Structural Calculations

For

Miller House

McCall, Idaho

Prepared by

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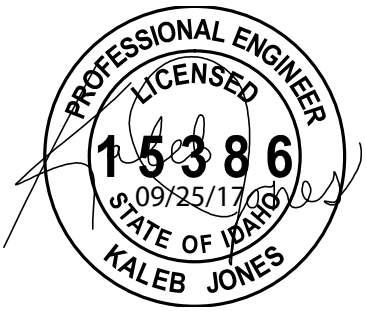
2017-04857
September 25, 2017



Design Criteria

Project Name: SMC - Miller
Job Number: 2017-04857
Location: McCall, Idaho

Governing Code: *2012 IBC*

Snow Criteria

Roof Snow Load (P_f)	150 psf
Ground Snow Load (P_g)	150 psf
Snow Exposure (C_e)	1.0
Thermal Factor (C_t)	1.0
Snow Importance (I_s)	1.0

Wind Criteria

Wind Speed (V_3)	115 mph
Wind Exposure	C
Wind Importance (I_w)	1.0
Building Category	II

Seismic Criteria

Site Class	D
S_s	0.42
S_1	0.13
S_{DS}	0.41
S_{D1}	0.20

Risk Category	II
Seismic Importance (I_E)	1.0
Seismic Design Category (SDC)	C
Seismic Response Coefficient, R	6.5
Design Base Shear	.06Wp

Live Loads

Typical	40 psf
Corridor	n/a
Storage	n/a

Soil Bearing

Typical	1500 psf

Roof Dead Loads:

Deck	*1.5*
Insulation	*2.0*
Roofing	*3.0*
Joist	*2.5*
Ceiling	*3.0*
Misc	*4.5*
TOTAL	**17 psf**

Floor Dead Loads:

Deck	2.3
Joist	2.0
Ceiling	0.0
Flooring	1.0
Misc	5.0
TOTAL	**10 psf**

Exterior Wall Dead Loads:

Studs	2.0
Siding	2.5
Insulation	0.5
Gyp Board	2.5
Sheating	1.5
Misc	3.0
TOTAL	**12 psf**

Project # : *2017-04857*
Project: *SMC - Miller*

Seismic Loading Analysis

S_s =	*0.4170*	C_T =	*0.020*	
S_1 =	*0.1300*	h_n =	*21.50*	ft
F_a =	*1.5*			
F_v =	*2.3*			
R =	*6.5*			
I_E =	*1.0*			

$S_{MS} = F_a S_s$ =	0.6117	
$S_{M1} = F_v S_1$ =	0.2963	
		Seismic Design Category
$S_{DS} = 2/3\ S_{MS}$ =	0.4078	*C*
$S_{D1} = 2/3\ S_{M1}$ =	0.1975	*C*
$C_s = S_{DS}/(R/I_E)$ =	0.0627	**Controls**
$T_a = C_T h_n^{3/4}$ =	0.1997	
$C_s < S_{D1}/[(R/I_E)T]$ =	0.1522	
$C_s > 0.044 S_{DS} I_E$ =	0.0179	
$C_s > 0.5 S_1/(R/I_E)$ =	0.0100	

$V = C_s W$ = **0.0627** W

0.7*V = **0.0439** W

Project # : *2017-04857*
Project: *SMC - Miller*

Seismic Component Loading

w_p =	*1*	psf	weight of element
V_{px} =	*0*	plf	Portion of seismic shear load at the level of the diaphragm, required to be transferred to the components of the vertical seismic-force-resisting system beacause of the offsets or changes in the stiffness of the vertical components above of below the diaphragm.
w_w =	*1*	psf	weight of wall
L_b =	*40*	ft	length of the building

NOTE: Use 1 for unit weight to achieve an answer per element unit weight

Connections

$F_p = 0.133\ S_{DS}\ w_p$ =	**0.05**	psf		
or				
$F_p = 0.05\ w_p$ =	**0.05**	psf		

Diaphragm

$F_p = 0.2\ I_E\ S_{DS}\ w_p + V_{px}$ =	**0.08**	psf		

Bearing Walls & Shear Walls

Out of Plane Forces

$F_p = 0.40\ I_E\ S_{DS}\ w_w$ =	**0.16**	psf	**Controls**	*12.11.1*
$F_p = 0.10\ w_w$ =	**0.10**	psf		*12.11.1*

Anchorage

F_p =	**0.2**	psf		*12.11.2a*
$F_p = 400\ I_E\ S_{DS}$ =	**163**	plf		*12.11.2b*
F_p =	**280**	plf	(multiply by 0.7 for service loads)	*12.11.2c*
$F_p = 0.40\ I_E\ S_{DS}\ w_w\ k_a$ =	**0.2**	psf		*12.11-1*
$F_p = 0.2\ I_E\ k_a\ w_w$ =	**0.2800**	psf	**Controls**	
$k_a = 1.0 + L_b / 100$ =	**1.4000**			*12.11-2*

Note: *12.11.2.2.2* The strength design forces for steel elements of the structural wall anchorage system, with exception of anchor bolts and reinforcing steel, shall be increased by 1.4 times the forces otherwise noted above.

WIND LOADING ANALYSIS - Main Wind-Force Resisting System

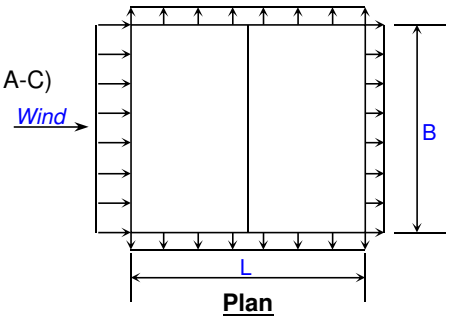
Per ASCE 7-10 Code for Enclosed or Partially Enclosed Buildings

Using Method 2: Analytical Procedure (Section 27 & 28) for Low-Rise Buildings

Job Name:	SMC - Miller	Location:	McCall, Idaho		
Job Number:	2017-04857	Originator:	ara	Checker:	kkj

Input Data:

Wind Speed, V =	115	mph (Wind Map, Figure 26.5-1A-C)
Bldg. Classification =	II	(Table 1.5-1 Risk Category)
Exposure Category =	C	(Sect. 26.7)
Ridge Height, hr =	29.25	ft. (hr >= he)
Eave Height, he =	10.25	ft. (he <= hr)
Building Width =	57.00	ft. (Normal to Building Ridge)
Building Length =	94.00	ft. (Parallel to Building Ridge)
Roof Type =	Monoslope	(Gable or Monoslope)
Topo. Factor, Kzt =	1.00	(Sect. 26.8 & Figure 26.8-1)
Direct. Factor, Kd =	0.85	(Table 26.6)
Enclosed? (Y/N)	Y	(Sect. 26.2 & Table 26.11-1)
Hurricane Region?	N	



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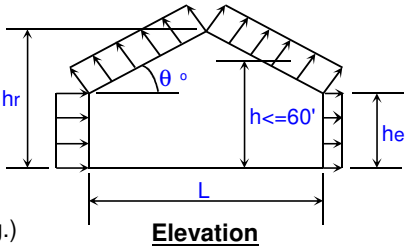


Elevation

Resulting Parameters and Coefficients:

Roof Angle, θ =	18.43	deg.
Mean Roof Ht., h =	19.75	ft. (h = (hr+he)/2, for angle >10 deg.)

Check Criteria for a Low-Rise Building:

1. Is h <= 60' ? Yes, O.K. 2. Is h <= Lesser of L or B? Yes, O.K.

External Pressure Coeff's., GCpf (Fig. 28.4-1):
(For values, see following wind load tabulations.)
Positive & Negative Internal Pressure Coefficients, GCpi (Table 26.11-1):

+GCpi Coef. =	0.18	(positive internal pressure)
-GCpi Coef. =	-0.18	(negative internal pressure)

If h < 15 then: Kh = 2.01*(15/zg)^(2/α) (Table 28.3-1)
If h >= 15 then: Kh = 2.01*(z/zg)^(2/α) (Table 28.3-1)

α =	9.50	(Table 26.9-1)
zg =	900	(Table 26.9-1)
Kh =	0.90	(Kh = Kz evaluated at z = h)

Velocity Pressure: qz = 0.00256*Kz*Kzt*Kd*V^2 (Sect. 28.3.2, Eq. 28.3-1)
qh = 25.89 psf qh = 0.00256*Kh*Kzt*Kd*V^2 (qz evaluated at z = h)
Design Net External Wind Pressures (Sect. 28.4.1):
p = qh*[(GCpf) - (+/-GCpi)] (psf, Eq. 28.4-1)

Wall and Roof End Zone Widths 'a' and '2*a' (Fig. 28.4-1):

a =	5.70	ft.
2*a =	11.40	ft.

MWFRS Wind Load for Load Case A				MWFRS Wind Load for Load Case B			
Surface	GCpf	p = Net Pressures (psf)		Surface	*GCpf	p = Net Pressures (psf)	
		(w/ +GCpi)	(w/ -GCpi)			(w/ +GCpi)	(w/ -GCpi)
Zone 1	0.52	8.71	18.03	Zone 1	0.40	5.69	15.01
Zone 2	-0.69	-22.52	-13.20	Zone 2	-0.69	-22.52	-13.20
Zone 3	-0.47	-16.79	-7.47	Zone 3	-0.37	-14.24	-4.92
Zone 4	-0.42	-15.41	-6.09	Zone 4	-0.29	-12.17	-2.85
Zone 5	---	---	---	Zone 5	-0.45	-16.31	-6.99
Zone 6	---	---	---	Zone 6	-0.45	-16.31	-6.99
Zone 1E	0.78	15.54	24.85	Zone 1E	0.61	11.13	20.45
Zone 2E	-1.07	-32.36	-23.04	Zone 2E	-1.07	-32.36	-23.04
Zone 3E	-0.67	-22.09	-12.77	Zone 3E	-0.53	-18.38	-9.06
Zone 4E	-0.62	-20.66	-11.34	Zone 4E	-0.43	-15.79	-6.47
Zone 5E	---	---	---	Zone 5E	0.61	11.13	20.45
Zone 6E	---	---	---	Zone 6E	-0.43	-15.79	-6.47

*Note: Use roof angle θ = 0 degrees for Longitudinal Direction.

For Case A when GCpf is neg. in Zones 2/2E:
Zones 2/2E dist. = 25.63 ft.

For Case B when GCpf is neg. in Zones 2/2E:
Zones 2/2E dist. = 25.63 ft.

Remainder of roof Zones 2/2E extending to ridge line shall use roof Zones 3/3E pressure coefficients.

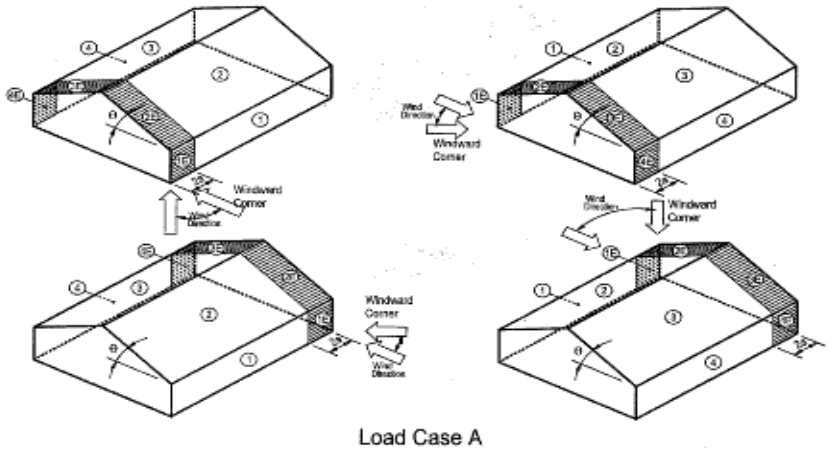
MWFRS Wind Load for Load Case A, Torsional Case				MWFRS Wind Load for Case B, Torsional Case			
Surface	GCpf	p = Net Pressure (psf)		Surface	GCpf	p = Net Pressure (psf)	
		(w/ +GCpi)	(w/ -GCpi)			(w/ +GCpi)	(w/ -GCpi)
Zone 1T	---	2.18	4.51	Zone 1T	---	1.42	3.75
Zone 2T	---	-5.63	-3.30	Zone 2T	---	-5.63	-3.30
Zone 3T	---	-4.20	-1.87	Zone 3T	---	-3.56	-1.23
Zone 4T	---	-3.85	-1.52	Zone 4T	---	-3.04	-0.71
Zone 5T	---	---	---	Zone 5T	---	-4.08	-1.75
Zone 6T	---	---	---	Zone 6T	---	-4.08	-1.75

Notes: 1. For Load Case A (Transverse), Load Case B (Longitudinal), and Torsional Cases:

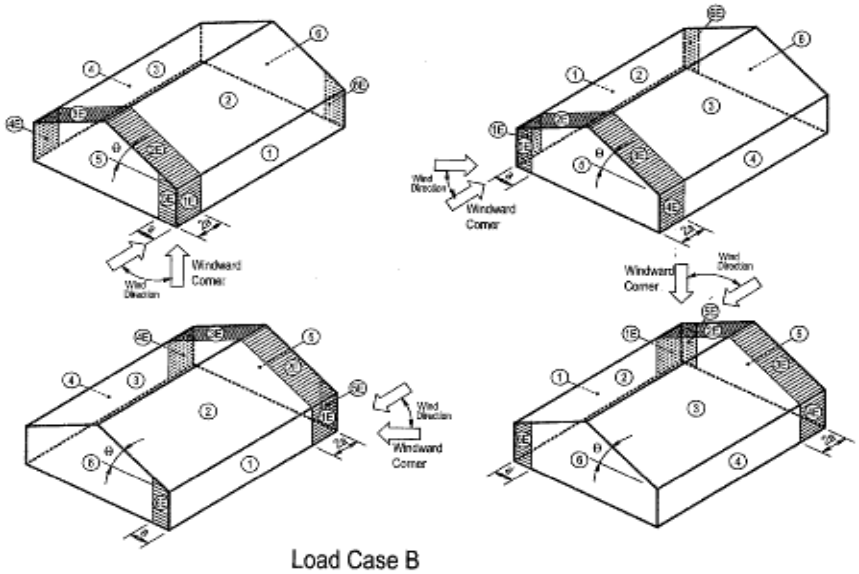
Zone 1 is windward wall for interior zone. Zone 1E is windward wall for end zone.
Zone 2 is windward roof for interior zone. Zone 2E is windward roof for end zone.
Zone 3 is leeward roof for interior zone. Zone 3E is leeward roof for end zone.
Zone 4 is leeward wall for interior zone. Zone 4E is leeward wall for end zone.
Zones 5 and 6 are sidewalls. Zone 5E & 6E is sidewalls for end zone.
Zone 1T is windward wall for torsional case Zone 2T is windward roof for torsional case.
Zone 3T is leeward roof for torsional case Zone 4T is leeward wall for torsional case.
Zones 5T and 6T are sidewalls for torsional case.

2. (+) and (-) signs signify wind pressures acting toward & away from respective surfaces.
3. Building must be designed for all wind directions using the 8 load cases shown below. The load cases are applied to each building corner in turn as the reference corner.
4. Wind loads for torsional cases are 25% of respective transverse or longitudinal zone load values. Torsional loading shall apply to all 8 basic load cases applied at each reference corner.
   Exception: One-story buildings with "h" <= 30', buildings <= 2 stories framed with light frame construction, and buildings <=2 stories designed with flexible diaphragms need not be designed for torsional load cases.
5. Per Code Section 28.4.4, the minimum wind load for MWFRS shall not be less than 16 psf.

Low-Rise Buildings h <= 60'

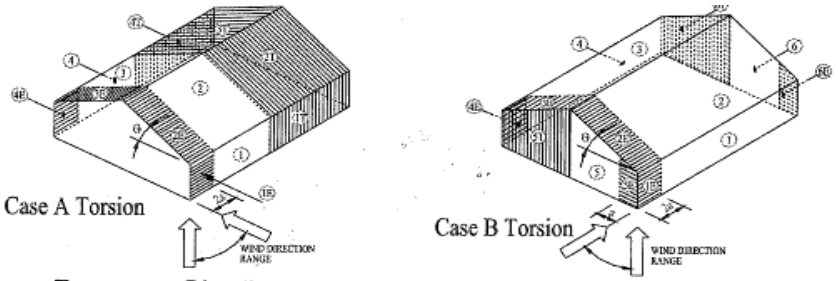


Load Case A



Load Case B

Basic Load Cases



Transverse Direction

Longitudinal Direction

Torsional Load Cases

WIND LOADING ANALYSIS - Wall Components and Cladding

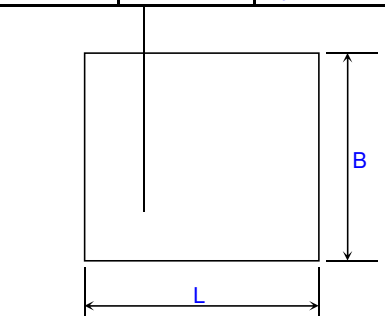
Per ASCE 7-10 Code for Buildings of Any Height

Using Part 1 & 3: Analytical Procedure (Section 30.4 & 30.6)

Job Name:	SMC - Miller	Location:	McCall, Idaho		
Job Number:	2017-04857	Originator:	ara	Checker:	kkj

Input Data:

Wind Speed, V =	115	mph (Wind Map, Figure 26.5-1A-C)
Bldg. Classification =	II	(Table 1.5-1 Risk Category)
Exposure Category =	C	(Sect. 26.7)
Ridge Height, hr =	29.25	ft. (hr >= he)
Eave Height, he =	10.25	ft. (he <= hr)
Building Width =	57.00	ft. (Normal to Building Ridge)
Building Length =	94.00	ft. (Parallel to Building Ridge)
Roof Type =	Monoslope	(Gable or Monoslope)
Topo. Factor, Kzt =	1.00	(Sect. 26.8 & Figure 26.8-1)
Direct. Factor, Kd =	0.85	(Table 26.6)
Enclosed? (Y/N)	Y	(Sect. 28.6-1 & Figure 26.11-1)
Hurricane Region?	N	
Component Name =	Wall	(Girt, Siding, Wall, or Fastener)
Effective Area, Ae =	21.333333	ft.^2 (Area Tributary to C&C)



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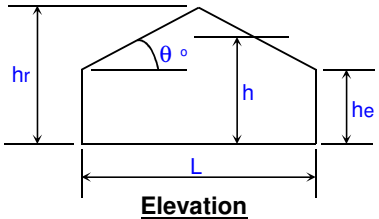


Elevation

Resulting Parameters and Coefficients:

Roof Angle, θ =	18.43	deg.
Mean Roof Ht., h =	19.75	ft. (h = (hr+he)/2, for roof angle >10 deg.)

