_u	34.8	34.6	30.3	38.0	37.9	33.3	41.6	41.5	36.4	49.2	49.1	43.4	57.6	57.4	50.8	76.8	76.5	68.3	99.4	98.9	88.9	125.6	124.7	112.9
	p_s	29.4	29.4	24.9	32.3	32.2	27.4	35.3	35.2	30.0	41.8	41.7	35.8	48.9	48.8	41.9	65.2	65.0	56.3	84.4	83.9	73.9	107.2	106.9	92.7
50	p_u	32.8	32.8	28.0	36.0	35.9	31.4	39.3	39.2	34.3	46.4	46.3	40.7	54.2	54.1	47.7	72.0	71.9	63.7	92.7	92.4	82.5	116.7	116.1	104.4
	p_s	28.7	28.6	24.3	31.4	31.4	26.7	34.3	34.3	29.2	40.5	40.5	34.6	47.4	47.3	40.5	62.7	62.7	54.2	81.0	80.7	70.2	101.0	101.4	88.8
40	p_u	30.8	30.8	26.7	33.7	33.7	28.9	36.8	36.8	32.0	43.4	43.4	37.8	50.6	50.5	44.2	66.9	66.8	58.8	85.6	85.6	75.8	107.1	107.1	95.5
	p_s	27.6	27.6	23.5	30.5	30.5	25.0	33.3	33.2	28.3	39.2	39.2	33.5	45.7	45.7	39.2	60.4	60.3	52.1	77.5	77.5	67.2	97.1	96.8	84.6
30	p_u	28.8	28.8	24.6	31.2	31.2	27.0	34.1	34.1	29.5	40.1	40.1	34.8	46.7	46.6	40.5	61.4	61.4	53.6	78.4	78.3	68.8	97.6	97.6	86.1
	p_s	26.6	26.6	22.4	29.4	29.4	25.1	32.1	32.1	27.4	37.8	37.8	32.4	44.0	43.9	37.2	57.9	57.9	49.9	73.9	73.9	64.0	92.1	91.9	80.2
20	p_u	26.8	26.8	22.6	29.7	29.7	25.2	31.2	31.2	26.9	36.7	36.7	31.2	42.6	42.6	36.4	55.9	55.9	48.5	71.1	71.1	61.9	88.2	88.2	77.0
	p_s	25.2	25.2	21.0	28.3	28.3	23.8	30.8	30.8	26.5	36.2	36.2	31.2	42.1	42.1	36.5	55.2	55.2	47.7	70.1	70.1	60.8	87.1	87.1	75.8
15	p_u	25.5	25.5	21.0	27.6	27.6	23.8	30.0	30.0	26.0	35.3	35.3	30.6	41.0	41.0	35.5	53.7	53.7	46.6	68.1	68.1	59.3	84.4	84.4	73.6
	p_s	25.2	25.2	21.0	27.6	27.6	23.8	30.0	30.0	26.0	35.3	35.3	30.6	41.0	41.0	35.5	53.7	53.7	46.6	68.1	68.1	59.3	84.4	84.4	73.6

Exposure Adjustment Factor, Exposures B and D

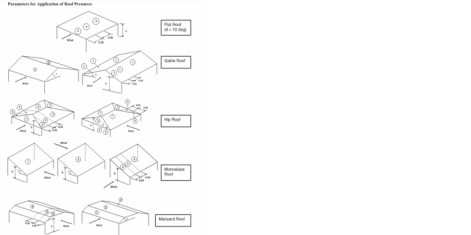
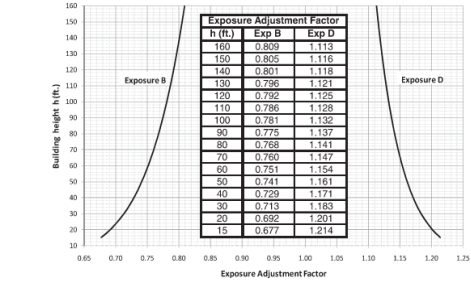


Table 27-5.2 (Continued). Main Wind Force Resisting System, Part 2 ($h \leq 160$ ft ($h \leq 48.8$ m)): Enclosed Simple Diaphragm Buildings—Wind Pressures—Roofs
Exposure C: $h = 50$ –70 ft, $V = 110$ –120 mi/h

h (ft)	Roof Slope	Load Case	V(mi/h)															
			110				115				120							
			Zone 1				Zone 2				Zone 3							
			1	2	3	4	1	2	3	4	1	2	3	4				
70	Flat < 2:12 (9.46°)	1	NA	NA	-32.8	-29.2	-24.0	NA	NA	-35.8	-31.9	-26.2	NA	NA	-39.0	-34.8	-28.5	
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0		
	3:12 (14.0°)	1	-32.1	-31.9	-32.8	-29.2	-24.0	-35.1	-35.3	-31.9	-26.2	-38.3	-36.0	-39.0	-34.8	-28.5		
		2	4.6	-6.5	0.0	0.0	5.1	-7.1	0.0	0.0	5.5	-7.8	0.0	0.0	0.0	0.0		
	4:12 (18.4°)	1	-30.4	-31.3	-32.8	-29.2	-24.0	-38.0	-35.1	-35.8	-31.9	-26.2	-41.8	-34.8	-39.0	-34.8	-28.5	
		2	-9.2	-9.4	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	
	5:12 (22.6°)	1	-31.2	-31.3	-32.8	-29.2	-24.0	-37.2	-33.3	-35.8	-31.9	-26.2	-35.2	-34.8	-39.0	-34.8	-28.5	
		2	12.2	-10.2	0.0	0.0	0.0	13.3	-11.1	0.0	0.0	14.5	-12.1	0.0	0.0	0.0	0.0	
	6:12 (26.6°)	1	-31.0	-31.3	-32.8	-29.2	-24.0	-36.6	-31.3	-35.8	-31.9	-26.2	-34.8	-39.0	-34.8	-28.5		
		2	13.4	-10.2	0.0	0.0	0.0	15.7	-11.1	0.0	0.0	16.9	-12.1	0.0	0.0	0.0	0.0	
60	9:12 (36.9°)	1	-9.9	-31.3	-32.8	-29.2	-24.0	-38.0	-35.1	-35.8	-31.9	-26.2	-41.8	-34.8	-39.0	-34.8	-28.5	
		2	-16.1	-10.2	0.0	0.0	0.0	17.6	-11.1	0.0	0.0	19.1	-12.1	0.0	0.0	0.0	0.0	
	12:12 (45.0°)	1	-5.6	-31.3	-32.8	-29.2	-24.0	-6.1	-23.3	-35.8	-31.9	-26.2	-6.6	-25.4	-39.0	-34.8	-28.5	
		2	-16.1	-10.2	0.0	0.0	0.0	17.6	-11.1	0.0	0.0	19.1	-12.1	0.0	0.0	0.0	0.0	
	Flat < 2:12 (9.46°)	1	NA	NA	-32.8	-29.2	-24.0	NA	NA	-35.8	-31.9	-26.2	NA	NA	-39.0	-34.8	-28.5	
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	
	3:12 (14.0°)	1	-31.1	-31.2	-31.7	-28.3	-23.2	-34.0	-34.5	-34.7	-30.9	-25.3	-17.0	-25.7	-17.8	-33.7	-27.6	
		2	-12.5	-6.5	0.0	0.0	0.0	14.9	-8.9	0.0	0.0	15.3	-8.9	0.0	0.0	0.0	0.0	
	4:12 (18.4°)	1	-25.6	-20.6	-31.7	-28.3	-23.2	-29.6	-27.3	-31.7	-30.9	-25.3	-17.0	-24.3	-27.3	-17.8	-33.7	-27.6
		2	8.9	-0.1	0.0	0.0	0.0	9.7	-0.9	0.0	0.0	10.5	-10.8	0.0	0.0	0.0	0.0	
50	5:12 (22.6°)	1	-20.5	-20.6	-31.7	-28.3	-23.2	-22.4	-22.6	-34.7	-30.9	-25.3	-24.6	-24.6	-37.8	-33.7	-27.6	
		2	11.8	-0.9	0.0	0.0	0.0	0.0	-10.8	0.0	0.0	14.0	-11.8	0.0	0.0	0.0	0.0	
	6:12 (26.6°)	1	-16.5	-20.6	-31.7	-28.3	-23.2	-18.0	-24.6	-34.7	-30.9	-25.3	-19.6	-24.6	-37.8	-33.7	-27.6	
		2	13.0	-0.9	0.0	0.0	0.0	14.2	-10.8	0.0	0.0	15.5	-11.8	0.0	0.0	0.0	0.0	
	9:12 (36.9°)	1	-9.5	-20.6	-31.7	-28.3	-23.2	-10.4	-22.6	-34.7	-30.9	-25.3	-11.4	-24.6	-37.8	-33.7	-27.6	
		2	-16.5	-9.9	0.0	0.0	0.0	13.8	-10.8	0.0	0.0	14.9	-11.8	0.0	0.0	0.0	0.0	
	12:12 (45.0°)	1	-5.4	-20.6	-31.7	-28.3	-23.2	-5.9	-22.6	-34.7	-30.9	-25.3	-6.4	-24.6	-37.8	-33.7	-27.6	
		2	15.6	-0.9	0.0	0.0	0.0	17.0	-10.8	0.0	0.0	18.5	-11.8	0.0	0.0	0.0	0.0	
	Flat < 2:12 (9.46°)	1	NA	NA	-36.5	-27.2	-22.3	NA	NA	-33.4	-29.7	-24.4	NA	NA	-35.5	-24.6	-26.6	
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	
40	3:12 (14.0°)	1	-30.0	-30.4	-30.5	-27.2	-22.3	-33.7	-23.6	-33.4	-29.7	-24.4	-35.6	-24.7	-36.3	-32.4	-26.6	
		2	4.3	-6.1	0.0	0.0	0.0	4.7	-6.6	0.0	0.0	5.1	-7.2	0.0	0.0	0.0	0.0	
	4:12 (18.4°)	1	-24.6	-19.9	-30.5	-27.2	-22.3	-26.9	-21.7	-33.4	-29.7	-24.4	-39.9	-24.6	-32.4	-26.6		
		2	8.5	-8.7	0.0	0.0	0.0	9.0	-10.4	0.0	0.0	10.1	-10.4	0.0	0.0	0.0	0.0	
	5:12 (22.6°)	1	-19.8	-19.9	-30.5	-27.2	-22.3	-21.6	-21.7	-33.4	-29.7	-24.4	-23.5	-23.6	-36.3	-32.4	-26.6	
		2	11.3	-6.5	0.0	0.0	0.0	12.4	-10.4	0.0	0.0	0.0	13.5	-11.3	0.0	0.0	0.0	
	6:12 (26.6°)	1	-19.2	-19.9	-30.5	-27.2	-22.3	-21.6	-21.7	-33.4	-29.7	-24.4	-23.5	-23.6	-36.3	-32.4	-26.6	
		2	12.5	-6.5	0.0	0.0	0.0	13.7	-10.4	0.0	0.0	0.0	14.9	-11.3	0.0	0.0	0.0	
	9:12 (36.9°)	1	-9.2	-19.9	-30.5	-27.2	-22.3	-20.0	-21.7	-33.4	-29.7	-24.4	-10.9	-23.6	-36.3	-32.4	-26.6	
		2	15.0	-6.5	0.0	0.0	0.0	16.4	-10.4	0.0	0.0	0.0	17.8	-11.3	0.0	0.0	0.0	
30	12:12 (45.0°)	1	-5.2	-19.9	-30.5	-27.2	-22.3	-2.8	-21.7	-33.4	-29.7	-24.4	-2.8	-23.6	-36.3	-32.4	-26.6	
		2	15.0	-6.5	0.0	0.0	0.0	16.4	-10.4	0.0	0.0	0.0	17.8	-11.3	0.0	0.0	0.0	

Project:	2728 63rd Ave SE (Mercer Island)	Designed By:	JDA	Date:	2/3/2025		
Project No.:	270-2024	Client:	CenterLine	Sheet:	1	of	1

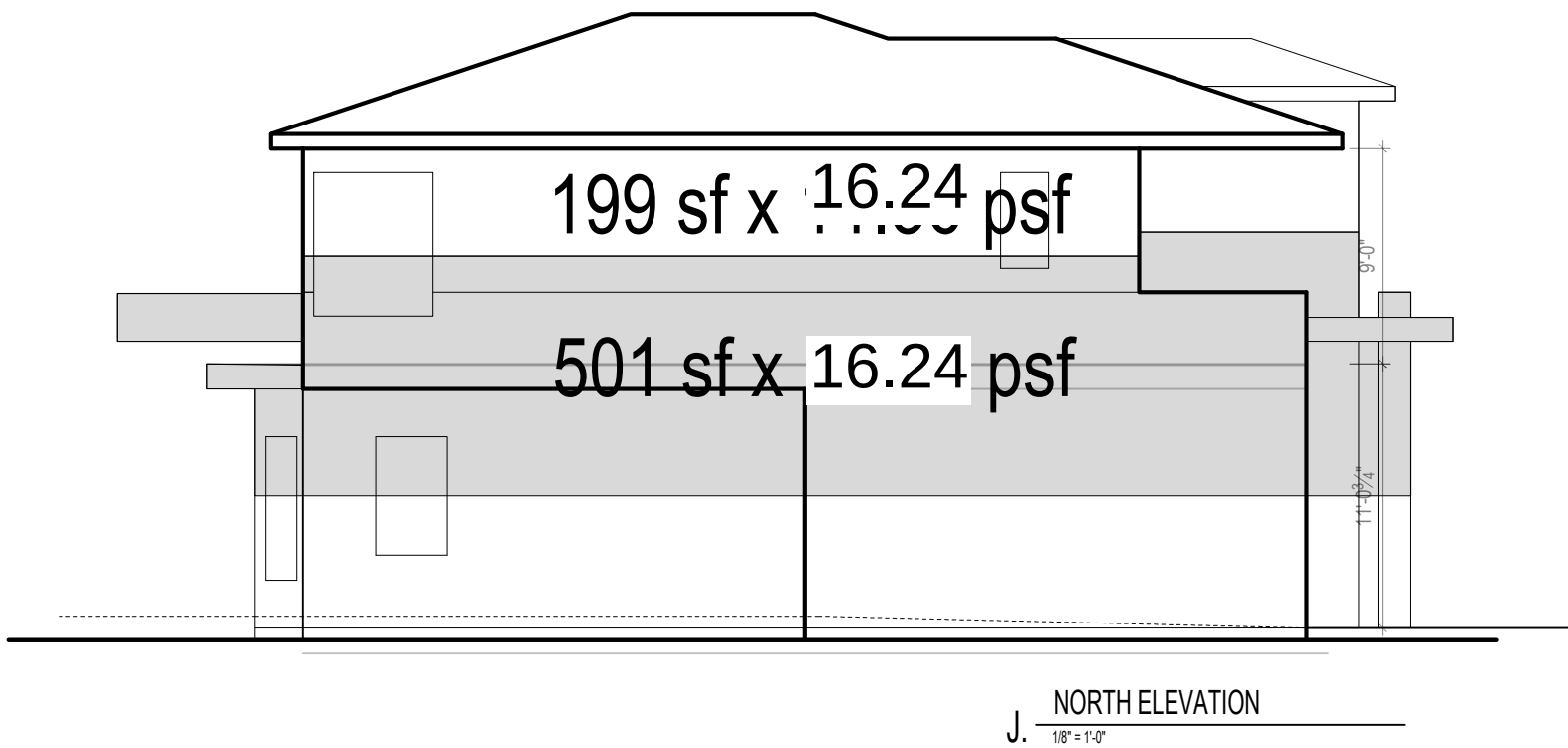
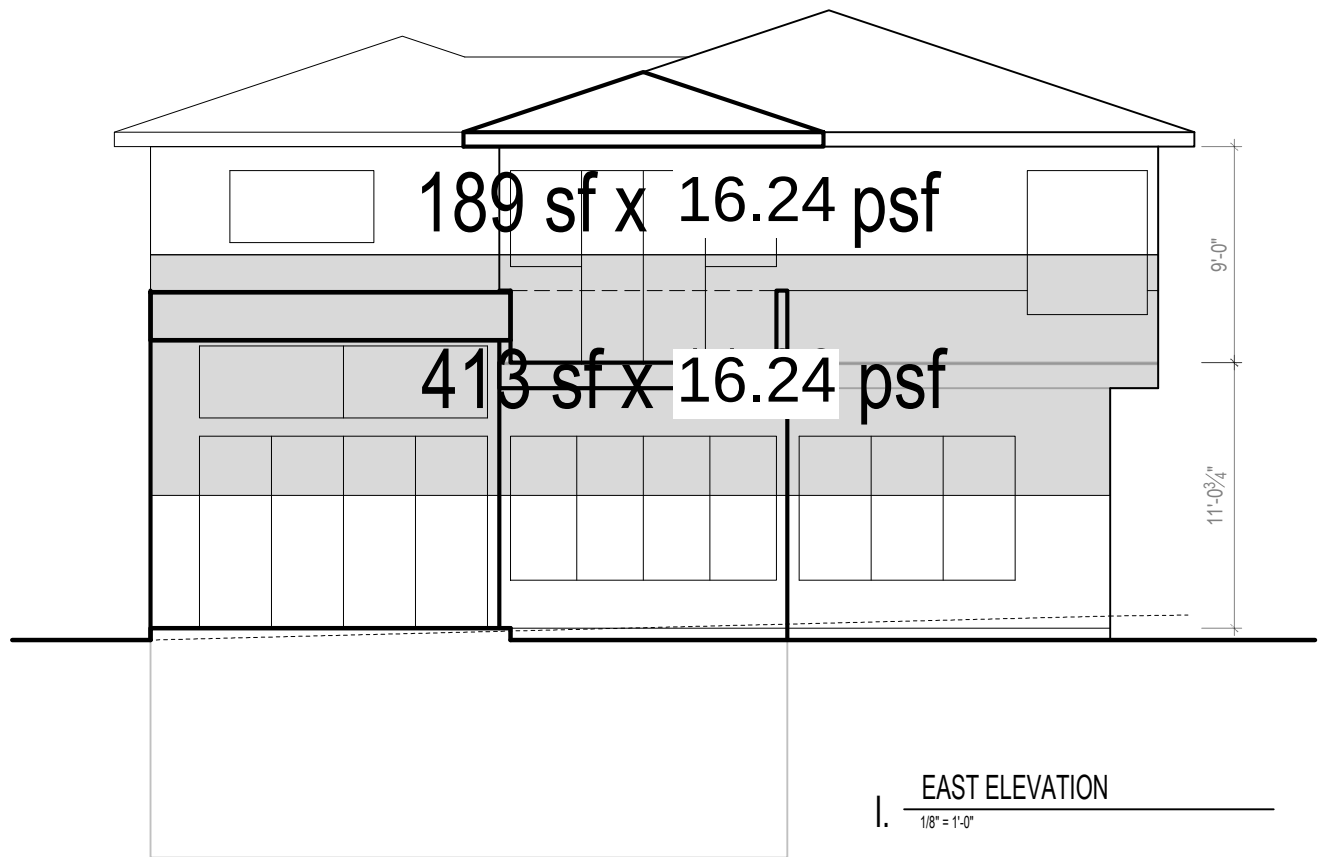
ASCE 7-16 Chapter 30 Part 4: Components and Cladding Design Pressures

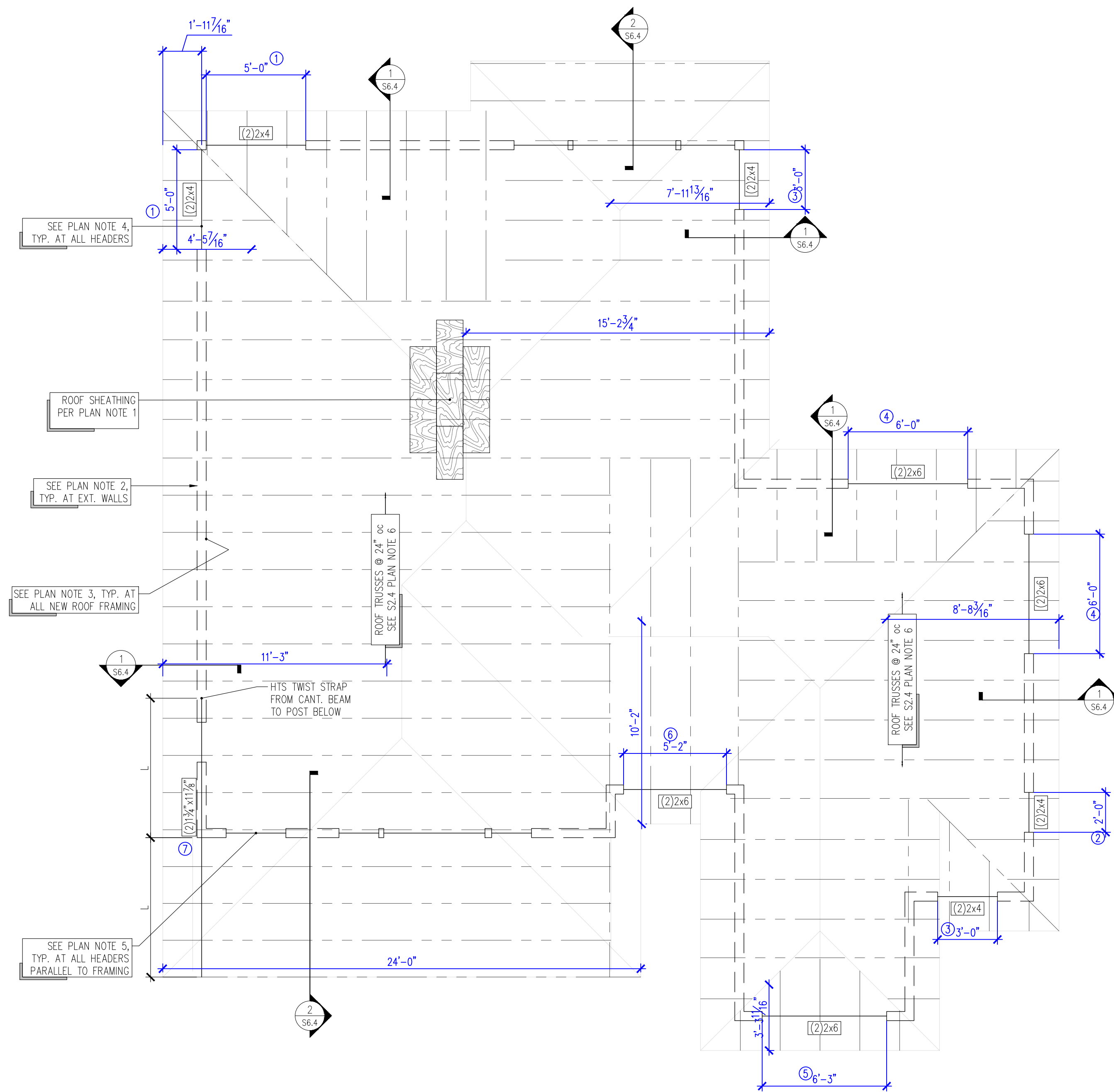
Inputs		
K _{zt}	1	-
Roof Form	Gable/Mansard Roof	-
Wind Speed	110	mph
Exposure	C	-
Building Height	23.75	ft
Zone 1 Area	10	ft ²
Zone 2 Area	10	ft ²
Zone 3 Area	10	ft ²
Zone 4 Area	10	ft ²
Zone 5 Area	10	ft ²

