



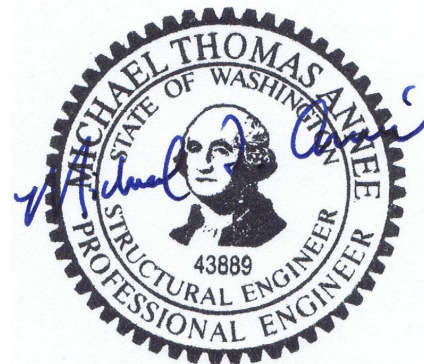
Structural Calculations

Project: **Ehrhardt Residence**
8456 N. Mercer Way
Mercer Island, WA 98040

For: **Sturman Architects**
9 – 103rd Avenue NE, Suite 203
Bellevue, WA 98004

By: **Année Structural Engineering, LLC**
1801 18th Ave S
Seattle, WA 98144

Date: **August 16, 2023**



Design Criteria

Project Name: **Ehrhardt Residence**
 Location: **8456 N. Mercer Way, Mercer Island, WA**

Date: **7/20/2023**
 Soil Bearing: **2000** psf
 Frost Depth: **12"**



Dead Loads:	<u>Roof:</u>		<u>Floors:</u>		<u>Walls:</u>	
	Comp. Roofing	5.1 PSF	Flooring	3.0 PSF	Siding	2.3 PSF
	1/2" Sheathing	1.7 PSF		0.0 PSF	Plywood	1.7 PSF
	Rafters	2.2 PSF	3/4" Sheathing	2.5 PSF	2x Studs	1.8 PSF
	Insulation	0.9 PSF	Joists	2.2 PSF	Insulation	0.5 PSF
	5/8" Gypsum	2.8 PSF	5/8" Gypsum	2.8 PSF	1/2" Gypsum	2.2 PSF
	Miscellaneous	2.3 PSF	Miscellaneous	1.5 PSF	Miscellaneous	1.5 PSF
	Total	15.0 PSF	Total	12.0 PSF	Total	10.0 PSF
Live Loads:	Snow	25.0 PSF	Floor	40.0 PSF	Wind	17.1 PSF

Seismic Loads: *per 2018 IBC, Sect. 1613 & ASCE 7-16, Chapter 11*

Design Category = **D** Importance = **1.0** Redundancy = **1.00**
 Site Class = **D** R = **6.5**
 Latitude ($^{\circ}$ N) = **47.585** (*per USGS*) $S_s = 1.391$ $F_a = 1.20$ $S_{DS} = 2/3(F_a \times S_s) = 1.113$
 Longitude ($^{\circ}$ W) = **122.224** (*per USGS*) $S_1 = 0.484$ $F_v = 1.82$ $S_{D1} = 2/3(F_v \times S_1) = 0.586$

Building $C_t = 0.02$ (wood)
 Height $h_n = 18.0$ ft.
 Period $T = C_t(h_n)^{3/4} = 0.17$ sec. $T_0 = 0.2 * (S_{D1}/S_{DS}) = 0.11$ $T_s = (S_{D1}/S_{DS}) = 0.53$

$S_a = 1.113$ $S_a = S_{DS}$ if $T_0 < T < T_{sr}$, $S_a = 0.6 * (S_{DS}/T_0) * T + 0.4 * S_{DS}$ if $T < T_0$, $S_a = S_{D1}/T$ if $T > T_s$

Not greater than: $C_s = S_{D1}/T * (R/I) = 0.516$
 Not less than: $C_s = 0.044 S_{DS} * I = 0.049$
 Design Category E or F; not less than: $C_s = 0.5 S_1 / (R/I) = 0.037$
 Seismic Design Coefficient: $C_s = S_{DS} / (R/I) = 0.171$

$C_s = 0.171$

Seismic Weight Distribution:

Diaphragm	h_i (ft.)	w_i (kips)	$h_i w_i$ (K-ft.)	$w_i h_i / \sum(w_i h_i)$	F_i (lbs.)	Sum F _i (lbs.)
			0	0	0	0
			0	0	0	0
			0	0	0	0
Roof	16.5	113.11	1866	0.7345	16,942	16,942
Main Floor	8.5	79.36	674.5	0.2655	6,123	23,065
		192.47	2541			

Design Base Shear (ASD) = $0.7 * (0.171 * W) = 0.120 * W =$ **23,065 lbs.**

Wind Loads:

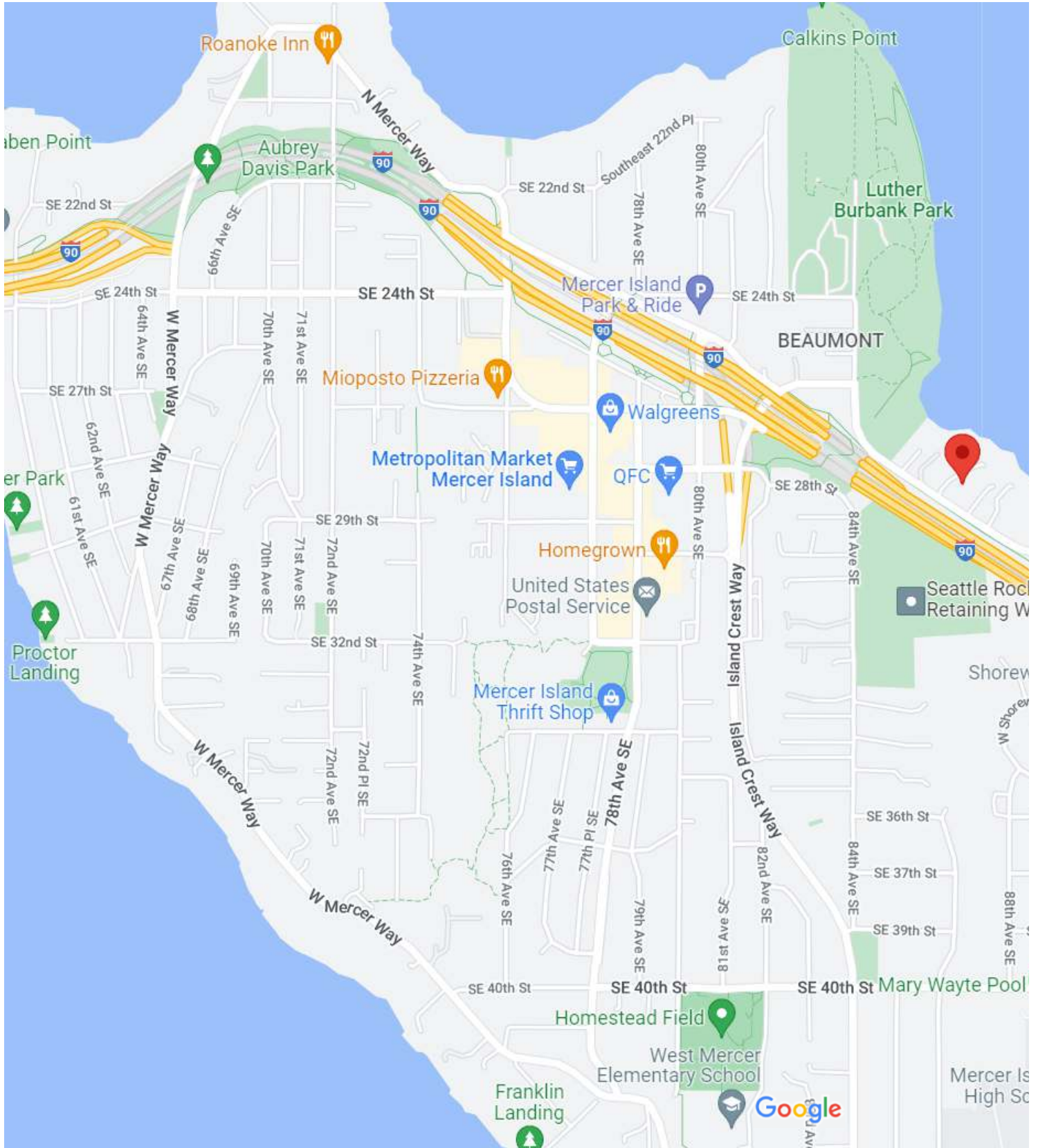
per ASCE 7-16, Section 27.5

Section 30.4

Cladding (ft2): 100 20

Wind Speed (MPH)	110	Zone	(ASD)	Adj.	Zone	Pn30	P	Pn30	P		
Exposure	C	Wall - Ph	25.8	15.5	(p.352)	Wall	4	-20.4	-15.4	-22.6	-17.1
Roof Pitch (x:12)	5	Wall - Po	25.6	15.3			5	-22.6	-17.1	-27.2	-20.5
$K_1 =$	0.00	Roof - 1	9.2	5.5		Roof	1	-22.8	-17.2	-31.0	-23.4
$K_2 =$	0.00	Roof - 2	-7.6	-4.6			2e	-22.8	-17.2	-31.0	-23.4
$K_3 =$	0.00	Roof - 3	-25.2	-15.1			2n	-29.0	-21.9	-43.3	-32.7
$K_t = (1 + K_1 * K_2 * K_3)^2 =$	1.00	Roof - 4	-22.4	-13.4			2r	-29.0	-21.9	-43.3	-32.7
(p.362) $\lambda =$	1.26	Roof - 5	-19.3	-11.6			3e	-29.0	-21.9	-43.3	-32.7
(p.291) Exp. Fctr =	1.00						3r	-36.5	-27.6	-52.0	-39.2

Google Maps 8546 N Mercer Way



Map data ©2022 Google 1000 ft

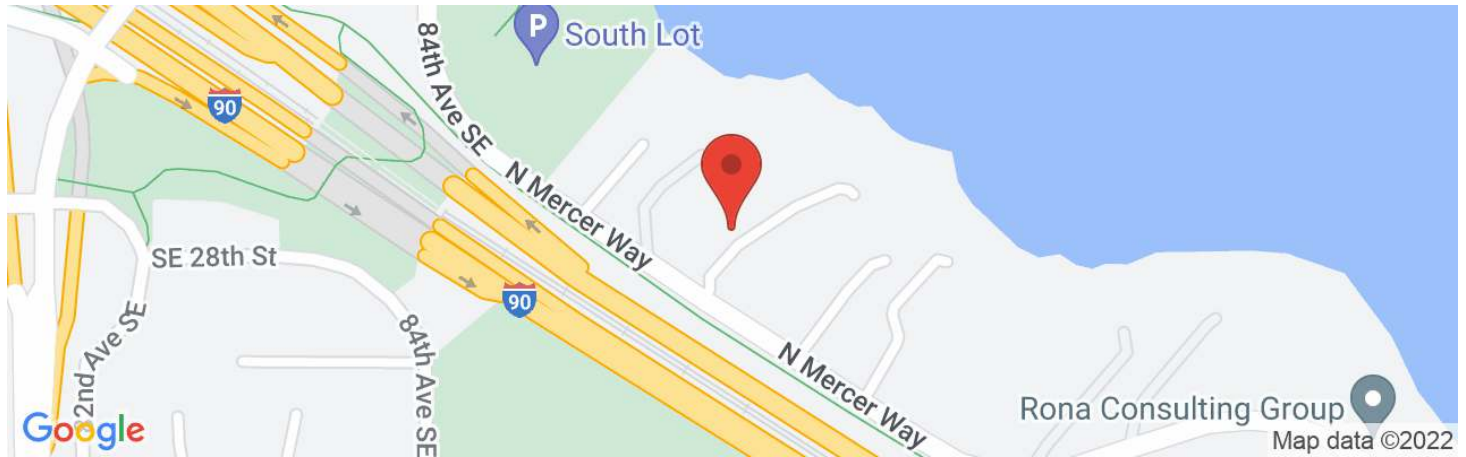
110 mph, Exposure C, Kt = 1.00



Erdhardt Residence

8456 N Mercer Way, Mercer Island, WA 98040, USA

Latitude, Longitude: 47.5852958, -122.2240024



Date	6/3/2022, 11:47:57 AM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Default (See Section 11.4.3)

Type	Value	Description
S _S	1.391	MCE _R ground motion. (for 0.2 second period)
S ₁	0.484	MCE _R ground motion. (for 1.0s period)
S _{MS}	1.669	Site-modified spectral acceleration value
S _{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S _{DS}	1.113	Numeric seismic design value at 0.2 second SA
S _{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F _a	1.2	Site amplification factor at 0.2 second
F _v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.595	MCE _G peak ground acceleration
F _{PGA}	1.2	Site amplification factor at PGA
PGA _M	0.714	Site modified peak ground acceleration
T _L	6	Long-period transition period in seconds
SsRT	1.391	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.541	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	3.302	Factored deterministic acceleration value. (0.2 second)
S1RT	0.484	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.54	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	1.347	Factored deterministic acceleration value. (1.0 second)
PGAd	1.139	Factored deterministic acceleration value. (Peak Ground Acceleration)
C _{RS}	0.903	Mapped value of the risk coefficient at short periods
C _{R1}	0.897	Mapped value of the risk coefficient at a period of 1 s

LATERAL ANALYSIS - SEISMIC WEIGHT:

AT ROOF; $W_R = 4,707 \text{ ft}^2 (15\%/\text{ft}^2) + 10\%/\text{ft}^2 \left(\frac{13.1}{2} \times 260\right)$
 $+ 1371 (980\%/\text{ft}^2) + 3825 (3,070\%/\text{ft}^2) = 113,111 \text{ k}$

