

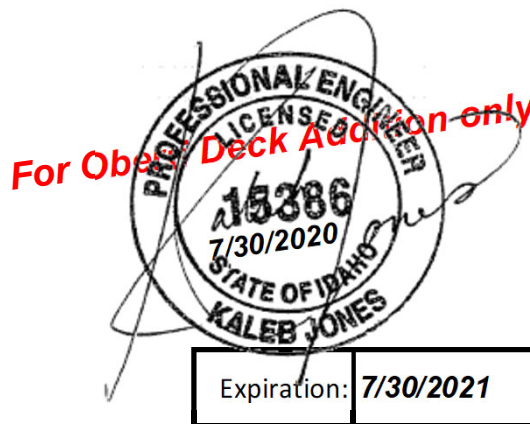
Deck Addition Calculations

For

Oberti Deck Addition

Valley County, Idaho

2020-10141



Design Criteria

Governing Code: **2015 IBC**

Snow Criteria

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

Wind Criteria

Wind Speed (V_3)	115 mph	
Wind Exposure	B	Urban / wooded
Wind Importance (I_w)	1.0	
Building Category	II	

Seismic Criteria

Site Class	D	Stiff Soil
S_s	0.51	F_a 1.39
S_1	0.15	F_v 2.19
S_{D1}	0.47	S_{D1} 0.22
Risk Category	II	Other
Seismic Importance (I_E)	1.0	
Seismic Design Category (SDC)	D	

Wall Material	Design Base Shear	Seismic Response Coefficient, R	
OSB	.07Wp	6.5	Typ @ Ext
GYP	.24Wp	2	Typ @ Int

Live Loads

Typ Residential	40 psf
Garage (P.V.)	40 psf
	-

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	2.5
Joist	2.0
Ceiling	2.0
Flooring	2.5
Misc	3.0
TOTAL	12 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

Interior Wall Dead Loads:

Studs	2.0
Gyp. Board	2.5
-	-
-	-
-	-
Misc	3.0
TOTAL	8 psf

OSB Seismic Loading Analysis

$$S_s = 0.507$$

$$C_T = 0.020$$

$$S_1 = 0.152$$

$$h_n = 12.16 \text{ ft}$$

$$F_a = 1.4$$

$$F_v = 2.2$$

$$R = 6.5$$

$$I_E = 1.0$$

$$S_{MS} = F_a S_s = 0.7068$$

$$S_{M1} = F_v S_1 = 0.3332$$

$$S_{DS} = 2/3 S_{MS} = 0.4712$$

$$S_{D1} = 2/3 S_{M1} = 0.2221$$

Seismic Design Category

C

D

$$C_s = 1.2 S_{DS} / (R / I_E) = 0.0725$$

Controls

$$T_a = C_T h_n^{3/4} = 0.1891$$

$$C_s < S_{D1} / [(R / I_E) T] = 0.1807$$

$$C_s > 0.044 S_{DS} I_E = 0.0207$$

$$C_s > 0.5 S_1 / (R / I_E) = 0.0117$$

$$V = C_s W = \mathbf{0.0725} \text{ W}$$

$$0.7 * V = \mathbf{0.0507} \text{ W}$$

OSB Seismic Component Loading

$w_p =$	1	psf	weight of element
			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 because of the offsets or changes in the stiffness of the vertical components above of below the diaphragm.
$V_{px} =$	0	plf	
$w_w =$	1	psf	weight of wall
$L_b =$	18	ft	length of the building