EAF	1.000
-----	-------

Area Reduction Factors		
Zone	Negative Pressure	Positive Pressure
1	1.000	1.000
2	1.000	1.000
3	1.000	1.000
4	1.000	1.000
5	1.000	1.000

Load Case	Zone Pressures				
	1	2	3	4	5
Neg. (PSF)	-28.94	-48.58	-73.16	-31.41	-48.58
Pos. (PSF)	16.66	16.66	16.66	28.94	26.46
Overhangs Neg. (PSF)	-28.94	-48.58	-84.39	N/A	N/A



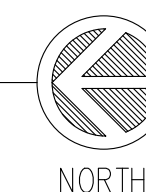


ROOF FRAMING PLAN NOTES

1. ROOF SHEATHING SHALL CONSIST OF $\frac{5}{8}$ " SHEATHING (PANEL SPAN RATING 32/16) NAILED AT ALL FRAMED PANEL EDGES, DIAPHRAGM BOUNDARIES, AND SHEAR WALLS w/ 10d @ 6" oc; AND AT ALL INTERMEDIATE SUPPORTS w/ 10d @ 12" oc (SEE 3/S6.2).
2. DASHED WALLS AND SHEARWALLS SHOWN IN PLAN ARE BELOW ROOF FRAMING ELEVATION.
3. PROVIDE H2.5A HURRICANE TIES AT EACH END OF ALL ROOF FRAMING.
4. ALL HEADERS SHALL HAVE A MINIMUM NUMBER OF POSTS PER 4/S6.1 AT NON-LOAD BEARING EXTERIOR WALLS, AND PER 6/S6.1 AT LOAD BEARING EXTERIOR WALLS.
5. HEADERS IN EXTERIOR WALLS NOT SUPPORTING RAFTERS, JOISTS, OR BEAMS SHALL BE PER DETAIL 4/S6.1 U.N.O. IN PLAN.
6. SEE GENERAL STRUCTURAL NOTE #9, 10, AND 24 FOR CONNECTOR PLATE ROOF TRUSS REQUIREMENTS.

1
S2.4

ROOF FRAMING PLAN
1/4" = 1'-0"



NORTH

Roof			
Member Name	Results (Max UTIL %)	Current Solution	Comments
1	Passed (54% M)	2 piece(s) 2 x 4 DF No.2	
2	Passed (29% M)	2 piece(s) 2 x 4 DF No.2	
3	Passed (55% M)	2 piece(s) 2 x 4 DF No.2	
4	Passed (99% M)	2 piece(s) 2 x 6 DF No.2	
5	Passed (44% M)	2 piece(s) 2 x 6 DF No.2	
6	Passed (91% M)	2 piece(s) 2 x 6 DF No.2	
7	Passed (102% ΔT)	3 piece(s) 1 3/4" x 9 1/4" 2.0E Microllam® LVL	
Upper			
Member Name	Results (Max UTIL %)	Current Solution	Comments
11	Passed (93% ΔL)	1 piece(s) 3 1/2" x 10 1/2" 24F-V4 DF Glulam	
12	Passed (98% ΔT)	4 piece(s) 1 3/4" x 16" 2.0E Microllam® LVL	
12 w/ overstrength	Failed (100% R)	4 piece(s) 1 3/4" x 16" 2.0E Microllam® LVL	An excessive uplift of -2538 lbs at support located at 20' 5 3/4" failed this product.
13	Passed (71% R)	1 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
14	Passed (100% ΔT)	4 piece(s) 1 1/2" x 14" 1.5E TimberStrand® LSL	
15 Hi	Passed (89% R)	1 piece(s) 5 1/2" x 16" 24F-V4 DF Glulam	
15 Hi w/ overstrength	Passed (89% R)	1 piece(s) 5 1/2" x 16" 24F-V4 DF Glulam	
15 Lo	Passed (77% ΔT)	3 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
16	Failed (44% R)	1 piece(s) 3 1/2" x 16" 24F-V4 DF Glulam	Right cantilever exceeds the maximum braced cantilever length of 7'.
17	Passed (39% ΔL)	2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
17 w/ overstrength	Passed (42% R)	2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
18	Passed (35% R)	1 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
19	Passed (100% R)	1 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
20	Passed (67% R)	1 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
21	Failed (124% ΔL)	4 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
21 (no seismic)	Passed (99% R)	4 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	
Main			
Member Name	Results (Max UTIL %)	Current Solution	Comments
30	Failed (39% M) OK	2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	Multiple Failures/Errors
30 (overstrength)	Failed (91% M) OK	2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	Multiple Failures/Errors
31	Failed (33% M) OK	2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	Multiple Failures/Errors
31 (overstrength)	Failed (78% M) OK	2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	Multiple Failures/Errors
32	Passed (51% R)	2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
33	Passed (44% R)	2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
34	Passed (56% R)	2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
Joists			
Member Name	Results (Max UTIL %)	Current Solution	Comments
TJI 110 @ 24" oc (13.5' max)	Passed (96% M)	1 piece(s) 11 7/8" TJI@ 110 @ 24" OC	
TJI 210 @ 24" oc (14.5' max)	Passed (92% M)	1 piece(s) 11 7/8" TJI@ 210 @ 24" OC	
TJI 230 @ 24" oc (15' max)	Passed (89% M)	1 piece(s) 11 7/8" TJI@ 230 @ 24" OC	
TJI 360 @ 24" oc (16' max)	Passed (72% R)	1 piece(s) 11 7/8" TJI@ 360 @ 24" OC	
TJI 110 @ 16" oc (16.5' max)	Passed (95% M)	1 piece(s) 11 7/8" TJI@ 110 @ 16" OC	
TJI 210 @ 16" oc (17.5' max)	Passed (89% M)	1 piece(s) 11 7/8" TJI@ 210 @ 16" OC	
TJI 230 @ 16" oc (18' max)	Passed (85% M)	1 piece(s) 11 7/8" TJI@ 230 @ 16" OC	
TJI 360 @ 16" oc (19' max)	Passed (77% ΔL)	1 piece(s) 11 7/8" TJI@ 360 @ 16" OC	
Cant Floor: Joist	Passed (84% R)	1 piece(s) 11 7/8" TJI@ 210 @ 24" OC	

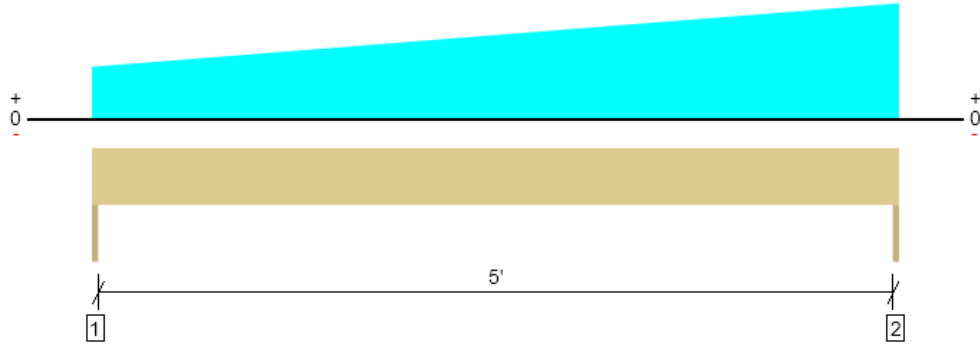
ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8
File Name: 270-2024 (2728 63rd)

Roof, 1
2 piece(s) 2 x 4 DF No.2

Overall Length: 5' 3"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	397 @ 5' 3"	2813 (1.50")	Passed (14%)	--	1.0 D + 1.0 Lr (All Spans)
Shear (lbs)	322 @ 4' 10"	1575	Passed (20%)	1.25	1.0 D + 1.0 Lr (All Spans)
Moment (Ft-lbs)	465 @ 2' 9 7/16"	861	Passed (54%)	1.25	1.0 D + 1.0 Lr (All Spans)
Live Load Defl. (in)	0.080 @ 2' 8"	0.175	Passed (L/783)	--	1.0 D + 1.0 Lr (All Spans)
Total Load Defl. (in)	0.134 @ 2' 8"	0.262	Passed (L/470)	--	1.0 D + 1.0 Lr (All Spans)

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Member Length : 5' 3"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Roof Live	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	124	185	309	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	158	239	397	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 3" o/c	
Bottom Edge (Lu)	5' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Roof Live (1.25)	Comments
0 - Self Weight (PLF)	0 to 5' 3"	N/A	2.7	--	
1 - Tapered (PSF)	0 to 5' 3"	2' to 4' 5 1/2"	15.8	25.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

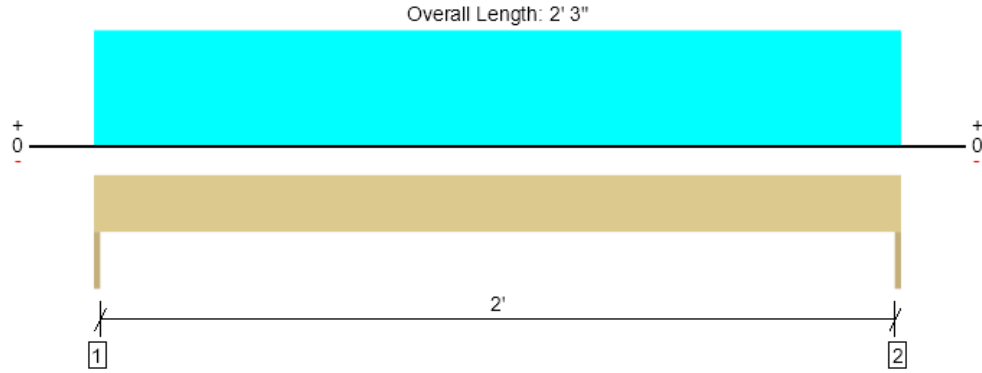
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javidabdidi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Roof, 2
2 piece(s) 2 x 4 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	405 @ 0	2813 (1.50")	Passed (14%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	255 @ 5"	1449	Passed (18%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	228 @ 1' 1 1/2"	792	Passed (29%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.007 @ 1' 1 1/2"	0.075	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.012 @ 1' 1 1/2"	0.112	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Member Length : 2' 3"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	159	246	405	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	159	246	405	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	2' 3" o/c	
Bottom Edge (Lu)	2' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 2' 3"	N/A	2.7	--	
1 - Uniform (PSF)	0 to 2' 3"	8' 9"	15.8	25.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

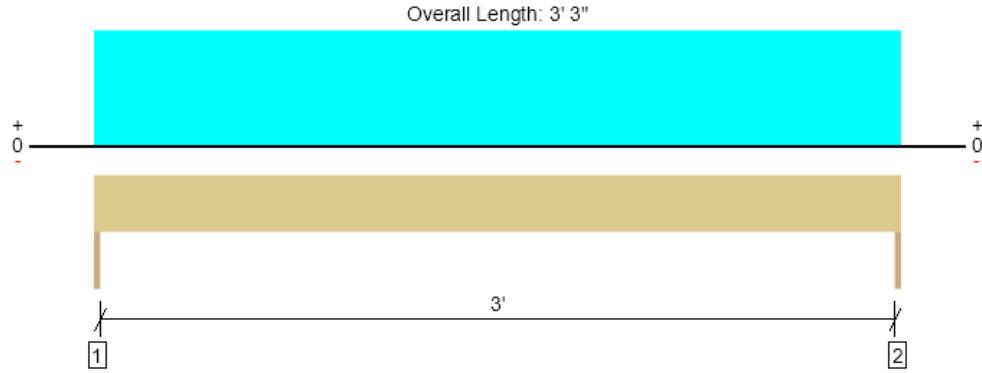
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javidabdidi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Roof, 3
2 piece(s) 2 x 4 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	535 @ 0	2813 (1.50")	Passed (19%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	398 @ 5"	1449	Passed (27%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	435 @ 1' 7 1/2"	792	Passed (55%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.029 @ 1' 7 1/2"	0.108	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.048 @ 1' 7 1/2"	0.162	Passed (L/810)	--	1.0 D + 1.0 S (All Spans)

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Member Length : 3' 3"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	210	325	535	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	210	325	535	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 3" o/c	
Bottom Edge (Lu)	3' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 3"	N/A	2.7	--	
1 - Uniform (PSF)	0 to 3' 3"	8'	15.8	25.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

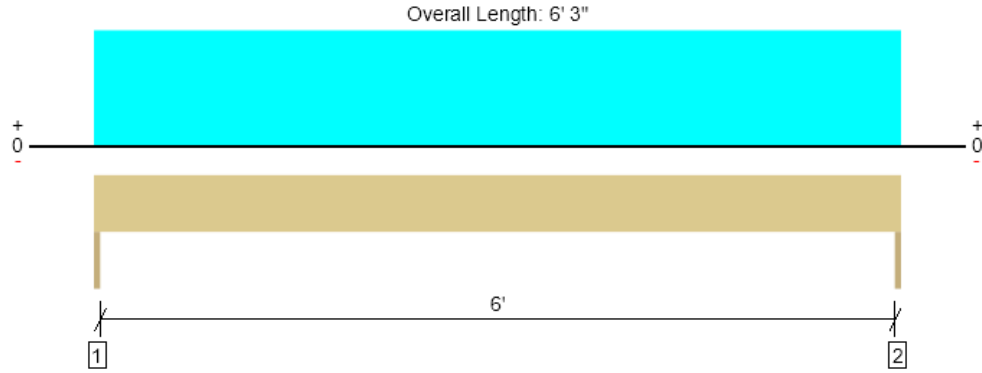
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javidabdidi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Roof, 4
2 piece(s) 2 x 6 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1076 @ 0	2813 (1.50")	Passed (38%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	875 @ 7"	2277	Passed (38%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1681 @ 3' 1 1/2"	1696	Passed (99%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.107 @ 3' 1 1/2"	0.208	Passed (L/698)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.178 @ 3' 1 1/2"	0.313	Passed (L/422)	--	1.0 D + 1.0 S (All Spans)

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Member Length : 6' 3"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	425	651	1076	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	425	651	1076	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	2' 1" o/c	
Bottom Edge (Lu)	6' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 3"	N/A	4.2	--	
1 - Uniform (PSF)	0 to 6' 3"	8' 4"	15.8	25.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

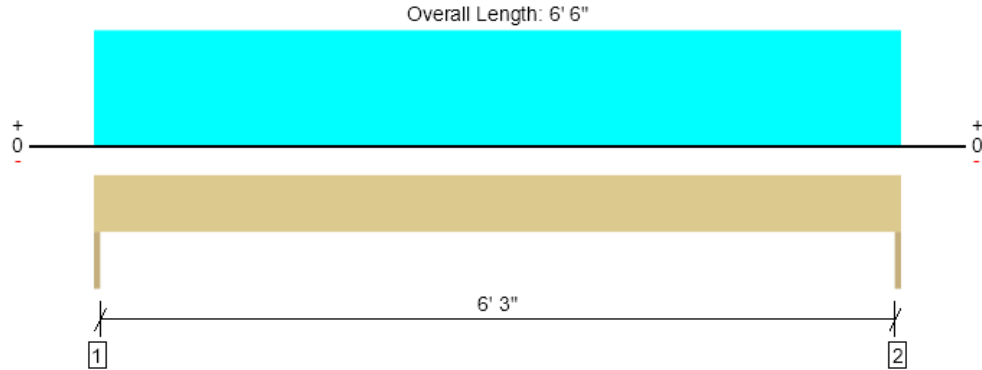
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javidabdidi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Roof, 5
2 piece(s) 2 x 6 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	456 @ 0	2813 (1.50")	Passed (16%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	374 @ 7"	2277	Passed (16%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	741 @ 3' 3"	1696	Passed (44%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.050 @ 3' 3"	0.217	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.085 @ 3' 3"	0.313	Passed (L/922)	--	1.0 D + 1.0 S (All Spans)

- Deflection criteria: LL (L/360) and TL (5/16").
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Member Length : 6' 6"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	185	271	456	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	185	271	456	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 6" o/c	
Bottom Edge (Lu)	6' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 6"	N/A	4.2	--	
1 - Uniform (PSF)	0 to 6' 6"	3' 4"	15.8	25.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

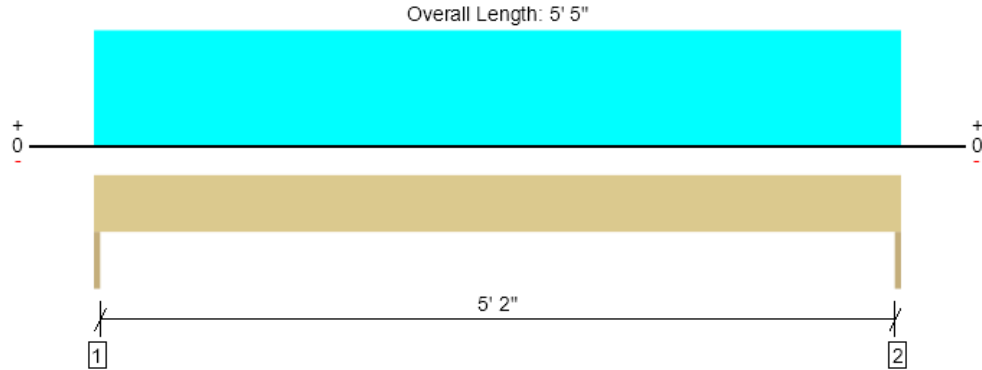
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javidabdidi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Roof, 6
2 piece(s) 2 x 6 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1135 @ 0	2813 (1.50")	Passed (40%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	891 @ 7"	2277	Passed (39%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1537 @ 2' 8 1/2"	1696	Passed (91%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.074 @ 2' 8 1/2"	0.181	Passed (L/879)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.122 @ 2' 8 1/2"	0.271	Passed (L/533)	--	1.0 D + 1.0 S (All Spans)

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Member Length : 5' 5"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	447	688	1135	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	447	688	1135	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 5" o/c	
Bottom Edge (Lu)	5' 5" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 5' 5"	N/A	4.2	--	
1 - Uniform (PSF)	0 to 5' 5"	10' 2"	15.8	25.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javidabdidi@yahoo.com	

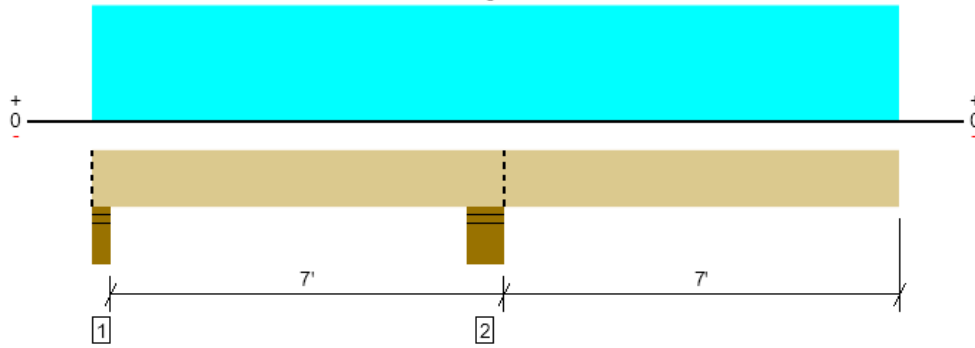


1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Roof, 7

3 piece(s) 1 3/4" x 9 1/4" 2.0E Microllam® LVL

Overall Length: 14' 4 1/2"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	7617 @ 7'	29531 (9.00")	Passed (26%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3225 @ 5' 10 1/4"	10611	Passed (30%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-14017 @ 7'	19327	Passed (73%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.599 @ 14' 4 1/2"	0.738	Passed (2L/296)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	1.003 @ 14' 4 1/2"	0.983	Passed (2L/176)	--	1.0 D + 1.0 S (Alt Spans)

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Right cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- 752 lbs uplift at support located at 3". Strapping or other restraint may be required.