Wall External Pressure Coefficients, GCp:

GCp Zone 4 Pos. =	0.94	(Fig. 30.4-1)
GCp Zone 5 Pos. =	0.94	(Fig. 30.4-1)
GCp Zone 4 Neg. =	-1.04	(Fig. 30.4-1)
GCp Zone 5 Neg. =	-1.28	(Fig. 30.4-1)

Positive & Negative Internal Pressure Coefficients, GCpi (Figure 26.11-1):

+GCpi Coef. =	0.18	(positive internal pressure)
-GCpi Coef. =	-0.18	(negative internal pressure)

If z <= 15 then: Kz = 2.01*(15/zg)^(2/α) , If z > 15 then: Kz = 2.01*(z/zg)^(2/α) (Table 30.3-1)

α =	9.50	(Table 26.9-1)
zg =	900	(Table 26.9-1)
Kh =	0.90	(Kh = Kz evaluated at z = h)

Velocity Pressure: qz = 0.00256*Kz*Kzt*Kd*V^2 (Sect. 30.3.2, Eq. 30.3-1)

qh = 25.89 psf qh = 0.00256*Kh*Kzt*Kd*V^2 (qz evaluated at z = h)

Design Net External Wind Pressures (Sect. 30.4 & 30.6):

For h <= 60 ft.: p = qh*((GCp) - (+/-GCpi)) (psf)

For h > 60 ft.: p = q*(GCp) - qi*(+/-GCpi) (psf)

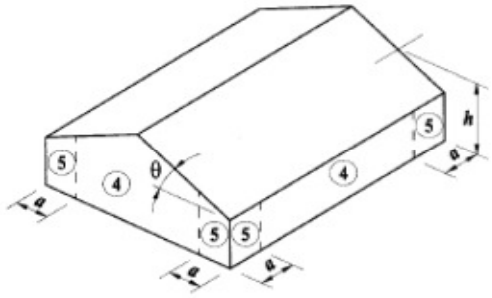
where: q = qz for windward walls, q = qh for leeward walls and side walls

qi = qh for all walls (conservatively assumed per Sect. 30.6)

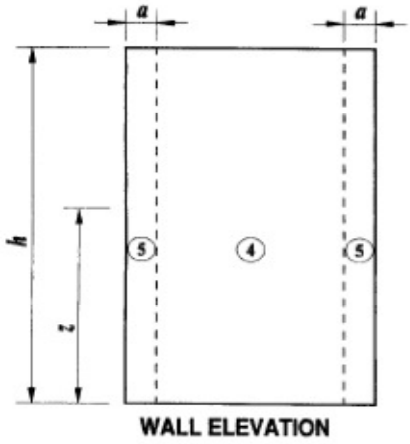
Wind Load Tabulation for Wall Components & Cladding							
Component	z (ft.)	Kh	qh (psf)	p = Net Design Pressures (psf)			
				Zone 4 (+)	Zone 4 (-)	Zone 5 (+)	Zone 5 (-)
Wall	0	0.90	25.89	29.04	-31.63	29.04	-37.89
	15.00	0.90	25.89	29.04	-31.63	29.04	-37.89
	20.00	0.90	25.89	29.04	-31.63	29.04	-37.89
	25.00	0.90	25.89	29.04	-31.63	29.04	-37.89
For z = hr:	29.25	0.90	25.89	29.04	-31.63	29.04	-37.89
For z = he:	10.25	0.90	25.89	29.04	-31.63	29.04	-37.89
For z = h:	19.75	0.90	25.89	29.04	-31.63	29.04	-37.89

Notes: 1. (+) and (-) signs signify wind pressures acting toward & away from respective surfaces.
2. Width of Zone 5 (end zones), 'a' = 5.70 ft.
3. Per Code Section 30.2.2, the minimum wind load for C&C shall not be less than 16 psf.
4. References : a. ASCE 7-10, "Minimum Design Loads for Buildings and Other Structures".
b. "Guide to the Use of the Wind Load Provisions of ASCE 7-02"
by: Kishor C. Mehta and James M. Delahay (2004).

Wall Components and Cladding:



Wall Zones for Buildings with h <= 60 ft.



Wall Zones for Buildings with h > 60 ft.

WIND LOADING ANALYSIS - Roof Components and Cladding

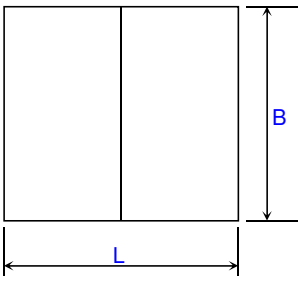
Per ASCE 7-10 Code for Bldgs. of Any Height with Gable Roof θ <= 45˚ or Monoslope Roof θ <= 3˚

Using Part 1 & 3: Analytical Procedure (Section 30.4 & 30.6)

Job Name:	SMC - Miller	Location:	McCall, Idaho		
Job Number:	2017-04857	Originator:	ara	Checker:	kkj

Input Data:

Wind Speed, V =	115	mph (Wind Map, Figure 26.5-1A-C)
Bldg. Classification =	II	(Table 1-1 Occupancy Category)
Exposure Category =	C	(Sect. 26.7)
Ridge Height, hr =	29.25	ft. (hr >= he)
Eave Height, he =	10.25	ft. (he <= hr)
Building Width =	57.00	ft. (Normal to Building Ridge)
Building Length =	94.00	ft. (Parallel to Building Ridge)
Roof Type =	Gable	(Gable or Monoslope)
Topo. Factor, Kzt =	1.00	(Sect. 26.8 & Figure 26.8-1)
Direct. Factor, Kd =	0.85	(Table 26.6)
Enclosed? (Y/N)	Y	(Sect. 28.6-1 & Figure 26.11-1)
Hurricane Region?	N	
Component Name =	Joist	(Purlin, Joist, Decking, or Fastener)
Effective Area, Ae =	36.75	ft.^2 (Area Tributary to C&C)
Overhangs? (Y/N)	Y	(if used, overhangs on all sides)



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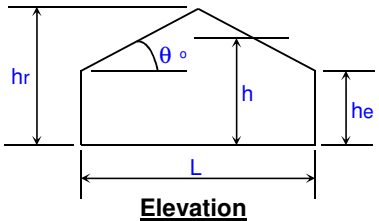


Elevation

Resulting Parameters and Coefficients:

Roof Angle, θ =	33.69	deg.
Mean Roof Ht., h =	19.75	ft. (h = (hr+he)/2, for roof angle >10 deg.)

Roof External Pressure Coefficients, GCp:

GCp Zone 1-3 Pos. =	0.84	(Fig. 30.4-2A, 30.4-2B, and 30.4-2C)
GCp Zone 1 Neg. =	-0.89	(Fig. 30.4-2A, 30.4-2B, and 30.4-2C)
GCp Zone 2 Neg. =	-1.89	(Fig. 30.4-2A, 30.4-2B, and 30.4-2C)
GCp Zone 3 Neg. =	-1.89	(Fig. 30.4-2A, 30.4-2B, and 30.4-2C)

Positive & Negative Internal Pressure Coefficients, GCpi (Figure 26.11-1):

+GCpi Coef. =	0.18	(positive internal pressure)
-GCpi Coef. =	-0.18	(negative internal pressure)

If z <= 15 then: Kz = 2.01*(15/zg)^(2/α) , If z > 15 then: Kz = 2.01*(z/zg)^(2/α) (Table 30.3-1)

α =	9.50	(Table 26.9-1)
zg =	900	(Table 26.9-1)
Kh =	0.90	(Kh = Kz evaluated at z = h)

Velocity Pressure: qz = 0.00256*Kz*Kzt*Kd*V^2 (Sect. 30.3.2, Eq. 30.3-1)

qh = 25.89 psf qh = 0.00256*Kh*Kzt*Kd*V^2 (qz evaluated at z = h)

Design Net External Wind Pressures (Sect. 30.4 & 30.6):

For h <= 60 ft.: p = qh*((GCp) - (+/-GCpi)) (psf)

For h > 60 ft.: p = q*(GCp) - qi*(+/-GCpi) (psf)

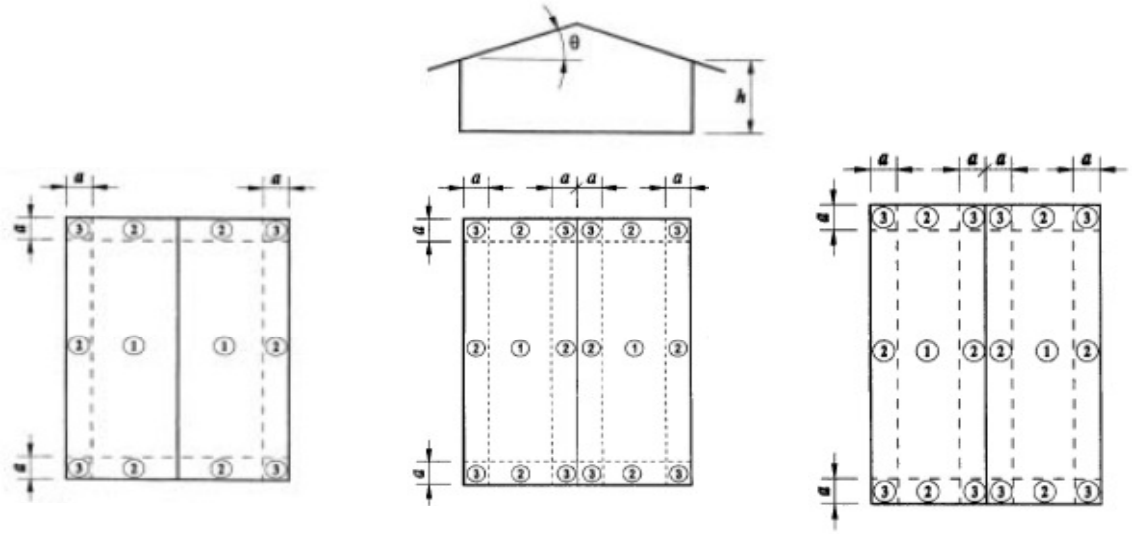
where: q = qh for roof

qi = qh for roof (conservatively assumed per Sect. 30.6)

Wind Load Tabulation for Roof Components & Cladding							
Component	z (ft.)	Kh	qh (psf)	p = Net Design Pressures (psf)			
				Zone 1,2,3 (+)	Zone 1 (-)	Zone 2 (-)	Zone 3 (-)
Joist	0	0.90	25.89	26.49	-27.62	-53.50	-53.50
	15.00	0.90	25.89	26.49	-27.62	-53.50	-53.50
	20.00	0.90	25.89	26.49	-27.62	-53.50	-53.50
	25.00	0.90	25.89	26.49	-27.62	-53.50	-53.50
For z = hr:	29.25	0.90	25.89	26.49	-27.62	-53.50	-53.50
For z = he:	10.25	0.90	25.89	26.49	-27.62	-53.50	-53.50
For z = h:	19.75	0.90	25.89	26.49	-27.62	-53.50	-53.50

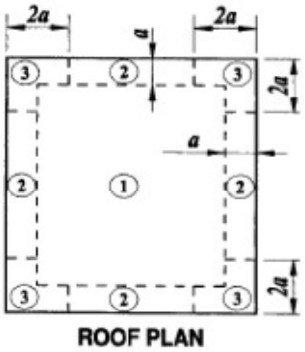
Notes:
1. (+) and (-) signs signify wind pressures acting toward & away from respective surfaces.
2. Width of Zone 2 (edge), 'a' = 5.70 ft.
3. Width of Zone 3 (corner), 'a' = 5.70 ft.
4. For monoslope roofs with θ <= 3 degrees, use Fig. 30.4-2A for 'GCp' values with 'qh'.
5. For buildings with h > 60' and θ > 10 degrees, use Fig. 30.6-1 for 'GCpi' values with 'qh'.
6. For all buildings with overhangs, use Fig. 30.4-2B for 'GCp' values per Sect. 30.10.
7. If a parapet >= 3' in height is provided around perimeter of roof with θ <= 10 degrees, Zone 3 shall be treated as Zone 2.
8. Per Code Section 30.2.2, the minimum wind load for C&C shall not be less than 16 psf.
9. References : a. ASCE 7-02, "Minimum Design Loads for Buildings and Other Structures".
   b. "Guide to the Use of the Wind Load Provisions of ASCE 7-02" by: Kishor C. Mehta and James M. Delahay (2004).

Roof Components and Cladding:



θ <= 7 deg. **7 deg. < θ <= 27 deg.** **27 deg. < θ <= 45 deg.**

Roof Zones for Buildings with h <= 60 ft.
(for Gable Roofs <= 45° and Monoslope Roofs <= 3°)

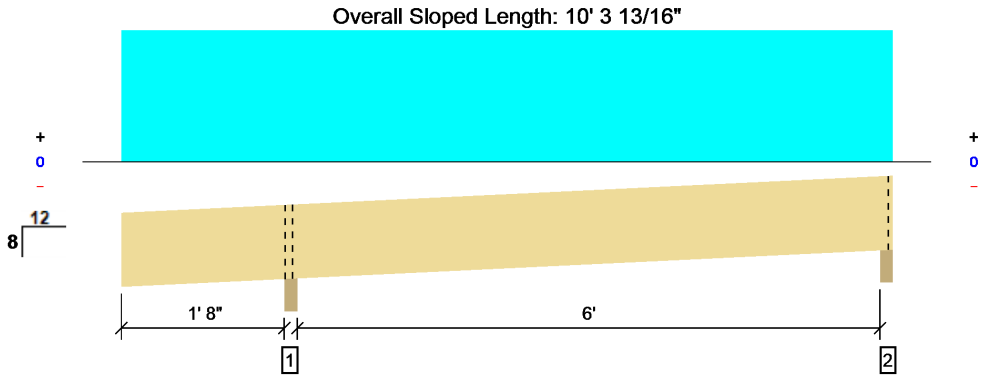


ROOF PLAN

Roof Zones for Buildings with h > 60 ft.
(for Gable Roofs <= 10° and Monoslope Roofs <= 3°)

PASSED

1 piece(s) 2 x 8 Douglas Fir-Larch No. 2 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1180 @ 1' 9 3/4"	3944 (3.50")	Passed (30%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	620 @ 2' 5 9/16"	1501	Passed (41%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1000 @ 5' 7/8"	1564	Passed (64%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	-0.095 @ 0	0.218	Passed (2L/550)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	-0.104 @ 0	0.290	Passed (2L/500)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD
Member Pitch: 8/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Top Edge Bracing (Lu): Top compression edge must be braced at 9' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 9' 11" o/c unless detailed otherwise.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Beveled Plate - DF	3.50"	3.50"	1.50"	141	1038	1179	Blocking
2 - Beveled Plate - DF	3.50"	3.50"	1.50"	83	638	721	Blocking

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

Loads	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 8' 3"	16"	17.0	150.0	Roof

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

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Andrew Aitchison Performance Engineers (208) 475-0023 andrewa@inteframe.com	

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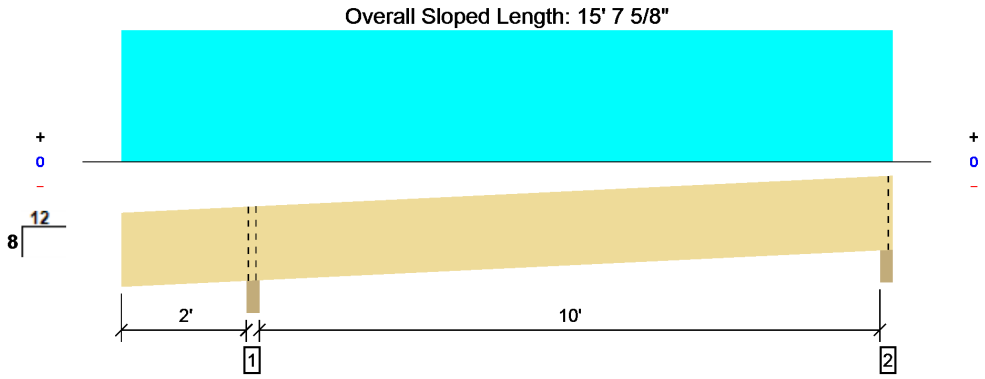
PASSED

1 piece(s) 2 x 10 Douglas Fir-Larch No. 2 @ 12" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1276 @ 2' 1 3/4"	3944 (3.50")	Passed (32%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	776 @ 2' 11 3/16"	1915	Passed (41%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2121 @ 7' 4 5/8"	2334	Passed (91%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	-0.203 @ 0	0.258	Passed (2L/304)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	-0.228 @ 0	0.344	Passed (2L/272)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD
Member Pitch: 8/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Top Edge Bracing (Lu): Top compression edge must be braced at 4' 3" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 15' 1" o/c unless detailed otherwise.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Beveled Plate - DF	3.50"	3.50"	1.50"	153	1123	1276	Blocking
2 - Beveled Plate - DF	3.50"	3.50"	1.50"	104	782	886	Blocking

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

Loads	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 12' 7"	12"	17.0	150.0	Roof

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Forte Software Operator	Job Notes
Andrew Aitchison Performance Engineers (208) 475-0023 andrewa@inteframe.com	

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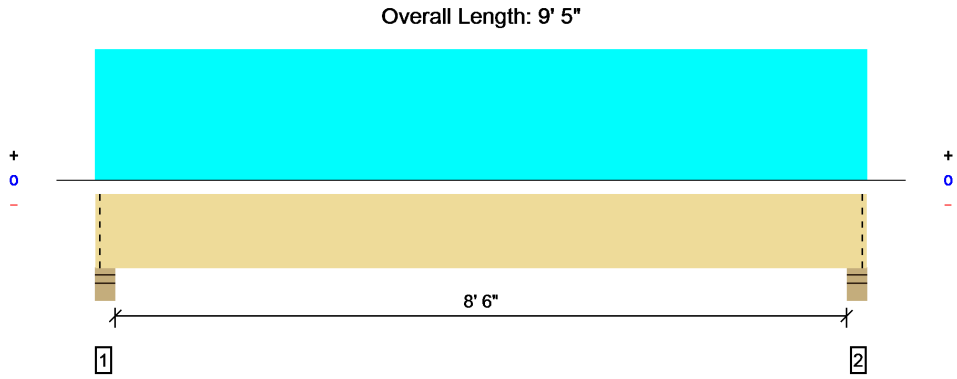
1 piece(s) 5 1/8" x 10 1/2" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4779 @ 4"	17617 (5.50")	Passed (27%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3426 @ 1' 4"	10933	Passed (31%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	9715 @ 4' 8 1/2"	21660	Passed (45%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.133 @ 4' 8 1/2"	0.438	Passed (L/787)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.150 @ 4' 8 1/2"	0.583	Passed (L/698)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Top Edge Bracing (Lu): Top compression edge must be braced at 9' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 9' 5" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 8' 9".
- 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			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - DF	5.50"	5.50"	1.50"	542	4238	4780	Blocking
2 - Stud wall - DF	5.50"	5.50"	1.50"	542	4238	4780	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 9' 5"	N/A	13.1		
1 - Uniform (PSF)	0 to 9' 5" (Front)	6'	17.0	150.0	Roof

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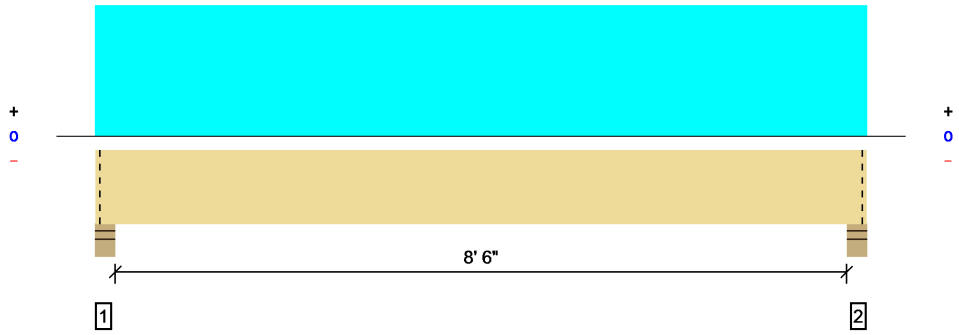
1 piece(s) 8 3/4" x 13 1/2" 24F-V4 DF Glulam

PASSED

Overall Length: 9' 5"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4067 @ 4"	30078 (5.50")	Passed (14%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2699 @ 1' 7"	23999	Passed (11%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	8266 @ 4' 8 1/2"	61130	Passed (14%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.031 @ 4' 8 1/2"	0.438	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.035 @ 4' 8 1/2"	0.583	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Top Edge Bracing (Lu): Top compression edge must be braced at 9' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 9' 5" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 8' 9".
- 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			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - DF	5.50"	5.50"	1.50"	535	3531	4066	Blocking
2 - Stud wall - DF	5.50"	5.50"	1.50"	535	3531	4066	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 9' 5"	N/A	28.7		
1 - Uniform (PSF)	0 to 9' 5" (Front)	5'	17.0	150.0	Roof

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1 piece(s) 5 1/8" x 9" 24F-V4 DF Glulam

PASSED

Overall Length: 4' 11"

