



March 2, 2018

John Allen  
Park City Building Department  
445 Marsac Avenue  
Park City, UT 84060

RE: BD-17-25139  
2575 Larkspur Dr.  
Structural Review

**14031 (Larkspur Residence - Think)**

John,

I am sending this letter in response to your structural review letter dated December 22, 2017.

**20. Please specify footing depth (40" min).**

- a. Footing depth is specified on sheets S201 & S202. Please see the Footing & Foundation Plan Notes on these sheets.

**21. Per Design Criteria S101 and structural calcs you show 15 lb dead load for floors. There are architectural sheets that show on floor radiant heat. Please justify.**

Dead load has been updated, and framing sizes have been revised as required.

**22. S202 is missing footing types.**

Sheet S202 does not show any structural footings because all of the concrete walls that are shown on this plan are site walls and should be provided by others.

**a. S202 appears to be a shear wall plan too. Please clarify/specify.**

- a. S202 shows the shear wall above. These shear walls are also reflected on sheet S402, and the hold downs are also shown on sheet S401.

**b. Along grid C near 1 and 2 please clarify the CS16, as well as grid A near 2 and 7, and 6 D and E.**

- a. The CS16 shown on Sheet S202 are the hold down straps

**23. S401, grid 5 near E, detail 302. How does that work with wide flange beam??**

Detail at this location has been revised.

- a. Several specified details don't appear to apply. Please ensure there are details for each application and they are referenced on plans.



- a. Plans have been reviewed for detail callouts, and to make sure that they are called out appropriately.
- b. Please review all sheets for correct reference notes/details.**
  - a. Sheets have been reviewed for correct notes and reference.

Simpson products listed above have been revised on the plans to show approved products. Simpson Steel Strong-walls have been recently approved, as we discussed on the phone.

Thank you for the opportunity to respond to these comments. Please call if you have any questions.

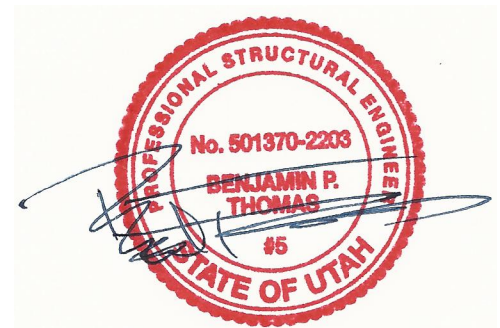
Sincerely

**Benjamin P. Thomas, P.E.**

email: [ben@5iveengineering.com](mailto:ben@5iveengineering.com)

phone: 801.915.4525

address: 834 West 75 North  
Kaysville, UT 84037



Project: 14031 (Larkspur Residence - Think)

Location: Floor Joists (10.333 ft)

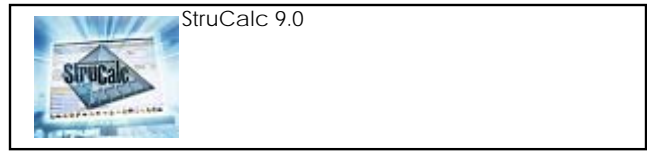
Floor Joist

[2012 International Building Code(2012 NDS)

TJI 210 / 11.875 - iLevel Trus Joist x 10.333 FT @ 24 O.C.

Section Adequate By: 21.6%

Controlling Factor: End Reaction



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<b>DEFLECTIONS</b>		Center
Live Load	0.08	IN L/1470
Dead Load	0.08	in
Total Load	0.17	IN L/735
Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360		

<b>REACTIONS</b>		A	B
Live Load	413 lb	413 lb	
Dead Load	413 lb	413 lb	
Total Load	826 lb	826 lb	
Bearing Length	1.75 in	1.75 in	
Web Stiffeners	No	No	

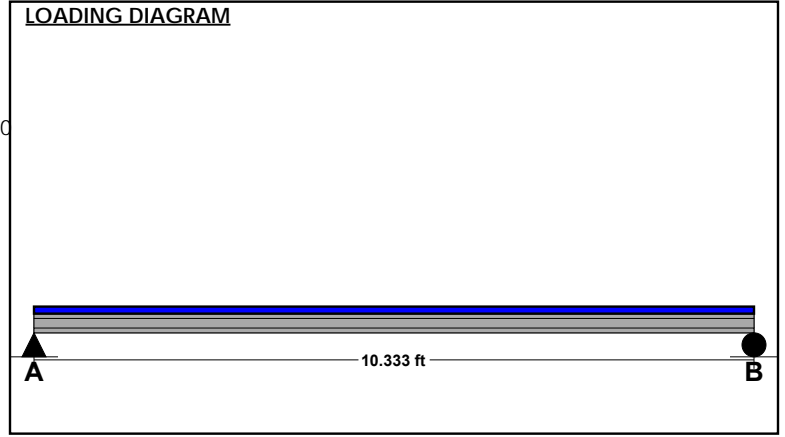
<b>SUPPORT LOADS</b>		A	B
Live Load	207 plf	207 plf	
Dead Load	207 plf	207 plf	
Total Load	413 plf	413 plf	

<b>I-JOIST PROPERTIES</b>		
TJI 210 / 11.875 - iLevel Trus Joist		
	Base Values	Adjusted
Moment Cap:	Mcap = 3795 ft-lb Cd = 1.00	Mcap' = 3795 ft-lb
Shear Stress:	Vcap = 1655 lb Cd = 1.00	Vcap' = 1655 lb
Reaction A:	Rcap = 1005 lb	Rcap' = 1005 lb
Reaction B:	Rcap = 1005 lb	Rcap' = 1005 lb
E.I.:	EI = 315 lb-in <sup>2</sup>	EI' = 315 lb-in <sup>2</sup>

**Controlling Moment:** 2135 ft-lb  
5.17 Ft from left support of span 3 (Right Span)  
Created by combining all dead and live loads.

**Controlling Shear:** 827 lb  
At left support of span 2 (Center Span)  
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
E.I.:	154 in <sup>2</sup> -lb E6	315 in <sup>2</sup> -lb xE6
Moment:	2135 ft-lb	3795 ft-lb
Shear:	827 lb	1655 lb



<b>JOIST DATA</b>		Center
Span Length	10.33	ft
Unbraced Length-Top	0	ft
Unbraced Length-Bottom	0	ft
Floor sheathing applied to top of joists-top of joists fully braced.		
Floor Duration Factor	1.00	

<b>JOIST LOADING</b>		Center
<b>Uniform Floor Loading</b>		
Live Load	LL =	40 psf
Dead Load	DL =	40 psf
Total Load	TL =	80 psf
TL Adj. For Joist Spacing	wT =	160 plf

Project: 14031 (Larkspur Residence - Think)

Location: Floor Joists (15 ft)

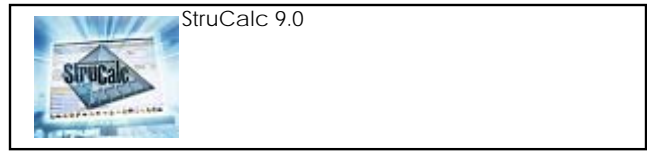
Floor Joist

[2012 International Building Code(2012 NDS)

TJI 210 / 11.875 - iLevel Trus Joist x 15.0 FT @ 16 O.C.

Section Adequate By: 13.7%

Controlling Factor: Deflection



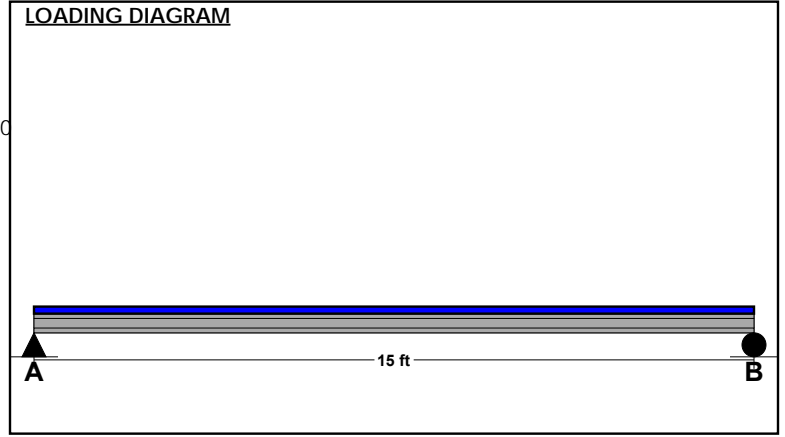
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<b>DEFLECTIONS</b>		Center
Live Load	0.22	IN L/819
Dead Load	0.22	in
Total Load	0.44	IN L/409
Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360		

<b>REACTIONS</b>		A	B
Live Load	400 lb	400 lb	
Dead Load	400 lb	400 lb	
Total Load	800 lb	800 lb	
Bearing Length	1.75 in	1.75 in	
Web Stiffeners	No	No	

<b>SUPPORT LOADS</b>		A	B
Live Load	300 plf	300 plf	
Dead Load	300 plf	300 plf	
Total Load	600 plf	600 plf	



**I-JOIST PROPERTIES**  
TJI 210 / 11.875 - iLevel Trus Joist

	Base Values	Adjusted
Moment Cap:	Mcap = 3795 ft-lb Cd = 1.00	Mcap' = 3795 ft-lb
Shear Stress:	Vcap = 1655 lb Cd = 1.00	Vcap' = 1655 lb
Reaction A:	Rcap = 1005 lb	Rcap' = 1005 lb
Reaction B:	Rcap = 1005 lb	Rcap' = 1005 lb
E.I.:	EI = 315 lb-in <sup>2</sup>	EI' = 315 lb-in <sup>2</sup>

**JOIST DATA**

	Center
Span Length	15 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	0 ft
Floor sheathing applied to top of joists-top of joists fully braced.	
Floor Duration Factor	1.00

**JOIST LOADING**

<b>Uniform Floor Loading</b>		Center
Live Load	LL =	40 psf
Dead Load	DL =	40 psf
Total Load	TL =	80 psf
TL Adj. For Joist Spacing	wT =	106.7 plf

**Controlling Moment:** 3000 ft-lb  
7.5 Ft from left support of span 3 (Right Span)  
Created by combining all dead and live loads.

**Controlling Shear:** 800 lb  
At left support of span 2 (Center Span)  
Created by combining all dead and live loads.

**Comparisons with required sections:**

	Req'd	Provided
E.I.:	277 in <sup>2</sup> -lb E6	315 in <sup>2</sup> -lb xE6
Moment:	3000 ft-lb	3795 ft-lb
Shear:	800 lb	1655 lb

Project: 14031 (Larkspur Residence - Think)

Location: Floor Joists (21.75 ft)

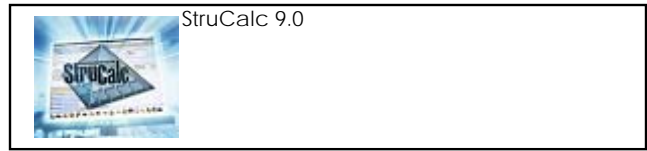
Floor Joist

[2012 International Building Code(2012 NDS)

TJI 560 / 11.875 - iLevel Trus Joist x 21.75 FT @ 12 O.C.

Section Adequate By: 2.7%

Controlling Factor: Deflection



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<b>DEFLECTIONS</b>		Center
Live Load	0.35	IN L/739
Dead Load	0.35	in
Total Load	0.71	IN L/370
Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360		

<b>REACTIONS</b>		A	B
Live Load	435 lb	435 lb	
Dead Load	435 lb	435 lb	
Total Load	870 lb	870 lb	
Bearing Length	1.75 in	1.75 in	
Web Stiffeners	No	No	

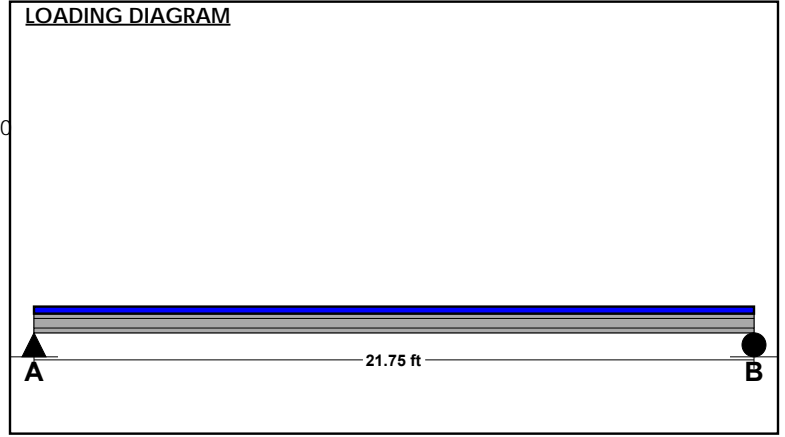
<b>SUPPORT LOADS</b>		A	B
Live Load	435 plf	435 plf	
Dead Load	435 plf	435 plf	
Total Load	870 plf	870 plf	

<b>I-JOIST PROPERTIES</b>		
TJI 560 / 11.875 - iLevel Trus Joist		
	Base Values	Adjusted
Moment Cap:	Mcap = 9500 ft-lb <i>Cd = 1.00</i>	Mcap' = 9500 ft-lb
Shear Stress:	Vcap = 2050 lb <i>Cd = 1.00</i>	Vcap' = 2050 lb
Reaction A:	Rcap = 1265 lb	Rcap' = 1265 lb
Reaction B:	Rcap = 1265 lb	Rcap' = 1265 lb
E.I.:	EI = 636 lb-in <sup>2</sup>	EI' = 636 lb-in <sup>2</sup>

**Controlling Moment:** 4731 ft-lb  
10.88 Ft from left support of span 3 (Right Span)  
Created by combining all dead and live loads.

**Controlling Shear:** -870 lb  
22.0 Ft from left support of span 2 (Center Span)  
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
E.I.:	620 in <sup>2</sup> -lb E6	636 in <sup>2</sup> -lb xE6
Moment:	4731 ft-lb	9500 ft-lb
Shear:	-870 lb	2050 lb



<b>JOIST DATA</b>		Center
Span Length	21.75	ft
Unbraced Length-Top	0	ft
Unbraced Length-Bottom	0	ft
Floor sheathing applied to top of joists-top of joists fully braced.		
Floor Duration Factor	1.00	

<b>JOIST LOADING</b>		Center
<b>Uniform Floor Loading</b>		
Live Load	LL = 40	psf
Dead Load	DL = 40	psf
Total Load	TL = 80	psf
TL Adj. For Joist Spacing	wT = 80	plf

Project: 14031 (Larkspur Residence - Think)

Location: ff01

Multi-Span Floor Beam

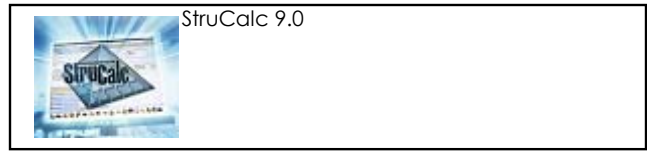
[2012 International Building Code(2012 NDS)]

5.5 IN x 5.5 IN x 6.0 FT (2 + 4)

#2 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 175.9%

Controlling Factor: Moment



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<b>DEFLECTIONS</b>		Left	Center
Live Load	-0.01 IN 2L/3228	0.01 IN L/5164	
Dead Load	-0.01 in	0.01 in	
Total Load	-0.02 IN 2L/1966	0.02 IN L/2767	
Live Load Deflection Criteria: L/360		Total Load Deflection Criteria: L/240	

<b>REACTIONS</b>		A	B
Live Load		578 lb	320 lb
Dead Load		449 lb	310 lb
Total Load		1027 lb	630 lb
Bearing Length		0.30 in	0.18 in

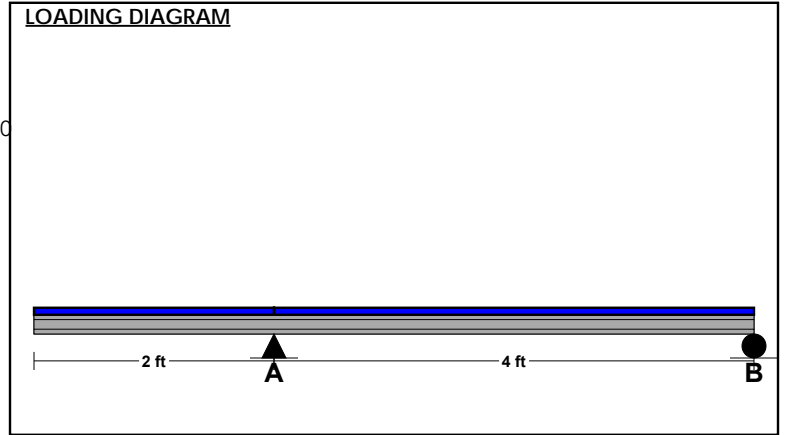
<b>BEAM DATA</b>		Left	Center
Span Length		2 ft	4 ft
Unbraced Length-Top		0 ft	0 ft
Unbraced Length-Bottom		2 ft	4 ft
Floor Duration Factor		1.00	
Notch Depth		0.00	

<b>MATERIAL PROPERTIES</b>			
#2 - Douglas-Fir-Larch (North)			
	Base Values		Adjusted
Bending Stress:	Fb =	725 psi	Fb' = 725 psi
		<i>Cd=1.00 CF=1.00</i>	
Shear Stress:	Fv =	170 psi	Fv' = 170 psi
		<i>Cd=1.00</i>	
Modulus of Elasticity:	E =	1300 ksi	E' = 1300 ksi
Comp. $\perp$ to Grain:	Fc - $\perp$ =	625 psi	Fc - $\perp$ ' = 625 psi

**Controlling Moment:** 607 ft-lb  
 2.08 Ft from left support of span 2 (Center Span)  
 Created by combining all dead loads and live loads on span(s) 2

**Controlling Shear:** 728 lb  
 At left support of span 2 (Center Span)  
 Created by combining all dead loads and live loads on span(s) 1, 2

<b>Comparisons with required sections:</b>		
	Req'd	Provided
Section Modulus:	10.05 in <sup>3</sup>	27.73 in <sup>3</sup>
Area (Shear):	6.42 in <sup>2</sup>	30.25 in <sup>2</sup>
Moment of Inertia (deflection):	9.31 in <sup>4</sup>	76.26 in <sup>4</sup>
Moment:	607 ft-lb	1675 ft-lb
Shear:	728 lb	3428 lb



<b>FLOOR LOADING</b>		Left	Center
Floor Live Load	FLL =	103 psf	40 psf
Floor Dead Load	FDL =	40 psf	40 psf
Floor Tributary Width Side One	TW1 =	1 ft	4 ft
Floor Tributary Width Side Two	TW2 =	0 ft	0 ft
Wall Load	WALL =	0 plf	0 plf

<b>BEAM LOADING</b>		Left	Center
Reduced Floor Live Load		103 psf	40 psf
Total Live Load		103 plf	160 plf
Total Dead Load		40 plf	160 plf
Beam Self Weight		6 plf	6 plf
Total Load		149 plf	326 plf

Project: 14031 (Larkspur Residence - Think)

Location: ff02

Multi-Loaded Multi-Span Beam

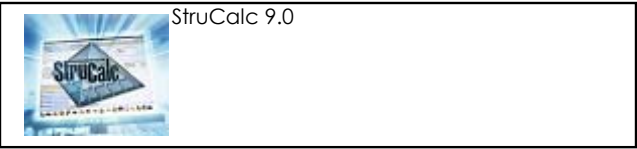
[2012 International Building Code(2012 NDS)]

1.75 IN x 11.875 IN x 16.0 FT

1.9E Microllam - iLevel Trus Joist

Section Adequate By: 11.3%

Controlling Factor: Deflection



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DEFLECTIONS		Center
Live Load	0.45	IN L/427
Dead Load	0.27	in
Total Load	0.72	IN L/267
Live Load Deflection Criteria:		L/360
Total Load Deflection Criteria:		L/240

REACTIONS		A	B
Live Load	1040	lb	1040
Dead Load	644	lb	644
Total Load	1684	lb	1684
Bearing Length	1.28	in	1.28

