

April 3, 2023

Walker Custom Homes, LLC
Attn: Jason Walker & Robert Lindsey

Re: 2506 SW Tracker Lane, Lee's Summit, MO (Permit # PRRES2022-4900)
Lot 127, Hook Farms 2nd Plat

Vista Structural Engineering, LLC, was asked to address the following city inspection comment for the house being built at 2506 SW Tracker Lane, in Lee's Summit, MO:

- **Missing LVL above garage entry, see plans.**
 - **Vista Structural's response:** *This LVL was left over from a previous plan iteration that required an LVL at this location. This plan, however, has no ceiling, roof, or beam load on this header. Therefore, the double 9 ½" LVL can be eliminated. See page 2 of this report.*
- **Frame great room west wall to plans**
 - **Vista Structural's response:** *The great room header was framed continuously with intermediate trimmer studs. Per the attached calculations, the current framing is adequate and does not require any changes. A picture of the framing can be found on page 3 of this report and an updated partial plan view of the framing in question is on page 4. Calculations are on the pages following the partial plan view.*

Our firm appreciates the opportunity to serve you. If you have any questions or if you need anything further, please feel free to contact us.

Sincerely,

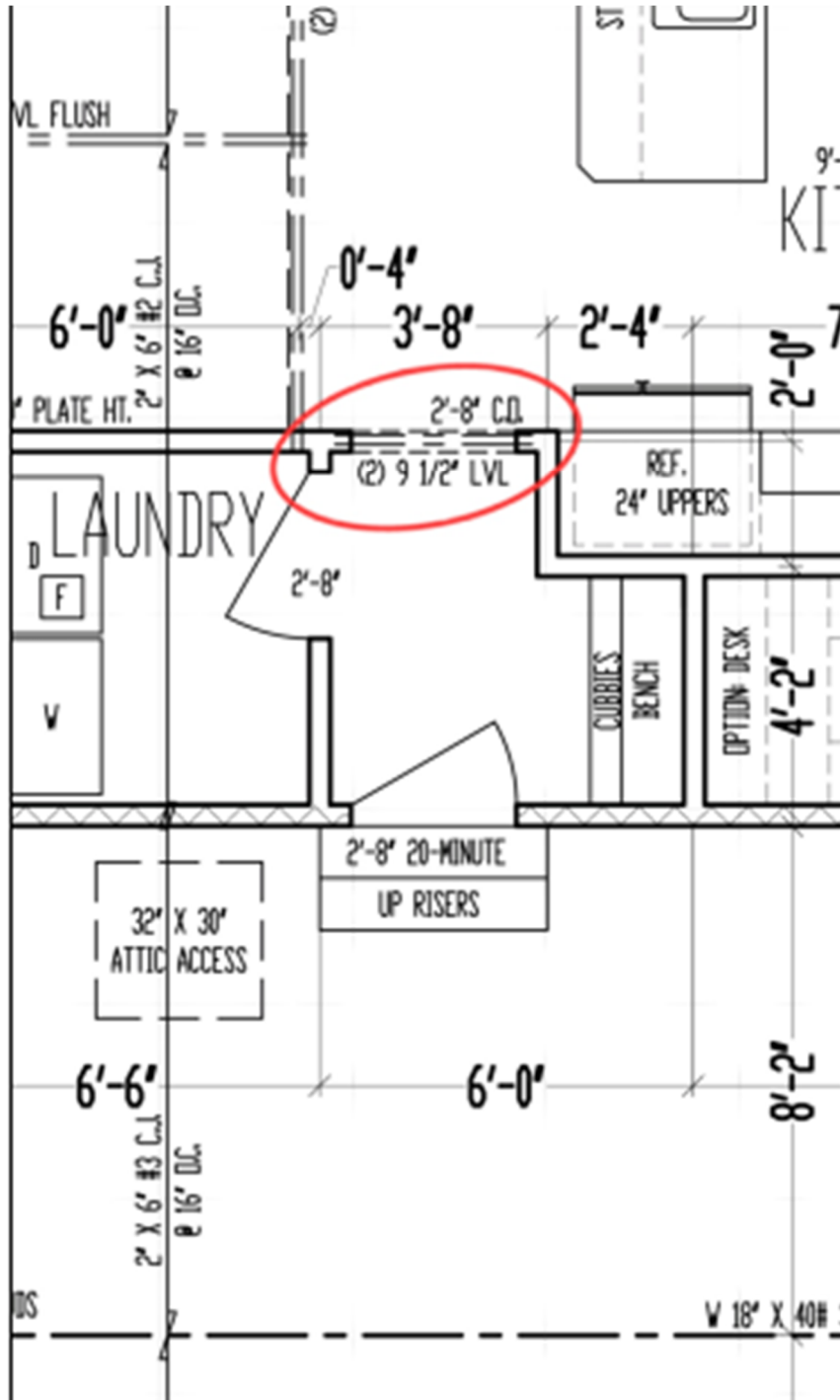
Vista Structural Engineering, LLC

Dennis Heier, P.E.