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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	9881 @ 4"	17617 (5.50")	Passed (56%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	5024 @ 1' 2 1/2"	9371	Passed (54%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	9075 @ 2' 5 1/2"	15913	Passed (57%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.047 @ 2' 5 1/2"	0.213	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.053 @ 2' 5 1/2"	0.283	Passed (L/969)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Top Edge Bracing (Lu): Top compression edge must be braced at 4' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 4' 11" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 4' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - DF	5.50"	5.50"	3.08"	1031	8850	9881	Blocking
2 - Stud wall - DF	5.50"	5.50"	3.08"	1031	8850	9881	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 4' 11"	N/A	11.2		
1 - Uniform (PSF)	0 to 4' 11" (Front)	24'	17.0	150.0	Roof

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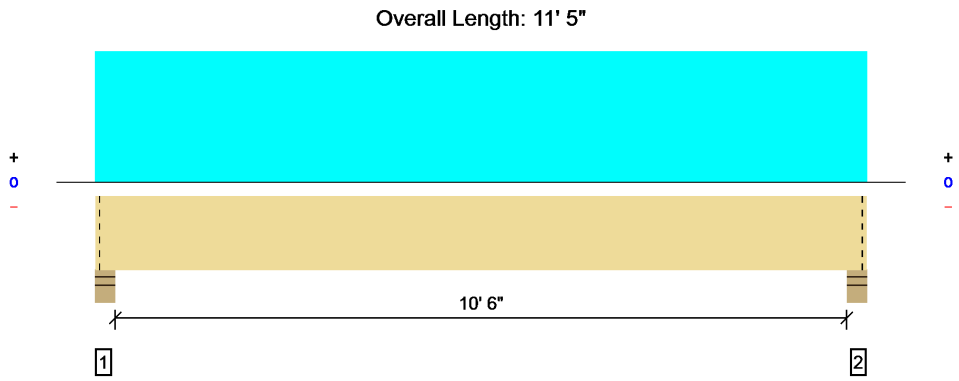
1 piece(s) 8 3/4" x 13 1/2" 24F-V4 DF Glulam

PASSED



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	6837 @ 4"	30078 (5.50")	Passed (23%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	4941 @ 1' 7"	23999	Passed (21%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	17301 @ 5' 8 1/2"	61130	Passed (28%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.098 @ 5' 8 1/2"	0.538	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.111 @ 5' 8 1/2"	0.717	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Top Edge Bracing (Lu): Top compression edge must be braced at 11' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 11' 5" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 10' 9".
- 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			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - DF	5.50"	5.50"	1.50"	843	5994	6837	Blocking
2 - Stud wall - DF	5.50"	5.50"	1.50"	843	5994	6837	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 11' 5"	N/A	28.7		
1 - Uniform (PSF)	0 to 11' 5" (Front)	7'	17.0	150.0	Roof

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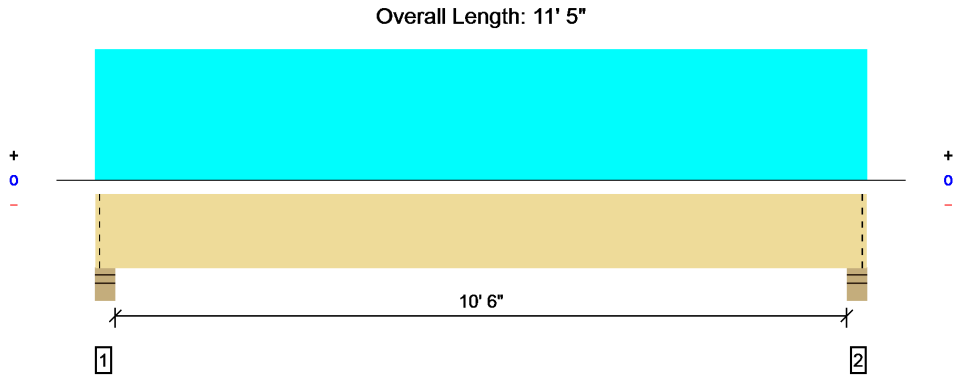
04857.4te

1 piece(s) 5 1/8" x 12" 24F-V4 DF Glulam

PASSED



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	6758 @ 4"	17617 (5.50")	Passed (38%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	5032 @ 1' 5 1/2"	12495	Passed (40%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	17102 @ 5' 8 1/2"	28290	Passed (60%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.238 @ 5' 8 1/2"	0.538	Passed (L/543)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.268 @ 5' 8 1/2"	0.717	Passed (L/482)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Top Edge Bracing (Lu): Top compression edge must be braced at 11' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 11' 5" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 10' 9".
- 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			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - DF	5.50"	5.50"	2.11"	765	5994	6759	Blocking
2 - Stud wall - DF	5.50"	5.50"	2.11"	765	5994	6759	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 11' 5"	N/A	14.9		
1 - Uniform (PSF)	0 to 11' 5" (Front)	7'	17.0	150.0	Roof

Weyerhaeuser Notes

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

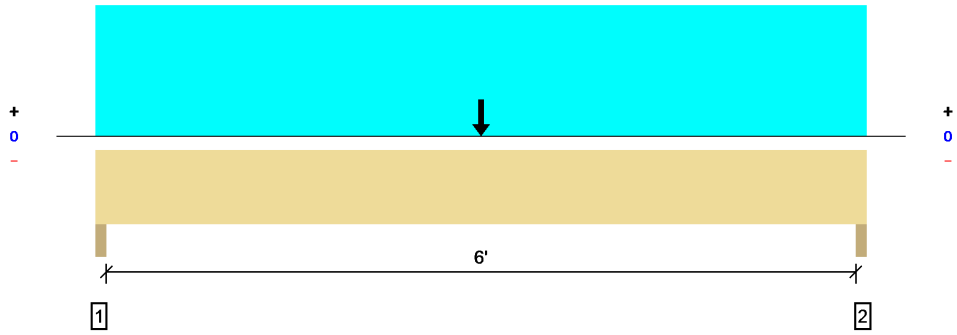
SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
Andrew Aitchison Performance Engineers (208) 475-0023 andrewa@inteframe.com	

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

PASSED

Overall Length: 6' 6"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5590 @ 1 1/2"	7875 (3.00")	Passed (71%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	4747 @ 1' 2 7/8"	9081	Passed (52%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	13882 @ 3' 3"	20525	Passed (68%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.109 @ 3' 3"	0.313	Passed (L/687)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.123 @ 3' 3"	0.417	Passed (L/609)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD

- Deflection criteria: LL (L/240) and TL (L/180).
- Top Edge Bracing (Lu): Top compression edge must be braced at 6' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 6' 6" o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - DF	3.00"	3.00"	2.13"	643	4947	5590	None
2 - Trimmer - DF	3.00"	3.00"	2.13"	643	4947	5590	None

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 6"	N/A	12.1		
1 - Uniform (PSF)	0 to 6' 6"	4'	17.0	150.0	Outlooker Load
2 - Point (lb)	3' 3"	N/A	765	5994	Linked from: B10, Support 1

Weyerhaeuser Notes

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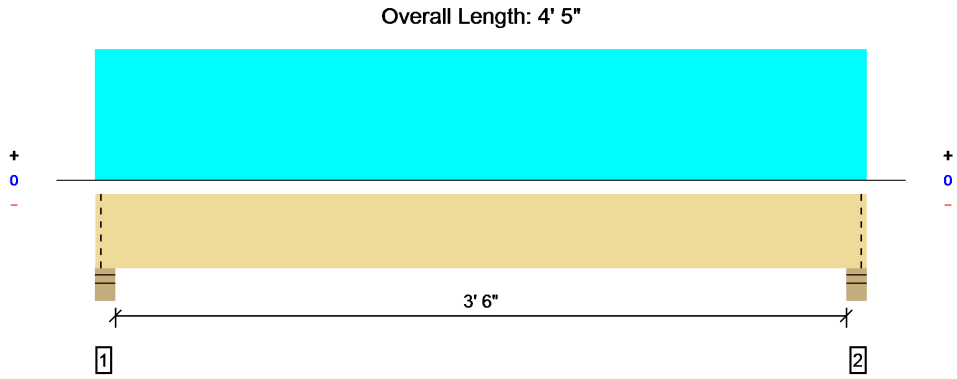
The product application, input design loads, dimensions and support information have been provided by Forte Software Operator

SUSTAINABLE FORESTRY INITIATIVE

1 piece(s) 6 x 12 Douglas Fir-Larch No. 2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	7780 @ 4"	18906 (5.50")	Passed (41%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2789 @ 1' 5"	8244	Passed (34%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	6193 @ 2' 2 1/2"	10166	Passed (61%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.015 @ 2' 2 1/2"	0.188	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.017 @ 2' 2 1/2"	0.250	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Top Edge Bracing (Lu): Top compression edge must be braced at 4' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 4' 5" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - DF	5.50"	5.50"	2.26"	824	6956	7780	Blocking
2 - Stud wall - DF	5.50"	5.50"	2.26"	824	6956	7780	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 4' 5"	N/A	16.0		
1 - Uniform (PSF)	0 to 4' 5" (Front)	21'	17.0	150.0	Roof

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

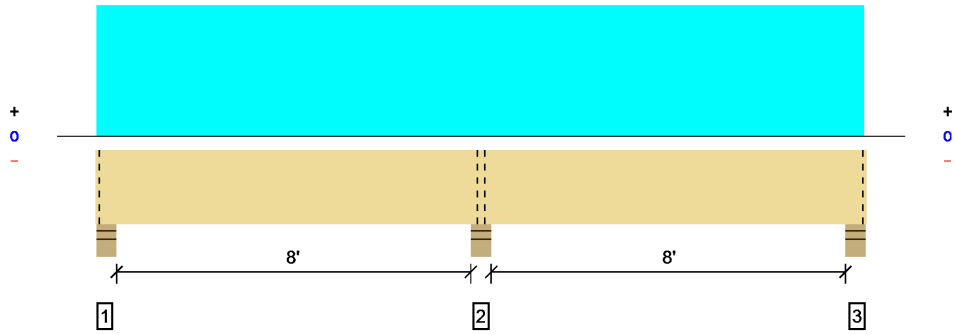
SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
Andrew Aitchison Performance Engineers (208) 475-0023 andrewa@inteframe.com	

1 piece(s) 8 3/4" x 13 1/2" 24F-V4 DF Glulam

PASSED

Overall Length: 17' 4 1/2"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	12507 @ 8' 8 1/4"	30078 (5.50")	Passed (42%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	4632 @ 10' 1/2"	23999	Passed (19%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	6768 @ 13' 8 3/16"	61130	Passed (11%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-10449 @ 8' 8 1/4"	47121	Passed (22%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.020 @ 13' 2 7/8"	0.418	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.022 @ 13' 3 3/16"	0.557	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Top Edge Bracing (Lu): Top compression edge must be braced at 17' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 17' 5" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 6' 8 11/16".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 4' 2 1/8".
- 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			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - DF	5.50"	5.50"	1.50"	512	3914	4426	Blocking
2 - Stud wall - DF	5.50"	5.50"	2.29"	1543	10965	12508	Blocking
3 - Stud wall - DF	5.50"	5.50"	1.50"	512	3914	4426	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 17' 4 1/2"	N/A	28.7		
1 - Uniform (PSF)	0 to 17' 4 1/2" (Front)	7'	17.0	150.0	Roof

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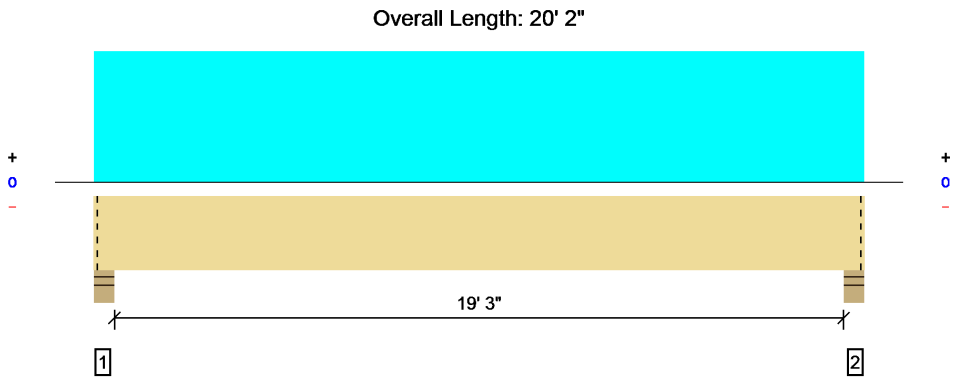
The product application, input design loads, dimensions and support information have been provided by Forte Software Operator

SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
Andrew Aitchison Performance Engineers (208) 475-0023 andrewa@inteframe.com	

PASSED

1 piece(s) 8 3/4" x 19 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.;Drawing is Conceptual

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	17257 @ 4"	30078 (5.50")	Passed (57%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	13692 @ 2' 1"	34665	Passed (39%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	81348 @ 10' 1"	116026	Passed (70%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.501 @ 10' 1"	0.975	Passed (L/467)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.572 @ 10' 1"	1.300	Passed (L/409)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Top Edge Bracing (Lu): Top compression edge must be braced at 20' 2" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 20' 2" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 0.91 that was calculated using length L = 19' 6".
- 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			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - DF	5.50"	5.50"	3.16"	2132	15125	17257	Blocking
2 - Stud wall - DF	5.50"	5.50"	3.16"	2132	15125	17257	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 20' 2"	N/A	41.5		
1 - Uniform (PSF)	0 to 20' 2" (Front)	10'	17.0	150.0	Roof

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SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
Andrew Aitchison Performance Engineers (208) 475-0023 andrewa@inteframe.com	

9/22/2017 10:50:15 AM
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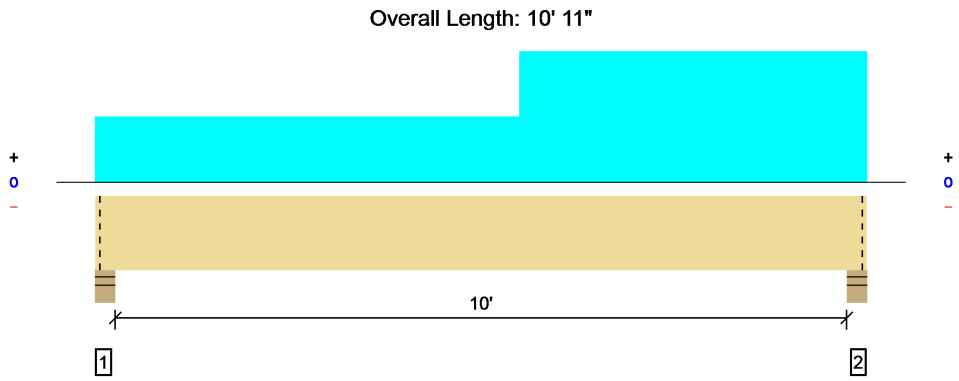
1 piece(s) 5 1/8" x 15" 24F-V4 DF Glulam

PASSED



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	11813 @ 10' 7"	17617 (5.50")	Passed (67%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	7502 @ 9' 2 1/2"	15618	Passed (48%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	23851 @ 6' 2 13/16"	44203	Passed (54%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.153 @ 5' 7 1/8"	0.512	Passed (L/806)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.172 @ 5' 7 1/16"	0.683	Passed (L/716)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Top Edge Bracing (Lu): Top compression edge must be braced at 10' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 10' 11" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 10' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - DF	5.50"	5.50"	2.57"	929	7293	8222	Blocking
2 - Stud wall - DF	5.50"	5.50"	3.69"	1294	10519	11813	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 10' 11"	N/A	18.7		
1 - Uniform (PSF)	0 to 6' (Front)	7' 6"	17.0	150.0	Roof
2 - Uniform (PSF)	6' to 10' 11" (Front)	15'	17.0	150.0	Roof

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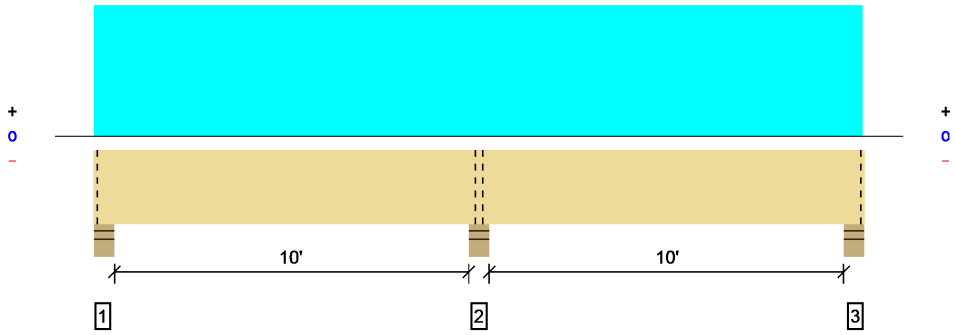
SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
Andrew Aitchison Performance Engineers (208) 475-0023 andrewa@inteframe.com	

PASSED

1 piece(s) 8 3/4" x 13 1/2" 24F-V4 DF Glulam

Overall Length: 21' 4 1/2"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	15502 @ 10' 8 1/4"	20453 (5.50")	Passed (76%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	6129 @ 12' 1/2"	23999	Passed (26%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	10396 @ 4' 6"	61130	Passed (17%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-16051 @ 10' 8 1/4"	47121	Passed (34%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.047 @ 16' 4 3/8"	0.518	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.052 @ 16' 4 11/16"	0.690	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Top Edge Bracing (Lu): Top compression edge must be braced at 21' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 21' 5" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 8' 4".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 5' 2 1/8".
- 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			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - DF	5.50"	5.50"	1.50"	623	4767	5390	Blocking
2 - Stud wall - SPF	5.50"	5.50"	4.17"	1912	13590	15502	Blocking
3 - Stud wall - DF	5.50"	5.50"	1.50"	623	4767	5390	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 21' 4 1/2"	N/A	28.7		
1 - Uniform (PSF)	0 to 21' 4 1/2" (Front)	7'	17.0	150.0	Roof

Weyerhaeuser Notes

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SUSTAINABLE FORESTRY INITIATIVE

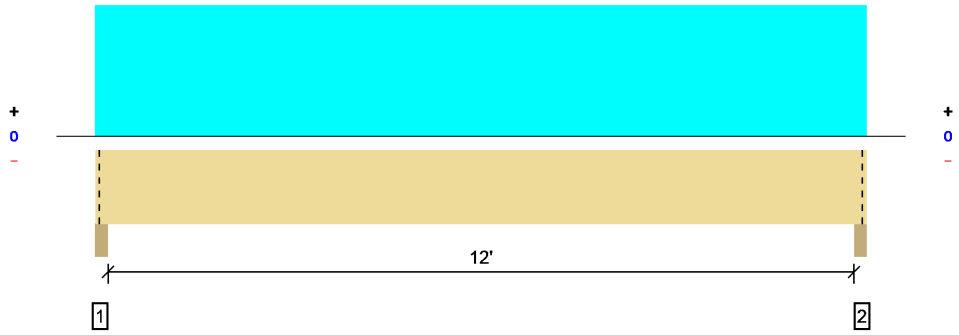
Forte Software Operator	Job Notes
Andrew Aitchison Performance Engineers (208) 475-0023 andrewa@inteframe.com	

MEMBER REPORT *Miller Residence, Master Deck Joists*

PASSED

2 piece(s) 2 x 8 Douglas Fir-Larch No. 2 @ 16" OC

Overall Length: 12' 7"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	881 @ 2 1/2"	6563 (3.50")	Passed (13%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	755 @ 10 3/4"	3002	Passed (25%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2590 @ 6' 3 1/2"	3128	Passed (83%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.410 @ 6' 3 1/2"	0.406	Passed (L/356)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.453 @ 6' 3 1/2"	0.608	Passed (L/322)	--	1.0 D + 1.0 S (All Spans)
TJ-Pro™ Rating	N/A	N/A	--	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 12' 7" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' 7" o/c unless detailed otherwise.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Beam - DF	3.50"	3.50"	1.50"	84	797	881	Blocking
2 - Beam - DF	3.50"	3.50"	1.50"	84	797	881	Blocking

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

Loads	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 12' 7"	16"	10.0	95.0	Residential - Living Areas