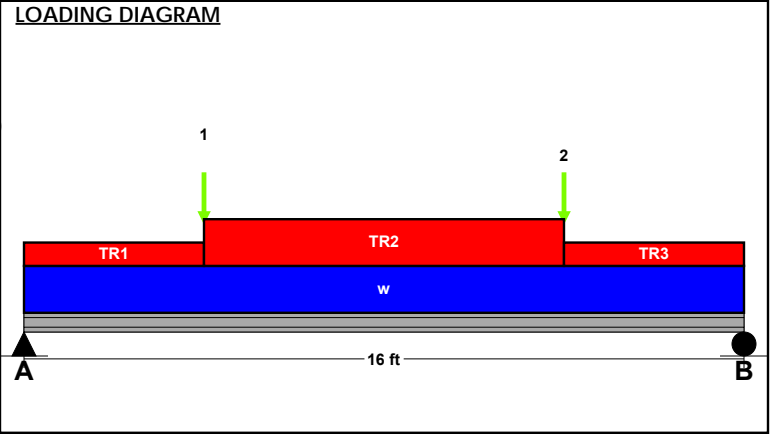
BEAM DATA		Center
Span Length	16	ft
Unbraced Length-Top	0	ft
Unbraced Length-Bottom	16	ft
Live Load Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES		1.9E Microllam - iLevel Trus Joist	
	Base Values	Adjusted	
Bending Stress:	Fb = 2600 psi	Fb' = 2604 psi	
	<i>Cd=1.00 CF=1.00</i>		
Shear Stress:	Fv = 285 psi	Fv' = 285 psi	
	<i>Cd=1.00</i>		
Modulus of Elasticity:	E = 1900 ksi	E' = 1900 ksi	
Comp. ⊥ to Grain:	Fc - ⊥ = 750 psi	Fc - ⊥' = 750 psi	

**Controlling Moment:** 7175 ft-lb  
 8.0 Ft from left support of span 2 (Center Span)  
 Created by combining all dead loads and live loads on span(s) 2

**Controlling Shear:** 1684 lb  
 At left support of span 2 (Center Span)  
 Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	33.07 in3	41.13 in3
Area (Shear):	8.86 in2	20.78 in2
Moment of Inertia (deflection):	219.51 in4	244.21 in4
Moment:	7175 ft-lb	8924 ft-lb
Shear:	1684 lb	3948 lb



UNIFORM LOADS		Center
Uniform Live Load	40	plf
Uniform Dead Load	40	plf
Beam Self Weight	6	plf
Total Uniform Load	86	plf

POINT LOADS - CENTER SPAN		
Load Number	One	Two
Live Load	240 lb	240 lb
Dead Load	92 lb	92 lb
Location	4 ft	12 ft

TRAPEZOIDAL LOADS - CENTER SPAN			
Load Number	One	Two	Three
Left Live Load	40 plf	80 plf	40 plf
Left Dead Load	15 plf	30 plf	15 plf
Right Live Load	40 plf	80 plf	40 plf
Right Dead Load	15 plf	30 plf	15 plf
Load Start	0 ft	4 ft	12 ft
Load End	4 ft	12 ft	16 ft
Load Length	4 ft	8 ft	4 ft

Project: 14031 (Larkspur Residence - Think)

Location: ff03

Multi-Span Floor Beam

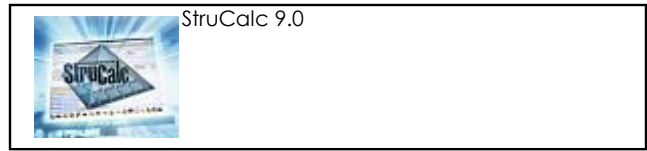
[2015 International Building Code(2012 NDS)]

( 3 ) 1.5 IN x 9.25 IN x 16.125 FT (3.5 + 9.1 + 3.5)

#2 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 4.2%

Controlling Factor: Deflection



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**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS**

	Left	Center	Right
Live Load	0.22 IN 2L/374	-0.12 IN L/931	0.22 IN 2L/374
Dead Load	0.06 in	-0.01 in	0.06 in
Total Load	0.28 IN 2L/298	-0.13 IN L/854	0.28 IN 2L/298
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240			

**REACTIONS**

	A	B
Live Load	2090 lb	2090 lb
Dead Load	1386 lb	1386 lb
Total Load	3476 lb	3476 lb
Bearing Length	1.24 in	1.24 in

**BEAM DATA**

	Left	Center	Right
Span Length	3.5 ft	9.13 ft	3.5 ft
Unbraced Length-Top	0 ft	0 ft	0 ft
Unbraced Length-Bottom	3.5 ft	9.13 ft	3.5 ft
Floor Duration Factor	1.00		
Notch Depth	0.00		

**MATERIAL PROPERTIES**

#2 - Douglas-Fir-Larch (North)

	Base Values	Adjusted
Bending Stress:	Fb = 850 psi Cd=1.00 Cl=0.99 CF=1.10 Cr=1.15	Fb' = 1066 psi
Shear Stress:	Fv = 180 psi Cd=1.00	Fv' = 180 psi
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Comp. $\perp$ to Grain:	Fc $\perp$ = 625 psi	Fc $\perp$ ' = 625 psi

**Controlling Moment:**

-4850 ft-lb

9.12 Ft from left support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 1, 3

**Controlling Shear:**

1841 lb

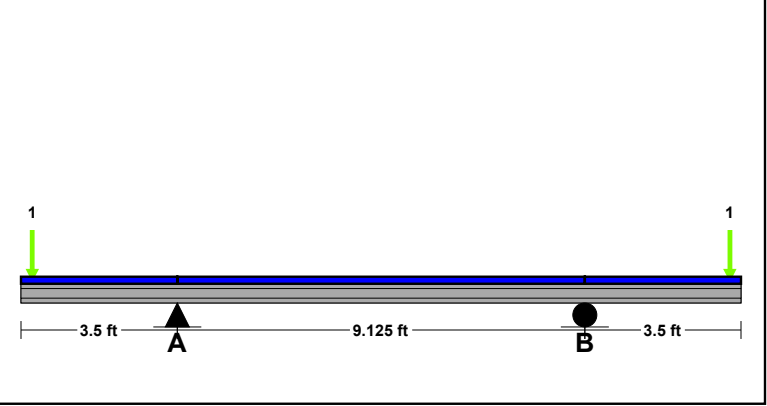
At left support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 1, 2

**Comparisons with required sections:**

	Req'd	Provided
Section Modulus:	54.59 in3	64.17 in3
Area (Shear):	15.34 in2	41.63 in2
Moment of Inertia (deflection):	284.96 in4	296.79 in4
Moment:	-4850 ft-lb	5702 ft-lb
Shear:	1841 lb	4995 lb

**LOADING DIAGRAM**



**FLOOR LOADING**

	Left	Center	Right
Floor Live Load	FLL = 40 psf	40 psf	40 psf
Floor Dead Load	FDL = 40 psf	40 psf	40 psf
Floor Tributary Width Side One	TW1 = 1 ft	1 ft	1 ft
Floor Tributary Width Side Two	TW2 = 0 ft	3 ft	0 ft
Wall Load	WALL = 0 plf	0 plf	0 plf

**POINT LOADS - LEFT SPAN**

Load Number	One *
Live Load	880 lb
Dead Load	445 lb
Location	0.25 ft

**RIGHT SPAN**

Load Number	One *
Live Load	880 lb
Dead Load	445 lb
Location	3.25 ft

\* Load obtained from Load Tracker. See Summary Report for details.

**BEAM LOADING**

	Left	Center	Right
Reduced Floor Live Load	40 psf	40 psf	40 psf
Total Live Load	40 plf	160 plf	40 plf
Total Dead Load	40 plf	160 plf	40 plf
Beam Self Weight	9 plf	9 plf	9 plf
Total Load	89 plf	329 plf	89 plf



Project: 14031 (Larkspur Residence - Think)

Location: ff04

Uniformly Loaded Floor Beam

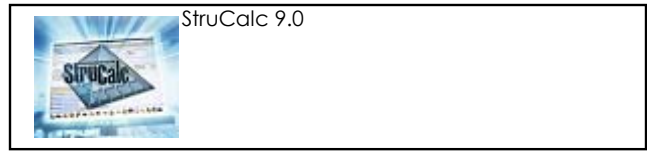
[2015 International Building Code(2012 NDS)

( 2 ) 1.5 IN x 5.5 IN x 2.75 FT

#2 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 12.2%

Controlling Factor: Shear



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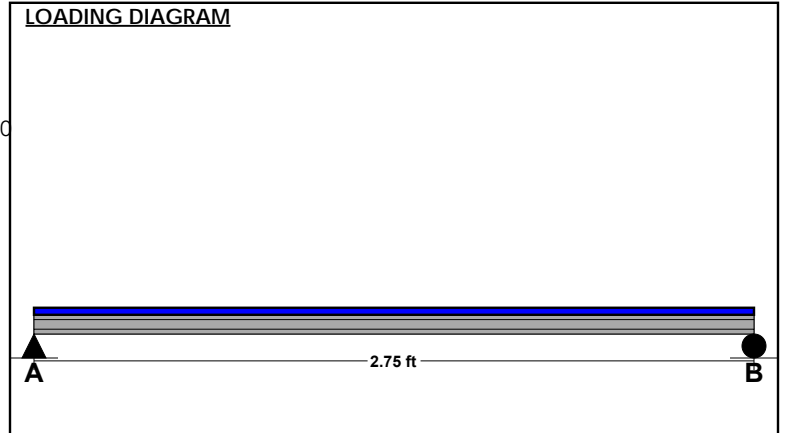
<b>DEFLECTIONS</b>		Center
Live Load	0.01	IN L/2667
Dead Load	0.01	in
Total Load	0.02	IN L/1330
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

<b>REACTIONS</b>		A	B
Live Load	880 lb	880 lb	
Dead Load	885 lb	885 lb	
Total Load	1765 lb	1765 lb	
Bearing Length	0.94 in	0.94 in	

<b>BEAM DATA</b>		Center
Span Length	2.75	ft
Unbraced Length-Top	0	ft
Floor Duration Factor	1.00	
Notch Depth	0.00	

<b>MATERIAL PROPERTIES</b>			
#2 - Douglas-Fir-Larch (North)			
	<u>Base Values</u>	<u>Adjusted</u>	
Bending Stress:	Fb = 850 psi <i>Cd=1.00 CF=1.30</i>	Fb' = 1105 psi	
Shear Stress:	Fv = 180 psi <i>Cd=1.00</i>	Fv' = 180 psi	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi	
Comp. $\perp$ to Grain:	Fc $\perp$ = 625 psi	Fc $\perp$ ' = 625 psi	
<b>Controlling Moment:</b>	1213 ft-lb		
1.375 ft from left support Created by combining all dead and live loads.			
<b>Controlling Shear:</b>	1765 lb		
At support. Created by combining all dead and live loads.			

<b>Comparisons with required sections:</b>		
	<u>Req'd</u>	<u>Provided</u>
Section Modulus:	13.18 in <sup>3</sup>	15.13 in <sup>3</sup>
Area (Shear):	14.71 in <sup>2</sup>	16.5 in <sup>2</sup>
Moment of Inertia (deflection):	7.51 in <sup>4</sup>	41.59 in <sup>4</sup>
Moment:	1213 ft-lb	1393 ft-lb
Shear:	1765 lb	1980 lb



<b>FLOOR LOADING</b>			
		<u>Side 1</u>	<u>Side 2</u>
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	40 psf	40 psf
Floor Tributary Width	FTW =	8 ft	8 ft
Wall Load	WALL =	0 plf	

<b>BEAM LOADING</b>		
Beam Total Live Load:	wL =	640 plf
Beam Total Dead Load:	wD =	640 plf
Beam Self Weight:	BSW =	4 plf
Total Maximum Load:	wT =	1284 plf

Project: 14031 (Larkspur Residence - Think)

Location: ff05

Combination Roof And Floor Beam

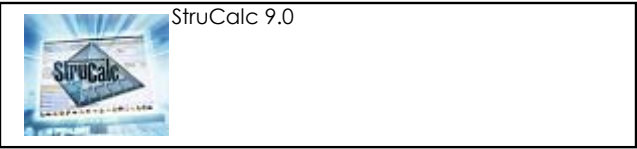
[2015 International Building Code(2012 NDS)

( 2 ) 1.5 IN x 9.25 IN x 3.25 FT

#2 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 18.7%

Controlling Factor: Shear



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**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS** Center

Live Load 0.01 IN L/3554

Dead Load 0.00 in

Total Load 0.02 IN L/2477

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

**REACTIONS**

Live Load 2249 lb 2249 lb

Dead Load 978 lb 978 lb

Total Load 3227 lb 3227 lb

Bearing Length 1.72 in 1.72 in

**BEAM DATA** Center

Span Length 3.25 ft

Unbraced Length-Top 0 ft

Roof Pitch 4 :12

Floor Duration Factor 1.00

Roof Duration Factor 1.15

Notch Depth 0.00

**MATERIAL PROPERTIES**

#2 - Douglas-Fir-Larch (North)

	Base Values	Adjusted
Bending Stress:	Fb = 850 psi <i>Cd=1.15 CF=1.10</i>	Fb' = 1075 psi
Shear Stress:	Fv = 180 psi <i>Cd=1.15</i>	Fv' = 207 psi
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

**Controlling Moment:** 2622 ft-lb

1.625 ft from left support

Created by combining all dead and live loads.

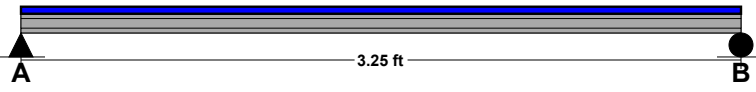
**Controlling Shear:** 3227 lb

At support.

Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	29.26 in3	42.78 in3
Area (Shear):	23.38 in2	27.75 in2
Moment of Inertia (deflection):	20.04 in4	197.86 in4
Moment:	2622 ft-lb	3833 ft-lb
Shear:	3227 lb	3830 lb

**LOADING DIAGRAM**



**ROOF LOADING**

	Side 1	Side 2
Roof Live Load	RLL = 103 psf	0 psf
Roof Dead Load	RDL = 40 psf	0 psf
Roof Tributary Width	RTW = 10.3 ft	0 ft

**FLOOR LOADING**

	Side 1	Side 2
Floor Live Load	FLL = 40 psf	0 psf
Floor Dead Load	FDL = 20 psf	0 psf
Floor Tributary Width	FTW = 8 ft	0 ft

Wall Load WALL = 0 plf

**BEAM LOADING**

Roof Uniform Live Load:	wL-roof = 1064 plf
Roof Uniform Dead Load:	wD-roof = 436 plf
Floor Uniform Live Load:	wL-floor = 320 plf
Floor Uniform Dead Load:	wD-floor = 160 plf
Beam Self Weight:	BSW = 6 plf
Combined Uniform Live Load:	wL = 1384 plf
Combined Uniform Dead Load:	wD = 602 plf
Combined Uniform Total Load:	wT = 1986 plf

Project: 14031 (Larkspur Residence - Think)

Location: ff06

Combination Roof And Floor Beam

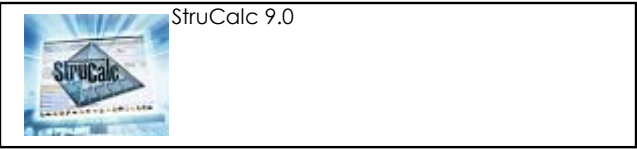
[2015 International Building Code(2012 NDS)

( 2 ) 1.5 IN x 7.25 IN x 6.25 FT

#2 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 43.9%

Controlling Factor: Moment



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**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS** Center

Live Load 0.02 IN L/4779

Dead Load 0.06 in

Total Load 0.07 IN L/1030

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

**REACTIONS**

Live Load 808 lb 163 lb

Dead Load 979 lb 777 lb

Total Load 1787 lb 940 lb

Bearing Length 0.95 in 0.50 in

**BEAM DATA**

Span Length 6.25 ft

Unbraced Length-Top 0 ft

Roof Pitch 4 :12

Floor Duration Factor 1.00

Roof Duration Factor 1.15

Notch Depth 0.00

**MATERIAL PROPERTIES**

#2 - Douglas-Fir-Larch (North)

	Base Values	Adjusted
Bending Stress:	Fb = 850 psi Cd=1.00 CF=1.20	Fb' = 1020 psi
Shear Stress:	Fv = 180 psi Cd=1.00	Fv' = 180 psi
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 1552 ft-lb

3.125 ft from left support

Created by combining all dead and live loads.

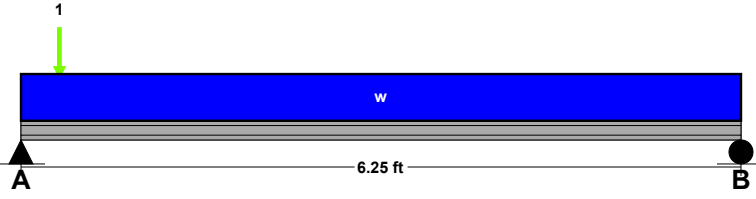
Controlling Shear: 1787 lb

At support.

Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	18.26 in3	26.28 in3
Area (Shear):	14.89 in2	21.75 in2
Moment of Inertia (deflection):	22.2 in4	95.27 in4
Moment:	1552 ft-lb	2234 ft-lb
Shear:	1787 lb	2610 lb

**LOADING DIAGRAM**



**ROOF LOADING**

	Side 1	Side 2
Roof Live Load	RLL = 0 psf	0 psf
Roof Dead Load	RDL = 0 psf	0 psf
Roof Tributary Width	RTW = 0 ft	0 ft

**FLOOR LOADING**

	Side 1	Side 2
Floor Live Load	FLL = 40 psf	0 psf
Floor Dead Load	FDL = 40 psf	0 psf
Floor Tributary Width	FTW = 1 ft	0 ft
Wall Load	WALL = 200 plf	

**BEAM LOADING**

Roof Uniform Live Load:	wL-roof = 0 plf
Roof Uniform Dead Load:	wD-roof = 0 plf
Floor Uniform Live Load:	wL-floor = 40 plf
Floor Uniform Dead Load:	wD-floor = 40 plf
Beam Self Weight:	BSW = 5 plf
Combined Uniform Live Load:	wL = 40 plf
Combined Uniform Dead Load:	wD = 245 plf
Combined Uniform Total Load:	wT = 285 plf

**POINT LOADS - CENTER SPAN**

Load Number	One
Live Load	721 lb
Dead Load	227 lb
Location	0.33 ft

Project: 14031 (Larkspur Residence - Think)

Location: ff08

Combination Roof And Floor Beam

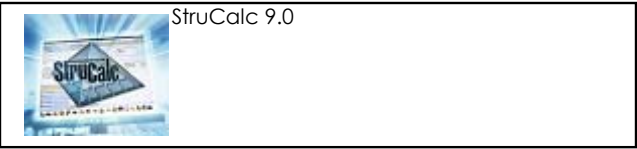
[2015 International Building Code(2012 NDS)]

( 3 ) 1.75 IN x 9.25 IN x 6.666 FT

1.9E Microllam - iLevel Trus Joist

Section Adequate By: 7.2%

Controlling Factor: Shear



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**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS** Center

Live Load 0.13 IN L/638

Dead Load 0.04 in

Total Load 0.17 IN L/471

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

**REACTIONS**

Live Load 5522 lb 7410 lb

Dead Load 2046 lb 2493 lb

Total Load 7568 lb 9903 lb

Bearing Length 1.92 in 2.51 in

**BEAM DATA**

Span Length 6.67 ft

Unbraced Length-Top 0 ft

Roof Pitch 4 :12

Floor Duration Factor 1.00

Roof Duration Factor 1.15

Notch Depth 0.00

**MATERIAL PROPERTIES**

1.9E Microllam - iLevel Trus Joist

	Base Values	Adjusted
Bending Stress:	Fb = 2600 psi <i>Cd=1.15 CF=1.04</i>	Fb' = 3098 psi
Shear Stress:	Fv = 285 psi <i>Cd=1.15</i>	Fv' = 328 psi
Modulus of Elasticity:	E = 1900 ksi	E' = 1900 ksi
Comp. $\perp$ to Grain:	Fc - $\perp$ = 750 psi	Fc - $\perp$ ' = 750 psi

**Controlling Moment:** 13752 ft-lb

3.333 ft from left support

Created by combining all dead and live loads.

**Controlling Shear:** -9903 lb

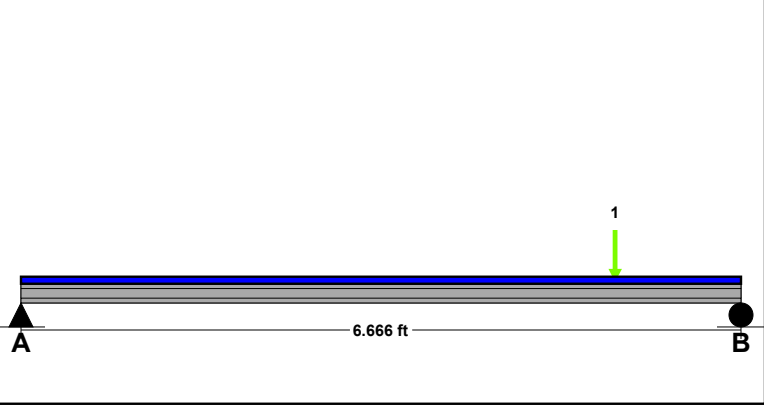
At support.