Member Length : 14' 4 1/2"
System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 0/12

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - DF	4.50"	4.50"	1.50"	-87	483/-665	396/-752	Blocking
2 - Stud wall - DF	9.00"	9.00"	2.32"	3184	4434	7617	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)	14' 5" o/c	
Bottom Edge (Lu)	14' 5" o/c	

Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 14' 4 1/2"	N/A	14.2	--	
1 - Uniform (PSF)	0 to 14' 4 1/2" (Top)	12'	16.8	25.0	Default Load

Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javidabdidi@yahoo.com	

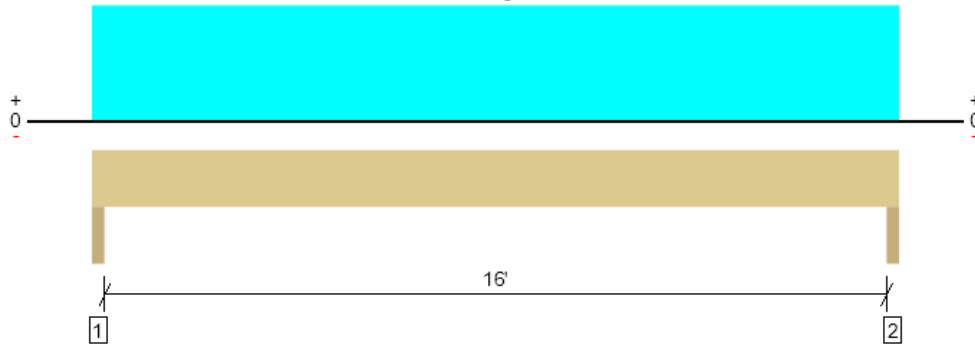


1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Upper, 11

1 piece(s) 3 1/2" x 10 1/2" 24F-V4 DF Glulam

Overall Length: 16' 6"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2353 @ 1 1/2"	6825 (3.00")	Passed (34%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2032 @ 1' 1 1/2"	6493	Passed (31%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	9413 @ 8' 3"	12863	Passed (73%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.503 @ 8' 3"	0.542	Passed (L/387)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.736 @ 8' 3"	0.813	Passed (L/265)	--	1.0 D + 1.0 L (All Spans)

Member Length : 16' 6"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 16' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Trimmer - DF	3.00"	3.00"	1.50"	744	1609	2353	None
2 - Trimmer - DF	3.00"	3.00"	1.50"	744	1609	2353	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	16' 6" o/c	
Bottom Edge (Lu)	16' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 16' 6"	N/A	8.9	--	
1 - Uniform (PSF)	0 to 16' 6"	3' 3"	25.0	60.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

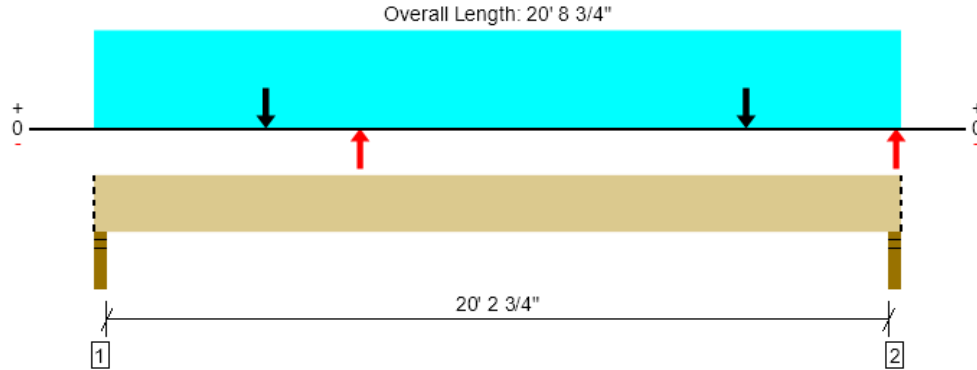
ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Upper, 12

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



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	11810 @ 1' 1/2"	13125 (3.00")	Passed (90%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	10006 @ 1' 7"	21280	Passed (47%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	59733 @ 10' 4 3/8"	62228	Passed (96%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.622 @ 10' 4 3/8"	0.683	Passed (L/395)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	1.005 @ 10' 4 3/8"	1.024	Passed (L/245)	--	1.0 D + 1.0 L (All Spans)

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Member should be side-loaded from both sides of the member or braced to prevent rotation.

Member Length : 20' 8 3/4"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Seismic	Factored	
1 - Stud wall - DF	3.00"	3.00"	2.70"	4503	7307	1316/-131 6	11810	Blocking
2 - Stud wall - DF	3.00"	3.00"	2.70"	4503	7307	1316/-131 6	11810	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' 4" o/c	
Bottom Edge (Lu)	20' 9" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 20' 8 3/4"	N/A	32.7	--	--	
1 - Uniform (PSF)	0 to 20' 8 3/4" (Top)	3' 3"	25.0	60.0	-	Default Load
2 - Uniform (PSF)	0 to 20' 8 3/4" (Top)	8' 6"	25.0	60.0	-	Default Load
3 - Uniform (PSF)	0 to 20' 8 3/4" (Front)	9'	12.0	-	-	
4 - Point (lb)	4' 5" (Front)	N/A	-	-	4298	Chord
5 - Point (lb)	6' 10" (Front)	N/A	-	-	-4298	Chord
6 - Point (lb)	16' 9" (Front)	N/A	-	-	4298	Chord
7 - Point (lb)	20' 7 1/4" (Front)	N/A	-	-	-4298	Chord

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

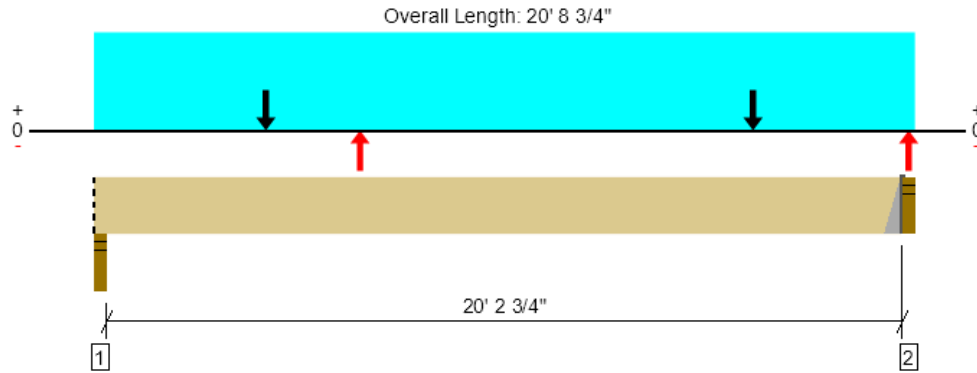
ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javidabdi@yahoo.com	



1/7/2025 1:59:38 AM UTC
 ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
 File Name: 270-2024 (2728 63rd)

Upper, 12 w/ overstrength
4 piece(s) 1 3/4" x 16" 2.0E Microllam® LVL

An excessive uplift of -2538 lbs at support located at 20' 5 3/4" failed this product.



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	13740 @ 20' 5 3/4"	13740 (2.62")	Passed (100%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	10077 @ 19' 1 3/4"	21280	Passed (47%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	59006 @ 10' 3 5/8"	62228	Passed (95%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.607 @ 10' 3 5/8"	0.678	Passed (L/402)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.982 @ 10' 3 5/8"	1.018	Passed (L/249)	--	1.0 D + 1.0 L (All Spans)

Member Length : 20' 5 3/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Member should be side-loaded from both sides of the member or braced to prevent rotation.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Seismic	Factored	
1 - Stud wall - DF	3.00"	3.00"	2.68"	4475	7263	3244/-324 4	11738	Blocking
2 - Hanger on DF studWall	3.00"	Hanger ¹	2.62"	4522	7351	7501/-750 1	13973/-253 8	See note ¹

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' o/c	
Bottom Edge (Lu)	20' 6" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie

Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Top Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 20' 5 3/4"	N/A	32.7	--	--	
1 - Uniform (PSF)	0 to 20' 8 3/4" (Top)	3' 3"	25.0	60.0	-	Default Load
2 - Uniform (PSF)	0 to 20' 8 3/4" (Top)	8' 6"	25.0	60.0	-	Default Load
3 - Uniform (PSF)	0 to 20' 8 3/4" (Front)	9'	12.0	-	-	
4 - Point (lb)	4' 5" (Front)	N/A	-	-	10745	Chord
5 - Point (lb)	6' 10" (Front)	N/A	-	-	-10745	Chord
6 - Point (lb)	16' 9" (Front)	N/A	-	-	10745	Chord
7 - Point (lb)	20' 7 1/4" (Front)	N/A	-	-	-10745	Chord

- Side loads are assumed to not induce cross-grain tension.

Forteweb Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	



1/7/2025 1:59:38 AM UTC
Forteweb v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

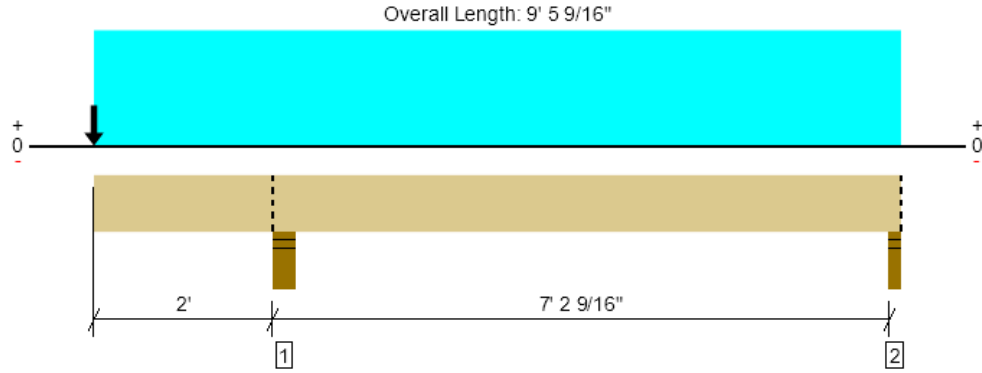
Weyerhaeuser Notes
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library .
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javidabd@yahoo.com	



Upper, 13

1 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4258 @ 2' 2 3/4"	6016 (5.50")	Passed (71%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1691 @ 3' 5 3/8"	3948	Passed (43%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-3473 @ 2' 2 3/4"	10263	Passed (34%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.052 @ 5' 9 3/8"	0.178	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.077 @ 0	0.223	Passed (2L/694)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Member Length : 9' 5 9/16"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Stud wall - DF	5.50"	5.50"	3.89"	2139	2085	740	4258	Blocking
2 - Stud wall - DF	3.00"	3.00"	1.64"	537	1251/-119	-177	1788	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)	9' 6" o/c	
Bottom Edge (Lu)	9' 6" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 9' 5 9/16"	N/A	6.1	--	--	
1 - Uniform (PSF)	0 to 9' 5 9/16" (Top)	8' 6"	25.0	40.0	-	Default Load
2 - Point (lb)	0 (Front)	N/A	608	-	563	

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	

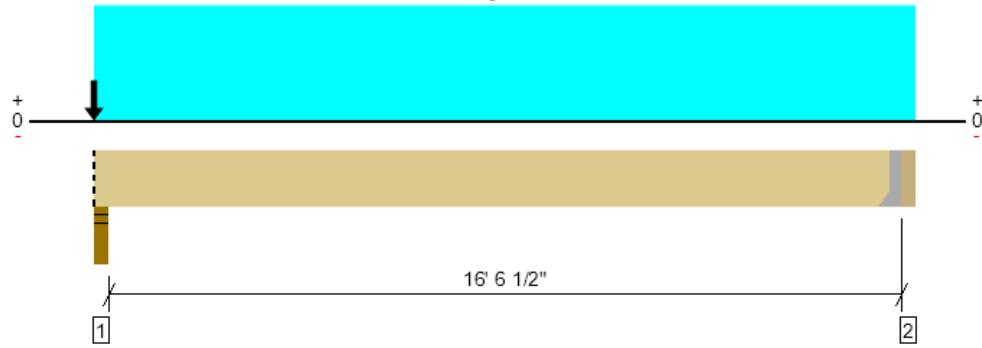


1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Upper, 14

4 piece(s) 1 1/2" x 14" 1.5E TimberStrand® LSL

Overall Length: 17' 1 1/2"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	7690 @ 16' 10"	7740 (1.50")	Passed (99%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	6613 @ 15' 8"	16800	Passed (39%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	32042 @ 8' 6"	36232	Passed (88%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.501 @ 8' 6"	0.556	Passed (L/399)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.837 @ 8' 6"	0.833	Passed (L/239)	--	1.0 D + 1.0 L (All Spans)

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Member Length : 16' 10"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Stud wall - DF	3.50"	3.50"	2.25"	3759	4693	563	8452	Blocking
2 - Hanger on 14" DF beam	3.50"	Hanger ¹	1.50"	3190	4762	-	7952	See note ¹

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 5" o/c	
Bottom Edge (Lu)	16' 10" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie

Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	HGUS210-4	4.00"	N/A	46-10d	16-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 16' 10"	N/A	25.7	--	--	
1 - Uniform (PSF)	0 to 17' 1 1/2" (Top)	13' 9 5/8"	25.0	40.0	-	Default Load
2 - Point (lb)	0 (Front)	N/A	608	-	563	

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

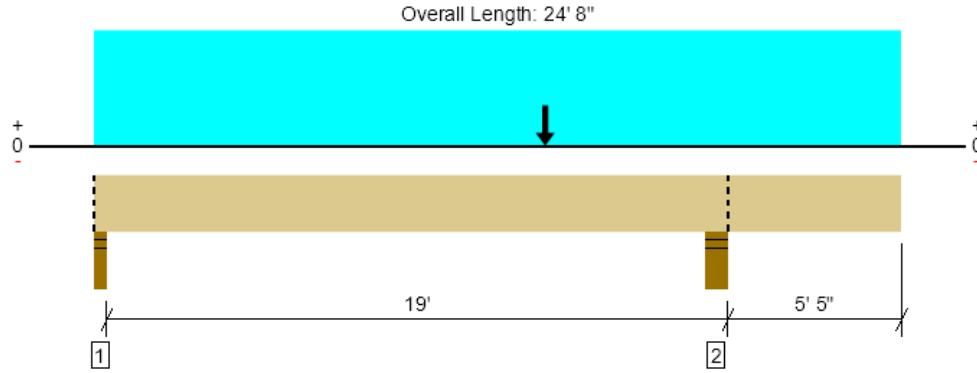
ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	



1/7/2025 1:59:38 AM UTC
 ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
 File Name: 270-2024 (2728 63rd)

Upper, 15 Hi

1 piece(s) 5 1/2" x 16" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	9167 @ 1 1/2"	10313 (3.00")	Passed (89%)	--	1.0 D + 1.0 S (Alt Spans)
Shear (lbs)	8931 @ 17' 5 1/2"	17879	Passed (50%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	39929 @ 8' 11 1/2"	52981	Passed (75%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-16306 @ 19' 1/4"	41604	Passed (39%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.424 @ 9' 5 1/16"	0.630	Passed (L/535)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.734 @ 9' 4 1/8"	0.945	Passed (L/309)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 24' 8"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Upward deflection on right cantilever exceeds overhang deflection criteria.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 0.98 that was calculated using length L = 17' 8 1/16".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 7' 4".
- Upward deflection on right cantilever exceeds 0.4".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Seismic	Factored	
1 - Stud wall - DF	3.00"	3.00"	2.67"	4055	5112	105/-105	9167	Blocking
2 - Stud wall - DF	5.50"	5.50"	4.74"	7404	8902	276/-276	16306	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)	24' 8" o/c	
Bottom Edge (Lu)	24' 8" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 24' 8"	N/A	21.4	--	--	
1 - Uniform (PSF)	0 to 24' 8" (Front)	7' 1 3/8"	15.0	25.0	-	
2 - Uniform (PSF)	0 to 24' 8" (Front)	15' 2 3/4"	15.0	25.0	-	
3 - Uniform (PSF)	0 to 24' 8" (Front)	9'	12.0	-	-	
4 - Point (lb)	13' 9 1/2" (Front)	N/A	-	-	381	

- Side loads are assumed to not induce cross-grain tension.

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	



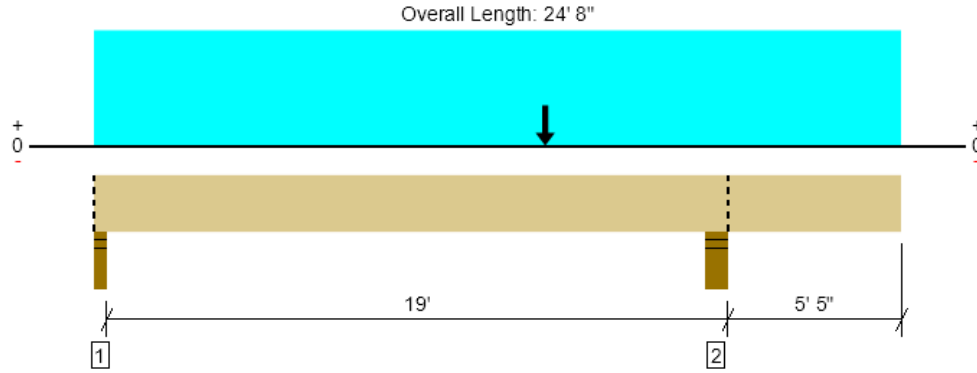
1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Weyerhaeuser Notes
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library .
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javidabd@yahoo.com	



Upper, 15 Hi w/ overstrength
1 piece(s) 5 1/2" x 16" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	9167 @ 1 1/2"	10313 (3.00")	Passed (89%)	--	1.0 D + 1.0 S (Alt Spans)
Shear (lbs)	8931 @ 17' 5 1/2"	17879	Passed (50%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	39929 @ 8' 11 1/2"	52981	Passed (75%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-16306 @ 19' 1/4"	41604	Passed (39%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.424 @ 9' 5 1/16"	0.630	Passed (L/535)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.734 @ 9' 4 1/8"	0.945	Passed (L/309)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 24' 8"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Upward deflection on right cantilever exceeds overhang deflection criteria.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 0.98 that was calculated using length L = 17' 8 1/16".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 7' 4".
- Upward deflection on right cantilever exceeds 0.4".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Seismic	Factored	
1 - Stud wall - DF	3.00"	3.00"	2.67"	4055	5112	264/-264	9167	Blocking
2 - Stud wall - DF	5.50"	5.50"	4.74"	7404	8902	689/-689	16306	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)	24' 8" o/c	
Bottom Edge (Lu)	24' 8" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 24' 8"	N/A	21.4	--	--	
1 - Uniform (PSF)	0 to 24' 8" (Front)	7' 1 3/8"	15.0	25.0	-	
2 - Uniform (PSF)	0 to 24' 8" (Front)	15' 2 3/4"	15.0	25.0	-	
3 - Uniform (PSF)	0 to 24' 8" (Front)	9'	12.0	-	-	
4 - Point (lb)	13' 9 1/2" (Front)	N/A	-	-	953	

- Side loads are assumed to not induce cross-grain tension.

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

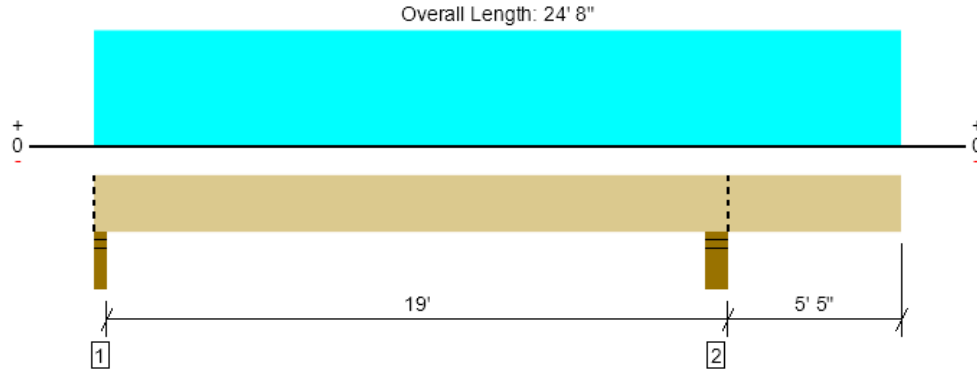
Weyerhaeuser Notes
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library .
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javidabd@yahoo.com	



Upper, 15 Lo

3 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3615 @ 1 1/2"	9844 (3.00")	Passed (37%)	--	1.0 D + 1.0 L (Alt Spans)
Shear (lbs)	3556 @ 17' 9 5/8"	11845	Passed (30%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	16226 @ 9' 2 11/16"	26772	Passed (61%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.469 @ 9' 6 7/8"	0.630	Passed (L/483)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.732 @ 9' 5 3/8"	0.945	Passed (L/310)	--	1.0 D + 1.0 L (Alt Spans)

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Upward deflection on right cantilever exceeds overhang deflection criteria.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Upward deflection on right cantilever exceeds 0.4".

