

Wood Beam

Lic. #:

James Forbes, PE

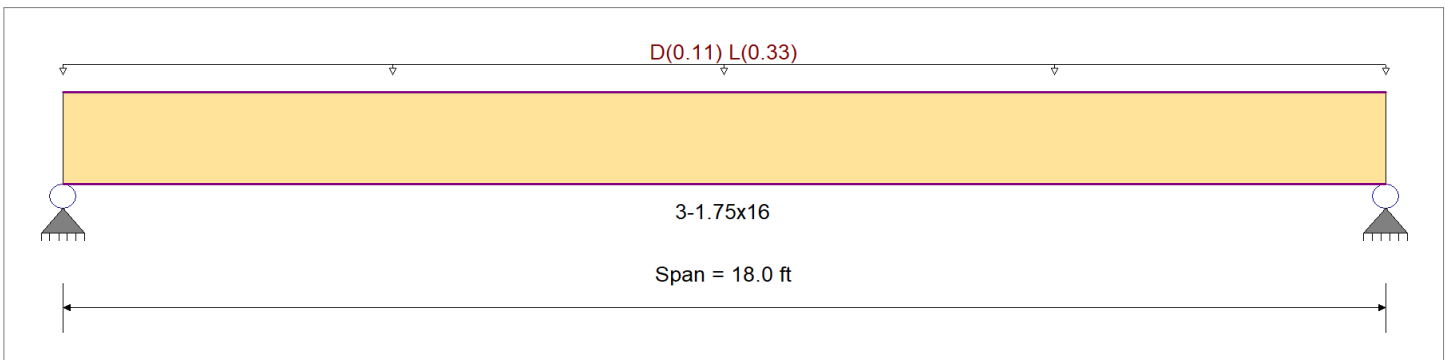
DESCRIPTION: 18' opening w/ LVL header, separates entry to dining

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10
 Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,600.0 psi	E : Modulus of Elasticity
Load Combination ASCE 7-16	Fb -	2,600.0 psi	Ebend- xx 2,000.0 ksi
Wood Species : iLevel Truss Joist	Fc - Prll	2,510.0 psi	Eminbend - xx 1,016.54 ksi
Wood Grade : MicroLam LVL 2.0 E	Fc - Perp	750.0 psi	
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	Fv	285.0 psi	
	Ft	1,555.0 psi	Density 42.010pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations

Uniform Load : D = 0.010, L = 0.030 ksf, Tributary Width = 11.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.382 1	Maximum Shear Stress Ratio =	0.212 : 1
Section used for this span =	3-1.75x16	Section used for this span =	3-1.75x16
=	954.64 psi	=	60.39 psi
=	2,500.24 psi	=	285.00 psi
Load Combination =	+D+L+H	Load Combination =	+D+L+H
Location of maximum on span =	9.000ft	Location of maximum on span =	16.686 ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.219 in	Ratio =	987 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.292 in	Ratio =	740 >=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 _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	Fv
+D+H Length = 18.0 ft	1	0.106	0.059	0.90	0.962	1.00	1.00	1.00	1.00	1.00	4.46	238.66	2250.22	0.85	15.10	256.50
+D+L+H Length = 18.0 ft	1	0.382	0.212	1.00	0.962	1.00	1.00	1.00	1.00	1.00	17.82	954.64	2500.24	3.38	60.39	285.00
+D+Lr+H Length = 18.0 ft	1	0.076	0.042	1.25	0.962	1.00	1.00	1.00	1.00	1.00	4.46	238.66	3125.30	0.85	15.10	356.25
+D+S+H Length = 18.0 ft	1	0.083	0.046	1.15	0.962	1.00	1.00	1.00	1.00	1.00	4.46	238.66	2875.28	0.85	15.10	327.75
+D+0.750Lr+0.750L+H Length = 18.0 ft	1	0.248	0.138	1.25	0.962	1.00	1.00	1.00	1.00	1.00	14.48	775.65	3125.30	2.75	49.07	356.25
+D+0.750L+0.750S+H Length = 18.0 ft	1	0.270	0.150	1.15	0.962	1.00	1.00	1.00	1.00	1.00	14.48	775.65	2875.28	2.75	49.07	327.75
+D+0.60W+H Length = 18.0 ft	1	0.060	0.033	1.60	0.962	1.00	1.00	1.00	1.00	1.00	4.46	238.66	4000.38	0.85	15.10	456.00