Created by combining all dead and live loads.

**Comparisons with required sections:**

	Req'd	Provided
Section Modulus:	53.27 in3	74.87 in3
Area (Shear):	45.32 in2	48.56 in2
Moment of Inertia (deflection):	195.33 in4	346.26 in4
Moment:	13752 ft-lb	19327 ft-lb
Shear:	-9903 lb	10611 lb

**LOADING DIAGRAM**



**ROOF LOADING**

	Side 1	Side 2
Roof Live Load	RLL = 103 psf	103 psf
Roof Dead Load	RDL = 20 psf	20 psf
Roof Tributary Width	RTW = 1 ft	10.5 ft

**FLOOR LOADING**

	Side 1	Side 2
Floor Live Load	FLL = 40 psf	0 psf
Floor Dead Load	FDL = 40 psf	0 psf
Floor Tributary Width	FTW = 8 ft	0 ft

Wall Load WALL = 0 plf

**BEAM LOADING**

Roof Uniform Live Load:	wL-roof = 1185 plf
Roof Uniform Dead Load:	wD-roof = 242 plf
Floor Uniform Live Load:	wL-floor = 320 plf
Floor Uniform Dead Load:	wD-floor = 320 plf
Beam Self Weight:	BSW = 15 plf
Combined Uniform Live Load:	wL = 1505 plf
Combined Uniform Dead Load:	wD = 578 plf
Combined Uniform Total Load:	wT = 2082 plf

**POINT LOADS - CENTER SPAN**

Load Number	One *
Live Load	2903 lb
Dead Load	688 lb
Location	5.5 ft

\* Load obtained from Load Tracker. See Summary Report for details.

Project: 14031 (Larkspur Residence - Think)

Location: ff09

Combination Roof And Floor Beam

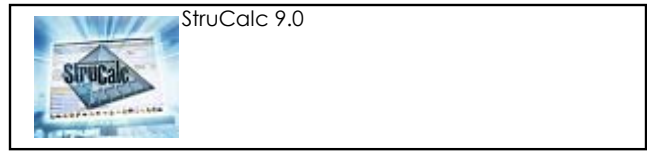
[2015 International Building Code(2012 NDS)]

( 2 ) 1.5 IN x 5.5 IN x 4.25 FT

#2 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 37.0%

Controlling Factor: Moment



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<b>DEFLECTIONS</b>		Center
Live Load	0.04	IN L/1155
Dead Load	0.01	in
Total Load	0.06	IN L/893
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

<b>REACTIONS</b>		A	B
Live Load	851 lb	851 lb	
Dead Load	249 lb	249 lb	
Total Load	1100 lb	1100 lb	
Bearing Length	0.59 in	0.59 in	

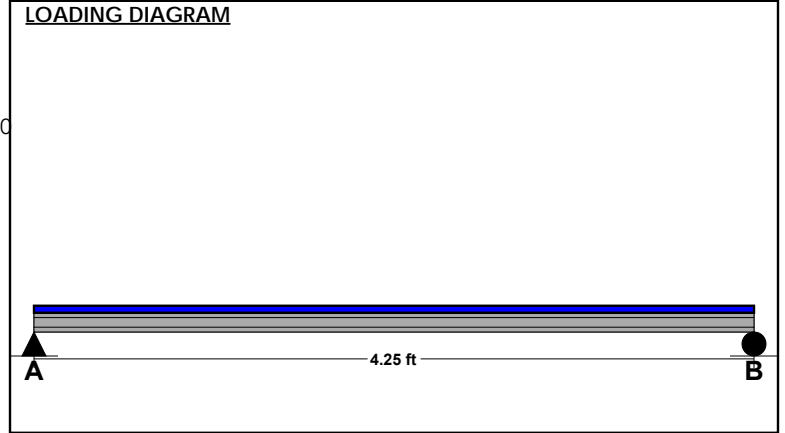
<b>BEAM DATA</b>		Center
Span Length	4.25	ft
Unbraced Length-Top	0	ft
Roof Pitch	4	:12
Floor Duration Factor	1.00	
Roof Duration Factor	1.15	
Notch Depth	0.00	

<b>MATERIAL PROPERTIES</b>			
#2 - Douglas-Fir-Larch (North)			
	Base Values	Adjusted	
Bending Stress:	Fb = 850 psi	Fb' = 1271 psi	
	<i>Cd=1.15 CF=1.30</i>		
Shear Stress:	Fv = 180 psi	Fv' = 207 psi	
	<i>Cd=1.15</i>		
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi	
Comp. $\perp$ to Grain:	Fc $\perp$ = 625 psi	Fc $\perp$ = 625 psi	

**Controlling Moment:** 1169 ft-lb  
 2.125 ft from left support  
 Created by combining all dead and live loads.

**Controlling Shear:** -1100 lb  
 At support.  
 Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	11.04 in <sup>3</sup>	15.13 in <sup>3</sup>
Area (Shear):	7.97 in <sup>2</sup>	16.5 in <sup>2</sup>
Moment of Inertia (deflection):	12.97 in <sup>4</sup>	41.59 in <sup>4</sup>
Moment:	1169 ft-lb	1602 ft-lb
Shear:	-1100 lb	2277 lb



<b>ROOF LOADING</b>			
		Side 1	Side 2
Roof Live Load	RLL =	103 psf	0 psf
Roof Dead Load	RDL =	20 psf	0 psf
Roof Tributary Width	RTW =	3.5 ft	0 ft

<b>FLOOR LOADING</b>			
		Side 1	Side 2
Floor Live Load	FLL =	40 psf	0 psf
Floor Dead Load	FDL =	40 psf	0 psf
Floor Tributary Width	FTW =	1 ft	0 ft

Wall Load	WALL =	0 plf
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<b>BEAM LOADING</b>			
Roof Uniform Live Load:	wL-roof =	361	plf
Roof Uniform Dead Load:	wD-roof =	74	plf
Floor Uniform Live Load:	wL-floor =	40	plf
Floor Uniform Dead Load:	wD-floor =	40	plf
Beam Self Weight:	BSW =	4	plf
Combined Uniform Live Load:	wL =	401	plf
Combined Uniform Dead Load:	wD =	117	plf
Combined Uniform Total Load:	wT =	518	plf

Project: 14031 (Larkspur Residence - Think)

Location: ff10

Uniformly Loaded Floor Beam

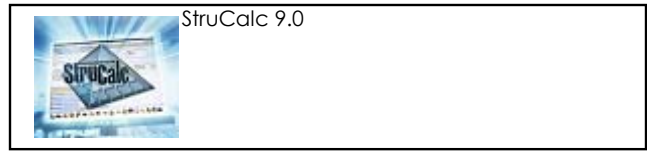
[2015 International Building Code(2012 NDS)

( 2 ) 1.5 IN x 7.25 IN x 10.25 FT

#2 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 3.3%

Controlling Factor: Moment



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**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS** Center

Live Load 0.13 IN L/944

Dead Load 0.14 in

Total Load 0.27 IN L/459

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

**REACTIONS**

Live Load 410 lb 410 lb

Dead Load 434 lb 434 lb

Total Load 844 lb 844 lb

Bearing Length 0.45 in 0.45 in

**BEAM DATA**

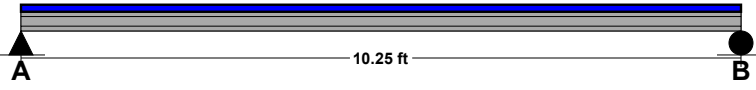
Span Length 10.25 ft

Unbraced Length-Top 0 ft

Floor Duration Factor 1.00

Notch Depth 0.00

**LOADING DIAGRAM**



**MATERIAL PROPERTIES**

#2 - Douglas-Fir-Larch (North)

	Base Values	Adjusted
Bending Stress:	Fb = 850 psi Cd=1.00 CF=1.20	Fb' = 1020 psi
Shear Stress:	Fv = 180 psi Cd=1.00	Fv' = 180 psi
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Comp. $\perp$ to Grain:	Fc $\perp$ = 625 psi	Fc $\perp$ ' = 625 psi

**Controlling Moment:** 2162 ft-lb

5.125 ft from left support

Created by combining all dead and live loads.

**Controlling Shear:** 844 lb

At support.

Created by combining all dead and live loads.

Comparisons with required sections:	Rea'd	Provided
Section Modulus:	25.43 in3	26.28 in3
Area (Shear):	7.03 in2	21.75 in2
Moment of Inertia (deflection):	49.85 in4	95.27 in4
Moment:	2162 ft-lb	2234 ft-lb
Shear:	844 lb	2610 lb

**FLOOR LOADING**

	Side 1	Side 2
Floor Live Load	FLL = 40 psf	0 psf
Floor Dead Load	FDL = 40 psf	0 psf
Floor Tributary Width	FTW = 2 ft	0 ft
Wall Load	WALL = 0 plf	

**BEAM LOADING**

Beam Total Live Load:	wL = 80 plf
Beam Total Dead Load:	wD = 80 plf
Beam Self Weight:	BSW = 5 plf
Total Maximum Load:	wT = 165 plf

Project: 14031 (Larkspur Residence - Think)

Location: ff11

Uniformly Loaded Floor Beam

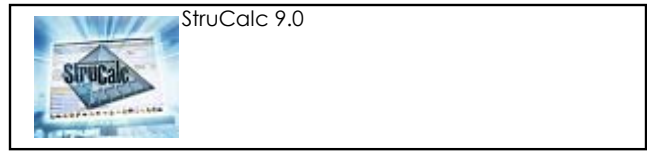
[2015 International Building Code(2012 NDS)

( 2 ) 1.5 IN x 7.25 IN x 10.25 FT

#2 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 3.3%

Controlling Factor: Moment



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**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS** Center

Live Load 0.13 IN L/944

Dead Load 0.14 in

Total Load 0.27 IN L/459

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

**REACTIONS**

Live Load 410 lb 410 lb

Dead Load 434 lb 434 lb

Total Load 844 lb 844 lb

Bearing Length 0.45 in 0.45 in

**BEAM DATA** Center

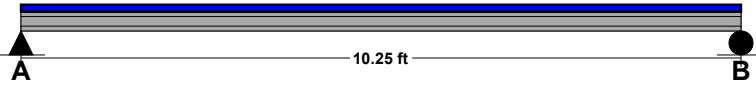
Span Length 10.25 ft

Unbraced Length-Top 0 ft

Floor Duration Factor 1.00

Notch Depth 0.00

**LOADING DIAGRAM**



**MATERIAL PROPERTIES**

#2 - Douglas-Fir-Larch (North)

	Base Values	Adjusted
Bending Stress:	Fb = 850 psi Cd=1.00 CF=1.20	Fb' = 1020 psi
Shear Stress:	Fv = 180 psi Cd=1.00	Fv' = 180 psi
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Comp. ⊥ to Grain:	Fc ⊥ = 625 psi	Fc ⊥' = 625 psi

**Controlling Moment:** 2162 ft-lb

5.125 ft from left support

Created by combining all dead and live loads.

**Controlling Shear:** 844 lb

At support.

Created by combining all dead and live loads.

Comparisons with required sections:	Rea'd	Provided
Section Modulus:	25.43 in3	26.28 in3
Area (Shear):	7.03 in2	21.75 in2
Moment of Inertia (deflection):	49.85 in4	95.27 in4
Moment:	2162 ft-lb	2234 ft-lb
Shear:	844 lb	2610 lb

**FLOOR LOADING**

	Side 1	Side 2
Floor Live Load	FLL = 40 psf	0 psf
Floor Dead Load	FDL = 40 psf	0 psf
Floor Tributary Width	FTW = 2 ft	0 ft
Wall Load	WALL = 0 plf	

**BEAM LOADING**

Beam Total Live Load:	wL = 80 plf
Beam Total Dead Load:	wD = 80 plf
Beam Self Weight:	BSW = 5 plf
Total Maximum Load:	wT = 165 plf

Project: 14031 (Larkspur Residence - Think)

Location: ff12

Combination Roof And Floor Beam

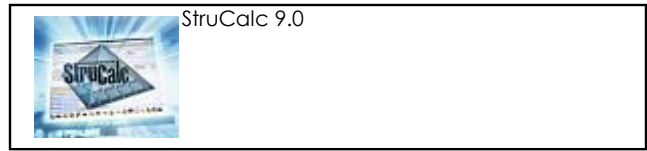
[2015 International Building Code(2012 NDS)

( 2 ) 1.5 IN x 5.5 IN x 4.0 FT

#2 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 8.2%

Controlling Factor: Moment



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<b>DEFLECTIONS</b>		Center
Live Load	0.03	IN L/1733
Dead Load	0.03	in
Total Load	0.06	IN L/862
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

<b>REACTIONS</b>		A	B
Live Load	640 lb	640 lb	
Dead Load	647 lb	647 lb	
Total Load	1287 lb	1287 lb	
Bearing Length	0.69 in	0.69 in	

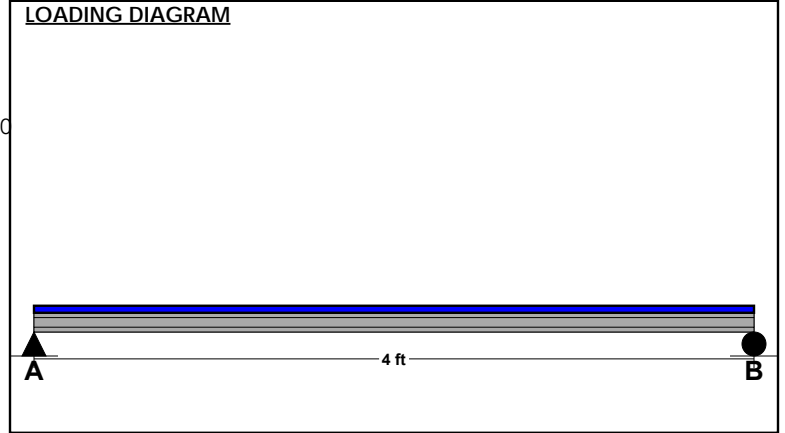
<b>BEAM DATA</b>		Center
Span Length	4	ft
Unbraced Length-Top	0	ft
Roof Pitch	4	:12
Floor Duration Factor	1.00	
Roof Duration Factor	1.15	
Notch Depth	0.00	

<b>MATERIAL PROPERTIES</b>			
#2 - Douglas-Fir-Larch (North)			
	Base Values	Adjusted	
Bending Stress:	Fb = 850 psi	Fb' = 1105 psi	
	<i>Cd=1.00 CF=1.30</i>		
Shear Stress:	Fv = 180 psi	Fv' = 180 psi	
	<i>Cd=1.00</i>		
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi	
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi	

**Controlling Moment:** 1287 ft-lb  
 2.0 ft from left support  
 Created by combining all dead and live loads.

**Controlling Shear:** -1287 lb  
 At support.  
 Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	13.98 in <sup>3</sup>	15.13 in <sup>3</sup>
Area (Shear):	10.73 in <sup>2</sup>	16.5 in <sup>2</sup>
Moment of Inertia (deflection):	11.58 in <sup>4</sup>	41.59 in <sup>4</sup>
Moment:	1287 ft-lb	1393 ft-lb
Shear:	-1287 lb	1980 lb



<b>ROOF LOADING</b>			
		Side 1	Side 2
Roof Live Load	RLL =	0 psf	0 psf
Roof Dead Load	RDL =	0 psf	0 psf
Roof Tributary Width	RTW =	0 ft	0 ft

<b>FLOOR LOADING</b>			
		Side 1	Side 2
Floor Live Load	FLL =	40 psf	0 psf
Floor Dead Load	FDL =	40 psf	0 psf
Floor Tributary Width	FTW =	8 ft	0 ft

Wall Load	WALL =	0 plf
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<b>BEAM LOADING</b>		
Roof Uniform Live Load:	wL-roof =	0 plf
Roof Uniform Dead Load:	wD-roof =	0 plf
Floor Uniform Live Load:	wL-floor =	320 plf
Floor Uniform Dead Load:	wD-floor =	320 plf
Beam Self Weight:	BSW =	4 plf
Combined Uniform Live Load:	wL =	320 plf
Combined Uniform Dead Load:	wD =	324 plf
Combined Uniform Total Load:	wT =	644 plf



Project: 14031 (Larkspur Residence - Think)

Location: ff13

Uniformly Loaded Floor Beam

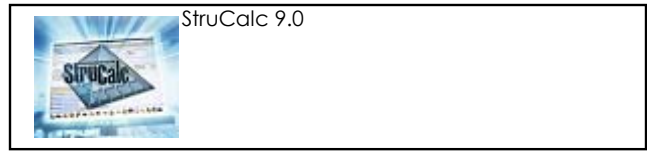
[2015 International Building Code(2012 NDS)

( 2 ) 1.5 IN x 11.25 IN x 10.0 FT

#2 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 20.1%

Controlling Factor: Moment



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3/2/2018 9:30:05 AM

**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS** Center

Live Load 0.05 IN L/2232

Dead Load 0.06 in

Total Load 0.11 IN L/1075

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

**REACTIONS**

Live Load 673 lb 537 lb

Dead Load 725 lb 581 lb

Total Load 1398 lb 1118 lb

Bearing Length 0.75 in 0.60 in

**BEAM DATA**

Span Length 10 ft

Unbraced Length-Top 0 ft

Floor Duration Factor 1.00

Notch Depth 0.00

**MATERIAL PROPERTIES**

#2 - Douglas-Fir-Larch (North)

	Base Values	Adjusted
Bending Stress:	Fb = 850 psi Cd=1.00 CF=1.00	Fb' = 850 psi
Shear Stress:	Fv = 180 psi Cd=1.00	Fv' = 180 psi
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Comp. $\perp$ to Grain:	Fc $\perp$ = 625 psi	Fc $\perp$ ' = 625 psi

**Controlling Moment:** 3732 ft-lb

5.0 ft from left support

Created by combining all dead and live loads.

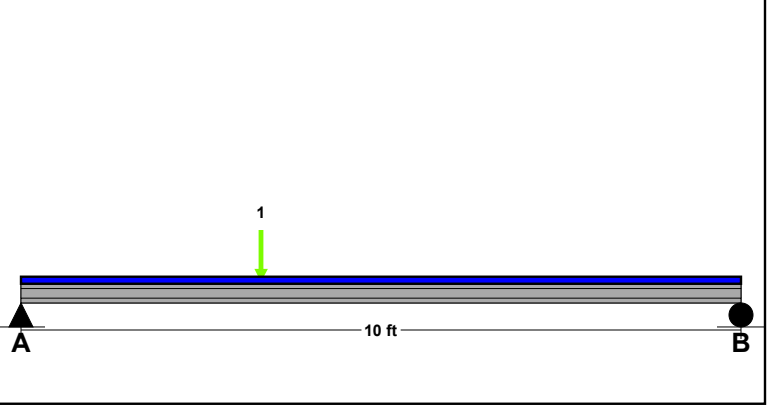
**Controlling Shear:** 1399 lb

At support.

Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	52.69 in3	63.28 in3
Area (Shear):	11.65 in2	33.75 in2
Moment of Inertia (deflection):	79.48 in4	355.96 in4
Moment:	3732 ft-lb	4482 ft-lb
Shear:	1399 lb	4050 lb

**LOADING DIAGRAM**



**FLOOR LOADING**

	Side 1	Side 2
Floor Live Load	FLL = 40 psf	0 psf
Floor Dead Load	FDL = 40 psf	0 psf
Floor Tributary Width	FTW = 2 ft	0 ft
Wall Load	WALL = 0 plf	

**BEAM LOADING**

Beam Total Live Load:	wL = 80 plf
Beam Total Dead Load:	wD = 80 plf
Beam Self Weight:	BSW = 7 plf
Total Maximum Load:	wT = 167 plf

**POINT LOADS - CENTER SPAN**

Load Number	One *
Live Load	410 lb
Dead Load	434 lb
Location	3.33 ft

\* Load obtained from Load Tracker. See Summary Report for details.

