

# MYERS ENGINEERING

## BEAM CALCULATIONS



Mark Myers  
2025.06.26  
14:20:07  
-07'00'

MUST BEAR ORIGINAL BLUE INK SIGNATURE OR  
DIGITAL PDF SIGNATURE FOR PERMIT SUBMITTAL.

**Project: Addendum to RKK Spec House  
4115 78<sup>th</sup> Avenue SE  
Mercer Island, WA**

June 26, 2025

2021 INTERNATIONAL BUILDING CODE  
100 MPH WIND, EXPOSURE C,  $K_{zt} = 1.61$   
RISK CATEGORY II - SOIL SITE CLASS D  
SEISMIC DESIGN CATEGORY D (IBC)

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**Multiple Simple Beam**

Project File: 4115 78th AVE SE.ec6

LIC#: KW-06015659, Build:20.25.06.16

MYERS ENGINEERING

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**Description :**

**Wood Beam Design :** 10. Rear Rim beam at Bed-3

Calculations per NDS 2018, IBC 2018, CBC 2019

BEAM Size : **3.5x14, TimberStrand LSL, Fully Braced**

Using Allowable Stress Design with IBC 2021 Load Combinations, Major Axis Bending

Wood Species : iLevel Truss Joist

Wood Grade : TimberStrand LSL 1.55E

Fb - Tension	2,325.0 psi	Fc - Prll	2,050.0 psi	Fv	310.0 psi	Ebend- xx	1,550.0 ksi	Density	45.010 pcf
Fb - Compr	2,325.0 psi	Fc - Perp	800.0 psi	Ft	1,070.0 psi	Eminbend - xx	787.82 ksi		

Applied Loads

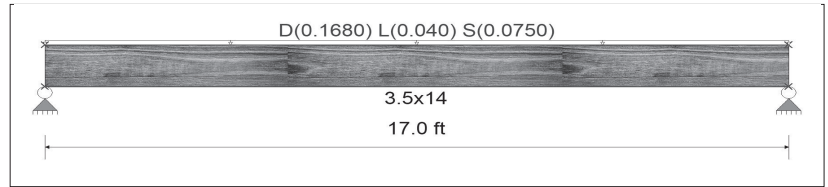
Unif Load: D = 0.1680, L = 0.040, S = 0.0750 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.366 : 1**  
 fb : Actual : 964.00 psi at 8.500 ft in Span # 1  
 Fb : Allowable : 2,636.10 psi  
 Load Comb : +D+0.750L+0.750S

Max fv/FvRatio = **0.161 : 1**  
 fv : Actual : 57.34 psi at 15.867 ft in Span # 1  
 Fv : Allowable : 356.50 psi  
 Load Comb : +D+0.750L+0.750S

Max Reactions (k)	<u>D</u>	<u>Lr</u>	<u>L</u>	<u>S</u>	<u>W</u>	<u>E</u>	<u>H</u>
Left Support	1.43		0.34	0.64			
Right Support	1.43		0.34	0.64			



Max Deflections

Transient Downward	0.114 in	Total Downward	0.387 in
Ratio	1785	Ratio	526
LC: S Only		LC: +D+0.750L+0.750S	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

**Wood Beam Design :** 11. Side beam at Bed-3

Calculations per NDS 2018, IBC 2018, CBC 2019

BEAM Size : **3.5x14, TimberStrand LSL, Fully Braced**

Using Allowable Stress Design with IBC 2021 Load Combinations, Major Axis Bending

Wood Species : iLevel Truss Joist

Wood Grade : TimberStrand LSL 1.55E

Fb - Tension	2325 psi	Fc - Prll	2050 psi	Fv	310 psi	Ebend- xx	1550 ksi	Density	45.01 pcf
Fb - Compr	2325 psi	Fc - Perp	800 psi	Ft	1070 psi	Eminbend - xx	787.815 ksi		

Applied Loads

Unif Load: D = 0.3860, L = 0.350, S = 0.2440 k/ft, 0.0 ft to 9.0 ft, Trib= 1.0 ft

1Point: D = 1.740, S = 2.560 k @ 0.50 ft

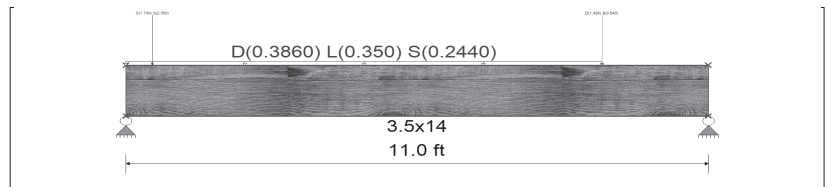
2Point: D = 1.430, S = 0.640 k @ 9.0 ft

Design Summary

Max fb/Fb Ratio = **0.580 : 1**  
 fb : Actual : 1,529.26 psi at 5.537 ft in Span # 1  
 Fb : Allowable : 2,636.10 psi  
 Load Comb : +D+0.750L+0.750S

Max fv/FvRatio = **0.411 : 1**  
 fv : Actual : 146.65 psi at 9.020 ft in Span # 1  
 Fv : Allowable : 356.50 psi  
 Load Comb : +D+0.750L+0.750S