Wood Beam

DESCRIPTION: 18' opening w/ LVL header, separates entry to dining

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	Fv
+D+0.750Lr+0.750L+0.450W+H	Length = 18.0 ft	1	0.194	0.108	1.60	0.962	1.00	1.00	1.00	1.00	1.00	14.48	775.65	4000.38	0.00	0.00	0.00
+D+0.750L+0.750S+0.450W+H	Length = 18.0 ft	1	0.194	0.108	1.60	0.962	1.00	1.00	1.00	1.00	14.48	775.65	4000.38	0.00	0.00	0.00	
+0.60D+0.60W+0.60H	Length = 18.0 ft	1	0.036	0.020	1.60	0.962	1.00	1.00	1.00	1.00	2.67	143.20	4000.38	0.00	0.00	0.00	
+D+0.70E+0.60H	Length = 18.0 ft	1	0.060	0.033	1.60	0.962	1.00	1.00	1.00	1.00	4.46	238.66	4000.38	0.00	0.00	0.00	
+D+0.750L+0.750S+0.5250E+H	Length = 18.0 ft	1	0.194	0.108	1.60	0.962	1.00	1.00	1.00	1.00	14.48	775.65	4000.38	0.00	0.00	0.00	
+0.60D+0.70E+H	Length = 18.0 ft	1	0.036	0.020	1.60	0.962	1.00	1.00	1.00	1.00	2.67	143.20	4000.38	0.00	0.00	0.00	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.2917	9.066		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.960	3.960
Overall MINimum	2.970	2.970
+D+H	0.990	0.990
+D+L+H	3.960	3.960
+D+Lr+H	0.990	0.990
+D+S+H	0.990	0.990
+D+0.750Lr+0.750L+H	3.218	3.218
+D+0.750L+0.750S+H	3.218	3.218
+D+0.60W+H	0.990	0.990
+D+0.750Lr+0.750L+0.450W+H	3.218	3.218
+D+0.750L+0.750S+0.450W+H	3.218	3.218
+0.60D+0.60W+0.60H	0.594	0.594
+D+0.70E+0.60H	0.990	0.990
+D+0.750L+0.750S+0.5250E+H	3.218	3.218
+0.60D+0.70E+H	0.594	0.594
D Only	0.990	0.990
Lr Only		
L Only	2.970	2.970
S Only		
W Only		
E Only		
H Only		

Wood Beam

DESCRIPTION: wood header over 16' opening

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
Length = 16.0 ft	1	0.108	0.077	1.60	0.946	1.00	1.00	1.00	1.00	1.00	10.06	425.93	3936.81	2.20	34.95	456.00
+D+0.750Lr+0.750L+0.450W+H					0.946	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.163	0.113	1.60	0.946	1.00	1.00	1.00	1.00	1.00	15.12	639.95	3936.81	3.23	51.32	456.00
+D+0.750L+0.750S+0.450W+H					0.946	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.290	0.195	1.60	0.946	1.00	1.00	1.00	1.00	1.00	26.95	1,140.94	3936.81	5.60	88.97	456.00
+0.60D+0.60W+0.60H					0.946	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.065	0.046	1.60	0.946	1.00	1.00	1.00	1.00	1.00	6.04	255.56	3936.81	1.32	20.97	456.00
+D+0.70E+0.60H					0.946	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.108	0.077	1.60	0.946	1.00	1.00	1.00	1.00	1.00	10.06	425.93	3936.81	2.20	34.95	456.00
+D+0.750L+0.750S+0.5250E+H					0.946	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.290	0.195	1.60	0.946	1.00	1.00	1.00	1.00	1.00	26.95	1,140.94	3936.81	5.60	88.97	456.00
+0.60D+0.70E+H					0.946	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.065	0.046	1.60	0.946	1.00	1.00	1.00	1.00	1.00	6.04	255.56	3936.81	1.32	20.97	456.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.2469	8.642		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.069	7.031
Overall MINimum	2.063	4.538
+D+H	2.006	2.494
+D+L+H	2.006	2.494
+D+Lr+H	2.631	3.869
+D+S+H	4.069	7.031
+D+0.750Lr+0.750L+H	2.475	3.525
+D+0.750L+0.750S+H	3.553	5.897
+D+0.60W+H	2.006	2.494
+D+0.750Lr+0.750L+0.450W+H	2.475	3.525
+D+0.750L+0.750S+0.450W+H	3.553	5.897
+0.60D+0.60W+0.60H	1.204	1.496
+D+0.70E+0.60H	2.006	2.494
+D+0.750L+0.750S+0.5250E+H	3.553	5.897
+0.60D+0.70E+H	1.204	1.496
D Only	2.006	2.494
Lr Only	0.625	1.375
L Only		
S Only	2.063	4.538
W Only		
E Only		
H Only		

Wood Beam

Lic. #: [REDACTED]

