



# HEART OF AMERICA HYPER ENERGY BAR

## Structural Computations

2060 NW LOWENSTEIN DR.  
LEE'S SUMMIT, MO

IMEG #22001321.05

February 2, 2026



*Ali Abdullah Gharamti*

Date: 2/2/26

Exp: 12/31/26

# DESIGN CRITERIA AND LOADS

1. STRUCTURE HAS BEEN DESIGNED TO COMPLY WITH:	IBC 2018
2. OCCUPANCY RISK CATEGORY	II
3. WIND:	
BASIC WIND SPEED	115 MPH
IMPORTANCE FACTOR	1.0
EXPOSURE CLASS	B
NET ROOF UPLIFT PRESSURE	15 PSF
4. LIVE LOADS:	
TYPICAL ROOF	20 PSF (REDUCIBLE)
FLOOR LOAD	100 PSF
5. SNOW:	
GROUND SNOW	20 PSF
DESIGN SNOW	20 PSF



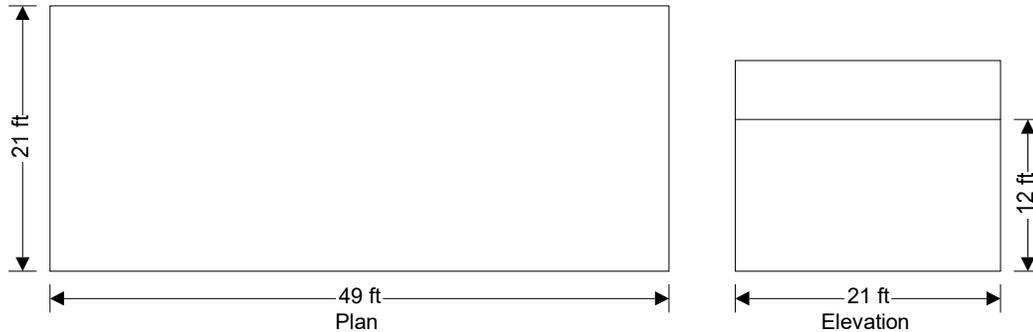
Job: Hyper Energy Bar	By: Todd Barrett	Job Number: 22001321.00
Subject: Wind Design Criteria	Checked By:	Date: 6/11/2025

**WIND LOADING**

In accordance with ASCE7-16

Using the directional design method

Tedds calculation version 2.1.14



**Building data**

Type of roof	Flat
Length of building	b = 49.00 ft
Width of building	d = 21.00 ft
Height to eaves	H = 12.00 ft
Height of parapet	h <sub>p</sub> = 4.67 ft
Mean height	h = 12.00 ft

**General wind load requirements**

Basic wind speed	V = 115.0 mph
Risk category	II
Velocity pressure exponent coef (Table 26.6-1)	K <sub>d</sub> = 0.85
Ground elevation above sea level	z <sub>gl</sub> = 0 ft
Ground elevation factor	K <sub>e</sub> = exp(-0.0000362 × z <sub>gl</sub> /1ft) = 1.00
Exposure category (cl 26.7.3)	B
Enclosure classification (cl.26.12)	Partially enclosed buildings
Internal pressure coef +ve (Table 26.13-1)	GC <sub>pi_p</sub> = 0.55
Internal pressure coef -ve (Table 26.13-1)	GC <sub>pi_n</sub> = -0.55
Gust effect factor	G <sub>f</sub> = 0.85
Minimum design wind loading (cl.27.1.5)	p <sub>min_r</sub> = 8 lb/ft <sup>2</sup>

**Topography**

Topography factor not significant	K <sub>zt</sub> = 1.0
Velocity pressure equation	q = 0.00256 × K <sub>z</sub> × K <sub>zt</sub> × K <sub>d</sub> × V <sup>2</sup> × 1psf/mph <sup>2</sup>

**Velocity pressures table**

z (ft)	K <sub>z</sub> (Table 26.10-1)	q <sub>z</sub> (psf)
12.00	0.57	16.40

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z (ft)	K <sub>z</sub> (Table 26.10-1)	q <sub>z</sub> (psf)
16.67	0.59	16.88

**Peak velocity pressure for internal pressure**

Peak velocity pressure – internal (as roof press.)     q<sub>i</sub> = **16.40** psf

**Parapet pressures and forces**

Velocity pressure at top of parapet     q<sub>p</sub> = **16.88** psf

Combined net pressure coefficient, leeward     GC<sub>pnl</sub> = **-1.0**

Combined net parapet pressure, leeward     p<sub>pl</sub> = q<sub>p</sub> × GC<sub>pnl</sub> = **-16.88** psf

Combined net pressure coefficient, windward     GC<sub>pnw</sub> = **1.5**

Combined net parapet pressure, windward     p<sub>pw</sub> = q<sub>p</sub> × GC<sub>pnw</sub> = **25.32** psf

Wind direction 0 deg:

Leeward parapet force     F<sub>w,wpl\_0</sub> = p<sub>pl</sub> × h<sub>p</sub> × b = **-3.9** kips

Windward parapet force     F<sub>w,wpw\_0</sub> = p<sub>pw</sub> × h<sub>p</sub> × b = **5.8** kips

Wind direction 90 deg:

Leeward parapet force     F<sub>w,wpl\_90</sub> = p<sub>pl</sub> × h<sub>p</sub> × d = **-1.7** kips

Windward parapet force     F<sub>w,wpw\_90</sub> = p<sub>pw</sub> × h<sub>p</sub> × d = **2.5** kips

**Pressures and forces**

Net pressure     p = q × G<sub>f</sub> × C<sub>pe</sub> - q<sub>i</sub> × GC<sub>pi</sub>

Net force     F<sub>w</sub> = p × A<sub>ref</sub>

**Roof load case 1 - Wind 0, GC<sub>pi</sub> 0.55, -C<sub>pe</sub>**

Zone	Ref. height (ft)	Ext pressure coefficient c <sub>pe</sub>	Peak velocity pressure q <sub>p</sub> (psf)	Net pressure p (psf)	Area A <sub>ref</sub> (ft <sup>2</sup> )	Net force F <sub>w</sub> (kips)
A (-ve)	12.00	-0.94	16.40	-22.09	294.00	-6.50
B (-ve)	12.00	-0.87	16.40	-21.17	294.00	-6.22
C (-ve)	12.00	-0.53	16.40	-16.39	441.00	-7.23

Total vertical net force     F<sub>w,v</sub> = **-19.95** kips

Total horizontal net force     F<sub>w,h</sub> = **0.00** kips

**Walls load case 1 - Wind 0, GC<sub>pi</sub> 0.55, -C<sub>pe</sub>**

Zone	Ref. height (ft)	Ext pressure coefficient c <sub>pe</sub>	Peak velocity pressure q <sub>p</sub> (psf)	Net pressure p (psf)	Area A <sub>ref</sub> (ft <sup>2</sup> )	Net force F <sub>w</sub> (kips)
A	12.00	0.80	16.40	2.13	588.00	1.25
B	12.00	-0.50	16.40	-15.99	588.00	-9.40
C	12.00	-0.70	16.40	-18.78	252.00	-4.73
D	12.00	-0.70	16.40	-18.78	252.00	-4.73

**Overall loading**

Projected vertical plan area of wall     A<sub>vert\_w\_0</sub> = b × (H + h<sub>p</sub>) = **816.68** ft<sup>2</sup>

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Projected vertical area of roof  $A_{vert\_r\_0} = 0.00 \text{ ft}^2$   
 Minimum overall horizontal loading  $F_{w,total\_min} = p_{min\_w} \times A_{vert\_w\_0} + p_{min\_r} \times A_{vert\_r\_0} = 13.07 \text{ kips}$   
 Leeward net force  $F_l = F_{w,wB} + F_{w,wpl\_0} = -13.3 \text{ kips}$   
 Windward net force  $F_w = F_{w,wA} + F_{w,wpw\_0} = 7.0 \text{ kips}$   
 Overall horizontal loading  $F_{w,total} = \max(F_w - F_l + F_{w,h}, F_{w,total\_min}) = 20.3 \text{ kips}$

**Roof load case 2 - Wind 0,  $GC_{pi} -0.55, -1c_{pe}$**

Zone	Ref. height (ft)	Ext pressure coefficient $c_{pe}$	Peak velocity pressure $q_p$ (psf)	Net pressure $p$ (psf)	Area $A_{ref}$ (ft <sup>2</sup> )	Net force $F_w$ (kips)
A (+ve)	12.00	-0.18	16.40	6.51	294.00	1.91
B (+ve)	12.00	-0.18	16.40	6.51	294.00	1.91
C (+ve)	12.00	-0.18	16.40	6.51	441.00	2.87

Total vertical net force  $F_{w,v} = 6.70 \text{ kips}$   
 Total horizontal net force  $F_{w,h} = 0.00 \text{ kips}$

**Walls load case 2 - Wind 0,  $GC_{pi} -0.55, -1c_{pe}$**

Zone	Ref. height (ft)	Ext pressure coefficient $c_{pe}$	Peak velocity pressure $q_p$ (psf)	Net pressure $p$ (psf)	Area $A_{ref}$ (ft <sup>2</sup> )	Net force $F_w$ (kips)
A	12.00	0.80	16.40	20.18	588.00	11.86
B	12.00	-0.50	16.40	2.05	588.00	1.21
C	12.00	-0.70	16.40	-0.74	252.00	-0.19
D	12.00	-0.70	16.40	-0.74	252.00	-0.19

**Overall loading**

Projected vertical plan area of wall  $A_{vert\_w\_0} = b \times (H + h_p) = 816.68 \text{ ft}^2$   
 Projected vertical area of roof  $A_{vert\_r\_0} = 0.00 \text{ ft}^2$   
 Minimum overall horizontal loading  $F_{w,total\_min} = p_{min\_w} \times A_{vert\_w\_0} + p_{min\_r} \times A_{vert\_r\_0} = 13.07 \text{ kips}$   
 Leeward net force  $F_l = F_{w,wB} + F_{w,wpl\_0} = -2.7 \text{ kips}$   
 Windward net force  $F_w = F_{w,wA} + F_{w,wpw\_0} = 17.7 \text{ kips}$   
 Overall horizontal loading  $F_{w,total} = \max(F_w - F_l + F_{w,h}, F_{w,total\_min}) = 20.3 \text{ kips}$

**Roof load case 3 - Wind 90,  $GC_{pi} 0.55, -c_{pe}$**

Zone	Ref. height (ft)	Ext pressure coefficient $c_{pe}$	Peak velocity pressure $q_p$ (psf)	Net pressure $p$ (psf)	Area $A_{ref}$ (ft <sup>2</sup> )	Net force $F_w$ (kips)
A (-ve)	12.00	-0.90	16.40	-21.57	126.00	-2.72
B (-ve)	12.00	-0.90	16.40	-21.57	126.00	-2.72
C (-ve)	12.00	-0.50	16.40	-15.99	252.00	-4.03
D (-ve)	12.00	-0.30	16.40	-13.20	525.00	-6.93

Total vertical net force  $F_{w,v} = -16.40 \text{ kips}$   
 Total horizontal net force  $F_{w,h} = 0.00 \text{ kips}$

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### Walls load case 3 - Wind 90, $GC_{pi}$ 0.55, $-C_{pe}$

Zone	Ref. height (ft)	Ext pressure coefficient $c_{pe}$	Peak velocity pressure $q_p$ (psf)	Net pressure $p$ (psf)	Area $A_{ref}$ (ft <sup>2</sup> )	Net force $F_w$ (kips)
A	12.00	0.80	16.40	2.13	252.00	0.54
B	12.00	-0.28	16.40	-12.97	252.00	-3.27
C	12.00	-0.70	16.40	-18.78	588.00	-11.04
D	12.00	-0.70	16.40	-18.78	588.00	-11.04