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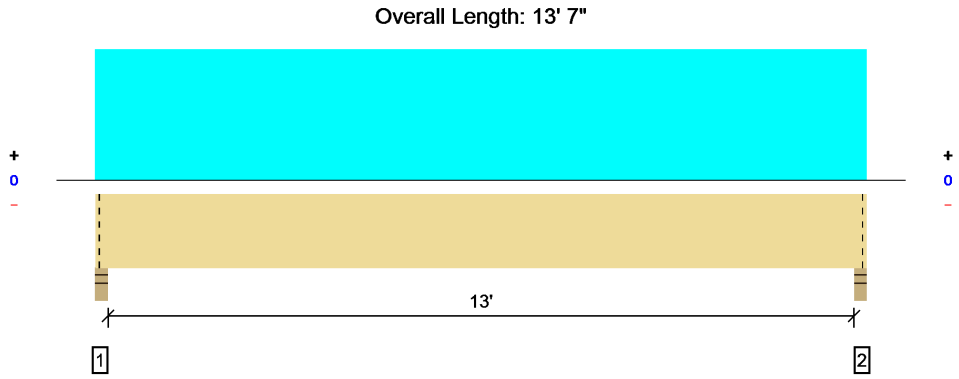
The product application, input design loads, dimensions and support information have been provided by Forte Software Operator

SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
Andrew Aitchison Performance Engineers (208) 475-0023 andrewa@inteframe.com	

1 piece(s) 5 1/8" 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.;Drawing is Conceptual

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5615 @ 2"	11211 (3.50")	Passed (50%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	4444 @ 1' 5"	14057	Passed (32%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	18145 @ 6' 9 1/2"	35805	Passed (51%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.275 @ 6' 9 1/2"	0.442	Passed (L/578)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.303 @ 6' 9 1/2"	0.663	Passed (L/524)	--	1.0 D + 1.0 S (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 13' 7" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 13' 7" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 13' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - DF	3.50"	3.50"	1.75"	522	5094	5616	Blocking
2 - Stud wall - DF	3.50"	3.50"	1.75"	522	5094	5616	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 13' 7"	N/A	16.8		
1 - Uniform (PSF)	0 to 13' 7" (Front)	5'	12.0	150.0	Residential - Living Areas

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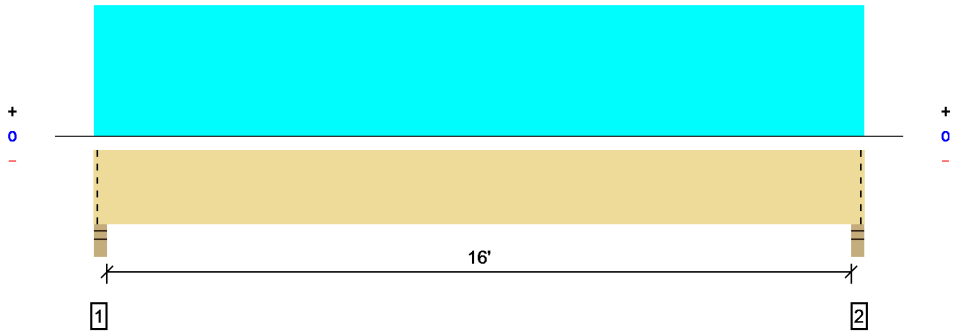
SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
Andrew Aitchison Performance Engineers (208) 475-0023 andrewa@inteframe.com	

1 piece(s) 6 3/4" x 15" 24F-V4 DF Glulam

PASSED

Overall Length: 16' 7"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5594 @ 2"	14766 (3.50")	Passed (38%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4554 @ 1' 6 1/2"	17888	Passed (25%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	22267 @ 8' 3 1/2"	49414	Passed (45%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.230 @ 8' 3 1/2"	0.542	Passed (L/849)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.310 @ 8' 3 1/2"	0.813	Passed (L/630)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 16' 7" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 16' 7" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 0.98 that was calculated using length L = 16' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - DF	3.50"	3.50"	1.50"	1448	4146	5594	Blocking
2 - Stud wall - DF	3.50"	3.50"	1.50"	1448	4146	5594	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 16' 7"	N/A	24.6		
1 - Uniform (PSF)	0 to 16' 7" (Front)	12' 6"	12.0	40.0	Residential - Living Areas

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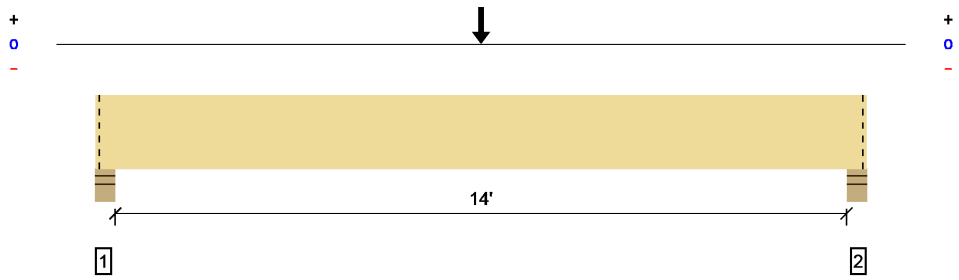
Forte Software Operator	Job Notes
Andrew Aitchison Performance Engineers (208) 475-0023 andrewa@inteframe.com	

PASSED

1 piece(s) 5 1/8" x 12" 24F-V4 DF Glulam

Overall Length: 14' 11"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3524 @ 4"	17617 (5.50")	Passed (20%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3502 @ 1' 5 1/2"	12495	Passed (28%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	24693 @ 7' 5 1/2"	28290	Passed (87%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.480 @ 7' 5 1/2"	0.712	Passed (L/356)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.546 @ 7' 5 1/2"	0.950	Passed (L/313)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Top Edge Bracing (Lu): Top compression edge must be braced at 14' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 14' 11" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 14' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - DF	5.50"	5.50"	1.50"	461	3063	3524	Blocking
2 - Stud wall - DF	5.50"	5.50"	1.50"	461	3063	3524	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 14' 11"	N/A	14.9		
1 - Point (lb)	7' 5 1/2" (Front)	N/A	700	6125	Roof

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SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
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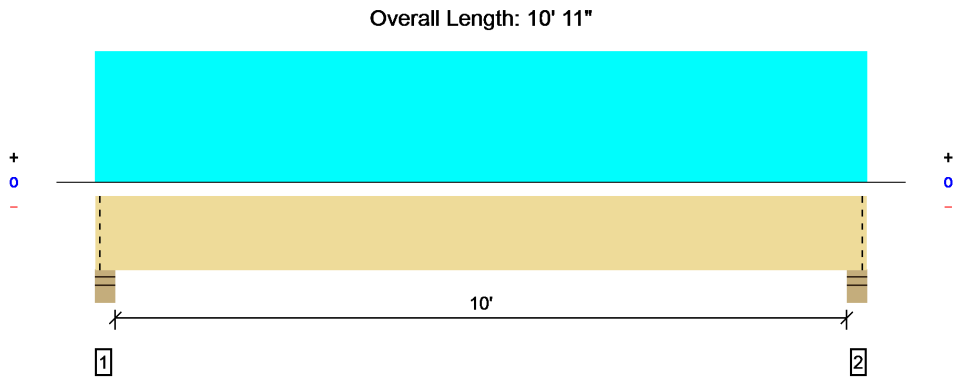
1 piece(s) 5 1/8" x 10 1/2" 24F-V4 DF Glulam

PASSED



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	8805 @ 4"	17617 (5.50")	Passed (50%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	6654 @ 1' 4"	10933	Passed (61%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	21184 @ 5' 5 1/2"	21660	Passed (98%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.419 @ 5' 5 1/2"	0.512	Passed (L/294)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.450 @ 5' 5 1/2"	0.683	Passed (L/273)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Top Edge Bracing (Lu): Top compression edge must be braced at 10' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 10' 11" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 10' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - DF	5.50"	5.50"	2.75"	617	8187	8804	Blocking
2 - Stud wall - DF	5.50"	5.50"	2.75"	617	8187	8804	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 10' 11"	N/A	13.1		
1 - Uniform (PSF)	0 to 10' 11" (Front)	10'	10.0	150.0	Roof

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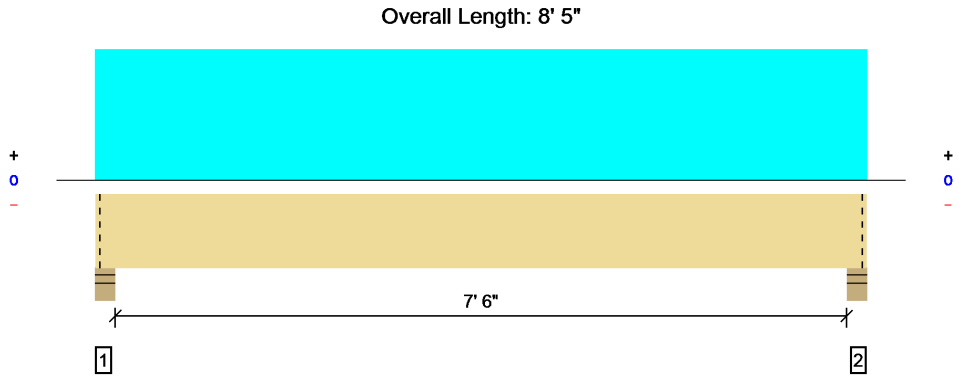
SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
Andrew Aitchison Performance Engineers (208) 475-0023 andrewa@inteframe.com	

MEMBER REPORT *Miller Residence, B5*

PASSED

1 piece(s) 6 x 10 Douglas Fir-Larch No. 2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3422 @ 4"	18906 (5.50")	Passed (18%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2406 @ 1' 3"	6810	Passed (35%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	6106 @ 4' 2 1/2"	6937	Passed (88%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.119 @ 4' 2 1/2"	0.258	Passed (L/780)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.129 @ 4' 2 1/2"	0.387	Passed (L/720)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 8' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 8' 5" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - DF	5.50"	5.50"	1.50"	266	3156	3422	Blocking
2 - Stud wall - DF	5.50"	5.50"	1.50"	266	3156	3422	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 8' 5"	N/A	13.2		
1 - Uniform (PSF)	0 to 8' 5" (Front)	5'	10.0	150.0	Roof

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SUSTAINABLE FORESTRY INITIATIVE

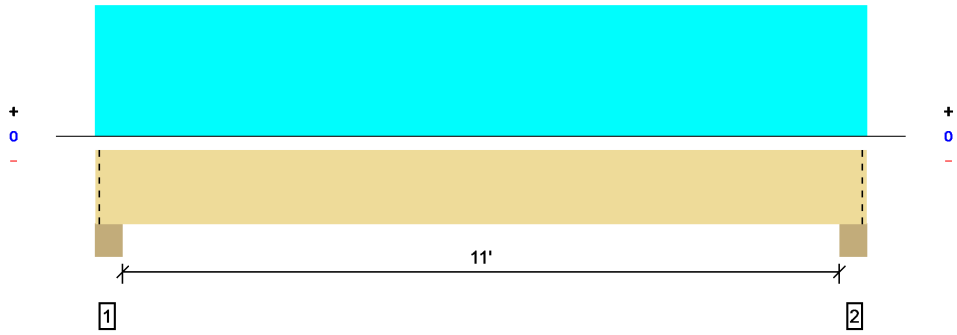
Forte Software Operator	Job Notes
Andrew Aitchison Performance Engineers (208) 475-0023 andrewa@inteframe.com	

MEMBER REPORT *Miller Residence, B13*

1 piece(s) 6 3/4" x 18" 24F-V4 DF Glulam

PASSED

Overall Length: 12' 3"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	26396 @ 6"	32906 (7.50")	Passed (80%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	17238 @ 2' 1 1/2"	24685	Passed (70%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	68178 @ 6' 1 1/2"	83361	Passed (82%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.220 @ 6' 1 1/2"	0.375	Passed (L/614)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.263 @ 6' 1 1/2"	0.563	Passed (L/513)	--	1.0 D + 1.0 S (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 12' 3" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' 3" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 0.99 that was calculated using length L = 11' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Column - DF	7.50"	7.50"	6.02"	4346	3920	22050	30316	Blocking
2 - Column - DF	7.50"	7.50"	6.02"	4346	3920	22050	30316	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 12' 3"	N/A	29.5			
1 - Uniform (PSF)	0 to 12' 3" (Front)	16'	12.0	40.0	-	Residential - Living Areas
2 - Uniform (PSF)	0 to 12' 3" (Front)	24'	17.0	-	150.0	Roof Load
3 - Uniform (PSF)	0 to 12' 3" (Top)	10'	8.0	-	-	Wall Load

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Forte v5.3, Design Engine: V7.0.0.5
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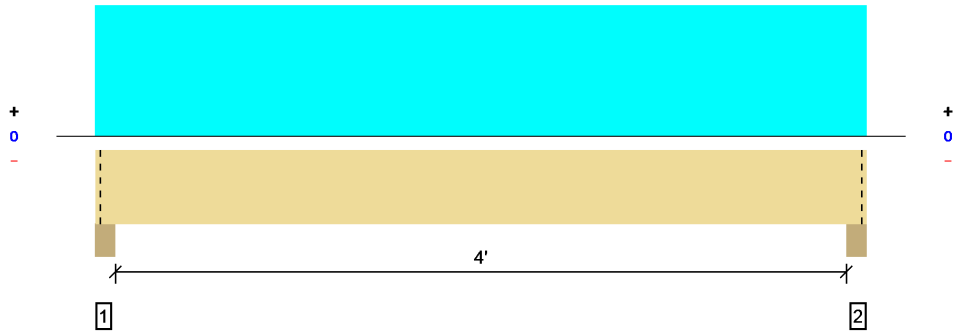
1 piece(s) 6 3/4" x 7 1/2" 24F-V4 DF Glulam

PASSED

Overall Length: 4' 11"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	13337 @ 4"	24131 (5.50")	Passed (55%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	7460 @ 1' 1"	10285	Passed (73%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	12249 @ 2' 5 1/2"	14555	Passed (84%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.080 @ 2' 5 1/2"	0.142	Passed (L/638)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.093 @ 2' 5 1/2"	0.213	Passed (L/547)	--	1.0 D + 1.0 S (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 4' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 4' 11" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 4' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Column - DF	5.50"	5.50"	3.04"	1906	1278	11431	14615	Blocking
2 - Column - DF	5.50"	5.50"	3.04"	1906	1278	11431	14615	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 4' 11"	N/A	12.3			
1 - Uniform (PSF)	0 to 4' 11" (Front)	13'	12.0	40.0	-	Residential - Living Areas
2 - Uniform (PSF)	0 to 4' 11" (Front)	31'	17.0	-	150.0	Roof Load
3 - Uniform (PSF)	0 to 4' 11" (Top)	10'	8.0	-	-	Wall Load

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

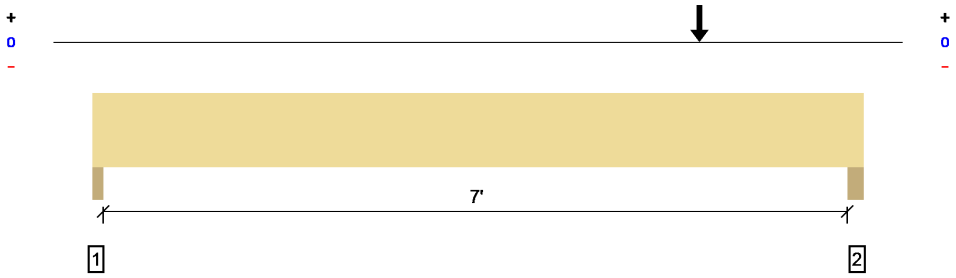
SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
Andrew Aitchison Performance Engineers (208) 475-0023 andrewa@inteframe.com	

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

PASSED

Overall Length: 7' 7 1/2"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	10863 @ 7' 4 1/2"	11813 (4.50")	Passed (92%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	10841 @ 6' 1"	10707	Passed (101%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	14918 @ 6'	27897	Passed (53%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.075 @ 4' 2 1/4"	0.363	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.088 @ 4' 2 3/16"	0.483	Passed (L/988)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD

- Deflection criteria: LL (L/240) and TL (L/180).
- Top Edge Bracing (Lu): Top compression edge must be braced at 7' 8" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 7' 8" o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Trimmer - DF	3.00"	3.00"	1.50"	415	242	2168	2825	None
2 - Trimmer - DF	4.50"	4.50"	4.14"	1600	1036	9263	11899	None

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 7' 7 1/2"	N/A	14.3			
1 - Point (lb)	6'	N/A	1906	1278	11431	Linked from: B15, Support 2

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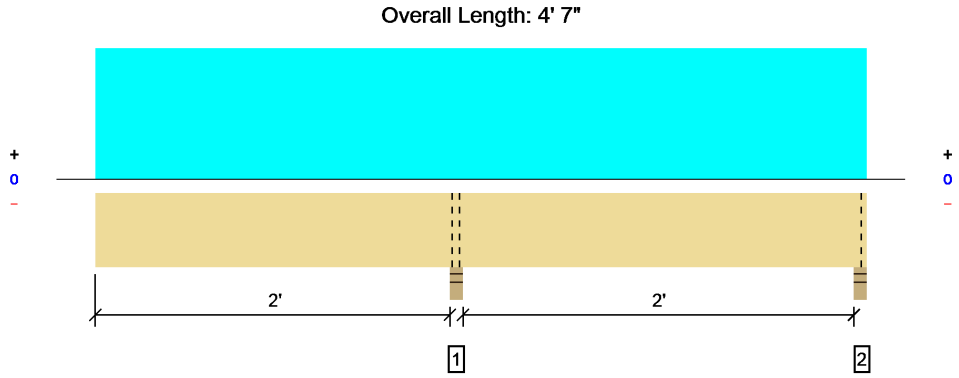
The product application, input design loads, dimensions and support information have been provided by Forte Software Operator

SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
Andrew Aitchison Performance Engineers (208) 475-0023 andrewa@inteframe.com	

PASSED

1 piece(s) 2 x 6 Douglas Fir-Larch No. 2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1444 @ 2' 1 3/4"	2231 (3.50")	Passed (65%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	519 @ 2' 9"	1139	Passed (46%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-774 @ 2' 1 3/4"	848	Passed (91%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.091 @ 0	0.200	Passed (2L/564)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.101 @ 0	0.215	Passed (2L/508)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (0.2") and TL (2L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 4' 7" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 4' 7" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - SPF	3.50"	3.50"	2.26"	155	1289	1444	Blocking
2 - Stud wall - SPF	3.50"	3.50"	1.50"	10	239/-109	249/-109	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 4' 7"	N/A	2.1		
1 - Uniform (PSF)	0 to 4' 7" (Front)	2'	17.0	150.0	Roof

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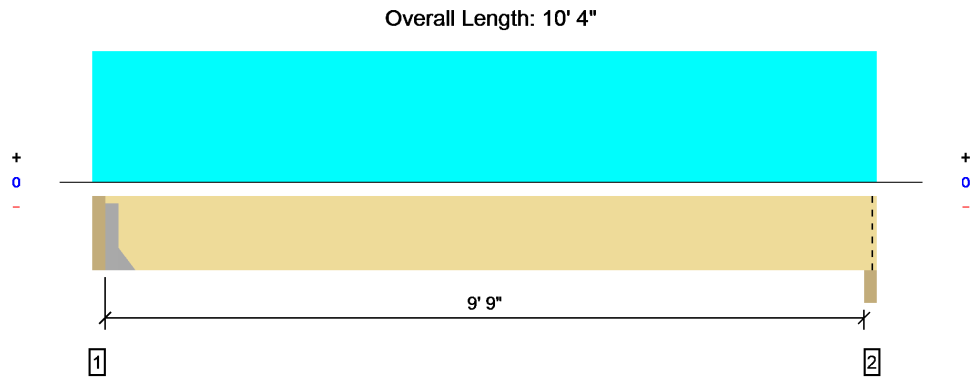
The product application, input design loads, dimensions and support information have been provided by Forte Software Operator

SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
Andrew Aitchison Performance Engineers (208) 475-0023 andrewa@inteframe.com	