Project: 14031 (Larkspur Residence - Think)

Location: ff14

Uniformly Loaded Floor Beam

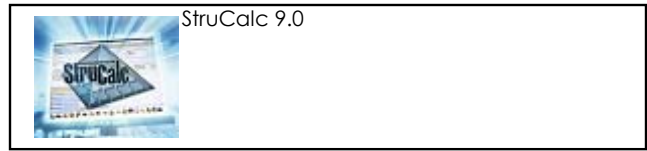
[2015 International Building Code(2012 NDS)

( 2 ) 1.5 IN x 3.5 IN x 3.25 FT

#2 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 53.0%

Controlling Factor: Moment



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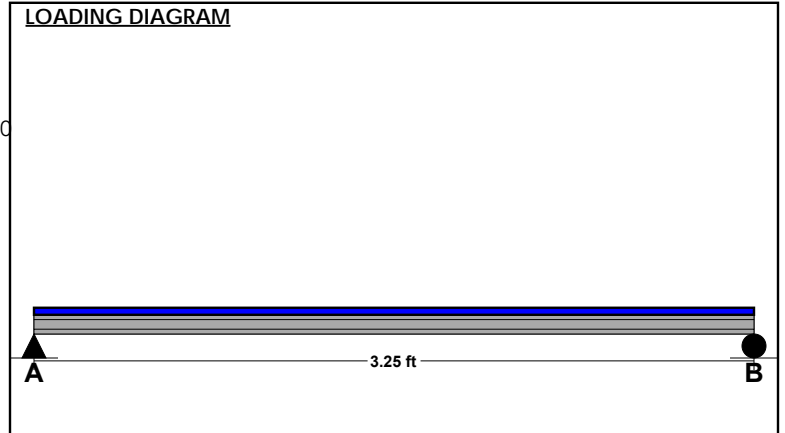
<b>DEFLECTIONS</b>		Center
Live Load	0.02	IN L/1666
Dead Load	0.02	in
Total Load	0.05	IN L/827
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

<b>REACTIONS</b>		A	B
Live Load	260 lb	260 lb	
Dead Load	264 lb	264 lb	
Total Load	524 lb	524 lb	
Bearing Length	0.28 in	0.28 in	

<b>BEAM DATA</b>		Center
Span Length	3.25	ft
Unbraced Length-Top	0	ft
Floor Duration Factor	1.00	
Notch Depth	0.00	

<b>MATERIAL PROPERTIES</b>			
#2 - Douglas-Fir-Larch (North)			
	Base Values	Adjusted	
Bending Stress:	Fb = 850 psi <i>Cd=1.00 CF=1.50</i>	Fb' = 1275 psi	
Shear Stress:	Fv = 180 psi <i>Cd=1.00</i>	Fv' = 180 psi	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi	
Comp. $\perp$ to Grain:	Fc $\perp$ = 625 psi	Fc $\perp$ ' = 625 psi	
<b>Controlling Moment:</b>	425 ft-lb		
1.625 ft from left support Created by combining all dead and live loads.			
<b>Controlling Shear:</b>	-524 lb		
At support. Created by combining all dead and live loads.			

<b>Comparisons with required sections:</b>		
	Req'd	Provided
Section Modulus:	4 in <sup>3</sup>	6.13 in <sup>3</sup>
Area (Shear):	4.36 in <sup>2</sup>	10.5 in <sup>2</sup>
Moment of Inertia (deflection):	3.11 in <sup>4</sup>	10.72 in <sup>4</sup>
Moment:	425 ft-lb	651 ft-lb
Shear:	-524 lb	1260 lb



<b>FLOOR LOADING</b>			
		Side 1	Side 2
Floor Live Load	FLL =	40 psf	0 psf
Floor Dead Load	FDL =	40 psf	0 psf
Floor Tributary Width	FTW =	4 ft	0 ft
Wall Load	WALL =	0 plf	

<b>BEAM LOADING</b>		
Beam Total Live Load:	wL =	160 plf
Beam Total Dead Load:	wD =	160 plf
Beam Self Weight:	BSW =	2 plf
Total Maximum Load:	wT =	322 plf

Project: 14031 (Larkspur Residence - Think)

Location: ff15

Uniformly Loaded Floor Beam

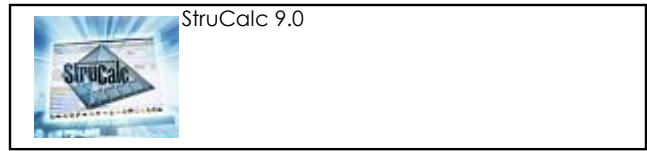
[2015 International Building Code(2012 NDS)

( 2 ) 1.5 IN x 7.25 IN x 4.25 FT

#2 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 7.0%

Controlling Factor: Moment



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**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS** Center

Live Load 0.02 IN L/2303

Dead Load 0.02 in

Total Load 0.04 IN L/1146

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

**REACTIONS**

Live Load 978 lb 978 lb

Dead Load 987 lb 987 lb

Total Load 1965 lb 1965 lb

Bearing Length 1.05 in 1.05 in

**BEAM DATA**

Span Length 4.25 ft

Unbraced Length-Top 0 ft

Floor Duration Factor 1.00

Notch Depth 0.00

**MATERIAL PROPERTIES**

#2 - Douglas-Fir-Larch (North)

	Base Values	Adjusted
Bending Stress:	Fb = 850 psi Cd=1.00 CF=1.20	Fb' = 1020 psi
Shear Stress:	Fv = 180 psi Cd=1.00	Fv' = 180 psi
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Comp. $\perp$ to Grain:	Fc $\perp$ = 625 psi	Fc $\perp$ ' = 625 psi

**Controlling Moment:** 2088 ft-lb

2.125 ft from left support

Created by combining all dead and live loads.

**Controlling Shear:** -1965 lb

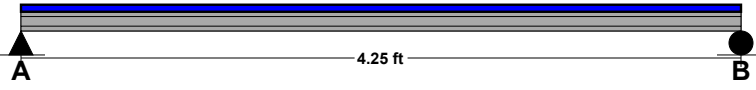
At support.

Created by combining all dead and live loads.

**Comparisons with required sections:**

	Req'd	Provided
Section Modulus:	24.56 in <sup>3</sup>	26.28 in <sup>3</sup>
Area (Shear):	16.37 in <sup>2</sup>	21.75 in <sup>2</sup>
Moment of Inertia (deflection):	19.96 in <sup>4</sup>	95.27 in <sup>4</sup>
Moment:	2088 ft-lb	2234 ft-lb
Shear:	-1965 lb	2610 lb

**LOADING DIAGRAM**



**FLOOR LOADING**

		Side 1	Side 2
Floor Live Load	FLL =	40 psf	0 psf
Floor Dead Load	FDL =	40 psf	0 psf
Floor Tributary Width	FTW =	11.5 ft	0 ft
Wall Load	WALL =	0 plf	

**BEAM LOADING**

Beam Total Live Load:	wL =	460 plf
Beam Total Dead Load:	wD =	460 plf
Beam Self Weight:	BSW =	5 plf
Total Maximum Load:	wT =	925 plf

Project: 14031 (Larkspur Residence - Think)

Location: ff16

Combination Roof And Floor Beam

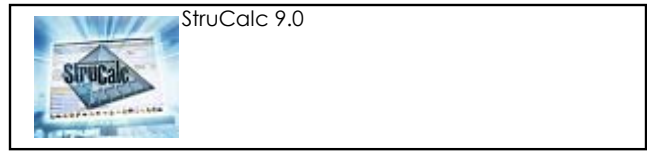
[2015 International Building Code(2012 NDS)

( 2 ) 1.5 IN x 9.25 IN x 2.25 FT

#2 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 61.9%

Controlling Factor: Shear



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**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS** Center

Live Load 0.00 IN L/9140

Dead Load 0.00 in

Total Load 0.00 IN L/7050

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

**REACTIONS**

Live Load 1825 lb 1825 lb

Dead Load 541 lb 541 lb

Total Load 2366 lb 2366 lb

Bearing Length 1.26 in 1.26 in

**BEAM DATA**

Span Length 2.25 ft

Unbraced Length-Top 0 ft

Roof Pitch 4 :12

Floor Duration Factor 1.00

Roof Duration Factor 1.15

Notch Depth 0.00

**MATERIAL PROPERTIES**

#2 - Douglas-Fir-Larch (North)

	Base Values	Adjusted
Bending Stress:	Fb = 850 psi <i>Cd=1.15 CF=1.10</i>	Fb' = 1075 psi
Shear Stress:	Fv = 180 psi <i>Cd=1.15</i>	Fv' = 207 psi
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Comp. $\perp$ to Grain:	Fc - $\perp$ = 625 psi	Fc - $\perp$ ' = 625 psi

**Controlling Moment:** 1331 ft-lb

1.125 ft from left support

Created by combining all dead and live loads.

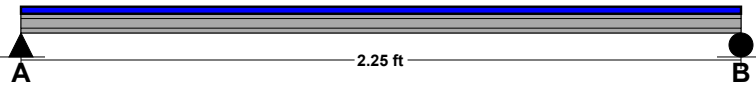
**Controlling Shear:** -2366 lb

At support.

Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	14.85 in3	42.78 in3
Area (Shear):	17.14 in2	27.75 in2
Moment of Inertia (deflection):	7.79 in4	197.86 in4
Moment:	1331 ft-lb	3833 ft-lb
Shear:	-2366 lb	3830 lb

**LOADING DIAGRAM**



**ROOF LOADING**

	Side 1	Side 2
Roof Live Load	RLL = 103 psf	0 psf
Roof Dead Load	RDL = 20 psf	0 psf
Roof Tributary Width	RTW = 14 ft	0 ft

**FLOOR LOADING**

	Side 1	Side 2
Floor Live Load	FLL = 40 psf	0 psf
Floor Dead Load	FDL = 40 psf	0 psf
Floor Tributary Width	FTW = 4.5 ft	0 ft
Wall Load	WALL = 0 plf	

**BEAM LOADING**

Roof Uniform Live Load:	wL-roof = 1442 plf
Roof Uniform Dead Load:	wD-roof = 295 plf
Floor Uniform Live Load:	wL-floor = 180 plf
Floor Uniform Dead Load:	wD-floor = 180 plf
Beam Self Weight:	BSW = 6 plf
Combined Uniform Live Load:	wL = 1622 plf
Combined Uniform Dead Load:	wD = 481 plf
Combined Uniform Total Load:	wT = 2103 plf

Project: 14031 (Larkspur Residence - Think)

Location: ff17

Combination Roof And Floor Beam

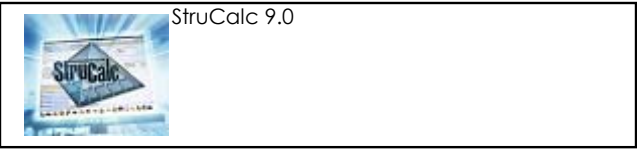
[2015 International Building Code(2012 NDS)]

( 3 ) 1.75 IN x 9.25 IN x 6.25 FT

1.9E Microllam - iLevel Trus Joist

**Section Inadequate By: 0.1%**

Controlling Factor: Shear / Depth Required 9.26 In.



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**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS** Center

Live Load 0.15 IN L/512

Dead Load 0.04 in

Total Load 0.19 IN L/405

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

**REACTIONS**

	A	B
Live Load	6928 lb	8374 lb
Dead Load	1934 lb	2246 lb
Total Load	8862 lb	10620 lb
Bearing Length	2.25 in	2.70 in

**BEAM DATA**

Center

Span Length 6.25 ft

Unbraced Length-Top 0 ft

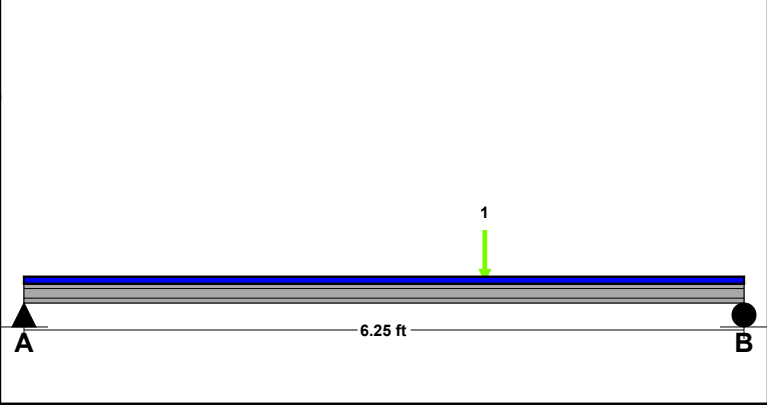
Roof Pitch 4 :12

Floor Duration Factor 1.00

Roof Duration Factor 1.15

Notch Depth 0.00

**LOADING DIAGRAM**



**ROOF LOADING**

		Side 1	Side 2
Roof Live Load	RLL =	103 psf	0 psf
Roof Dead Load	RDL =	20 psf	0 psf
Roof Tributary Width	RTW =	14 ft	0 ft

**FLOOR LOADING**

		Side 1	Side 2
Floor Live Load	FLL =	40 psf	0 psf
Floor Dead Load	FDL =	40 psf	0 psf
Floor Tributary Width	FTW =	4.5 ft	0 ft
Wall Load	WALL =	0 plf	

**BEAM LOADING**

Roof Uniform Live Load:	wL-roof =	1442 plf
Roof Uniform Dead Load:	wD-roof =	295 plf
Floor Uniform Live Load:	wL-floor =	180 plf
Floor Uniform Dead Load:	wD-floor =	180 plf
Beam Self Weight:	BSW =	15 plf
Combined Uniform Live Load:	wL =	1622 plf
Combined Uniform Dead Load:	wD =	490 plf
Combined Uniform Total Load:	wT =	2112 plf

**POINT LOADS - CENTER SPAN**

Load Number	One
Live Load	5165 lb
Dead Load	1115 lb
Location	4 ft

**MATERIAL PROPERTIES**

1.9E Microllam - iLevel Trus Joist

	Base Values	Adjusted
Bending Stress:	Fb = 2600 psi Cd=1.15 CF=1.04	Fb' = 3098 psi
Shear Stress:	Fv = 285 psi Cd=1.15	Fv' = 328 psi
Modulus of Elasticity:	E = 1900 ksi	E' = 1900 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 750 psi	Fc - ⊥' = 750 psi

Controlling Moment: 18549 ft-lb

3.125 ft from left support

Created by combining all dead and live loads.

Controlling Shear: -10620 lb

At support.

Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	71.85 in3	74.87 in3
Area (Shear):	48.61 in2	48.56 in2
Moment of Inertia (deflection):	243.43 in4	346.26 in4
Moment:	18549 ft-lb	19327 ft-lb
Shear:	-10620 lb	10611 lb

Project: 14031 (Larkspur Residence - Think)

Location: ff18

Combination Roof And Floor Beam

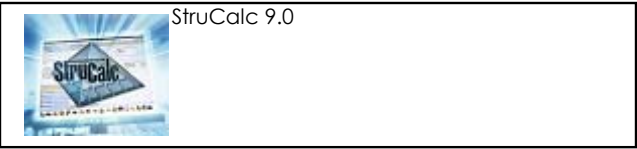
[2015 International Building Code(2012 NDS)]

( 2 ) 1.5 IN x 3.5 IN x 2.25 FT

#2 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 160.2%

Controlling Factor: Moment



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<b>DEFLECTIONS</b>		Center
Live Load	0.01	IN L/2301
Dead Load	0.00	in
Total Load	0.02	IN L/1767
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

<b>REACTIONS</b>		
	A	B
Live Load	393 lb	393 lb
Dead Load	119 lb	119 lb
Total Load	512 lb	512 lb
Bearing Length	0.27 in	0.27 in

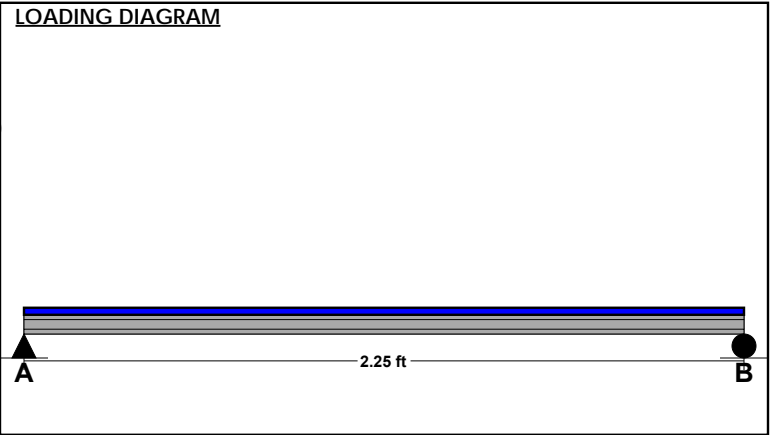
<b>BEAM DATA</b>		Center
Span Length	2.25	ft
Unbraced Length-Top	0	ft
Roof Pitch	4	:12
Floor Duration Factor	1.00	
Roof Duration Factor	1.15	
Notch Depth	0.00	

<b>MATERIAL PROPERTIES</b>			
#2 - Douglas-Fir-Larch (North)			
	Base Values	Adjusted	
Bending Stress:	Fb = 850 psi	Fb' = 1466 psi	
	<i>Cd=1.15 Cf=1.50</i>		
Shear Stress:	Fv = 180 psi	Fv' = 207 psi	
	<i>Cd=1.15</i>		
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi	
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi	

**Controlling Moment:** 288 ft-lb  
 1.125 ft from left support  
 Created by combining all dead and live loads.

**Controlling Shear:** 511 lb  
 At support.  
 Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	2.35 in <sup>3</sup>	6.13 in <sup>3</sup>
Area (Shear):	3.7 in <sup>2</sup>	10.5 in <sup>2</sup>
Moment of Inertia (deflection):	1.68 in <sup>4</sup>	10.72 in <sup>4</sup>
Moment:	288 ft-lb	748 ft-lb
Shear:	511 lb	1449 lb



<b>ROOF LOADING</b>			
		Side 1	Side 2
Roof Live Load	RLL =	103 psf	0 psf
Roof Dead Load	RDL =	20 psf	0 psf
Roof Tributary Width	RTW =	3 ft	0 ft

<b>FLOOR LOADING</b>			
		Side 1	Side 2
Floor Live Load	FLL =	40 psf	0 psf
Floor Dead Load	FDL =	40 psf	0 psf
Floor Tributary Width	FTW =	1 ft	0 ft

Wall Load	WALL =	0 plf
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<b>BEAM LOADING</b>			
Roof Uniform Live Load:	wL-roof =	309	plf
Roof Uniform Dead Load:	wD-roof =	63	plf
Floor Uniform Live Load:	wL-floor =	40	plf
Floor Uniform Dead Load:	wD-floor =	40	plf
Beam Self Weight:	BSW =	2	plf
Combined Uniform Live Load:	wL =	349	plf
Combined Uniform Dead Load:	wD =	105	plf
Combined Uniform Total Load:	wT =	454	plf

Project: 14031 (Larkspur Residence - Think)

Location: ff19

Combination Roof And Floor Beam

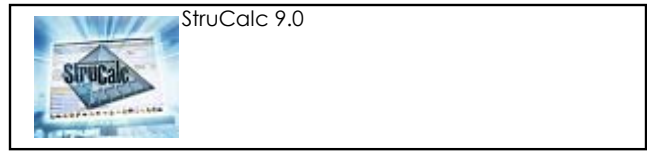
[2015 International Building Code(2012 NDS)]

( 3 ) 1.75 IN x 7.25 IN x 6.25 FT

1.9E Microllam - iLevel Trus Joist

Section Adequate By: 0.1%

Controlling Factor: Moment



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**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS** Center

Live Load 0.17 IN L/450

Dead Load 0.11 in

Total Load 0.27 IN L/276

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

**REACTIONS**

Live Load 4808 lb 4808 lb

Dead Load 3038 lb 3038 lb

Total Load 7846 lb 7846 lb

Bearing Length 1.99 in 1.99 in

**BEAM DATA**

Span Length 6.25 ft

Unbraced Length-Top 0 ft

Roof Pitch 4 :12

Floor Duration Factor 1.00

Roof Duration Factor 1.15

Notch Depth 0.00

**MATERIAL PROPERTIES**

1.9E Microllam - iLevel Trus Joist

	Base Values	Adjusted
Bending Stress:	Fb = 2600 psi <i>Cd=1.15 CF=1.07</i>	Fb' = 3202 psi
Shear Stress:	Fv = 285 psi <i>Cd=1.15</i>	Fv' = 328 psi
Modulus of Elasticity:	E = 1900 ksi	E' = 1900 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 750 psi	Fc - ⊥' = 750 psi

**Controlling Moment:** 12259 ft-lb

3.125 ft from left support

Created by combining all dead and live loads.