#### Overall loading

Projected vertical plan area of wall  $A_{vert\_w\_90} = d \times (H + h_p) = 350.01 \text{ ft}^2$   
 Projected vertical area of roof  $A_{vert\_r\_90} = 0.00 \text{ ft}^2$   
 Minimum overall horizontal loading  $F_{w,total\_min} = p_{min\_w} \times A_{vert\_w\_90} + p_{min\_r} \times A_{vert\_r\_90} = 5.60 \text{ kips}$   
 Leeward net force  $F_l = F_{w,wB} + F_{w,wpl\_90} = -4.9 \text{ kips}$   
 Windward net force  $F_w = F_{w,wA} + F_{w,wpw\_90} = 3.0 \text{ kips}$   
 Overall horizontal loading  $F_{w,total} = \max(F_w - F_l + F_{w,h}, F_{w,total\_min}) = 7.9 \text{ kips}$

### Roof load case 4 - Wind 90, $GC_{pi}$ -0.55, $+C_{pe}$

Zone	Ref. height (ft)	Ext pressure coefficient $c_{pe}$	Peak velocity pressure $q_p$ (psf)	Net pressure $p$ (psf)	Area $A_{ref}$ (ft <sup>2</sup> )	Net force $F_w$ (kips)
A (+ve)	12.00	-0.18	16.40	6.51	126.00	0.82
B (+ve)	12.00	-0.18	16.40	6.51	126.00	0.82
C (+ve)	12.00	-0.18	16.40	6.51	252.00	1.64
D (+ve)	12.00	-0.18	16.40	6.51	525.00	3.42

Total vertical net force  $F_{w,v} = 6.70 \text{ kips}$   
 Total horizontal net force  $F_{w,h} = 0.00 \text{ kips}$

### Walls load case 4 - Wind 90, $GC_{pi}$ -0.55, $+C_{pe}$

Zone	Ref. height (ft)	Ext pressure coefficient $c_{pe}$	Peak velocity pressure $q_p$ (psf)	Net pressure $p$ (psf)	Area $A_{ref}$ (ft <sup>2</sup> )	Net force $F_w$ (kips)
A	12.00	0.80	16.40	20.18	252.00	5.08
B	12.00	-0.28	16.40	5.07	252.00	1.28
C	12.00	-0.70	16.40	-0.74	588.00	-0.43
D	12.00	-0.70	16.40	-0.74	588.00	-0.43

#### Overall loading

Projected vertical plan area of wall  $A_{vert\_w\_90} = d \times (H + h_p) = 350.01 \text{ ft}^2$   
 Projected vertical area of roof  $A_{vert\_r\_90} = 0.00 \text{ ft}^2$   
 Minimum overall horizontal loading  $F_{w,total\_min} = p_{min\_w} \times A_{vert\_w\_90} + p_{min\_r} \times A_{vert\_r\_90} = 5.60 \text{ kips}$   
 Leeward net force  $F_l = F_{w,wB} + F_{w,wpl\_90} = -0.4 \text{ kips}$

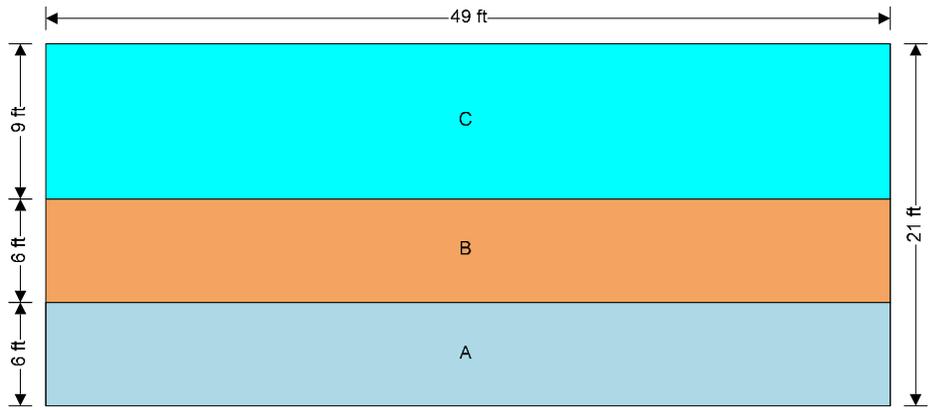
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Windward net force

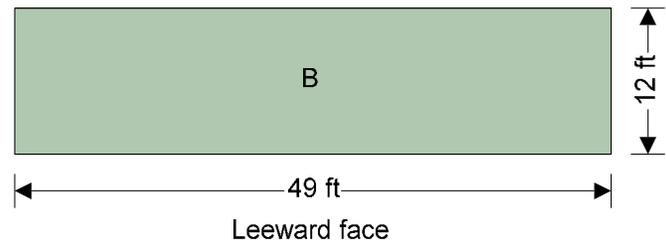
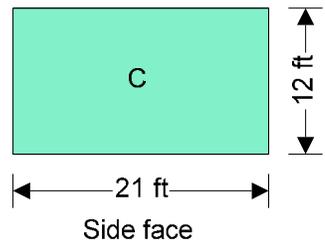
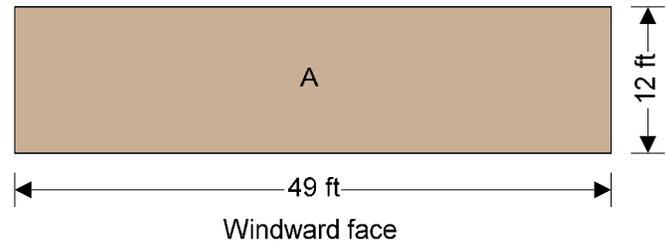
$$F_w = F_{w,WA} + F_{w,wpw_{90}} = 7.6 \text{ kips}$$

Overall horizontal loading

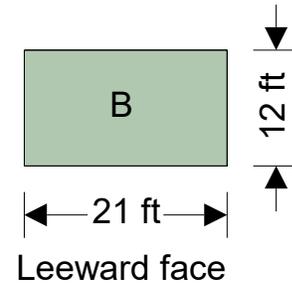
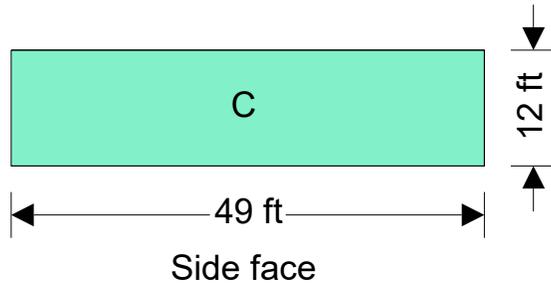
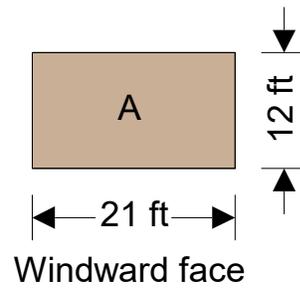
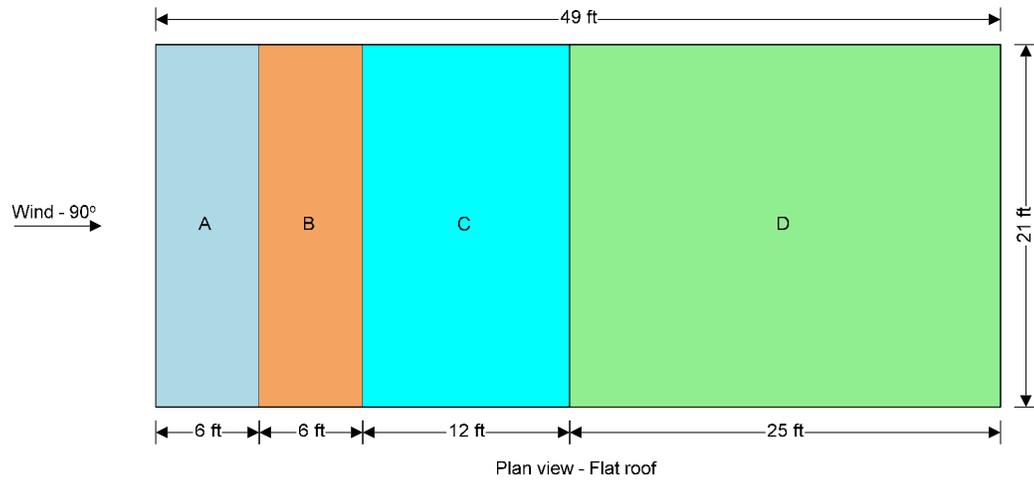
$$F_{w,total} = \max(F_w - F_l + F_{w,h}, F_{w,total\_min}) = 7.9 \text{ kips}$$



Wind - 0°  
Plan view - Flat roof

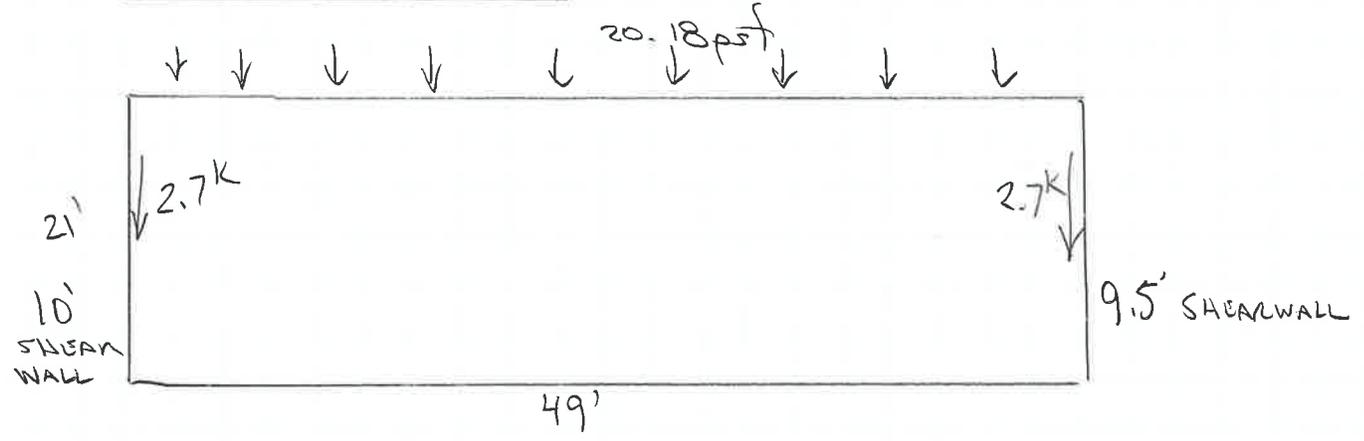


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PROJECT HEB -	DATE 6/10/25	BY DF/AG	PROJECT NO. 23001321,00
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WIND SHEAR WALLS



WIND LOAD:  $(20.18 \text{ psf}) \times \left(\frac{11}{2}\right) \times 49' = 5439 \text{ lb}$

$5439 \text{ lb} \div 2 \text{ WALLS} = 2719 \text{ lb per wall}$

BACK WALL  $2719 \text{ lb} \div 9.5' = 286 \text{ plf}$  (8# NAILS @ 4" O.C.)  
NO SPECIAL ANCHORS

FRONT WALL - USE (2) SIMPSON SHEAR PANELS (2195 lb each) REQ'D

MINIMUM NAILING ON SIDEWALLS BY INSPECTION

TABLE 2

**RECOMMENDED SHEAR (POUNDS PER FOOT) FOR APA PANEL SHEAR WALLS WITH FRAMING OF DOUGLAS-FIR, LARCH, OR SOUTHERN PINE<sup>(a)</sup> FOR WIND OR SEISMIC LOADING<sup>(b)</sup>**