PASSED

1 piece(s) 2 x 8 Douglas Fir-Larch No. 2 @ 12" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	615 @ 3 1/2"	1406 (1.50")	Passed (44%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	539 @ 10 3/4"	1501	Passed (36%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1511 @ 5' 2 1/2"	1564	Passed (97%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.317 @ 5' 2 1/2"	0.328	Passed (L/372)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.345 @ 5' 2 1/2"	0.492	Passed (L/342)	--	1.0 D + 1.0 S (All Spans)
TJ-Pro™ Rating	N/A	N/A	--	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 3' 2" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 10' 1" o/c unless detailed otherwise.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Hanger on 7 1/4" DF beam	3.50"	Hanger[1]	1.50"	52	599	651	See note [1]
2 - Beam - DF	3.50"	3.50"	1.50"	51	589	640	Blocking

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

Connector: Simpson Strong-Tie Connectors

Support	Model	Seat Length	Top Nails	Face Nails	Member Nails	Accessories
1 - Face Mount Hanger	LU26	1.50"	N/A	6-10d common	4-10d x 1-1/2	

Loads	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 10' 4"	12"	10.0	115.0	Residential - Living Areas

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SUSTAINABLE FORESTRY INITIATIVE

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Andrew Aitchison Performance Engineers (208) 475-0023 andrewa@inteframe.com	

9/22/2017 10:50:15 AM
Forte v5.3, Design Engine: V7.0.0.5
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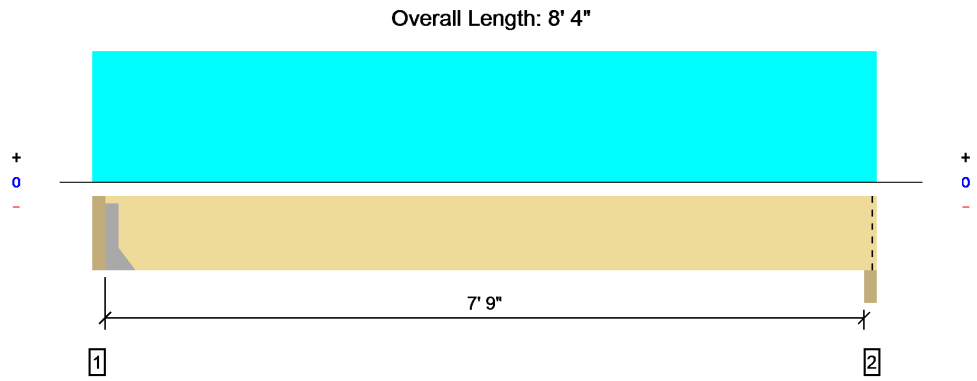
1 piece(s) 2 x 8 Douglas Fir-Larch No. 2 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	679 @ 3 1/2"	1406 (1.50")	Passed (48%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	574 @ 10 3/4"	1501	Passed (38%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1329 @ 4' 2 1/2"	1564	Passed (85%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.178 @ 4' 2 1/2"	0.261	Passed (L/529)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.193 @ 4' 2 1/2"	0.392	Passed (L/488)	--	1.0 D + 1.0 S (All Spans)
TJ-Pro™ Rating	N/A	N/A	--	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2009
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 7' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 8' 1" o/c unless detailed otherwise.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Hanger on 7 1/4" DF beam	3.50"	Hanger[1]	1.50"	56	673	729	See note [1]
2 - Beam - DF	3.50"	3.50"	1.50"	55	660	715	Blocking

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

Connector: Simpson Strong-Tie Connectors

Support	Model	Seat Length	Top Nails	Face Nails	Member Nails	Accessories
1 - Face Mount Hanger	LU26	1.50"	N/A	6-10d common	4-10d x 1-1/2	

Loads	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 8' 4"	16"	10.0	120.0	Residential - Living Areas

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SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
Andrew Aitchison Performance Engineers (208) 475-0023 andrewa@inteframe.com	

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Performance Engineers
1102 N. Franklin Blvd.
Nampa, Id 83687
208-475-0023

Project Title:
Engineer:
Project Descr:

Project ID:

Printed: 25 SEP 2017, 9:30AM

Wood Beam

File = V:_PROJE~1\2017-0~3\20903E~1\Calcs\04857.ec6
ENERCALC, INC. 1983-2015, Build:6.15.12.9, Ver:6.15.12.9

Lic. # : KW-06007473 — Licensee : SHAWN REEDER

Description : B18

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10
Load Combination Set : ASCE 7-10

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10

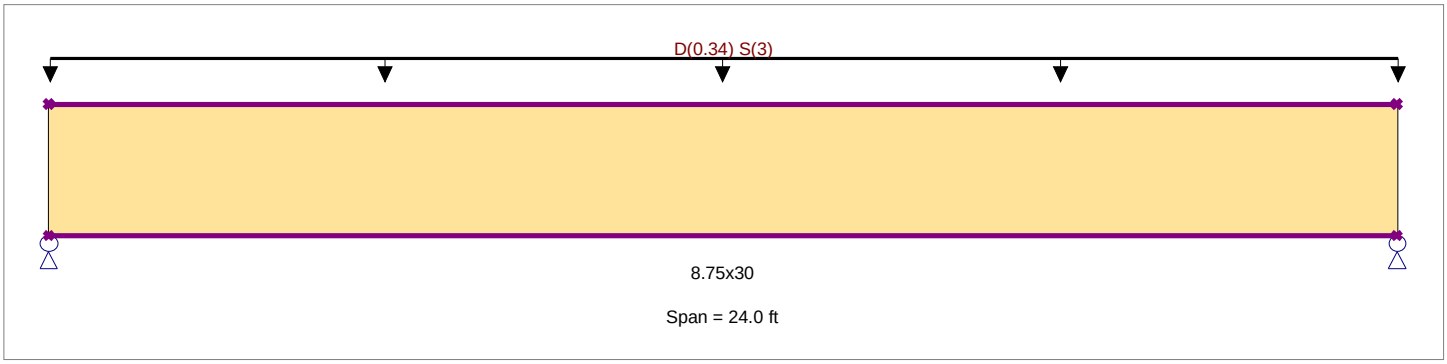
Wood Species : DF/DF
Wood Grade : 24F - V4

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling

Fb - Tension	2,400.0 psi
Fb - Compr	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.20 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.0170, S = 0.150 ksf, Tributary Width = 20.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.949 : 1	Maximum Shear Stress Ratio	=	0.608 : 1
Section used for this span		8.75x30	Section used for this span		8.75x30
fb : Actual	=	2,236.11 psi	fv : Actual	=	185.32 psi
FB : Allowable	=	2,355.51 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	12.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.636 in	Ratio =	453
Max Upward Transient Deflection	0.000 in	Ratio =	0 <240
Max Downward Total Deflection	0.720 in	Ratio =	400
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H													0.00	0.00	0.00	0.00
Length = 24.0 ft	1	0.142	0.091	0.90	0.853	1.00	1.00	1.00	1.00	1.00	28.58	261.26	1843.44	3.79	21.65	238.50
+D+L+H					0.853	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.0 ft	1	0.128	0.082	1.00	0.853	1.00	1.00	1.00	1.00	1.00	28.58	261.26	2048.27	3.79	21.65	265.00
+D+Lr+H					0.853	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.0 ft	1	0.102	0.065	1.25	0.853	1.00	1.00	1.00	1.00	1.00	28.58	261.26	2560.33	3.79	21.65	331.25
+D+S+H					0.853	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.0 ft	1	0.949	0.608	1.15	0.853	1.00	1.00	1.00	1.00	1.00	244.58	2,236.11	2355.51	32.43	185.32	304.75
+D+0.750Lr+0.750L+H					0.853	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.0 ft	1	0.102	0.065	1.25	0.853	1.00	1.00	1.00	1.00	1.00	28.58	261.26	2560.33	3.79	21.65	331.25
+D+0.750L+0.750S+H					0.853	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Performance Engineers
1102 N. Franklin Blvd.
Nampa, Id 83687
208-475-0023

Project Title:
Engineer:
Project Descr:

Project ID:

Printed: 25 SEP 2017, 9:30AM

Wood Beam

File = V:_PROJE~1\2017-0~3\20903E~1\Calcs\04857.ec6
ENERCALC, INC. 1983-2015, Build:6.15.12.9, Ver:6.15.12.9

Lic. # : KW-06007473 **Licensee : SHAWN REEDER**

Description : B18

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 24.0 ft	1	0.740	0.474	1.15	0.853	1.00	1.00	1.00	1.00	1.00	190.58	1,742.40	2355.51	25.27	144.41	304.75
+D+0.60W+H					0.853	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.0 ft	1	0.080	0.051	1.60	0.853	1.00	1.00	1.00	1.00	1.00	28.58	261.26	3277.23	3.79	21.65	424.00
+D+0.70E+H					0.853	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.0 ft	1	0.080	0.051	1.60	0.853	1.00	1.00	1.00	1.00	1.00	28.58	261.26	3277.23	3.79	21.65	424.00
+D+0.750Lr+0.750L+0.450W+H					0.853	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.0 ft	1	0.080	0.051	1.60	0.853	1.00	1.00	1.00	1.00	1.00	28.58	261.26	3277.23	3.79	21.65	424.00
+D+0.750L+0.750S+0.450W+H					0.853	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.0 ft	1	0.532	0.341	1.60	0.853	1.00	1.00	1.00	1.00	1.00	190.58	1,742.40	3277.23	25.27	144.41	424.00
+D+0.750L+0.750S+0.5250E+H					0.853	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.0 ft	1	0.532	0.341	1.60	0.853	1.00	1.00	1.00	1.00	1.00	190.58	1,742.40	3277.23	25.27	144.41	424.00
+0.60D+0.60W+0.60H					0.853	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.0 ft	1	0.048	0.031	1.60	0.853	1.00	1.00	1.00	1.00	1.00	17.15	156.75	3277.23	2.27	12.99	424.00
+0.60D+0.70E+0.60H					0.853	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 24.0 ft	1	0.048	0.031	1.60	0.853	1.00	1.00	1.00	1.00	1.00	17.15	156.75	3277.23	2.27	12.99	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.7197	12.088		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	40.763	40.763
Overall MINimum	2.858	2.858
+D+H	4.763	4.763
+D+L+H	4.763	4.763
+D+Lr+H	4.763	4.763
+D+S+H	40.763	40.763
+D+0.750Lr+0.750L+H	4.763	4.763
+D+0.750L+0.750S+H	31.763	31.763
+D+0.60W+H	4.763	4.763
+D+0.70E+H	4.763	4.763
+D+0.750Lr+0.750L+0.450W+H	4.763	4.763
+D+0.750L+0.750S+0.450W+H	31.763	31.763
+D+0.750L+0.750S+0.5250E+H	31.763	31.763
+0.60D+0.60W+0.60H	2.858	2.858
+0.60D+0.70E+0.60H	2.858	2.858
D Only	4.763	4.763
Lr Only		
L Only		
S Only	36.000	36.000
W Only		
E Only		
H Only		

Wood Header Allowable Loads kip/ft

Project Name: SMC - Miller
Job Number: 2017-04857
Location: McCall, Idaho

Governing Code: *2012 IBC*
Load Duration Factor: *1.00*
LVL Grade *1.9E*
Top Chord Bracing *2'-0" O.C.*
Max TL Deflection *L/240, 0.75in*
Repetitive Stress Increase *No*

Header Span

Header Type	*2'*	*3'*	*4'*	*5'*	*6'*	*8'*	*10'*	*12'*	*14'*	*16'*	*18'*
(2) 2x4 DF Stud	1.00	0.60	0.25	0.22	0.10	NA	NA	NA	NA	NA	NA
(3) 2x4 DF Stud	1.60	0.90	0.40	0.35	0.16	NA	NA	NA	NA	NA	NA
(2) 2x6 DF #2	2.90	1.25	0.72	0.48	0.31	0.17	0.10	NA	NA	NA	NA
(3) 2x6 DF #2	4.40	1.90	1.10	0.72	0.48	0.26	0.16	0.11	NA	NA	NA
(2) 2x8 DF #2	4.70	2.00	1.10	0.80	0.51	0.28	0.17	0.12	0.08	NA	NA
(3) 2x8 DF #2	7.60	2.95	1.90	1.18	0.84	0.46	0.29	0.20	0.14	0.10	NA
(2) 2x10 DF #2	7.00	2.95	1.70	1.18	0.77	0.42	0.27	0.18	0.13	0.09	NA
(3) 2x10 DF #2	11.50	4.50	2.80	1.80	1.20	0.71	0.45	0.31	0.22	0.17	0.13
(2) 2x12 DF #2	9.40	4.20	2.30	1.60	1.00	0.58	0.36	0.25	0.18	0.13	0.10
(3) 2x12 DF #2	15.60	6.10	3.90	2.40	1.70	0.96	0.61	0.42	0.30	0.23	0.18
(2) 1-3/4x7-1/4 LVL	12.00	5.90	3.30	2.40	1.40	0.82	0.45	0.26	0.16	0.10	NA
(3) 1-3/4x7-1/4 LVL	18.00	9.10	4.90	3.50	2.20	1.20	0.69	0.39	0.24	0.15	NA
(2) 1-3/4x9-1/2 LVL	21.50	9.10	4.90	3.75	2.30	1.30	0.80	0.55	0.34	0.21	0.13
(3) 1-3/4x9-1/2 LVL	32.30	15.00	7.40	6.00	3.50	2.00	1.20	0.83	0.52	0.32	0.19
(2) 1-3/4x11-7/8 LVL	35.40	15.00	7.70	6.00	3.90	2.20	1.40	0.97	0.71	0.46	0.28
(3) 1-3/4x11-7/8 LVL	53.30	21.00	11.50	8.75	5.80	3.30	2.10	1.40	1.00	0.69	0.42
(2) 1-3/4x14 LVL	49.10	21.00	10.90	8.00	5.00	3.00	1.90	1.30	0.98	0.75	0.47
(3) 1-3/4x14 LVL	74.00	25.00	16.40	12.00	7.50	4.60	2.90	2.00	1.40	1.10	0.70

Wood Trimmer Allowable Loads, kips

Project Name: SMC - Miller
Job Number: 2017-04857
Location: McCall, Idaho

Governing Code: *2012 IBC*
Load Duration Factor: *1.0*
Eccentricity *0"*
Weak Axis Braced *Y*

Height

Trimmer Type	***8'***	***10'***	***12'***	***14'***	***16'***	***18'***	***20'***	***Max Allow Compression Wood Header***	***Cost Factor***
(1) 2x4 Stud	2.4	1.7	1.2	NA	NA	NA	NA	3.2	
(2) 2x4 Stud	4.9	3.4	2.4	NA	NA	NA	NA	6.5	
(3) 2x4 Stud	7.1	5.0	3.6	NA	NA	NA	NA	9.8	
(1) 2x6 DF #2	5.1	5.1	5.0	3.8	3.0	NA	NA	5.1	
(2) 2x6 DF #2	10.3	10.3	10.1	7.7	6.0	NA	NA	10.3	
(3) 2x6 DF #2	15.4	15.4	15.1	11.6	9.1	NA	NA	15.4	
(1) 2x8 DF #2	6.7	6.7	6.7	6.7	6.4	5.3	4.4	6.7	
(2) 2x8 DF #2	13.5	13.5	13.5	13.5	12.9	10.6	8.8	13.5	
(3) 2x8 DF #2	20.3	20.3	20.3	20.3	19.4	15.9	13.2	20.3	

9' Interior Stud Wall

Project #: *2017-04857* Engineer: *ara*
Location : *McCall, Idaho* Date: *9/22/2017*
Project: *SMC - Miller*

Program: ***Stud Wall - Combined Bending and Compression***

This spreadsheet is used for designing a stud wall according to the 2012 edition of the NDS.
Inputs are in *ITALICS* and outputs are in **BOLDFACE**.

Species	*DF-L*				
Grade	*No. 2*				
t =	*2*	in	nominal width	1.5	in
d =	*6*	in	nominal depth	5.5	in
L =	*9*	ft	span		
s =	*12*	in	stud spacing		
w_{wind} =	*5*	psf	Lateral pressure	w = 5.0	plf
P =	*5450*	lbs	axial load		
e =	*0*	in	eccentricity		
K_{cE} =	*0.3*				
c =	*0.8*		buckling and crushing interaction factor for columns		

	F_b	F_v	F_c	$F_{c\text{-}perp}$	E
	900	190	1350	625	1,600,000 psi
C_d =	*1.60*	*1.60*	*1.60*		
C_F =	*1.30*		*1.10*		
C_r =	*1.15*				
C_p =			0.45		
C_H =		*1.00*			
C_b =				*1.07*	

Allowable Stress:

F'_b =	$F_b C_d C_F C_r$ =	**2,153**	psi
F'_v =	$F'_v C_d C_H$ =	**304**	psi
F^*_c =	$F_c C_d C_F$ =	2,376	psi
F_{cE} =	$(K_{cE} E')/(l_e/d)2$ =	1,245	psi
F'_c =	$F_c C_d C_F C_p$ =	**1,070**	psi
$F'_{c\ perp}$ =	$F_{c\ perp} Cb$ =	**668**	psi
E' =	E =	**1,600,000**	psi

Bending:

M =	$w L^2/8 + P e/12$ =	51	lb ft	
f_b =	M/S =	**80**	psi	< F'b OK
	S =	7.56	in^3	

Shear:

V =	$w L/2$ =	23	lbs	
f_v =	$1.5 V/A$ =	**4.09**	psi	< F'v OK
	A =	8.25	in^2	

Compression:

f_c =	P/A =	**660.6**	psi	< F'c OK
$f_{c\ perp}$ =	P/A =	**660.6**	psi	< F'c OK

Combined:

$(f_c/F_c)^2 + \{f_b/[F_b(1-(f_c/F_{cE})]\}$ = 0.46 < 1.0 OK

Deflection:

$\Delta = 22.5\ w L^4/E' I$ =	**0.02**	in =	SPAN
I =	20.80	in^4	4869

10' King Studs @ 6' Opening

PERFORMANCE ENGINEERS

Project #: *2017-04857* Engineer: *ara*
Location : *McCall, Idaho* Date: *9/22/2017*
Project: *SMC - Miller*

Program: ***Stud Wall - Combined Bending and Compression***

This spreadsheet is used for designing a stud wall according to the 2012 edition of the NDS.
Inputs are in *ITALICS* and outputs are in **BOLDFACE**.

Species *DF-L*
Grade *Stud*

t =	*2*	in	nominal width	1.5 in	
d =	*6*	in	nominal depth	5.5 in	
L =	*10*	ft	span		
s =	*44*	in	Trib Width		
w_{wind} =	*18*	psf	Lateral pressure	w = 66.0	plf
P =	*50*	lbs	axial load		
e =	*0*	in	eccentricity		
K_{cE} =	*0.3*				
c =	*0.8*		buckling and crushing interaction factor for columns		

	F_b	F_v	F_c	$F_{c\text{-}perp}$	E
	700	190	850	625	1,400,000 psi
C_d =	*1.60*	*1.60*	*1.60*		
C_F =	*1.30*		*1.10*		
C_r =	*1.00*				
C_p =			0.49		
C_H =		*1.00*			
C_b =				*1.07*	

Allowable Stress:

F'_b =	$F_b C_d C_F C_r$ =	**1,456**	psi
F'_v =	$F'_v C_d C_H$ =	**304**	psi
F^*_c =	$F_c C_d C_F$ =	1,496	psi
F_{cE} =	$(K_{cE} E')/(l_e/d)2$ =	882	psi
F'_c =	$F_c C_d C_F C_p$ =	**738**	psi
$F'_{c\ perp}$ =	$F_{c\ perp} Cb$ =	**668**	psi
E' =	E =	**1,400,000**	psi

Bending:

M = $w L^2/8 + P e/12$ = 825 lb ft
f_b = M/S = **1309** psi **< F'b OK**
S = 7.56 in^3

Shear:

V = w L/2 = 90 lbs
f_v = 1.5 V/A = **16.36** psi **< F'v OK**
A = 8.25 in^2

Compression:

f_c = P/A = **6.1** psi **< F'c OK**

$f_{c\ perp}$ = P/A = **6.1** psi **< F'c OK**

Combined:

$(f_c/F_c)^2 + \{f_b/[F_b(1-(f_c/F_{cE})]\}$ = 0.91 **< 1.0 OK**

Deflection:

$\Delta = 22.5\ w\ L^4/E'\ I$ = **0.51** in = **SPAN**
I = 20.80 in^4 **235**

10' King Studs @ 10' Opening

Project #: *2017-04857* Engineer: *ara*
Location : *McCall, Idaho* Date: *9/22/2017*
Project: *SMC - Miller*

Program: ***Stud Wall - Combined Bending and Compression***

This spreadsheet is used for designing a stud wall according to the 2012 edition of the NDS.
Inputs are in *ITALICS* and outputs are in **BOLDFACE**.