**Controlling Shear:** 7846 lb

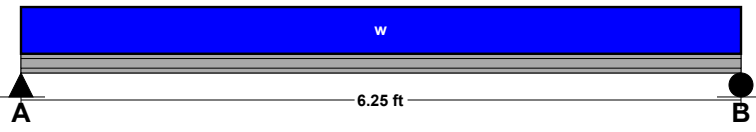
At support.

Created by combining all dead and live loads.

**Comparisons with required sections:**

	Req'd	Provided
Section Modulus:	45.94 in3	45.99 in3
Area (Shear):	35.91 in2	38.06 in2
Moment of Inertia (deflection):	145.15 in4	166.72 in4
Moment:	12259 ft-lb	12273 ft-lb
Shear:	7846 lb	8317 lb

**LOADING DIAGRAM**



**ROOF LOADING**

	Side 1	Side 2
Roof Live Load	RLL = 103 psf	0 psf
Roof Dead Load	RDL = 20 psf	0 psf
Roof Tributary Width	RTW = 9.5 ft	0 ft

**FLOOR LOADING**

	Side 1	Side 2
Floor Live Load	FLL = 40 psf	0 psf
Floor Dead Load	FDL = 40 psf	0 psf
Floor Tributary Width	FTW = 14 ft	0 ft

Wall Load WALL = 200 plf

**BEAM LOADING**

Roof Uniform Live Load:	wL-roof = 979 plf
Roof Uniform Dead Load:	wD-roof = 200 plf
Floor Uniform Live Load:	wL-floor = 560 plf
Floor Uniform Dead Load:	wD-floor = 560 plf
Beam Self Weight:	BSW = 12 plf
Combined Uniform Live Load:	wL = 1539 plf
Combined Uniform Dead Load:	wD = 972 plf
Combined Uniform Total Load:	wT = 2511 plf

Project: 14031 (Larkspur Residence - Think)

Location: ff20

Combination Roof And Floor Beam

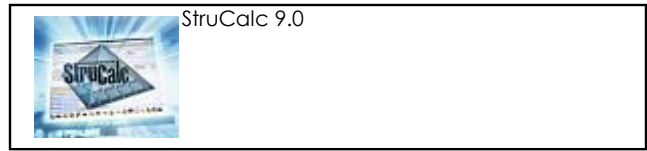
[2015 International Building Code(2012 NDS)]

( 2 ) 1.5 IN x 9.25 IN x 2.75 FT

#2 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 11.2%

Controlling Factor: Shear



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**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS** Center

Live Load 0.01 IN L/5278

Dead Load 0.00 in

Total Load 0.01 IN L/3242

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

**REACTIONS**

Live Load 2115 lb 2115 lb

Dead Load 1328 lb 1328 lb

Total Load 3443 lb 3443 lb

Bearing Length 1.84 in 1.84 in

**BEAM DATA**

Center

Span Length 2.75 ft

Unbraced Length-Top 0 ft

Roof Pitch 4 :12

Floor Duration Factor 1.00

Roof Duration Factor 1.15

Notch Depth 0.00

**MATERIAL PROPERTIES**

#2 - Douglas-Fir-Larch (North)

	Base Values	Adjusted
Bending Stress:	Fb = 850 psi <i>Cd=1.15 CF=1.10</i>	Fb' = 1075 psi
Shear Stress:	Fv = 180 psi <i>Cd=1.15</i>	Fv' = 207 psi
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Comp. $\perp$ to Grain:	Fc - $\perp$ = 625 psi	Fc - $\perp$ ' = 625 psi

**Controlling Moment:** 2368 ft-lb

1.375 ft from left support

Created by combining all dead and live loads.

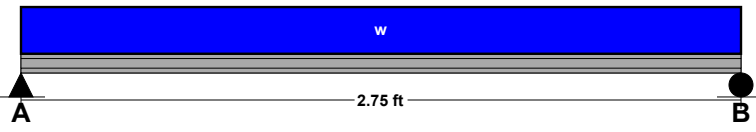
**Controlling Shear:** 3444 lb

At support.

Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	26.42 in3	42.78 in3
Area (Shear):	24.96 in2	27.75 in2
Moment of Inertia (deflection):	14.65 in4	197.86 in4
Moment:	2368 ft-lb	3833 ft-lb
Shear:	3444 lb	3830 lb

**LOADING DIAGRAM**



**ROOF LOADING**

	Side 1	Side 2
Roof Live Load	RLL = 103 psf	0 psf
Roof Dead Load	RDL = 20 psf	0 psf
Roof Tributary Width	RTW = 9.5 ft	0 ft

**FLOOR LOADING**

	Side 1	Side 2
Floor Live Load	FLL = 40 psf	0 psf
Floor Dead Load	FDL = 40 psf	0 psf
Floor Tributary Width	FTW = 14 ft	0 ft
Wall Load	WALL = 200 plf	

**BEAM LOADING**

Roof Uniform Live Load:	wL-roof = 979 plf
Roof Uniform Dead Load:	wD-roof = 200 plf
Floor Uniform Live Load:	wL-floor = 560 plf
Floor Uniform Dead Load:	wD-floor = 560 plf
Beam Self Weight:	BSW = 6 plf
Combined Uniform Live Load:	wL = 1539 plf
Combined Uniform Dead Load:	wD = 966 plf
Combined Uniform Total Load:	wT = 2505 plf



Project: 14031 (Larkspur Residence - Think)

Location: ff21

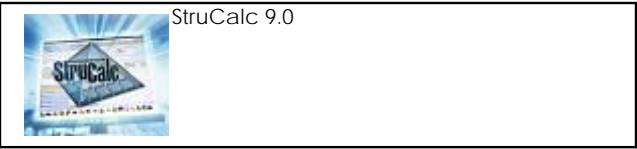
Combination Roof And Floor Beam

[2015 International Building Code(AISC 14th Ed ASD)]

A992-50 W21x55 x 25.75 FT

Section Adequate By: 2.8%

Controlling Factor: Moment



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<b>DEFLECTIONS</b>		Center
Live Load	0.80	IN L/388
Dead Load	0.31	in
Total Load	1.10	IN L/280
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

<b>REACTIONS</b>		A	B
Live Load	34235	lb	34235
Dead Load	13260	lb	13260
Total Load	47495	lb	47495
Bearing Length	2.17	in	2.17

<b>BEAM DATA</b>		Center
Span Length	25.75	ft
Unbraced Length-Top	0	ft
Roof Pitch	4	:12
Floor Duration Factor	0.00	
Roof Duration Factor	0.00	

<b>STEEL PROPERTIES</b>	
W21x55 - A992-50	

**Properties:**

Yield Stress:	Fy =	50	ksi
Modulus of Elasticity:	E =	29000	ksi
Depth:	d =	20.8	in
Web Thickness:	tw =	0.38	in
Flange Width:	bf =	8.22	in
Flange Thickness:	tf =	0.52	in
Distance to Web Toe of Fillet:	k =	1.02	in
Moment of Inertia About X-X Axis:	Ix =	1140	in <sup>4</sup>
Section Modulus About X-X Axis:	Sx =	110	in <sup>3</sup>
Plastic Section Modulus About X-X Axis:	Zx =	126	in <sup>3</sup>

**Design Properties per AISC 14th Edition Steel Manual:**

Flange Buckling Ratio:	FBR =	7.87
Allowable Flange Buckling Ratio:	AFBR =	9.15
Web Buckling Ratio:	WBR =	50.03
Allowable Web Buckling Ratio:	AWBR =	90.55
Controlling Unbraced Length:	Lb =	0 ft
Limiting Unbraced Length - for lateral-torsional buckling:	Lp =	6.11 ft
Nominal Flexural Strength w/ safety factor:	Mn =	314371 ft-lb
Controlling Equation:	F2-1	
Web height to thickness ratio:	h/tw =	50.03
Limiting height to thickness ratio for eqn. G2-2:	h/tw-limit =	53.95
Cv Factor:	Cv =	1
Controlling Equation:	G2-2	
Nominal Shear Strength w/ safety factor:	Vn =	156000 lb

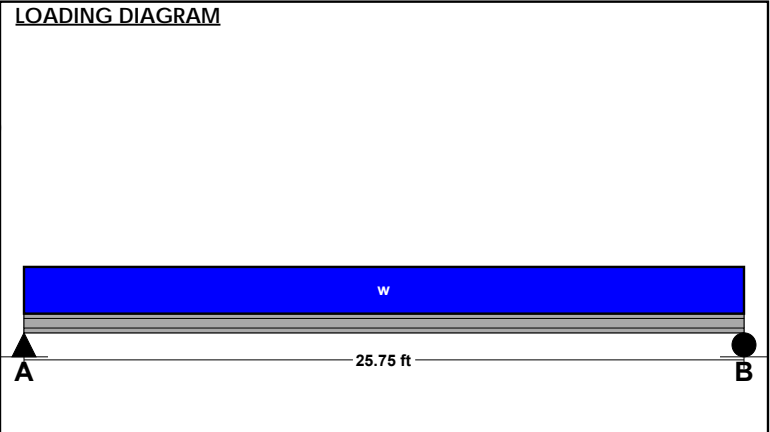
**Controlling Moment:** 305745 ft-lb  
12.875 ft from left support

Created by combining all dead and live loads.

**Controlling Shear:** 47494 lb  
At support.

Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Moment of Inertia (deflection):	1056.54 in <sup>4</sup>	1140 in <sup>4</sup>
Moment:	305745 ft-lb	314371 ft-lb
Shear:	47494 lb	156000 lb



<b>ROOF LOADING</b>		
	Side 1	Side 2
Roof Live Load	RLL = 103 psf	103 psf
Roof Dead Load	RDL = 20 psf	20 psf
Roof Tributary Width	RTW = 9 ft	14 ft

<b>FLOOR LOADING</b>		
	Side 1	Side 2
Floor Live Load	FLL = 40 psf	0 psf
Floor Dead Load	FDL = 40 psf	0 psf
Floor Tributary Width	FTW = 7.3 ft	0 ft
Wall Load	WALL = 200 plf	

<b>BEAM LOADING</b>	
Roof Uniform Live Load:	wL-roof = 2369 plf
Roof Uniform Dead Load:	wD-roof = 485 plf
Floor Uniform Live Load:	wL-floor = 290 plf
Floor Uniform Dead Load:	wD-floor = 290 plf
Beam Self Weight:	BSW = 55 plf
Combined Uniform Live Load:	wL = 2659 plf
Combined Uniform Dead Load:	wD = 1030 plf
Combined Uniform Total Load:	wT = 3689 plf

Project: 14031 (Larkspur Residence - Think)

Location: ff22

Combination Roof And Floor Beam

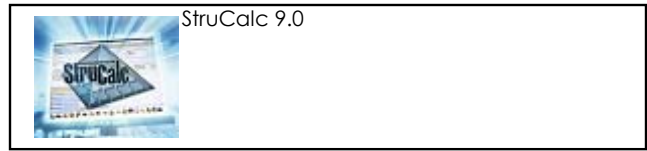
[2015 International Building Code(2012 NDS)]

( 3 ) 1.75 IN x 11.875 IN x 11.0 FT

1.9E Microllam - iLevel Trus Joist

**Section Inadequate By: 3.3%**

Controlling Factor: Moment / Depth Required 12.07 In.



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**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS** Center

Live Load 0.32 IN L/407

Dead Load 0.17 in

Total Load 0.50 IN L/265

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

**REACTIONS**

	A	B
Live Load	7543 lb	7543 lb
Dead Load	4020 lb	4020 lb
Total Load	11563 lb	11563 lb
Bearing Length	2.94 in	2.94 in

**BEAM DATA**

Center

Span Length 11 ft

Unbraced Length-Top 0 ft

Roof Pitch 4 :12

Floor Duration Factor 1.00

Roof Duration Factor 1.15

Notch Depth 0.00

**MATERIAL PROPERTIES**

1.9E Microllam - iLevel Trus Joist

	Base Values	Adjusted
Bending Stress:	Fb = 2600 psi <i>Cd=1.15 CF=1.00</i>	Fb' = 2994 psi
Shear Stress:	Fv = 285 psi <i>Cd=1.15</i>	Fv' = 328 psi
Modulus of Elasticity:	E = 1900 ksi	E' = 1900 ksi
Comp. $\perp$ to Grain:	Fc - $\perp$ = 750 psi	Fc - $\perp$ ' = 750 psi

**Controlling Moment:** 31798 ft-lb

5.5 ft from left support

Created by combining all dead and live loads.

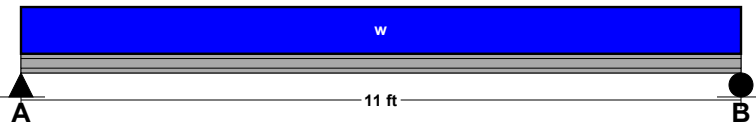
**Controlling Shear:** -11563 lb

At support.

Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	127.44 in3	123.39 in3
Area (Shear):	52.92 in2	62.34 in2
Moment of Inertia (deflection):	662.63 in4	732.62 in4
Moment:	31798 ft-lb	30788 ft-lb
Shear:	-11563 lb	13622 lb

**LOADING DIAGRAM**



**ROOF LOADING**

	Side 1	Side 2
Roof Live Load	RLL = 103 psf	103 psf
Roof Dead Load	RDL = 20 psf	20 psf
Roof Tributary Width	RTW = 1 ft	9.5 ft

**FLOOR LOADING**

	Side 1	Side 2
Floor Live Load	FLL = 40 psf	0 psf
Floor Dead Load	FDL = 40 psf	0 psf
Floor Tributary Width	FTW = 7.3 ft	0 ft

Wall Load WALL = 200 plf

**BEAM LOADING**

Roof Uniform Live Load:	wL-roof = 1082 plf
Roof Uniform Dead Load:	wD-roof = 221 plf
Floor Uniform Live Load:	wL-floor = 290 plf
Floor Uniform Dead Load:	wD-floor = 290 plf
Beam Self Weight:	BSW = 19 plf
Combined Uniform Live Load:	wL = 1372 plf
Combined Uniform Dead Load:	wD = 731 plf
Combined Uniform Total Load:	wT = 2102 plf

Project: 14031 (Larkspur Residence - Think)

Location: ff32

Uniformly Loaded Floor Beam

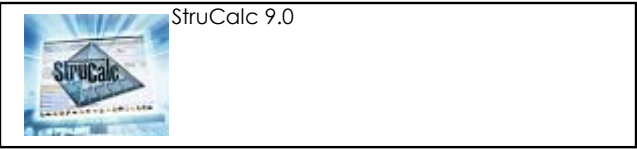
[2015 International Building Code(2012 NDS)]

( 2 ) 1.5 IN x 3.5 IN x 4.25 FT

#2 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 77.7%

Controlling Factor: Moment



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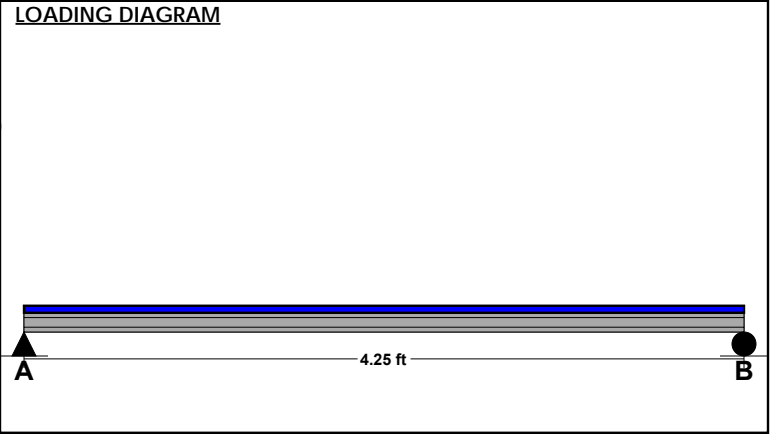
<b>DEFLECTIONS</b>		Center
Live Load	0.03	IN L/1490
Dead Load	0.04	in
Total Load	0.07	IN L/735
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

<b>REACTIONS</b>		A	B
Live Load	170 lb	170 lb	
Dead Load	175 lb	175 lb	
Total Load	345 lb	345 lb	
Bearing Length	0.18 in	0.18 in	

<b>BEAM DATA</b>		Center
Span Length	4.25	ft
Unbraced Length-Top	0	ft
Floor Duration Factor	1.00	
Notch Depth	0.00	

<b>MATERIAL PROPERTIES</b>			
#2 - Douglas-Fir-Larch (North)			
	<u>Base Values</u>	<u>Adjusted</u>	
Bending Stress:	Fb = 850 psi <i>Cd=1.00 CF=1.50</i>	Fb' = 1275 psi	
Shear Stress:	Fv = 180 psi <i>Cd=1.00</i>	Fv' = 180 psi	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi	
Comp. $\perp$ to Grain:	Fc $\perp$ = 625 psi	Fc $\perp$ ' = 625 psi	
<b>Controlling Moment:</b>	366 ft-lb		
2.125 ft from left support Created by combining all dead and live loads.			
<b>Controlling Shear:</b>	-345 lb		
At support. Created by combining all dead and live loads.			

<b>Comparisons with required sections:</b>		
	<u>Req'd</u>	<u>Provided</u>
Section Modulus:	3.45 in <sup>3</sup>	6.13 in <sup>3</sup>
Area (Shear):	2.87 in <sup>2</sup>	10.5 in <sup>2</sup>
Moment of Inertia (deflection):	3.5 in <sup>4</sup>	10.72 in <sup>4</sup>
Moment:	366 ft-lb	651 ft-lb
Shear:	-345 lb	1260 lb



<b>FLOOR LOADING</b>			
		<u>Side 1</u>	<u>Side 2</u>
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	40 psf	40 psf
Floor Tributary Width	FTW =	1 ft	1 ft
Wall Load	WALL =	0 plf	

<b>BEAM LOADING</b>		
Beam Total Live Load:	wL =	80 plf
Beam Total Dead Load:	wD =	80 plf
Beam Self Weight:	BSW =	2 plf
Total Maximum Load:	wT =	162 plf

Project: 14031 (Larkspur Residence - Think)

Location: ff33

Uniformly Loaded Floor Beam

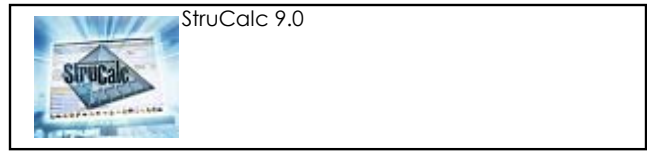
[2015 International Building Code(2012 NDS)

( 2 ) 1.5 IN x 3.5 IN x 4.25 FT

#2 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 77.7%

Controlling Factor: Moment



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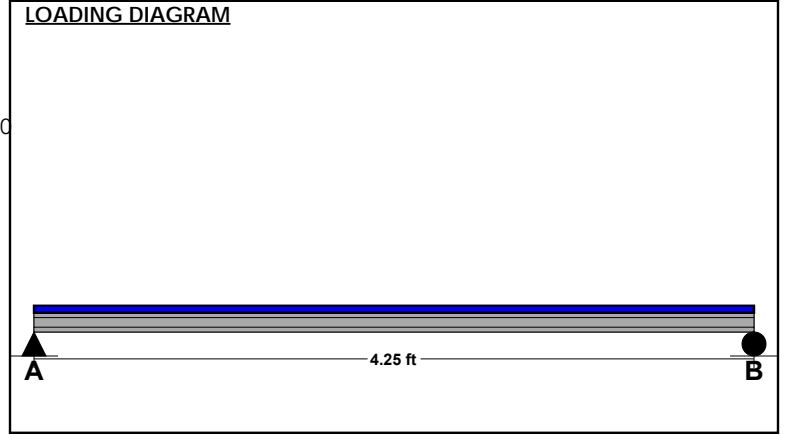
<b>DEFLECTIONS</b>		Center
Live Load	0.03	IN L/1490
Dead Load	0.04	in
Total Load	0.07	IN L/735
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

<b>REACTIONS</b>		A	B
Live Load	170 lb	170 lb	
Dead Load	175 lb	175 lb	
Total Load	345 lb	345 lb	
Bearing Length	0.18 in	0.18 in	

<b>BEAM DATA</b>		Center
Span Length	4.25	ft
Unbraced Length-Top	0	ft
Floor Duration Factor	1.00	
Notch Depth	0.00	

<b>MATERIAL PROPERTIES</b>			
#2 - Douglas-Fir-Larch (North)			
	Base Values	Adjusted	
Bending Stress:	Fb = 850 psi <i>Cd=1.00 CF=1.50</i>	Fb' = 1275 psi	
Shear Stress:	Fv = 180 psi <i>Cd=1.00</i>	Fv' = 180 psi	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi	
Comp. $\perp$ to Grain:	Fc $\perp$ = 625 psi	Fc $\perp$ ' = 625 psi	
<b>Controlling Moment:</b>	366 ft-lb		
2.125 ft from left support Created by combining all dead and live loads.			
<b>Controlling Shear:</b>	-345 lb		
At support. Created by combining all dead and live loads.			