Panel Grade	Minimum Nominal Panel Thickness (in.)	Minimum Nail Penetration in Framing (in.)	Panels Applied Direct to Framing				Panels Applied Over 1/2" or 5/8" Gypsum Sheathing					
			Nail Size (common or galvanized box)	Nail Spacing at Panel Edges (in.)				Nail Size (common or galvanized box)	Nail Spacing at Panel Edges (in.)			
				6	4	3	2 <sup>(e)</sup>		6	4	3	2 <sup>(e)</sup>
APA STRUCTURAL I grades	5/16	1-1/4	6d	200	300	390	510	8d	200	300	390	510
	3/8			230 <sup>(d)</sup>	360 <sup>(d)</sup>	460 <sup>(d)</sup>	610 <sup>(d)</sup>					
	7/16	1-3/8	8d	255 <sup>(d)</sup>	395 <sup>(d)</sup>	505 <sup>(d)</sup>	670 <sup>(d)</sup>	10d	280	430	550 <sup>(f)</sup>	730
	15/32			280	430	550	730					
APA RATED SHEATHING; APA RATED SIDING <sup>(g)</sup> and other APA grades except species Group 5	15/32	1-1/2	10d	340	510	665 <sup>(f)</sup>	870					
	5/16 or 1/4 <sup>(c)</sup>			180	270	350	450		180	270	350	450
	3/8	1-1/4	6d	200	300	390	510	8d	200	300	390	510
	3/8			220 <sup>(d)</sup>	320 <sup>(d)</sup>	410 <sup>(d)</sup>	530 <sup>(d)</sup>					
	7/16	1-3/8	8d	240 <sup>(d)</sup>	350 <sup>(d)</sup>	450 <sup>(d)</sup>	585 <sup>(d)</sup>	10d	260	380	490 <sup>(f)</sup>	640
	15/32			260	380	490	640					
APA RATED SIDING <sup>(g)</sup> and other APA grades except species Group 5	15/32			310	460	600 <sup>(f)</sup>	770					
	19/32	1-1/2	10d	340	510	665 <sup>(f)</sup>	870					
	5/16 <sup>(c)</sup>	1-1/4	Nail Size (galvanized casing) 6d	140	210	275	360	Nail Size (galvanized casing) 8d	140	210	275	360
	3/8	1-3/8	8d	160	240	310	410	10d	160	240	310 <sup>(f)</sup>	410

(a) For framing of other species: (1) Find specific gravity for species of lumber in the AFPA National Design Specification. (2) For common or galvanized box nails, find shear value from table above for nail size for actual grade. (3) Multiply value by the following adjustment factor: Specific Gravity Adjustment Factor = [1 - (0.5 - SG)], where SG = specific gravity of the framing. This adjustment shall not be greater than 1.

(b) All panel edges backed with 2-inch nominal or wider framing. Install panels either horizontally or vertically. Space nails maximum 6 inches o.c. along intermediate framing members for 3/8-inch and 7/16-inch panels installed on studs spaced 24 inches o.c. For other conditions and panel thicknesses, space nails maximum 12 inches o.c. on intermediate supports. Fasteners shall be located 3/8 inch from panel edges.

(c) 3/8-inch or APA RATED SIDING 16 oc is minimum recommended when applied direct to framing as exterior siding.

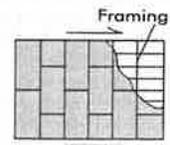
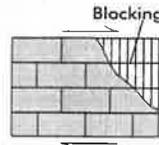
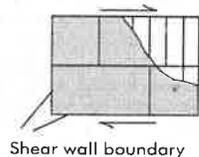
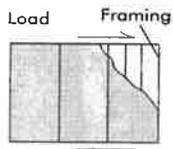
(d) Shears may be increased to values shown for 15/32-inch sheathing with same nailing provided (1) studs are spaced a maximum of 16 inches o.c., or (2) if panels are applied with strength axis across studs.

(e) Framing at adjoining panel edges shall be 3-inch nominal or wider, and nails shall be staggered where nails are spaced 2 inches o.c. Check local code for variations of these requirements.

(f) Framing at adjoining panel edges shall be 3-inch nominal or wider, and nails shall be staggered where 10d nails having penetration into framing of more than 1-1/2 inches are spaced 3 inches o.c. Check local code for variations of these requirements.

(g) Values apply to all-veneer plywood APA RATED SIDING panels only. Other APA RATED SIDING panels may also qualify on a proprietary basis. APA RATED SIDING 16 oc plywood may be 11/32 inch, 3/8 inch or thicker. Thickness at point of nailing on panel edges governs shear values.

**TYPICAL LAYOUTS FOR SHEAR WALLS**



Foundation resistance

**TABLE 2—ALLOWABLE ASD IN-PLANE SHEAR FOR STANDARD APPLICATION  
STRONG-WALL HIGH STRENGTH WOOD SHEARWALL (WSWH) ON CONCRETE FOUNDATION**

Strong-Wall High Strength Wood Shearwall Model	Panel Evaluation Height, H <sub>e</sub> (in.)	Allow. Vertical Load, P (lb.)	2,500 psi Concrete						3,000 psi Concrete					
			Seismic			Wind			Seismic			Wind		
			Allow. ASD Shear Load, V (lb.)	Drift at Allow. Shear, Δ (in.)	Anchor Tension at Allow. Shear, T (lb.)	Allow. ASD Shear Load, V (lb.)	Drift at Allow. Shear, Δ (in.)	Anchor Tension at Allow. Shear, T (lb.)	Allow. ASD Shear Load, V (lb.)	Drift at Allow. Shear, Δ (in.)	Anchor Tension at Allow. Shear, T (lb.)	Allow. ASD Shear Load, V (lb.)	Drift at Allow. Shear, Δ (in.)	Anchor Tension at Allow. Shear, T (lb.)
WSWH12x7	78	1,000	1,300	0.32	13,295	1,670	0.43	17,075	1,300	0.32	13,295	1,670	0.43	17,075
		4,000	1,300	0.32	13,295	1,670	0.43	17,075	1,300	0.32	13,295	1,670	0.43	17,075
		7,500	1,300	0.32	13,295	1,670	0.43	17,075	1,300	0.32	13,295	1,670	0.43	17,075
WSWH18x7	78	1,000	3,795	0.32	23,680	4,470	0.39	27,890	3,795	0.32	23,680	4,470	0.39	27,890
		4,000	3,795	0.32	23,680	4,365	0.38	27,245	3,795	0.32	23,680	4,470	0.39	27,890
		7,500	3,795	0.32	23,680	4,050	0.36	25,285	3,795	0.32	23,680	4,470	0.39	27,890
WSWH24x7	78	1,000	7,450	0.30	33,210	7,795	0.34	34,755	7,450	0.30	33,210	7,795	0.34	34,755
		4,000	7,450	0.30	33,210	7,565	0.33	33,715	7,450	0.30	33,210	7,795	0.34	34,755
		7,500	7,115	0.28	31,715	7,115	0.31	31,715	7,450	0.30	33,210	7,795	0.34	34,755
WSWH12x8	93%	1,000	1,030	0.40	12,580	1,325	0.53	16,195	1,030	0.40	12,580	1,325	0.53	16,195
		4,000	1,030	0.40	12,580	1,325	0.53	16,195	1,030	0.40	12,580	1,325	0.53	16,195
		7,500	1,030	0.40	12,580	1,325	0.53	16,195	1,030	0.40	12,580	1,325	0.53	16,195
WSWH18x8	93%	1,000	3,060	0.39	22,835	3,880	0.52	28,925	3,060	0.39	22,835	3,955	0.53	29,490
		4,000	3,060	0.39	22,835	3,650	0.49	27,245	3,060	0.39	22,835	3,955	0.53	29,490
		7,500	3,060	0.39	22,835	3,390	0.46	25,285	3,060	0.39	22,835	3,955	0.53	29,490
WSWH24x8	93%	1,000	6,240	0.37	33,240	6,650	0.43	35,430	6,240	0.37	33,240	6,910	0.45	36,815
		4,000	6,240	0.37	33,240	6,330	0.41	33,715	6,240	0.37	33,240	6,910	0.45	36,815
		7,500	5,950	0.35	31,715	5,950	0.38	31,715	6,240	0.37	33,240	6,910	0.45	36,815
WSWH12x9	105%	1,000	850	0.45	11,750	1,095	0.60	15,145	850	0.45	11,750	1,095	0.60	15,145
		4,000	850	0.45	11,750	1,095	0.60	15,145	850	0.45	11,750	1,095	0.60	15,145
		7,500	850	0.45	11,750	1,095	0.60	15,145	850	0.45	11,750	1,095	0.60	15,145
WSWH18x9	105%	1,000	2,575	0.45	21,680	3,325	0.60	27,975	2,575	0.45	21,680	3,325	0.60	27,975
		4,000	2,575	0.45	21,680	3,235	0.58	27,245	2,575	0.45	21,680	3,325	0.60	27,975
		7,500	2,575	0.45	21,680	3,005	0.54	25,285	2,575	0.45	21,680	3,325	0.60	27,975
WSWH24x9	105%	1,000	5,150	0.43	30,975	5,890	0.52	35,430	5,150	0.43	30,975	6,120	0.54	36,815
		4,000	5,150	0.43	30,975	5,605	0.50	33,715	5,150	0.43	30,975	6,120	0.54	36,815
		7,500	5,150	0.43	30,975	5,275	0.47	31,715	5,150	0.43	30,975	6,120	0.54	36,815
WSWH12x10	117%	1,000	700	0.50	10,750	900	0.67	13,855	700	0.50	10,750	900	0.67	13,855
		4,000	700	0.50	10,750	900	0.67	13,855	700	0.50	10,750	900	0.67	13,855
		7,500	700	0.50	10,750	900	0.67	13,855	700	0.50	10,750	900	0.67	13,855
WSWH18x10	117%	1,000	2,140	0.50	20,055	2,755	0.67	25,840	2,140	0.50	20,055	2,755	0.67	25,840
		4,000	2,140	0.50	20,055	2,755	0.67	25,840	2,140	0.50	20,055	2,755	0.67	25,840
		7,500	2,140	0.50	20,055	2,695	0.65	25,285	2,140	0.50	20,055	2,755	0.67	25,840
WSWH24x10	117%	1,000	4,010	0.48	26,860	5,215	0.67	34,935	4,010	0.48	26,860	5,215	0.67	34,935
		4,000	4,010	0.48	26,860	5,030	0.64	33,715	4,010	0.48	26,860	5,215	0.67	34,935
		7,500	4,010	0.48	26,860	4,735	0.61	31,715	4,010	0.48	26,860	5,215	0.67	34,935
WSWH12x11	129%	1,000	595	0.56	10,055	765	0.73	12,930	595	0.56	10,055	765	0.73	12,930
		4,000	595	0.56	10,055	765	0.73	12,930	595	0.56	10,055	765	0.73	12,930
		7,500	595	0.56	10,055	765	0.73	12,930	595	0.56	10,055	765	0.73	12,930
WSWH18x11	129%	1,000	1,960	0.55	20,240	2,520	0.73	26,060	1,960	0.55	20,240	2,520	0.73	26,060
		4,000	1,960	0.55	20,240	2,520	0.73	26,060	1,960	0.55	20,240	2,520	0.73	26,060
		7,500	1,960	0.55	20,240	2,445	0.71	25,285	1,960	0.55	20,240	2,520	0.73	26,060
WSWH24x11	129%	1,000	4,000	0.54	29,550	4,795	0.68	35,430	4,000	0.54	29,550	4,985	0.70	36,815
		4,000	4,000	0.54	29,550	4,565	0.64	33,715	4,000	0.54	29,550	4,985	0.70	36,815
		7,500	4,000	0.54	29,550	4,295	0.60	31,715	4,000	0.54	29,550	4,985	0.70	36,815
WSWH12x12	144	1,000	505	0.61	9,495	645	0.80	12,150	505	0.61	9,495	645	0.80	12,150
		4,000	505	0.61	9,495	645	0.80	12,150	505	0.61	9,495	645	0.80	12,150
		7,500	505	0.61	9,495	645	0.80	12,150	505	0.61	9,495	645	0.80	12,150
WSWH18x12	144	1,000	1,705	0.61	19,665	2,195	0.80	25,285	1,705	0.61	19,665	2,195	0.80	25,285
		4,000	1,705	0.61	19,665	2,195	0.80	25,285	1,705	0.61	19,665	2,195	0.80	25,285
		7,500	1,705	0.61	19,665	2,195	0.80	25,285	1,705	0.61	19,665	2,195	0.80	25,285
WSWH24x12	144	1,000	3,525	0.60	29,015	4,305	0.75	35,430	3,525	0.60	29,015	4,475	0.78	36,815
		4,000	3,525	0.60	29,015	4,100	0.72	33,715	3,525	0.60	29,015	4,475	0.78	36,815
		7,500	3,525	0.60	29,015	3,855	0.67	31,715	3,525	0.60	29,015	4,475	0.78	36,815