Species *DF-L*
Grade *Stud*

t =	*4*	in	nominal width	3 in
d =	*6*	in	nominal depth	5.5 in
L =	*10*	ft	span	
s =	*68*	in	Trib Width	
w_{wind} =	*18*	psf	Lateral pressure	w = 102.0 plf
P =	*50*	lbs	axial load	
e =	*0*	in	eccentricity	
K_{cE} =	*0.3*			
c =	*0.8*		buckling and crushing interaction factor for columns	

	F_b	F_v	F_c	$F_{c\text{-}perp}$	E
	700	190	850	625	1,400,000 psi
C_d =	*1.60*	*1.60*	*1.60*		
C_F =	*1.30*		*1.10*		
C_r =	*1.00*				
C_p =			0.49		
C_H =		*1.00*			
C_b =				*1.07*	

Allowable Stress:

F'_b =	$F_b C_d C_F C_r$ =	**1,456**	psi
F'_v =	$F'_v C_d C_H$ =	**304**	psi
F^*_c =	$F_c C_d C_F$ =	1,496	psi
F_{cE} =	$(K_{cE} E')/(l_e/d)2$ =	882	psi
F'_c =	$F_c C_d C_F C_p$ =	**738**	psi
$F'_{c\ perp}$ =	$F_{c\ perp} Cb$ =	**668**	psi
E' =	E =	**1,400,000**	psi

Bending:

M = $w L^2/8 + P e/12$ = 1275 lb ft
f_b = M/S = **1012** psi **< F'b OK**
S = 15.13 in^3

Shear:

V = w L/2 = 90 lbs
f_v = 1.5 V/A = **8.18** psi **< F'v OK**
A = 16.50 in^2

Compression:

f_c = P/A = **3.0** psi **< F'c OK**

$f_{c\ perp}$ = P/A = **3.0** psi **< F'c OK**

Combined:

$(f_c/F_c)^2 + \{f_b/[F_b(1-(f_c/F_{cE})]\}$ = 0.70 **< 1.0 OK**

Deflection:

$\Delta = 22.5\ w\ L^4/E'\ I$ = **0.39** in = **SPAN**
I = 41.59 in^4 **304**

10' Stud Wall

Project #: *2017-04857* Engineer: *ara*
Location : *McCall, Idaho* Date: *9/22/2017*
Project: *SMC - Miller*

Program: ***Stud Wall - Combined Bending and Compression***

This spreadsheet is used for designing a stud wall according to the 2012 edition of the NDS.
Inputs are in *ITALICS* and outputs are in **BOLDFACE**.

Species *DF-L*
Grade *No. 2*

t =	*2*	in	nominal width	1.5 in	
d =	*6*	in	nominal depth	5.5 in	
L =	*10*	ft	span		
s =	*16*	in	stud spacing		
w_{wind} =	*17*	psf	Lateral pressure	w = 23.2	plf
P =	*4110*	lbs	axial load		
e =	*0*	in	eccentricity		
K_{cE} =	*0.3*				
c =	*0.8*		buckling and crushing interaction factor for columns		

	F_b	F_v	F_c	$F_{c\text{-}perp}$	E
	900	190	1350	625	1,600,000 psi
C_d =	*1.60*	*1.60*	*1.60*		
C_F =	*1.30*		*1.10*		
C_r =	*1.15*				
C_p =			0.38		
C_H =		*1.00*			
C_b =				*1.07*	

Allowable Stress:

F'_b =	$F_b C_d C_F C_r$ =	**2,153**	psi
F'_v =	$F'_v C_d C_H$ =	**304**	psi
F^*_c =	$F_c C_d C_F$ =	2,376	psi
F_{cE} =	$(K_{cE} E')/(l_e/d)2$ =	1,008	psi
F'_c =	$F_c C_d C_F C_p$ =	**899**	psi
$F'_{c\ perp}$ =	$F_{c\ perp} Cb$ =	**668**	psi
E' =	E =	**1,600,000**	psi

Bending:

M = $w L^2/8 + P e/12$ = 290 lb ft
f_b = M/S = **460** psi **< F'b OK**
S = 7.56 in^3

Shear:

V = w L/2 = 87 lbs
f_v = 1.5 V/A = **15.82** psi **< F'v OK**
A = 8.25 in^2

Compression:

f_c = P/A = **498.2** psi **< F'c OK**

$f_{c\ perp}$ = P/A = **498.2** psi **< F'c OK**

Combined:

$(f_c/F_c)^2 + \{f_b/[F_b(1-(f_c/F_{cE})]\}$ = 0.73 **< 1.0 OK**

Deflection:

$\Delta = 22.5\ w\ L^4/E'\ I$ = **0.16** in = **SPAN**
I = 20.80 in^4 **765**

Project # : *2017-04857*
Project: *SMC - Miller*

Point Load Footing Design

Square Concrete Footing Pads for Soil Bearing = 1500 psf				
size (")	max magnitude (kip)	number of #4 Rebar	Thickness (")	min column size (")
18	3.00	2	10	3.5
24	5.50	2	10	3.5
30	8.75	2	10	3.5
36	12.50	3	10	3.5
42	16.75	4	10	3.5
48	22.00	4	10	3.5
54	27.75	5	10	3.5
60	33.75	6	12	3.5
66	40.75	7	12	5.5
72	44.50	8	12	5.5

Bars to be 3 1/2" from bottom of pad. Evenly space in both directions.

F1 Footing Design

Project # : *2017-04857*
Project: *SMC - Miller*

Individual Footing Design

Program: ***Typical Footing Design***

Description:

Inputs are in *ITALICS* and outputs are in **BOLDFACE**.

Soil Bearing Pressure: *1500psf*

Roof

Dead Load:	*(17psf) (4.0ft)*	=	**68plf**
Live/Snow Load:	*(150psf) (4.0ft)*	=	**600plf**

Patio Load

Dead Load:	*(17psf) (5.0ft)*	=	**85plf**
Live Load:	*(150psf) (5.0ft)*	=	**750plf**

Main Floor

Dead Load:	*(10psf) (2.0ft)*	=	**20plf**
Live Load:	*(40psf) (2.0ft)*	=	**80plf**

Upper Floor

Dead Load:	*(10psf) (.0ft)*	=	**plf**
Live Load:	*(40psf) (.0ft)*	=	**plf**

Misc

Wall Load:	*(8psf) (10.0ft)*	=	**80plf**
Conc Ftg:	*(150pcf) (1.5ft2)*	=	**225plf**
Misc Load:		=	**plf**

1908plf

Min Footing Width: $\frac{1908\text{plf}}{1500\text{psf}}$ = **16 in**

Use Footing Width = **16 in**

F2 Footing Design

Project # : *2017-04857*
Project: *SMC - Miller*

Individual Footing Design

Program: ***Typical Footing Design***

Description:
Inputs are in *ITALICS* and outputs are in **BOLDFACE**.

Soil Bearing Pressure: *1500psf*

Roof			
Dead Load:	*(17psf) (13.0ft)*	=	**221plf**
Live/Snow Load:	*(150psf) (13.0ft)*	=	**1950plf**
Patio Cover			
Dead Load:	*(psf) (.0ft)*	=	**plf**
Live Load:	*(psf) (.0ft)*	=	**plf**
Main Floor			
Dead Load:	*(10psf) (6.0ft)*	=	**60plf**
Live Load:	*(40psf) (6.0ft)*	=	**240plf**
Upper Floor			
Dead Load:	*(10psf) (.0ft)*	=	**plf**
Live Load:	*(40psf) (.0ft)*	=	**plf**
Misc			
Wall Load:	*(8psf) (20.0ft)*	=	**160plf**
Conc Ftg:	*(150pcf) (2.0ft2)*	=	**300plf**
Misc Load:		=	**plf**
			2931plf

Min Footing Width: $\frac{2931\text{plf}}{1500\text{psf}}$ = **24 in**

Use Footing Width = **24 in**

F2.5 Footing Design

Project # : *2017-04857*
Project: *SMC - Miller*

Individual Footing Design

Program: ***Typical Footing Design***

Description:

Inputs are in *ITALICS* and outputs are in **BOLDFACE**.

Soil Bearing Pressure: *1500psf*

Roof			
Dead Load:	*(17psf) (20.0ft)*	=	**340plf**
Live/Snow Load:	*(120psf) (20.0ft)*	=	**2400plf**
Patio Cover			
Dead Load:	*(psf) (.0ft)*	=	**plf**
Live Load:	*(psf) (.0ft)*	=	**plf**
Main Floor			
Dead Load:	*(10psf) (5.0ft)*	=	**50plf**
Live Load:	*(40psf) (5.0ft)*	=	**200plf**
Upper Floor			
Dead Load:	*(10psf) (.0ft)*	=	**plf**
Live Load:	*(40psf) (.0ft)*	=	**plf**
Misc			
Wall Load:	*(12psf) (20.0ft)*	=	**240plf**
Conc Ftg:	*(150pcf) (2.5ft2)*	=	**375plf**
Misc Load:		=	**plf**
			3605plf

Min Footing Width: $\frac{3605\text{plf}}{1500\text{psf}}$ = **29 in**

Use Footing Width = **30 in**

F2.5 Footing Design (2)

Project # : *2017-04857*
Project: *SMC - Miller*

Individual Footing Design

Program: ***Typical Footing Design***

Description:

Inputs are in *ITALICS* and outputs are in **BOLDFACE**.

Soil Bearing Pressure: *1500psf*

Roof			
Dead Load:	*(17psf) (14.0ft)*	=	**238plf**
Live/Snow Load:	*(150psf) (14.0ft)*	=	**2100plf**
Patio Load			
Dead Load:	*(17psf) (.0ft)*	=	**plf**
Live Load:	*(120psf) (.0ft)*	=	**plf**
Main Floor			
Dead Load:	*(10psf) (13.0ft)*	=	**130plf**
Live Load:	*(40psf) (13.0ft)*	=	**520plf**
Upper Floor			
Dead Load:	*(10psf) (.0ft)*	=	**plf**
Live Load:	*(40psf) (.0ft)*	=	**plf**
Misc			
Wall Load:	*(12psf) (10.0ft)*	=	**120plf**
Conc Ftg:	*(150pcf) (2.0ft2)*	=	**300plf**
Misc Load:		=	**plf**
			3408plf

Min Footing Width: $\frac{3408\text{plf}}{1500\text{psf}}$ = **28 in**

Use Footing Width = **24 in**

F3 Footing Design

Project # : *2017-04857*
Project: *SMC - Miller*

Individual Footing Design

Program: ***Typical Footing Design***

Description:

Inputs are in *ITALICS* and outputs are in **BOLDFACE**.

Soil Bearing Pressure: *1500psf*

Roof			
Dead Load:	*(17psf) (15.0ft)*	=	**255plf**
Live/Snow Load:	*(150psf) (15.0ft)*	=	**2250plf**
Patio Cover			
Dead Load:	*(psf) (.0ft)*	=	**plf**
Live Load:	*(psf) (.0ft)*	=	**plf**
Main Floor			
Dead Load:	*(10psf) (9.0ft)*	=	**90plf**
Live Load:	*(40psf) (9.0ft)*	=	**360plf**
Upper Floor			
Dead Load:	*(10psf) (.0ft)*	=	**plf**
Live Load:	*(40psf) (.0ft)*	=	**plf**
Misc			
Wall Load:	*(8psf) (20.0ft)*	=	**160plf**
Conc Ftg:	*(150pcf) (2.0ft2)*	=	**300plf**
Misc Load:		=	**plf**
			3415plf

Min Footing Width: $\frac{3415\text{plf}}{1500\text{psf}}$ = **28 in**

Use Footing Width = **36 in**

F4 Footing Design

Project # : *2017-04857*
Project: *SMC - Miller*

Individual Footing Design

Program: ***Typical Footing Design***

Description:

Inputs are in *ITALICS* and outputs are in **BOLDFACE**.

Soil Bearing Pressure: *1500psf*

Roof			
Dead Load:	*(17psf) (24.0ft)*	=	**408plf**
Live/Snow Load:	*(150psf) (24.0ft)*	=	**3600plf**
Patio Cover			
Dead Load:	*(psf) (.0ft)*	=	**plf**
Live Load:	*(psf) (.0ft)*	=	**plf**
Main Floor			
Dead Load:	*(10psf) (16.0ft)*	=	**160plf**
Live Load:	*(40psf) (16.0ft)*	=	**640plf**
Upper Floor			
Dead Load:	*(10psf) (.0ft)*	=	**plf**
Live Load:	*(40psf) (.0ft)*	=	**plf**
Misc			
Wall Load:	*(12psf) (20.0ft)*	=	**240plf**
Conc Ftg:	*(150pcf) (3.5ft2)*	=	**525plf**
Misc Load:		=	**plf**
			5573plf

Min Footing Width: $\frac{5573\text{plf}}{1500\text{psf}}$ = **45 in**

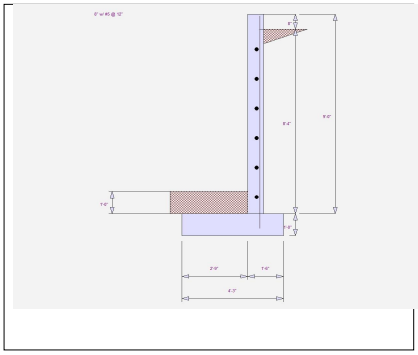
Use Footing Width = **48 in**

Criteria

Retained Height	=	8.33 ft
Wall height above soil	=	0.67 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Heel Active Pressure	=	40.0 psf/ft
	=	
Passive Pressure	=	422.0 psf/ft
Soil Density, Heel	=	120.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

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

Axial Load Applied to Stem

Axial Dead Load	=	3,490.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
The above lateral load has been increased by a factor of		1.00
Wind on Exposed Stem (Service Level)	=	20.0 psf

Adjacent Footing Load

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

Design Summary

Wall Stability Ratios

Overturning	=	3.26	OK
Sliding	=	1.70	OK
Total Bearing Load	=	5,861 lbs	
...resultant ecc.	=	0.18 in	
Soil Pressure @ Toe	=	1,350 psf	OK
Soil Pressure @ Heel	=	1,408 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	1,620 psf	
ACI Factored @ Heel	=	1,689 psf	
Footing Shear @ Toe	=	25.3 psi	OK
Footing Shear @ Heel	=	10.1 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	1,754.4 lbs	
less 100% Passive Force	= -	633.0 lbs	
less 100% Friction Force	= -	2,344.2 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

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

Stem Construction

		Bottom
		Stem OK
Design Height Above Ftg	ft =	0.00
Wall Material Above "Ht"	=	Concrete
Design Method	=	LRFD
Thickness	=	8.00
Rebar Size	=	# 5
Rebar Spacing	=	12.00
Rebar Placed at	=	Edge
Design Data		
fb/FB + fa/Fa	=	**0.773**
Total Force @ Section		
Service Level	lbs =	
Strength Level	lbs =	2,233.8
Moment....Actual		
Service Level	ft-# =	
Strength Level	ft-# =	6,281.5
Moment.....Allowable	=	8,121.3
Shear.....Actual		
Service Level	psi =	
Strength Level	psi =	30.1
Shear.....Allowable	psi =	75.0
Wall Weight	psf =	100.0
Rebar Depth 'd'	in =	6.19
Masonry Data		
f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Short Term Factor	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	Medium Weight
Masonry Design Method	=	ASD
Concrete Data		
f'c	psi =	2,500.0
Fy	psi =	60,000.0

Footing Dimensions & Strengths

Toe Width	=	2.75 ft
Heel Width	=	1.50
Total Footing Width	=	4.25
Footing Thickness	=	12.00 in
Key Width	=	12.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	2.00 ft

f'c = 2,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	1,620	1,689 psf
Mu' : Upward	=	6,183	0 ft-#
Mu' : Downward	=	1,225	479 ft-#
Mu: Design	=	4,958	479 ft-#
Actual 1-Way Shear	=	25.32	10.08 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	None Spec'd	
Heel Reinforcing	=	None Spec'd	
Key Reinforcing	=	None Spec'd	

Other Acceptable Sizes & Spacings

Toe: #4@ 9.26 in, #5@ 14.35 in, #6@ 20.37 in, #7@ 27.78 in, #8@ 36.57 in, #9@ 46
Heel: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Key: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm

Summary of Overturning & Resisting Forces & Moments

		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#			.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	1,741.0	3.11	5,414.4	Soil Over Heel	=	833.0	3.83	3,193.2
Surcharge over Heel	=				Sloped Soil Over Heel	=			
Surcharge Over Toe	=				Surcharge Over Heel	=			
Adjacent Footing Load	=				Adjacent Footing Load	=			
Added Lateral Load	=				Axial Dead Load on Stem	=	3,490.0	3.08	10,760.8
Load @ Stem Above Soil	=	13.4	9.67	129.5	* Axial Live Load on Stem	=			
	=				Soil Over Toe	=		1.38	
					Surcharge Over Toe	=			
Total		1,754.4	**O.T.M.**	5,544.0	Stem Weight(s)	=	900.0	3.08	2,775.0
	=		=		Earth @ Stem Transitions	=			
					Footing Weight	=	637.5	2.13	1,354.7
					Key Weight	=		2.50	
					Vert. Component	=			
					Total =		5,860.5 lbs	**R.M.=**	18,083.7

Resisting/Overturning Ratio = 3.26
Vertical Loads used for Soil Pressure = 5,860.5 lbs

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

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.083	in

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

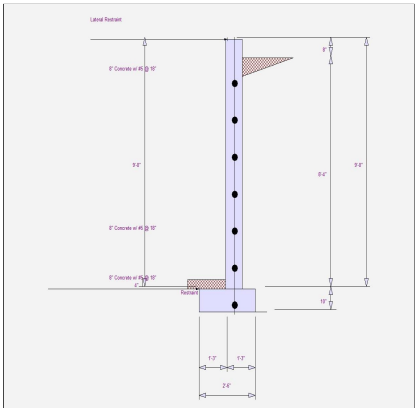
Restrained Retaining Wall Design

Criteria

Retained Height	=	8.33 ft
Wall height above soil	=	0.67 ft
Total Wall Height	=	9.00 ft
Top Support Height	=	9.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	4.00 in

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Heel Active Pressure	=	32.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density	=	110.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



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Surcharge Loads

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

Axial Load Applied to Stem

Axial Dead Load	=	1,830.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Earth Pressure Seismic Load

Stem Weight Seismic Load

Uniform Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
The above lateral load has been increased by a factor of		1.00
Wind on Exposed Stem	=	20.0 psf

K_h Soil Density Multiplier = 0.200 g — Added seismic per unit area = 0.0 psf

F_p / W_p Weight Multiplier = 0.000 g — Added seismic per unit area = 0.0 psf

Adjacent Footing Load

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

Design Summary

Total Bearing Load	=	3,623 lbs	
...resultant ecc.	=	0.17 in	
Soil Pressure @ Toe	=	1,399 psf	OK
Soil Pressure @ Heel	=	1,499 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	1,679 psf	
ACI Factored @ Heel	=	1,799 psf	
Footing Shear @ Toe	=	13.6 psi	OK
Footing Shear @ Heel	=	3.5 psi	OK
Allowable	=	75.0 psi	
Reaction at Top	=	204.9 lbs	
Reaction at Bottom	=	1,151.1 lbs	

Sliding Calcs
Lateral Sliding Force = 1,151.1 lbs

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

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

Concrete Stem Construction

Thickness = 8.00 in — Fy = 60,000 psi
Wall Weight = 100.0 psf — f'c = 2,500 psi
Stem is FIXED to top of footing