<b>Comparisons with required sections:</b>		
	Req'd	Provided
Section Modulus:	3.45 in <sup>3</sup>	6.13 in <sup>3</sup>
Area (Shear):	2.87 in <sup>2</sup>	10.5 in <sup>2</sup>
Moment of Inertia (deflection):	3.5 in <sup>4</sup>	10.72 in <sup>4</sup>
Moment:	366 ft-lb	651 ft-lb
Shear:	-345 lb	1260 lb



<b>FLOOR LOADING</b>			
		Side 1	Side 2
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	40 psf	40 psf
Floor Tributary Width	FTW =	1 ft	1 ft
Wall Load	WALL =	0 plf	

<b>BEAM LOADING</b>		
Beam Total Live Load:	wL =	80 plf
Beam Total Dead Load:	wD =	80 plf
Beam Self Weight:	BSW =	2 plf
Total Maximum Load:	wT =	162 plf

Project: 14031 (Larkspur Residence - Think)

Location: bf01

Uniformly Loaded Floor Beam

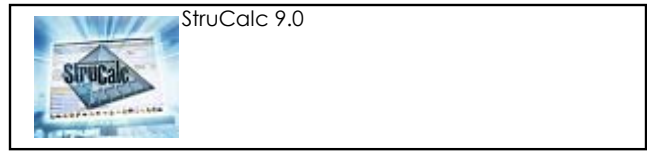
[2015 International Building Code(2012 NDS)]

5.5 IN x 9.5 IN x 10.5 FT

#1 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 50.9%

Controlling Factor: Moment



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<b>DEFLECTIONS</b>		Center
Live Load	0.09	IN L/1380
Dead Load	0.10	in
Total Load	0.19	IN L/672
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

<b>REACTIONS</b>		A	B
Live Load	1103	lb	1103 lb
Dead Load	1161	lb	1161 lb
Total Load	2264	lb	2264 lb
Bearing Length	0.66	in	0.66 in

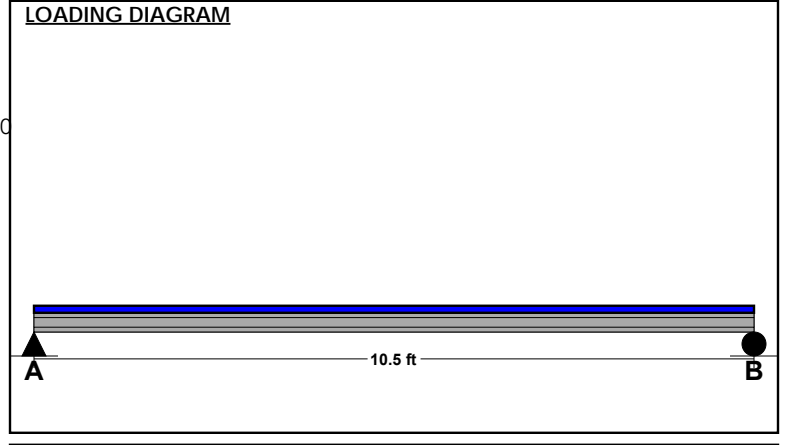
<b>BEAM DATA</b>		Center
Span Length	10.5	ft
Unbraced Length-Top	0	ft
Floor Duration Factor	1.00	
Notch Depth	0.00	

<b>MATERIAL PROPERTIES</b>			
#1 - Douglas-Fir-Larch (North)			
	<u>Base Values</u>	<u>Adjusted</u>	
Bending Stress:	Fb = 1300 psi <i>Cd=1.00 CF=1.00</i>	Fb' = 1300 psi	
Shear Stress:	Fv = 170 psi <i>Cd=1.00</i>	Fv' = 170 psi	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi	
Comp. $\perp$ to Grain:	Fc $\perp$ = 625 psi	Fc $\perp$ ' = 625 psi	

**Controlling Moment:** 5941 ft-lb  
5.25 ft from left support  
Created by combining all dead and live loads.

**Controlling Shear:** -2263 lb  
At support.  
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	54.84 in <sup>3</sup>	82.73 in <sup>3</sup>
Area (Shear):	19.97 in <sup>2</sup>	52.25 in <sup>2</sup>
Moment of Inertia (deflection):	140.34 in <sup>4</sup>	392.96 in <sup>4</sup>
Moment:	5941 ft-lb	8962 ft-lb
Shear:	-2263 lb	5922 lb



<b>FLOOR LOADING</b>			
		Side 1	Side 2
Floor Live Load	FLL =	40 psf	0 psf
Floor Dead Load	FDL =	40 psf	0 psf
Floor Tributary Width	FTW =	5.3 ft	0 ft
Wall Load	WALL =	0 plf	

<b>BEAM LOADING</b>		
Beam Total Live Load:	wL =	210 plf
Beam Total Dead Load:	wD =	210 plf
Beam Self Weight:	BSW =	11 plf
Total Maximum Load:	wT =	431 plf

Project: 14031 (Larkspur Residence - Think)

Location: bf02

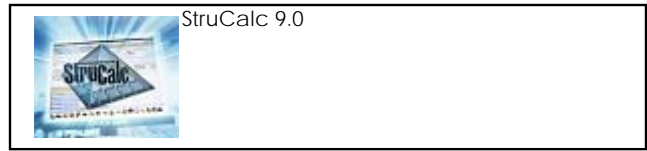
Uniformly Loaded Floor Beam

[2015 International Building Code(AISC 14th Ed ASD)]

A992-50 W21x68 x 21.0 FT

Section Adequate By: 5.1%

Controlling Factor: Moment



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<b>DEFLECTIONS</b>		Center
Live Load	0.40	IN L/635
Dead Load	0.19	in
Total Load	0.59	IN L/427
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

<b>REACTIONS</b>		A	B
Live Load	35310 lb	24435 lb	
Dead Load	17890 lb	13990 lb	
Total Load	53200 lb	38425 lb	
Bearing Length	1.19 in	1.19 in	

<b>BEAM DATA</b>		Center
Span Length	21	ft
Unbraced Length-Top	0	ft

**STEEL PROPERTIES**

W21x68 - A992-50

**Properties:**

Yield Stress:	Fy =	50	ksi
Modulus of Elasticity:	E =	29000	ksi
Depth:	d =	21.1	in
Web Thickness:	tw =	0.43	in
Flange Width:	bf =	8.27	in
Flange Thickness:	tf =	0.69	in
Distance to Web Toe of Fillet:	k =	1.19	in
Moment of Inertia About X-X Axis:	Ix =	1480	in4
Section Modulus About X-X Axis:	Sx =	140	in3
Plastic Section Modulus About X-X Axis:	Zx =	160	in3

**Design Properties per AISC 14th Edition Steel Manual:**

Flange Buckling Ratio:	FBR =	6.04
Allowable Flange Buckling Ratio:	AFBR =	9.15
Web Buckling Ratio:	WBR =	43.53
Allowable Web Buckling Ratio:	AWBR =	90.55
Controlling Unbraced Length:	Lb =	0 ft
Limiting Unbraced Length - for lateral-torsional buckling:	Lp =	6.36 ft
Nominal Flexural Strength w/ safety factor:	Mn =	399202 ft-lb
Controlling Equation:	F2-1	
Web height to thickness ratio:	h/tw =	43.53
Limiting height to thickness ratio for eqn. G2-2:	h/tw-limit =	53.95
Cv Factor:	Cv =	1
Controlling Equation:	G2-2	
Nominal Shear Strength w/ safety factor:	Vn =	181460 lb

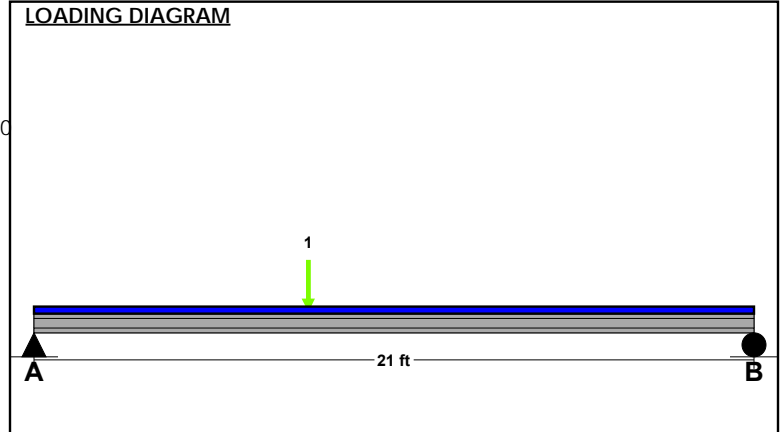
**Controlling Moment:** 379707 ft-lb

10.5 ft from left support  
Created by combining all dead and live loads.

**Controlling Shear:** 53200 lb

At support.  
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Moment of Inertia (deflection):	839.15 in4	1480 in4
Moment:	379707 ft-lb	399202 ft-lb
Shear:	53200 lb	181460 lb



**FLOOR LOADING**

	Side 1	Side 2
Floor Live Load	FLL = 40 psf	0 psf
Floor Dead Load	FDL = 40 psf	0 psf
Floor Tributary Width	FTW = 16.8 ft	0 ft
Wall Load	WALL = 0 plf	

**BEAM LOADING**

Beam Total Live Load:	wL = 670 plf
Beam Total Dead Load:	wD = 670 plf
Beam Self Weight:	BSW = 68 plf
Total Maximum Load:	wT = 1408 plf

**POINT LOADS - CENTER SPAN**

Load Number	One *	Two
Live Load	1103 lb	44572 lb
Dead Load	1161 lb	15221 lb
Location	8 ft	8 ft

\* Load obtained from Load Tracker. See Summary Report for details.

Project: 14031 (Larkspur Residence - Think)

Location: bf03

Uniformly Loaded Floor Beam

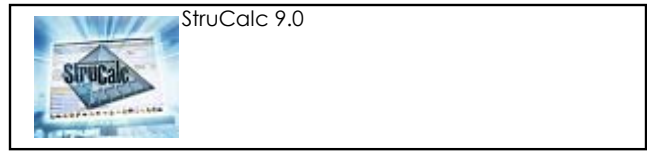
[2015 International Building Code(2012 NDS)]

( 3 ) 1.75 IN x 9.25 IN x 9.666 FT

1.9E Microllam - iLevel Trus Joist

Section Adequate By: 37.0%

Controlling Factor: Moment



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**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS** Center

Live Load 0.20 IN L/576

Dead Load 0.11 in

Total Load 0.31 IN L/370

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

**REACTIONS**

Live Load 3262 lb 3262 lb

Dead Load 1813 lb 1813 lb

Total Load 5075 lb 5075 lb

Bearing Length 1.29 in 1.29 in

**BEAM DATA**

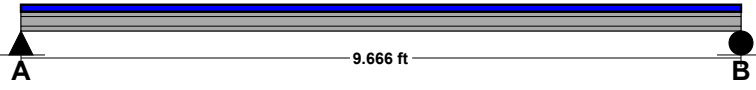
Span Length 9.67 ft

Unbraced Length-Top 0 ft

Floor Duration Factor 1.00

Notch Depth 0.00

**LOADING DIAGRAM**



**MATERIAL PROPERTIES**

1.9E Microllam - iLevel Trus Joist

	Base Values	Adjusted
Bending Stress:	Fb = 2600 psi Cd=1.00 CF=1.04	Fb' = 2694 psi
Shear Stress:	Fv = 285 psi Cd=1.00	Fv' = 285 psi
Modulus of Elasticity:	E = 1900 ksi	E' = 1900 ksi
Comp. $\perp$ to Grain:	Fc $\perp$ = 750 psi	Fc $\perp$ ' = 750 psi

**Controlling Moment:** 12265 ft-lb  
4.833 ft from left support  
Created by combining all dead and live loads.

**Controlling Shear:** 5076 lb  
At support.  
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	54.64 in <sup>3</sup>	74.87 in <sup>3</sup>
Area (Shear):	26.71 in <sup>2</sup>	48.56 in <sup>2</sup>
Moment of Inertia (deflection):	224.59 in <sup>4</sup>	346.26 in <sup>4</sup>
Moment:	12265 ft-lb	16806 ft-lb
Shear:	5076 lb	9227 lb

**FLOOR LOADING**

	Side 1	Side 2
Floor Live Load	FLL = 40 psf	103 psf
Floor Dead Load	FDL = 40 psf	40 psf
Floor Tributary Width	FTW = 4 ft	5 ft
Wall Load	WALL = 0 plf	

**BEAM LOADING**

Beam Total Live Load:	wL = 675 plf
Beam Total Dead Load:	wD = 360 plf
Beam Self Weight:	BSW = 15 plf
Total Maximum Load:	wT = 1050 plf

Project: 14031 (Larkspur Residence - Think)

Location: bf04

Uniformly Loaded Floor Beam

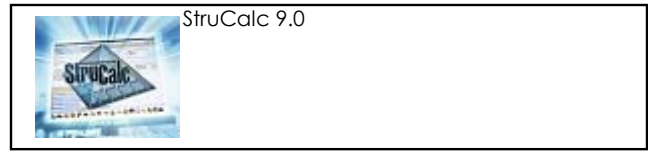
[2015 International Building Code(2012 NDS)

( 3 ) 1.75 IN x 11.25 IN x 10.5 FT

1.9E Microllam - iLevel Trus Joist

Section Adequate By: 10.4%

Controlling Factor: Moment



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**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS** Center

Live Load 0.26 IN L/481

Dead Load 0.11 in

Total Load 0.37 IN L/343

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

**REACTIONS**

Live Load 5948 lb 5948 lb

Dead Load 2407 lb 2407 lb

Total Load 8355 lb 8355 lb

Bearing Length 2.12 in 2.12 in

**BEAM DATA**

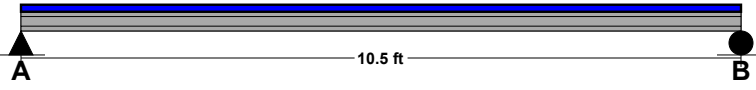
Span Length 10.5 ft

Unbraced Length-Top 0 ft

Floor Duration Factor 1.00

Notch Depth 0.00

**LOADING DIAGRAM**



**FLOOR LOADING**

	Side 1	Side 2
Floor Live Load	FLL = 103 psf	103 psf
Floor Dead Load	FDL = 40 psf	40 psf
Floor Tributary Width	FTW = 6 ft	5 ft
Wall Load	WALL = 0 plf	

**BEAM LOADING**

Beam Total Live Load:	wL = 1133 plf
Beam Total Dead Load:	wD = 440 plf
Beam Self Weight:	BSW = 18 plf
Total Maximum Load:	wT = 1591 plf

**MATERIAL PROPERTIES**

1.9E Microllam - iLevel Trus Joist

	Base Values	Adjusted
Bending Stress:	Fb = 2600 psi Cd=1.00 CF=1.01	Fb' = 2623 psi
Shear Stress:	Fv = 285 psi Cd=1.00	Fv' = 285 psi
Modulus of Elasticity:	E = 1900 ksi	E' = 1900 ksi
Comp. $\perp$ to Grain:	Fc $\perp$ = 750 psi	Fc $\perp$ ' = 750 psi

**Controlling Moment:** 21932 ft-lb

5.25 ft from left support

Created by combining all dead and live loads.

**Controlling Shear:** -8355 lb

At support.

Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	100.34 in3	110.74 in3
Area (Shear):	43.97 in2	59.06 in2
Moment of Inertia (deflection):	465.89 in4	622.92 in4
Moment:	21932 ft-lb	24206 ft-lb
Shear:	-8355 lb	11222 lb



Project: 14031 (Larkspur Residence - Think)

Location: bf05

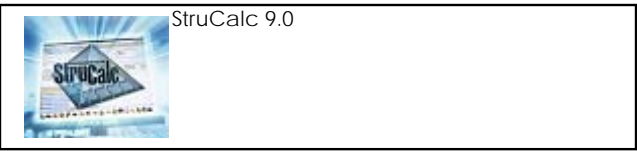
Uniformly Loaded Floor Beam

[2015 International Building Code(AISC 14th Ed ASD)]

A992-50 W16x36 x 22.25 FT

Section Adequate By: 29.1%

Controlling Factor: Deflection



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<b>DEFLECTIONS</b>		Center
Live Load	0.57	IN L/465
Dead Load	0.25	in
Total Load	0.83	IN L/323
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

<b>REACTIONS</b>		A	B
Live Load	31279	lb	11595
Dead Load	10125	lb	5839
Total Load	41404	lb	17434
Bearing Length	5.96	in	0.83

<b>BEAM DATA</b>		Center
Span Length	22.25	ft
Unbraced Length-Top	0	ft

**STEEL PROPERTIES**

W16x36 - A992-50

**Properties:**

Yield Stress:	Fy =	50	ksi
Modulus of Elasticity:	E =	29000	ksi
Depth:	d =	15.9	in
Web Thickness:	tw =	0.3	in
Flange Width:	bf =	6.99	in
Flange Thickness:	tf =	0.43	in
Distance to Web Toe of Fillet:	k =	0.83	in
Moment of Inertia About X-X Axis:	Ix =	448	in4
Section Modulus About X-X Axis:	Sx =	56.5	in3
Plastic Section Modulus About X-X Axis:	Zx =	64	in3

**Design Properties per AISC 14th Edition Steel Manual:**

Flange Buckling Ratio:	FBR =	8.13
Allowable Flange Buckling Ratio:	AFBR =	9.15
Web Buckling Ratio:	WBR =	48.26
Allowable Web Buckling Ratio:	AWBR =	90.55
Controlling Unbraced Length:	Lb =	0 ft
Limiting Unbraced Length - for lateral-torsional buckling:	Lp =	5.37 ft
Nominal Flexural Strength w/ safety factor:	Mn =	159681 ft-lb
Controlling Equation:	F2-1	
Web height to thickness ratio:	h/tw =	48.26
Limiting height to thickness ratio for eqn. G2-2:	h/tw-limit =	53.95
Cv Factor:	Cv =	1
Controlling Equation:	G2-2	
Nominal Shear Strength w/ safety factor:	Vn =	93810 lb

**Controlling Moment:**

117440 ft-lb

11.125 ft from left support

Created by combining all dead and live loads.

**Controlling Shear:**

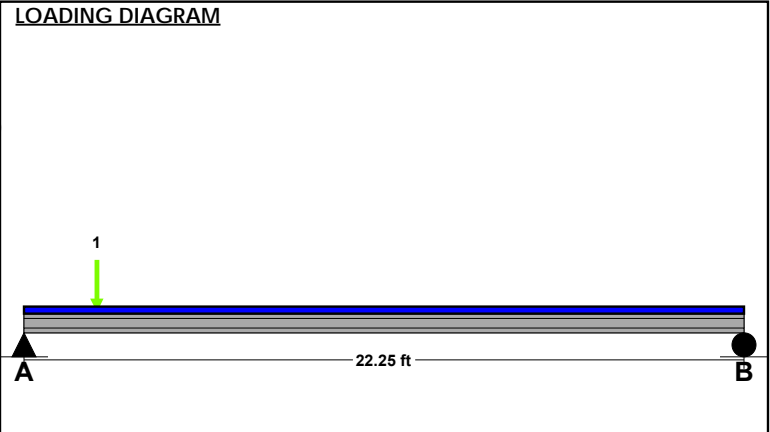
41404 lb

At support.

Created by combining all dead and live loads.