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

Connections

$$F_p = 0.133 S_{DS} w_p = \mathbf{0.06} \text{ psf}$$

or

$$F_p = 0.05 w_p = \mathbf{0.05} \text{ psf}$$

Diaphragm

$$F_p = 0.2 I_E S_{DS} w_p + V_{px} = \mathbf{0.09} \text{ psf}$$

$$F_{p,max} = 0.4 I_E S_{DS} w_p + V_{px} = \mathbf{0.19} \text{ psf}$$

Bearing Walls & Shear Walls

Out of Plane Forces

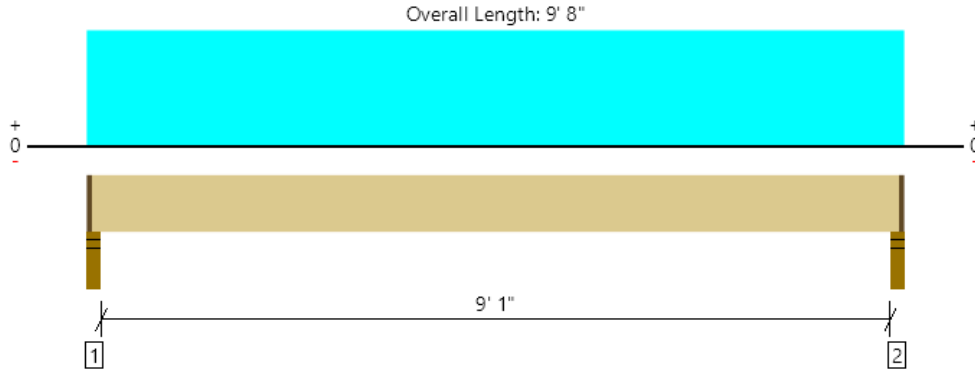
$F_p = 0.40 I_E S_{DS} w_w =$	0.19	psf	Controls	12.11.1
$F_p = 0.10 w_w =$	0.10	psf		12.11.1

Anchorage

$F_p = 0.40 I_E S_{DS} w_w k_a =$	0.3	psf		12.11-1
$F_p = 0.2 I_E k_a w_w =$	0.3200	psf	Controls	
$k_a = 1.0 + L_b / 100 =$	1.6000			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.

Level, Deck Floor Beam (B05 and B06)
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.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3140 @ 2"	7734 (2.25")	Passed (41%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2379 @ 1' 3"	8244	Passed (29%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	7230 @ 4' 10"	10166	Passed (71%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.113 @ 4' 10"	0.233	Passed (L/991)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.125 @ 4' 10"	0.467	Passed (L/895)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - DF	3.50"	2.25"	1.50"	308	2900	3208	1 1/4" Rim Board
2 - Stud wall - DF	3.50"	2.25"	1.50"	308	2900	3208	1 1/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	9' 6" o/c	
Bottom Edge (Lu)	9' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	1 1/4" to 9' 6 3/4"	N/A	16.0	--	
1 - Uniform (PSF)	0 to 9' 8" (Front)	4'	12.0	150.0	Default Load

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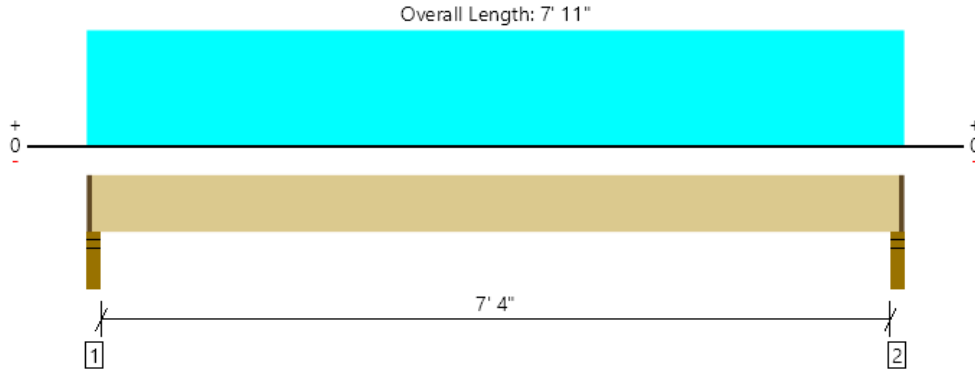
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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Level, Deck Floor Beam (B04)
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.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3192 @ 2"	7734 (2.25")	Passed (41%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2381 @ 1' 1"	6810	Passed (35%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	5954 @ 3' 11 1/2"	6937	Passed (86%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.109 @ 3' 11 1/2"	0.190	Passed (L/833)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.121 @ 3' 11 1/2"	0.379	Passed (L/754)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - DF	3.50"	2.25"	1.50"	308	2969	3277	1 1/4" Rim Board
2 - Stud wall - DF	3.50"	2.25"	1.50"	308	2969	3277	1 1/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	7' 9" o/c	
Bottom Edge (Lu)	7' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	1 1/4" to 7' 9 3/4"	N/A	13.2	--	
1 - Uniform (PSF)	0 to 7' 11" (Front)	4'	12.0	150.0	Default Load
2 - Uniform (PSF)	0 to 7' 11" (Front)	1'	17.0	150.0	

