



Title Block Line 1
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 Title Block Line 6

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Printed: 16/08/2022 1:13PM

Wood Beam

Lic. #: KW-06001844

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 HD ENGINEERING DESIGN

DESCRIPTION: 2x10 BETWEEN GARAGES

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2018

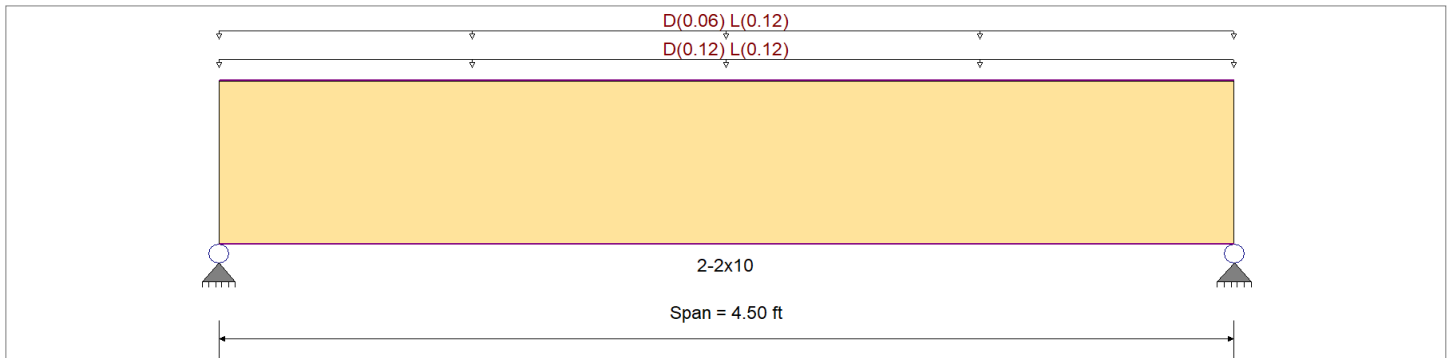
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination IBC 2018

Wood Species : Douglas Fir-Larch
 Wood Grade : No.2

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

Fb + 900 psi E : Modulus of Elasticity
 Fb - 900 psi Ebend- xx 1600 ksi
 Fc - Prll 1350 psi Eminbend - xx 580 ksi
 Fc - Perp 625 psi
 Fv 180 psi
 Ft 575 psi Density 31.21 pcf



Applied Loads

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

Uniform Load : D = 0.010, L = 0.010 ksf, Tributary Width = 12.0 ft, (CEILING)

Uniform Load : D = 0.010, L = 0.020 ksf, Tributary Width = 6.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.301	1	Maximum Shear Stress Ratio	=	0.188	1
Section used for this span		2-2x10		Section used for this span		2-2x10	
fb: Actual	=	298.20	psi	fv: Actual	=	33.93	psi
Fb: Allowable	=	990.00	psi	Fv: Allowable	=	180.00	psi
Load Combination		+D+L		Load Combination		+D+L	
Location of maximum on span	=	2.250	ft	Location of maximum on span	=	3.745	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.007	in	Ratio =		7675	>=360
Max Upward Transient Deflection		0.000	in	Ratio =		0	<360
Max Downward Total Deflection		0.012	in	Ratio =		4385	>=180
Max Upward Total Deflection		0.000	in	Ratio =		0	<180

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values		
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv
D Only														0.00	0.00	0.00
Length = 4.50 ft	1	0.143	0.090	0.90	1.100	1.00	1.00	1.00	1.00	1.00	0.46	127.80	891.00	0.27	14.54	162.00
+D+L					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.50 ft	1	0.301	0.188	1.00	1.100	1.00	1.00	1.00	1.00	1.00	1.06	298.20	990.00	0.63	33.93	180.00
+D+0.750L					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.50 ft	1	0.207	0.129	1.25	1.100	1.00	1.00	1.00	1.00	1.00	0.91	255.60	1237.50	0.54	29.08	225.00
+0.60D					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.50 ft	1	0.048	0.030	1.60	1.100	1.00	1.00	1.00	1.00	1.00	0.27	76.68	1584.00	0.16	8.72	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0123	2.266		0.0000	0.000

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Engineer:
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Project Descr:

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Wood Beam

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DESCRIPTION: 2x10 BETWEEN GARAGES