**Comparisons with required sections:**

	Req'd	Provided
Moment of Inertia (deflection):	347.03 in4	448 in4
Moment:	117440 ft-lb	159681 ft-lb
Shear:	41404 lb	93810 lb



<b>FLOOR LOADING</b>			
		Side 1	Side 2
Floor Live Load	FLL =	103 psf	40 psf
Floor Dead Load	FDL =	40 psf	40 psf
Floor Tributary Width	FTW =	6 ft	5 ft
Wall Load	WALL =	0 plf	

<b>BEAM LOADING</b>			
Beam Total Live Load:	wL =	818	plf
Beam Total Dead Load:	wD =	440	plf
Beam Self Weight:	BSW =	36	plf
Total Maximum Load:	wT =	1294	plf

<b>POINT LOADS - CENTER SPAN</b>			
Load Number	One		
Live Load	24674	lb	
Dead Load	5373	lb	
Location	2.25	ft	

Project: 14031 (Larkspur Residence - Think)

Location: bf06

Uniformly Loaded Floor Beam

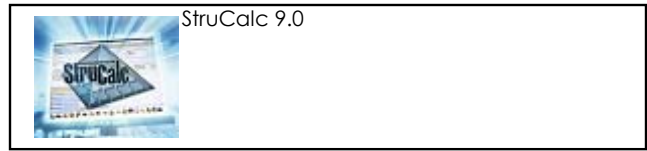
[2015 International Building Code(2012 NDS)]

( 5 ) 1.75 IN x 11.875 IN x 22.0 FT

1.9E Microllam - iLevel Trus Joist

**Section Inadequate By: 5.8%**

Controlling Factor: Deflection / Depth Required 12.1 In.



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**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS** Center

Live Load 0.55 IN L/484

Dead Load 0.62 in

Total Load 1.16 IN L/227

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

**REACTIONS**

Live Load 2640 lb 2640 lb

Dead Load 2997 lb 2997 lb

Total Load 5637 lb 5637 lb

Bearing Length 0.86 in 0.86 in

**BEAM DATA** Center

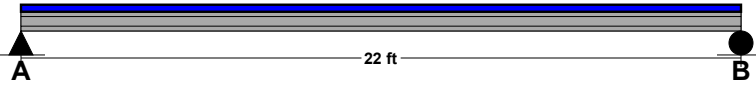
Span Length 22 ft

Unbraced Length-Top 0 ft

Floor Duration Factor 1.00

Notch Depth 0.00

**LOADING DIAGRAM**



**MATERIAL PROPERTIES**

1.9E Microllam - iLevel Trus Joist

	Base Values	Adjusted
Bending Stress:	Fb = 2600 psi Cd=1.00 CF=1.00	Fb' = 2604 psi
Shear Stress:	Fv = 285 psi Cd=1.00	Fv' = 285 psi
Modulus of Elasticity:	E = 1900 ksi	E' = 1900 ksi
Comp. ⊥ to Grain:	Fc ⊥ = 750 psi	Fc ⊥' = 750 psi

**Controlling Moment:** 31004 ft-lb

11.0 ft from left support

Created by combining all dead and live loads.

**Controlling Shear:** -5637 lb

At support.

Created by combining all dead and live loads.

**FLOOR LOADING**

		Side 1	Side 2
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	40 psf	40 psf
Floor Tributary Width	FTW =	1 ft	5 ft
Wall Load	WALL =	0 plf	

**BEAM LOADING**

Beam Total Live Load:	wL =	240 plf
Beam Total Dead Load:	wD =	240 plf
Beam Self Weight:	BSW =	32 plf
Total Maximum Load:	wT =	512 plf

**Comparisons with required sections:**

	Req'd	Provided
Section Modulus:	142.89 in3	205.65 in3
Area (Shear):	29.67 in2	103.91 in2
Moment of Inertia (deflection):	1292.19 in4	1221.03 in4
Moment:	31004 ft-lb	44621 ft-lb
Shear:	-5637 lb	19742 lb

Project: 14031 (Larkspur Residence - Think)

Location: bf07

Uniformly Loaded Floor Beam

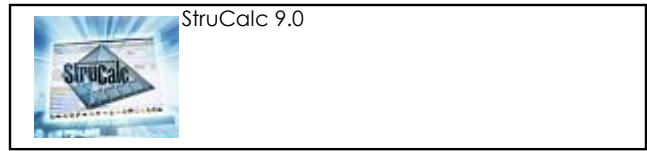
[2015 International Building Code(2012 NDS)

( 4 ) 1.75 IN x 22.0 IN x 22.0 FT

1.9E Microllam - iLevel Trus Joist

**Section Inadequate By: 1.6%**

Controlling Factor: Moment / Depth Required 20.16 In.



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**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS** Center

Live Load 0.40 IN L/663

Dead Load 0.54 in

Total Load 0.94 IN L/280

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

**REACTIONS**

Live Load 7370 lb 7370 lb

Dead Load 10051 lb 10051 lb

Total Load 17421 lb 17421 lb

Bearing Length 3.32 in 3.32 in

**BEAM DATA**

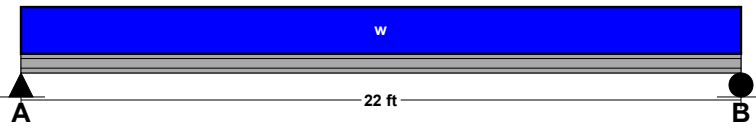
Span Length 22 ft

Unbraced Length-Top 0 ft

Floor Duration Factor 1.00

Notch Depth 0.00

**LOADING DIAGRAM**



**MATERIAL PROPERTIES**

1.9E Microllam - iLevel Trus Joist

	Base Values	Adjusted
Bending Stress:	Fb = 2600 psi Cd=1.00 CF=0.93	Fb' = 2425 psi
Shear Stress:	Fv = 285 psi Cd=1.00	Fv' = 285 psi
Modulus of Elasticity:	E = 1900 ksi	E' = 1900 ksi
Comp. ⊥ to Grain:	Fc ⊥ = 750 psi	Fc ⊥' = 750 psi

**Controlling Moment:** 95817 ft-lb

11.0 ft from left support

Created by combining all dead and live loads.

**Controlling Shear:** 17421 lb

At support.

Created by combining all dead and live loads.

**Comparisons with required sections:**

	Req'd	Provided
Section Modulus:	474.06 in3	466.67 in3
Area (Shear):	91.69 in2	140 in2
Moment of Inertia (deflection):	3993.41 in4	4666.67 in4
Moment:	95817 ft-lb	94323 ft-lb
Shear:	17421 lb	26600 lb

**FLOOR LOADING**

	Side 1	Side 2
Floor Live Load	FLL = 40 psf	40 psf
Floor Dead Load	FDL = 40 psf	40 psf
Floor Tributary Width	FTW = 5.3 ft	11.5 ft
Wall Load	WALL = 200 plf	

**BEAM LOADING**

Beam Total Live Load:	wL = 670 plf
Beam Total Dead Load:	wD = 870 plf
Beam Self Weight:	BSW = 44 plf
Total Maximum Load:	wT = 1584 plf

Project: 14031 (Larkspur Residence - Think)

Location: bf08

Uniformly Loaded Floor Beam

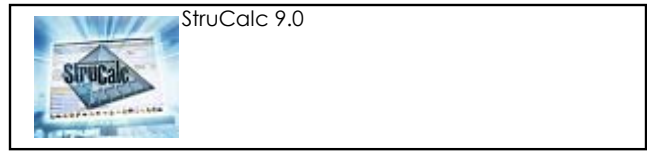
[2015 International Building Code(2012 NDS)]

( 3 ) 1.5 IN x 9.25 IN x 6.25 FT

#2 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 53.2%

Controlling Factor: Moment



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**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS** Center

Live Load 0.02 IN L/3705

Dead Load 0.04 in

Total Load 0.06 IN L/1349

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

**REACTIONS**

Live Load 875 lb 875 lb

Dead Load 1528 lb 1528 lb

Total Load 2403 lb 2403 lb

Bearing Length 0.85 in 0.85 in

**BEAM DATA**

Span Length 6.25 ft

Unbraced Length-Top 0 ft

Floor Duration Factor 1.00

Notch Depth 0.00

**MATERIAL PROPERTIES**

#2 - Douglas-Fir-Larch (North)

	Base Values	Adjusted
Bending Stress:	Fb = 850 psi <i>Cd=1.00 CF=1.10 Cr=1.15</i>	Fb' = 1075 psi
Shear Stress:	Fv = 180 psi <i>Cd=1.00</i>	Fv' = 180 psi
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Comp. $\perp$ to Grain:	Fc $\perp$ = 625 psi	Fc $\perp$ ' = 625 psi

**Controlling Moment:** 3754 ft-lb

3.125 ft from left support

Created by combining all dead and live loads.

**Controlling Shear:** 2403 lb

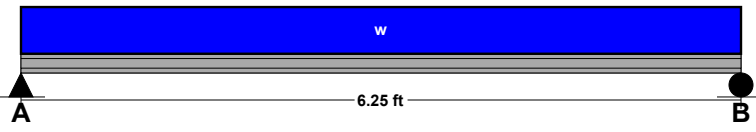
At support.

Created by combining all dead and live loads.

**Comparisons with required sections:**

	Req'd	Provided
Section Modulus:	41.9 in3	64.17 in3
Area (Shear):	20.02 in2	41.63 in2
Moment of Inertia (deflection):	52.78 in4	296.79 in4
Moment:	3754 ft-lb	5750 ft-lb
Shear:	2403 lb	4995 lb

**LOADING DIAGRAM**



**FLOOR LOADING**

	Side 1	Side 2
Floor Live Load	FLL = 40 psf	0 psf
Floor Dead Load	FDL = 40 psf	0 psf
Floor Tributary Width	FTW = 7 ft	0 ft
Wall Load	WALL = 200 plf	

**BEAM LOADING**

Beam Total Live Load:	wL = 280 plf
Beam Total Dead Load:	wD = 480 plf
Beam Self Weight:	BSW = 9 plf
Total Maximum Load:	wT = 769 plf

Project: 14031 (Larkspur Residence - Think)

Location: bf09

Uniformly Loaded Floor Beam

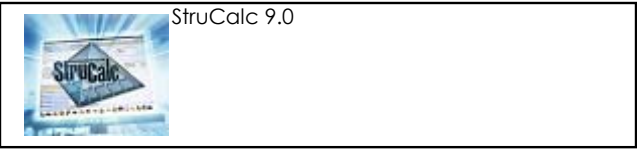
[2015 International Building Code(2012 NDS)

( 2 ) 1.5 IN x 5.5 IN x 4.0 FT

#2 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 42.3%

Controlling Factor: Moment



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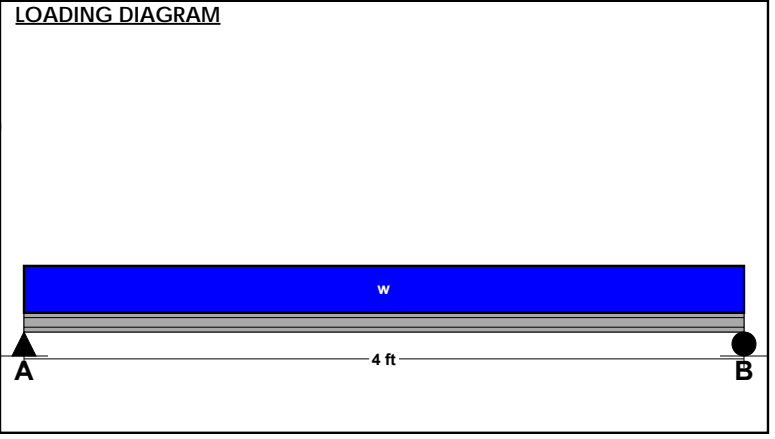
<b>DEFLECTIONS</b>		Center
Live Load	0.02	IN L/2693
Dead Load	0.02	in
Total Load	0.04	IN L/1133
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

<b>REACTIONS</b>		
	A	B
Live Load	412 lb	412 lb
Dead Load	567 lb	567 lb
Total Load	979 lb	979 lb
Bearing Length	0.52 in	0.52 in

<b>BEAM DATA</b>		Center
Span Length	4	ft
Unbraced Length-Top	0	ft
Floor Duration Factor	1.00	
Notch Depth	0.00	

<b>MATERIAL PROPERTIES</b>			
#2 - Douglas-Fir-Larch (North)			
	Base Values	Adjusted	
Bending Stress:	Fb = 850 psi <i>Cd=1.00 CF=1.30</i>	Fb' = 1105 psi	
Shear Stress:	Fv = 180 psi <i>Cd=1.00</i>	Fv' = 180 psi	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi	
Comp. $\perp$ to Grain:	Fc $\perp$ = 625 psi	Fc $\perp$ ' = 625 psi	
<b>Controlling Moment:</b>	979 ft-lb		
2.0 ft from left support Created by combining all dead and live loads.			
<b>Controlling Shear:</b>	979 lb		
At support. Created by combining all dead and live loads.			

<b>Comparisons with required sections:</b>		
	Req'd	Provided
Section Modulus:	10.63 in <sup>3</sup>	15.13 in <sup>3</sup>
Area (Shear):	8.16 in <sup>2</sup>	16.5 in <sup>2</sup>
Moment of Inertia (deflection):	8.81 in <sup>4</sup>	41.59 in <sup>4</sup>
Moment:	979 ft-lb	1393 ft-lb
Shear:	979 lb	1980 lb



<b>FLOOR LOADING</b>			
		Side 1	Side 2
Floor Live Load	FLL =	103 psf	0 psf
Floor Dead Load	FDL =	40 psf	0 psf
Floor Tributary Width	FTW =	2 ft	0 ft
Wall Load	WALL =	200 plf	

<b>BEAM LOADING</b>		
Beam Total Live Load:	wL =	206 plf
Beam Total Dead Load:	wD =	280 plf
Beam Self Weight:	BSW =	4 plf
Total Maximum Load:	wT =	490 plf

Project: 14031 (Larkspur Residence - Think)

Location: bf10

Uniformly Loaded Floor Beam

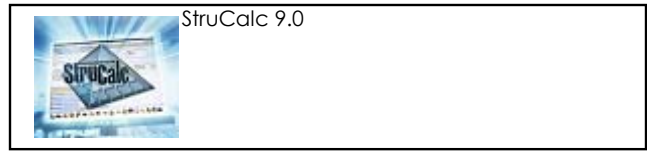
[2015 International Building Code(2012 NDS)]

5.5 IN x 7.5 IN x 6.333 FT

24F-V4 - Visually Graded Western Species - Dry Use

Section Adequate By: 8.9%

Controlling Factor: Moment



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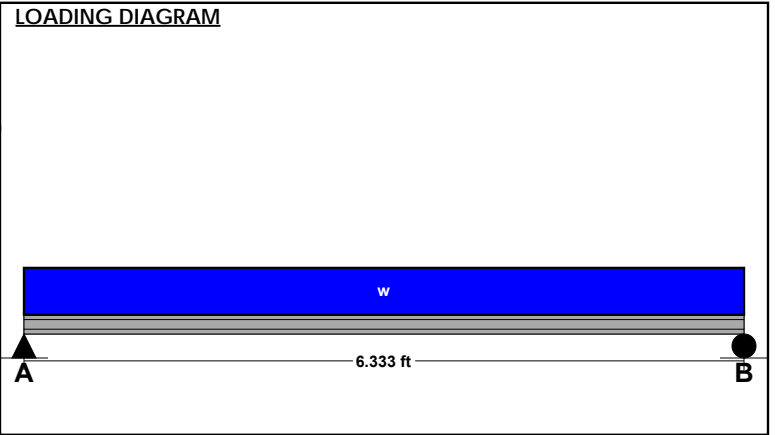
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DEFLECTIONS		Center
Live Load	0.09	IN L/870
Dead Load	0.11	in
Total Load	0.20	IN L/387
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

REACTIONS		A	B
Live Load	2660 lb	2660 lb	
Dead Load	3321 lb	3321 lb	
Total Load	5981 lb	5981 lb	
Bearing Length	1.67 in	1.67 in	

BEAM DATA		Center
Span Length	6.33	ft
Unbraced Length-Top	0	ft
Floor Duration Factor	1.00	
Camber Adj. Factor	0	
Camber Required	0	
Notch Depth	0.00	

MATERIAL PROPERTIES			
24F-V4 - Visually Graded Western Species			
	Base Values		Adjusted
Bending Stress:	Fb =	2400 psi	Controlled by:
	Fb_cmpr =	1850 psi	Fb' = 2400 psi
	Cd=1.00		
Shear Stress:	Fv =	265 psi	Fv' = 265 psi
	Cd=1.00		
Modulus of Elasticity:	E =	1800 ksi	E' = 1800 ksi
Comp. $\perp$ to Grain:	Fc - $\perp$ =	650 psi	Fc - $\perp$ = 650 psi



FLOOR LOADING			
		Side 1	Side 2
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	40 psf	40 psf
Floor Tributary Width	FTW =	13 ft	8 ft
Wall Load	WALL =	200 plf	

BEAM LOADING			
Beam Total Live Load:	wL =	840 plf	
Beam Total Dead Load:	wD =	1040 plf	
Beam Self Weight:	BSW =	9 plf	
Total Maximum Load:	wT =	1889 plf	

**Controlling Moment:** 9470 ft-lb  
 3.167 ft from left support  
 Created by combining all dead and live loads.

**Controlling Shear:** 5981 lb  
 At support.  
 Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	47.35 in <sup>3</sup>	51.56 in <sup>3</sup>
Area (Shear):	33.86 in <sup>2</sup>	41.25 in <sup>2</sup>
Moment of Inertia (deflection):	119.93 in <sup>4</sup>	193.36 in <sup>4</sup>
Moment:	9470 ft-lb	10313 ft-lb
Shear:	5981 lb	7288 lb

Project: 14031 (Larkspur Residence - Think)

Location: bf11

Uniformly Loaded Floor Beam

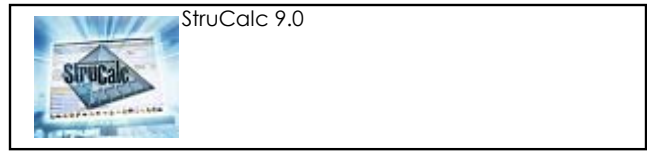
[2015 International Building Code(2012 NDS)]

5.5 IN x 11.5 IN x 10.25 FT

#2 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 26.2%

Controlling Factor: Moment



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<b>DEFLECTIONS</b>		Center
Live Load	0.04	IN L/2805
Dead Load	0.10	in
Total Load	0.15	IN L/841
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

<b>REACTIONS</b>		A	B
Live Load	820 lb	820 lb	
Dead Load	1914 lb	1914 lb	
Total Load	2734 lb	2734 lb	
Bearing Length	0.80 in	0.80 in	

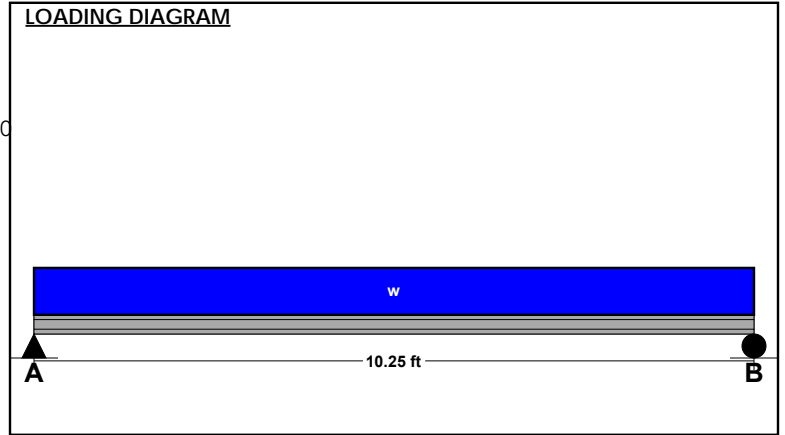
<b>BEAM DATA</b>		Center
Span Length	10.25	ft
Unbraced Length-Top	0	ft
Floor Duration Factor	1.00	
Notch Depth	0.00	

<b>MATERIAL PROPERTIES</b>			
#2 - Douglas-Fir-Larch (North)			
	Base Values	Adjusted	
Bending Stress:	Fb = 875 psi <i>Cd=1.00 CF=1.00</i>	Fb' = 875 psi	
Shear Stress:	Fv = 170 psi <i>Cd=1.00</i>	Fv' = 170 psi	
Modulus of Elasticity:	E = 1300 ksi	E' = 1300 ksi	
Comp. $\perp$ to Grain:	Fc $\perp$ = 625 psi	Fc $\perp$ ' = 625 psi	

**Controlling Moment:** 7006 ft-lb  
5.125 ft from left support  
Created by combining all dead and live loads.

**Controlling Shear:** 2734 lb  
At support.  
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	96.08 in <sup>3</sup>	121.23 in <sup>3</sup>
Area (Shear):	24.12 in <sup>2</sup>	63.25 in <sup>2</sup>
Moment of Inertia (deflection):	198.82 in <sup>4</sup>	697.07 in <sup>4</sup>
Moment:	7006 ft-lb	8840 ft-lb
Shear:	2734 lb	7168 lb



<b>FLOOR LOADING</b>			
		Side 1	Side 2
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	40 psf	40 psf
Floor Tributary Width	FTW =	2 ft	2 ft
Wall Load	WALL =	200 plf	

<b>BEAM LOADING</b>		
Beam Total Live Load:	wL =	160 plf
Beam Total Dead Load:	wD =	360 plf
Beam Self Weight:	BSW =	13 plf
Total Maximum Load:	wT =	533 plf

Project: 14031 (Larkspur Residence - Think)

Location: bf12

Uniformly Loaded Floor Beam

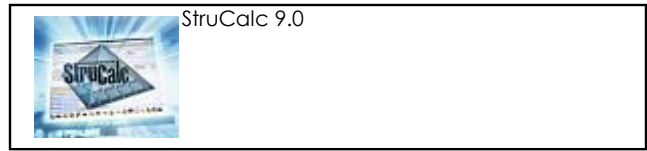
[2015 International Building Code(2012 NDS)]

( 2 ) 1.75 IN x 9.25 IN x 10.25 FT

1.9E Microllam - iLevel Trus Joist

Section Adequate By: 60.9%

Controlling Factor: Moment



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**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS** Center

Live Load 0.09 IN L/1358

Dead Load 0.21 in

Total Load 0.30 IN L/410

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

**REACTIONS**

Live Load 820 lb 820 lb

Dead Load 1897 lb 1897 lb

Total Load 2717 lb 2717 lb

Bearing Length 1.03 in 1.03 in

**BEAM DATA** Center

Span Length 10.25 ft

Unbraced Length-Top 0 ft

Floor Duration Factor 1.00

Notch Depth 0.00

**MATERIAL PROPERTIES**

1.9E Microllam - iLevel Trus Joist

	Base Values	Adjusted
Bending Stress:	Fb = 2600 psi Cd=1.00 CF=1.04	Fb' = 2694 psi
Shear Stress:	Fv = 285 psi Cd=1.00	Fv' = 285 psi
Modulus of Elasticity:	E = 1900 ksi	E' = 1900 ksi
Comp. $\perp$ to Grain:	Fc $\perp$ = 750 psi	Fc $\perp$ ' = 750 psi

**Controlling Moment:** 6962 ft-lb

5.125 ft from left support

Created by combining all dead and live loads.