# Snow Drift Design

## Roof

### Snow Drift calculations

April 25, 2025

1:03 PM

$P_g = 30$  psf {ground snow}

$W_b = 48$  ft {horizontal length of high roof normal to elevation change,  $50 \text{ ft} < W_b < 500 \text{ ft}$ }

Upper Elev = 17 ft {Elevation of upper roof}

Lower Elev = 12 ft {Elevation of lower roof}

Does 40% sliding snow factor apply? (Is upper roof slope greater than 16.7%, 2 vertical to 12 horizontal?)

yes  no

Is this a windward drift or a leeward drift?

Windward  Leeward

$P_f = 30$  psf {roof snow, assume = ground snow}

$h_r = 5$  ft {difference in height of upper and lower roof}

$D = 17.9$  pcf {snow density,  $0.13P_g + 14 = D \leq 35$  pcf}

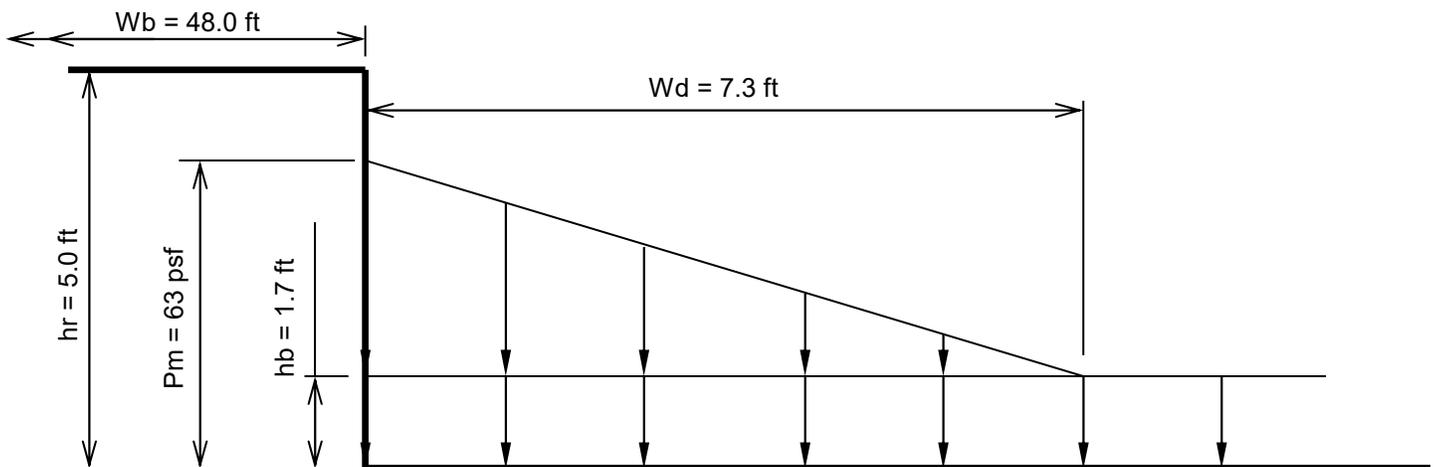
$h_b = 1.7$  ft {height of balanced snow on lower roof,  $h_b = P_f / D$ }

$h_d = 1.8$  ft {height of snow drift adjacent elevation change,  $h_d = 0.43(W_b)^{1/3}(P_g + 10)^{1/4} - 1.5$ }

$W_d = 7.3$  ft {width of snow drift, base of triangular drift load,  $W_d = \text{min of } 4h_d \text{ or } 4(h_r - h_b)$ }

$P_m = 63$  psf {maximum snow load at elevation change,  $P_m = D(h_d + h_b) \leq D(h_r)$ }

$(h_r - h_b) / h_b = 1.98 > 0.2$  {drift calculations not required if  $(h_r - h_b) / h_b \leq 0.2$ }





Member # **roof joists**

Location : **Hyper**

Nominal Size : ( 1 ) 2 x 10

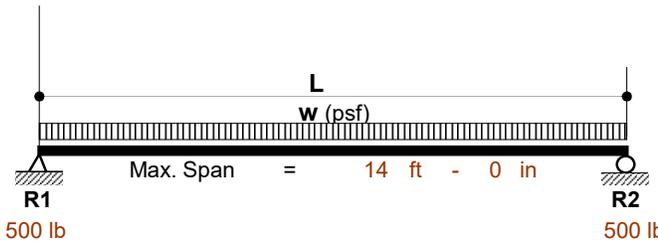
Species = **Spruce-Pine-Fir (South)**

\*\* Dimension Lumber \*\* Grade = **No.2**

Span (L) = **12 ft - 6 in**

Spacing (S) = **24 in**

Unsupported Length (lu) = **1 ft - 0 in**



### Stress and/or Deflection Check → OK

	<u>A</u>	<u>c</u>	<u>t</u>	<u>a</u>	<u>A</u>	<u>l</u>	<u>l</u>	<u>o</u>	<u>w</u>	<u>a</u>	<u>b</u>	<u>l</u>	<u>e</u>	<u>R</u>
	Actual		Allowable				Ratio							
Max fv (psi) & V (lb)	47	438	151	1393			31%							
Max fb (psi) & M (lb-ft)	877	1563	1105	1970			79%							
Total Load Max. Defl. (in)	-0.45	L/334	L/180	0.83			54%							
Live Load Max. Defl. (in)	-0.34	L/446	L/240	0.63			54%							

Setup  Beam or Girder  Joist or Rafter

Member at	<input checked="" type="checkbox"/> Floor	<input checked="" type="checkbox"/> Roof	
Repetitive Use ?	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes	
Incised for PT ?	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes	
Flat Use :	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes	
Moisture Content :	<input type="checkbox"/> <19%	<input checked="" type="checkbox"/> >19%	
Temperature (° F) :	<input type="checkbox"/> <100	<input checked="" type="checkbox"/> 100-125	<input type="checkbox"/> 125-150
Set Duration Factors	<input type="checkbox"/> with Cantilever		
Set Deflection Limits	<input type="checkbox"/> with Point Load(s)		
Reset Loads to Zero	<input type="checkbox"/> with Sloped Load(s)		

(pressed-down buttons are selected)

### LOADING Load Type

Dead Load	Uniform	w (psf) =	10
Snow Load	Uniform	w (psf) =	30

CD = 1.15

Shear Force, V (lb)

Bending Moment, M (lb-ft)

Total Load Deflection (in)

#### Adjustment Factors

		<u>for Fb</u>	<u>for Fv</u>	<u>for E</u>
Wet Service	C <sub>M</sub> =	1.00	0.97	0.90
Temperature	C <sub>t</sub> =	1.00	1.00	1.00
Beam Stability	C <sub>L</sub> =	0.98	N/A	N/A
Size	C <sub>F</sub> =	1.10	N/A	N/A
Flat Use	C <sub>fu</sub> =	1.00	N/A	N/A
Incising	C <sub>i</sub> =	1.00	1.00	1.00
Repetitive Member	C <sub>r</sub> =	1.15	N/A	N/A
Buckling Stiffness	C <sub>T</sub> =	N/A	N/A	1.05

(C<sub>T</sub> for Emin only)

#### Design Values in psi

	<u>Fb</u>	<u>Fv</u>	<u>E</u>	<u>Emin</u>
Reference	775	135	1100000	400000
Adjusted	1105	151	990000	360000

#### Section Properties

breadth (b) = 1.5 in  
depth (d) = 9.25 in  
Area (A) = 13.9 in<sup>2</sup>  
Section Modulus (Sx) = 21.4 in<sup>3</sup>  
Moment of Inertial (Ix) = 98.9 in<sup>4</sup>





Member # RTU support

Location : Hyper

Nominal Size : ( 1 ) 2 x 10

Species = Spruce-Pine-Fir (South)

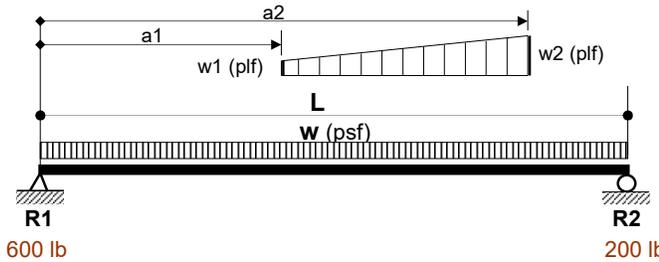
\*\* Dimension Lumber \*\*

Grade = No.2

Span (L) = 12 ft - 0 in

Tributary Width (B) = 1 ft - 0 in

Unsupported Length (lu) = 2 ft - 0 in



Stress and/or Deflection Check — OK

	<u>A</u>	<u>C</u>	<u>A</u>	<u>A</u>	<u>R</u>
	<u>ct</u>	<u>u</u>	<u>l</u>	<u>l</u>	<u>at</u>
Max fv (psi) & V (lb)	65	600	151	1393	43%
Max fb (psi) & M (lb-ft)	842	1500	936	1668	90%
Total Load Max. Defl. (in)	-0.34	L/425	L/180	0.80	42%
Live Load Max. Defl. (in)	0.00	L / INF.	L/240	0.60	0%

Setup  Beam or Girder  Joist or Rafter

Member at	Floor	Roof	
Repetitive Use ?	No	Yes	
Incised for PT ?	No	Yes	
Flat Use :	No	Yes	
Moisture Content :	<19%	>19%	
Temperature (° F) :	<100	100~125	125~150

Set Duration Factors  with Cantilever

Set Deflection Limits  with Point Load(s)

Reset Loads to Zero  with Sloped Load(s)

(pressed-down buttons are selected)

LOADING Load Type

Dead Load	Uniform	w (psf) =	
	Sloped	a1 (ft) = 1.00	w1(plf) = 200
		a2 (ft) = 5.00	w2(plf) = 200
Snow Load	Uniform	w (psf) = 0	
	Sloped	a1 (ft) = 0.00	w1(plf) = 0
		a2 (ft) = 0.00	w2(plf) = 0

CD = 1.15

Shear Force, V (lb)

Bending Moment, M (lb-ft)

Total Load Deflection (in)