Member Length : 24' 8"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	3.00"	3.00"	1.50"	1414	2202/-194	3615	Blocking
2 - Stud wall - DF	5.50"	5.50"	1.90"	2581	3666	6246	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)	17' 5" o/c	
Bottom Edge (Lu)	24' 8" o/c	

Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 24' 8"	N/A	18.2	--	
1 - Uniform (PSF)	0 to 24' 8" (Back)	5' 9"	25.0	40.0	Default Load

Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javidabdi@yahoo.com	

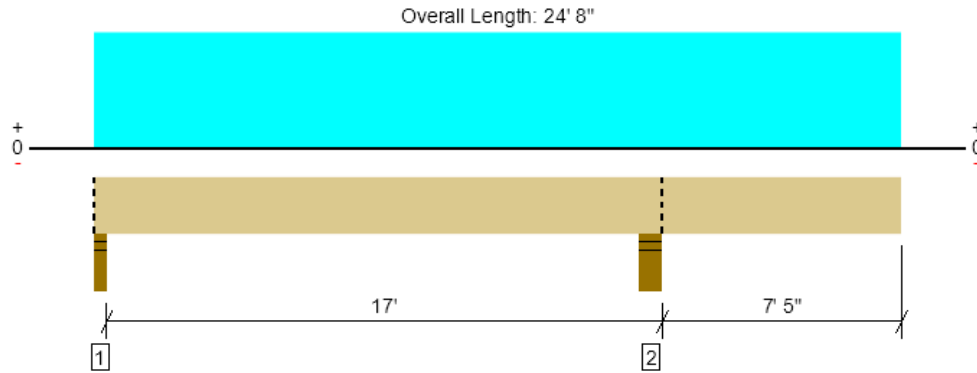


1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Upper, 16

1 piece(s) 3 1/2" x 16" 24F-V4 DF Glulam

Right cantilever exceeds the maximum braced cantilever length of 7'.



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5315 @ 17' 1/4"	12031 (5.50")	Passed (44%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2569 @ 15' 5 1/2"	11377	Passed (23%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	7802 @ 7' 4 5/16"	34347	Passed (23%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-8716 @ 17' 1/4"	19857	Passed (44%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.131 @ 24' 8"	0.510	Passed (2L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.168 @ 8' 1/4"	0.845	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 24' 8"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Moment capacity over cantilever support 2 has been reduced by 25% to lessen the effects of buckling.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 14' 5 5/8".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 11' 1 1/4".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - DF	3.00"	3.00"	1.50"	823	1371	2194	Blocking
2 - Stud wall - DF	5.50"	5.50"	2.43"	2145	3170	5315	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)	24' 8" o/c	
Bottom Edge (Lu)	24' 8" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 24' 8"	N/A	13.6	--	
1 - Uniform (PSF)	0 to 24' 8" (Front)	7' 1 3/8"	15.0	25.0	

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

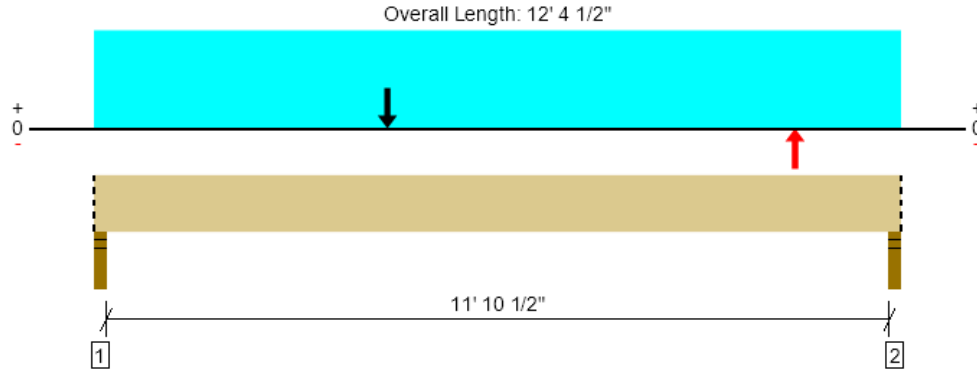
ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Upper, 17

2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2249 @ 1' 1/2"	6563 (3.00")	Passed (34%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1775 @ 1' 2 7/8"	7897	Passed (22%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	6593 @ 6' 2 1/4"	17848	Passed (37%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.117 @ 6' 2 1/4"	0.303	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.197 @ 6' 2 1/4"	0.606	Passed (L/739)	--	1.0 D + 1.0 L (All Spans)

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Member Length : 12' 4 1/2"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Seismic	Factored	
1 - Stud wall - DF	3.00"	3.00"	1.50"	900	1320	685/-685	2249	Blocking
2 - Stud wall - DF	3.00"	3.00"	1.50"	900	1320	685/-685	2249	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)	12' 5" o/c	
Bottom Edge (Lu)	12' 5" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 12' 4 1/2"	N/A	12.1	--	--	
1 - Uniform (PSF)	0 to 12' 4 1/2" (Top)	5' 4"	25.0	40.0	-	Default Load
2 - Uniform (PSF)	0 to 12' 4 1/2" (Top)	9'	-	-	-	
3 - Point (lb)	4' 6" (Top)	N/A	-	-	1328	CHORD
4 - Point (lb)	10' 9" (Top)	N/A	-	-	-1328	CHORD

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

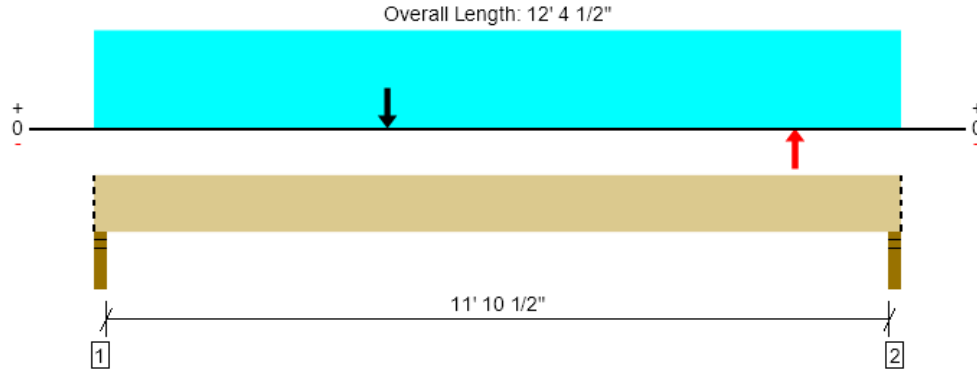
ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Upper, 17 w/ overstrength

2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2788 @ 1 1/2"	6563 (3.00")	Passed (42%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1775 @ 1' 2 7/8"	7897	Passed (22%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	6593 @ 6' 2 1/4"	17848	Passed (37%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.117 @ 6' 2 1/4"	0.303	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.197 @ 6' 2 1/4"	0.606	Passed (L/739)	--	1.0 D + 1.0 L (All Spans)

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- 658 lbs uplift at support located at 1 1/2". Strapping or other restraint may be required.
- 658 lbs uplift at support located at 12' 3". Strapping or other restraint may be required.

Member Length : 12' 4 1/2"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Seismic	Factored	
1 - Stud wall - DF	3.00"	3.00"	1.50"	900	1320	1711/-171 1	2788/-658	Blocking
2 - Stud wall - DF	3.00"	3.00"	1.50"	900	1320	1711/-171 1	2788/-658	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)	12' 5" o/c	
Bottom Edge (Lu)	12' 5" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 12' 4 1/2"	N/A	12.1	--	--	
1 - Uniform (PSF)	0 to 12' 4 1/2" (Top)	5' 4"	25.0	40.0	-	Default Load
2 - Uniform (PSF)	0 to 12' 4 1/2" (Top)	9'	-	-	-	
3 - Point (lb)	4' 6" (Top)	N/A	-	-	3320	overstrength
4 - Point (lb)	10' 9" (Top)	N/A	-	-	-3320	overstrength

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	

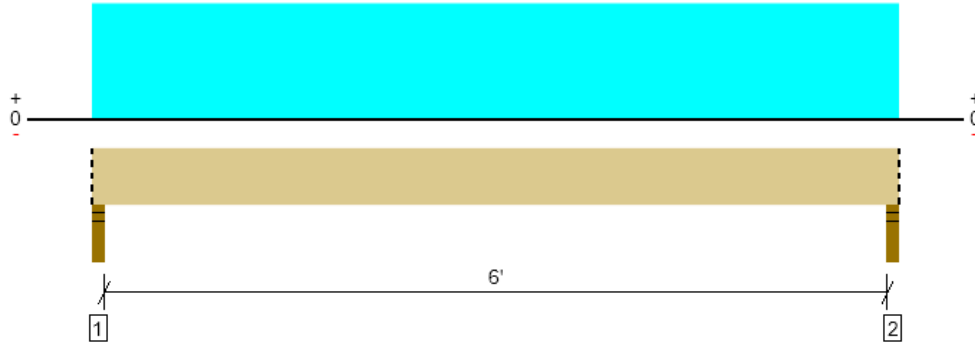


1/7/2025 1:59:38 AM UTC
 ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
 File Name: 270-2024 (2728 63rd)

Upper, 18

1 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL

Overall Length: 6' 6"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1146 @ 1' 1/2"	3281 (3.00")	Passed (35%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	709 @ 1' 2 7/8"	3948	Passed (18%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1722 @ 3' 3"	8924	Passed (19%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.021 @ 3' 3"	0.156	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.034 @ 3' 3"	0.313	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Member Length : 6' 6"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	3.00"	3.00"	1.50"	453	693	1146	Blocking
2 - Stud wall - DF	3.00"	3.00"	1.50"	453	693	1146	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)	6' 6" o/c	
Bottom Edge (Lu)	6' 6" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 6' 6"	N/A	6.1	--	
1 - Uniform (PSF)	0 to 6' 6" (Top)	5' 4"	25.0	40.0	Default Load

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

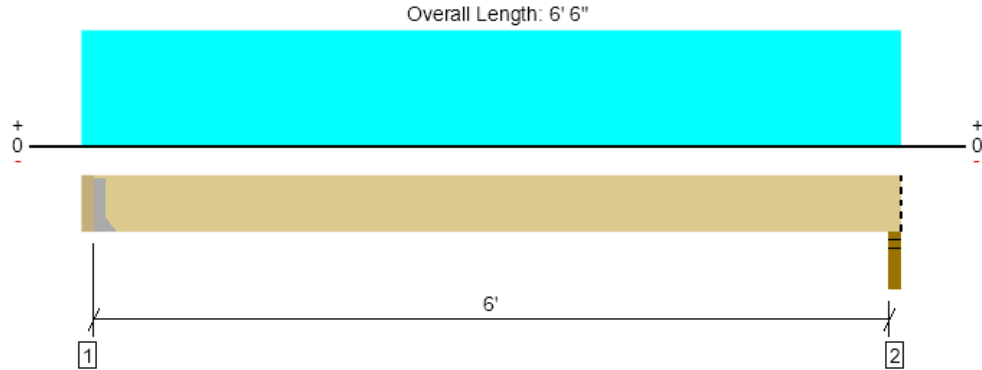
ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javidabdidi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Upper, 19

1 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1976 @ 3"	1976 (1.51")	Passed (100%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1338 @ 1' 2 7/8"	3948	Passed (34%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3026 @ 3' 3 3/4"	8924	Passed (34%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.036 @ 3' 3 3/4"	0.153	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.059 @ 3' 3 3/4"	0.306	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Member Length : 6' 3"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Hanger on 11 7/8" DF beam	3.00"	Hanger ¹	1.51"	833	1303	2136	See note ¹
2 - Stud wall - DF	3.00"	3.00"	1.88"	803	1254	2057	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 3" o/c	
Bottom Edge (Lu)	6' 3" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie

Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HUS1.81/10	3.00"	N/A	30-10dx1.5	10-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	3" to 6' 6"	N/A	6.1	--	
1 - Uniform (PSF)	0 to 6' 6" (Top)	9' 10"	25.0	40.0	Default Load

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

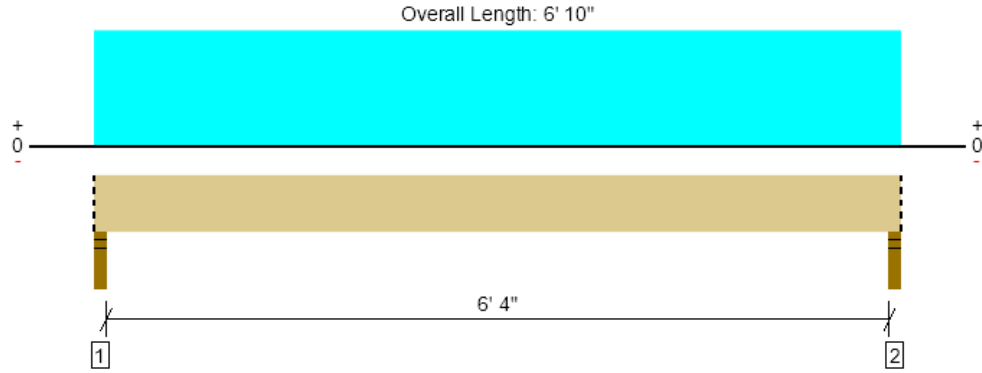
ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Upper, 20

1 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2193 @ 1' 1/2"	3281 (3.00")	Passed (67%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1397 @ 1' 2 7/8"	3948	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3477 @ 3' 5"	8924	Passed (39%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.046 @ 3' 5"	0.165	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.075 @ 3' 5"	0.329	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Member Length : 6' 10"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	3.00"	3.00"	2.00"	856	1337	2193	Blocking
2 - Stud wall - DF	3.00"	3.00"	2.00"	856	1337	2193	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)	6' 10" o/c	
Bottom Edge (Lu)	6' 10" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 6' 10"	N/A	6.1	--	
1 - Uniform (PSF)	0 to 6' 10" (Top)	9' 9 3/8"	25.0	40.0	Default Load

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javidabdidi@yahoo.com	

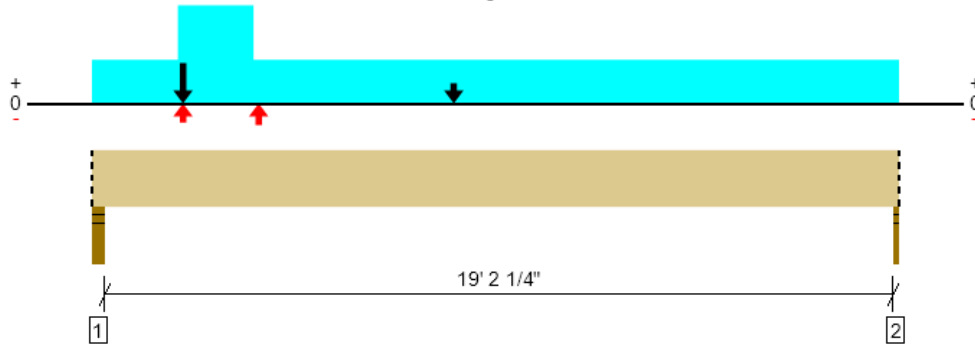


1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Upper, 21

4 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL

Overall Length: 19' 6 3/4"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern) [Group]
Member Reaction (lbs)	12991 @ 1 1/2"	13125 (3.00")	Passed (99%)	--	1.0 D + 1.0 L (All Spans) [1]
Shear (lbs)	12853 @ 1' 2 7/8"	15794	Passed (81%)	1.00	1.0 D + 1.0 L (All Spans) [1]
Moment (Ft-lbs)	29404 @ 8' 9 1/4"	35696	Passed (82%)	1.00	1.0 D + 1.0 L (All Spans) [1]
Live Load Defl. (in)	0.603 @ 8' 9 1/4"	0.486	Failed (L/387)	--	1.0 D + 1.0 L (All Spans) [1]
Total Load Defl. (in)	1.032 @ 9' 5/8"	0.972	Failed (L/226)	--	1.0 D + 1.0 L (All Spans) [1]

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Member should be side-loaded from both sides of the member or braced to prevent rotation.

Member Length : 19' 6 3/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Seismic	Factored	
1 - Stud wall - DF	3.00"	3.00"	2.97"	5218	7772	1464/-1464	12991	Blocking
2 - Stud wall - DF	1.50"	1.50"	1.50"	1442	1881	430/-430	3323	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)	13' 6" o/c	
Bottom Edge (Lu)	19' 7" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 19' 6 3/4"	N/A	24.2	--	--	
1 - Uniform (PSF)	0 to 19' 6 3/4" (Top)	1' 4"	25.0	40.0	-	Default Load
2 - Point (lb)	2' 2 1/2" (Front)	N/A	4503	7307	1316/-1316	Linked from: 12, Support 2
3 - Point (lb)	2' 2 1/2" (Front)	N/A	-	-	3068	
4 - Point (lb)	4' 1/2" (Front)	N/A	-	-	-3068	
5 - Uniform (PSF)	2' 1" to 3' 11" (Top)	9'	12.0	-	-	
6 - Point (lb)	8' 9 1/4" (Front)	N/A	833	1303	-	Linked from: 19, Support 1

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	

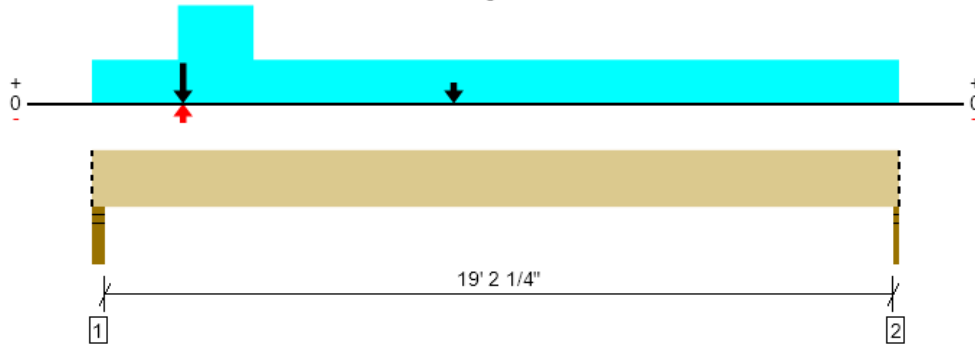


1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Upper, 21 (no seismic)

4 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL

Overall Length: 19' 6 3/4"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern) [Group]
Member Reaction (lbs)	13033 @ 1' 1/2"	13125 (3.00")	Passed (99%)	--	1.0 D + 1.0 L (All Spans) [1]
Shear (lbs)	12870 @ 1' 5"	18620	Passed (69%)	1.00	1.0 D + 1.0 L (All Spans) [1]
Moment (Ft-lbs)	29606 @ 8' 9 1/4"	48517	Passed (61%)	1.00	1.0 D + 1.0 L (All Spans) [1]
Live Load Defl. (in)	0.373 @ 8' 9 1/4"	0.486	Passed (L/625)	--	1.0 D + 1.0 L (All Spans) [1]
Total Load Defl. (in)	0.644 @ 8' 9 1/4"	0.972	Passed (L/362)	--	1.0 D + 1.0 L (All Spans) [1]

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Member should be side-loaded from both sides of the member or braced to prevent rotation.

Member Length : 19' 6 3/4"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Seismic	Factored	
1 - Stud wall - DF	3.00"	3.00"	2.98"	5261	7772	1175/-1175	13033	Blocking
2 - Stud wall - DF	1.50"	1.50"	1.50"	1484	1881	141/-141	3365	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)	17' 10" o/c	
Bottom Edge (Lu)	19' 7" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 19' 6 3/4"	N/A	28.6	--	--	
1 - Uniform (PSF)	0 to 19' 6 3/4" (Top)	1' 4"	25.0	40.0	-	Default Load
2 - Point (lb)	2' 2 1/2" (Front)	N/A	4503	7307	1316/-1316	Linked from: 12, Support 2
3 - Uniform (PSF)	2' 1" to 3' 11" (Top)	9'	12.0	-	-	
4 - Point (lb)	8' 9 1/4" (Front)	N/A	833	1303	-	Linked from: 19, Support 1

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javidabdidi@yahoo.com	



1/7/2025 1:59:38 AM UTC
 ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
 File Name: 270-2024 (2728 63rd)

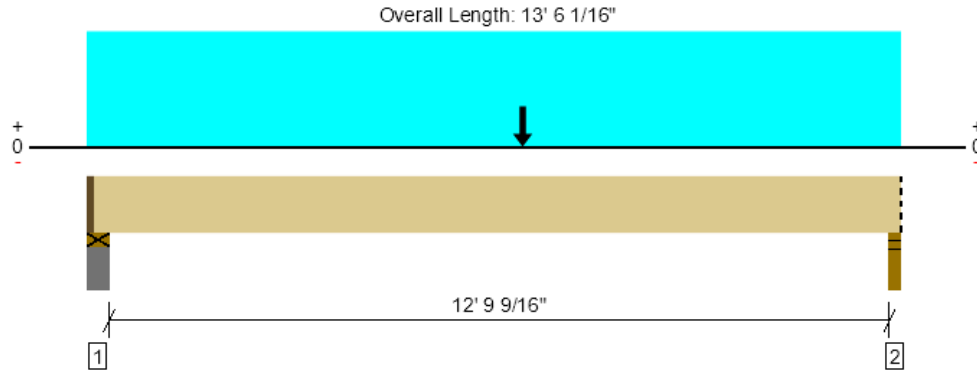
Main, 30

2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL

An excessive uplift of -1175 lbs at support located at 4" failed this product.

OK, provide connection to resist uplift

An excessive uplift of -1355 lbs at support located at 13' 4 9/16" failed this product.



