HD Engineering & Design

Solutions for all your engineering and design needs

Capital Construction
Raleigh Orig Rev GR 1.5
Lot 54 ToPR
4075 NE Timberlake Ct
Lee's Summit, MO

Our firm has been asked to make structural clarifications to the plans of the house to be built at the address listed above. During the rough in inspection process the AHJ has questioned and item. Below is our recommendations along with the corresponding city item.

The city has questioned the rafter end bearing over the Master Suite area. After performing calculations attached our firm recommends approval of the 2X8 rafters cut down to 5.5" at the inside plane of the wall. See attached calculations and photo.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted engineering practices. No warranties, either express or implied, are intended or made.

We appreciate the opportunity to be of service to you on this project. If you have any questions regarding this report, please contact us.

STATE OF MISSOURI
CHRIS SAATHOFF
NUMBER 2008001865
02/28/2022
REGISTERED PROFESSIONAL ENGINEER

STRUCTURAL REVIEW
HD ENGINEERING & DESIGN
HD: 41968 DATE: 2/28/2022

11656 W. 75th Street
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Project Title: Raleigh Orig Rev GR 1.5
Engineer:
Project ID:
Project Descr: Lot 54 ToPR

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STATE OF MISSOURI
CHRIS SAATHOFF
NUMBER
2008001865
02/28/2022
REGISTERED PROFESSIONAL ENGINEER

Wood Beam

File: 41968.ec6

Lic. # : KW-06001844 **HD ENGINEERING & DESIGN INC**

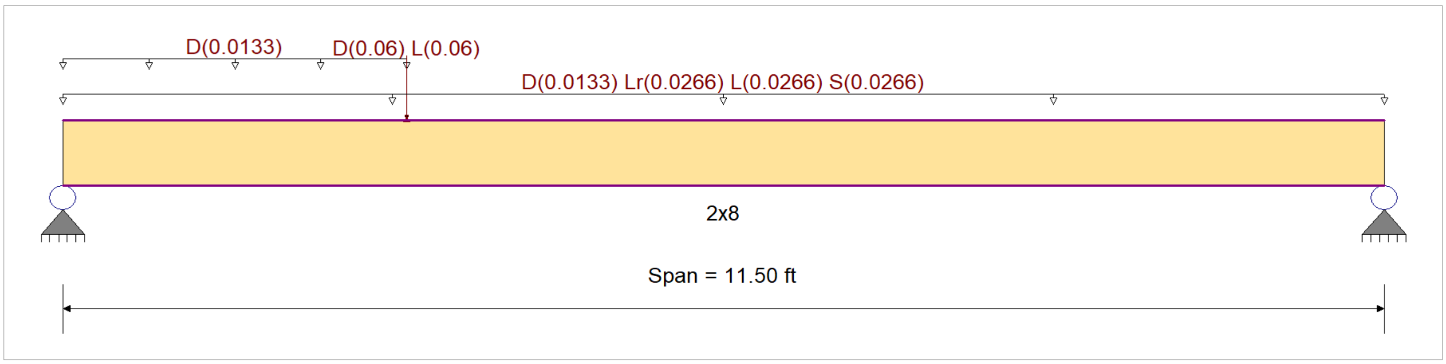
DESCRIPTION: RAFTERS OVER MASTER AREA

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	900 psi	*E : Modulus of Elasticity*	
Load Combination :	ASCE 7-16	Fb -	900 psi	Ebend- xx	1600 ksi
		Fc - Prll	1350 psi	Eminbend - xx	580 ksi
Wood Species	: Douglas Fir-Larch	Fc - Perp	625 psi		
Wood Grade	: No.2	Fv	180 psi		
		Ft	575 psi	Density	31.21 pcf
Beam Bracing	: Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase	



Applied Loads

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

Uniform Load : D = 0.010, Lr = 0.020, L = 0.020, S = 0.020 ksf, Tributary Width = 1.330 ft, (ROOF)
Uniform Load : D = 0.010 ksf, Extent = 0.0 -->> 3.0 ft, Tributary Width = 1.330 ft, (CEILING)
Point Load : D = 0.060, L = 0.060 k @ 3.0 ft, (CEILING PT LOAD)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.689** : 1	Maximum Shear Stress Ratio	=	**0.253** : 1
Section used for this span		**2x8**	Section used for this span		**2x8**
fb: Actual	=	983.39 psi	fv: Actual	=	52.29 psi
Fb: Allowable	=	1,428.30 psi	Fv: Allowable	=	207.00 psi
Load Combination		+D+0.750L+0.750S	Load Combination		+D+0.750L+0.750S
Location of maximum on span	=	5.120 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	0.169 in	Ratio =	816 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.341 in	Ratio =	404 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

$F_v = 4V/3A$
$F_v = 4*418/3*(1.5*5.5)$
$F_{v\ actual} = 77.74$ psi < 207 psi allowable

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 11.50 ft	1	0.291	0.119	0.90	1.200	1.00	1.15	1.00	1.00	1.00	0.36	325.23	1117.80	0.14	19.29	162.00
+D+L					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.50 ft	1	0.652	0.246	1.00	1.200	1.00	1.15	1.00	1.00	1.00	0.89	809.30	1242.00	0.32	44.35	180.00
+D+Lr					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.50 ft	1	0.462	0.170	1.25	1.200	1.00	1.15	1.00	1.00	1.00	0.78	716.83	1552.50	0.28	38.24	225.00
+D+S					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.50 ft	1	0.502	0.185	1.15	1.200	1.00	1.15	1.00	1.00	1.00	0.78	716.83	1428.30	0.28	38.24	207.00
+D+0.750Lr+0.750L					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.50 ft	1	0.633	0.232	1.25	1.200	1.00	1.15	1.00	1.00	1.00	1.08	983.39	1552.50	0.38	52.29	225.00
+D+0.750L+0.750S					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.50 ft	1	0.689	0.253	1.15	1.200	1.00	1.15	1.00	1.00	1.00	1.08	983.39	1428.30	0.38	52.29	207.00

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Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+0.60D					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.50 ft	1	0.098	0.040	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.21	195.14	1987.20	0.08	11.58	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.3413	5.666		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.418	0.338
Overall MINimum	0.153	0.153
D Only	0.156	0.097
+D+L	0.353	0.266
+D+Lr	0.308	0.250
+D+S	0.308	0.250
+D+0.750Lr+0.750L	0.418	0.338
+D+0.750L+0.750S	0.418	0.338
+0.60D	0.093	0.058
Lr Only	0.153	0.153
L Only	0.197	0.169
S Only	0.153	0.153