Vertical Reactions		Support notation : Far left is #1		Values in KIPS
Load Combination	Support 1	Support 2		
Overall MAXimum	0.945	0.945		
Overall MINimum	0.540	0.540		
D Only	0.405	0.405		
+D+L	0.945	0.945		
+D+0.750L	0.810	0.810		
+0.60D	0.243	0.243		
L Only	0.540	0.540		

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Wood Beam

Lic. #: KW-06001844

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DESCRIPTION: LVL UNDER GABLE WALL

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2018

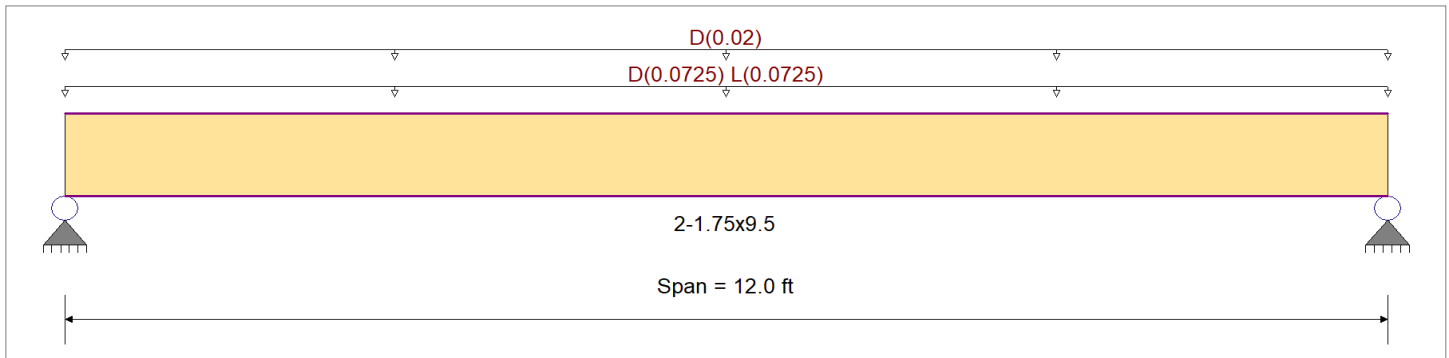
Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

Wood Species : Louisiana Pacific
Wood Grade : SolidStart LVL 2650Fb-1.9E

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

Fb + 2,650.0 psi
Fb - 2,650.0 psi
Fc - Prll 2,350.0 psi
Fc - Perp 750.0 psi
Fv 285.0 psi
Ft 1,600.0 psi
E : Modulus of Elasticity
Ebend- xx 1,900.0 ksi
Eminbend - xx 980.0 ksi
Density 28.720 pcf



Applied Loads

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

Uniform Load : D = 0.010, L = 0.010 ksf, Tributary Width = 7.250 ft, (CEILING)

Uniform Load : D = 0.020, Tributary Width = 1.0 ft, (GABLE WALL)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.255	1	Maximum Shear Stress Ratio	=	0.136	1
Section used for this span		2-1.75x9.5		Section used for this span		2-1.75x9.5	
fb: Actual	=	676.98 psi		fv: Actual	=	38.79 psi	
Fb: Allowable	=	2,650.00 psi		Fv: Allowable	=	285.00 psi	
Load Combination		+D+L		Load Combination		+D+L	
Location of maximum on span	=	6.000 ft		Location of maximum on span	=	0.000 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.072 in	Ratio = 2010	>=360			
Max Upward Transient Deflection		0.000 in	Ratio = 0	<360			
Max Downward Total Deflection		0.163 in	Ratio = 883	>=180			
Max Upward Total Deflection		0.000 in	Ratio = 0	<180			

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values		
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv
D Only														0.00	0.00	0.00
Length = 12.0 ft	1	0.159	0.085	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.67	379.52	2385.00	0.48	21.75	256.50
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.255	0.136	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.97	676.98	2650.00	0.86	38.79	285.00
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.182	0.097	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.64	602.61	3312.50	0.77	34.53	356.25
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.054	0.029	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	227.71	4240.00	0.29	13.05	456.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1630	6.044		0.0000	0.000

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Wood Beam

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DESCRIPTION: LVL UNDER GABLE WALL

Vertical Reactions		Support notation : Far left is #1		Values in KIPS
Load Combination	Support 1	Support 2		
Overall MAXimum	0.990	0.990		
Overall MINimum	0.435	0.435		
D Only	0.555	0.555		
+D+L	0.990	0.990		
+D+0.750L	0.881	0.881		
+0.60D	0.333	0.333		
L Only	0.435	0.435		