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2016 @ 13' 4 9/16"	6563 (3.00")	Passed (31%)	--	1.0 D + 0.7 E (All Spans)
Shear (lbs)	1939 @ 12' 3 3/16"	12635	Passed (15%)	1.60	1.0 D + 0.7 E (All Spans)
Moment (Ft-lbs)	11178 @ 7' 2 3/4"	28557	Passed (39%)	1.60	1.0 D + 0.7 E (All Spans)
Live Load Defl. (in)	0.058 @ 6' 10 1/4"	0.326	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.103 @ 6' 10 1/4"	0.652	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Member Length : 13' 4 5/16"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Seismic	Factored	
1 - Plate on concrete - DF	5.50"	3.75"	1.50"	424	549	2043/-2043	1908/-1175	1 3/4" Rim Board
2 - Stud wall - DF	3.00"	3.00"	1.50"	413	532	2290/-2290	2016/-1355	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- 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)	13' 4" o/c	
Bottom Edge (Lu)	13' 4" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	1 3/4" to 13' 6 1/16"	N/A	12.1	--	--	
1 - Uniform (PSF)	0 to 13' 6 1/16" (Top)	2'	25.0	40.0	-	Default Load
2 - Point (lb)	7' 2 3/4" (Top)	N/A	-	-	4333	chord force

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

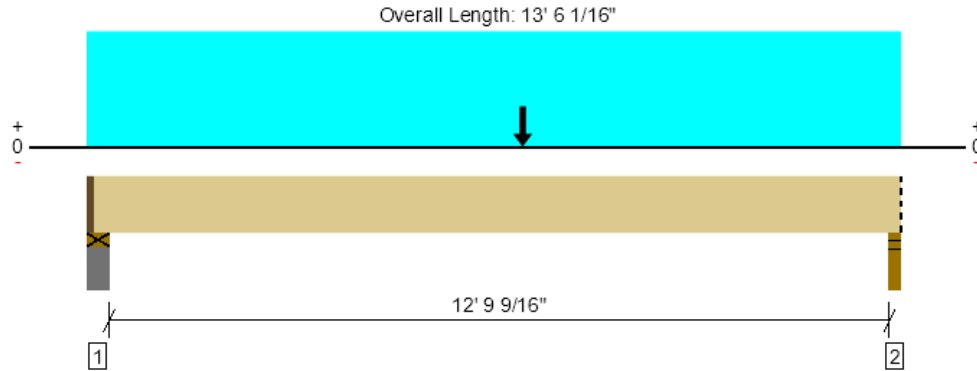
Main, 30 (overstrength)

2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL

An excessive uplift of -3320 lbs at support located at 4" failed this product.

OK, provide connection to resist uplift

An excessive uplift of -3760 lbs at support located at 13' 4 9/16" failed this product.



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4421 @ 13' 4 9/16"	6563 (3.00")	Passed (67%)	--	1.0 D + 0.7 E (All Spans)
Shear (lbs)	4344 @ 12' 3 3/16"	12635	Passed (34%)	1.60	1.0 D + 0.7 E (All Spans)
Moment (Ft-lbs)	25970 @ 7' 2 3/4"	28557	Passed (91%)	1.60	1.0 D + 0.7 E (All Spans)
Live Load Defl. (in)	0.058 @ 6' 10 1/4"	0.326	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.103 @ 6' 10 1/4"	0.652	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Member Length : 13' 4 5/16"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Seismic	Factored	
1 - Plate on concrete - DF	5.50"	3.75"	1.82"	424	549	5107/-5107	3999/-3320	1 3/4" Rim Board
2 - Stud wall - DF	3.00"	3.00"	2.02"	413	532	5725/-5725	4421/-3760	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- 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)	3' 7" o/c	
Bottom Edge (Lu)	4' 8" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	1 3/4" to 13' 6 1/16"	N/A	12.1	--	--	
1 - Uniform (PSF)	0 to 13' 6 1/16" (Top)	2'	25.0	40.0	-	Default Load
2 - Point (lb)	7' 2 3/4" (Top)	N/A	-	-	10833	2.5 times 4333 (chord force)

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

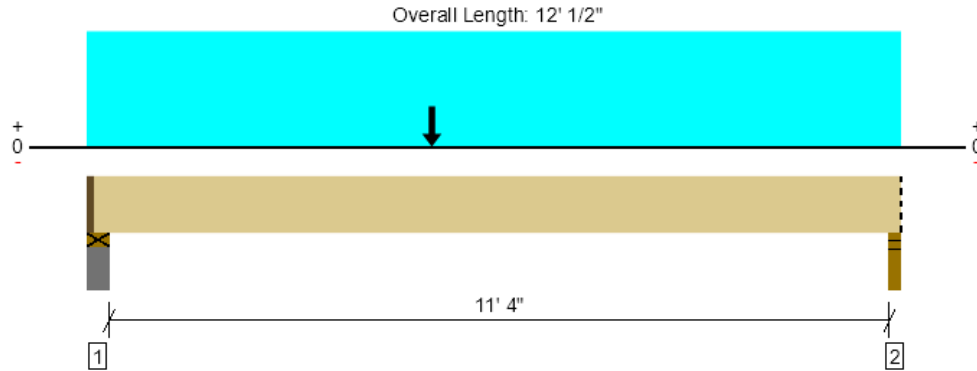
Main, 31

2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL

An excessive uplift of -1557 lbs at support located at 4" failed this product.

OK, provide connection to resist uplift

An excessive uplift of -1029 lbs at support located at 11' 11" failed this product.



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2155 @ 4"	8203 (3.75")	Passed (26%)	--	1.0 D + 0.7 E (All Spans)
Shear (lbs)	2074 @ 1' 5 3/8"	12635	Passed (16%)	1.60	1.0 D + 0.7 E (All Spans)
Moment (Ft-lbs)	9520 @ 5' 1 1/4"	28557	Passed (33%)	1.60	1.0 D + 0.7 E (All Spans)
Live Load Defl. (in)	0.037 @ 6' 1 1/2"	0.290	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.066 @ 6' 1 1/2"	0.579	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

• Deflection criteria: LL (L/480) and TL (L/240).

• Allowed moment does not reflect the adjustment for the beam stability factor.

Member Length : 11' 10 3/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Seismic	Factored	
1 - Plate on concrete - DF	5.50"	3.75"	1.50"	379	490	2548/-2548	2163/-1557	1 3/4" Rim Board
2 - Stud wall - DF	3.00"	3.00"	1.50"	368	473	1785/-1785	1659/-1029	Blocking

• Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

• 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)	11' 11" o/c	
Bottom Edge (Lu)	11' 11" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	1 3/4" to 12' 1/2"	N/A	12.1	--	--	
1 - Uniform (PSF)	0 to 12' 1/2" (Top)	2'	25.0	40.0	-	Default Load
2 - Point (lb)	5' 1 1/4" (Top)	N/A	-	-	4333	chord force

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javidabdidi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

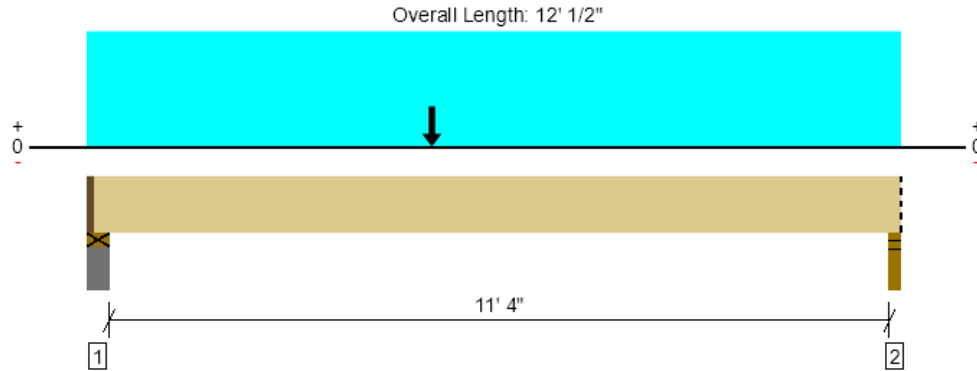
Main, 31 (overstrength)

2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL

An excessive uplift of -4232 lbs at support located at 4" failed this product.

OK, provide connection to resist uplift

An excessive uplift of -2903 lbs at support located at 11' 11" failed this product.



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4831 @ 4"	8203 (3.75")	Passed (59%)	--	1.0 D + 0.7 E (All Spans)
Shear (lbs)	4750 @ 1' 5 3/8"	12635	Passed (38%)	1.60	1.0 D + 0.7 E (All Spans)
Moment (Ft-lbs)	22286 @ 5' 1 1/4"	28557	Passed (78%)	1.60	1.0 D + 0.7 E (All Spans)
Live Load Defl. (in)	0.037 @ 6' 1 1/2"	0.290	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.066 @ 6' 1 1/2"	0.579	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Member Length : 11' 10 3/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Seismic	Factored	
1 - Plate on concrete - DF	5.50"	3.75"	2.21"	379	490	6371/-6371	4838/-4232	1 3/4" Rim Board
2 - Stud wall - DF	3.00"	3.00"	1.60"	368	473	4462/-4462	3491/-2903	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- 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)	5' 3" o/c	
Bottom Edge (Lu)	5' 11" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	1 3/4" to 12' 1/2"	N/A	12.1	--	--	
1 - Uniform (PSF)	0 to 12' 1/2" (Top)	2'	25.0	40.0	-	Default Load
2 - Point (lb)	5' 1 1/4" (Top)	N/A	-	-	10833	2.5 times 4333 (chord force)

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

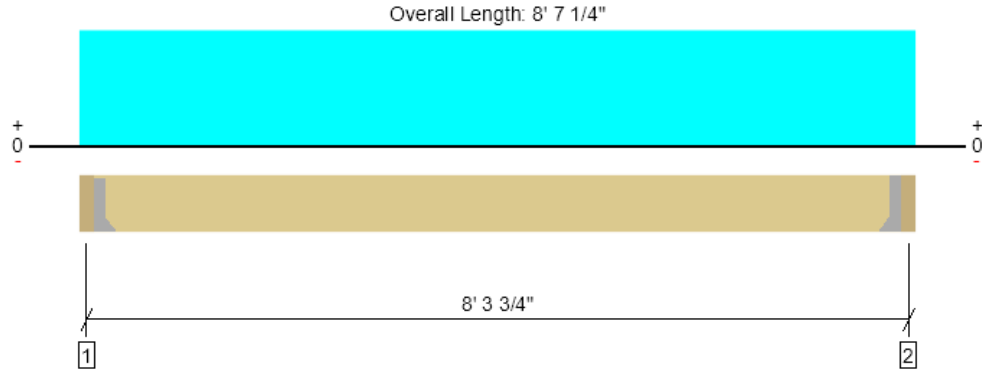
ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Main, 32

2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2009 @ 3 1/2"	3938 (1.50")	Passed (51%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1513 @ 1' 3 3/8"	7897	Passed (19%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	4029 @ 4' 3 5/8"	17848	Passed (23%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.035 @ 4' 3 5/8"	0.201	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.059 @ 4' 3 5/8"	0.401	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Member Length : 8' 1/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Hanger on 11 7/8" DF beam	3.50"	Hanger ¹	1.50"	857	1294	2152	See note ¹
2 - Hanger on 11 7/8" DF beam	3.50"	Hanger ¹	1.50"	857	1294	2152	See note ¹

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' o/c	
Bottom Edge (Lu)	8' o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	LUS414	2.00"	N/A	10-16d	6-16d	
2 - Face Mount Hanger	LUS414	2.00"	N/A	10-16d	6-16d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	3 1/2" to 8' 3 3/4"	N/A	12.1	--	
1 - Uniform (PSF)	0 to 8' 7 1/4" (Top)	1' 11"	25.0	40.0	Default Load
2 - Uniform (PSF)	0 to 8' 7 1/4" (Top)	5' 7 1/4"	25.0	40.0	Default Load

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library .
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

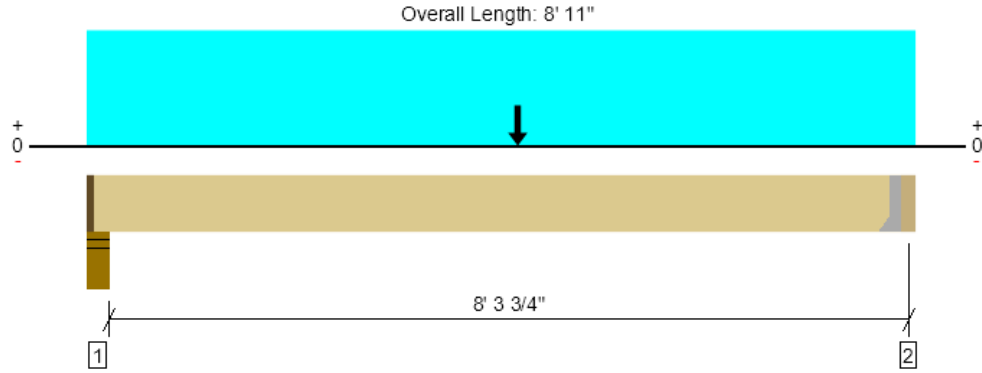
ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Main, 33

2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1724 @ 8' 7 1/2"	3938 (1.50")	Passed (44%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1584 @ 7' 7 5/8"	7897	Passed (20%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	5663 @ 4' 8 1/2"	17848	Passed (32%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.045 @ 4' 8 1/2"	0.207	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.076 @ 4' 8 1/2"	0.415	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Member Length : 8' 5 3/4"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	5.50"	3.75"	1.50"	681	970	1651	1 3/4" Rim Board
2 - Hanger on 11 7/8" DF beam	3.50"	Hanger ¹	1.50"	724	1038	1762	See note ¹

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' 6" o/c	
Bottom Edge (Lu)	8' 6" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie

Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	LUS410	2.00"	N/A	8-16d	6-16d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 3/4" to 8' 7 1/2"	N/A	12.1	--	
1 - Uniform (PSF)	0 to 8' 11" (Top)	2'	25.0	40.0	Default Load
2 - Point (lb)	4' 8 1/2" (Front)	N/A	857	1294	Linked from: 32, Support 1

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

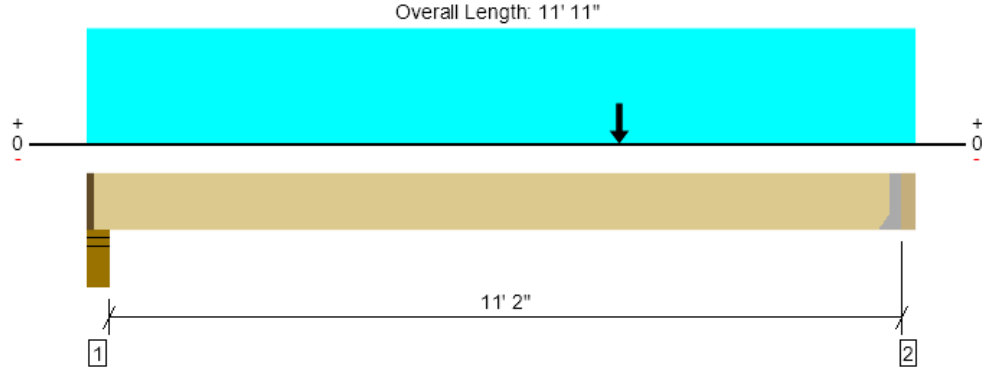
ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	



1/7/2025 1:59:38 AM UTC
 ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
 File Name: 270-2024 (2728 63rd)

Main, 34

2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2207 @ 11' 7 1/2"	3938 (1.50")	Passed (56%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2067 @ 10' 7 5/8"	7897	Passed (26%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	7555 @ 7' 8 1/2"	17848	Passed (42%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.101 @ 6' 3 1/2"	0.282	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.172 @ 6' 3 7/16"	0.565	Passed (L/787)	--	1.0 D + 1.0 L (All Spans)

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Member Length : 11' 5 3/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	5.50"	3.75"	1.50"	667	927	1594	1 3/4" Rim Board
2 - Hanger on 11 7/8" DF beam	3.50"	Hanger ¹	1.50"	925	1320	2245	See note ¹

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	11' 6" o/c	
Bottom Edge (Lu)	11' 6" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie

Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	LUS414	2.00"	N/A	10-SD9112	6-SD9212	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 3/4" to 11' 7 1/2"	N/A	12.1	--	
1 - Uniform (PSF)	0 to 11' 11" (Top)	2'	25.0	40.0	Default Load
2 - Point (lb)	7' 8 1/2" (Front)	N/A	857	1294	Linked from: 32, Support 1

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

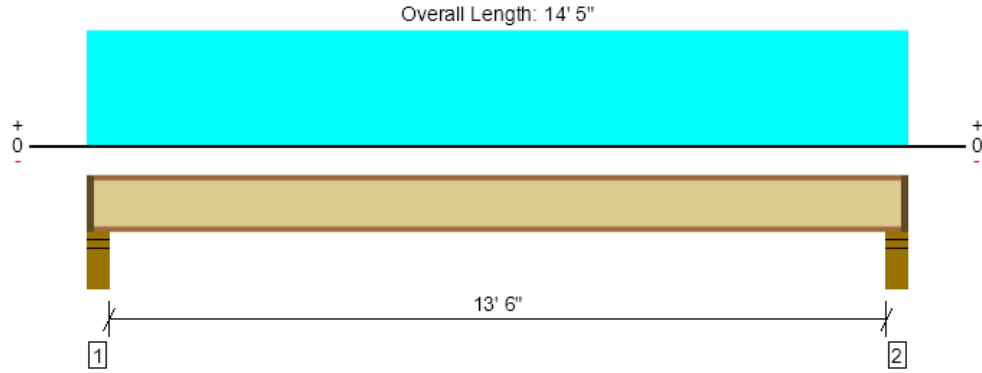
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Joists, TJI 110 @ 24" oc (13.5' max)
1 piece(s) 11 7/8" TJI@ 110 @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	918 @ 4 1/2"	1375 (3.50")	Passed (67%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	878 @ 5 1/2"	1560	Passed (56%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3035 @ 7' 2 1/2"	3160	Passed (96%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.211 @ 7' 2 1/2"	0.342	Passed (L/779)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.342 @ 7' 2 1/2"	0.683	Passed (L/479)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	43	40	Passed	--	--

- Deflection criteria: LL (L/480) 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: None.

Member Length : 14' 1 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	5.50"	3.75"	1.78"	360	577	937	1 3/4" Rim Board
2 - Stud wall - DF	5.50"	3.75"	1.78"	360	577	937	1 3/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 1" o/c	
Bottom Edge (Lu)	14' 2" 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 14' 5"	24"	25.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

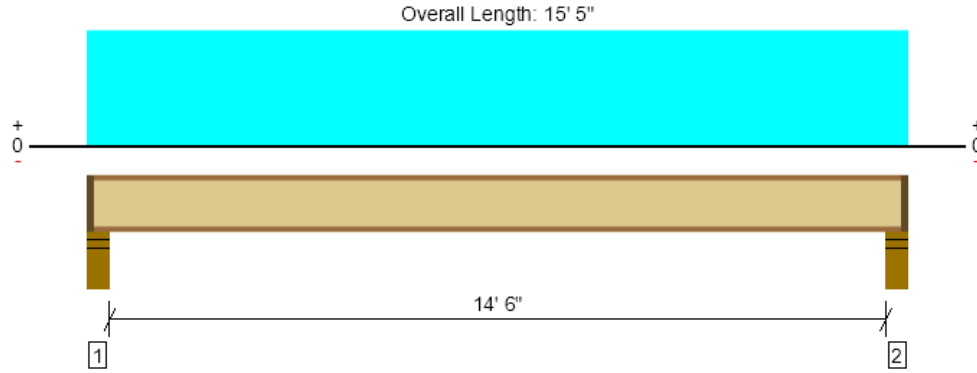
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javidabdi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Joists, TJI 210 @ 24" oc (14.5' max)
1 piece(s) 11 7/8" TJI@ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	983 @ 4 1/2"	1460 (3.50")	Passed (67%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	943 @ 5 1/2"	1655	Passed (57%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3496 @ 7' 8 1/2"	3795	Passed (92%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.243 @ 7' 8 1/2"	0.367	Passed (L/725)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.394 @ 7' 8 1/2"	0.733	Passed (L/446)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	41	40	Passed	--	--

- Deflection criteria: LL (L/480) 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: None.

Member Length : 15' 1 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	5.50"	3.75"	1.75"	385	617	1002	1 3/4" Rim Board
2 - Stud wall - DF	5.50"	3.75"	1.75"	385	617	1002	1 3/4" Rim Board

• Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 9" o/c	
Bottom Edge (Lu)	15' 2" 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 15' 5"	24"	25.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

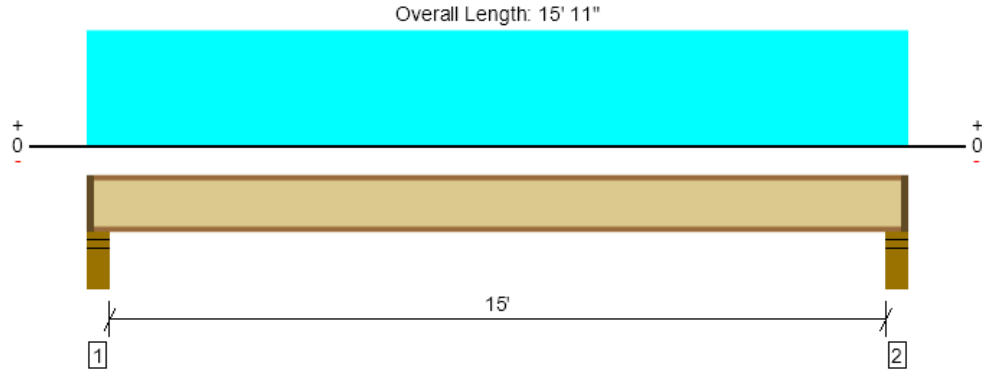
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javidabdidi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Joists, TJI 230 @ 24" oc (15' max)
1 piece(s) 11 7/8" TJI@ 230 @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1016 @ 4 1/2"	1485 (3.50")	Passed (68%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	975 @ 5 1/2"	1655	Passed (59%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3738 @ 7' 11 1/2"	4215	Passed (89%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.256 @ 7' 11 1/2"	0.379	Passed (L/711)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.416 @ 7' 11 1/2"	0.758	Passed (L/437)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	41	40	Passed	--	--

- Deflection criteria: LL (L/480) 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: None.