AT FLOOR; $W_F = 2,822 \text{ ft}^2 (12\%/\text{ft}^2) + 722 \text{ ft}^2 (18\%/\text{ft}^2)$
 $+ 10\%/\text{ft}^2 \left(\frac{13.1}{2} \times 260 + \frac{7.3}{2} \times 128\right) + 894 (3,070\%/\text{ft}^2)$
 $= 79,356 \text{ k}$

DESIGN BASE SHEAR; $V = \frac{16942 \text{ k}}{23,065 \text{ k}}$

WIND ANALYSIS PER ASCE 7, § 27.5:

LONGITUDINAL DIRECTION; EAST-TO-WEST;

AT ROOF; $W_{R_L} = 525 \text{ ft}^2 (15.5\%/\text{ft}^2) + 468 \text{ ft}^2 (5.5\%/\text{ft}^2)$
 $+ 311 \text{ ft}^2 (-4.6\%/\text{ft}^2) = 12,115 \text{ k}$

AT FLOOR; $W_{F_L} = 419 \text{ ft}^2 (15.5\%/\text{ft}^2) = 6,494 \text{ k}$
 $\Sigma W_L = 18,609 \text{ k}$

TRANSVERSE DIR; NORTH-TO-SOUTH:

AT ROOF; $W_{R_T} = 568 (15.5) + 591 (5.5) - 468 (-4.6)$
 $= 14,184 \text{ k}$

AT FLOOR; $W_{F_T} = 617 (15.5) = 9,564 \text{ k}$
 $\Sigma W_T = 23,748 \text{ k}$

∴ SEISMIC CONTROLS AT ALL LOCATIONS EXCEPT LOWER FLOOR SHEAR WALLS IN NORTH-SOUTH DIRECTION

LATERAL LOAD DISTRIBUTION: TO MAIN FR. WALLS:

LINES ①, ②, ③; $V_{123} = 33\% (14,184 \text{ k}) = 4,680 \text{ k}$

$V_{123} = 4,680 \text{ k} / 45.2' = 104 \text{ k}/\text{ft} \rightarrow \text{SW}_6 / \text{SW}(E)$

LINE ⑤; $V_5 = 27\% (14,184 \text{ k}) = 3,830 \text{ k}$

$V_5 = 3,830 \text{ k} / 23.2' = 165 \text{ k}/\text{ft} \rightarrow \text{SW}_6 / \text{SW}(E)$

LINE ⑥; $V_6 = 20\% (13,126 \text{ k}) + 3,816 \text{ k} \text{ (SEISMIC)} = 6,441 \text{ k}$

$V_6 = 6,441 \text{ k} / 17.3' = 372 \text{ k}/\text{ft} \rightarrow \text{EXISTING, NO CHANGES}$

LINE ⑦; $V_7 = 16\% (14,184 \text{ k}) = 2,269 \text{ k}$

$V_7 = 2,269 \text{ k} / 20.1' = 113 \text{ k}/\text{ft} \rightarrow \text{EXISTING, NO CHANGES}$

LINE ⑧; $V_8 = 4\% (14,184 \text{ k}) = 567 \text{ k}$

$V_8 = 567 \text{ k} / 20.3' = 28 \text{ k}/\text{ft} \rightarrow \text{SW}_6 / \text{SW}(E)$

LINE ⑨; $V_9 = 24\% (13,126 \text{ k}) + 50\% (3,816 \text{ k}) = 5,321 \text{ k}$

$V_9 = 5,321 \text{ k} / 10.8' = 493 \text{ k}/\text{ft}$

HOWEVER; $809 \times \frac{2(2.5)}{7.95} = 509 \text{ k}/\text{ft} \therefore 0.148 \text{ k}/\text{ft} \text{ @ } 2\% \text{ SW}_2$

LINE ⑩; $V_{10} = 3.5\% (13,126 \text{ k}) = 459 \text{ k}$

$V_{10} = 459 \text{ k} / 9.0' = 51 \text{ k}/\text{ft} \rightarrow \text{SW}_6$

LINE ⑪; $V_{11} = 24.5\% (13,126 \text{ k}) + 50\% (3,816 \text{ k}) = 5,124 \text{ k}$

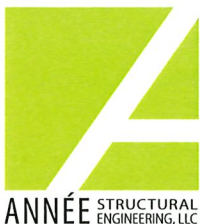
$V_{11} = 5,124 \text{ k} / 15.7' = 324 \text{ k}/\text{ft} \rightarrow \text{SW}_4$

87,635 k
25,476 k
113,111 k

$V_2 = 13,126 \text{ (E)}$
 $= 3,816 \text{ (SW)}$

12,990 SW
38,922 SW
21,438 SW
79,356

1,003 (0)
 $V_1 = 3,003 \text{ (W)}$
 $= 2,117 \text{ (SW)}$



Project EHRHARDT

Designer _____

Date _____



LINE (E); $V_E = 19.5\% (13,126^*) = 2,560^*$

$V_E = 2,560^* / 14.8' = 173^* / ft. \rightarrow \frac{SW(E)^*}{EXISTING, NO CHANGES}$

LINE (F); $V_F = 17\% (13,126^*) = 2,231^*$

$V_F = 2,231^* / 34.2' = 65^* / ft. \rightarrow \frac{SW(F)^*}{NO CHANGES}$

LINE (C); $V_C = 9.5\% (13,126^*) = 1,247^*$

$V_C = 1,247^* / 11.6' = 108^* / ft. \rightarrow \frac{SW(C)^*}{EXISTING, NO CHANGES}$

TO LOWER FLOOR WALLS / FON:

LINE (3); $V_3 = 24\% (9,564^*) + \frac{19.9'}{45.2'} (4,680^*) = 4,356^*$

$V_3 = 4,356^* / 25.5' = 171^* / ft. \rightarrow \frac{SW(E)^*}{EXISTING, NO CHANGES}$

LINE (5); $V_5 = 21\% (9,564^*) + \frac{19.1'}{23.2'} (3,830^*) = 5,162^*$

$V_5 = 5,162^* / 19.15' = 265^* / ft. \rightarrow \frac{EXISTING, UNCHANGED.}{EXISTING, UNCHANGED.}$

LINE (6); $V_6 = 22\% (4,006^*) + 2,117^* + 6,441^* = 9,439^*$ (SEISMIC)

$V_6 = 9,439^* / 21.1' = 447^* \rightarrow \frac{EXISTING, UNCHANGED.}{EXISTING, UNCHANGED.}$

LINE (7); $V_7 = 23\% (9,564^*) + 2,269^* = 4,469^*$

$V_7 = 4,469^* / 21.7' = 206^* / ft. \rightarrow \frac{EXISTING, UNCHANGED.}{EXISTING, UNCHANGED.}$

LINE (8); $V_8 = 8\% (9,564^*) + 567^* = 1,332^*$

$V_8 = 1,332^* / 21.6' = 62^* / ft. \rightarrow \frac{EXISTING, UNCHANGED.}{EXISTING, UNCHANGED.}$

* SW(E) IS ASSUMED TO BE MIN. 3/8" CD PLY W/ 6" OC PANEL EDGE NAILING BASED ON AGE OF STRUCTURE, SITE OBSERVATIONS ($V_0 = 205^* / ft.$)

LINE (C); $V_C = 46\% (4,006^*) + 56\% (2,117^*) + \frac{3.5'}{10.8'} (5,321^*)$

$= 4,626^*; V_C = 4,626^* / 9.1' = 508^* / ft. \rightarrow SW3$

LINE (B); $V_B = 7\% (4,006^*) + 25\% (2,117^*) + \frac{7.3'}{10.8'} (5,321^*)$

$= 4,406^*; V_B = 4,406^* / 7.8' = 565^* / ft. \rightarrow SW2$

LINE (C4); $V_{C4} = 17\% (4,006^*) + 25\% (2,117^*) + 5,124^*$

$= 6,334^*; V_{C4} = 6,334^* / 17.1' = 370^* / ft. \rightarrow SW4$

LINE (E,F); $V_{EF} = 33\% (4,006^*) + 2,560^* + 2,231^*$

$= 6,113^*; V_{EF} = 6,113^* / 77.1' = 79^* / ft. \rightarrow (B) FON.$

OVERTURNING: FROM MAIN FR. WALLS:

LINE (5); $T_5 = 117^* / ft. (8.0') - \frac{25.7'}{2} (0.6 \times 80) = 320^*$

\therefore NO HD REQ'D

BY INSPECTION NO HD REQ'D @ LINES (1), (2), (3)

(7), (8), (C), (D), (E), (F)

NO CHANGES @ LINE (6) \therefore NO ADDED HD

LINE (6); $T_6 = 408 (8.0') - \frac{14.5'}{2} (0.6 \times 80) = 2,916^*$

\therefore MSTC52 / MSTC48B3



ANNEE STRUCTURAL ENGINEERING, LLC

Project _____

Designer _____

Date _____

1801 18th Ave S, Seattle, WA 98144 206.658.5169

Sheet



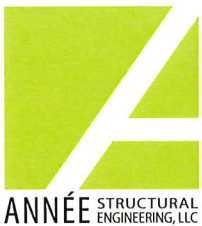
From Lower Floor WAKS:

$$\text{LINE (5)}; T_5 = 207(8.5') - \frac{9.51}{2}(0.6 \times 9.5) = 1,489^{\#}$$

\therefore W1002

Sim. c (1.5, 3.3, 6.2, 7, c) ←

$$\begin{aligned} \text{LINE (B)}; T_B &= 502(10.2') - \frac{4.61}{2}(0.6 \times 10.2) + 2916^{\#} \\ &= 7,996^{\#} \rightarrow \underline{\text{W1008}} \end{aligned}$$



Project _____

Designer _____

Date _____

1801 18th Ave S, Seattle, WA 98144 206.658.5169

Sheet



DIAPHRAGM FORCES ACROSS GRID (C) & STEPS
IN DIAPHRAGM ELEVATIONS;

AT ROOF & (2) LOCATIONS:

$$F_p = \frac{25,476}{113,111} (1.25 \times 25,174 \text{ ft}^2) \times 0.7 (ASD) / 2$$

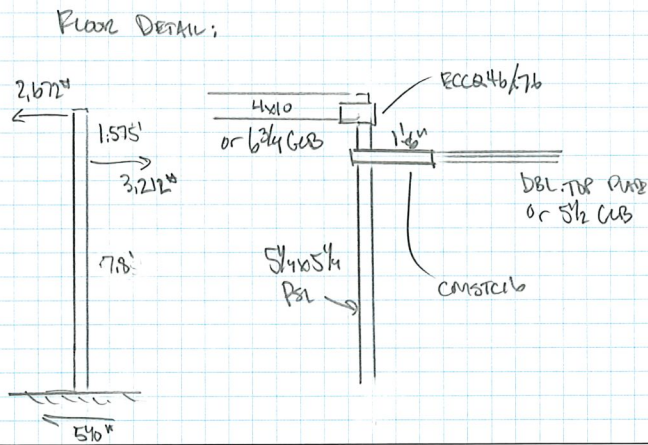
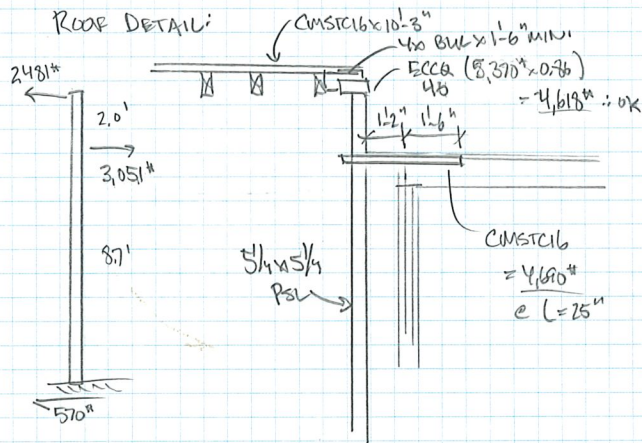
$$= 2,481 \text{ lb} \quad h_d = 2'0''$$

AT FLOOR & (2) LOCATIONS:

$$F_p = \frac{27,438}{79,356} (1.25 \times 17,661 \text{ ft}^2) \times 0.7 (ASD) / 2$$

$$= 2,672 \text{ lb} \quad h_d = 1'7''$$

$$L_d = 2,672 \text{ lb} / 2 (140 \text{ lb/ft} \times 0.93) = 10.26' \text{ or } 10'3''$$