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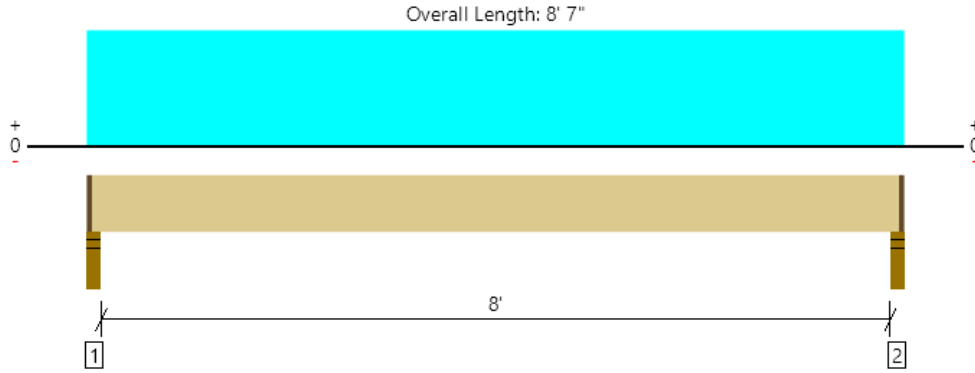
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Level, Deck Joist

1 piece(s) 2 x 10 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.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	893 @ 2 1/2"	1434 (2.25")	Passed (62%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	689 @ 1' 3/4"	1915	Passed (36%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1779 @ 4' 3 1/2"	2334	Passed (76%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.126 @ 4' 3 1/2"	0.204	Passed (L/775)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.135 @ 4' 3 1/2"	0.408	Passed (L/727)	--	1.0 D + 1.0 S (All Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

System : Floor
 Member Type : Joist
 Building Use : Residential
 Building Code : IBC 2015
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - SPF	3.50"	2.25"	1.50"	57	858	915	1 1/4" Rim Board
2 - Stud wall - SPF	3.50"	2.25"	1.50"	57	858	915	1 1/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 1" o/c	
Bottom Edge (Lu)	8' 5" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 8' 7"	16"	10.0	150.0	FLOOR LOAD

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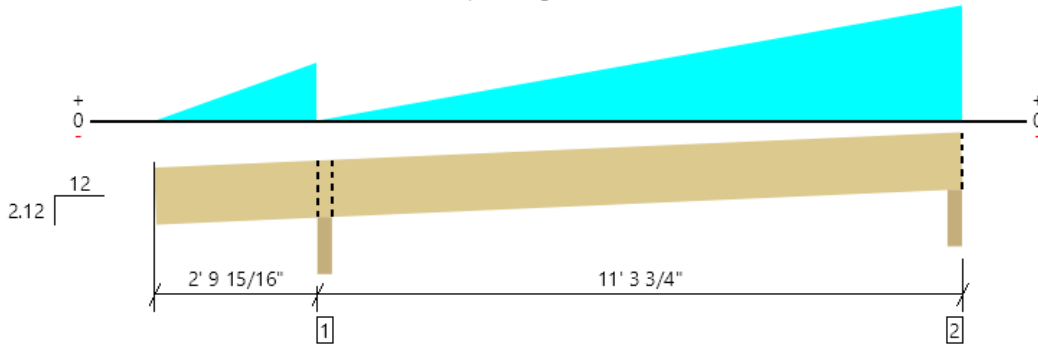
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Level, Roof Hip Beam
1 piece(s) 6 x 12 Douglas Fir-Larch No. 2

Sloped Length: 14' 4 5/16"



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

Member Length : 14' 6 3/8"