Member Length : 15' 7 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	5.50"	3.75"	1.75"	398	637	1035	1 3/4" Rim Board
2 - Stud wall - DF	5.50"	3.75"	1.75"	398	637	1035	1 3/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 3" o/c	
Bottom Edge (Lu)	15' 8" 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 15' 11"	24"	25.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

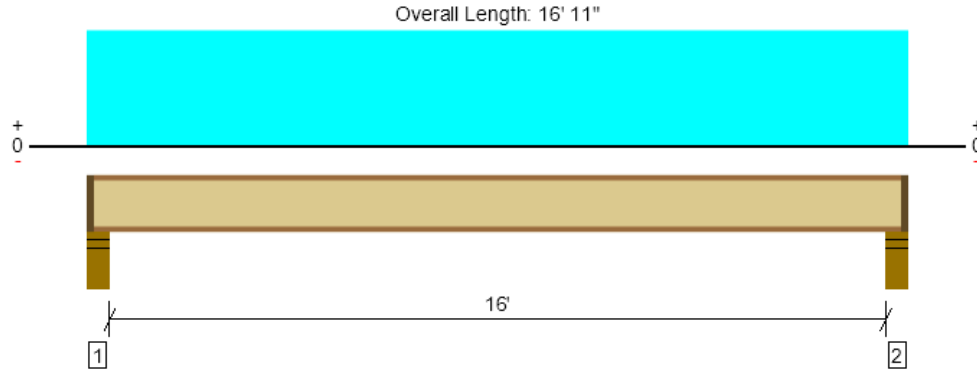
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Joists, TJI 360 @ 24" oc (16' max)
1 piece(s) 11 7/8" TJI® 360 @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1081 @ 4 1/2"	1505 (3.50")	Passed (72%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1040 @ 5 1/2"	1705	Passed (61%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	4247 @ 8' 5 1/2"	6180	Passed (69%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.283 @ 8' 5 1/2"	0.404	Passed (L/686)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.459 @ 8' 5 1/2"	0.808	Passed (L/422)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	40	40	Passed	--	--

- Deflection criteria: LL (L/480) 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: None.

Member Length : 16' 7 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	5.50"	3.75"	1.75"	423	677	1100	1 3/4" Rim Board
2 - Stud wall - DF	5.50"	3.75"	1.75"	423	677	1100	1 3/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 5" o/c	
Bottom Edge (Lu)	16' 8" 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 16' 11"	24"	25.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

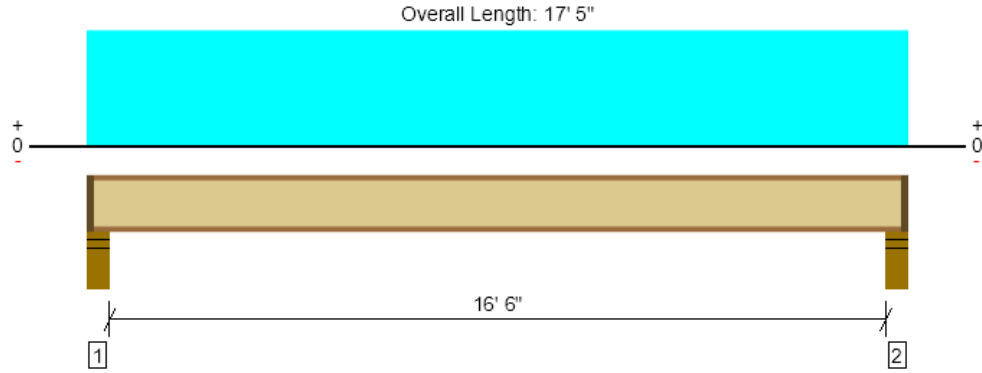
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Joists, TJI 110 @ 16" oc (16.5' max)
1 piece(s) 11 7/8" TJI@ 110 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	742 @ 4 1/2"	1375 (3.50")	Passed (54%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	715 @ 5 1/2"	1560	Passed (46%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3009 @ 8' 8 1/2"	3160	Passed (95%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.309 @ 8' 8 1/2"	0.417	Passed (L/647)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.502 @ 8' 8 1/2"	0.833	Passed (L/398)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	41	40	Passed	--	--

- Deflection criteria: LL (L/480) 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: None.

Member Length : 17' 1 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	5.50"	3.75"	1.75"	290	464	755	1 3/4" Rim Board
2 - Stud wall - DF	5.50"	3.75"	1.75"	290	464	755	1 3/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 1" o/c	
Bottom Edge (Lu)	17' 2" 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 17' 5"	16"	25.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

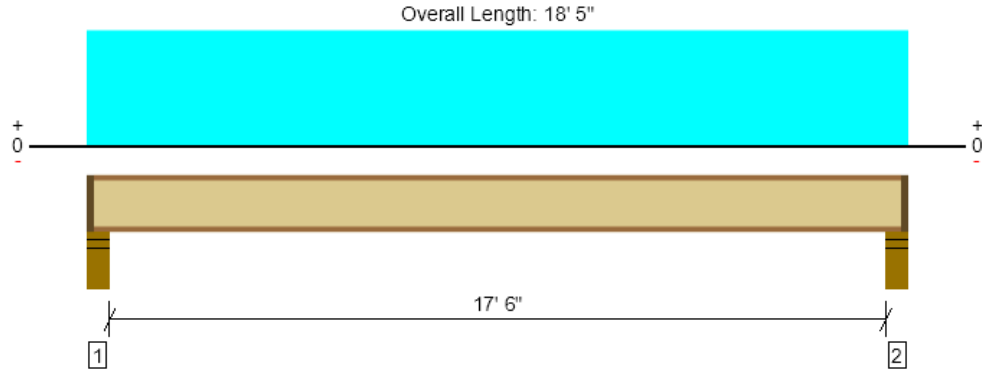
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Joists, TJI 210 @ 16" oc (17.5' max)
1 piece(s) 11 7/8" TJI@ 210 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	785 @ 4 1/2"	1460 (3.50")	Passed (54%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	758 @ 5 1/2"	1655	Passed (46%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3381 @ 9' 2 1/2"	3795	Passed (89%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.339 @ 9' 2 1/2"	0.442	Passed (L/625)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.551 @ 9' 2 1/2"	0.883	Passed (L/385)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	40	40	Passed	--	--

- Deflection criteria: LL (L/480) 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: None.

Member Length : 18' 1 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	5.50"	3.75"	1.75"	307	491	798	1 3/4" Rim Board
2 - Stud wall - DF	5.50"	3.75"	1.75"	307	491	798	1 3/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 10" o/c	
Bottom Edge (Lu)	18' 2" 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' 5"	16"	25.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

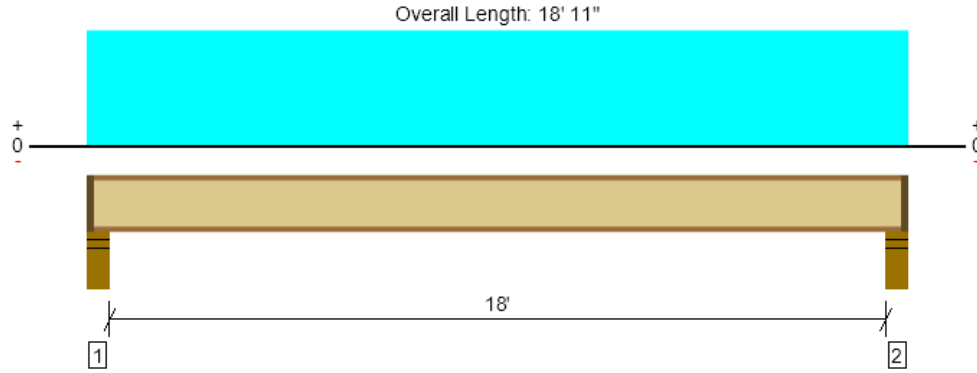
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javidabdi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Joists, TJI 230 @ 16" oc (18' max)
1 piece(s) 11 7/8" TJI@ 230 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	807 @ 4 1/2"	1485 (3.50")	Passed (54%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	780 @ 5 1/2"	1655	Passed (47%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3575 @ 9' 5 1/2"	4215	Passed (85%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.350 @ 9' 5 1/2"	0.454	Passed (L/623)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.569 @ 9' 5 1/2"	0.908	Passed (L/383)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	40	40	Passed	--	--

- Deflection criteria: LL (L/480) 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: None.

Member Length : 18' 7 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	5.50"	3.75"	1.75"	315	504	820	1 3/4" Rim Board
2 - Stud wall - DF	5.50"	3.75"	1.75"	315	504	820	1 3/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 4" o/c	
Bottom Edge (Lu)	18' 8" 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' 11"	16"	25.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

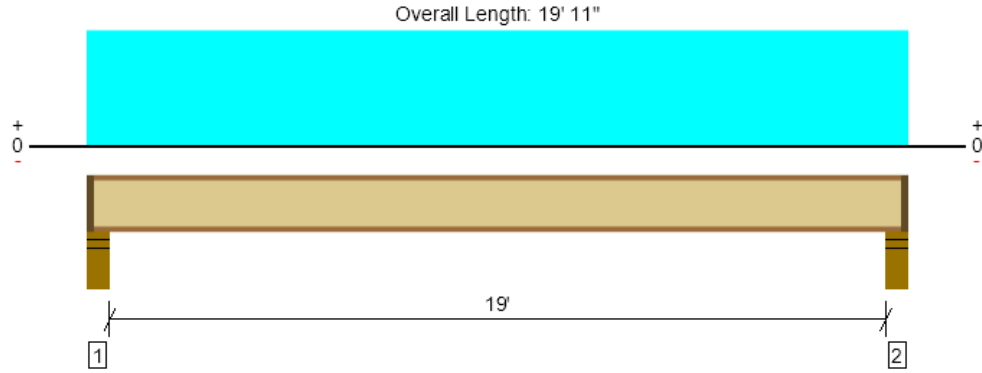
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javidabdidi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Joists, TJI 360 @ 16" oc (19' max)
1 piece(s) 11 7/8" TJI@ 360 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	850 @ 4 1/2"	1505 (3.50")	Passed (57%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	823 @ 5 1/2"	1705	Passed (48%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3980 @ 9' 11 1/2"	6180	Passed (64%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.370 @ 9' 11 1/2"	0.479	Passed (L/622)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.601 @ 9' 11 1/2"	0.958	Passed (L/383)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	40	40	Passed	--	--

- Deflection criteria: LL (L/480) 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: None.

Member Length : 19' 7 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	5.50"	3.75"	1.75"	332	531	863	1 3/4" Rim Board
2 - Stud wall - DF	5.50"	3.75"	1.75"	332	531	863	1 3/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 7" o/c	
Bottom Edge (Lu)	19' 8" 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 19' 11"	16"	25.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

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

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	

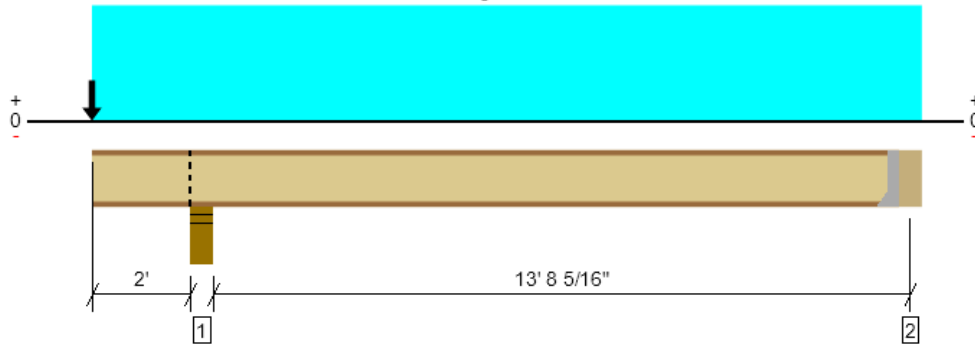


1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Joists, Cant Floor: Joist

1 piece(s) 11 7/8" TJI® 210 @ 24" OC

Overall Length: 16' 4 9/16"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2467 @ 2' 2 3/4"	2950 (5.25")	Passed (84%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1536 @ 2'	1903	Passed (81%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-3325 @ 2' 2 3/4"	4364	Passed (76%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.116 @ 0	0.200	Passed (2L/462)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.176 @ 0	0.223	Passed (2L/304)	--	1.0 D + 1.0 S (All Spans)
TJ-Pro™ Rating	41	40	Passed	--	--

Member Length : 15' 11 1/16"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (0.2") and TL (2L/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: None.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Stud wall - DF	5.50"	5.50"	3.50"	1247	741	886	2467	Blocking
2 - Hanger on 11 7/8" DF beam	5.50"	Hanger ¹	1.75" / - ²	246	584	-124	831	See note ¹

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.
- ² Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 10" o/c	
Bottom Edge (Lu)	3' 11" o/c	

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

Connector: Simpson Strong-Tie

Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	IUS2.06/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 16' 4 9/16"	24"	25.0	40.0	-	Default Load
2 - Point (PLF)	0	24"	229.0	-	381.0	
3 - Point (PLF)	0	24"	108.0	-	-	

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javiddabdi@yahoo.com	



1/7/2025 1:59:38 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 270-2024 (2728 63rd)

Weyerhaeuser Notes
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library .
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Javid Abdi Atlas Consulting Engineers (206) 427-7233 javidabd@yahoo.com	



CANTILEVER RETAINING WALL EXTERNAL STABILITY

SOIL DATA

w	120	(pcf)	soil unit weight
Ca	0.35		coeff. friction w/Concrete
Cp	0.417		coeff. of active pressure
	2.917		coeff. of passive pressure
	50	(pcf)	active pressure
	350	(pcf)	passive pressure

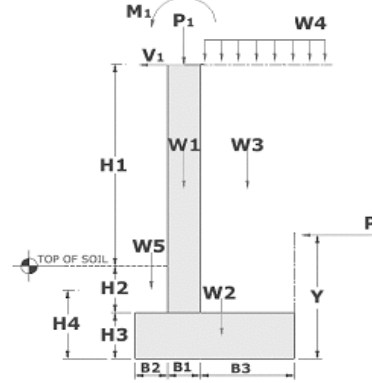
Unit Weight	Int Friction	Coeff. Friction	
		w. Conc	Soil
110-120	33-40	0.5-0.6	Sand or gravel, no fines
120-130	25-35	0.4-0.5	Sand or gravel, w/ fines
110-120	23-30	0.3-0.4	Silty sand, high clay
100-120	25-35	0.2-0.4	Medium or stiff clay
90-110	20-25	0.2-0.3	Soft clay, silt

WALL GEOMETRY

H1	9	(ft)	soil retained
H2	0.5	(ft)	soil depth above toe
H3	1	(ft)	footing thickness
H4	1	(ft)	passive pressure soil depth
B1	0.6666667	(ft)	wall width
B2 (toe)	4	(ft)	toe width
B3 (heel)	1.25	(ft)	heel width
H	10.5	(ft)	total height
B	5.9166667	(ft)	total base
	150	(pcf)	concrete unit weight

EXTERNAL LOADS

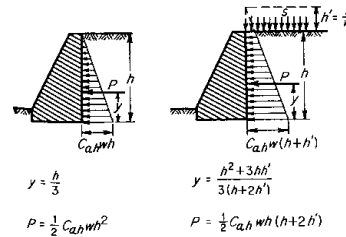
Surcharge	0	h
P applied	0	(lb/ft)
V applied	0	(lb/ft)
M applied	0	(lb-ft / ft)
V Surcharge	0	psf



LOAD CALCULATIONS

lateral soil force and overturning moment

H _{prime}	0.00	(lbs)	surcharge resultant
	4.75	(ft)	distance to surcharge resultant
Y	3.17	(ft)	distance to soil load resultant
P	2256.25	(lbs)	soil load resultant
	7140	(lb-ft)	Mo, soil
	0	(lb-ft)	Mo, surcharge
	7,140	(lb-ft)	total overturning Moment

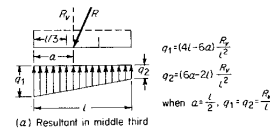


wall restoring forces

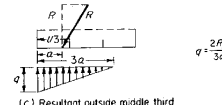
component	weight (#)	arm (ft)	moment (#-ft)
w1 (concrete)	950	4.33	4117
w2 (concrete)	888	2.96	2626
w3 (heel soil)	1425	5.29	7541
w4 (surcharge)	0	5.29	0
w5 (toe soil)	0	2.00	0
P applied	0	4.33	0
vert. force	3,263	moment	14,283

lateral sliding resistance

175	(lb)	passive pressure sliding resistance
1142	(lb)	soil friction force
1317	(lb)	total sliding resistance



(a) Resultant in middle third



(c) Resultant outside middle third

STABILITY FACTOR OF SAFETY CHECKS

	1.5	F.S. overturning
	0.1	F.S. sliding
overturning	2.00	OK
sliding	0.58	OK
		Mr / Mo
		(PP+F)/(Ph+V)

SOIL BEARING

a	2.19	(ft)	distance to resultant
	1.97' to 3.94'		middle third of footing
q1	981	(psf)	bearing pressure @ toe
q2	122	(psf)	bearing pressure @ heel

FACTORED (1.6) STEM LOAD FORCES

11.42	(kip-ft)	Wall Moment
3.61	(Kip)	Wall Shear

FACTORED (1.6) FOOTING LOADS

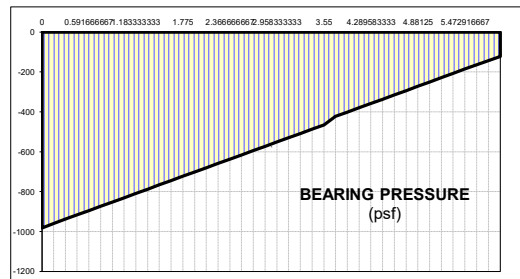
10.1	(kip-ft)	Mu @ Toe (Bot Reinf)
0.2	(kip-ft)	Mu @ Heel (Bot Reinf)
4.42	(kip)	Vu @ Toe
0.43	(kip)	Vu @ Heel

Footings

øVc	8,100	12" thick	OK
As	0.66	#6 @ 8" oc	
a	1.5529		
øMn	24.42	k-ft	OK
	1.86	6-#5	
	0.0021831	Reinf. Ratio	
	0.0045833	Reinf. Ratio	

Wall

øVc	5,400	8" thick	OK
As	0.66	#6 @ 8" oc	
a	1.5529		
øMn	15.51	k-ft	OK
	0.006875	Reinf. Ratio	
	0.2	#4 @ 12" oc	
	0.00208333		



CANTILEVER RETAINING WALL EXTERNAL STABILITY

SOIL DATA

w	120	(pcf)	soil unit weight
Ca	0.35		coeff. friction w/Concrete
Cp	0.417		coeff. of active pressure
	2.917		coeff. of passive pressure
	50	(pcf)	active pressure
	350	(pcf)	passive pressure

Unit Weight	Int Friction	Coeff. Friction	
		w. Conc	Soil
110-120	33-40	0.5-0.6	Sand or gravel, no fines
120-130	25-35	0.4-0.5	Sand or gravel, w/ fines
110-120	23-30	0.3-0.4	Silty sand, high clay
100-120	25-35	0.2-0.4	Medium or stiff clay
90-110	20-25	0.2-0.3	Soft clay, silt

WALL GEOMETRY

H1	9	(ft)	soil retained
H2	0.5	(ft)	soil depth above toe
H3	1	(ft)	footing thickness
H4	1	(ft)	passive pressure soil depth
B1	0.6666667	(ft)	wall width
B2 (toe)	4	(ft)	toe width
B3 (heel)	1.25	(ft)	heel width
H	10.5	(ft)	total height
B	5.9166667	(ft)	total base
	150	(pcf)	concrete unit weight

EXTERNAL LOADS

Surcharge	7	h
P _{applied}	0	(lb/ft)
V _{applied}	0	(lb/ft)
M _{applied}	0	(lb-ft / ft)
V Surcharge	0	psf

LOAD CALCULATIONS

lateral soil force and overturning moment

H _{prime}	631.75	(lbs)	surcharge resultant
	4.75	(ft)	distance to surcharge resultant
Y	3.17	(ft)	distance to soil load resultant
P	2256.25	(lbs)	soil load resultant
	7140	(lb-ft)	Mo, soil
	3000	(lb-ft)	Mo, surcharge
	10,140	(lb-ft)	total overturning Moment

wall restoring forces

component	weight (#)	arm (ft)	moment (#-ft)
w1 (concrete)	950	4.33	4117
w2 (concrete)	888	2.96	2626
w3 (heel soil)	1425	5.29	7541
w4 (surcharge)	0	5.29	0
w5 (toe soil)	0	2.00	0
P applied	0	4.33	0
vert. force	3,263	moment	14,283

lateral sliding resistance

	175	(lb)	passive pressure sliding resistance
	1142	(lb)	soil friction force
	1317	(lb)	total sliding resistance

STABILITY FACTOR OF SAFETY CHECKS

	1	F.S. overturning
	0.1	F.S. sliding
overturning	1.41	OK
sliding	0.58	OK
		Mr / Mo
		(PP+F)/(Ph+V)

SOIL BEARING

a	1.27	(ft)	distance to resultant
	1.97' to 3.94'		middle third of footing
q1	1713	(psf)	bearing pressure @ toe
q2	0	(psf)	bearing pressure @ heel