ANNÉE STRUCTURAL ENGINEERING, LLC

Project _____

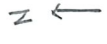
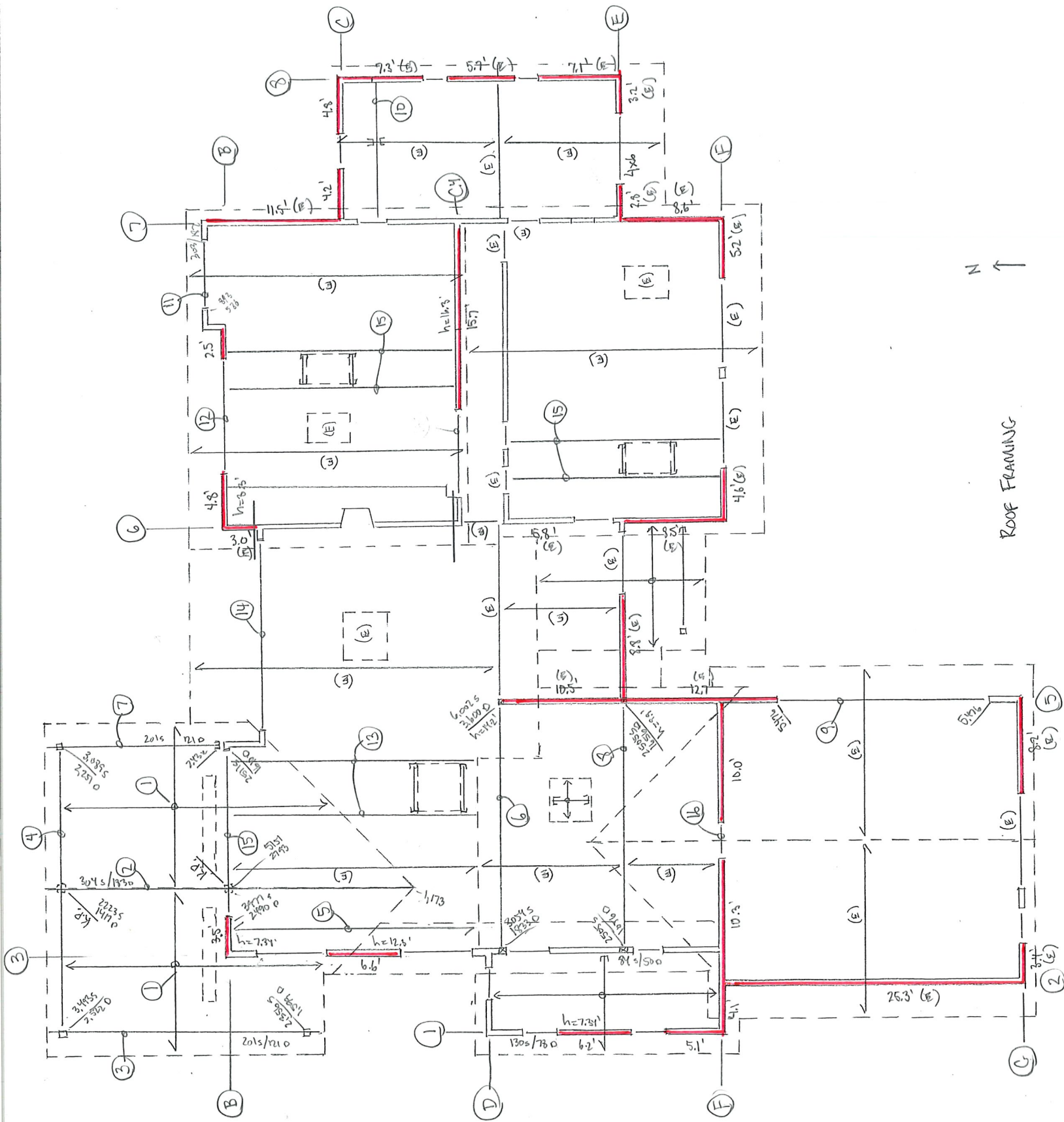
Designer _____

Date _____

1801 18th Ave S, Seattle, WA 98144 206.658.5169

Sheet





ROOF FRAMING

GRAVITY ANALYSIS - ROOF PANNEL (25x15 ft) #/ft²:

① $L = 12.2'$; $w = \frac{24''}{2'}(25+15) = 80''/ft.$

$R=V = 488''$; $M = 1,488 ft\cdot''$

$f_v = 53 psi$; $f_b = 835 psi$; $\Delta_n = 0.31'' = 4/12$

\therefore 2x10 HP#2 @ 24" oc

② SEE ATTACHED CALC. \rightarrow 5/2x12 GLB

③ SEE ATTACHED CALC \rightarrow 5/2x12 GLB

④ $L = 24.0'$; $P = 3,610'' \in$ mid- $ft.$; $w = 20''/ft.$

$R=V = 2,060''$; $M = 23,280''$

$f_v = 42 psi$; $f_b = 1,672 psi$; $\Delta_n = 0.91'' = 4/298$

\therefore 5/2x13 1/2 GLB

⑤ SEE ATTACHED CALC. \rightarrow 2x12 HP#2 @ 16" oc

⑥ $L = 21.05'$; $w = \frac{23.2'}{2}(25+15) = 465''/ft.$

$R=V = 4,887''$; $M = 25,699 ft\cdot''$

$f_v = 109 psi$; $f_b = 1,710 psi$; $\Delta_n = 0.74'' = 4/342$

\therefore 5/2x15 GLB

⑦ SEE ATTACHED CALC. \rightarrow 5/2x12 GLB

⑧ SEE ATTACHED CALC. \rightarrow 5/2x13 1/2 GLB

⑨ $L = 19.375'$; $w = \frac{29.8'}{2}(25+15) = 596''/ft.$

$R=V = 5,476''$; $M = 25,154 ft\cdot''$

$f_v = 111 psi$; $f_b = 1,807 psi$; $\Delta_n = 0.75'' = 4/292$

\therefore 5/2x13 1/2 GLB

⑩ $L = 11.9'$; $w = \frac{13.5'}{2}(25+15) = 270''/ft.$

$R=V = 1,607''$; $M = 4,779 ft\cdot''$

$f_v = 73 psi$; $f_b = 1,087 psi \in 900(1.2)1.15$

$\Delta_n = 0.30'' = 4/469$ \therefore 4x10 DP#2

⑪ $L = 6.0'$; $w = 12.2'(25+15) = 481''/ft.$

$R=V = 1,451''$; $M = 2,176 ft\cdot''$

$f_v = 83 psi$; $f_b = 796 psi$; \therefore 4x8 DP#2
(EXISTING)

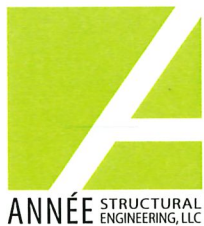
⑫ $L = 10.0'$; $w = 13.15'(25+15) = 526''/ft.$

$R=V = 2,630''$; $M = 6,575 ft\cdot''$

$f_v = 125 psi$; $f_b = 1,670 psi$; $\Delta_n = 0.31'' = 4/388$

\therefore 3/2x9 GLB

⑬ SEE ATTACHED CALC. \rightarrow (2) 2x12 HP#2



Project _____

Designer _____

Date _____

1801 18th Ave S, Seattle, WA 98144 206.658.5169

Sheet



.3924



(14) $L = 16.5'$; $w = 16.7(25+15) = 670 \text{ #/ft}$

$R=V = 5,528 \text{ #}$; $M = 22,901 \text{ ft-#}$

$f_v = 112 \text{ psi}$; $f_b = 1,638 \text{ psi}$; $\Delta_{TL} = 0.55" = 4/360$

\therefore 5 1/2 x 13 1/2 GLB

(15) SEE ATTACHED CALC. \rightarrow (2) 2x12 HF #2

(16) $L = 3.4'$; $P = \frac{786 \text{ lb}^2}{4}(25+15) = 7,856 \text{ #}$

$R=V = 3,928 \text{ #}$; $M = 6,693 \text{ ft-#}$

$f_v = 188 \text{ psi}$; $f_b = 1,700 \text{ psi}$ \therefore 3 1/2 x 9 GLB

(16A) $L = 7.6'$; $w = 478 \text{ #/ft}$; $R=V = 1,815 \text{ #}$; $M = 3,448 \text{ ft-#}$

SEE # (10) \Rightarrow 4x10 DF #2

FLOOR FRAMING (30-40u, 12-22u) #/ft²:

(17) $L = 11.0'$; $w = \frac{16}{12}(40+15) = 73 \text{ #/ft}$

$R=V = 403 \text{ #}$; $M = 1,109 \text{ ft-#}$

$f_v = 44 \text{ psi}$; $f_b = 622 \text{ psi}$; $\Delta_{TL} = 0.19" = 4/703$

\therefore 2x10 HF #2 @ 16" oc

(18) $L = 13.7'$; $w = \frac{12}{12}(60+18) = 178 \text{ #/ft}$

$R=V = 534 \text{ #}$; $M = 1,830 \text{ ft-#}$

$f_v = 68 \text{ psi}$; $f_b = 963 \text{ psi}$; $\Delta_{TL} = 0.44" = 4/374$

\therefore 2x10 HF #2 @ 12" oc
(RIPPERD 1/4" PER FT.)

(19) $L = 6.8'$; $w = \frac{16}{12}(60+18) = 104 \text{ #/ft}$

$R=V = 354 \text{ #}$; $M = 601 \text{ ft-#}$

$f_v = 44 \text{ psi}$; $f_b = 1519 \text{ psi}$; $\Delta_{TL} = 0.05" = 4/1540$

\therefore 2x8 HF #2 @ 16" oc
(RIPPERD 1/4" PER FT.)

(17B) SEE ATTACHED CALC. \rightarrow 3 1/2 x 9 GLB

(17C) SEE ATTACHED CALC. \rightarrow (3) 2x10 HF #2

(20) SEE ATTACHED CALC. \rightarrow 5 1/2 x 15 GLB
(UPPER)

(21) $L = 24.15'$; $w = \frac{14.15}{2}(60+18) = 552 \text{ #/ft}$

$R=V = 6,662 \text{ #}$; $M = 40,220 \text{ ft-#}$

$f_v = 117 \text{ psi}$; $f_b = 1,844 \text{ psi}$; $\Delta_{TL} = 0.78" = 4/320$

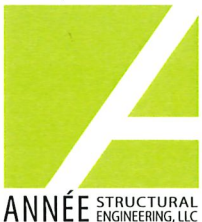
\therefore 5 1/2 x 18 GLB

STEEL OPTION; $S \geq 16.1 \text{ in}^3$; $I \geq 186 \text{ in}^4$

\therefore W12x26/W10x39

$h_{mid} = 9.55"$

$h_{low} = 7.86"$



Project _____

Designer _____

Date _____



(22) SEE ATTACHED CALC. → 5 1/2 x 13 1/2 CLB

(23) SEE ATTACHED CALC. → 5 1/2 x 15 CLB

(24) $L = 21.75'$; $w = \frac{6.85'}{2} (60 + 13.75) = 267 \text{ #/ft.}$

$R = V = 2905 \text{ #}$; $M = 15,797 \text{ ft-#}$

$f_u = 66 \text{ psi}$; $f_b = 1,436 \text{ psi}$; $D_n = 0.94" = 4/277$

\therefore 5 1/2 x 12 CLB $D_u = 4/360$
 $D_{ol} = 0.22"$

(25) SEE ATTACHED CALC. → 5 1/2 x 12 CLB

(26) SEE ATTACHED CALC. → 6 3/4 x 9 CLB

(27) $L = 18.4'$; $w = 9.13' (40 + 12) = 237 \text{ #/ft.}$

$R = V = 2,181 \text{ #}$; $M = 10,076 \text{ ft-#}$

$f_u = 59 \text{ psi}$; $f_b = 1,193 \text{ psi}$; $D_n = 0.64" = 4/345$

\therefore 5 1/2 x 10 1/2 CLB

(28) SEE ATTACHED CALC. → 5 1/2 x 9 CLB

(29) SEE ATTACHED CALC. → 5 1/2 x 13 1/2 CLB

(30) $L = 18.5'$; $w = \frac{25.8'}{2} (30 + 17) + 8'(7) = 662 \text{ #/ft.}$

$R = V = 6,126 \text{ #}$; $M = 23,334 \text{ ft-#}$

$f_u = 116 \text{ psi}$; $f_b = 1,649 \text{ psi}$; $D_n = 0.63" = 4/354$

\therefore 5 1/2 x 15 CLB

(31) $L = 9.25'$; $w = \frac{25.8'}{2} (30 + 12) + 8'(7) = 598 \text{ #/ft.}$

$R = V = 2,766 \text{ #}$; $M = 6,396 \text{ ft-#}$

$f_u = 101 \text{ psi}$; $f_b = 1,489 \text{ psi}$; $D_n = 0.28" = 4/357$

SEE ATTACHED CALC. → 5 1/2 x 10 1/2 CLB

(32) SEE ATTACHED CALC. → 4 x 6 DF #2

(34) $L = 12.9'$; $w = \frac{14.15'}{2} (60 + 13) + \frac{3.15'}{2} (40 + 12) + 8'(10) = 710 \text{ #/ft.}$

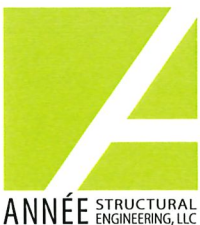
$R = V = 4,582 \text{ #}$; $M = 14,778 \text{ ft-#}$