**Adjustment Factors**

		for Fb	for Fv	for E
Wet Service	C <sub>M</sub> =	1.00	0.97	0.90
Temperature	C <sub>t</sub> =	1.00	1.00	1.00
Beam Stability	C <sub>L</sub> =	0.95	N/A	N/A
Size	C <sub>F</sub> =	1.10	N/A	N/A
Flat Use	C <sub>fu</sub> =	1.00	N/A	N/A
Incising	C <sub>i</sub> =	1.00	1.00	1.00
Repetitive Member	C <sub>r</sub> =	1.00	N/A	N/A
Buckling Stiffness	C <sub>T</sub> =	N/A	N/A	1.09

(C<sub>T</sub> for Emin only)

**Design Values in psi**

	Fb	Fv	E	Emin
Reference	775	135	1100000	400000
Adjusted	936	151	990000	360000

**Section Properties**

breadth (b) = 1.5 in  
depth (d) = 9.25 in  
Area (A) = 13.9 in<sup>2</sup>  
Section Modulus (Sx) = 21.4 in<sup>3</sup>  
Moment of Inertial (Ix) = 98.9 in<sup>4</sup>



Member # roof header

Location : Hyper

Nominal Size : ( 3 ) 2 x 10

Species = Spruce-Pine-Fir (South)

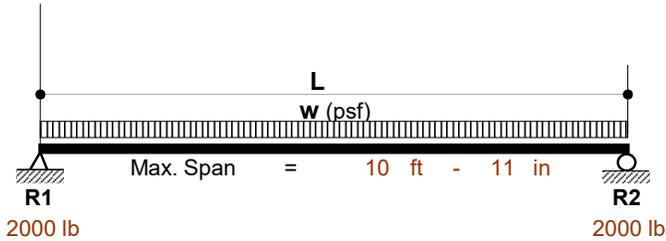
\*\* Dimension Lumber \*\*

Grade = No.2

Span (L) = 10 ft - 0 in

Tributary Width (B) = 10 ft - 0 in

Unsupported Length (lu) = 2 ft - 0 in



Stress and/or Deflection Check — OK

	<u>A</u> ctual	<u>A</u> llowable	<u>R</u> atio
Max fv (psi) & V (lb)	61 1692	151 4179	40%
Max fb (psi) & M (lb-ft)	935 5000	1124 6008	83%
Total Load Max. Defl. (in)	-0.31 L/392	L/180	0.67 46%
Live Load Max. Defl. (in)	-0.23 L/522	L/240	0.50 46%

Setup  Beam or Girder  Joist or Rafter

Member at	Floor	Roof	
Repetitive Use ?	No	Yes	
Incised for PT ?	No	Yes	
Flat Use :	No	Yes	
Moisture Content :	<19%	>19%	
Temperature (° F) :	<100	100-125	125-150
Set Duration Factors	<input type="checkbox"/> with Cantilever		
Set Deflection Limits	<input type="checkbox"/> with Point Load(s)		
Reset Loads to Zero	<input type="checkbox"/> with Sloped Load(s)		

(pressed-down buttons are selected)

LOADING Load Type

Dead Load	Uniform	w (psf) = 10
Snow Load	Uniform	w (psf) = 30
		CD = 1.15

Shear Force, V (lb)

Bending Moment, M (lb-ft)

Total Load Deflection (in)

**Adjustment Factors**

		<u>for Fb</u>	<u>for Fv</u>	<u>for E</u>
Wet Service	C <sub>M</sub> =	1.00	0.97	0.90
Temperature	C <sub>t</sub> =	1.00	1.00	1.00
Beam Stability	C <sub>L</sub> =	1.00	N/A	N/A
Size	C <sub>F</sub> =	1.10	N/A	N/A
Flat Use	C <sub>fu</sub> =	1.00	N/A	N/A
Incising	C <sub>i</sub> =	1.00	1.00	1.00
Repetitive Member	C <sub>r</sub> =	1.15	N/A	N/A
Buckling Stiffness	C <sub>T</sub> =	N/A	N/A	1.09

(C<sub>T</sub> for Emin only)

**Design Values in psi**

	<u>Fb</u>	<u>Fv</u>	<u>E</u>	<u>Emin</u>
Reference	775	135	1100000	400000
Adjusted	1124	151	990000	360000

**Section Properties**

breadth (b) = 4.5 in  
depth (d) = 9.25 in  
Area (A) = 41.6 in<sup>2</sup>  
Section Modulus (Sx) = 64.2 in<sup>3</sup>  
Moment of Inertial (Ix) = 296.8 in<sup>4</sup>



How to Enter Data



Print



Order Pro Version

ASD Method



Developed by: Forum Engineers

Member # interior wall

Location : Hyper

Sits on Sill Plate ? No Yes

\*\* Dimension Lumber \*\*

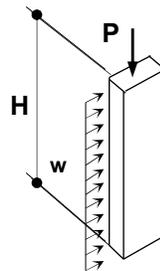
Nominal Size : ( 1 ) 2 x 4
Species = Spruce-Pine-Fir (South)
Grade = No.2

\*\* Dimension Lumber \*\*

Sill Plate Nominal Size : 2 x 4
Species or Symbol = Spruce-Pine-Fir (South)
Grade = No.2

Bearing at < 3" of Sill End? No

Height (H) = 11 ft - 0 in
Unbraced Length (I1) = 11 ft - 0 in
Unbraced Length (I2) = 1 ft - 0 in



P = 600 lb = DL + RL
w = 0.0 plf = Wind
lu = 1 ft - 0 in

Setup (pressed-down buttons are selected)

Table with setup options: Repetitive Use, Incised for PT, Flat Use, Moisture Content, Temperature, Set Duration Factors, Set Effective-length Factor, Set Deflection Limit.

for P only, fc (psi) = 114 < 223 = Fc //
for P + w, fc (psi) = 114 < 225 = Fc //
(1.3/2) fb (psi) = 0 < 1654 = Fb
K = 1.00 (fc / F'c)^2 + fb / [F'b (1 - fc / Fce)] = 0.26 < 1.00 OK
Delta / H = 240 Mid-H Deflection due to w, Delta (inch) = 0.00 < H / 240 OK

Section Properties

Table with section properties: breadth (b), depth (d), Area (A), Section Modulus (S), Moment of Inertial (I).

Adjustment Factors

Table with adjustment factors: Bending, Comp //, E, Comp -I, Wet Service, Temperature, Beam Stability, Size, Flat Use, Incising, Repetitive Member, Column Stability (P), Column Stability (P+w), Bearing Area.

Design Values (psi)

Table with design values: Fb, Fc //, E, Fc -I, Emin for Reference, Adjusted (P), and Adjusted (P+w).



ASD Method



Developed by: Forum Engineers

How to Enter Data



Member # exterior wall

Location : Hyper

Sits on Sill Plate ? No Yes

\*\* Dimension Lumber \*\*

Nominal Size : ( 1 ) 2 x 6

Species = Spruce-Pine-Fir (South)

Grade = No.2

\*\* Dimension Lumber \*\*

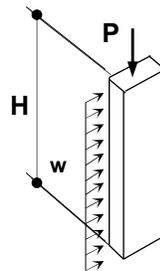
Sill Plate Nominal Size : 2 x 6

Species or Symbol = Spruce-Pine-Fir (South)

Grade = No.2

Bearing at < 3" of Sill End? No

Height (H) = 11 ft - 0 in
Unbraced Length (I1) = 11 ft - 0 in
Unbraced Length (I2) = 1 ft - 0 in



P = 360 lb = DL + RL
w = 23.0 plf = Wind
lu = 1 ft - 0 in

Setup (pressed-down buttons are selected)

Table with 2 columns: Label and Value. Includes Repetitive Use, Incised for PT, Flat Use, Moisture Content, Temperature, and various factors like CD, K, and Delta/H.

for P only, fc (psi) = 44 < 419 = Fc -|
for P + w, fc (psi) = 44 < 419 = Fc -|
(1.3/2) fb (psi) = 359 < 1427 = Fb
(fc / F'c)^2 + fb / [F'b (1 - fc / Fce)] = 0.28 < 1.00 OK
Mid-H Deflection due to w, Delta (inch) = 0.64 < H / 200 OK

Section Properties

Table with 2 columns: Post/Stud and Sill PL. Lists properties like breadth (b), depth (d), Area (A), Section Modulus (S), and Moment of Inertial (I).

Adjustment Factors

Table with 4 columns: Bending, Comp //, E, Comp -|. Lists factors like Wet Service, Temperature, Beam Stability, Size, Flat Use, Incising, Repetitive Member, Column Stability (P), Column Stability (P+w), and Bearing Area.

Design Values (psi)

Table with 5 columns: Fb, Fc //, E, Fc -|, Emin. Shows design values for Reference, Adjusted (P), and Adjusted (P+w).



Member # header under drift

Location : Hyper

Nominal Size : ( 6 ) 2 x 14

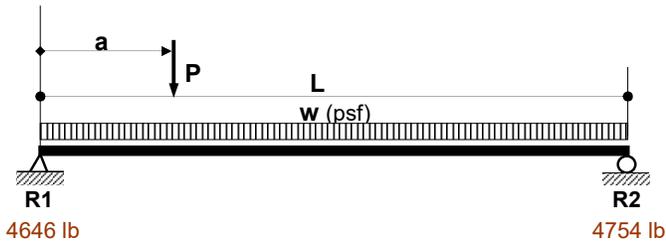
Species = Spruce-Pine-Fir (South)

\*\* Dimension Lumber \*\* Grade = No.2

Span (L) = 14 ft - 0 in

Tributary Width (B) = 10 ft - 0 in

Unsupported Length (lu) = 1 ft - 4 in



Stress and/or Deflection Check → OK

	<u>A c t u a l</u>	<u>A l l o w a b l e</u>	<u>R a t i o</u>
Max fv (psi) & V (lb)	51 4091	151 11972	34%
Max fb (psi) & M (lb-ft)	789 17325	922 20230	86%
Total Load Max. Defl. (in)	-0.35 L/478	L/180 0.93	38%
Live Load Max. Defl. (in)	-0.25 L/671	L/240 0.70	36%

Equivalent uniform load = 707 plf (LVL)

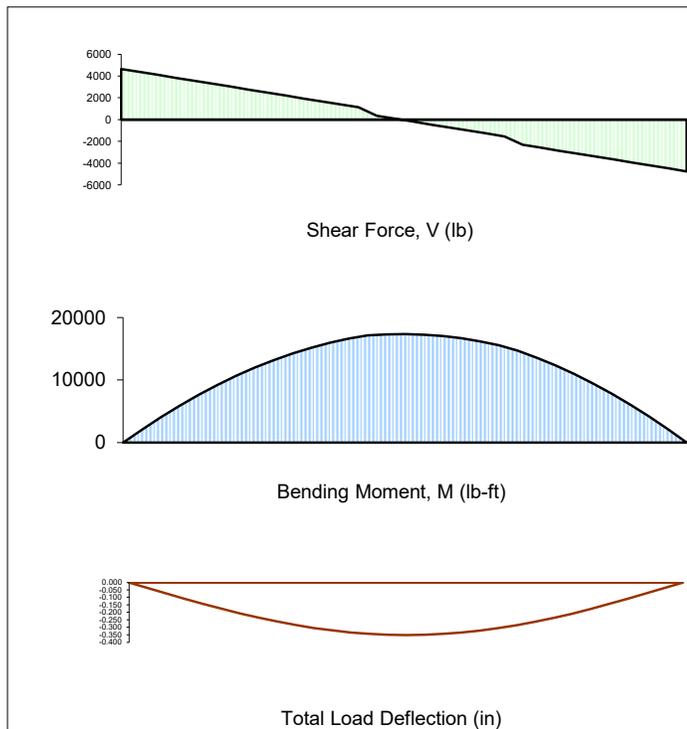
Setup  Beam or Girder  Joist or Rafter

Member at	Floor	Roof	
Repetitive Use ?	No	Yes	
Incised for PT ?	No	Yes	
Flat Use :	No	Yes	
Moisture Content :	<19%	>19%	
Temperature (° F) :	<100	100~125	125~150
Set Duration Factors	<input type="checkbox"/> with Cantilever		
Set Deflection Limits	<input checked="" type="checkbox"/> with Point Load(s)		
Reset Loads to Zero	<input type="checkbox"/> with Sloped Load(s)		