FACTORED (1.6) STEM LOAD FORCES

	15.71	(kip-ft)	Wall Moment
	4.51	(Kip)	Wall Shear

FACTORED (1.6) FOOTING LOADS

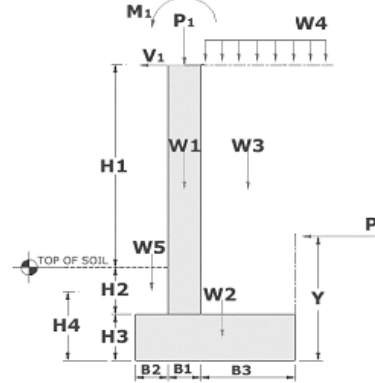
	17.0	(kip-ft)	Mu @ Toe (Bot Reinf)
	0.2	(kip-ft)	Mu @ Heel (Bot Reinf)
	7.26	(kip)	Vu @ Toe
	0.36	(kip)	Vu @ Heel

Footing

øVc	8,100	12" thick	OK
As	0.66	#6 @ 8" oc	
a	1.5529		
øMn	24.42	k-ft	OK
	1.86	6-#5	
	0.0021831	Reinf. Ratio	
	0.0045833	Reinf. Ratio	

Wall

øVc	5,400	8" thick	OK
As	0.66	#6 @ 8" oc	
a	1.2941		
øMn	15.90	k-ft	OK
	0.006875	Reinf. Ratio	
	0.2	#4 @ 12" oc	
	0.00208333		



$$y = \frac{h}{3}$$

$$P = \frac{1}{2} C_a h w h^2$$

$$y = \frac{h^2 + 3hh'}{3(h+2h')}$$

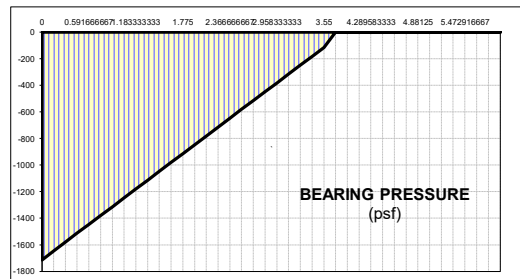
$$P = \frac{1}{2} C_a h w h (h+2h')$$

$$q_1 = (4l - 6a) \frac{R_v}{l^2}$$

$$q_2 = (6a - 2l) \frac{R_v}{l^2}$$

when $a < \frac{l}{2}$, $q_1 = q_2 = \frac{R_v}{l}$

$$q = \frac{2R_v}{3a}$$



CANTILEVER RETAINING WALL EXTERNAL STABILITY

SOIL DATA

w	120	(pcf)	soil unit weight
Ca	0.35		coeff. friction w/Concrete
Cp	0.417		coeff. of active pressure
	2.917		coeff. of passive pressure
	50	(pcf)	active pressure
	350	(pcf)	passive pressure

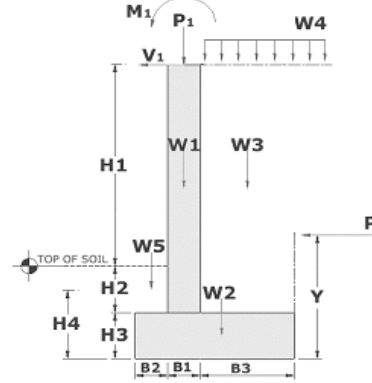
Unit Weight	Int Friction	Coeff. Friction	
		w. Conc	Soil
110-120	33-40	0.5-0.6	Sand or gravel, no fines
120-130	25-35	0.4-0.5	Sand or gravel, w/ fines
110-120	23-30	0.3-0.4	Silty sand, high clay
100-120	25-35	0.2-0.4	Medium or stiff clay
90-110	20-25	0.2-0.3	Soft clay, silt

WALL GEOMETRY

H1	8.5	(ft)	soil retained
H2	0.5	(ft)	soil depth above toe
H3	1	(ft)	footing thickness
H4	1	(ft)	passive pressure soil depth
B1	0.6666667	(ft)	wall width
B2 (toe)	4	(ft)	toe width
B3 (heel)	1.25	(ft)	heel width
H	10	(ft)	total height
B	5.9166667	(ft)	total base
	150	(pcf)	concrete unit weight

EXTERNAL LOADS

Surcharge	7	h
P applied	0	(lb/ft)
V applied	360	(lb/ft)
M applied	1620	(lb-ft / ft)
w Surcharge	40	psf



LOAD CALCULATIONS

lateral soil force and overturning moment

H _{prime}	567.00	(lbs)	surcharge resultant
	4.50	(ft)	distance to surcharge resultant
Y	3.00	(ft)	distance to soil load resultant
P	2025	(lbs)	soil load resultant
	6080	(lb-ft)	Mo, soil
	2550	(lb-ft)	Mo, surcharge
	10,250	(lb-ft)	total overturning Moment

wall restoring forces

component	weight (#)	arm (ft)	moment (#-ft)
w1 (concrete)	900	4.33	3900
w2 (concrete)	888	2.96	2626
w3 (heel soil)	1350	5.29	7144
w4 (surcharge)	50	5.29	265
w5 (toe soil)	0	2.00	0
P applied	0	4.33	0
vert. force	3,188	moment	13,934

lateral sliding resistance

	175	(lb)	passive pressure sliding resistance
	1116	(lb)	soil friction force
	1291	(lb)	total sliding resistance

STABILITY FACTOR OF SAFETY CHECKS

	1	F.S. overturning
	0.1	F.S. sliding
overturning	1.36	OK
sliding	0.54	OK
		Mr / Mo
		(PP+F)/(Ph+V)

SOIL BEARING

a	1.16	(ft)	distance to resultant
	1.97' to 3.94'		middle third of footing
q1	1832	(psf)	bearing pressure @ toe
q2	0	(psf)	bearing pressure @ heel

FACTORED (1.6) STEM LOAD FORCES

	13.37	(kip-ft)	Wall Moment
	4.05	(Kip)	Wall Shear

FACTORED (1.6) FOOTING LOADS

	18.2	(kip-ft)	Mu @ Toe (Bot Reinf)
	0.2	(kip-ft)	Mu @ Heel (Bot Reinf)
	7.76	(kip)	Vu @ Toe
	0.39	(kip)	Vu @ Heel

Footings

øVc	8,100	12" thick	OK
As	0.66	#6 @ 8" oc	
a	1.5529		
øMn	24.42	k-ft	OK
	1.2	6-#4	
	0.0014085	Reinf. Ratio	
	0.0045833	Reinf. Ratio	

Wall

øVc	5,400	8" thick	OK
As	0.66	#6 @ 8" oc	
a	1.2941		
øMn	15.90	k-ft	OK
	0.006875	Reinf. Ratio	
	0.2	#4 @ 12" oc	
	0.00208333		

$$y = \frac{h}{3}$$

$$y = \frac{h^2 + 3hh'}{3(h + 2h')}$$

$$P = \frac{1}{2} C_a h w h^2$$

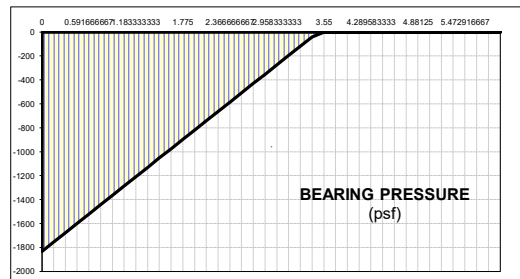
$$P = \frac{1}{2} C_a h w h (h + 2h')$$

$$R_1 = \frac{q_1 (4l - 6a) - \frac{q_2}{l^2}}{l^2}$$

$$q_2 = (6a - 2l) \frac{R_2}{l^2}$$

when $a \leq \frac{l}{2}$, $q_1 \leq q_2 \leq \frac{R_2}{l}$

$$q = \frac{2R_2}{3l}$$



CANTILEVER RETAINING WALL EXTERNAL STABILITY

SOIL DATA

w	120	(pcf)	soil unit weight
Ca	0.35		coeff. friction w/Concrete
Cp	0.417		coeff. of active pressure
	2.917		coeff. of passive pressure
	50	(pcf)	active pressure
	350	(pcf)	passive pressure

Unit Weight	Int Friction	Coeff. Friction	
		w. Conc	Soil
110-120	33-40	0.5-0.6	Sand or gravel, no fines
120-130	25-35	0.4-0.5	Sand or gravel, w/ fines
110-120	23-30	0.3-0.4	Silty sand, high clay
100-120	25-35	0.2-0.4	Medium or stiff clay
90-110	20-25	0.2-0.3	Soft clay, silt

WALL GEOMETRY

H1	7	(ft)	soil retained
H2	0.5	(ft)	soil depth above toe
H3	1	(ft)	footing thickness
H4	1	(ft)	passive pressure soil depth
B1	0.6666667	(ft)	wall width
B2 (toe)	2.25	(ft)	toe width
B3 (heel)	1.25	(ft)	heel width
H	8.5	(ft)	total height
B	4.1666667	(ft)	total base
	150	(pcf)	concrete unit weight

EXTERNAL LOADS

Surcharge	0	h
P _{applied}	0	(lb/ft)
V _{applied}	0	(lb/ft)
M _{applied}	0	(lb-ft / ft)
V Surcharge	0	psf

LOAD CALCULATIONS

lateral soil force and overturning moment

H _{prime}	0.00	(lbs)	surcharge resultant
	3.75	(ft)	distance to surcharge resultant
Y	2.50	(ft)	distance to soil load resultant
P	1406.25	(lbs)	soil load resultant
	3520	(lb-ft)	Mo, soil
	0	(lb-ft)	Mo, surcharge
	3,520	(lb-ft)	total overturning Moment

wall restoring forces

component	weight (#)	arm (ft)	moment (#-ft)
w1 (concrete)	750	2.58	1938
w2 (concrete)	625	2.08	1302
w3 (heel soil)	1125	3.54	3984
w4 (surcharge)	0	3.54	0
w5 (toe soil)	0	1.13	0
P applied	0	2.58	0
vert. force	2,500	moment	7,224

lateral sliding resistance

175	(lb)	passive pressure sliding resistance
875	(lb)	soil friction force
1050	(lb)	total sliding resistance

STABILITY FACTOR OF SAFETY CHECKS

	1.5	F.S. overturning
	0.1	F.S. sliding
overturning	2.05	OK
sliding	0.75	OK
		Mr / Mo
		(PP+F)/(Ph+V)

SOIL BEARING

a	1.48	(ft)	distance to resultant
	1.39' to 2.78'		middle third of footing
q1	1121	(psf)	bearing pressure @ toe
q2	79	(psf)	bearing pressure @ heel

FACTORED (1.6) STEM LOAD FORCES

5.63	(kip-ft)	Wall Moment
2.25	(Kip)	Wall Shear

FACTORED (1.6) FOOTING LOADS

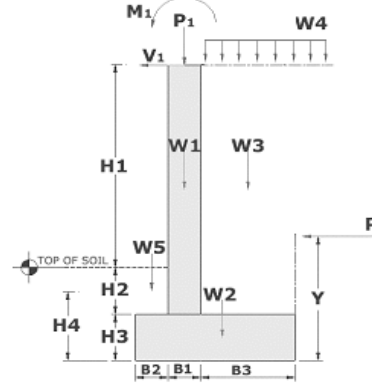
3.8	(kip-ft)	Mu @ Toe (Bot Reinf)
0.2	(kip-ft)	Mu @ Heel (Bot Reinf)
3.02	(kip)	Vu @ Toe
0.47	(kip)	Vu @ Heel

Footings

øVc	8,100	12" thick	OK
As	0.31	#5 @ 12" oc	
a	0.7294		
øMn	12.05	k-ft	OK
	1.24	4-#5	
	0.0020667	Reinf. Ratio	
	0.0021528	Reinf. Ratio	

Wall

øVc	5,400	8" thick	OK
As	0.31	#5 @ 12" oc	
a	0.7294		
øMn	7.86	k-ft	OK
	0.00322917	Reinf. Ratio	
	0.2	#4 @ 12" oc	
	0.00208333		



$$y = \frac{h}{3}$$

$$P = \frac{1}{2} C_a h w h^2$$

$$y = \frac{h^2 + 3hh'}{3(h+2h')}$$

$$P = \frac{1}{2} C_a h w h (h+2h')$$

$$q_1 = (4l - 6a) \frac{R_v}{l^2}$$

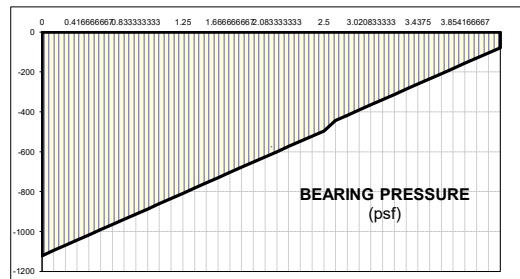
$$q_2 = (6a - 2l) \frac{R_v}{l^2}$$

when $a = \frac{l}{2}$, $q_1 = q_2 = \frac{R_v}{l}$

(a) Resultant in middle third

$$q = \frac{2R_v}{3a}$$

(c) Resultant outside middle third



CANTILEVER RETAINING WALL EXTERNAL STABILITY

SOIL DATA

w	120	(pcf)	soil unit weight
Ca	0.417		coeff. friction w/Concrete
Cp	2.917		coeff. of active pressure
	50	(pcf)	active pressure
	350	(pcf)	passive pressure

Unit Weight	Int Friction	Coeff. Friction	
		w. Conc	Soil
110-120	33-40	0.5-0.6	Sand or gravel, no fines
120-130	25-35	0.4-0.5	Sand or gravel, w/ fines
110-120	23-30	0.3-0.4	Silty sand, high clay
100-120	25-35	0.2-0.4	Medium or stiff clay
90-110	20-25	0.2-0.3	Soft clay, silt

WALL GEOMETRY

H1	7	(ft)	soil retained
H2	0.5	(ft)	soil depth above toe
H3	1	(ft)	footing thickness
H4	1	(ft)	passive pressure soil depth
B1	0.6666667	(ft)	wall width
B2 (toe)	2.25	(ft)	toe width
B3 (heel)	1.25	(ft)	heel width
H	8.5	(ft)	total height
B	4.1666667	(ft)	total base
	150	(pcf)	concrete unit weight

EXTERNAL LOADS

Surcharge	7	h
P _{applied}	0	(lb/ft)
V _{applied}	0	(lb/ft)
M _{applied}	0	(lb-ft / ft)
V Surcharge	0	psf

LOAD CALCULATIONS

lateral soil force and overturning moment

H _{prime}	393.75	(lbs)	surcharge resultant
	3.75	(ft)	distance to surcharge resultant
Y	2.50	(ft)	distance to soil load resultant
P	1406.25	(lbs)	soil load resultant
	3520	(lb-ft)	Mo, soil
	1480	(lb-ft)	Mo, surcharge
	5,000	(lb-ft)	total overturning Moment

wall restoring forces

component	weight (#)	arm (ft)	moment (#-ft)
w1 (concrete)	750	2.58	1938
w2 (concrete)	625	2.08	1302
w3 (heel soil)	1125	3.54	3984
w4 (surcharge)	0	3.54	0
w5 (toe soil)	0	1.13	0
P applied	0	2.58	0
vert. force	2,500	moment	7,224

lateral sliding resistance

175	(lb)	passive pressure sliding resistance
875	(lb)	soil friction force
1050	(lb)	total sliding resistance

STABILITY FACTOR OF SAFETY CHECKS

	1	F.S. overturning
	0.1	F.S. sliding
overturning	1.44	OK
sliding	0.75	OK
		Mr / Mo
		(PP+F)/(Ph+V)

SOIL BEARING

a	0.89	(ft)	distance to resultant
	1.39' to 2.78'		middle third of footing
q1	1873	(psf)	bearing pressure @ toe
q2	0	(psf)	bearing pressure @ heel

FACTORED (1.6) STEM LOAD FORCES

7.75	(kip-ft)	Wall Moment
2.81	(Kip)	Wall Shear

FACTORED (1.6) FOOTING LOADS

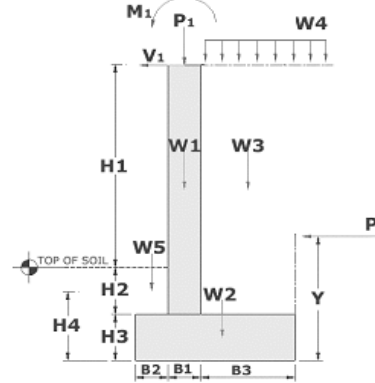
6.2	(kip-ft)	Mu @ Toe (Bot Reinf)
0.2	(kip-ft)	Mu @ Heel (Bot Reinf)
4.92	(kip)	Vu @ Toe
0.56	(kip)	Vu @ Heel

Footings

øVc	8,100	12" thick	OK
As	0.31	#5 @ 12" oc	
a	0.7294		
øMn	12.05	k-ft	OK
	1.2	6-#4	
	0.002	Reinf. Ratio	
	0.0021528	Reinf. Ratio	

Wall

øVc	5,400	8" thick	OK
As	0.31	#5 @ 12" oc	
a	0.6078		
øMn	7.95	k-ft	OK
	0.00322917	Reinf. Ratio	
	0.2	#4 @ 12" oc	
	0.00208333		



$$y = \frac{h}{3}$$

$$y = \frac{h^2 + 3hh'}{3(h+2h')}$$

$$P = \frac{1}{2} C_a h w h^2$$

$$P = \frac{1}{2} C_a h w h (h+2h')$$

$$q_1 = (4l - 6a) \frac{R_v}{l^2}$$

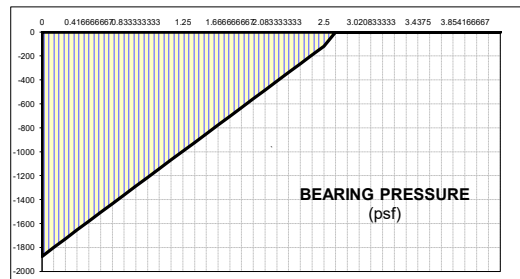
$$q_2 = (6a - 2l) \frac{R_v}{l^2}$$

when $a = \frac{l}{2}$, $q_1 = q_2 = \frac{R_v}{l}$

(a) Resultant in middle third

$$q = \frac{2R_v}{3a}$$

(c) Resultant outside middle third



CANTILEVER RETAINING WALL EXTERNAL STABILITY

SOIL DATA

w	120	(pcf)	soil unit weight
Ca	0.35		coeff. friction w/Concrete
Cp	0.417		coeff. of active pressure
	2.917		coeff. of passive pressure
	50	(pcf)	active pressure
	350	(pcf)	passive pressure

Unit Weight	Int Friction	Coeff. Friction	
		w. Conc	Soil
110-120	33-40	0.5-0.6	Sand or gravel, no fines
120-130	25-35	0.4-0.5	Sand or gravel, w/ fines
110-120	23-30	0.3-0.4	Silty sand, high clay
100-120	25-35	0.2-0.4	Medium or stiff clay
90-110	20-25	0.2-0.3	Soft clay, silt

WALL GEOMETRY

H1	5	(ft)	soil retained
H2	0.5	(ft)	soil depth above toe
H3	0.8333333	(ft)	footing thickness
H4	1	(ft)	passive pressure soil depth
B1	0.6666667	(ft)	wall width
B2 (toe)	1.25	(ft)	toe width
B3 (heel)	1.25	(ft)	heel width
H	6.3333333	(ft)	total height
B	3.1666667	(ft)	total base
	150	(pcf)	concrete unit weight

EXTERNAL LOADS

Surcharge	7	h
P _{applied}	0	(lb/ft)
V _{applied}	0	(lb/ft)
M _{applied}	0	(lb-ft / ft)
V Surcharge	0	psf

LOAD CALCULATIONS

lateral soil force and overturning moment

H _{prime}	211.75	(lbs)	surcharge resultant
	2.75	(ft)	distance to surcharge resultant
Y	1.83	(ft)	distance to soil load resultant
P	756.25	(lbs)	soil load resultant
	1390	(lb-ft)	Mo, soil
	580	(lb-ft)	Mo, surcharge
	1,970	(lb-ft)	total overturning Moment

wall restoring forces

component	weight (#)	arm (ft)	moment (#-ft)
w1 (concrete)	550	1.58	871
w2 (concrete)	396	1.58	627
w3 (heel soil)	825	2.54	2097
w4 (surcharge)	0	2.54	0
w5 (toe soil)	25	0.63	16
P applied	0	1.58	0
vert. force	1,796	moment	3,610

lateral sliding resistance

175	(lb)	passive pressure sliding resistance
629	(lb)	soil friction force
804	(lb)	total sliding resistance

STABILITY FACTOR OF SAFETY CHECKS

	1	F.S. overturning
	0.1	F.S. sliding
overturning	1.83	OK
sliding	1.06	OK
		Mr / Mo
		(PP+F)/(Ph+V)

SOIL BEARING

a	0.91	(ft)	distance to resultant
	1.06' to 2.11'		middle third of footing
q1	1316	(psf)	bearing pressure @ toe
q2	0	(psf)	bearing pressure @ heel

FACTORED (1.6) STEM LOAD FORCES

3.05	(kip-ft)	Wall Moment
1.51	(Kip)	Wall Shear

FACTORED (1.6) FOOTING LOADS

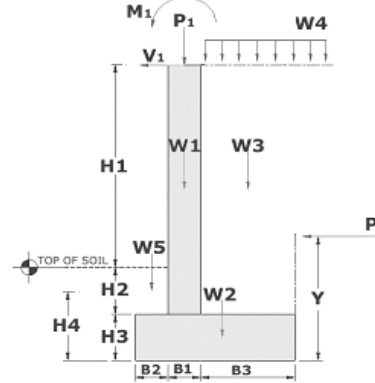
1.4	(kip-ft)	Mu @ Toe (Bot Reinf)
0.2	(kip-ft)	Mu @ Heel (Bot Reinf)
2.11	(kip)	Vu @ Toe
0.52	(kip)	Vu @ Heel