$f_u = 119 \text{ psi}$; $f_b = 1,755 \text{ psi}$; $D_n = 0.46" = 4/334$

\therefore 5 1/2 x 10 1/2 CLB

or 3 1/2 x 12 CLB

(35) SEE ATTACHED CALC. → 6 3/4 x 10 1/2 CLB



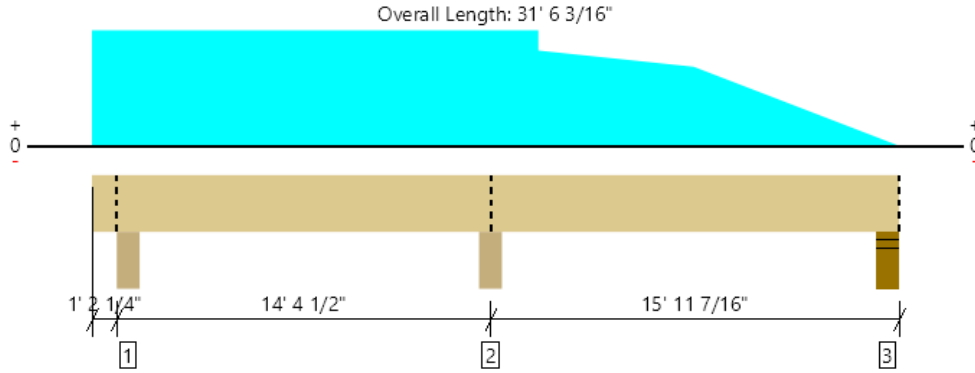
Project _____

Designer _____

Date _____



Roof Framing, 2 - Drop Beam
1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	7981 @ 15' 6 3/4"	19663 (5.50")	Passed (41%)	--	1.0 D + 1.0 S (Adj Spans)
Shear (lbs)	3699 @ 14' 4"	13409	Passed (28%)	1.15	1.0 D + 1.0 S (Adj Spans)
Pos Moment (Ft-lbs)	8169 @ 7' 2 7/8"	30360	Passed (27%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-11107 @ 15' 6 3/4"	23403	Passed (47%)	1.15	1.0 D + 1.0 S (Adj Spans)
Live Load Defl. (in)	0.109 @ 7' 10 3/8"	0.707	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.174 @ 7' 10 1/16"	0.943	Passed (L/974)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- 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 = 11' 4 13/16".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 7' 3 9/16".
- 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 - Column - DF	5.50"	5.50"	1.50"	1430	2223	3653	Blocking
2 - Column - DF	5.50"	5.50"	2.23"	2830	5151	7981	Blocking
3 - Stud wall - HF	5.50"	5.50"	1.50"	293	893	1186	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)	31' 6" o/c	
Bottom Edge (Lu)	31' 6" 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 31' 6 3/16"	N/A	16.0	--	
1 - Uniform (PSF)	0 to 17' 5 3/16" (Front)	12' 2 1/16"	15.0	25.0	Default Load
2 - Tapered (PSF)	17' 5 3/16" to 23' 6" (Front)	12' 2 1/16" to 10' 1 1/8"	8.0	25.0	Default Load
3 - Tapered (PSF)	23' 6" to 31' 6 3/16" (Front)	10' 1 1/8" to 0	8.0	25.0	Default Load

Weyerhaeuser Notes

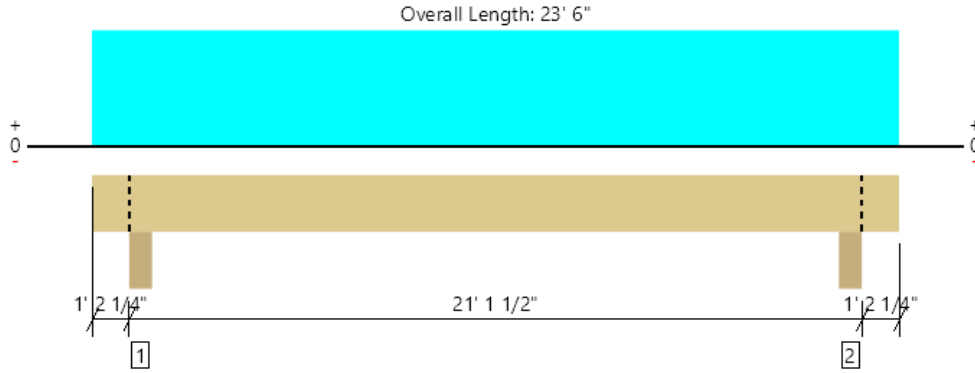
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional 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
Mike Annee Annee Structural Engineering LLC (206) 658-5169 mike@annestructural.com	



Roof Framing, 3 - Drop Beam
1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3955 @ 1' 5"	19663 (5.50")	Passed (20%)	--	1.0 D + 1.0 S (Adj Spans)
Shear (lbs)	3065 @ 2' 7 3/4"	13409	Passed (23%)	1.15	1.0 D + 1.0 S (Adj Spans)
Pos Moment (Ft-lbs)	17710 @ 11' 9"	30215	Passed (59%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-337 @ 1' 5"	23403	Passed (1%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.570 @ 11' 9"	1.033	Passed (L/435)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.953 @ 11' 9"	1.378	Passed (L/260)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Upward deflection on left and right cantilevers 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 1.00 that was calculated using length L = 20' 6 3/8".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 1' 6 3/16".
- 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 - Column - DF	5.50"	5.50"	1.50"	1599	2356	3955	Blocking
2 - Column - DF	5.50"	5.50"	1.50"	1599	2356	3955	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)	23' 6" o/c	
Bottom Edge (Lu)	23' 6" 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 23' 6"	N/A	16.0	--	
1 - Uniform (PSF)	0 to 23' 6" (Front)	8' 1/16"	15.0	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

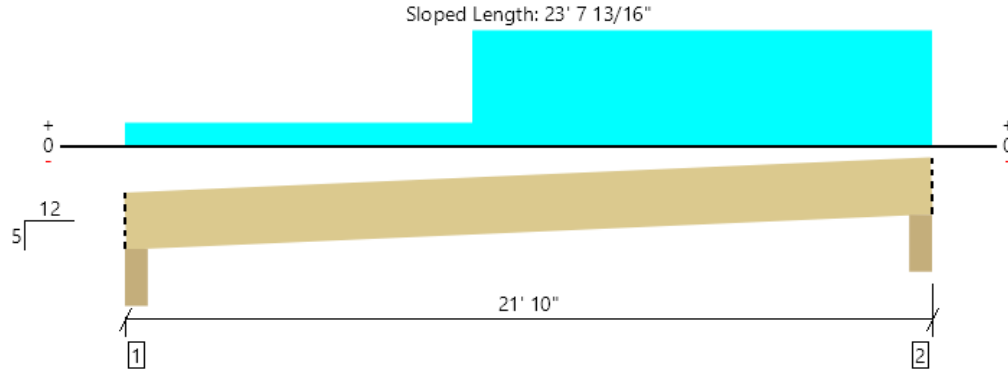
ForteWEB Software Operator	Job Notes
Mike Annee Annee Structural Engineering LLC (206) 658-5169 mike@anneestructural.com	



8/16/2023 9:48:49 PM UTC
ForteWEB v3.6, Engine: V8.3.0.43, Data: V8.1.4.1

File Name: Ehrhardt Residence

Roof Framing, 5 - Rafters
1 piece(s) 2 x 12 HF No.2 @ 16" OC



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

Member Length : 24' 1/2"

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	517 @ 21' 5 1/2"	3341 (5.50")	Passed (15%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	444 @ 20' 6 1/8"	1941	Passed (23%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2236 @ 12' 5 5/16"	2964	Passed (75%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.464 @ 11' 6 1/2"	1.142	Passed (L/591)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.864 @ 11' 4 5/16"	1.523	Passed (L/317)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 5/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Beveled Plate - HF	5.50"	5.50"	1.50"	161	115	276	Blocking
2 - Beveled Plate - HF	5.50"	5.50"	1.50"	217	300	517	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' 8" o/c	
Bottom Edge (Lu)	23' 8" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 9' 4 3/4"	16"	8.0	-	Default Load
2 - Uniform (PSF)	9' 4 3/4" to 21' 10"	16"	15.0	25.0	Default Load

Weyerhaeuser Notes

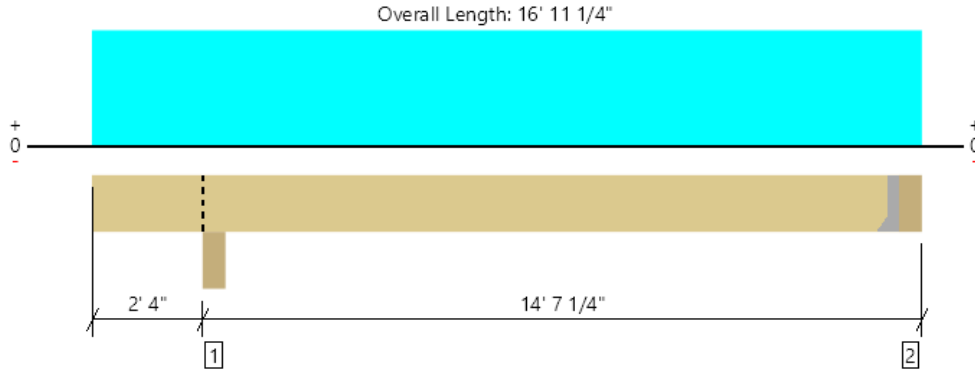
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional 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
Mike Annee Annee Structural Engineering LLC (206) 658-5169 mike@anneestructural.com	



Roof Framing, 7 - Beam
1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2283 @ 16' 5 3/4"	5363 (1.50")	Passed (43%)	--	1.0 D + 1.0 S (Alt Spans)
Shear (lbs)	2005 @ 3' 9 1/2"	13409	Passed (15%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	7755 @ 9' 8 1/4"	30360	Passed (26%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-1104 @ 2' 6 3/4"	23403	Passed (5%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.114 @ 9' 6 3/4"	0.696	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.188 @ 9' 6 15/16"	0.928	Passed (L/890)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- 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 = 13' 7".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 3' 7/16".
- 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 - Column - DF	5.50"	5.50"	1.50"	1328	1952	3280	Blocking
2 - Hanger on 12" HF Ledger	5.50"	Hanger ¹	1.50"	970	1460	2430	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)	16' 6" o/c	
Bottom Edge (Lu)	16' 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	HU614	2.50"	N/A	24-10dx1.5	12-10d	

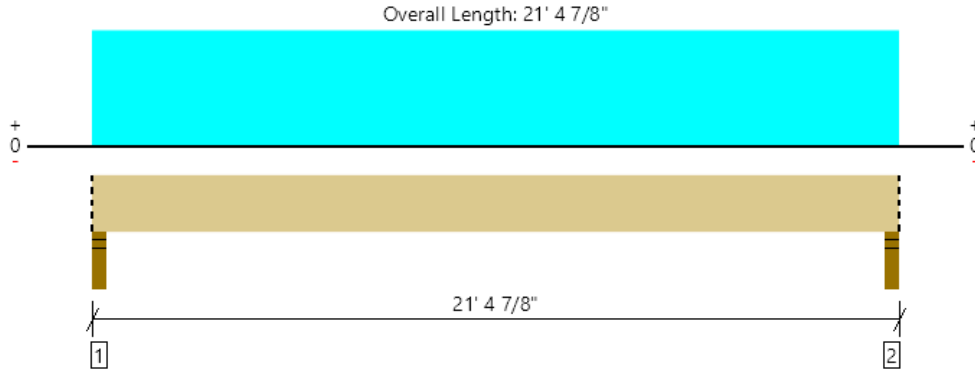
• Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 16' 5 3/4"	N/A	16.0	--	
1 - Uniform (PSF)	0 to 16' 11 1/4" (Front)	8' 1/16"	15.0	25.0	Default Load

ForTEWEB Software Operator	Job Notes
Mike Annee Annee Structural Engineering LLC (206) 658-5169 mike@anneestructural.com	



Roof Framing, 8 - Beam
1 piece(s) 5 1/2" x 13 1/2" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4201 @ 2"	12031 (3.50")	Passed (35%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3645 @ 1' 5"	15085	Passed (24%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	21789 @ 10' 8 7/16"	37694	Passed (58%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.512 @ 10' 8 7/16"	1.054	Passed (L/494)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.858 @ 10' 8 7/16"	1.405	Passed (L/295)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- 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 = 21' 7/8".
- 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	3.50"	3.50"	1.50"	1696	2505	4201	Blocking
2 - Stud wall - DF	3.50"	3.50"	1.50"	1696	2505	4201	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)	21' 5" o/c	
Bottom Edge (Lu)	21' 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 21' 4 7/8"	N/A	18.0	--	
1 - Uniform (PSF)	0 to 21' 4 7/8" (Front)	9' 4 3/8"	15.0	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.