	@ Top Support	Mmax Between Top & Base	@ Base of Wall
	Stem OK	Stem OK	Stem OK
Design Height Above Ftg =	9.00 ft	4.88 ft	0.00 ft
Rebar Size =	# 5	# 5	# 5
Rebar Spacing =	18.00 in	18.00 in	18.00 in
Rebar Placed at =	Center	Center	Center
Rebar Depth 'd' =	4.00 in	4.00 in	4.00 in
Design Data			
fb/FB + fa/Fa =	0.000	0.266	0.614
Mu....Actual =	0.0 ft-#	929.1 ft-#	2,146.1 ft-#
Mn * Phi.....Allowable =	3,493.2 ft-#	3,493.2 ft-#	3,493.2 ft-#
Shear Force @ this height =	323.0 lbs		1,468.0 lbs
Shear.....Actual =	6.73 psi		30.58 psi
Shear.....Allowable =	75.00 psi		75.00 psi

Other Acceptable Sizes & Spacings:
Toe: None Spec'd -or- Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Heel: None Spec'd -or- Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Key: Slab Resists Sliding -or- Slab Resists Sliding - No Force on

Footing Strengths & Dimensions

Toe Width	=	1.25 ft
Heel Width	=	1.25
Total Footing Width	=	2.50
Footing Thickness	=	10.00 in
Key Width	=	12.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	2.00 ft

f'c = 2,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top = 2.00 in @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel	
Factored Pressure	=	1,679	1,799	psf
Mu' : Upward	=	1,327	308	ft-#
Mu' : Downward	=	152	213	ft-#
Mu: Design	=	1,176	-95	ft-#
Actual 1-Way Shear	=	13.64	3.47	psi
Allow 1-Way Shear	=	75.00	75.00	psi

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

Forces acting on footing for soil pressure

>>> Sliding Forces are restrained by the adjacent slab

Load & Moment Summary For Footing : For Soil Pressure Calcs

Moment @ Top of Footing Applied from Stem	=				-1,342.1 ft-#
Surcharge Over Heel	=	lbs	ft		ft-#
Adjacent Footing Load	=	lbs	ft		ft-#
Axial Dead Load on Stem	=	1,830.0 lbs	1.58 ft		2,897.5 ft-#
Soil Over Toe	=	45.8 lbs	0.63 ft		28.6 ft-#
Surcharge Over Toe	=	lbs	ft		ft-#
Stem Weight	=	900.0 lbs	1.58 ft		1,425.0 ft-#
Soil Over Heel	=	534.7 lbs	2.21 ft		1,180.8 ft-#
Footing Weight	=	312.5 lbs	1.25 ft		391.1 ft-#
Total Vertical Force	=	3,623.0 lbs	Base Moment	=	4,580.9 ft-#

Soil Pressure Resulting Moment = -52.2 ft-#

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

PERFORMANCE ENGINEERS

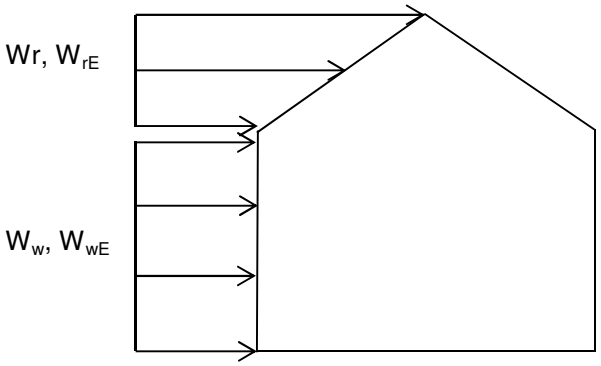
Location: *McCall, Idaho*
Project # : *2017-04857*
Project: *SMC - Miller*
Engineer: *ara*

Wind Shear Force Calculations

From 'ASCE 7-10 Wind Loading Analysis':

FACTORED LOADS CASE A		
$0.6*W_r$	$= (Z_2 + Z_3) * 0.6 =$	**3.4 psf**
$0.6*W_{rE}$	$= (Z_{2E} + Z_{3E}) * 0.6 =$	**6.2 psf**
$0.6*W_w$	$= (Z_1 + Z_4) * 0.6 =$	**14.5 psf**
$0.6*W_{wE}$	$= (Z_{1E} + Z_{4E}) * 0.6 =$	**21.7 psf**

FACTORED LOADS CASE B		
$0.6*W_r$	$= (Z_2 + Z_3) * 0.6 =$	**5.6 psf**
$0.6*W_{rE}$	$= (Z_{2E} + Z_{3E}) * 0.6 =$	**9.4 psf**
$0.6*W_w$	$= (Z_1 + Z_4) * 0.6 =$	**11.6 psf**
$0.6*W_{wE}$	$= (Z_{1E} + Z_{4E}) * 0.6 =$	**18.1 psf**



Wall Line	Wind Force (psf)	Wall ht (ft)	Upper wall trib. (ft)	Tributary dist. (ft)	+	Wind Force (psf)	wall ht (ft)	truss trib (ft)	Tributary dist (ft)	+	Shear, Upper (#)	=	**Wind Force (kips)**
X1-2	17.91	9		24	+	9.60		5	24	+		=	**3.09**
X2-2	16.31	9		45	+	9.60		5	45	+		=	**4.81**
X3-2	19.06	9		18	+	9.60		12	18	+		=	**2.24**
X4-2	19.06	9		18	+	9.60		12	18	+		=	**3.62**
Y1-2	19.98	9		15	+	9.60		10	15	+		=	**2.79**
Y2-2	19.98	9		15	+	9.60		10	15	+		=	**2.79**
Y3-2	17.14	9		31	+	9.60		6	31	+		=	**4.18**
Y4-2	17.14	9		31	+	9.60		6	31	+		=	**4.18**
X4-1	19.06	9	4.5	18	+					+	3.62	=	**5.53**
Y3-1	17.14	9	4.5	31	+					+	4.18	=	**3.57**
Y4-1	17.14	9	4.5	31	+					+	4.18	=	**7.14**

PERFORMANCE ENGINEERS

Location: *McCall, Idaho*
Project # : *2017-04857*
Project: *SMC - Miller*
Engineer: *ara*

Seismic Shear Force Calculations

From 'ASCE7-10 Seismic Loading Analysis':

Wall Line	Roof (psf)	Trib Width (ft)	Length (ft)	+	Floor (psf)	Trib Area W (ft)	Area L (ft)	+	Wall (psf)	Wall Height (ft)	Perp Wall Trib length (ft)		*C_s	+	Shear upper (kips)	=	Base Shear Force (kips)	**Seismic Shear Force at Wall (kips)**	**Lateral Control**
X1-2	41	24	30	+				+	12	9	48		.04Wp	+		=	1.52	**1.64**	**Wind**
X2-2	41	45	40	+				+	12	9	90		.04Wp	+		=	3.67	**3.96**	**Wind**
X3-2	41	18	41	+				+	13	9	36		.04Wp	+		=	1.51	**1.63**	**Wind**
X4-2	41	18	42	+				+	14	9	36		.04Wp	+		=	1.56	**1.68**	**Wind**
Y1-2	41	18	48	+				+	12	9	36		.04Wp	+		=	1.73	**1.86**	**Wind**
Y2-2	41	18	48	+				+	12	9	36		.04Wp	+		=	1.73	**1.86**	**Wind**
Y2-2	41	15	35	+				+	9	9	30		.04Wp	+		=	1.05	**1.14**	**Wind**
Y3-2	41	15	35	+				+	10	9	30		.04Wp	+		=	1.06	**1.15**	**Wind**
Y4-2	41	31	35	+				+	11	9	62		.04Wp	+		=	2.22	**2.40**	**Wind**
X4-1				+	15	18	46	+	12	9	36		.04Wp	+	1.52	=	0.72	**1.98**	**Wind**
Y3-1				+	15	31	52	+	12	9	62		.04Wp	+	1.73	=	1.36	**2.58**	**Wind**
Y4-1				+	15	31	52	+	12	9	62		.04Wp	+	1.73	=	1.36	**2.58**	**Wind**

Total Weight for Vertical Distribution	19.49 kips

Floor	Percent of Total Weight Distribution	Distribution Multiplication Factor
Third Floor		-
Second Floor	88.9%	1.08
First Floor	11.1%	0.63

Shear Wall (X1-2)

PERFORMANCE ENGINEERS

Location: *McCall, Idaho*
Project # : *2017-04857*
Project: *SMC - Miller*
Engineer: *ara*

Program: ***Shear Wall***

Description:

Perforated Shear Wall Calculation Sheet:
This spreadsheet is made in conformance to the IBC Chapters 2305-2308 and AFPA's "SDPWS: Lateral Force Resisting Systems".

Inputs are in *ITALICS and outlined in red* and outputs are in **BOLDFACE**. All outputs are outlined.

L_o =	*30*	ft	Overall length of wall
L =	*30*	ft	Total length of shear wall
L_w =	*30.00*	ft	Total length of full height segments
H =	*12.00*	ft	height of shear wall
H' =	*12.00*	ft	maximum opening height
V_1 =	*3086.66*	lbs	**Total Wind force at top of wall**
$w_{DL\ self}$ =	*96*	plf	Self weight
$w_{DL\ above}$ =	*68*	plf	Applied dead load
	7/16	in	Prefered OSB thickness
	y	y/n	Wall Connected to Concrete
	y	y/n	Wall Connected to Truss Heel / Joist Seat
	n	y/n	Wall Connected to Gable Truss/Rim

Shearwall segments
4
22
4

Calculate Unit Base Shear

$\%_{fh}$ = L_w/L =	1.000		percent of full height segments
$\%_{oh}$ = H'/H =	1.000		percent of maximum opening height
SCAF =	*1.00*		shear capacity adjustment factors (NDS SDPWS Table 4.3.3.4)
v_{base} = V_1/L_w =	103	plf	unit base shear
v_{req} = v_{base}/SCAF =	**103**	plf	effective unit base shear

OTM =	**37,040**	lb ft	overturning moment of total length of wall
RM =	**73,800**	lb ft	resisting moment of total le

T = **Not Req'd** lbs

Shear Transfer to Concrete: 3 1/2 Anchor Bolts= 72 o.c.

Provide	7/16	OSB with	1 1/2 16 Gage Staples	at 6" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	217
Provide	7/16	OSB with	8d Nails	at 6" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	336

Provide Blocking: No Blocking Needed

Shear Wall (X2-2)

PERFORMANCE ENGINEERS

Location: *McCall, Idaho*
Project # : *2017-04857*
Project: *SMC - Miller*
Engineer: *ara*

Program: ***Shear Wall***

Description:

Perforated Shear Wall Calculation Sheet:
This spreadsheet is made in conformance to the IBC Chapters 2305-2308 and AFPA's "SDPWS: Lateral Force Resisting Systems".

Inputs are in *ITALICS and outlined in red* and outputs are in **BOLDFACE**. All outputs are outlined.

L_o =	*60*	ft	Overall length of wall
L =	*60*	ft	Total length of shear wall
L_w =	*35.50*	ft	Total length of full height segments
H =	*9.00*	ft	height of shear wall
H' =	*9.00*	ft	maximum opening height
V_1 =	*4814.31*	lbs	**Total Wind force at top of wall**
$w_{DL\ self}$ =	*72*	plf	Self weight
$w_{DL\ above}$ =	*119*	plf	Applied dead load
	7/16	in	Prefered OSB thickness
	y	y/n	Wall Connected to Concrete
	y	y/n	Wall Connected to Truss Heel / Joist Seat
	y	y/n	Wall Connected to Gable Truss/Rim

Shearwall segments
6
4
4
6
3.5
3.5
8.5

Calculate Unit Base Shear

$\%_{fh}$ = L_w/L =	0.592		percent of full height segments	
$\%_{oh}$ = H'/H =	1.000		percent of maximum opening height	
SCAF =	*0.55*		shear capacity adjustment factors (NDS SDPWS Table 4.3.3.4)	
v_{base} = V_1/L_w =	136	plf	unit base shear	
v_{req} = v_{base}/SCAF =	**246**	plf	effective unit base shear	

OTM =	**78,714**	lb ft	overturning moment of total length of wall
RM =	**343,800**	lb ft	resisting moment of total le

T = **Not Req'd** lbs

Shear Transfer to Concrete: 5 1/2 Anchor Bolts= 72 o.c.

Provide	7/16	OSB with	8d Nails	at 6" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	336
Provide	7/16	OSB with	1 1/2 16 Gage Staples	at 4" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	322

OR:

Use 1/2" Gyp Board, Both Sides, Unblocked, with 5d Cooler Nails @ 4" O.C.
Va = 250 plf

Provide Blocking: No Blocking Needed
Nail Gable Truss to Top Plate With: 10d's @ 12 in O.C.

Shear Wall (X3-2)

PERFORMANCE ENGINEERS

Location: *McCall, Idaho*
Project # : *2017-04857*
Project: *SMC - Miller*
Engineer: *ara*

Program: ***Shear Wall***

Description:

Perforated Shear Wall Calculation Sheet:
This spreadsheet is made in conformance to the IBC Chapters 2305-2308 and AFPA's "SDPWS: Lateral Force Resisting Systems".

Inputs are in *ITALICS and outlined in red* and outputs are in **BOLDFACE**. All outputs are outlined.

L_o =	*14*	ft	Overall length of wall
L =	*14*	ft	Total length of shear wall
L_w =	*12.00*	ft	Total length of full height segments
H =	*9.00*	ft	height of shear wall
H' =	*4.00*	ft	maximum opening height
V_1 =	*2242.85*	lbs	**Total Wind force at top of wall**
$w_{DL\ self}$ =	*72*	plf	Self weight
$w_{DL\ above}$ =	*68*	plf	Applied dead load
	7/16	in	Prefered OSB thickness
	y	y/n	Wall Connected to Concrete
	y	y/n	Wall Connected to Truss Heel / Joist Seat
	y	y/n	Wall Connected to Gable Truss/Rim

Shearwall segments
7.25
4.75

Calculate Unit Base Shear

$\%_{fh}$ = L_w/L =	0.857		percent of full height segments
$\%_{oh}$ = H'/H =	0.444		percent of maximum opening height
SCAF =	*0.95*		shear capacity adjustment factors (NDS SDPWS Table 4.3.3.4)
v_{base} = V_1/L_w =	187	plf	unit base shear
v_{req} = v_{base}/SCAF =	**196**	plf	effective unit base shear

OTM =	**21,147**	lb ft	overturning moment of total length of wall
RM =	**13,720**	lb ft	resisting moment of total le

T = **1076** lbs **Simpson DTT2Z Holdown (Ta = 1825#)**

Shear Transfer to Concrete: 3 1/2 Anchor Bolts= 48 o.c.

Provide	7/16	OSB with	1 1/2 16 Gage Staples	at 6" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	217
Provide	7/16	OSB with	8d Nails	at 6" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	336

Provide Blocking: No Blocking Needed
Nail Gable Truss to Top Plate With: 10d's @ 6 in O.C.

Shear Wall (X4-2 A)

PERFORMANCE ENGINEERS

Location: *McCall, Idaho*
Project # : *2017-04857*
Project: *SMC - Miller*
Engineer: *ara*

Program: ***Shear Wall***

Description:

Perforated Shear Wall Calculation Sheet:
This spreadsheet is made in conformance to the IBC Chapters 2305-2308 and AFPA's "SDPWS: Lateral Force Resisting Systems".

Inputs are in *ITALICS and outlined in red* and outputs are in **BOLDFACE**. All outputs are outlined.

L_o =	*14*	ft	Overall length of wall
L =	*2.5*	ft	Total length of shear wall
L_w =	*2.50*	ft	Total length of full height segments
H =	*10.00*	ft	height of shear wall
H' =	*0.00*	ft	maximum opening height
V_1 =	*1808.75*	lbs	**Total Wind force at top of wall**
$w_{DL\ self}$ =	*80*	plf	Self weight
$w_{DL\ above}$ =	*68*	plf	Applied dead load
	7/16	in	Prefered OSB thickness
	n	y/n	Wall Connected to Concrete
	y	y/n	Wall Connected to Truss Heel / Joist Seat
	y	y/n	Wall Connected to Gable Truss/Rim

Shearwall segments
2.5

Calculate Unit Base Shear

$\%_{fh}$ = L_w/L =		1.000		percent of full height segments
$\%_{oh}$ = H'/H =		0.000		percent of maximum opening height
SCAF =	*1.00*			shear capacity adjustment factors (NDS SDPWS Table 4.3.3.4)
v_{base} = V_1/L_w =		724	plf	unit base shear
v_{req} = v_{base}/SCAF =		**724**	plf	effective unit base shear

OTM =	**18,088**	lb ft	overturning moment of shortest panel
RM =	**463**	lb ft	resisting moment of shorte

T = **7124** lbs **Simpson MSTC52 Strap (Ta = 4235#)**

Provide (2) APA Portal Frames

Va Each= 1575#

Va Total = 3150#

equired

Provide Blocking: No Blocking Needed
Nail Gable Truss to Top Plate With: 10d's @ 12 in O.C.

Shear Wall (X4-2 B)

PERFORMANCE ENGINEERS

Location: *McCall, Idaho*
Project # : *2017-04857*
Project: *SMC - Miller*
Engineer: *ara*

Program: ***Shear Wall***

Description:

Perforated Shear Wall Calculation Sheet:
This spreadsheet is made in conformance to the IBC Chapters 2305-2308 and AFPA's "SDPWS: Lateral Force Resisting Systems".

Inputs are in *ITALICS and outlined in red* and outputs are in **BOLDFACE**. All outputs are outlined.

L_o =	*10*	ft	Overall length of wall
L =	*10*	ft	Total length of shear wall
L_w =	*7.00*	ft	Total length of full height segments
H =	*9.00*	ft	height of shear wall
H' =	*5.00*	ft	maximum opening height
V_1 =	*1808.75*	lbs	**Total Wind force at top of wall**
$w_{DL\ self}$ =	*72*	plf	Self weight
$w_{DL\ above}$ =	*68*	plf	Applied dead load
	7/16	in	Prefered OSB thickness
	n	y/n	Wall Connected to Concrete
	y	y/n	Wall Connected to Truss Heel / Joist Seat
	y	y/n	Wall Connected to Gable Truss/Rim

Shearwall segments
3.5
3.5

Calculate Unit Base Shear

$\%_{fh}$ = L_w/L =	0.700		percent of full height segments
$\%_{oh}$ = H'/H =	0.556		percent of maximum opening height
SCAF =	*0.83*		shear capacity adjustment factors (NDS SDPWS Table 4.3.3.4)
v_{base} = V_1/L_w =	258	plf	unit base shear
v_{req} = v_{base}/SCAF =	**310**	plf	effective unit base shear

OTM =	**19,535**	lb ft	overturning moment of total length of wall
RM =	**7,000**	lb ft	resisting moment of total le

T = **2191** lbs **Simpson MSTC40 Strap (Ta = 2695#)**

Provide	7/16	OSB with	8d Nails	at 6" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	336
Provide	7/16	OSB with	1 1/2 16 Gage Staples	at 4" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	322

Provide Blocking: Every Other Bay with (6) 10d Nails Per Blocking
Nail Gable Truss to Top Plate With: 10d's @ 6 in O.C.

Shear Wall (Y1-2)

9/25/2017
9:56 AM

PERFORMANCE ENGINEERS

Location: *McCall, Idaho*
Project # : *2017-04857*
Project: *SMC - Miller*
Engineer: *ara*

Program: ***Shear Wall***

Description:

Perforated Shear Wall Calculation Sheet:
This spreadsheet is made in conformance to the IBC Chapters 2305-2308 and AFPA's "SDPWS: Lateral Force Resisting Systems".

Inputs are in *ITALICS and outlined in red* and outputs are in **BOLDFACE**. All outputs are outlined.