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3629 @ 13' 11 11/16"	8181 (3.50")	Passed (44%)	--	1.0 D + 1.0 S (Alt Spans)
Shear (lbs)	2509 @ 12' 10 7/8"	8244	Passed (30%)	1.15	1.0 D + 1.0 S (Alt Spans)
Moment (Ft-lbs)	7327 @ 9' 4 5/16"	10166	Passed (72%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	0.154 @ 8' 8 5/16"	0.559	Passed (L/869)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.176 @ 8' 8 5/16"	0.745	Passed (L/763)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 2.12/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Beveled Plate - SPF	3.50"	3.50"	1.50"	394	2233	2627	Blocking
2 - Beveled Plate - SPF	3.50"	3.50"	1.55"	432	3197	3629	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	14' 4" o/c	
Bottom Edge (Lu)	14' 4" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 14' 1 11/16"	N/A	16.0	--	
1 - Tapered (PLF)	0 to 2' 9 15/16"	N/A	0.0 to 48.8	0.0 to 424.3	Generated from Roof Geometry
2 - Tapered (PLF)	2' 9 15/16" to 14' 1 11/16"	N/A	0.0 to 91.5	0.0 to 848.5	Generated from Roof Geometry

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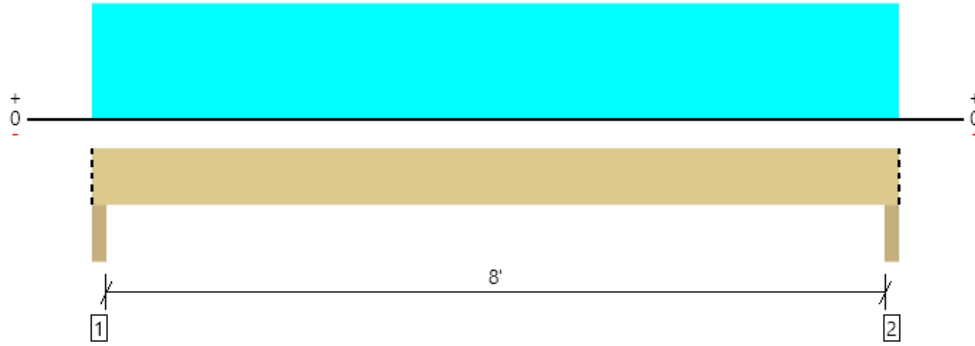
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Level, Roof Beams
 1 piece(s) 6 x 12 Douglas Fir-Larch No. 2
Or 8-3/4" GLB for looks

Overall Length: 8' 7"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4369 @ 2"	12031 (3.50")	Passed (36%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3096 @ 1' 3"	8244	Passed (38%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	8661 @ 4' 3 1/2"	10166	Passed (85%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.104 @ 4' 3 1/2"	0.412	Passed (L/956)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.117 @ 4' 3 1/2"	0.550	Passed (L/845)	--	1.0 D + 1.0 S (All Spans)

System : Roof
 Member Type : Drop Beam
 Building Use : Residential
 Building Code : IBC 2015
 Design Methodology : ASD
 Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Column - DF	3.50"	3.50"	1.50"	507	3863	4370	Blocking
2 - Column - DF	3.50"	3.50"	1.50"	507	3863	4370	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' 7" o/c	
Bottom Edge (Lu)	8' 7" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 8' 7"	N/A	16.0	--	
1 - Uniform (PSF)	0 to 8' 7" (Front)	6'	17.0	150.0	Default Load

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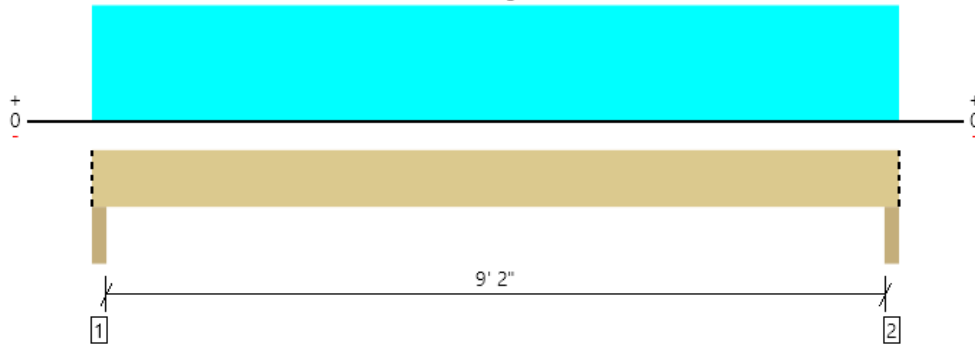
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Level, Roof Beams 2
 1 piece(s) 3 1/8" x 12" 24F-V4 DF Glulam
Or 8-3/4" GLB for looks