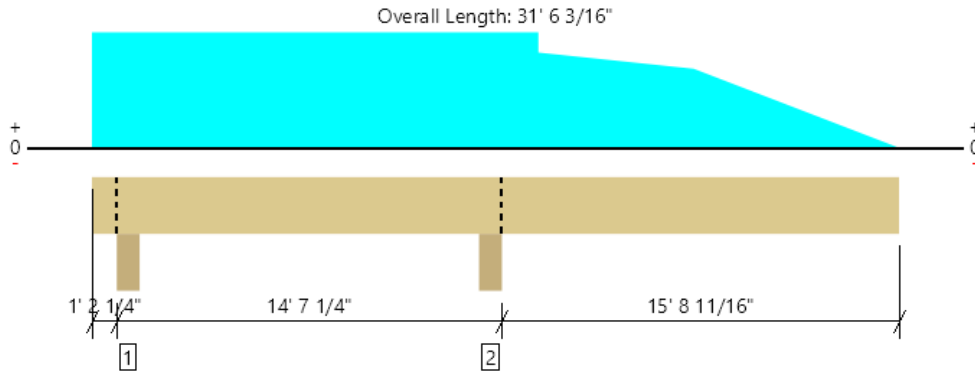
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Mike Annee Annee Structural Engineering LLC (206) 658-5169 mike@annestructural.com	



Roof Framing, 2c - Drop Beam
1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam

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



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	10227 @ 15' 6 3/4"	19663 (5.50")	Passed (52%)	--	1.0 D + 1.0 S (Adj Spans)
Shear (lbs)	4878 @ 14' 4"	13409	Passed (36%)	1.15	1.0 D + 1.0 S (Adj Spans)
Pos Moment (Ft-lbs)	4922 @ 5' 11 15/16"	30360	Passed (16%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-27782 @ 15' 6 3/4"	16735	Failed (166%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	2.683 @ 31' 6 3/16"	1.595	Failed (2L/142)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	3.563 @ 31' 6 3/16"	2.127	Failed (2L/108)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

- 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.
- Moment capacity over cantilever support 3 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 = 8' 10 3/16".
- Critical negative moment adjusted by a volume/size factor of 0.95 that was calculated using length L = 31' 6 3/16".
- 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 - Column - DF	5.50"	5.50"	1.50"	1107	1920	3026	Blocking
2 - Column - DF	5.50"	5.50"	2.86"	3446	6782	10227	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)	31' 6" o/c	
Bottom Edge (Lu)	6" o/c	

•Maximum allowable bracing intervals based on applied load.

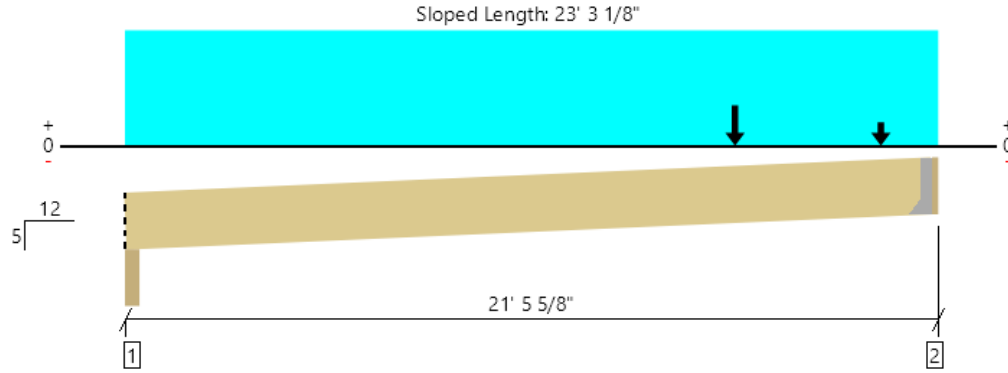
Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 31' 6 3/16"	N/A	16.0	--	
1 - Uniform (PSF)	0 to 17' 5 3/16" (Front)	12' 2 1/16"	15.0	25.0	Default Load
2 - Tapered (PSF)	17' 5 3/16" to 23' 6" (Front)	12' 2 1/16" to 10' 1 1/8"	8.0	25.0	Default Load
3 - Tapered (PSF)	23' 6" to 31' 6 3/16" (Front)	10' 1 1/8" to 0	8.0	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
Mike Annee Annee Structural Engineering LLC (206) 658-5169 mike@annestructural.com	



Roof Framing, 13 - Joist
2 piece(s) 2 x 12 HF No.2 @ 12" OC



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

Member Length : 23' 6 1/8"

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1233 @ 21' 4 1/8"	1823 (1.50")	Passed (68%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1197 @ 20' 5 3/4"	3881	Passed (31%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	5027 @ 15' 9 7/8"	5928	Passed (85%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.598 @ 11' 5 5/16"	1.145	Passed (L/459)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.972 @ 11' 5 3/16"	1.526	Passed (L/283)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 5/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Beveled Plate - HF	3.50"	3.50"	1.50"	253	399	653	Blocking
2 - Hanger on 11 1/4" HF beam	1.50"	Hanger ¹	1.50"	473	765	1238	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' 11" o/c	
Bottom Edge (Lu)	23' 1" 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	U210-2X SLD22	2.00"	N/A	14-10dx1.5	6-10d		

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

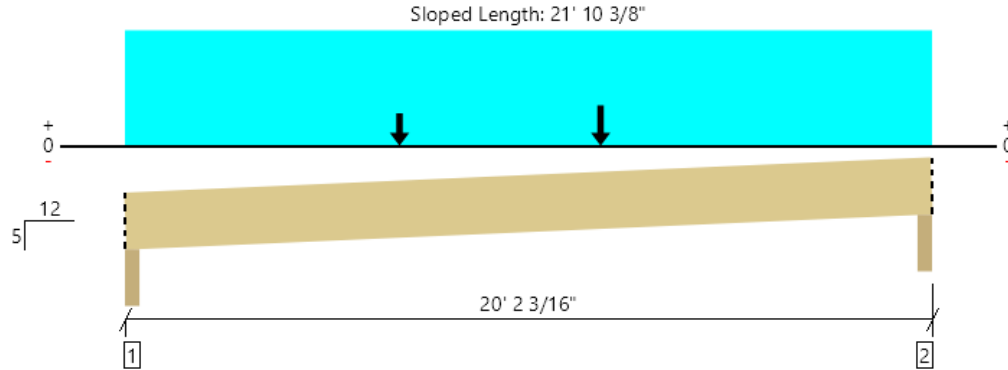
Vertical Loads	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 21' 5 5/8"	12"	15.0	25.0	Default Load
2 - Point (lb)	16' 2"	N/A	298	497	
3 - Point (lb)	20'	N/A	79	131	

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
Mike Annee Annee Structural Engineering LLC (206) 658-5169 mike@annestructural.com	



Roof Framing, 15 - Joist
2 piece(s) 2 x 12 HF No.2 @ 12" OC



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

Member Length : 22' 3 1/16"

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	780 @ 2 1/2"	4253 (3.50")	Passed (18%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	733 @ 1' 1 7/8"	3881	Passed (19%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	4629 @ 11' 3 5/8"	5928	Passed (78%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.496 @ 10' 13/16"	1.071	Passed (L/518)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.805 @ 10' 13/16"	1.428	Passed (L/319)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 5/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Beveled Plate - HF	3.50"	3.50"	1.50"	301	480	780	Blocking
2 - Beveled Plate - HF	3.50"	3.50"	1.50"	288	459	747	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)	7' 2" o/c	
Bottom Edge (Lu)	21' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 20' 2 3/16"	12"	15.0	25.0	Default Load
2 - Point (lb)	6' 10 3/8"	N/A	118	196	
3 - Point (lb)	11' 10 3/4"	N/A	143	238	

Weyerhaeuser Notes

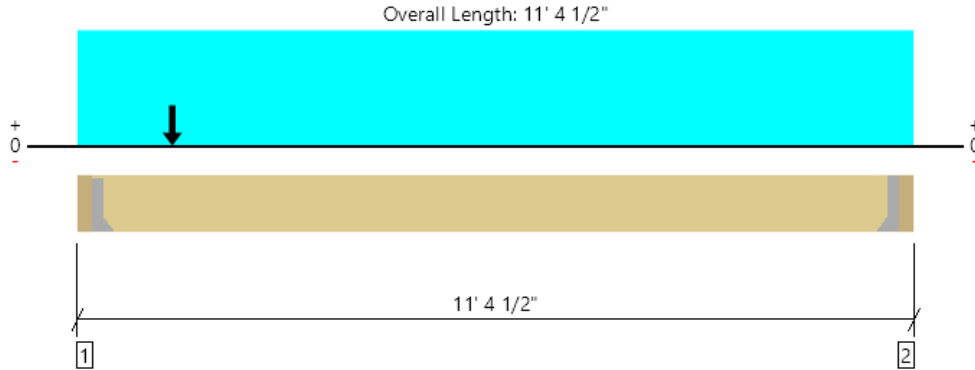
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional 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.woyehaeuser.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
Mike Annee Annee Structural Engineering LLC (206) 658-5169 mike@anneestructural.com	



Floor Framing, 17B - Flush Beam
1 piece(s) 3 1/2" x 9" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4987 @ 3 1/2"	4987 (2.19")	Passed (100%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	4906 @ 1' 1/2"	6400	Passed (77%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	5289 @ 1' 4 3/8"	10868	Passed (49%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.109 @ 4' 11"	0.270	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.259 @ 5' 2 5/16"	0.540	Passed (L/499)	--	1.0 D + 1.0 S (All Spans)

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

- Deflection criteria: LL (L/480) 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 = 10' 9 1/2".
- 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 - Hanger on 9" LSL beam	3.50"	Hanger ¹	2.19"	2267	2750	5017	See note ¹
2 - Hanger on 9" LSL beam	3.50"	Hanger ¹	1.50"	798	304	1102	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)	10' 10" o/c	
Bottom Edge (Lu)	10' 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	
1 - Face Mount Hanger	HHUS410	3.00"	N/A	30-10d	10-10d		
2 - Face Mount Hanger	LUS410	2.00"	N/A	8-10dx1.5	6-10d		

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

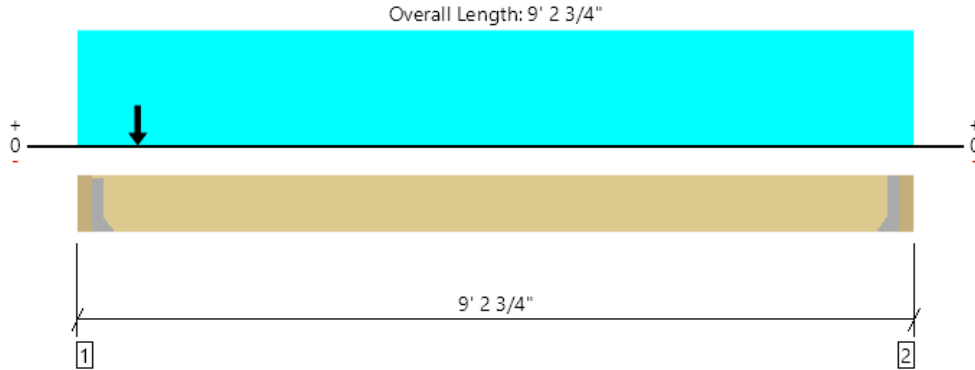
Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	3 1/2" to 11' 1"	N/A	7.7	--	
1 - Point (lb)	1' 4 3/8" (Front)	N/A	1833	3054	Default Load
2 - Uniform (PLF)	0 to 11' 4 1/2" (Front)	N/A	101.0	-	

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.eyerhaeuser.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
Mike Annee Annee Structural Engineering LLC (206) 658-5169 mike@annestructural.com	



Floor Framing, 17C - Flush Beam
3 piece(s) 2 x 10 HF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4987 @ 3 1/2"	4987 (2.74")	Passed (100%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3279 @ 1' 3/4"	4787	Passed (69%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3426 @ 3' 7 7/8"	5750	Passed (60%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.053 @ 4' 3 15/16"	0.216	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.123 @ 4' 5"	0.432	Passed (L/845)	--	1.0 D + 1.0 S (All Spans)

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

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Hanger on 9 1/4" LSL beam	3.50"	Hanger ¹	2.74"	2305	2751	5055	See note ¹
2 - Hanger on 9 1/4" LSL beam	3.50"	Hanger ¹	1.50"	836	529	1366	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' 8" o/c	
Bottom Edge (Lu)	8' 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	HHUS210-3	3.00"	N/A	30-10d	10-10d	
2 - Face Mount Hanger	LUS28-3	2.00"	N/A	6-16d	4-16d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	3 1/2" to 8' 11 1/4"	N/A	10.6	--	
1 - Point (lb)	9 3/8" (Front)	N/A	1656	2505	Default Load
2 - Uniform (PLF)	0 to 9' 2 3/4" (Front)	N/A	151.0	84.0	

Weyerhaeuser Notes

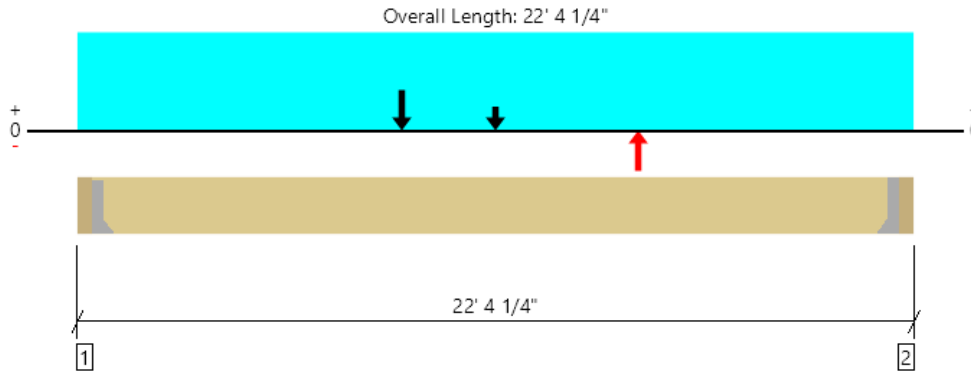
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional 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
Mike Annee Annee Structural Engineering LLC (206) 658-5169 mike@annestructural.com	