James Forbes, PE

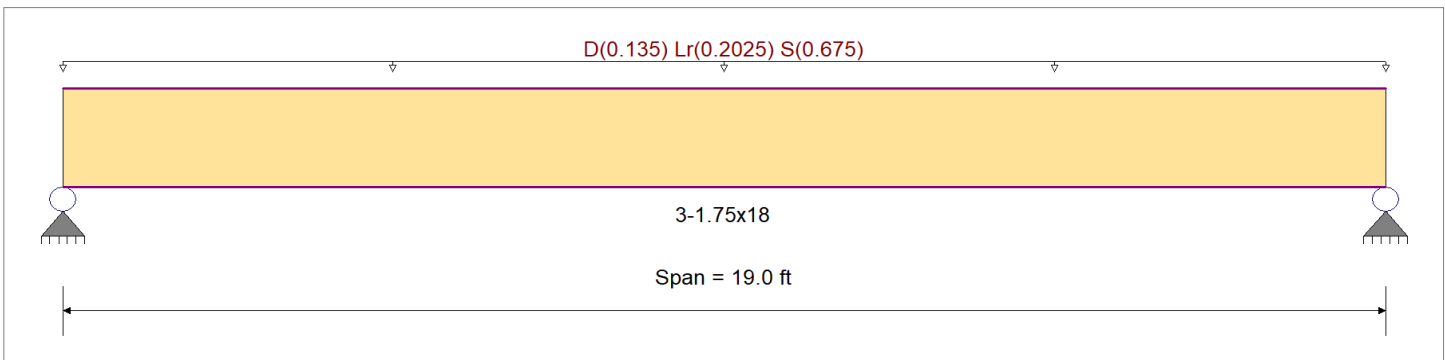
DESCRIPTION: LVL ridge beam in Den

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10
 Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,600.0 psi	E : Modulus of Elasticity
Load Combination ASCE 7-16	Fb -	2,600.0 psi	Ebend- xx
	Fc - Prll	2,510.0 psi	Eminbend - xx
Wood Species : iLevel Truss Joist	Fc - Perp	750.0 psi	
Wood Grade : MicroLam LVL 2.0 E	Fv	285.0 psi	
	Ft	1,555.0 psi	Density
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			42.010pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations

Uniform Load : D = 0.010, Lr = 0.0150, S = 0.050 ksf, Tributary Width = 13.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.547 : 1	Maximum Shear Stress Ratio =	0.316 : 1
Section used for this span =	3-1.75x18	Section used for this span =	3-1.75x18
	1,547.14 psi		103.42 psi
	2,829.59 psi		327.75 psi
Load Combination =	+D+S+H	Load Combination =	+D+S+H
Location of maximum on span =	9.500ft	Location of maximum on span =	17.544 ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.390 in	Ratio =	584 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.468 in	Ratio =	487 >=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 _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	Fv	
+D+H	Length = 19.0 ft	1	0.116	0.067	0.90	0.946	1.00	1.00	1.00	1.00	1.00	6.09	257.86	2214.46	0.00	1.09	17.24	256.50
+D+L+H	Length = 19.0 ft	1	0.105	0.060	1.00	0.946	1.00	1.00	1.00	1.00	1.00	6.09	257.86	2460.51	0.00	0.00	0.00	0.00
+D+Lr+H	Length = 19.0 ft	1	0.210	0.121	1.25	0.946	1.00	1.00	1.00	1.00	1.00	15.23	644.64	3075.64	0.00	0.00	0.00	0.00
+D+S+H	Length = 19.0 ft	1	0.547	0.316	1.15	0.946	1.00	1.00	1.00	1.00	1.00	36.55	1,547.14	2829.59	0.00	0.00	0.00	0.00
+D+0.750Lr+0.750L+H	Length = 19.0 ft	1	0.178	0.103	1.25	0.946	1.00	1.00	1.00	1.00	1.00	12.95	547.95	3075.64	0.00	0.00	0.00	0.00
+D+0.750L+0.750S+H	Length = 19.0 ft	1	0.433	0.250	1.15	0.946	1.00	1.00	1.00	1.00	1.00	28.94	1,224.82	2829.59	0.00	0.00	0.00	0.00
+D+0.60W+H	Length = 19.0 ft	1	0.065	0.038	1.60	0.946	1.00	1.00	1.00	1.00	1.00	6.09	257.86	3936.81	0.00	0.00	0.00	0.00

Project Title:
 Engineer:
 Project ID:
 Project Descr:

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Wood Beam

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James Forbes, PE

DESCRIPTION: LVL ridge beam in Den

Load Combination Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values					
		M	V								M	fb	F'b	V	fv	Fv			
+D+0.750Lr+0.750L+0.450W+H Length = 19.0 ft	1	0.139	0.080	1.60	0.946	1.00	1.00	1.00	1.00	1.00	12.95	547.95	3936.81	0.00	0.00	0.00	2.31	36.63	456.00
+D+0.750L+0.750S+0.450W+H Length = 19.0 ft	1	0.311	0.180	1.60	0.946	1.00	1.00	1.00	1.00	1.00	28.94	1,224.82	3936.81	0.00	0.00	0.00	5.16	81.87	456.00
+0.60D+0.60W+0.60H Length = 19.0 ft	1	0.039	0.023	1.60	0.946	1.00	1.00	1.00	1.00	1.00	3.66	154.71	3936.81	0.00	0.00	0.00	0.65	10.34	456.00
+D+0.70E+0.60H Length = 19.0 ft	1	0.065	0.038	1.60	0.946	1.00	1.00	1.00	1.00	1.00	6.09	257.86	3936.81	0.00	0.00	0.00	1.09	17.24	456.00
+D+0.750L+0.750S+0.5250E+H Length = 19.0 ft	1	0.311	0.180	1.60	0.946	1.00	1.00	1.00	1.00	1.00	28.94	1,224.82	3936.81	0.00	0.00	0.00	5.16	81.87	456.00
+0.60D+0.70E+H Length = 19.0 ft	1	0.039	0.023	1.60	0.946	1.00	1.00	1.00	1.00	1.00	3.66	154.71	3936.81	0.00	0.00	0.00	0.65	10.34	456.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.4682	9.569		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	7.695	7.695
Overall MINimum	6.413	6.413
+D+H	1.283	1.283
+D+L+H	1.283	1.283
+D+Lr+H	3.206	3.206
+D+S+H	7.695	7.695
+D+0.750Lr+0.750L+H	2.725	2.725
+D+0.750L+0.750S+H	6.092	6.092
+D+0.60W+H	1.283	1.283
+D+0.750Lr+0.750L+0.450W+H	2.725	2.725
+D+0.750L+0.750S+0.450W+H	6.092	6.092
+0.60D+0.60W+0.60H	0.770	0.770
+D+0.70E+0.60H	1.283	1.283
+D+0.750L+0.750S+0.5250E+H	6.092	6.092
+0.60D+0.70E+H	0.770	0.770
D Only	1.283	1.283
Lr Only	1.924	1.924
L Only		
S Only	6.413	6.413
W Only		
E Only		
H Only		

Project Title:
 Engineer:
 Project ID:
 Project Descr:

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Wood Beam

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Lic. #:

James Forbes, PE

DESCRIPTION: LVL ridge beam in vaulted living room ceiling

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	Fv
+D+0.750Lr+0.750L+0.450W+H	Length = 17.0 ft	1	0.159	0.093	1.60	0.962	1.00	1.00	1.00	1.00	1.00	11.90	637.43	4000.38	0.00	0.00	0.00
+D+0.750L+0.750S+0.450W+H	Length = 17.0 ft	1	0.356	0.208	1.60	0.962	1.00	1.00	1.00	1.00	1.00	26.60	1,424.84	4000.38	0.00	0.00	0.00
+0.60D+0.60W+0.60H	Length = 17.0 ft	1	0.045	0.026	1.60	0.962	1.00	1.00	1.00	1.00	1.00	3.36	179.98	4000.38	0.00	0.00	0.00
+D+0.70E+0.60H	Length = 17.0 ft	1	0.075	0.044	1.60	0.962	1.00	1.00	1.00	1.00	1.00	5.60	299.97	4000.38	0.00	0.00	0.00
+D+0.750L+0.750S+0.5250E+H	Length = 17.0 ft	1	0.356	0.208	1.60	0.962	1.00	1.00	1.00	1.00	1.00	26.60	1,424.84	4000.38	0.00	0.00	0.00
+0.60D+0.70E+H	Length = 17.0 ft	1	0.045	0.026	1.60	0.962	1.00	1.00	1.00	1.00	1.00	3.36	179.98	4000.38	0.00	0.00	0.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.4905	8.562		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	7.905	7.905
Overall MINimum	6.588	6.588
+D+H	1.318	1.318
+D+L+H	1.318	1.318
+D+Lr+H	3.294	3.294
+D+S+H	7.905	7.905
+D+0.750Lr+0.750L+H	2.800	2.800
+D+0.750L+0.750S+H	6.258	6.258
+D+0.60W+H	1.318	1.318
+D+0.750Lr+0.750L+0.450W+H	2.800	2.800
+D+0.750L+0.750S+0.450W+H	6.258	6.258
+0.60D+0.60W+0.60H	0.791	0.791
+D+0.70E+0.60H	1.318	1.318
+D+0.750L+0.750S+0.5250E+H	6.258	6.258
+0.60D+0.70E+H	0.791	0.791
D Only	1.318	1.318
Lr Only	1.976	1.976
L Only		
S Only	6.588	6.588
W Only		
E Only		
H Only		