Overall Length: 9' 9"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4928 @ 2"	7109 (3.50")	Passed (69%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3622 @ 1' 3 1/2"	7619	Passed (48%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	11203 @ 4' 10 1/2"	17250	Passed (65%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.196 @ 4' 10 1/2"	0.471	Passed (L/575)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.221 @ 4' 10 1/2"	0.628	Passed (L/512)	--	1.0 D + 1.0 S (All Spans)

System : Roof
 Member Type : Drop Beam
 Building Use : Residential
 Building Code : IBC 2015
 Design Methodology : ASD
 Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 9' 5".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Column - DF	3.50"	3.50"	2.43"	542	4387	4929	Blocking
2 - Column - DF	3.50"	3.50"	2.43"	542	4387	4929	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	9' 9" o/c	
Bottom Edge (Lu)	9' 9" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 9' 9"	N/A	9.1	--	
1 - Uniform (PSF)	0 to 9' 9" (Front)	6'	17.0	150.0	Default Load

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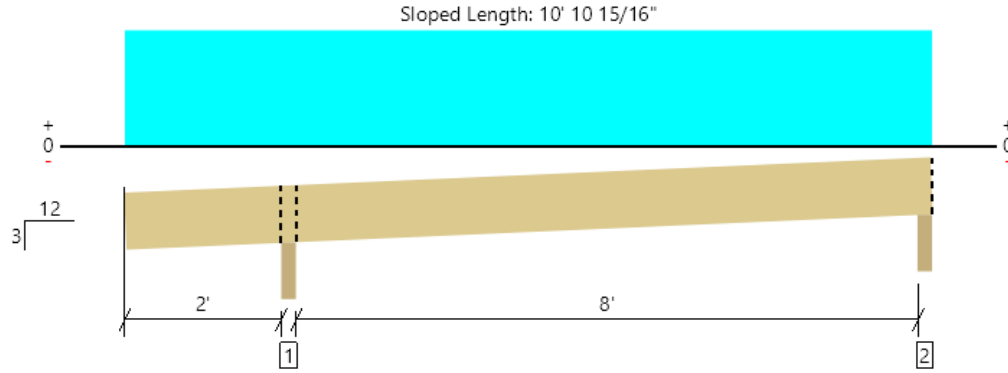
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Cameron Price Performance Engineers (208) 475-0040 cprice@inteframe.com	



Level, Roof Joists

1 piece(s) 4 x 10 Douglas Fir-Larch No. 2 @ 24" OC



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

Member Length : 11' 1 1/4"

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2191 @ 2' 1 3/4"	5366 (3.50")	Passed (41%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1173 @ 3' 1/2"	4468	Passed (26%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2627 @ 6' 5"	5941	Passed (44%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.082 @ 6' 3 11/16"	0.283	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.091 @ 6' 3 3/4"	0.424	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Roof
 Member Type : Joist
 Building Use : Residential
 Building Code : IBC 2015
 Design Methodology : ASD
 Member Pitch : 3/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Beveled Plate - SPF	3.50"	3.50"	1.50"	229	1962	2191	Blocking
2 - Beveled Plate - SPF	3.50"	3.50"	1.50"	142	1255	1397	Blocking

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

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

•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 10' 7"	24"	17.0	150.0	Default Load

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Uplift/Lateral Calcs:

-Weight of Materials:

$$\Rightarrow ((17 \text{ DL} * 4' \text{ trib}) + (150 \text{ LL} * 0.25 * 4' \text{ trib})) * 8.5' \text{ span trib} = 1853\#$$

-Lateral Force:

$$\Rightarrow 1853\# * 0.0507 \text{ (Seismic Coefficient)} = 94.03\#$$

-Moment at top of Posts (Worst Case):

$$\Rightarrow 94.03 * 8.25 = 775.75 \text{ lb-ft}$$

-Knee Brace Force:

$$\Rightarrow 775.75 / 2' = 388\#$$

= 388# Capacity required at knee brace connections

=> Screw each side of knee braces (4x4 DF #2 min) to post/beam w/
(2) 5" SDS screws (700# Capacity) = **OK**

-Uplift @ posts:

$$\Rightarrow 94.03\# * 8.25' \text{ (height)} / 7' \text{ (width)} = 110.82\#$$

= 111# Uplift capacity required at each post base

=> CB post bases = **OK**