Floor Framing, 20 - Beam
1 piece(s) 5 1/2" x 15" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	6403 @ 3 1/2"	6403 (1.79")	Passed (100%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	5159 @ 1' 6 1/2"	14575	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	34698 @ 11' 2 1/8"	39912	Passed (87%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.496 @ 11' 2 1/8"	0.544	Passed (L/526)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	1.021 @ 11' 2 1/8"	1.089	Passed (L/256)	--	1.0 D + 1.0 L (All Spans)

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

- Deflection criteria: LL (L/480) 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 0.97 that was calculated using length L = 21' 9 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	Floor Live	Snow	Seismic	Factored	
1 - Hanger on 15" GLB beam	3.50"	Hanger ¹	1.79"	3116	2762	861	1340/-1340	6536	See note ¹
2 - Hanger on 15" GLB beam	3.50"	Hanger ¹	1.79"	3116	2762	861	1340/-1340	6536	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)	21' 9" o/c	
Bottom Edge (Lu)	21' 9" 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	HGUS5.50/12	4.00"	N/A	56-10d	20-10d	
2 - Face Mount Hanger	HGUS5.50/12	4.00"	N/A	56-10d	20-10d	

- 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)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	3 1/2" to 22' 3/4"	N/A	20.0	--	--	--	
1 - Uniform (PSF)	0 to 22' 4 1/4" (Front)	3' 5 1/4"	18.0	60.0	-	-	Default Load
2 - Uniform (PLF)	0 to 22' 4 1/4" (Front)	N/A	182.0	-	77.0	-	
3 - Point (lb)	11' 2 1/8" (Front)	N/A	343	914	-	-	
4 - Point (lb)	8' 7 3/4" (Front)	N/A	-	-	-	4569	
5 - Point (lb)	15' 3/8" (Front)	N/A	-	-	-	-4569	

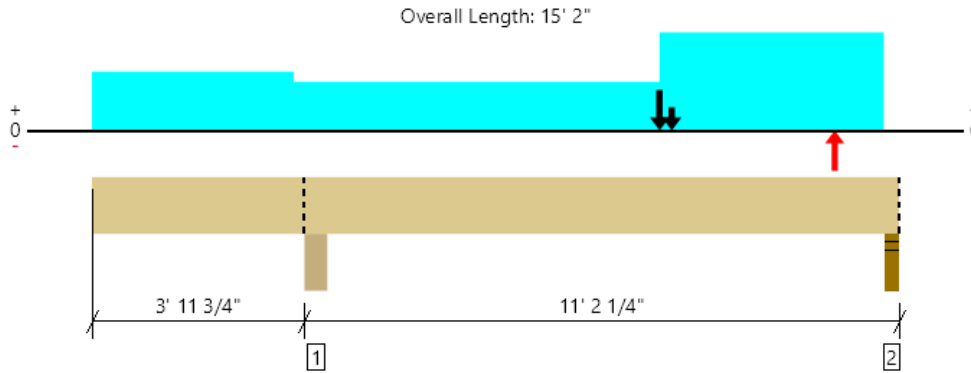
ForteWEB Software Operator	Job Notes
Mike Annee Annee Structural Engineering LLC (206) 658-5169 mike@anneestructural.com	



Floor Framing, 22 - Beam
1 piece(s) 5 1/2" x 13 1/2" 24F-V4 DF Glulam

An excessive uplift of -2534 lbs at support located at 4' 2 1/2" failed this product.

An excessive uplift of -2437 lbs at support located at 15' failed this product.



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	10706 @ 15'	12031 (3.50")	Passed (89%)	--	1.0 D - 0.525 E + 0.75 L + 0.75 S (Alt Spans)
Shear (lbs)	11903 @ 10' 10 3/4"	20988	Passed (57%)	1.60	1.0 D + 0.7 E (All Spans)
Pos Moment (Ft-lbs)	44003 @ 10' 8"	53460	Passed (82%)	1.60	1.0 D + 0.525 E + 0.75 L + 0.75 S (Alt Spans)
Neg Moment (Ft-lbs)	-22509 @ 10' 8"	41209	Passed (55%)	1.60	0.6 D - 0.7 E (All Spans)
Live Load Defl. (in)	0.119 @ 9' 9 1/8"	0.270	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.206 @ 9' 10 5/16"	0.540	Passed (L/629)	--	1.0 D + 1.0 L (Alt Spans)

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

- 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.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 10' 6 15/16".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 13' 2 1/16".
- 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	Snow	Seismic	Factored	
1 - Column - DF	5.50"	5.50"	3.10"	3179	5535	580	6344/-6344	11096/-2534	Blocking
2 - Stud wall - DF	3.50"	3.50"	3.11"	3339	3876/-373	1505	6344/-6344	10706/-2437	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)	15' 2" o/c	
Bottom Edge (Lu)	15' 2" o/c	

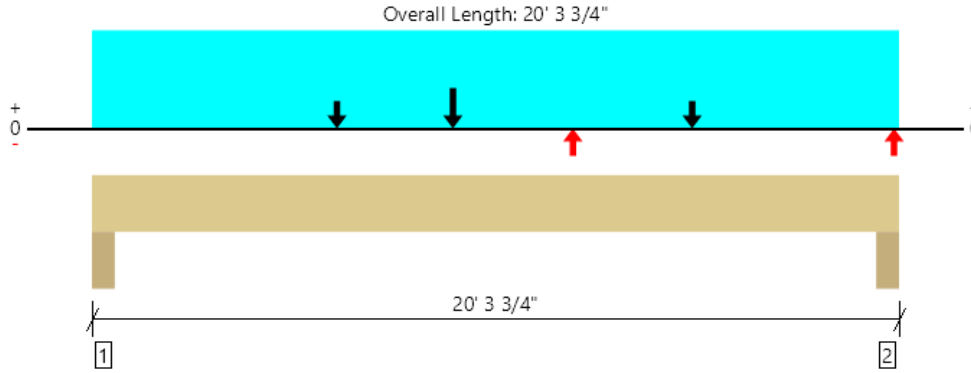
•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 15' 2"	N/A	18.0	--	--	--	
1 - Uniform (PSF)	0 to 3' 9 1/2" (Front)	7' 7"	25.0	60.0	-	-	Default Load
2 - Uniform (PSF)	3' 9 1/2" to 14' 10 1/2" (Front)	6' 10 1/8"	18.0	60.0	-	-	Default Load
3 - Point (lb)	10' 10 3/4" (Front)	N/A	3116	2762	861	-	
4 - Uniform (PLF)	10' 8" to 14' 10 1/2" (Front)	N/A	248.0	-	291.0	-	
5 - Point (lb)	10' 8" (Front)	N/A	-	-	-	20799	
6 - Point (lb)	13' 11 1/2" (Front)	N/A	-	-	-	-20799	

Forteweb Software Operator	Job Notes
Mike Annee Annee Structural Engineering LLC (206) 658-5169 mike@anneestructural.com	



Floor Framing, 23 - Beam
1 piece(s) 5 1/2" x 15" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5934 @ 4"	19663 (5.50")	Passed (30%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	4688 @ 1' 8 1/2"	16761	Passed (28%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Pos Moment (Ft-lbs)	33966 @ 9' 1"	46372	Passed (73%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.357 @ 9' 11 1/8"	0.491	Passed (L/660)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.744 @ 9' 11 1/2"	0.982	Passed (L/317)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

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

- Deflection criteria: LL (L/480) 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 0.98 that was calculated using length L = 19' 7 3/4".
- 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	Floor Live	Snow	Seismic	Factored	
1 - Column - DF	5.50"	5.50"	1.66"	2775	1226	1935	1500/-1500	5934	None
2 - Column - DF	5.50"	5.50"	1.53"	2571	985	1814	1500/-1500	5458	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	20' 4" o/c	
Bottom Edge (Lu)	20' 4" 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)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 20' 3 3/4"	N/A	20.0	--	--	--	
1 - Point (lb)	9' 1" (Front)	N/A	1872	2211	1108	-	Default Load
2 - Uniform (PLF)	0 to 20' 3 3/4" (Front)	N/A	151.0	-	130.0	-	
3 - Point (lb)	6' 2" (Front)	N/A	-	-	-	2726	
4 - Point (lb)	12' 1 1/4" (Front)	N/A	-	-	-	-2726	
5 - Point (lb)	15' 1 1/4" (Front)	N/A	-	-	-	2726	
6 - Point (lb)	20' 2 1/4" (Front)	N/A	-	-	-	-2726	

Weyerhaeuser Notes

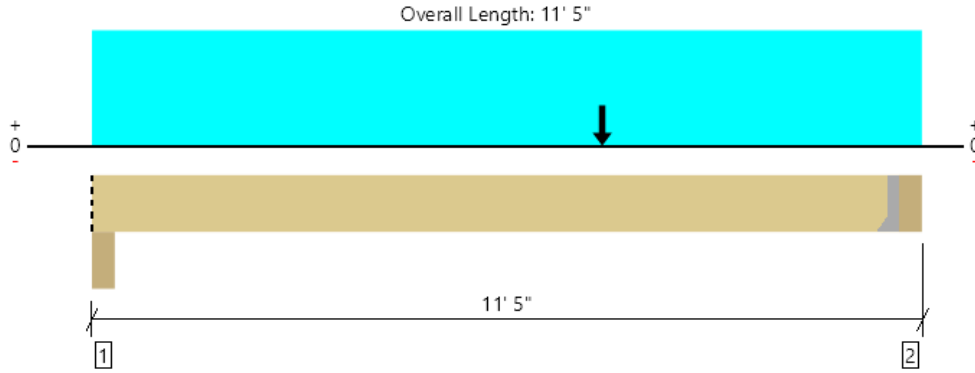
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional 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
Mike Annee Annee Structural Engineering LLC (206) 658-5169 mike@annestructural.com	



Floor Framing, 25 - Beam
1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	8221 @ 10' 11 1/2"	8221 (2.30")	Passed (100%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	7524 @ 9' 11 1/2"	13409	Passed (56%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Pos Moment (Ft-lbs)	28109 @ 7' 1 1/4"	30360	Passed (93%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.164 @ 5' 11 3/16"	0.266	Passed (L/777)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.327 @ 5' 11 3/8"	0.531	Passed (L/390)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

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

- Deflection criteria: LL (L/480) 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 = 10' 7 1/2".
- 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	Snow	Seismic	Factored	
1 - Column - DF	5.50"	5.50"	1.50"	2404	2253	1310	486/-486	5332	Blocking
2 - Hanger on 12" HF beam	5.50"	Hanger ¹	2.30"	3874	3039	2301	854/-854	8327	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)	11' o/c	
Bottom Edge (Lu)	11' 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	HGUS5.50/12	4.00"	N/A	56-10d	20-10d		

- 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)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 10' 11 1/2"	N/A	16.0	--	--	--	
1 - Uniform (PSF)	0 to 11' 5" (Front)	5' 6 1/2"	12.0	40.0	-	-	Default Load
2 - Point (lb)	7' 1 1/4" (Front)	N/A	5343	2762	3611	1340	

Weyerhaeuser Notes

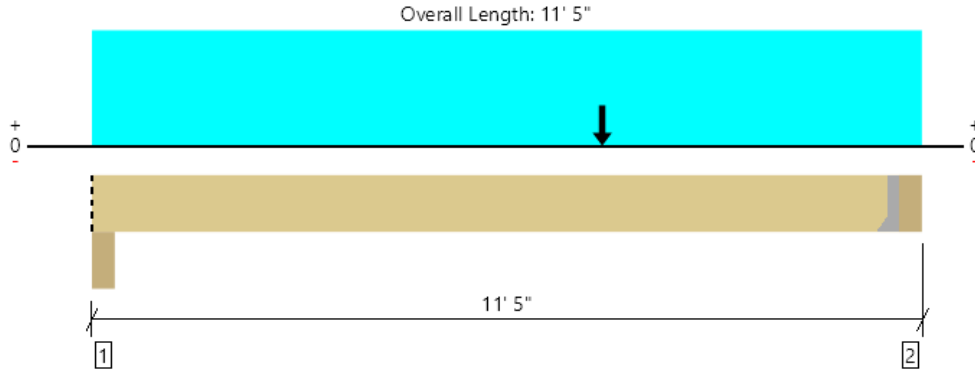
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional 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.woyehaeuser.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
Mike Annee Annee Structural Engineering LLC (206) 658-5169 mike@anneestructural.com	



Floor Framing, 26 - Beam
1 piece(s) 6 3/4" x 9" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5701 @ 10' 11 1/2"	6581 (1.50")	Passed (87%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	5381 @ 10' 2 1/2"	12342	Passed (44%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Pos Moment (Ft-lbs)	18807 @ 7' 1 1/4"	20959	Passed (90%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.235 @ 5' 10 1/16"	0.266	Passed (L/543)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.450 @ 5' 10 9/16"	0.531	Passed (L/283)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