Project Title:
 Engineer:
 Project ID:
 Project Descr:

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Wood Beam

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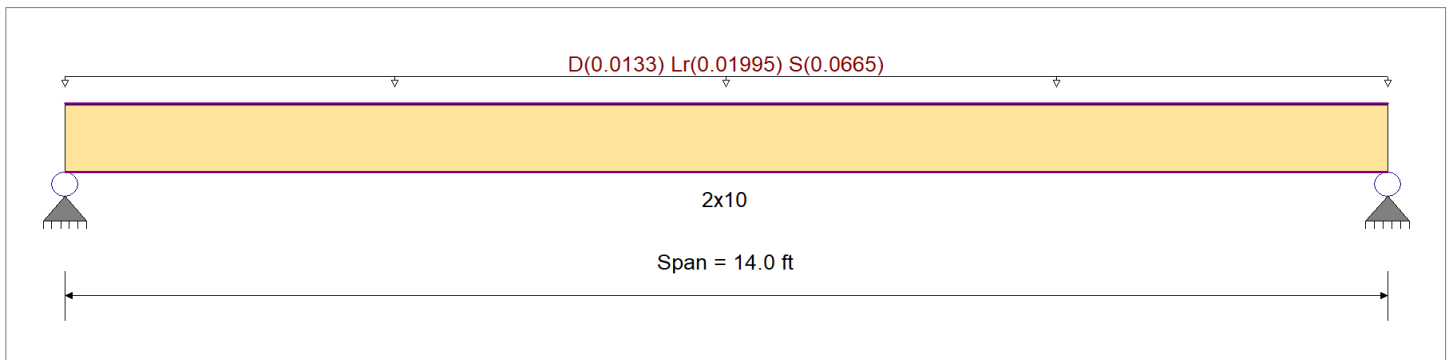
DESCRIPTION: rafter in Den

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10
 Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design	Fb +	1,000.0 psi	E : Modulus of Elasticity
Load Combination ASCE 7-16	Fb -	1,000.0 psi	Ebend- xx
	Fc - Prll	1,400.0 psi	Eminbend - xx
Wood Species : Spruce-Pine-Fir	Fc - Perp	425.0 psi	
Wood Grade : Construction	Fv	135.0 psi	Density
	Ft	500.0 psi	26.220pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			



Applied Loads

Service loads entered. Load Factors will be applied for calculations

Uniform Load : D = 0.010, Lr = 0.0150, S = 0.050 ksf, Tributary Width = 1.330 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.954 : 1	Maximum Shear Stress Ratio	=	0.346 : 1
Section used for this span		2x10	Section used for this span		2x10
	=	1,096.80 psi		=	53.78 psi
	=	1,150.00 psi		=	155.25 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	7.000ft	Location of maximum on span	=	13.234 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.450 in	Ratio =		373 >=360
Max Upward Transient Deflection		0.000 in	Ratio =		0 <360
Max Downward Total Deflection		0.539 in	Ratio =		311 >=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 _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	Fv			
+D+H	Length = 14.0 ft	1	0.203	0.074	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.33	182.80	900.00	0.00	0.00	0.00	0.08	8.96	121.50
+D+L+H	Length = 14.0 ft	1	0.183	0.066	1.00	1.000	1.00	1.00	1.00	1.00	1.00	0.33	182.80	1000.00	0.00	0.00	0.00	0.08	8.96	135.00
+D+Lr+H	Length = 14.0 ft	1	0.366	0.133	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.81	457.00	1250.00	0.00	0.00	0.00	0.21	22.41	168.75
+D+S+H	Length = 14.0 ft	1	0.954	0.346	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.96	1,096.80	1150.00	0.00	0.00	0.00	0.50	53.78	155.25
+D+0.750Lr+0.750L+H	Length = 14.0 ft	1	0.311	0.113	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.69	388.45	1250.00	0.00	0.00	0.00	0.18	19.05	168.75
+D+0.750L+0.750S+H	Length = 14.0 ft	1	0.755	0.274	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.55	868.30	1150.00	0.00	0.00	0.00	0.39	42.57	155.25
+D+0.60W+H	Length = 14.0 ft	1	0.114	0.041	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.33	182.80	1600.00	0.00	0.00	0.00	0.08	8.96	216.00

Project Title:
 Engineer:
 Project ID:
 Project Descr:

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Wood Beam

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Lic. #:

James Forbes, PE

DESCRIPTION: rafter in Den

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	Fv				
+D+0.750Lr+0.750L+0.450W+H	Length = 14.0 ft	1	0.243	0.088	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.69	388.45	1600.00	0.00	0.00	0.00	0.18	19.05	216.00
+D+0.750L+0.750S+0.450W+H	Length = 14.0 ft	1	0.543	0.197	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.55	868.30	1600.00	0.00	0.00	0.00	0.00	0.00	0.00
+0.60D+0.60W+0.60H	Length = 14.0 ft	1	0.069	0.025	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.20	109.68	1600.00	0.00	0.00	0.00	0.05	5.38	216.00
+D+0.70E+0.60H	Length = 14.0 ft	1	0.114	0.041	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.33	182.80	1600.00	0.00	0.00	0.00	0.00	0.00	0.00
+D+0.750L+0.750S+0.5250E+H	Length = 14.0 ft	1	0.543	0.197	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.55	868.30	1600.00	0.00	0.00	0.00	0.00	0.00	0.00
+0.60D+0.70E+H	Length = 14.0 ft	1	0.069	0.025	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.20	109.68	1600.00	0.00	0.00	0.00	0.05	5.38	216.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.5394	7.051		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.559	0.559
Overall MINimum	0.466	0.466
+D+H	0.093	0.093
+D+L+H	0.093	0.093
+D+Lr+H	0.233	0.233
+D+S+H	0.559	0.559
+D+0.750Lr+0.750L+H	0.198	0.198
+D+0.750L+0.750S+H	0.442	0.442
+D+0.60W+H	0.093	0.093
+D+0.750Lr+0.750L+0.450W+H	0.198	0.198
+D+0.750L+0.750S+0.450W+H	0.442	0.442
+0.60D+0.60W+0.60H	0.056	0.056
+D+0.70E+0.60H	0.093	0.093
+D+0.750L+0.750S+0.5250E+H	0.442	0.442
+0.60D+0.70E+H	0.056	0.056
D Only	0.093	0.093
Lr Only	0.140	0.140
L Only		
S Only	0.466	0.466
W Only		
E Only		
H Only		

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James Forbes, PE

DESCRIPTION: rafter in vaulted living room

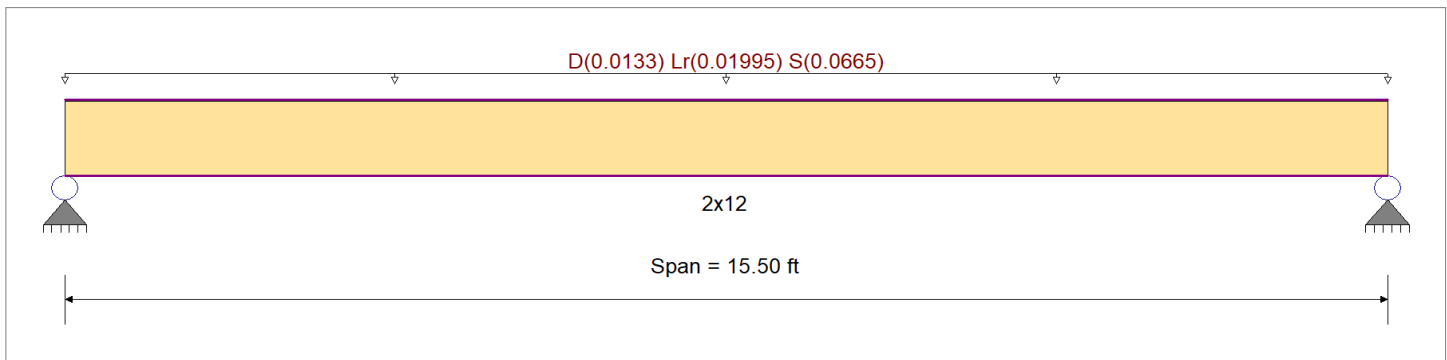
CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design	Fb +	1000 psi	E : Modulus of Elasticity	
Load Combination ASCE 7-16	Fb -	1000 psi	Ebend- xx	1300 ksi
	Fc - Prll	1400 psi	Eminbend - xx	470 ksi
Wood Species : Spruce-Pine-Fir	Fc - Perp	425 psi		
Wood Grade : Construction	Fv	135 psi		
	Ft	500 psi	Density	26.22pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations

Uniform Load : D = 0.010, Lr = 0.0150, S = 0.050 ksf, Tributary Width = 1.330 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.790 : 1	Maximum Shear Stress Ratio	=	0.313 : 1
Section used for this span		2x12	Section used for this span		2x12
	=	908.89 psi		=	48.55 psi
	=	1,150.00 psi		=	155.25 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	7.750 ft	Location of maximum on span	=	14.595 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.375 in	Ratio =		495 >=360
Max Upward Transient Deflection		0.000 in	Ratio =		0 <360
Max Downward Total Deflection		0.451 in	Ratio =		412 >=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 _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	Fv	
+D+H	Length = 15.50 ft	1	0.168	0.067	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.40	151.48	900.00	0.00	0.09	8.09	121.50
+D+L+H	Length = 15.50 ft	1	0.151	0.060	1.00	1.000	1.00	1.00	1.00	1.00	1.00	0.40	151.48	1000.00	0.00	0.09	8.09	135.00
+D+Lr+H	Length = 15.50 ft	1	0.303	0.120	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.00	378.71	1250.00	0.00	0.23	20.23	168.75
+D+S+H	Length = 15.50 ft	1	0.790	0.313	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.40	908.89	1150.00	0.00	0.55	48.55	155.25
+D+0.750Lr+0.750L+H	Length = 15.50 ft	1	0.258	0.102	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.85	321.90	1250.00	0.00	0.19	17.20	168.75
+D+0.750L+0.750S+H	Length = 15.50 ft	1	0.626	0.248	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.90	719.54	1150.00	0.00	0.43	38.44	155.25
+D+0.60W+H	Length = 15.50 ft	1	0.095	0.037	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.40	151.48	1600.00	0.00	0.09	8.09	216.00

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James Forbes, PE

DESCRIPTION: rafter in vaulted living room

Load Combination	Segment Length	Span #	Max Stress Ratios		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values					
			M	V								M	fb	F'b	V	fv	Fv			
+D+0.750Lr+0.750L+0.450W+H	Length = 15.50 ft	1	0.201	0.080	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.85	321.90	1600.00	0.00	0.00	0.00	0.19	17.20	216.00
+D+0.750L+0.750S+0.450W+H	Length = 15.50 ft	1	0.450	0.178	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.90	719.54	1600.00	0.00	0.00	0.00	0.00	0.00	0.00
+0.60D+0.60W+0.60H	Length = 15.50 ft	1	0.057	0.022	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.24	90.89	1600.00	0.00	0.00	0.00	0.05	4.86	216.00
+D+0.70E+0.60H	Length = 15.50 ft	1	0.095	0.037	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.40	151.48	1600.00	0.00	0.00	0.00	0.09	8.09	216.00
+D+0.750L+0.750S+0.5250E+H	Length = 15.50 ft	1	0.450	0.178	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.90	719.54	1600.00	0.00	0.00	0.00	0.43	38.44	216.00
+0.60D+0.70E+H	Length = 15.50 ft	1	0.057	0.022	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.24	90.89	1600.00	0.00	0.00	0.00	0.05	4.86	216.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.4505	7.807		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.618	0.618
Overall MINimum	0.515	0.515
+D+H	0.103	0.103
+D+L+H	0.103	0.103
+D+Lr+H	0.258	0.258
+D+S+H	0.618	0.618
+D+0.750Lr+0.750L+H	0.219	0.219
+D+0.750L+0.750S+H	0.490	0.490
+D+0.60W+H	0.103	0.103
+D+0.750Lr+0.750L+0.450W+H	0.219	0.219
+D+0.750L+0.750S+0.450W+H	0.490	0.490
+0.60D+0.60W+0.60H	0.062	0.062
+D+0.70E+0.60H	0.103	0.103
+D+0.750L+0.750S+0.5250E+H	0.490	0.490
+0.60D+0.70E+H	0.062	0.062
D Only	0.103	0.103
Lr Only	0.155	0.155
L Only		
S Only	0.515	0.515
W Only		
E Only		
H Only		

Steel Beam

Lic. #:

James Forbes, PE

DESCRIPTION: Lintel for stone

CODE REFERENCES

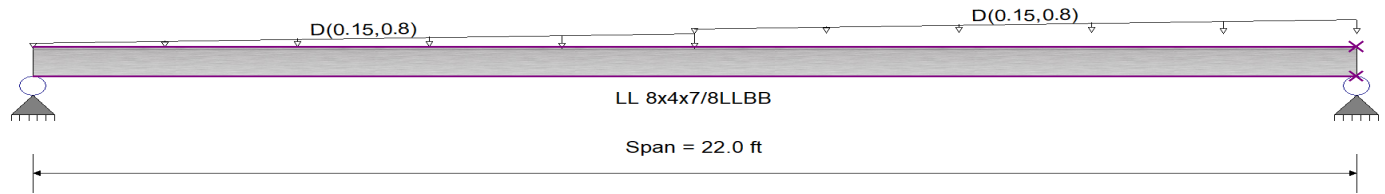
Calculations per AISC 360-10, IBC 2012, CBC 2013, ASCE 7-10
 Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Strength Design
 Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
 Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
 E: Modulus : 29,000.0 ksi