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DESCRIPTION: LVL AT MASTER SUITE WORST CASE

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2018

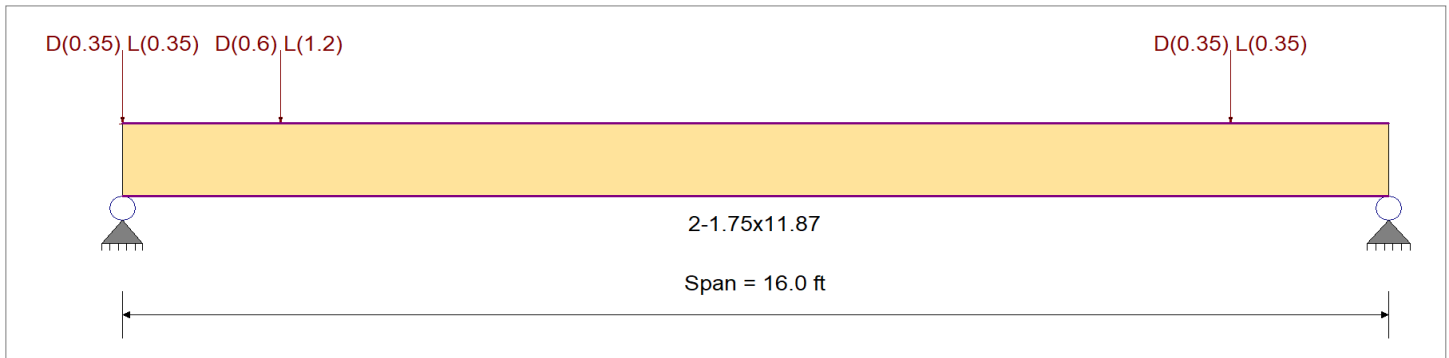
Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

Wood Species : Louisiana Pacific
Wood Grade : SolidStart LVL 2650Fb-1.9E

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

Fb + 2650 psi E : Modulus of Elasticity
Fb - 2650 psi Ebend- xx 1900 ksi
Fc - Prll 2350 psi Eminbend - xx 980 ksi
Fc - Perp 750 psi
Fv 285 psi
Ft 1600 psi Density 28.72 pcf



Applied Loads

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

Point Load : D = 0.350, L = 0.350 k @ 0.0 ft
Point Load : D = 0.350, L = 0.350 k @ 14.0 ft
Point Load : D = 0.60, L = 1.20 k @ 2.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.183	1	Maximum Shear Stress Ratio	=	0.211	1
Section used for this span		2-1.75x11.87		Section used for this span		2-1.75x11.87	
fb: Actual	=	484.17	psi	fv: Actual	=	60.00	psi
Fb: Allowable	=	2,650.00	psi	Fv: Allowable	=	285.00	psi
Load Combination		+D+L		Load Combination		+D+L	
Location of maximum on span	=	2.044	ft	Location of maximum on span	=	0.000	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection				3" STAND AT END BEARING,			
Max Downward Transient Deflection		0.092	in	Ratio =	2091	>=360	
Max Upward Transient Deflection		0.000	in	Ratio =	0	<360	
Max Downward Total Deflection		0.148	in	Ratio =	1300	>=180	
Max Upward Total Deflection		0.000	in	Ratio =	0	<180	
				Fv: Allowable = 72 psi,			
				fv: Actual = 60 psi			

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Moment Values										Shear Values		
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
D Only	Length = 16.0 ft	1	0.069	0.080	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.14	165.74	2385.00	0.00	0.00	0.00
+D+L	Length = 16.0 ft	1	0.183	0.211	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.32	484.17	2650.00	1.66	60.00	285.00
+D+0.750L	Length = 16.0 ft	1	0.122	0.141	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.77	404.57	3312.50	1.39	50.13	356.25
+0.60D	Length = 16.0 ft	1	0.023	0.027	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.68	99.44	4240.00	0.34	12.32	456.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1476	7.474		0.0000	0.000

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DESCRIPTION: LVL AT MASTER SUITE WORST CASE

Vertical Reactions		Support notation : Far left is #1		Values in KIPS
Load Combination	Support 1	Support 2		
Overall MAXimum	2.363	0.838		
Overall MINimum	1.444	0.456		
D Only	0.919	0.381		
+D+L	2.363	0.838		
+D+0.750L	2.002	0.723		
+0.60D	0.551	0.229		
L Only	1.444	0.456		