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

- Deflection criteria: LL (L/480) 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 = 10' 7 1/2".
- 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	Snow	Factored	
1 - Column - DF	5.50"	5.50"	1.50"	1872	2211	1108	4362	Blocking
2 - Hanger on 9" HF beam	5.50"	Hanger ¹	1.50"	2734	2260	1947	5889	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)	11' o/c	
Bottom Edge (Lu)	11' 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	HGUS6.88/10	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 10' 11 1/2"	N/A	14.8	--	--	
1 - Uniform (PSF)	0 to 11' 5" (Front)	9' 9 1/2"	12.0	40.0	-	Default Load
2 - Point (lb)	7' 1 1/4" (Front)	N/A	3103	-	3055	

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

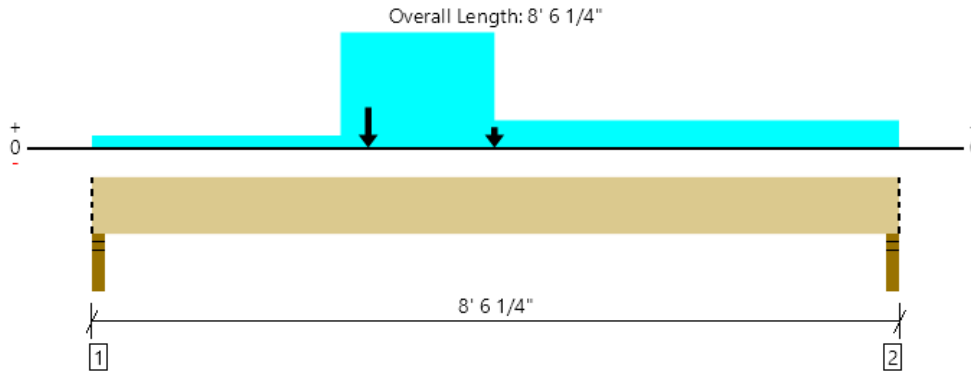
ForteWEB Software Operator	Job Notes
Mike Annee Annee Structural Engineering LLC (206) 658-5169 mike@anneestructural.com	



Floor Framing, 28 - Beam
1 piece(s) 5 1/2" x 9" 24F-V4 DF Glulam

An excessive uplift of -6281 lbs at support located at 1 1/2" failed this product.

An excessive uplift of -2982 lbs at support located at 8' 4 3/4" failed this product.



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	7604 @ 1 1/2"	10313 (3.00")	Passed (74%)	--	1.0 D + 0.7 E (All Spans)
Shear (lbs)	7574 @ 1'	13992	Passed (54%)	1.60	1.0 D + 0.7 E (All Spans)
Pos Moment (Ft-lbs)	21089 @ 2' 11"	23760	Passed (89%)	1.60	1.0 D + 0.7 E (All Spans)
Neg Moment (Ft-lbs)	-17617 @ 2' 11"	18315	Passed (96%)	1.60	0.6 D - 0.7 E (All Spans)
Live Load Defl. (in)	0.061 @ 4' 2 13/16"	0.276	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.110 @ 4' 2 11/16"	0.414	Passed (L/900)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

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

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 8' 3 1/4".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 8' 3 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	Floor Live	Snow	Seismic	Factored	
1 - Stud wall - DF	3.00"	3.00"	2.21"	827	407	969	9681/-9681	7604/-6281	Blocking
2 - Stud wall - DF	3.00"	3.00"	1.50"	784	547	868	4933/-4933	4435/-2982	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)	8' 6" o/c	
Bottom Edge (Lu)	8' 6" o/c	

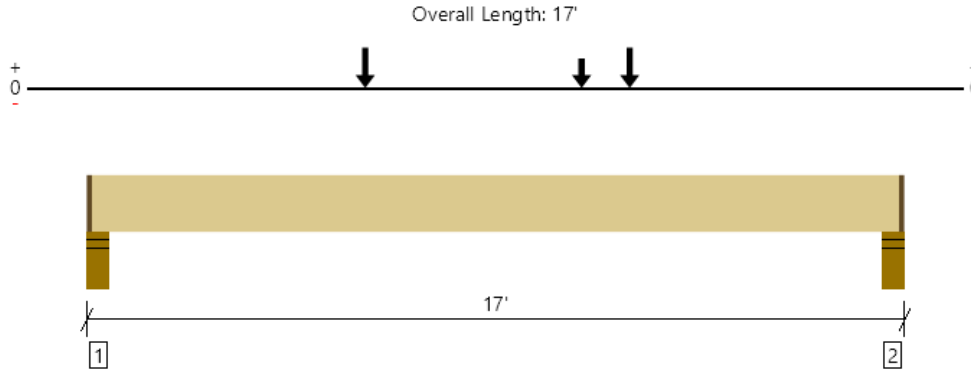
•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 8' 6 1/4"	N/A	12.0	--	--	--	
1 - Uniform (PSF)	0 to 2' 7 1/2" (Front)	1' 6"	12.0	40.0	-	-	Default Load
2 - Uniform (PSF)	2' 7 1/2" to 8' 6 1/4" (Front)	3' 4 1/2"	12.0	40.0	-	-	
3 - Uniform (PLF)	2' 7 1/2" to 4' 3" (Front)	N/A	256.0	-	303.0	-	Default Load
4 - Point (lb)	4' 3" (Front)	N/A	807	-	1345	-	
5 - Point (lb)	2' 11" (Front)	N/A	-	-	-	14614	

Forteweb Software Operator	Job Notes
Mike Annee Annee Structural Engineering LLC (206) 658-5169 mike@anneestructural.com	



Floor Framing, 29 - Beam
1 piece(s) 5 1/2" x 13 1/2" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3911 @ 16' 8"	9467 (4.25")	Passed (41%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	3884 @ 15' 5"	13118	Passed (30%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	21960 @ 10' 3 1/2"	33413	Passed (66%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.361 @ 8' 7 7/8"	0.408	Passed (L/543)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.491 @ 8' 7 7/8"	0.817	Passed (L/399)	--	1.0 D + 1.0 L (All Spans)

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

- Deflection criteria: LL (L/480) 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' 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	Floor Live	Factored	
1 - Stud wall - HF	5.50"	4.25"	1.56"	947	2518	3465	1 1/4" Rim Board
2 - Stud wall - HF	5.50"	4.25"	1.76"	1068	2843	3911	1 1/4" 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)	16' 10" o/c	
Bottom Edge (Lu)	16' 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)	1 1/4" to 16' 10 3/4"	N/A	18.0	--	
1 - Point (lb)	5' 9 1/2" (Front)	N/A	595	1985	Default Load
2 - Point (lb)	10' 3 1/2" (Front)	N/A	522	1391	
3 - Point (lb)	11' 3 1/2" (Front)	N/A	595	1985	

Weyerhaeuser Notes

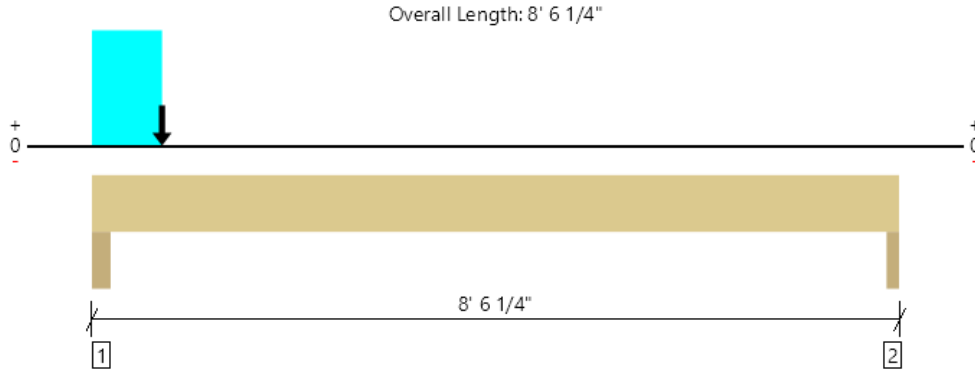
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional 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
Mike Annee Annee Structural Engineering LLC (206) 658-5169 mike@anneestructural.com	



Floor Framing, 32 - Header
1 piece(s) 4 x 6 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2926 @ 3"	9844 (4.50")	Passed (30%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1942 @ 10"	2657	Passed (73%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1287 @ 8 7/8"	1979	Passed (65%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.080 @ 3' 8 9/16"	0.272	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.134 @ 3' 8 7/8"	0.313	Passed (L/729)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- 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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Trimmer - HF	4.50"	4.50"	1.50"	1144	1782	2926	None
2 - Trimmer - HF	3.00"	3.00"	1.50"	84	104	187	None

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.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 8' 6 1/4"	N/A	4.9	--	
1 - Uniform (PLF)	0 to 8 7/8"	N/A	270.0	327.0	
2 - Point (lb)	8 7/8"	N/A	986	1644	

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.

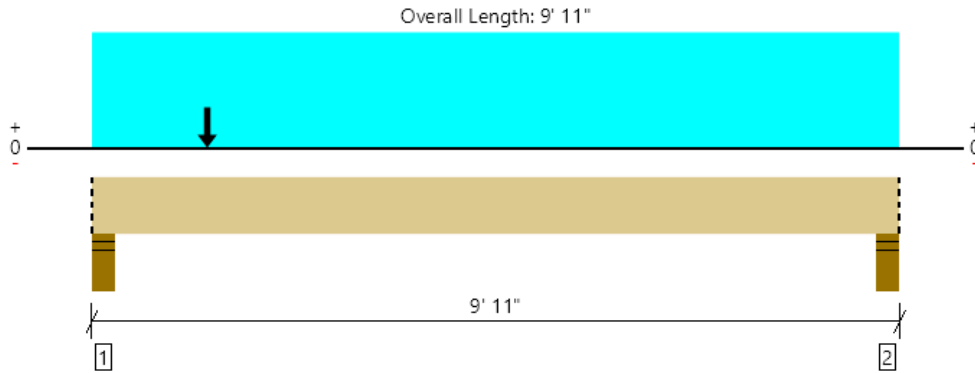
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Mike Annee Annee Structural Engineering LLC (206) 658-5169 mike@anneestructural.com	



Floor Framing, 31 - Beam
1 piece(s) 5 1/2" x 9" 24F-V4 DF Glulam

An excessive uplift of -11066 lbs at support located at 4" failed this product.



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	12835 @ 4"	18906 (5.50")	Passed (68%)	--	1.0 D + 0.7 E (All Spans)
Shear (lbs)	12566 @ 1' 2 1/2"	13992	Passed (90%)	1.60	1.0 D + 0.7 E (All Spans)
Pos Moment (Ft-lbs)	13693 @ 1' 5"	23760	Passed (58%)	1.60	1.0 D + 0.7 E (All Spans)
Neg Moment (Ft-lbs)	-12115 @ 1' 5"	18315	Passed (66%)	1.60	0.6 D - 0.7 E (All Spans)
Live Load Defl. (in)	0.106 @ 4' 11 9/16"	0.231	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.167 @ 4' 11 9/16"	0.463	Passed (L/664)	--	1.0 D + 1.0 L (All Spans)

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

- Deflection criteria: LL (L/480) 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 = 9' 3".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 9' 3".
- -892 lbs uplift at support located at 9' 7". Strapping or other restraint may be required.
- 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	Seismic	Factored	
1 - Stud wall - DF	5.50"	5.50"	3.73"	1106	1919	16756/-16756	12835/-11066	Blocking
2 - Stud wall - DF	5.50"	5.50"	1.50"	1106	1919	2223/-2223	3712/-892	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' 11" o/c	
Bottom Edge (Lu)	9' 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)	0 to 9' 11"	N/A	12.0	--	--	
1 - Uniform (PLF)	0 to 9' 11" (Front)	N/A	211.0	387.0	-	Default Load
2 - Point (lb)	1' 5" (Front)	N/A	-	-	18979	

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.

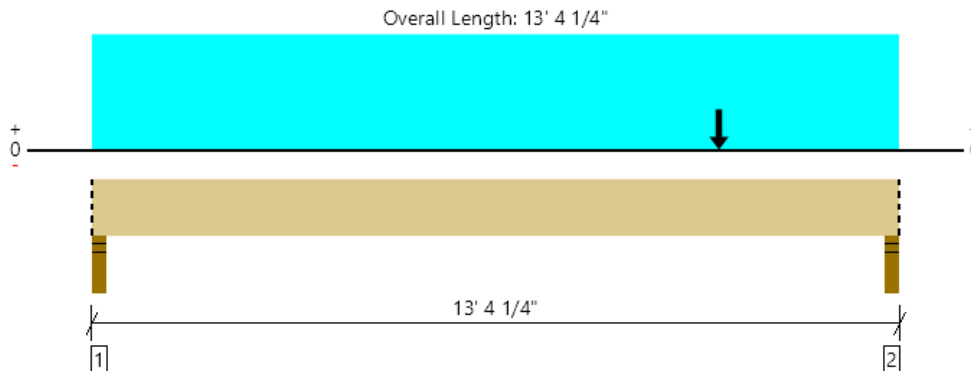
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Mike Annee Annee Structural Engineering LLC (206) 658-5169 mike@annestructural.com	



Floor Framing, 35 - Beam
1 piece(s) 6 3/4" x 10 1/2" 24F-V4 DF Glulam

An excessive uplift of -8360 lbs at support located at 13' 2 1/4" failed this product.