Vertical Leg Up



Applied Loads

Service loads entered. Load Factors will be applied for calculations

Beam self weight NOT internally calculated and added
 Load for Span Number 1

Varying Uniform Load : D = 0.150->0.80 k/ft, Extent = 0.0 --> 11.0 ft, Trib Width = 1.0 ft

Varying Uniform Load : D = 0.150->0.80 k/ft, Extent = 11.0 --> 22.0 ft, Trib Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.310 : 1	Maximum Shear Stress Ratio =	0.023 : 1
Section used for this span	LL 8x4x7/8LLBB	Section used for this span	LL 8x4x7/8LLBB
Ma : Applied	28.964 k-ft	Va : Applied	5.821 k
Mn / Omega : Allowable	93.563 k-ft	Vn/Omega : Allowable	251.497 k
Load Combination	+D+H	Load Combination	+D+H
Location of maximum on span	10.246 ft	Location of maximum on span	22.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.000 in	Ratio =	0 < 360
Max Upward Transient Deflection	0.000 in	Ratio =	0 < 360
Max Downward Total Deflection	0.694 in	Ratio =	381 >= 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		Summary of Moment Values						Summary of Shear Values			
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+H	Dsgn. L = 22.00 ft	1	0.310	0.023	28.96		28.96	156.25	93.56	1.00	1.00	5.82	420.00	251.50
+D+L+H	Dsgn. L = 22.00 ft	1	0.310	0.023	28.96		28.96	156.25	93.56	1.00	1.00	5.82	420.00	251.50
+D+Lr+H	Dsgn. L = 22.00 ft	1	0.310	0.023	28.96		28.96	156.25	93.56	1.00	1.00	5.82	420.00	251.50
+D+S+H	Dsgn. L = 22.00 ft	1	0.310	0.023	28.96		28.96	156.25	93.56	1.00	1.00	5.82	420.00	251.50
+D+0.750Lr+0.750L+H	Dsgn. L = 22.00 ft	1	0.310	0.023	28.96		28.96	156.25	93.56	1.00	1.00	5.82	420.00	251.50
+D+0.750L+0.750S+H	Dsgn. L = 22.00 ft	1	0.310	0.023	28.96		28.96	156.25	93.56	1.00	1.00	5.82	420.00	251.50
+D+0.60W+H	Dsgn. L = 22.00 ft	1	0.310	0.023	28.96		28.96	156.25	93.56	1.00	1.00	5.82	420.00	251.50
+D+0.750Lr+0.750L+0.450W+H	Dsgn. L = 22.00 ft	1	0.310	0.023	28.96		28.96	156.25	93.56	1.00	1.00	5.82	420.00	251.50
+D+0.750L+0.750S+0.450W+H	Dsgn. L = 22.00 ft	1	0.310	0.023	28.96		28.96	156.25	93.56	1.00	1.00	5.82	420.00	251.50
+0.60D+0.60W+0.60H	Dsgn. L = 22.00 ft	1	0.186	0.014	17.38		17.38	156.25	93.56	1.00	1.00	3.49	420.00	251.50

Project Title:
 Engineer:
 Project ID:
 Project Descr:

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Steel Beam

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James Forbes, PE

DESCRIPTION: Lintel for stone

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values			
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+0.70E+0.60H	Dsgn. L = 22.00 ft	1	0.310	0.023	28.96		28.96	156.25	93.56	1.00	1.00	5.82	420.00	251.50
+D+0.750L+0.750S+0.5250E+H	Dsgn. L = 22.00 ft	1	0.310	0.023	28.96		28.96	156.25	93.56	1.00	1.00	5.82	420.00	251.50
+0.60D+0.70E+H	Dsgn. L = 22.00 ft	1	0.186	0.014	17.38		17.38	156.25	93.56	1.00	1.00	3.49	420.00	251.50

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D Only	1	0.6938	11.000		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.629	5.821
Overall MINimum	2.778	3.493
+D+H	4.629	5.821
+D+L+H	4.629	5.821
+D+Lr+H	4.629	5.821
+D+S+H	4.629	5.821
+D+0.750Lr+0.750L+H	4.629	5.821
+D+0.750L+0.750S+H	4.629	5.821
+D+0.60W+H	4.629	5.821
+D+0.750Lr+0.750L+0.450W+H	4.629	5.821
+D+0.750L+0.750S+0.450W+H	4.629	5.821
+0.60D+0.60W+0.60H	2.778	3.493
+D+0.70E+0.60H	4.629	5.821
+D+0.750L+0.750S+0.5250E+H	4.629	5.821
+0.60D+0.70E+H	2.778	3.493
D Only	4.629	5.821
Lr Only		
L Only		
S Only		
W Only		
E Only		
H Only		