Max Reactions (k)	<u>D</u>	<u>Lr</u>	<u>L</u>	<u>S</u>	<u>W</u>	<u>E</u>	<u>H</u>
Left Support	3.97		1.86	3.86			
Right Support	2.67		1.29	1.54			



Max Deflections

Transient Downward	0.087 in	Total Downward	0.263 in
Ratio	1524	Ratio	502
LC: S Only		LC: +D+0.750L+0.750S	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

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Project Title: 4115 78th AVE SE  
 Engineer: Mark Myers, PE  
 Project ID:  
 Project Descr: SFR w/ Basement ADU

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**Multiple Simple Beam**

Project File: 4115 78th AVE SE.ec6

LIC#: KW-06015659, Build:20.25.06.16

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**Wood Beam Design :** 12. Beam at rear Patio behind Bed-3

Calculations per NDS 2018, IBC 2018, CBC 2019

BEAM Size : **5.5x10.5, GLB, Fully Braced**

Using Allowable Stress Design with IBC 2021 Load Combinations, Major Axis Bending

Wood Species : DF/DF

Wood Grade : 24F-V4

Fb - Tension	2,400.0 psi	Fc - Prll	1,650.0 psi	Fv	265.0 psi	Ebend- xx	1,800.0 ksi	Density	31.210 pcf
Fb - Compr	1,850.0 psi	Fc - Perp	650.0 psi	Ft	1,100.0 psi	Eminbend - xx	950.0 ksi		

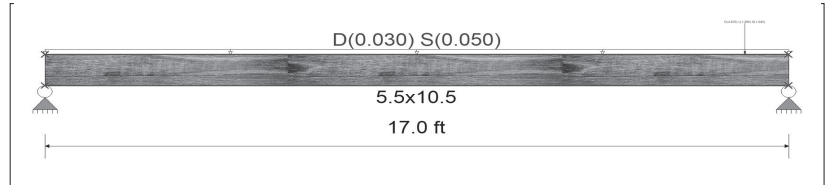
Applied Loads

Unif Load: D = 0.030, S = 0.050 k/ft, Trib= 1.0 ft  
 1Point: D = 2.670, L = 1.290, S = 1.540 k @ 16.0 ft

Design Summary

Max fb/Fb Ratio = **0.233 : 1**  
 fb : Actual : 643.96 psi at 12.693 ft in Span # 1  
 Fb : Allowable : 2,760.00 psi  
 Load Comb : +D+0.750L+0.750S

Max fv/FvRatio = **0.428 : 1**  
 fv : Actual : 130.57 psi at 16.150 ft in Span # 1  
 Fv : Allowable : 304.75 psi  
 Load Comb : +D+0.750L+0.750S



Max Reactions (k)	D	Lr	L	S	W	E	H
Left Support	0.41		0.08	0.52			
Right Support	2.77		1.21	1.87			

**Max Deflections**

Transient Downward	0.150 in	Total Downward	0.297 in
Ratio	1363	Ratio	686
LC: S Only		LC: +D+S	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

**Wood Beam Design :** 13. Beam at rear Patio

Calculations per NDS 2018, IBC 2018, CBC 2019

BEAM Size : **5.5x12, GLB, Fully Braced**

Using Allowable Stress Design with IBC 2021 Load Combinations, Major Axis Bending

Wood Species : DF/DF

Wood Grade : 24F-V4

Fb - Tension	2,400.0 psi	Fc - Prll	1,650.0 psi	Fv	265.0 psi	Ebend- xx	1,800.0 ksi	Density	31.210 pcf
Fb - Compr	1,850.0 psi	Fc - Perp	650.0 psi	Ft	1,100.0 psi	Eminbend - xx	950.0 ksi		

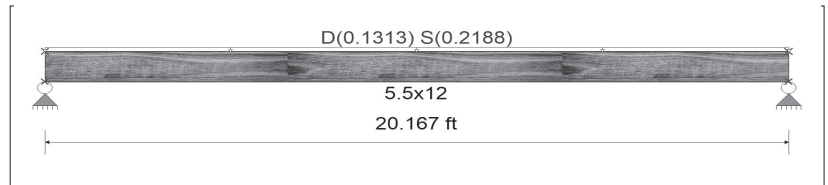
Applied Loads

Unif Load: D = 0.1313, S = 0.2188 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.588 : 1**  
 fb : Actual : 1,618.05 psi at 10.084 ft in Span # 1  
 Fb : Allowable : 2,751.69 psi  
 Load Comb : +D+S

Max fv/FvRatio = **0.239 : 1**  
 fv : Actual : 72.74 psi at 0.000 ft in Span # 1  
 Fv : Allowable : 304.75 psi  
 Load Comb : +D+S



Max Reactions (k)	D	Lr	L	S	W	E	H
Left Support	1.32			2.21			
Right Support	1.32			2.21			

**Max Deflections**

Transient Downward	0.574 in	Total Downward	0.919 in
Ratio	421	Ratio	263
LC: S Only		LC: +D+S	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	