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	14150 @ 13' 2 1/4"	14766 (3.50")	Passed (96%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	13244 @ 12' 2 1/4"	20034	Passed (66%)	1.60	1.0 D + 0.7 E (All Spans)
Pos Moment (Ft-lbs)	36662 @ 10' 4 1/2"	39690	Passed (92%)	1.60	1.0 D + 0.7 E (All Spans)
Neg Moment (Ft-lbs)	-24874 @ 10' 4 1/2"	30594	Passed (81%)	1.60	0.6 D - 0.7 E (All Spans)
Live Load Defl. (in)	0.291 @ 6' 8 1/16"	0.326	Passed (L/536)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.575 @ 6' 8 1/16"	0.651	Passed (L/272)	--	1.0 D + 1.0 S (All Spans)

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

- Deflection criteria: LL (L/480) 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 = 13' 1/4".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 13' 1/4".
- -814 lbs uplift at support located at 2". Strapping or other restraint may be required.
- 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	Snow	Seismic	Factored	
1 - Stud wall - DF	3.50"	3.50"	2.01"	3427	356	3526	4099/-4099	8490/-814	Blocking
2 - Stud wall - DF	3.50"	3.50"	3.35"	3427	356	3526	14880/-14880	14150/-8360	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' 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)	Snow (1.15)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 13' 4 1/4"	N/A	17.2	--	--	--	
1 - Uniform (PSF)	0 to 13' 4 1/4" (Front)	1' 4"	12.0	40.0	-	-	Default Load
2 - Point (lb)	10' 4 1/2" (Front)	N/A	-	-	-	18979	
3 - Uniform (PLF)	0 to 13' 4 1/4" (Front)	N/A	480.0	-	528.0	-	

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
Mike Annee Annee Structural Engineering LLC (206) 658-5169 mike@annestructural.com	



NDS 2018 Column Design - Combined Bending and Axial Load

Section	Grade
A	#2 SPF
B	#1 DF
C	#2 DF
D	#1 HF
E	#2 HF
F	HF-STUD
G	1.8E PSL

Stud Spacing	12
Wind (psf)	0.0
Moment (ft.-lbs.)	0
Moment - Strong	0
Moment - Weak	0
Axial Load (plf)	4,887
Load/stud (lbs.)	4,887
Ke	1.0

# of members	3
Section Mark	2x6
Grade Mark	E
Axial Load (lbs.)	4,887
Moment Strong Axis (ft.-lbs.)	373
Moment Weak Axis (ft.-lbs.)	0
Load Duration Factor	1.15
Repetitive Factor Cr	1.15
Incised Lumber (Y/N)	N
Unbraced Length Strong Axis (ft.)	14.20
Unbraced Length Weak Axis (ft.)	1.33
Grade	#2 HF
Axial alone = fc/F^*c	0.52
Interaction Eq. Term 1	0.27
Interaction Eq. Term 2	0.27
Interaction Eq. Term 3	0.00
Total Interaction Eq.	0.54

Mk	Section
A	2x4
B	2x6
C	2x8
D	2x10
E	2x12
F	4x4
G	4x6
H	4x8
I	4x10
J	4x12
K	6x6
L	6x8
M	6x10
N	6x12
P	3-1/2x5-1/4
3	2x6

Strong axis deflection - uniform load over simple span of 14.2' =	0.17	L / 1020
Weak axis deflection - uniform load over simple span of 1.33' =	0.00	L / 0
Strong axis deflection - point load at center of 14.2' span =	0.13	L / 1275
Weak axis deflection - point load at center of 1.33' span =	0.00	L / 0

Fbx (psi) = 1,105
Fby (psi) = 1,271
Fc (psi) = 1,430
Ex (psi) = 1.30E+06
Ex min (psi) = 4.70E+05
Ey (psi) = 1.30E+06
Ey min (psi) = 4.70E+05

fc = P/A (psi) = 197.5	AXIAL
F*c = Fc x Cd x Ci (psi) = 1644.5	
K*(le2/d2) = 3.5	OK
K*(le1/d1) = 31.0	OK
= 402.5	
F' = Fce/F*c = 0.245	
c = 0.8	
(1+F')/2c = 0.778	
Cp = 0.231	Column Stability Factor
<u>F*c = F*c x Cp (psi) = 379.7</u>	
fc/F*c = 0.520	
(fc/F*c)^2 = 0.27	Interaction Equation, 1st term

$fb_1 = M/S$ (psi) = 197.5	STRONG AXIS BENDING
$Fb^* = F_b \times C_d \times C_r \times C_i$ (psi) = 1461.4	
$l_u = 16.0$	in.
$l_e = 32.9$	in.
$R_b = \text{sq. rt.}(l_e \times d/b^2)$ 3.8	OK
$F_{be} = 1.2 \times E'_{min}/R_b^2$ (psi) = 38974.2	OK
$F = F_{be}/F_b^* = 26.670$	
$(1+F)/1.9 = 14.563$	
$CL = 0.998$	Beam Stability Factor
F'_{b1} (psi) = <u>1458.5</u>	
$fb_1/F'_{b1} = \mathbf{0.135}$	
(psi) = 402.5	OK
$1-(f_c/F_{ce1}) = 0.509$	
$fb_1/[F'_{b1} \times (1-(f_c/F_{ce2}))] = \mathbf{0.27}$	Interaction Equation, 2nd term

$fb_2 = M/S$ (psi) = 0.0	WEAK AXIS BENDING
$Fb^* = F_b \times C_d \times C_r \times C_i$ (psi) = 1680.6	
$F_{be} = 1.2 \times E'_{min}/R_b^2$ (psi) = 38974.2	OK
$F = F_{be}/F_b^* = 23.191$	
$(1+F)/1.9 = 12.732$	
$CL = 0.998$	Beam Stability factor
F'_{b2} (psi) = <u>1676.8</u>	
$fb_2/F'_{b2} = \mathbf{0.000}$	
(psi) = 30713.5	OK
$1-(f_c/F_{ce2}) = 0.994$	
$fb_1/F_{be} = 0.005$	
$fb_2/[F'_{b2} \times (1-(f_c/F_{ce2})) - (fb_1/F_{be})^2] = \mathbf{0.00}$	Interaction Equation, 3rd term

Allowable Axial Loads (lbs) for 1.3E TimberStrand® LSL

Column Bearing Type	Effective Column Length	Column Size														
		3½" x 3½"			3½" x 4¾"			3½" x 5½"			3½" x 7¼"			3½" x 8⅝"		
		100%	115%	125%	100%	115%	125%	100%	115%	125%	100%	115%	125%	100%	115%	125%
On Column Base	3'	12,165	13,665	14,625	15,210	17,085	18,280	19,120	21,475	22,980	25,205	28,310	30,290	29,985	33,680	36,035
	4'	10,745	11,830	12,490	13,435	14,790	15,610	16,885	18,590	19,625	22,260	24,505	25,870	26,480	29,155	30,780
	5'	9,120	9,810	10,215	11,400	12,265	12,765	14,335	15,420	16,050	18,895	20,325	21,155	22,480	24,180	25,170
	6'	7,550	7,985	8,235	9,440	9,980	10,295	11,865	12,550	12,945	15,640	16,540	17,060	18,610	19,680	20,300
	7'	6,235	6,525	6,695	7,795	8,160	8,370	9,800	10,255	10,520	12,915	13,520	13,870	15,365	16,085	16,500
	8'	5,195	5,400	5,515	6,490	6,750	6,895	8,160	8,485	8,670	10,755	11,185	11,430	12,795	13,305	13,595
	9'	4,375	4,525	4,610	5,465	5,655	5,765	6,870	7,110	7,245	9,060	9,370	9,550	10,775	11,150	11,360
	10'	3,725	3,840	3,905	4,655	4,795	4,880	5,850	6,030	6,135	7,715	7,950	8,085	9,175	9,460	9,620
	12'	2,785	2,855	2,895	3,480	3,565	3,615	4,375	4,485	4,545	5,770	5,910	5,995	6,860	7,030	7,130
On Wood Plate ⁽¹⁾⁽²⁾	3'-7'	5,765	5,765	5,765	7,065	7,065	7,065	8,740	8,740	8,740	10,785	10,785	10,785	12,830	12,830	12,830
	8'	5,195	5,400	5,515	6,490	6,750	6,895	8,160	8,485	8,670	10,755	10,785	10,785	12,795	12,830	12,830
	9'	4,375	4,525	4,610	5,465	5,655	5,765	6,870	7,110	7,245	9,060	9,370	9,550	10,775	11,150	11,360
	10'	3,725	3,840	3,905	4,655	4,795	4,880	5,850	6,030	6,135	7,715	7,950	8,085	9,175	9,460	9,620
	12'	2,785	2,855	2,895	3,480	3,565	3,615	4,375	4,485	4,545	5,770	5,910	5,995	6,860	7,030	7,130
14'	2,155	2,200	2,225	2,695	2,750	2,780	3,385	3,455	3,495	4,465	4,555	4,610	5,310	5,420	5,485	

(1) Wood plate bearing is based on compression perpendicular-to-grain stress of 425 psi adjusted per the NDS®, 3.10.4.

(2) See connection details below.

Allowable Axial Loads (lbs) for 1.8E Parallam® PSL

Column Bearing Type	Effective Column Length	Column Size																		
		3½" x 3½"			3½" x 5¼"			3½" x 7"			5¼" x 5¼"			5¼" x 7"			7" x 7"			
		100%	115%	125%	100%	115%	125%	100%	115%	125%	100%	115%	125%	100%	115%	125%	100%	115%	125%	
On Column Base	6'	10,595	11,200	11,545	15,890	16,800	17,320	21,190	22,395	23,095	33,295	36,675	38,735	40,000	40,000	40,000	40,000	40,000	40,000	40,000
	7'	8,735	9,140	9,370	13,105	13,710	14,060	17,475	18,280	18,745	30,010	32,545	34,030	40,000	40,000	40,000	40,000	40,000	40,000	40,000
	8'	7,265	7,550	7,715	10,900	11,325	11,570	14,535	15,100	15,425	26,650	28,490	29,555	35,530	37,985	39,410	40,000	40,000	40,000	40,000
	9'	6,115	6,320	6,440	9,170	9,480	9,660	12,225	12,640	12,880	23,475	24,835	25,620	31,300	33,115	34,165	40,000	40,000	40,000	40,000
	10'	5,200	5,355	5,445	7,800	8,035	8,170	10,400	10,715	10,895	20,660	21,695	22,290	27,545	28,925	29,725	40,000	40,000	40,000	40,000
	12'	3,885	3,980	4,030	5,825	5,965	6,050	7,765	7,955	8,065	16,160	16,805	17,175	21,545	22,405	22,900	40,000	40,000	40,000	40,000
	14'	3,000	3,065	3,100	4,500	4,595	4,645	6,005	6,125	6,195	12,890	13,315	13,560	17,185	17,755	18,080	34,155	35,785	36,720	36,720
	16'										10,480	10,775	10,950	13,970	14,370	14,595	28,485	29,640	30,300	30,300
	18'										8,670	8,885	9,010	11,560	11,850	12,010	24,020	24,860	25,345	25,345
	20'										7,285	7,445	7,535	9,710	9,925	10,050	20,475	21,110	21,475	21,475
22'																17,630	18,125	18,405	18,405	
24'																15,325	15,715	15,935	15,935	

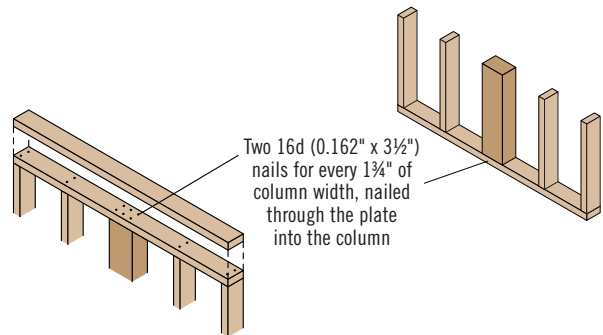
Slenderness ratio exceeds 50

General Notes

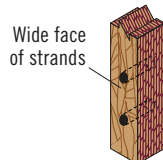
- Tables are based on:
 - Solid, one-piece column members used in dry-service conditions.
 - Bracing in both directions at column ends.
 - NDS®.
 - Simple columns with axial loads only. For side loads or other combined bending and axial loads, see the NDS®.
- Allowable loads have been adjusted to accommodate the worst case of the following eccentric conditions: ¼ of column thickness (first dimension) or ¼ of column width.
- Beams and columns must remain straight to within $5L/608$ (in.) of true alignment. L is the unrestrained length of the member in feet.

For column allowable design stresses see page 5.

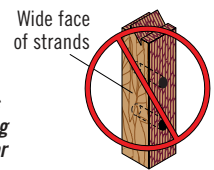
Top or Bottom Plate Connection



The column and connector values listed are for dry-service conditions ONLY. When wet-service conditions exist, contact your Weyerhaeuser representative for other product solutions.



In order to use the manufacturer's published capacities when designing column caps, bases, or holdowns for uplift, the bolts or screws must be installed perpendicular to the wide face of strands as shown at left.



DO NOT install bolts or screws into the narrow face of strands