L_o =	*48*	ft	Overall length of wall
L =	*48*	ft	Total length of shear wall
L_w =	*37.00*	ft	Total length of full height segments
H =	*12.00*	ft	height of shear wall
H' =	*12.00*	ft	maximum opening height
V_1 =	*2788.53*	lbs	**Total Wind force at top of wall**
$w_{DL\ self}$ =	*96*	plf	Self weight
$w_{DL\ above}$ =	*82.5*	plf	Applied dead load
	7/16	in	Prefered OSB thickness
	y	y/n	Wall Connected to Concrete
	y	y/n	Wall Connected to Truss Heel
	y	y/n	Wall Connected to Gable Truss/Rim

Shearwall segments
5
26
6

Calculate Unit Base Shear

$\%_{fh}$ = L_w/L =	0.771		percent of full height segments	
$\%_{oh}$ = H'/H =	1.000		percent of maximum opening height	
SCAF =	*0.69*		shear capacity adjustment factors (NDS SDPWS Table 4.3.3.4)	
v_{base} = V_1/L_w =	75	plf	unit base shear	
v_{req} = v_{base}/SCAF =	**110**	plf	effective unit base shear	

OTM =	**48,799**	lb ft	overturning moment of total length of wall
RM =	**205,632**	lb ft	resisting moment of total le

T = **Not Req'd** lbs

Shear Transfer to Concrete: 3 1/2 Anchor Bolts= 72 o.c.

Provide	7/16	OSB with	1 1/2 16 Gage Staples	at 6" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	217
Provide	7/16	OSB with	8d Nails	at 6" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	336

Provide Blocking: No Blocking Needed
Nail Gable Truss to Top Plate With: 10d's @ 12 in O.C.

Shear Wall (Y2-2 A)

PERFORMANCE ENGINEERS

Location: *McCall, Idaho*
Project # : *2017-04857*
Project: *SMC - Miller*
Engineer: *ara*

Program: ***Shear Wall***

Description:

Perforated Shear Wall Calculation Sheet:
This spreadsheet is made in conformance to the IBC Chapters 2305-2308 and AFPA's "SDPWS: Lateral Force Resisting Systems".

Inputs are in *ITALICS and outlined in red* and outputs are in **BOLDFACE**. All outputs are outlined.

L_o =	*14*	ft	Overall length of wall
L =	*6*	ft	Total length of shear wall
L_w =	*6.00*	ft	Total length of full height segments
H =	*12.00*	ft	height of shear wall
H' =	*0.00*	ft	maximum opening height
V_1 =	*1394.26*	lbs	**Total Wind force at top of wall**
$w_{DL\ self}$ =	*96*	plf	Self weight
$w_{DL\ above}$ =	*102*	plf	Applied dead load
	7/16	in	Prefered OSB thickness
	y	y/n	Wall Connected to Concrete
	n	y/n	Wall Connected to Truss Heel
	y	y/n	Wall Connected to Gable Truss

Shearwall segments: 6

Calculate Unit Base Shear

$\%_{fh}$ = L_w/L =	1.000		percent of full height segments
$\%_{oh}$ = H'/H =	0.000		percent of maximum opening height
SCAF =	*1.00*		shear capacity adjustment factors (NDS SDPWS Table 4.3.3.4)
v_{base} = V_1/L_w =	232	plf	unit base shear
v_{req} = v_{base}/SCAF =	**232**	plf	effective unit base shear

OTM =	**16,731**	lb ft	overturning moment of total length of wall
RM =	**3,564**	lb ft	resisting moment of total l

T = **2432** lbs

Shear Transfer to Concrete: 2 1/2 Anchor Bolts= 36 o.c.

Provide	7/16	OSB with	8d Nails	at 6" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	336
Provide	7/16	OSB with	1 1/2 16 Gage Staples	at 4" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	322

Nail Gable Truss to Top Plate With: 10d's @ 12 in O.C.

Shear Wall (Y2-2 B)

PERFORMANCE ENGINEERS

Location: *McCall, Idaho*
Project # : *2017-04857*
Project: *SMC - Miller*
Engineer: *ara*

Program: ***Shear Wall***

Description:

Perforated Shear Wall Calculation Sheet:
This spreadsheet is made in conformance to the IBC Chapters 2305-2308 and AFPA's "SDPWS: Lateral Force Resisting Systems".

Inputs are in *ITALICS and outlined in red* and outputs are in **BOLDFACE**. All outputs are outlined.

L_o =	*14*	ft	Overall length of wall
L =	*2*	ft	Total length of shear wall
L_w =	*2.00*	ft	Total length of full height segments
H =	*10.00*	ft	height of shear wall
H' =	*0.00*	ft	maximum opening height
V_1 =	*697.13*	lbs	**Total Wind force at top of wall**
$w_{DL\ self}$ =	*80*	plf	Self weight
$w_{DL\ above}$ =	*102*	plf	Applied dead load
	7/16	in	Prefered OSB thickness
	y	y/n	Wall Connected to Concrete
	n	y/n	Wall Connected to Truss Heel
	y	y/n	Wall Connected to Gable Truss

Shearwall segments: 2

Calculate Unit Base Shear

$\%_{fh} = L_w/L$ =	1.000		percent of full height segments
$\%_{oh} = H'/H$ =	0.000		percent of maximum opening height
SCAF =	*1.00*		shear capacity adjustment factors (NDS SDPWS Table 4.3.3.4)
$v_{base} = V_1/L_w$ =	349	plf	unit base shear
$v_{req} = v_{base}$/SCAF =	**349**	plf	effective unit base shear

OTM =	**6,971**	lb ft	overturning moment of total length of wall
RM =	**364**	lb ft	resisting moment of total l

T = **3376** lbs — **Simpson STHD14 Strap Tie (Ta = 5345#)**

Shear Transfer to Concrete: 1 1/2 Anchor Bolts= 24 o.c.

Provide (2) APA Portal Frames

Va Each= 1575#

Va Total = 3150#

Nail Gable Truss to Top Plate With: 10d's @ 12 in O.C.

Shear Wall (Y3-2)

PERFORMANCE ENGINEERS

Location: *McCall, Idaho*
Project # : *2017-04857*
Project: *SMC - Miller*
Engineer: *ara*

Program: ***Shear Wall***

Description:

Perforated Shear Wall Calculation Sheet:
This spreadsheet is made in conformance to the IBC Chapters 2305-2308 and AFPA's "SDPWS: Lateral Force Resisting Systems".

Inputs are in *ITALICS and outlined in red* and outputs are in **BOLDFACE**. All outputs are outlined.

L_o =	*14*	ft	Overall length of wall
L =	*2*	ft	Total length of shear wall
L_w =	*2.00*	ft	Total length of full height segments
H =	*10.00*	ft	height of shear wall
H' =	*0.00*	ft	maximum opening height
V_1 =	*1574.15*	lbs	**Total Wind force at top of wall**
$w_{DL\ self}$ =	*80*	plf	Self weight
$w_{DL\ above}$ =	*102*	plf	Applied dead load
	7/16	in	Prefered OSB thickness
	y	y/n	Wall Connected to Concrete
	n	y/n	Wall Connected to Truss Heel
	y	y/n	Wall Connected to Gable Truss

Shearwall segments: 2

Calculate Unit Base Shear

$\%_{fh}$ = L_w/L =	1.000		percent of full height segments
$\%_{oh}$ = H'/H =	0.000		percent of maximum opening height
SCAF =	*1.00*		shear capacity adjustment factors (NDS SDPWS Table 4.3.3.4)
v_{base} = V_1/L_w =	787	plf	unit base shear
v_{req} = v_{base}/SCAF =	**787**	plf	effective unit base shear

OTM =	**15,741**	lb ft	overturning moment of shortest panel
RM =	**364**	lb ft	resisting moment of shorte

T = **7762** lbs **Simpson STHD14 Strap Tie (Ta = 5345#)**

Shear Transfer to Concrete: 2 1/2 Anchor Bolts= 12 o.c.

Provide (2) APA Portal Frames

Va Each= 1575#

Va Total = 3150#

equired

Nail Gable Truss to Top Plate With: 10d's @ 12 in O.C.

Shear Wall (Y3-2) (2)

9/25/2017
9:56 AM

PERFORMANCE ENGINEERS

Location: *McCall, Idaho*
Project # : *2017-04857*
Project: *SMC - Miller*
Engineer: *ara*

Program: ***Shear Wall***

Description:

Perforated Shear Wall Calculation Sheet:
This spreadsheet is made in conformance to the IBC Chapters 2305-2308 and AFPA's "SDPWS: Lateral Force Resisting Systems".

Inputs are in *ITALICS and outlined in red* and outputs are in **BOLDFACE**. All outputs are outlined.

L_o =	*14*	ft	Overall length of wall
L =	*4*	ft	Total length of shear wall
L_w =	*4.00*	ft	Total length of full height segments
H =	*9.00*	ft	height of shear wall
H' =	*0.00*	ft	maximum opening height
V_1 =	*1026.15*	lbs	**Total Wind force at top of wall**
$w_{DL\ self}$ =	*72*	plf	Self weight
$w_{DL\ above}$ =	*102*	plf	Applied dead load
	7/16	in	Prefered OSB thickness
	y	y/n	Wall Connected to Concrete
	n	y/n	Wall Connected to Truss Heel
	y	y/n	Wall Connected to Gable Truss

Shearwall segments
4

Calculate Unit Base Shear

$\%_{fh}$ = L_w/L =	1.000		percent of full height segments
$\%_{oh}$ = H'/H =	0.000		percent of maximum opening height
SCAF =	*1.00*		shear capacity adjustment factors (NDS SDPWS Table 4.3.3.4)
v_{base} = V_1/L_w =	257	plf	unit base shear
v_{req} = v_{base}/SCAF =	**257**	plf	effective unit base shear

OTM =	**9,235**	lb ft	overturning moment of total length of wall
RM =	**1,392**	lb ft	resisting moment of total l

T = **2100** lbs **Simpson HDU2-SDS2.5 Holdown (Ta = 3075# w/ 2 Ply Stud)**

Shear Transfer to Concrete: 1 1/2 Anchor Bolts= 48 o.c.

Provide	7/16	OSB with	8d Nails	at 6" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	336
Provide	7/16	OSB with	1 1/2 16 Gage Staples	at 4" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	322

Nail Gable Truss to Top Plate With: 10d's @ 12 in O.C.

Shear Wall (Y4-2)

9/25/2017
9:56 AM

PERFORMANCE ENGINEERS

Location: *McCall, Idaho*
Project # : *2017-04857*
Project: *SMC - Miller*
Engineer: *ara*

Program: ***Shear Wall***

Description:

Perforated Shear Wall Calculation Sheet:
This spreadsheet is made in conformance to the IBC Chapters 2305-2308 and AFPA's "SDPWS: Lateral Force Resisting Systems".

Inputs are in *ITALICS and outlined in red* and outputs are in **BOLDFACE**. All outputs are outlined.

L_o =	*25*	ft	Overall length of wall
L =	*20.5*	ft	Total length of shear wall
L_w =	*14.50*	ft	Total length of full height segments
H =	*9.00*	ft	height of shear wall
H' =	*1.50*	ft	maximum opening height
V_1 =	*4176.15*	lbs	**Total Wind force at top of wall**
$w_{DL\ self}$ =	*72*	plf	Self weight
$w_{DL\ above}$ =	*255*	plf	Applied dead load
	7/16	in	Prefered OSB thickness
	y	y/n	Wall Connected to Concrete
	Y	y/n	Wall Connected to Truss Heel
	N	y/n	Wall Connected to Gable Truss

Shearwall segments
4
5.5
5

Calculate Unit Base Shear

$\%_{fh}$ = L_w/L =	0.707		percent of full height segments
$\%_{oh}$ = H'/H =	0.167		percent of maximum opening height
SCAF =	*1.00*		shear capacity adjustment factors (NDS SDPWS Table 4.3.3.4)
v_{base} = V_1/L_w =	288	plf	unit base shear
v_{req} = v_{base}/SCAF =	**288**	plf	effective unit base shear

OTM =	**37,585**	lb ft	overturning moment of total length of wall
RM =	**68,711**	lb ft	resisting moment of total le

T = **Not Req'd** lbs

Shear Transfer to Concrete: 5 1/2 Anchor Bolts= 48 o.c.

Provide	7/16	OSB with	8d Nails	at 6" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	336
Provide	7/16	OSB with	1 1/2 16 Gage Staples	at 4" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	322

Provide Blocking: No Blocking Needed

Shear Wall (X4-1)

9/25/2017
9:56 AM

PERFORMANCE ENGINEERS

Location: *McCall, Idaho*
Project # : *2017-04857*
Project: *SMC - Miller*
Engineer: *ara*

Program: ***Shear Wall***

Description:

Perforated Shear Wall Calculation Sheet:
This spreadsheet is made in conformance to the IBC Chapters 2305-2308 and AFPA's "SDPWS: Lateral Force Resisting Systems".

Inputs are in *ITALICS and outlined in red* and outputs are in **BOLDFACE**. All outputs are outlined.

				Shearwall segments
L_o =	*42*	ft	Overall length of wall	
L =	*45*	ft	Total length of shear wall	3
L_w =	*21.33*	ft	Total length of full height segments	2.83
H =	*9.00*	ft	height of shear wall	3
H' =	*5.00*	ft	maximum opening height	3
V_1 =	*5531.95*	lbs	**Total Wind force at top of wall**	3
$w_{DL\ self}$ =	*72*	plf	Self weight	3.5
$w_{DL\ above}$ =	*306*	plf	Applied dead load	3
	7/16	in	Prefered OSB thickness	3
	y	y/n	Wall Connected to Concrete	
	N	y/n	Wall Connected to Truss Heel	
	Y	y/n	Wall Connected to Gable Truss/Rim	

Calculate Unit Base Shear

$\%_{fh}$ = L_w/L =	0.474		percent of full height segments
$\%_{oh}$ = H'/H =	0.556		percent of maximum opening height
SCAF =	*0.74*		shear capacity adjustment factors (NDS SDPWS Table 4.3.3.4)
v_{base} = V_1/L_w =	259	plf	unit base shear
v_{req} = v_{base}/SCAF =	**350**	plf	effective unit base shear

OTM =	**67,246**	lb ft	overturning moment of total length of wall
RM =	**382,725**	lb ft	resisting moment of total le

T = **Not Req'd** lbs **Intersecting wall sufficient for uplift**

Shear Transfer to Concrete: 6 1/2 Anchor Bolts= 72 o.c.

Provide	7/16	OSB with	8d Nails	at 4" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	490
Provide	7/16	OSB with	1 1/2 16 Gage Staples	at 3" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	434

Nail Gable Truss to Top Plate With: 10d's @ 12 in O.C.

Shear Wall (Y3-1)

9/25/2017
9:56 AM

PERFORMANCE ENGINEERS

Location: *McCall, Idaho*
Project # : *2017-04857*
Project: *SMC - Miller*
Engineer: *ara*

Program: ***Shear Wall***

Description:

Perforated Shear Wall Calculation Sheet:
This spreadsheet is made in conformance to the IBC Chapters 2305-2308 and AFPA's "SDPWS: Lateral Force Resisting Systems".

Inputs are in *ITALICS and outlined in red* and outputs are in **BOLDFACE**. All outputs are outlined.

L_o =	*52*	ft	Overall length of wall
L =	*16*	ft	Total length of shear wall
L_w =	*16.00*	ft	Total length of full height segments
H =	*9.00*	ft	height of shear wall
H' =	*0.00*	ft	maximum opening height
V_1 =	*3570.21*	lbs	**Total Wind force at top of wall**
$w_{DL\ self}$ =	*72*	plf	Self weight
$w_{DL\ above}$ =	*357*	plf	Applied dead load
	7/16	in	Prefered OSB thickness
	y	y/n	Wall Connected to Concrete
	n	y/n	Wall Connected to Truss Heel
	y	y/n	Wall Connected to Gable Truss

Shearwall segments
16

Calculate Unit Base Shear

$\%_{fh}$ = L_w/L =	1.000		percent of full height segments
$\%_{oh}$ = H'/H =	0.000		percent of maximum opening height
SCAF =	*1.00*		shear capacity adjustment factors (NDS SDPWS Table 4.3.3.4)
v_{base} = V_1/L_w =	223	plf	unit base shear
v_{req} = v_{base}/SCAF =	**223**	plf	effective unit base shear

OTM =	**32,132**	lb ft	overturning moment of total length of wall
RM =	**54,912**	lb ft	resisting moment of total le

T = **Not Req'd** lbs

Shear Transfer to Concrete: 4 1/2 Anchor Bolts= 48 o.c.

Provide	7/16	OSB with	8d Nails	at 6" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	336
Provide	7/16	OSB with	1 1/2 16 Gage Staples	at 4" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	322

Nail Gable Truss to Top Plate With: 10d's @ 12 in O.C.

Shear Wall (Y4-1)

PERFORMANCE ENGINEERS

Location: *McCall, Idaho*
Project # : *2017-04857*
Project: *SMC - Miller*
Engineer: *ara*

Program: ***Shear Wall***

Description:

Perforated Shear Wall Calculation Sheet:
This spreadsheet is made in conformance to the IBC Chapters 2305-2308 and AFPA's "SDPWS: Lateral Force Resisting Systems".

Inputs are in *ITALICS and outlined in red* and outputs are in **BOLDFACE**. All outputs are outlined.

L_o =	*26*	ft	Overall length of wall
L =	*26*	ft	Total length of shear wall
L_w =	*26.00*	ft	Total length of full height segments
H =	*9.00*	ft	height of shear wall
H' =	*0.00*	ft	maximum opening height
V_1 =	*7140.43*	lbs	**Total Wind force at top of wall**
$w_{DL\ self}$ =	*72*	plf	Self weight
$w_{DL\ above}$ =	*283.5*	plf	Applied dead load
	7/16	in	Prefered OSB thickness
	y	y/n	Wall Connected to Concrete
	Y	y/n	Wall Connected to Truss Heel
	y	y/n	Wall Connected to Gable Truss

Shearwall segments
26

Calculate Unit Base Shear

$\%_{fh}$ = L_w/L =	1.000		percent of full height segments
$\%_{oh}$ = H'/H =	0.000		percent of maximum opening height
SCAF =	*1.00*		shear capacity adjustment factors (NDS SDPWS Table 4.3.3.4)
v_{base} = V_1/L_w =	275	plf	unit base shear
v_{req} = v_{base}/SCAF =	**275**	plf	effective unit base shear

OTM =	**64,264**	lb ft	overturning moment of total length of wall
RM =	**120,159**	lb ft	resisting moment of total l

T = **Not Req'd** lbs

Shear Transfer to Concrete: 7 1/2 Anchor Bolts= 36 o.c.

Provide	7/16	OSB with	8d Nails	at 6" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	336
Provide	7/16	OSB with	1 1/2 16 Gage Staples	at 4" o.c. all at panel edges and 12" o.c. in intermediate studs.	Va =	322

Provide Blocking: Every Bay with (6) 10d Nails Per Blocking
Nail Gable Truss to Top Plate With: 10d's @ 6 in O.C.

Table 1. Recommended Allowable Design Values for APA Portal Frame Used on a Rigid-Base

Minimum Width (in.)	Maximum Height (ft)	Allowable Design (ASD) Values per Frame Segment		
		Shear[e,f] (lbf)	Deflection (in.)	Load Factor
16	8	850	0.33	3.09
	10	625	0.44	2.97
24	8	1,675	0.38	2.88
	10	1,125	0.51	3.42

Foundation for Wind or Seismic Loading[a,b,c,d]

(a) Design values are based on the use of Douglas-fir or Southern pine framing. For other species of framing, multiply the above shear design value by the specific gravity adjustment factor = (1 – (0.5 – SG)), where SG = specific gravity of the actual framing. This adjustment shall not be greater than 1.0.

(b) For construction as shown in Figure 1.

(c) Values are for a single portal-frame segment (one vertical leg and a portion of the header). For multiple portal-frame segments, the allowable shear design values are permitted to be multiplied by the number of frame segments (e.g., two = 2x, three = 3x, etc.).

(d) Interpolation of design values for heights between 8 and 10 feet, and for portal widths between 16 and 24 inches, is permitted.

(e) The allowable shear design value is permitted to be multiplied by a factor of 1.4 for wind design.

(f) If story drift is not a design consideration, the tabulated design shear values are permitted to be multiplied by a factor of 1.15. This factor is permitted to be used cumulatively with the wind-design adjustment factor in Footnote (e) above.

Figure 1. Construction Details for APA Portal-Frame Design with Hold Downs