(pressed-down buttons are selected)

### LOADING Load Type

Load Type	Uniform	w (psf) =	Point 1	a (ft) =	P (lb) =	Point 2	a (ft) =	P (lb) =
Dead Load	Uniform	10						
	Point 1		6.00	500				
	Point 2		9.50	500				
Snow Load	Uniform	50						
	Point 1		0.00	0				
	Point 2		0.00	0				



### Adjustment Factors

		for Fb	for Fv	for E
Wet Service	C <sub>M</sub> =	1.00	0.97	0.90
Temperature	C <sub>t</sub> =	1.00	1.00	1.00
Beam Stability	C <sub>L</sub> =	1.00	N/A	N/A
Size	C <sub>F</sub> =	0.90	N/A	N/A
Flat Use	C <sub>fu</sub> =	1.00	N/A	N/A
Incising	C <sub>i</sub> =	1.00	1.00	1.00
Repetitive Member	C <sub>r</sub> =	1.15	N/A	N/A
Buckling Stiffness	C <sub>T</sub> =	N/A	N/A	1.06

(C<sub>T</sub> for Emin only)

### Design Values in psi

	Fb	Fv	E	Emin
Reference	775	135	1100000	400000
Adjusted	922	151	990000	360000

### Section Properties

breadth (b) =	9 in
depth (d) =	13.25 in
Area (A) =	119.3 in <sup>2</sup>
Section Modulus (Sx) =	263.3 in <sup>3</sup>
Moment of Inertial (Ix) =	1744.7 in <sup>4</sup>

# SNOW ROOF LOAD TABLES

## How to Use This Table

1. Calculate total load (neglect beam weight) on the beam or header in pounds per linear foot (plf).
2. Select appropriate **Span** (center-to-center of bearing).
3. Scan horizontally to find the proper width, and a depth with a capacity that exceeds actual total load.
4. Review bearing length requirements to ensure adequacy.

Also see **General Notes** on page 25.

## 2.OE Microllam® LVL: Roof—Snow Load Area 115% (PLF)

Span	Condition	1¾" Width							3½" Width (2-ply)					
		5½"	7¼"	9¼"	9½"	11¼"	11⅞"	14"	5½"	7¼"	9¼"	9½"	11¼"	11⅞"
6'	Total Load	474	877	1,182	1,223	1,523	1,638	1,961	948	1,755	2,365	2,446	3,047	3,277
	Deflection L/240	458	*	*	*	*	*	*	916	*	*	*	*	*
	Min. End/Int. Bearing (in.)	1.5/3.5	2/5	2.7/6.8	2.8/7	3.5/8.7	3.8/9.4	4.5/11.3	1.5/3.5	2/5	2.7/6.8	2.8/7	3.5/8.7	3.8/9.4
8'	Total Load	153	342	800	841	1,053	1,126	1,389	307	685	1,601	1,682	2,106	2,252
	Deflection L/240	*	*	*	*	*	*	*	*	*	*	*	*	*
	Min. End/Int. Bearing (in.)	1.5/3.5	1.5/3.5	2.5/6.1	2.6/6.4	3.2/8.1	3.5/8.6	4.3/10.6	1.5/3.5	1.5/3.5	2.5/6.1	2.6/6.4	3.2/8.1	3.5/8.6
9'-6"	Total Load	77	174	566	595	816	903	1,114	154	349	1,132	1,190	1,633	1,807
	Deflection L/240	*	*	543	585	*	*	*	*	*	1,086	1,171	*	*
	Min. End/Int. Bearing (in.)	1.5/3.5	1.5/3.5	2.1/5.2	2.2/5.4	3/7.4	3.3/8.2	4.1/10.2	1.5/3.5	1.5/3.5	2.1/5.2	2.2/5.4	3/7.4	3.3/8.2
10'	Total Load	62	142	510	536	736	814	1,045	124	284	1,021	1,073	1,473	1,629
	Deflection L/240	*	*	470	506	*	*	*	*	*	940	1,013	*	*
	Min. End/Int. Bearing (in.)	1.5/3.5	1.5/3.5	2/4.9	2.1/5.2	2.8/7.1	3.1/7.8	4/10	1.5/3.5	1.5/3.5	2/4.9	2.1/5.2	2.8/7.1	3.1/7.8
12'	Total Load		67	353	371	509	564	767	57	135	706	742	1,019	1,128
	Deflection L/240		*	279	301	488	*	*	*	*	558	602	976	*
	Min. End/Int. Bearing (in.)		1.5/3.5	1.6/4.1	1.7/4.3	2.4/5.9	2.6/6.5	3.5/8.9	1.5/3.5	1.5/3.5	1.6/4.1	1.7/4.3	2.4/5.9	2.6/6.5
14'	Total Load			233	252	372	412	562			70	466	505	745
	Deflection L/240			178	193	314	367	*			*	357	386	629
	Min. End/Int. Bearing (in.)			1.5/3.5	1.5/3.5	2/5	2.2/5.6	3/7.6			1.5/3.5	1.5/3.5	1.5/3.5	2/5
16'-6"	Total Load			142	154	255	295	402			285	308	510	591
	Deflection L/240			110	119	195	228	367			220	238	391	457
	Min. End/Int. Bearing (in.)			1.5/3.5	1.5/3.5	1.6/4.1	1.9/4.7	2.6/6.4			1.5/3.5	1.5/3.5	1.6/4.1	1.9/4.7
18'-6"	Total Load			100	108	181	212	318			200	217	362	425
	Deflection L/240			78	85	140	164	264			157	170	280	328
	Min. End/Int. Bearing (in.)			1.5/3.5	1.5/3.5	1.5/3.5	1.5/3.9	2.3/5.7			1.5/3.5	1.5/3.5	1.5/3.5	1.5/3.9
20'	Total Load			78	85	143	168	271			157	171	286	336
	Deflection L/240			62	67	111	130	211			125	135	223	261
	Min. End/Int. Bearing (in.)			1.5/3.5	1.5/3.5	1.5/3.5	1.5/3.5	2.1/5.3			1.5/3.5	1.5/3.5	1.5/3.5	1.5/3.5
22'	Total Load			58	63	106	125	206			116	126	213	251
	Deflection L/240			47	51	84	98	160			94	102	168	197
	Min. End/Int. Bearing (in.)			1.5/3.5	1.5/3.5	1.5/3.5	1.5/3.5	1.8/4.5			1.5/3.5	1.5/3.5	1.5/3.5	1.5/3.5
24'	Total Load					81	95	158			87	95	162	191
	Deflection L/240					65	76	124			73	79	130	153
	Min. End/Int. Bearing (in.)					1.5/3.5	1.5/3.5	1.5/3.8			1.5/3.5	1.5/3.5	1.5/3.5	1.5/3.5
26'	Total Load					62	74	123			67	73	125	148
	Deflection L/240					51	60	98			57	62	102	120
	Min. End/Int. Bearing (in.)					1.5/3.5	1.5/3.5	1.5/3.5			1.5/3.5	1.5/3.5	1.5/3.5	1.5/3.5
28'	Total Load						58	98			52	56	98	117
	Deflection L/240						48	78			46	50	82	97
	Min. End/Int. Bearing (in.)						1.5/3.5	1.5/3.5			1.5/3.5	1.5/3.5	1.5/3.5	1.5/3.5
30'	Total Load							78					78	93
	Deflection L/240							64					67	79
	Min. End/Int. Bearing (in.)							1.5/3.5					1.5/3.5	1.5/3.5

\* Indicates Total Load value controls.

## Snow Drift Design Canopy

### Snow Drift calculations

April 25, 2025  
1:06 PM

$P_g = 30$  psf {ground snow}  
 $W_b = 48$  ft {horizontal length of high roof normal to elevation change,  $50 \text{ ft} < W_b < 500 \text{ ft}$ }  
 Upper Elev = 17 ft {Elevation of upper roof}  
 Lower Elev = 12 ft {Elevation of lower roof}

Does 40% sliding snow factor apply? (Is upper roof slope greater than 16.7%, 2 vertical to 12 horizontal?)