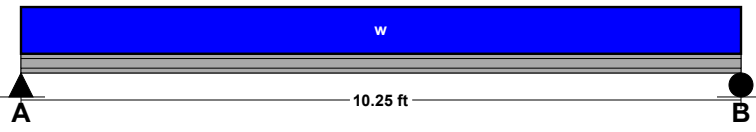
**Controlling Shear:** 2717 lb

At support.

Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	31.01 in3	49.91 in3
Area (Shear):	14.3 in2	32.38 in2
Moment of Inertia (deflection):	135.19 in4	230.84 in4
Moment:	6962 ft-lb	11204 ft-lb
Shear:	2717 lb	6151 lb

**LOADING DIAGRAM**



**FLOOR LOADING**

	Side 1	Side 2
Floor Live Load	FLL = 40 psf	40 psf
Floor Dead Load	FDL = 40 psf	40 psf
Floor Tributary Width	FTW = 2 ft	2 ft
Wall Load	WALL = 200 plf	

**BEAM LOADING**

Beam Total Live Load:	wL = 160 plf
Beam Total Dead Load:	wD = 360 plf
Beam Self Weight:	BSW = 10 plf
Total Maximum Load:	wT = 530 plf



Project: 14031 (Larkspur Residence - Think)

Location: bf13

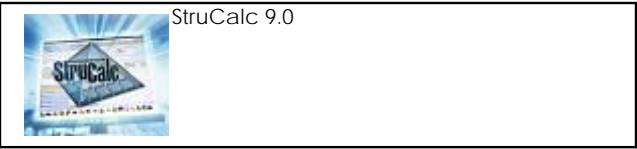
Uniformly Loaded Floor Beam

[2015 International Building Code(AISC 14th Ed ASD)

A992-50 W16x26 x 6.5 FT

Section Adequate By: 44.9%

Controlling Factor: Moment



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DEFLECTIONS		Center
Live Load	0.04	IN L/2003
Dead Load	0.01	in
Total Load	0.05	IN L/1448
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

REACTIONS	A	B
Live Load	15459 lb	20726 lb
Dead Load	6530 lb	8282 lb
Total Load	21989 lb	29008 lb
Bearing Length	2.08 in	5.46 in

BEAM DATA	Center
Span Length	6.5 ft
Unbraced Length-Top	0 ft

**STEEL PROPERTIES**

W16x26 - A992-50

**Properties:**

Yield Stress:	Fy =	50 ksi
Modulus of Elasticity:	E =	29000 ksi
Depth:	d =	15.7 in
Web Thickness:	tw =	0.25 in
Flange Width:	bf =	5.5 in
Flange Thickness:	tf =	0.35 in
Distance to Web Toe of Fillet:	k =	0.75 in
Moment of Inertia About X-X Axis:	Ix =	301 in4
Section Modulus About X-X Axis:	Sx =	38.4 in3
Plastic Section Modulus About X-X Axis:	Zx =	44.2 in3

**Design Properties per AISC 14th Edition Steel Manual:**

Flange Buckling Ratio:	FBR =	7.97
Allowable Flange Buckling Ratio:	AFBR =	9.15
Web Buckling Ratio:	WBR =	56.82
Allowable Web Buckling Ratio:	AWBR =	90.55
Controlling Unbraced Length:	Lb =	0 ft
Limiting Unbraced Length - for lateral-torsional buckling:	Lp =	3.96 ft
Nominal Flexural Strength w/ safety factor:	Mn =	110279 ft-lb
Controlling Equation:	F2-1	
Web height to thickness ratio:	h/tw =	56.82
Limiting height to thickness ratio for eqn. G2-2:	h/tw-limit =	53.95
Cv Factor:	Cv =	1
Controlling Equation:	G2-3	
Nominal Shear Strength w/ safety factor:	Vn =	70509 lb

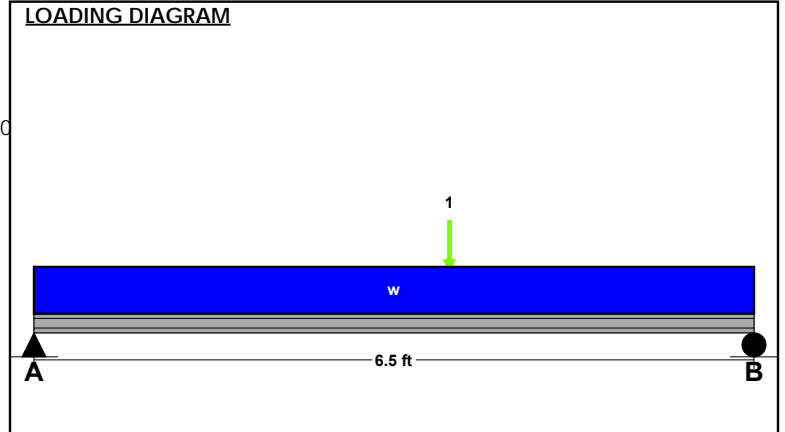
**Controlling Moment:** 76115 ft-lb

3.25 ft from left support  
Created by combining all dead and live loads.

**Controlling Shear:** -29008 lb

At support.  
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Moment of Inertia (deflection):	54.1 in4	301 in4
Moment:	76115 ft-lb	110279 ft-lb
Shear:	-29008 lb	70509 lb



**FLOOR LOADING**

	Side 1	Side 2
Floor Live Load	FLL = 40 psf	40 psf
Floor Dead Load	FDL = 40 psf	40 psf
Floor Tributary Width	FTW = 2 ft	5.5 ft
Wall Load	WALL = 200 plf	

**BEAM LOADING**

Beam Total Live Load:	wL = 300 plf
Beam Total Dead Load:	wD = 500 plf
Beam Self Weight:	BSW = 26 plf
Total Maximum Load:	wT = 826 plf

**POINT LOADS - CENTER SPAN**

Load Number	One
Live Load	34235 lb
Dead Load	11393 lb
Location	3.75 ft

Project: 14031 (Larkspur Residence - Think)

Location: bf14

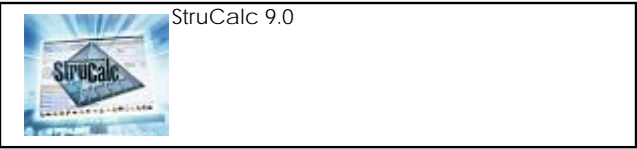
Uniformly Loaded Floor Beam

[2015 International Building Code(AISC 14th Ed ASD)

A992-50 W16x26 x 4.25 FT

Section Adequate By: 130.7%

Controlling Factor: Shear



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<b>DEFLECTIONS</b>		Center
Live Load	0.00	IN L/MAX
Dead Load	0.00	in
Total Load	0.00	IN L/MAX
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

<b>REACTIONS</b>		A	B
Live Load	20671	lb	3225
Dead Load	9887	lb	3372
Total Load	30558	lb	6597
Bearing Length	6.20	in	0.75

<b>BEAM DATA</b>		Center
Span Length	4.25	ft
Unbraced Length-Top	0	ft

**STEEL PROPERTIES**

W16x26 - A992-50

**Properties:**

Yield Stress:	Fy =	50	ksi
Modulus of Elasticity:	E =	29000	ksi
Depth:	d =	15.7	in
Web Thickness:	tw =	0.25	in
Flange Width:	bf =	5.5	in
Flange Thickness:	tf =	0.35	in
Distance to Web Toe of Fillet:	k =	0.75	in
Moment of Inertia About X-X Axis:	Ix =	301	in4
Section Modulus About X-X Axis:	Sx =	38.4	in3
Plastic Section Modulus About X-X Axis:	Zx =	44.2	in3

**Design Properties per AISC 14th Edition Steel Manual:**

Flange Buckling Ratio:	FBR =	7.97
Allowable Flange Buckling Ratio:	AFBR =	9.15
Web Buckling Ratio:	WBR =	56.82
Allowable Web Buckling Ratio:	AWBR =	90.55
Controlling Unbraced Length:	Lb =	0 ft
Limiting Unbraced Length - for lateral-torsional buckling:	Lp =	3.96 ft
Nominal Flexural Strength w/ safety factor:	Mn =	110279 ft-lb
Controlling Equation:	F2-1	
Web height to thickness ratio:	h/tw =	56.82
Limiting height to thickness ratio for eqn. G2-2:	h/tw-limit =	53.95
Cv Factor:	Cv =	1
Controlling Equation:	G2-3	
Nominal Shear Strength w/ safety factor:	Vn =	70509 lb

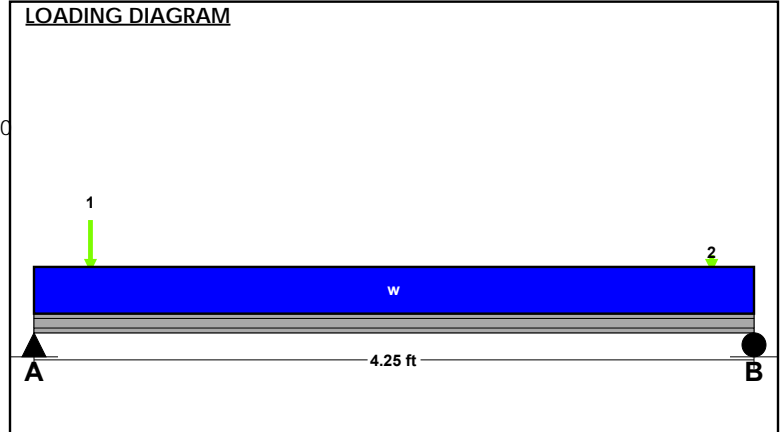
**Controlling Moment:** 10119 ft-lb

2.125 ft from left support  
Created by combining all dead and live loads.

**Controlling Shear:** 30558 lb

At support.  
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Moment of Inertia (deflection):	4.58 in4	301 in4
Moment:	10119 ft-lb	110279 ft-lb
Shear:	30558 lb	70509 lb



**FLOOR LOADING**

	Side 1	Side 2
Floor Live Load	FLL = 40 psf	0 psf
Floor Dead Load	FDL = 40 psf	0 psf
Floor Tributary Width	FTW = 9 ft	0 ft
Wall Load	WALL = 200 plf	

**BEAM LOADING**

Beam Total Live Load:	wL = 360	plf
Beam Total Dead Load:	wD = 560	plf
Beam Self Weight:	BSW = 26	plf
Total Maximum Load:	wT = 946	plf

**POINT LOADS - CENTER SPAN**

Load Number	One	Two
Live Load	21546 lb	820 lb
Dead Load	9282 lb	1487 lb
Location	0.33 ft	4 ft

Project: 14031 (Larkspur Residence - Think)

Location: bf15

Uniformly Loaded Floor Beam

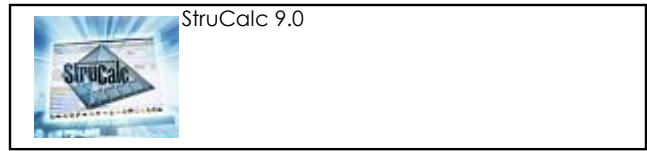
[2015 International Building Code(2012 NDS)]

( 2 ) 1.5 IN x 7.25 IN x 3.5 FT

#2 - Douglas-Fir-Larch (North) - Dry Use

Section Adequate By: 3.9%

Controlling Factor: Moment



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**CAUTIONS**

\* Laminations are to be fully connected to provide uniform transfer of loads to all members

**DEFLECTIONS** Center

Live Load 0.01 IN L/3161

Dead Load 0.02 in

Total Load 0.03 IN L/1350

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

**REACTIONS**

Live Load 1050 lb 1050 lb

Dead Load 1408 lb 1408 lb

Total Load 2458 lb 2458 lb

Bearing Length 1.31 in 1.31 in

**BEAM DATA**

Span Length 3.5 ft

Unbraced Length-Top 0 ft

Floor Duration Factor 1.00

Notch Depth 0.00

**MATERIAL PROPERTIES**

#2 - Douglas-Fir-Larch (North)

	Base Values	Adjusted
Bending Stress:	Fb = 850 psi Cd=1.00 CF=1.20	Fb' = 1020 psi
Shear Stress:	Fv = 180 psi Cd=1.00	Fv' = 180 psi
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Comp. $\perp$ to Grain:	Fc $\perp$ = 625 psi	Fc $\perp$ ' = 625 psi

**Controlling Moment:** 2151 ft-lb

1.75 ft from left support

Created by combining all dead and live loads.

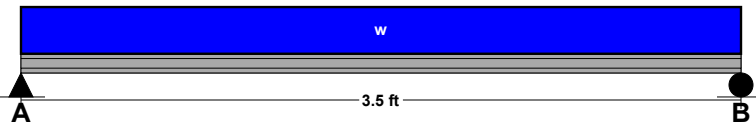
**Controlling Shear:** -2458 lb

At support.

Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	25.3 in <sup>3</sup>	26.28 in <sup>3</sup>
Area (Shear):	20.48 in <sup>2</sup>	21.75 in <sup>2</sup>
Moment of Inertia (deflection):	16.94 in <sup>4</sup>	95.27 in <sup>4</sup>
Moment:	2151 ft-lb	2234 ft-lb
Shear:	-2458 lb	2610 lb

**LOADING DIAGRAM**



**FLOOR LOADING**

	Side 1	Side 2
Floor Live Load	FLL = 40 psf	0 psf
Floor Dead Load	FDL = 40 psf	0 psf
Floor Tributary Width	FTW = 15 ft	0 ft
Wall Load	WALL = 200 plf	

**BEAM LOADING**

Beam Total Live Load:	wL = 600 plf
Beam Total Dead Load:	wD = 800 plf
Beam Self Weight:	BSW = 5 plf
Total Maximum Load:	wT = 1405 plf

Project: 14031 (Larkspur Residence - Think)

Location: bf16

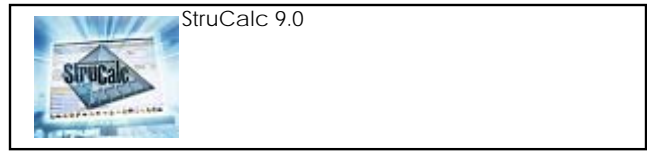
Uniformly Loaded Floor Beam

[2015 International Building Code(AISC 14th Ed ASD)]

A992-50 W16x26 x 13.0 FT

Section Adequate By: 262.2%

Controlling Factor: Moment



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<b>DEFLECTIONS</b>		Center
Live Load	0.06	IN L/2565
Dead Load	0.05	in
Total Load	0.11	IN L/1428
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240		

<b>REACTIONS</b>		A	B
Live Load	6143 lb	6143 lb	
Dead Load	4630 lb	4630 lb	
Total Load	10773 lb	10773 lb	
Bearing Length	0.75 in	0.75 in	

<b>BEAM DATA</b>		Center
Span Length	13	ft
Unbraced Length-Top	0	ft

**STEEL PROPERTIES**

W16x26 - A992-50

**Properties:**

Yield Stress:	Fy =	50	ksi
Modulus of Elasticity:	E =	29000	ksi
Depth:	d =	15.7	in
Web Thickness:	tw =	0.25	in
Flange Width:	bf =	5.5	in
Flange Thickness:	tf =	0.35	in
Distance to Web Toe of Fillet:	k =	0.75	in
Moment of Inertia About X-X Axis:	Ix =	301	in4
Section Modulus About X-X Axis:	Sx =	38.4	in3
Plastic Section Modulus About X-X Axis:	Zx =	44.2	in3

**Design Properties per AISC 14th Edition Steel Manual:**

Flange Buckling Ratio:	FBR =	7.97
Allowable Flange Buckling Ratio:	AFBR =	9.15
Web Buckling Ratio:	WBR =	56.82
Allowable Web Buckling Ratio:	AWBR =	90.55
Controlling Unbraced Length:	Lb =	0 ft
Limiting Unbraced Length - for lateral-torsional buckling:	Lp =	3.96 ft
Nominal Flexural Strength w/ safety factor:	Mn =	110279 ft-lb
Controlling Equation:	F2-1	
Web height to thickness ratio:	h/tw =	56.82
Limiting height to thickness ratio for eqn. G2-2:	h/tw-limit =	53.95
Cv Factor:	Cv =	1
Controlling Equation:	G2-3	
Nominal Shear Strength w/ safety factor:	Vn =	70509 lb

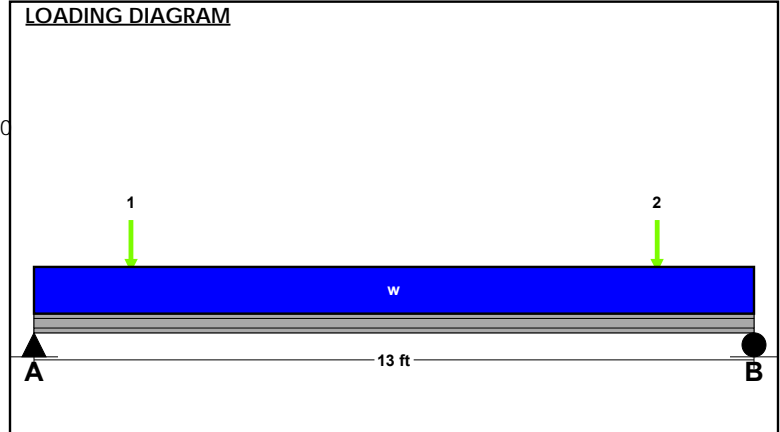
**Controlling Moment:** 30450 ft-lb

6.5 ft from left support  
Created by combining all dead and live loads.

**Controlling Shear:** 10773 lb

At support.  
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Moment of Inertia (deflection):	50.6 in4	301 in4
Moment:	30450 ft-lb	110279 ft-lb
Shear:	10773 lb	70509 lb



**FLOOR LOADING**

	Side 1	Side 2
Floor Live Load	FLL = 103 psf	40 psf
Floor Dead Load	FDL = 40 psf	40 psf
Floor Tributary Width	FTW = 4.5 ft	4 ft
Wall Load	WALL = 200 plf	

**BEAM LOADING**

Beam Total Live Load:	wL = 624 plf
Beam Total Dead Load:	wD = 540 plf
Beam Self Weight:	BSW = 26 plf
Total Maximum Load:	wT = 1190 plf

**POINT LOADS - CENTER SPAN**

Load Number	One	Two
Live Load	2090 lb	2090 lb
Dead Load	951 lb	951 lb
Location	1.75 ft	11.25 ft