Footing

øVc	6,300	10" thick	OK
As	0.24	#4 @ 10" oc	
a	0.5647		
øMn	7.26	k-ft	OK
	0.8	4-#4	
	0.0021053	Reinf. Ratio	
	0.002	Reinf. Ratio	

Wall

øVc	5,400	8" thick	OK
As	0.2	#4 @ 12" oc	
a	0.3922		
øMn	5.22	k-ft	OK
	0.00208333	Reinf. Ratio	
	0.2	#4 @ 12" oc	
	0.00208333		



$$y = \frac{h}{3}$$

$$y = \frac{h^2 + 3hh'}{3(h+2h')}$$

$$P = \frac{1}{2} C_a h w h^2$$

$$P = \frac{1}{2} C_a h w h (h+2h')$$

$$q_1 = (4l - 6a) \frac{R_v}{l^2}$$

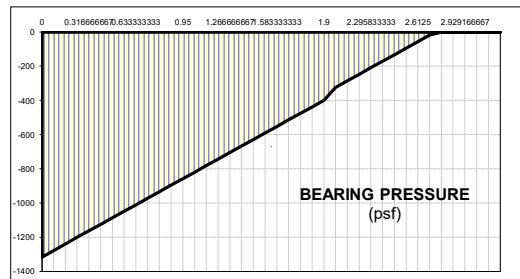
$$q_2 = (6a - 2l) \frac{R_v}{l^2}$$

when $a = \frac{l}{2}$, $q_1 = q_2 = \frac{R_v}{l}$

(a) Resultant in middle third

$$q = \frac{2R_v}{3a}$$

(c) Resultant outside middle third



CANTILEVER RETAINING WALL EXTERNAL STABILITY

SOIL DATA

w	120	(pcf)	soil unit weight
Ca	0.417		coeff. friction w/Concrete
Cp	2.917		coeff. of active pressure
	50	(pcf)	active pressure
	350	(pcf)	passive pressure

Unit Weight	Int Friction	Coeff. Friction	
		w. Conc	Soil
110-120	33-40	0.5-0.6	Sand or gravel, no fines
120-130	25-35	0.4-0.5	Sand or gravel, w/ fines
110-120	23-30	0.3-0.4	Silty sand, high clay
100-120	25-35	0.2-0.4	Medium or stiff clay
90-110	20-25	0.2-0.3	Soft clay, silt

WALL GEOMETRY

H1	3	(ft)	soil retained
H2	0.5	(ft)	soil depth above toe
H3	0.8333333	(ft)	footing thickness
H4	1	(ft)	passive pressure soil depth
B1	0.6666667	(ft)	wall width
B2 (toe)	0.8333333	(ft)	toe width
B3 (heel)	0.4166667	(ft)	heel width
H	4.3333333	(ft)	total height
B	1.9166667	(ft)	total base
	150	(pcf)	concrete unit weight

EXTERNAL LOADS

Surcharge	7	h
P _{applied}	0	(lb/ft)
V _{applied}	0	(lb/ft)
M _{applied}	0	(lb-ft / ft)
V Surcharge	0	psf

LOAD CALCULATIONS

lateral soil force and overturning moment

H _{prime}	85.75	(lbs)	surcharge resultant
	1.75	(ft)	distance to surcharge resultant
Y	1.17	(ft)	distance to soil load resultant
P	306.25	(lbs)	soil load resultant
	360	(lb-ft)	Mo, soil
	150	(lb-ft)	Mo, surcharge
	510	(lb-ft)	total overturning Moment

wall restoring forces

component	weight (#)	arm (ft)	moment (#-ft)
w1 (concrete)	350	1.17	408
w2 (concrete)	240	0.96	230
w3 (heel soil)	175	1.71	299
w4 (surcharge)	0	1.71	0
w5 (toe soil)	17	0.42	7
P applied	0	1.17	0
vert. force	781	moment	944

lateral sliding resistance

175	(lb)	passive pressure sliding resistance
273	(lb)	soil friction force
448	(lb)	total sliding resistance

STABILITY FACTOR OF SAFETY CHECKS

	1	F.S. overturning
	0.1	F.S. sliding
overturning	1.85	OK
sliding	1.46	OK
		Mr / Mo
		(PP+F)/(Ph+V)

SOIL BEARING

a	0.56	(ft)	distance to resultant
	0.64' to 1.28'		middle third of footing
q1	930	(psf)	bearing pressure @ toe
q2	0	(psf)	bearing pressure @ heel

FACTORED (1.6) STEM LOAD FORCES

0.79	(kip-ft)	Wall Moment
0.61	(Kip)	Wall Shear

FACTORED (1.6) FOOTING LOADS

0.4	(kip-ft)	Mu @ Toe (Bot Reinf)
0.0	(kip-ft)	Mu @ Heel (Bot Reinf)
0.97	(kip)	Vu @ Toe
0.07	(kip)	Vu @ Heel

Footings

øVc	6,300	12" thick	OK
As	0.24	#4 @ 10" oc	
a	0.5647		
øMn	7.26	k-ft	OK
	0.6	3-#4	
	0.0026087	Reinf. Ratio	
	0.002	Reinf. Ratio	

Wall

øVc	5,400	8" thick	OK
As	0.2	#4 @ 12" oc	
a	0.3922		
øMn	5.22	k-ft	OK
	0.00208333	Reinf. Ratio	
	0.2	#4 @ 12" oc	
	0.00208333		

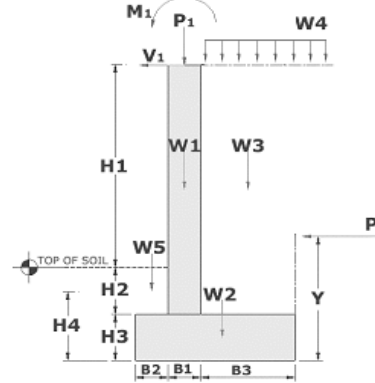


Diagram showing the calculation of the resultant force Y from the soil pressure distribution. The resultant is located at a distance Y from the base of the wall.

$$Y = \frac{h^2 + 3hh'}{3(h+2h')}$$

$$P = \frac{1}{2} C_a h w h^2$$

$$P = \frac{1}{2} C_a h w h (h+2h')$$

Diagram showing the calculation of the resultant force R from the soil pressure distribution. The resultant is located at a distance R from the base of the wall.

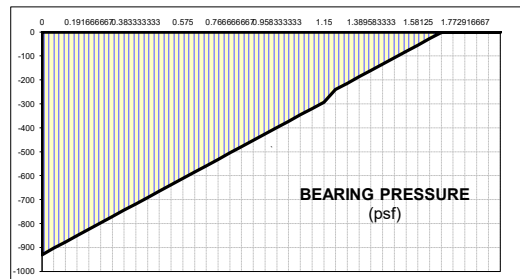
$$q_1 = (4l - 6a) \frac{R_v}{l^2}$$

$$q_2 = (6a - 2l) \frac{R_v}{l^2}$$

when $a = \frac{l}{2}$, $q_1 = q_2 = \frac{R_v}{l}$

Diagram showing the calculation of the resultant force R from the soil pressure distribution. The resultant is located at a distance R from the base of the wall.

$$q = \frac{2R_v}{3a}$$





Force Transfer Around Openings Calculator

ONE OPENING

The force transfer around openings (FTAO) method of shear wall analysis is an approach that aims to reinforce the wall such that it performs as if there was no opening. This approach lends certain advantages over segmented shear walls: more versatility, because it allows for narrower wall segments while still meeting the height-to-width ratios and, often, fewer required hold-downs.

Project Information

Code: IBC 2018

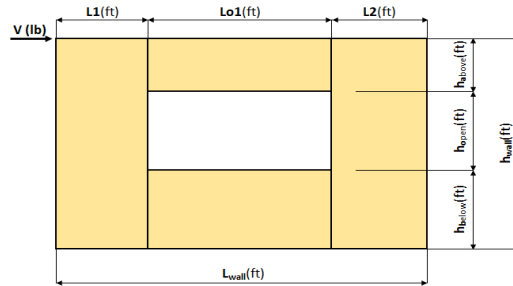
Date: 12/28/2024

Designer: Javid Abdi, PE, SE

Client: Center Line

Project: 2728 63rd Ave SE (Mercer Island)

Wall Line: North (Upper -to- Roof)



Shear Wall Calculation Variables

V	2207 lbf	Opening 1	Adj. Factor Method = $1.25-0.125h/bs$
L1	23.75 ft	ha	1.00 ft
L2	3.79 ft	ho	4.00 ft
hwall	9.00 ft	hb	4.00 ft
Lwall	29.54 ft	Lo1	2.00 ft
		Wall Pier Aspect Ratio	Adj. Factor
		P1=ho/L1=	0.17
		P2=ho/L2=	1.06
			N/A
			N/A

1. Hold-down forces: $H = Vh_{wall}/L_{wall}$ 672 lbf

2. Unit shear above + below opening

First opening: $va1 = vb1 = H/(h_a + h_b) = 134 \text{ plf}$

3. Total boundary force above + below openings

First opening: $O1 = va1 \times (Lo1) = 269 \text{ lbf}$

4. Corner forces

$F1 = O1(L1)/(L1+L2) = 232 \text{ lbf}$

$F2 = O1(L2)/(L1+L2) = 37 \text{ lbf}$

5. Tributary length of openings

$T1 = (L1 \times Lo1)/(L1+L2) = 1.72 \text{ ft}$

$T2 = (L2 \times Lo1)/(L1+L2) = 0.28 \text{ ft}$

6. Unit shear beside opening

$v1 = (V/L)(L1+T1)/L1 = 80 \text{ plf}$

$v2 = (V/L)(T2+L2)/L2 = 80 \text{ plf}$

Check $v1 \times L1 + v2 \times L2 = V?$ 2207 lbf OK

7. Resistance to corner forces

$R1 = v1 \times L1 = 1903 \text{ lbf}$

$R2 = v2 \times L2 = 304 \text{ lbf}$

8. Difference corner force + resistance

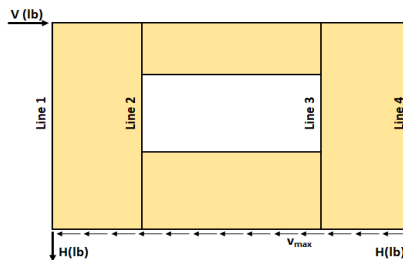
$R1-F1 = 1671 \text{ lbf}$

$R2-F2 = 267 \text{ lbf}$

9. Unit shear in corner zones

$vc1 = (R1-F1)/L1 = 70 \text{ plf}$

$vc2 = (R2-F2)/L2 = 70 \text{ plf}$



Check Summary of Shear Values for One Opening

Line 1: $vc1(h_a+h_b)+v1(h_o)=H?$	352	321	672 lbf
Line 2: $va1(h_a+h_b)-vc1(h_a+h_b)-v1(h_o)=0?$	672	352	0
Line 3: $va1(h_a+h_b)-vc2(h_a+h_b)-v1(h_o)=0?$	672	352	0
Line 4: $vc2(h_a+h_b)+v2(h_o)=H?$	352	321	672 lbf

Design Summary*

Req. Sheathing Capacity	134 plf	4-Term Deflection	0.177 in.	3-Term Deflection	0.213 in.
Req. Strap Force	232 lbf	4-Term Story Drift %	0.003 %	3-Term Story Drift %	0.003 %
Req. HD Force (H)	672 lbf				
Req. Shear Wall Anchorage Force (v_{max})	75 plf				

*The Design Summary assumes that the shear wall is designed as blocked.



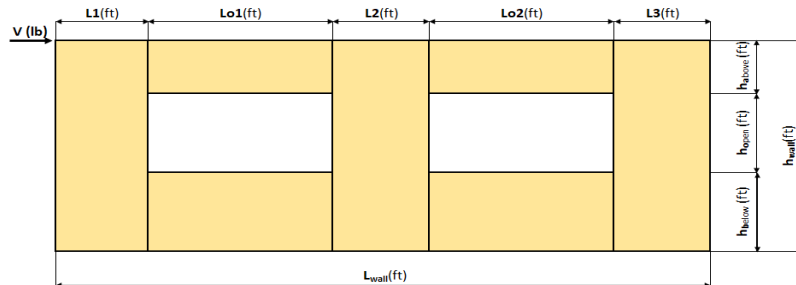
Force Transfer Around Openings Calculator

TWO OPENINGS

The force transfer around openings (FTAO) method of shear wall analysis is an approach that aims to reinforce the wall such that it performs as if there was no opening. This approach lends certain advantages over segmented shear walls: more versatility, because it allows for narrower wall segments while still meeting the height-to-width ratios and, often, fewer required hold-downs.

Project Information

Code:	IBC 2018	Date:	12/28/2024
Designer:	Javid Abdi, PE, SE		
Client:	Center Line		
Project:	2728 63rd Ave SE (Mercer Island)		
Wall Line:	South (Upper -to- Roof)		



Shear Wall Calculation Variables

V	695 lbf	Opening 1	Opening 2	Adj. Factor Method =	1.25-0.125h/bs
L1	2.76 ft	h _{a1}	h _{a2}	Wall Pier Aspect Ratio	Adj. Factor
L2	6.97 ft	h _{o1}	h _{o2}	P1=h _o /L1=	1.81
L3	3.46 ft	h _{b1}	h _{b2}	P2=h _o /L2=	0.72
h _{wall}	9.00 ft	Lo1	Lo2	P3=h _o /L3=	1.45
L _{wall}	21.19 ft				N/A

1. Hold-down forces: $H = Vh_{wall}/L_{wall}$ 295 lbf

2. Unit shear above + below opening
First opening: $va1 = vb1 = H/(h_{a1}+h_{b1}) = 74$ plf
Second opening: $va2 = vb2 = H/(h_{a2}+h_{b2}) = 74$ plf

3. Total boundary force above + below openings
First opening: $O1 = va1 \times (Lo1) = 148$ lbf
Second opening: $O2 = va2 \times (Lo2) = 443$ lbf

4. Corner forces
 $F1 = O1(L1)/(L1+L2) = 42$ lbf
 $F2 = O1(L2)/(L1+L2) = 106$ lbf
 $F3 = O2(L2)/(L2+L3) = 296$ lbf
 $F4 = O2(L3)/(L2+L3) = 147$ lbf

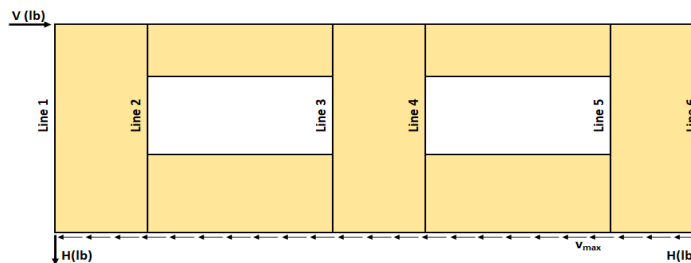
5. Tributary length of openings
 $T1 = (L1 \times Lo1)/(L1+L2) = 0.57$ ft
 $T2 = (L2 \times Lo1)/(L1+L2) = 1.43$ ft
 $T3 = (L2 \times Lo2)/(L2+L3) = 4.01$ ft
 $T4 = (L3 \times Lo2)/(L2+L3) = 1.99$ ft

6. Unit shear beside opening
 $v1 = (V/L)/(L1+T1)/L1 = 40$ plf
 $v2 = (V/L)/(T2+L2+T3)/L2 = 58$ plf
 $v3 = (V/L)/(T4+L3)/L3 = 52$ plf
Check $v1 \times L1 + v2 \times L2 + v3 \times L3 = V?$ 695 lbf OK

7. Resistance to corner forces
 $R1 = v1 \times L1 = 109$ lbf
 $R2 = v2 \times L2 = 407$ lbf
 $R3 = v3 \times L3 = 179$ lbf

8. Difference corner force + resistance
 $R1-F1 = 67$ lbf
 $R2-F2-F3 = 5$ lbf
 $R3-F4 = 32$ lbf

9. Unit shear in corner zones
 $vc1 = (R1-F1)/L1 = 24$ plf
 $vc2 = (R2-F2-F3)/L2 = 1$ plf
 $vc3 = (R3-F4)/L3 = 9$ plf



Check Summary of Shear Values for Two Openings

Line 1: $vc1(h_{a1}+h_{b1})+v1(h_{o1})=H?$	97	198	295 lbf
Line 2: $va1(h_{a1}+h_{b1})-vc1(h_{a1}+h_{b1})-v1(h_{o1})=0?$	295	97	0
Line 3: $vc2(h_{a2}+h_{b2})+v2(h_{o2})-va1(h_{a1}+h_{b1})=0?$	3	292	0
Line 4: $va2(h_{a2}+h_{b2})-v2(h_{o2})-vc2(h_{a2}+h_{b2})=0?$	295	292	0
Line 5: $va2(h_{a2}+h_{b2})-vc3(h_{a2}+h_{b2})-v3(h_{o2})=0?$	295	37	0
Line 6: $vc3(h_{a2}+h_{b2})+v3(h_{o2})=H?$	37	258	295 lbf

Design Summary*

Req. Sheathing Capacity	74 plf	4-Term Deflection	0.402 in.	3-Term Deflection	0.426 in.
Req. Strap Force	296 lbf	4-Term Story Drift %	0.006 %	3-Term Story Drift %	0.006 %
Req. HD Force	295 lbf				
Req. Shear Wall Anchorage Force	33 plf				

*The Design Summary assumes that the shear wall is designed as blocked.



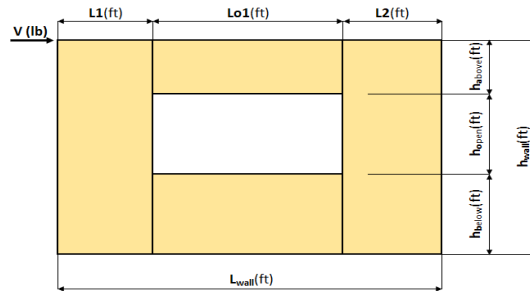
Force Transfer Around Openings Calculator

ONE OPENING

The force transfer around openings (FTAO) method of shear wall analysis is an approach that aims to reinforce the wall such that it performs as if there was no opening. This approach lends certain advantages over segmented shear walls: more versatility, because it allows for narrower wall segments while still meeting the height-to-width ratios and, often, fewer required hold-downs.

Project Information

Code:	IBC 2018	Date:	12/28/2024
Designer:	Javid Abdi, PE, SE		
Client:	Center Line		
Project:	2728 63rd Ave SE (Mercer Island)		
Wall Line:	South (Main-to-Upper)		



Shear Wall Calculation Variables

V	2691 lbf	Opening 1	Adj. Factor Method =	1.25-0.125h/bs
L1	3.76 ft	ha	Wall Pier Aspect Ratio	Adj. Factor
L2	14.43 ft	ho	P1=ha/L1=	N/A
hwall	10.00 ft	hb	P2=hb/L2=	0.35
Lwall	24.19 ft	Lo1		

1. Hold-down forces: $H = V_{hwall}/L_{wall}$ 1112 lbf

2. Unit shear above + below opening
First opening: $va1 = vb1 = H/(h_a + h_b) =$ 222 plf

3. Total boundary force above + below openings
First opening: $O1 = va1 \times (Lo1) =$ 1335 lbf

4. Corner forces
 $F1 = O1(L1)/(L1+L2) =$ 276 lbf
 $F2 = O1(L2)/(L1+L2) =$ 1059 lbf

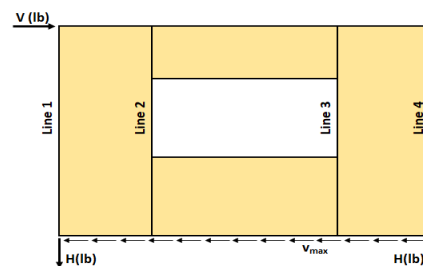
5. Tributary length of openings
 $T1 = (L1 \times Lo1)/(L1+L2) =$ 1.24 ft
 $T2 = (L2 \times Lo1)/(L1+L2) =$ 4.76 ft

6. Unit shear beside opening
 $v1 = (V/L)/(L1+T1)/L1 =$ 148 plf
 $v2 = (V/L)/(T2+L2)/L2 =$ 148 plf
Check $v1 \times L1 + v2 \times L2 = V?$ 2691 lbf OK

7. Resistance to corner forces
 $R1 = v1 \times L1 =$ 556 lbf
 $R2 = v2 \times L2 =$ 2135 lbf

8. Difference corner force + resistance
 $R1 - F1 =$ 280 lbf
 $R2 - F2 =$ 1076 lbf

9. Unit shear in corner zones
 $vc1 = (R1 - F1)/L1 =$ 75 plf
 $vc2 = (R2 - F2)/L2 =$ 75 plf



Check Summary of Shear Values for One Opening

Line 1: $vc1(h_a + h_b) + v1(h_o) = H?$	373	740	1112 lbf
Line 2: $va1(h_a + h_b) - vc1(h_a + h_b) - v1(h_o) = 0?$	1112	373	740
Line 3: $va1(h_a + h_b) - vc2(h_a + h_b) - v1(h_o) = 0?$	1112	373	740
Line 4: $vc2(h_a + h_b) + v2(h_o) = H?$	373	740	1112 lbf

Design Summary*

Req. Sheathing Capacity	222 plf	4-Term Deflection	0.329 in.	3-Term Deflection	0.396 in.
Req. Strap Force	1059 lbf	4-Term Story Drift %	0.004 %	3-Term Story Drift %	0.005 %
Req. HD Force (H)	1112 lbf				
Req. Shear Wall Anchorage Force (V_{max})	111 plf				

*The Design Summary assumes that the shear wall is designed as blocked.