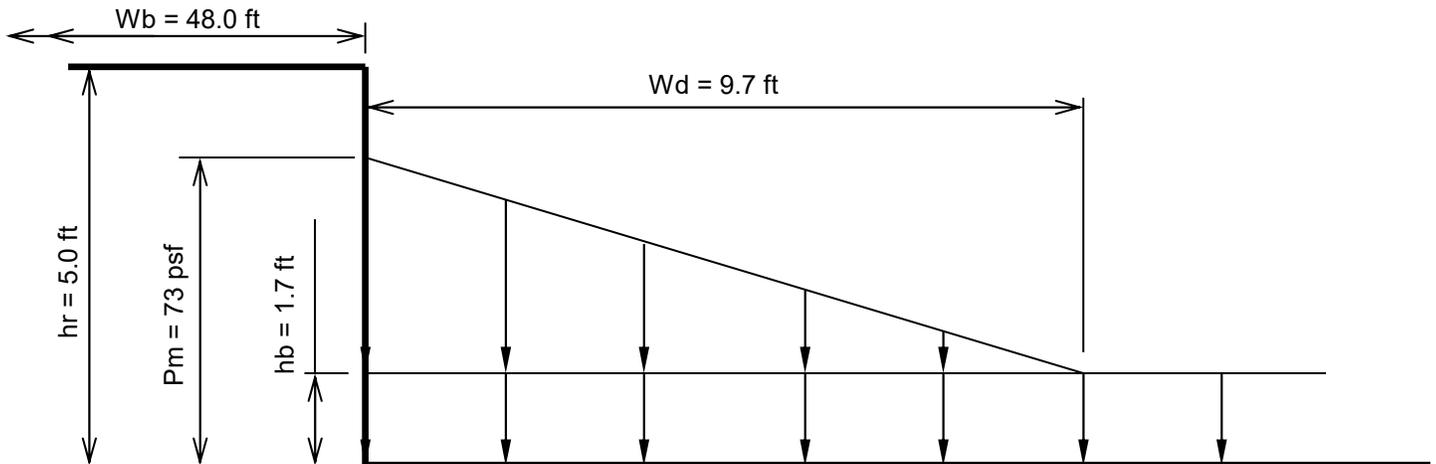
yes  no

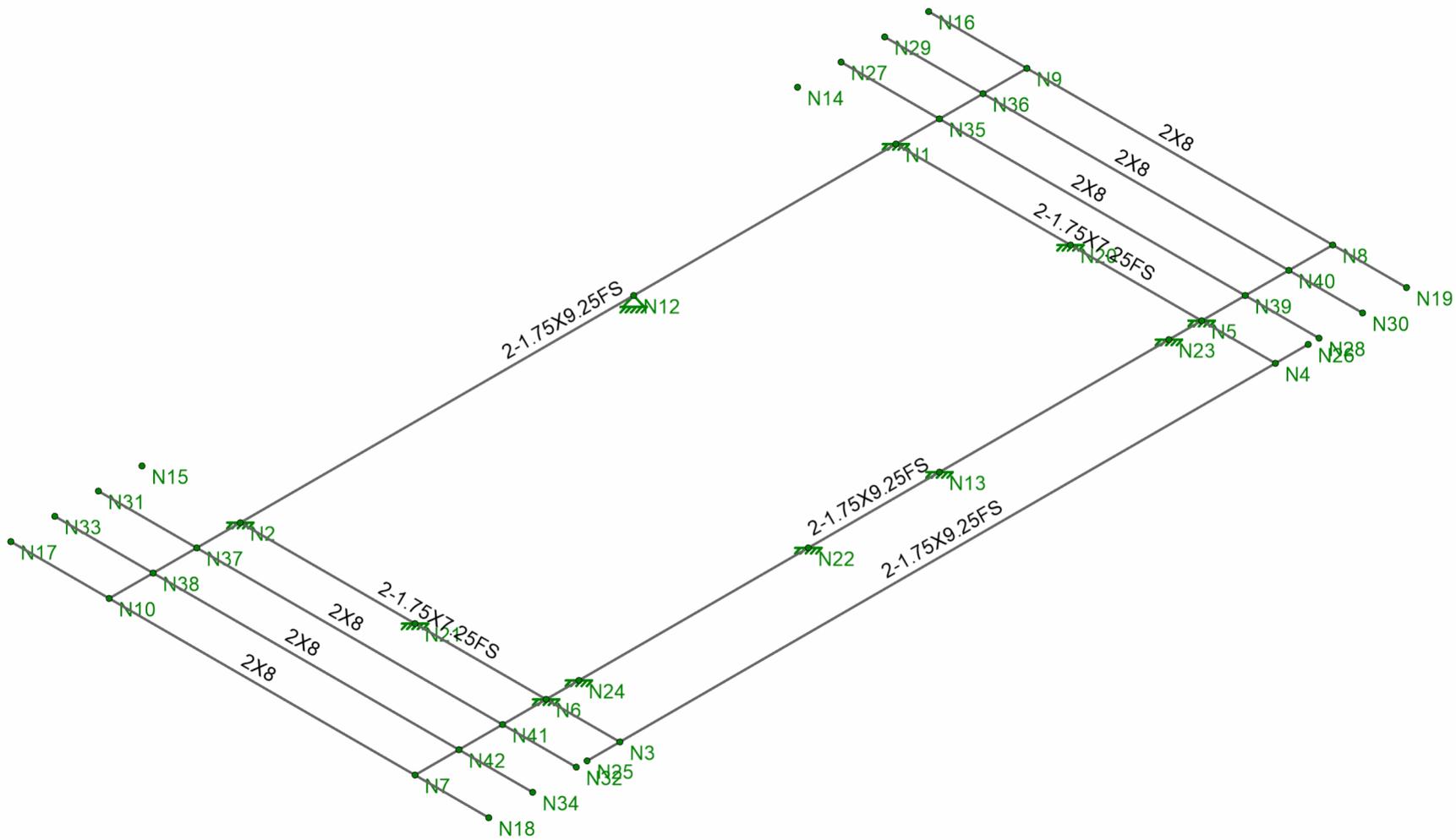
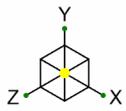
Is this a windward drift or a leeward drift?

Windward  Leeward

$P_f = 30$  psf {roof snow, assume = ground snow}  
 $h_r = 5$  ft {difference in height of upper and lower roof}  
 $D = 17.9$  pcf {snow density,  $0.13P_g + 14 = D \leq 35$  pcf}  
 $h_b = 1.7$  ft {height of balanced snow on lower roof,  $h_b = P_f / D$ }  
 $h_d = 2.4$  ft {height of snow drift adjacent elevation change,  $h_d = 0.43(W_b)^{1/3}(P_g + 10)^{1/4} - 1.5$ }  
 $W_d = 9.7$  ft {width of snow drift, base of triangular drift load,  $W_d = \text{min of } 4h_d \text{ or } 4(h_r - h_b)$ }  
 $P_m = 73$  psf {maximum snow load at elevation change,  $P_m = D(h_d + h_b) \leq D(h_r)$ }

$(h_r - h_b) / h_b = 1.98 > 0.2$  {drift calculations not required if  $(h_r - h_b) / h_b \leq 0.2$ }





IMEG Corp
David.A.Ferguson
22001321.00

Hyper Canopy

SK-1
Apr 28, 2025 at 11:36 AM
canopy - Revised.r3d



Company : IMEG Corp  
 Designer : David.A.Ferguson  
 Job Number : 22001321.00  
 Model Name : Hyper Canopy

4/28/2025  
 11:38:59 AM  
 Checked By : aag

**Node Coordinates**

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
1	N1	-0.83	0	0	
2	N2	-0.83	0	20	
3	N3	10.75	0	20	
4	N4	10.75	0	0	
5	N5	8.5	0	0	
6	N6	8.5	0	20	
7	N7	8.5	0	24	
8	N8	8.5	0	-4	
9	N9	-0.83	0	-4	
10	N10	-0.83	0	24	
11	N12	-0.83	0	8	
12	N13	8.5	0	8	
13	N14	-3.83	0	0	
14	N15	-3.83	0	20	
15	N16	-3.83	0	-4	
16	N17	-3.83	0	24	
17	N18	10.75	0	24	
18	N19	10.75	0	-4	
19	N20	4.5	0	0	
20	N21	4.5	0	20	
21	N22	8.5	0	12	
22	N23	8.5	0	1	
23	N24	8.5	0	19	
24	N25	10.75	0	21	
25	N26	10.75	0	-1	
26	N27	-3.83	0	-1.33	
27	N28	10.75	0	-1.33	
28	N29	-3.83	0	-2.66	
29	N30	10.75	0	-2.66	
30	N31	-3.83	0	21.33	
31	N32	10.75	0	21.33	
32	N33	-3.83	0	22.66	
33	N34	10.75	0	22.66	
34	N35	-0.83	0	-1.33	
35	N36	-0.83	0	-2.66	
36	N37	-0.83	0	21.33	
37	N38	-0.83	0	22.66	
38	N39	8.5	0	-1.33	
39	N40	8.5	0	-2.66	
40	N41	8.5	0	21.33	
41	N42	8.5	0	22.66	

**Node Boundary Conditions**

	Node Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot [k-ft/rad]	Y Rot [k-ft/rad]	Z Rot [k-ft/rad]
1	N1	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N2	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N12	Reaction	Reaction	Reaction			



Company : IMEG Corp  
 Designer : David.A.Ferguson  
 Job Number : 22001321.00  
 Model Name : Hyper Canopy

4/28/2025  
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**Node Boundary Conditions (Continued)**

Node Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot [k-ft/rad]	Y Rot [k-ft/rad]	Z Rot [k-ft/rad]
4	N13	Reaction	Reaction	Reaction	Reaction	Reaction
5	N5	Reaction	Reaction	Reaction	Reaction	Reaction
6	N6	Reaction	Reaction	Reaction	Reaction	Reaction
7	N20	Reaction	Reaction	Reaction	Reaction	Reaction
8	N21	Reaction	Reaction	Reaction	Reaction	Reaction
9	N22	Reaction	Reaction	Reaction	Reaction	Reaction
10	N23	Reaction	Reaction	Reaction	Reaction	Reaction
11	N24	Reaction	Reaction	Reaction	Reaction	Reaction

**Wood Properties**

Label	Type	Database	Species	Grade	Cm	Ci	Emod	Nu	Therm. Coeff. [1e <sup>5</sup> F <sup>-1</sup> ]	Density [k/ft <sup>3</sup> ]
1	DF	Solid Sawn	Visually Graded	Douglas Fir-Larch	No.1		1	0.3	0.3	0.035
2	SP	Solid Sawn	Visually Graded	Southern Pine	No.1		1	0.3	0.3	0.035
3	HF	Solid Sawn	Visually Graded	Hem-Fir	No.1		1	0.3	0.3	0.035
4	SPF	Solid Sawn	Visually Graded	Spruce-Pine-fir	No.1		1	0.3	0.3	0.035
5	24F-1.8E DF Balanced	Glulam	NDS Table 5A	24F-1.8E DF BAL	na		1	0.3	0.3	0.035
6	24F-1.8E DF Unbalanced	Glulam	NDS Table 5A	24F-1.8E DF UNBAL	na		1	0.3	0.3	0.035
7	24F-1.8E SP Balanced	Glulam	NDS Table 5A	24F-1.8E SP BAL	na		1	0.3	0.3	0.035
8	24F-1.8E SP Unbalanced	Glulam	NDS Table 5A	24F-1.8E SP UNBAL	na		1	0.3	0.3	0.035
9	1.3E-1600F VERSALAM	SCL	Boise Cascade	1.3E-1600F VERSALAM	na		1	0.3	0.3	0.035
10	1.35E LSL SolidStart	SCL	Louisiana Pacific	1.35E LSL SolidStart	na		1	0.3	0.3	0.035
11	1.4E RIGIDLAM LVL	SCL	Roseburg Forest Products 2023	1.4E RIGIDLAM LVL	na		1	0.3	0.3	0.035
12	2.0E DF Parallam PSL	SCL	TrusJoist	2.0E DF Parallam PSL	na		1	0.3	0.3	0.035
13	LVL PRL 1.5E 2250F	Custom	N/A	LVL PRL 1.5E 2250F	na		1	0.3	0.3	0.035
14	LVL Microlam 1.9E 2600F	Custom	N/A	LVL Microlam 1.9E 2600F	na		1	0.3	0.3	0.035
15	PSL Parallam 2.0E 2900F	Custom	N/A	PSL Parallam 2.0E 2900F	na		1	0.3	0.3	0.035
16	LSL TimberStrand 1.55E 2325F	Custom	N/A	LSL TimberStrand 1.55E 2325F	na		1	0.3	0.3	0.035

**Custom Wood Properties**

Label	Fb	Ft	Fv	Fc	E	E05	Type
1	LVL PRL 1.5E 2250F	2.25	1.5	0.22	1.95	1500	SCL
2	LVL PRL 2.0E 2900F	2.9	1.9	0.285	2.75	2000	SCL
3	LVL Microlam 1.9E 2600F	2.6	1.555	0.285	2.51	1900	SCL
4	PSL Parallam 2.0E 2900F	2.9	2.025	0.29	2.9	2000	SCL
5	PSL Parallam 1.8E	2.4	1.755	0.18	2.5	1800	SCL
6	LSL TimberStrand 1.55E 2325F	2.325	1.07	0.31	2.05	1550	SCL
7	LSL TimberStrand 1.3E 1700F	1.7	1.075	0.4	1.4	1300	SCL

**Member Primary Data**

Label	I Node	J Node	Section/Shape	Type	Design List	Material	Design Rule
1	M1	N10	N9	2-1.75X9.25FS	Beam	None	LVL Microlam 1.9E 2600F Typical
2	M2	N7	N8	2-1.75X9.25FS	Beam	None	LVL Microlam 1.9E 2600F Typical
3	M3	N1	N4	2-1.75X7.25FS	Beam	None	LVL Microlam 1.9E 2600F Typical
4	M4	N2	N3	2-1.75X7.25FS	Beam	None	LVL Microlam 1.9E 2600F Typical
5	M5	N25	N26	2-1.75X9.25FS	Beam	None	LVL Microlam 1.9E 2600F Typical



**Member Primary Data (Continued)**

	Label	I Node	J Node	Section/Shape	Type	Design List	Material	Design Rule
6	M6	N27	N28	2X8	Beam	Rectangular	SPF	Typical
7	M7	N29	N30	2X8	Beam	Rectangular	SPF	Typical
8	M8	N16	N19	2X8	Beam	Rectangular	SPF	Typical
9	M9	N31	N32	2X8	Beam	Rectangular	SPF	Typical
10	M10	N33	N34	2X8	Beam	Rectangular	SPF	Typical
11	M11	N17	N18	2X8	Beam	Rectangular	SPF	Typical

**Wood Design Parameters**

	Label	Shape	Length [ft]	le2 [ft]	le1 [ft]	le-bend top [ft]	le-bend bot [ft]	Cr	y sway	z sway
1	M1	2-1.75X9.25FS	28	Segment	Segment	Lbyy	Segment			
2	M2	2-1.75X9.25FS	28	1.33	1.33	Lbyy	Segment			
3	M3	2-1.75X7.25FS	11.58	1.33	1.33	Lbyy				
4	M4	2-1.75X7.25FS	11.58	1.33	1.33	Lbyy				
5	M5	2-1.75X9.25FS	22	2	2	Lbyy				
6	M6	2X8	14.58	1.33	1.33	Lbyy				
7	M7	2X8	14.58	1.33	1.33	Lbyy				
8	M8	2X8	14.58	1.33	1.33	Lbyy				
9	M9	2X8	14.58	1.33	1.33	Lbyy				
10	M10	2X8	14.58	1.33	1.33	Lbyy				
11	M11	2X8	14.58	1.33	1.33	Lbyy				

**Member Area Loads (BLC 1 :)**

	Node A	Node B	Node C	Node D	Direction	Load Direction	Magnitude [psf]
1	N14	N4	N19	N16	Y	B-C	-70
2	N17	N18	N3	N15	Y	B-C	-70
3	N6	N3	N4	N5	Y	A-B	-70

**Basic Load Cases**

	BLC Description	Category	Distributed	Area(Member)
1		None		3
2	BLC 1 Transient Area Loads	None	54	

**Load Combinations**

	Description	Solve	P-Delta	BLC	Factor
1	snow	Yes	Y	1	1

**Node Reactions**

	LC	Node Label	X [lb]	Y [lb]	Z [lb]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
0	1	N1	0	2121.041	0	4.641	0	0.299
1	1	N2	0	2121.037	0	-4.641	0	0.299
2	1	N12	0	0	0	0	0	0
3	1	N13	0	433.125	0	0.217	0	0



Company : IMEG Corp  
 Designer : David.A.Ferguson  
 Job Number : 22001321.00  
 Model Name : Hyper Canopy

4/28/2025  
 11:38:59 AM  
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**Node Reactions (Continued)**

LC	Node Label	X [lb]	Y [lb]	Z [lb]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
4	1 N5	0	2581.116	0	3.702	0	1.377
5	1 N6	0	2581.118	0	-3.702	0	1.377
6	1 N20	0	207.118	0	0	0	-0.05
7	1 N21	0	207.119	0	0	0	-0.05
8	1 N22	0	433.125	0	-0.217	0	0
9	1 N23	0	315	0	-0.315	0	0
10	1 N24	0	315	0	0.315	0	0
11	1 Totals:	0	11314.8	0			
12	1 COG (ft):	X: 5.143	Y: 0	Z: 10			

**Member Section Forces**

LC	Member Label	Sec	Axial[lb]	y Shear[lb]	z Shear[lb]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
0	1 M1	1	0	-381.15	0	0.033	0	-0.001
1		2	0	0	0	0	0	0
2		3	0	0	0	0	0	0
3		4	0	0	0	0	0	0
4		5	0	381.151	0	-0.033	0	-0.001
5	1 M2	1	0	-305.282	0	-0.006	0	0.001
6		2	0	118.125	0	0	0	-0.072
7		3	0	0	0	0	0	-0.052
8		4	0	-118.125	0	0	0	-0.072
9		5	0	305.281	0	0.006	0	0.001
10	1 M3	1	0	140.473	0	0	0	0.119
11		2	0	-13.359	0	0	0	-0.055
12		3	0	68.167	0	0	0	0.023
13		4	0	-61.212	0	0	0	0.011
14		5	0	787.5	0	0	0	0
15	1 M4	1	0	140.474	0	0	0	0.119
16		2	0	-13.359	0	0	0	-0.055
17		3	0	68.167	0	0	0	0.023
18		4	0	-61.21	0	0	0	0.011
19		5	0	787.5	0	0	0	0
20	1 M5	1	0	0	0	0	0	0
21		2	0	433.125	0	0	0	-2.746
22		3	0	0	0	0	0	-3.938
23		4	0	-433.125	0	0	0	-2.746
24		5	0	0	0	0	0	0
25	1 M6	1	0	0	0	0	0	0
26		2	0	376.369	0	-0.001	0	0.402
27		3	0	58.234	0	-0.001	0	-0.396
28		4	0	-283.821	0	-0.001	0	0.006
29		5	0	0	0	0	0	0
30	1 M7	1	0	0	0	0	0	0
31		2	0	399.564	0	-0.001	0	0.352
32		3	0	45.023	0	-0.001	0	-0.458
33		4	0	-279.514	0	-0.001	0	-0.025
34		5	0	0	0	0	0	0
35	1 M8	1	0	0	0	0	0	0



**Member Section Forces (Continued)**

LC	Member Label	Sec	Axial[lb]	y Shear[lb]	z Shear[lb]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
36		2	0	207.656	0	-0.001	0	0.12
37		3	0	22.092	0	-0.001	0	-0.305
38		4	0	-134.89	0	-0.001	0	-0.089
39		5	0	0	0	0	0	0
40	1	1	0	0	0	0	0	0
41		2	0	376.371	0	0.001	0	0.402
42		3	0	58.234	0	0.001	0	-0.396
43		4	0	-283.822	0	0.001	0	0.006
44		5	0	0	0	0	0	0
45	1	1	0	0	0	0	0	0
46		2	0	399.56	0	0.001	0	0.352
47		3	0	45.021	0	0.001	0	-0.458
48		4	0	-279.514	0	0.001	0	-0.025
49		5	0	0	0	0	0	0
50	1	1	0	0	0	0	0	0
51		2	0	207.655	0	0.001	0	0.12
52		3	0	22.091	0	0.001	0	-0.305
53		4	0	-134.89	0	0.001	0	-0.089
54		5	0	0	0	0	0	0

**Member Section Stresses**

LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
0	1	1	0	-0.018	0	0	0	0	0
1		2	0	0	0	0	0	0	0
2		3	0	0	0	0	0	0	0
3		4	0	0	0	0	0	0	0
4		5	0	0.018	0	0	0	0	0
5	1	1	0	-0.014	0	0	0	0	0
6		2	0	0.005	0	0.017	-0.017	0	0
7		3	0	0	0	0.013	-0.013	0	0
8		4	0	-0.005	0	0.017	-0.017	0	0
9		5	0	0.014	0	0	0	0	0
10	1	1	0	0.008	0	-0.046	0.046	0	0
11		2	0	-0.001	0	0.021	-0.021	0	0
12		3	0	0.004	0	-0.009	0.009	0	0
13		4	0	-0.004	0	-0.004	0.004	0	0
14		5	0	0.047	0	0	0	0	0
15	1	1	0	0.008	0	-0.046	0.046	0	0
16		2	0	-0.001	0	0.021	-0.021	0	0
17		3	0	0.004	0	-0.009	0.009	0	0
18		4	0	-0.004	0	-0.004	0.004	0	0
19		5	0	0.047	0	0	0	0	0
20	1	1	0	0	0	0	0	0	0
21		2	0	0.02	0	0.66	-0.66	0	0
22		3	0	0	0	0.947	-0.947	0	0
23		4	0	-0.02	0	0.66	-0.66	0	0
24		5	0	0	0	0	0	0	0
25	1	1	0	0	0	0	0	0	0



Company : IMEG Corp  
 Designer : David.A.Ferguson  
 Job Number : 22001321.00  
 Model Name : Hyper Canopy

4/28/2025  
 11:38:59 AM  
 Checked By : aag

**Member Section Stresses (Continued)**

LC	Member Label	Sec	Axial[ksj]	y Shear[ksj]	z Shear[ksj]	y top Bending[ksj]	y bot Bending[ksj]	z top Bending[ksj]	z bot Bending[ksj]
26		2	0	0.052	0	-0.367	0.367	0	0
27		3	0	0.008	0	0.362	-0.362	0	0
28		4	0	-0.039	0	-0.006	0.006	0	0
29		5	0	0	0	0	0	0	0
30	1	M7	1	0	0	0	0	0	0
31		2	0	0.055	0	-0.321	0.321	0	0
32		3	0	0.006	0	0.419	-0.419	0	0
33		4	0	-0.039	0	0.023	-0.023	0	0
34		5	0	0	0	0	0	0	0
35	1	M8	1	0	0	0	0	0	0
36		2	0	0.029	0	-0.109	0.109	0	0
37		3	0	0.003	0	0.279	-0.279	0	0
38		4	0	-0.019	0	0.081	-0.081	0	0
39		5	0	0	0	0	0	0	0
40	1	M9	1	0	0	0	0	0	0
41		2	0	0.052	0	-0.367	0.367	0	0
42		3	0	0.008	0	0.362	-0.362	0	0
43		4	0	-0.039	0	-0.006	0.006	0	0
44		5	0	0	0	0	0	0	0
45	1	M10	1	0	0	0	0	0	0
46		2	0	0.055	0	-0.321	0.321	0	0
47		3	0	0.006	0	0.419	-0.419	0	0
48		4	0	-0.039	0	0.023	-0.023	0	0
49		5	0	0	0	0	0	0	0
50	1	M11	1	0	0	0	0	0	0
51		2	0	0.029	0	-0.109	0.109	0	0
52		3	0	0.003	0	0.279	-0.279	0	0
53		4	0	-0.019	0	0.081	-0.081	0	0
54		5	0	0	0	0	0	0	0

**AWC NDS-18 / SDPWS-21 ASD Member Wood Code Checks**

LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Fc' [ksj]	Ft' [ksj]	Fb1' [ksj]	Fb2' [ksj]	FV' [ksj]	RB	CL	CP	Eqn	
0	1	M1	2-1.75X9.25FS	0.392	24.208	0.579	25.083	y	1.496	1.555	2.597	2.6	0.285	3.472	0.999	0.596	3.9-3
1	1	M2	2-1.75X9.25FS	0.313	3.792	0.893	25.083	y	1.496	1.555	2.597	2.6	0.285	3.472	0.999	0.596	3.9-3
2	1	M3	2-1.75X7.25FS	0.276	9.409	0.184	9.409	y	1.496	1.555	2.573	2.6	0.285	9.069	0.989	0.596	3.9-3
3	1	M4	2-1.75X7.25FS	0.276	9.409	0.184	9.409	y	1.496	1.555	2.573	2.6	0.285	9.069	0.989	0.596	3.9-3
4	1	M5	2-1.75X9.25FS	0.365	11	0.126	20.854	y	1.482	1.555	2.595	2.6	0.285	4.257	0.998	0.59	3.9-3
5	1	M6	2X8	0.678	3.038	0.46	3.038	y	1.112	0.54	0.873	1.05	0.135	23.744	0.832	0.921	3.9-3
6	1	M7	2X8	0.639	3.038	0.486	3.038	y	1.112	0.54	0.873	1.05	0.135	23.744	0.832	0.921	3.9-3
7	1	M8	2X8	0.271	7.746	0.262	3.038	y	1.112	0.54	1.045	1.05	0.135	7.171	0.995	0.921	3.9-3
8	1	M9	2X8	0.678	3.038	0.46	3.038	y	1.112	0.54	0.873	1.05	0.135	23.744	0.832	0.921	3.9-3
9	1	M10	2X8	0.639	3.038	0.486	3.038	y	1.112	0.54	0.873	1.05	0.135	23.744	0.832	0.921	3.9-3
10	1	M11	2X8	0.271	7.746	0.262	3.038	y	1.112	0.54	1.045	1.05	0.135	7.171	0.995	0.921	3.9-3