VISTA STRUCTURAL ENGINEERING, LLC

14718 NW DELIA STREET
PORTLAND, OREGON 97229



LVL above entry from garage (not required)

VISTA STRUCTURAL ENGINEERING, LLC

14718 NW DELIA STREET
PORTLAND, OREGON 97229

PHONE: 971.233.6099
VISTASTRUCTURAL.COM

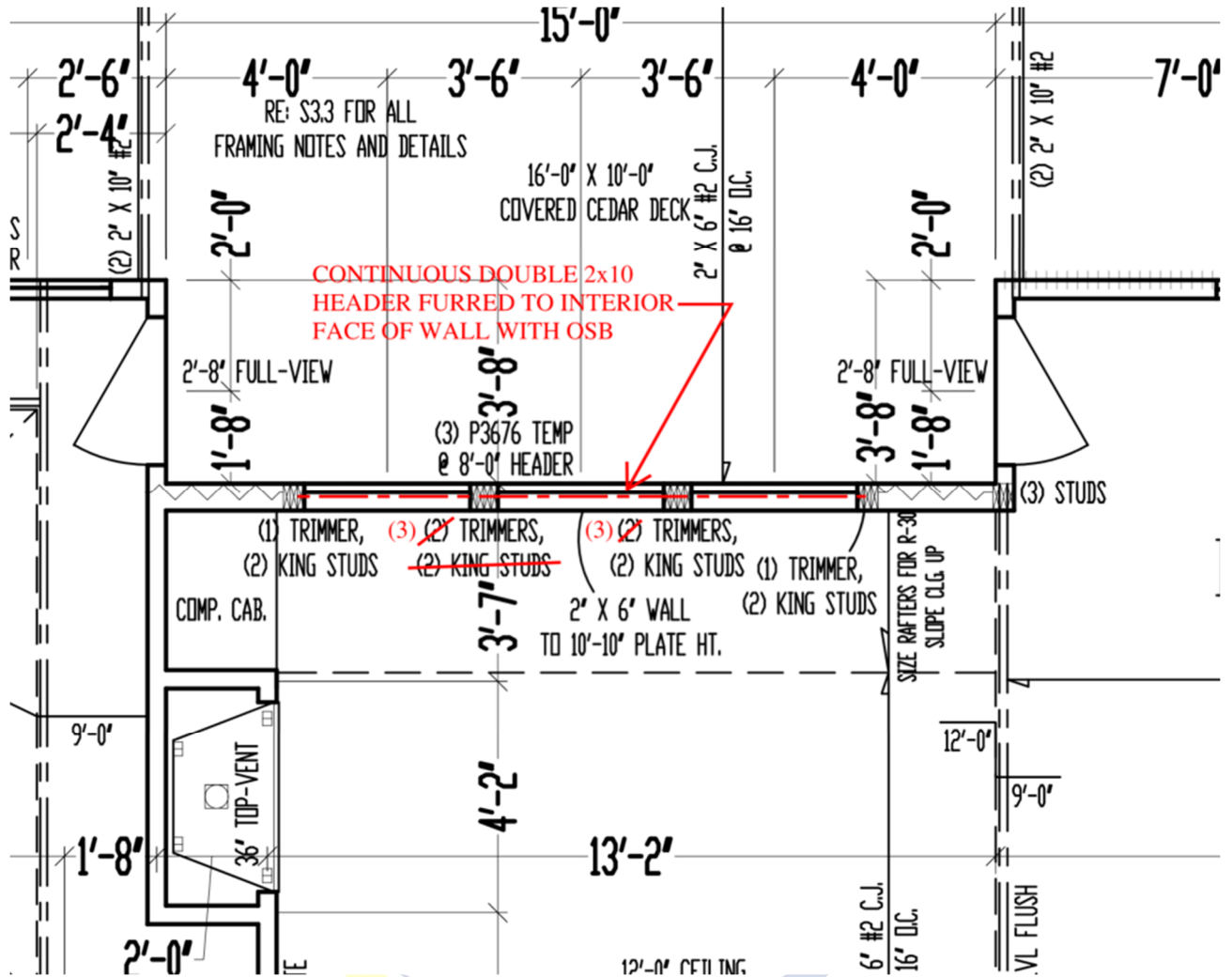


Great room exterior wall framing

VISTA STRUCTURAL ENGINEERING, LLC

14718 NW DELIA STREET
PORTLAND, OREGON 97229

PHONE: 971.233.6099
VISTASTRUCTURAL.COM



Updated partial main floor plan

VISTA STRUCTURAL ENGINEERING, LLC

Wood Column

Lic. #: KW-06010523

DESCRIPTION: King studs at ends of header above great room rear wall

Code References

Calculations per 2012 NDS, IBC 2012, CBC 2013, ASCE 7-10
 Load Combinations Used : IBC 2018

General Information

Analysis Method :	Allowable Stress Design			Wood Section Name	2-2x6	
End Fixities	Top & Bottom Pinned			Wood Grading/Manuf.	Graded Lumber	
Overall Column Height	10 ft			Wood Member Type	Sawn	
<i>(Used for non-slender calculations)</i>						
Wood Species	DouglasFir-Larch			Exact Width	3.0 in	
Wood Grade	No.2			Exact Depth	5.50 in	
Fb +	900.0 psi	Fv	180.0 psi	Area	16.50 in ²	
Fb -	900.0 psi	Ft	575.0 psi	Ix	41.594 in ⁴	
Fc - Prll	1,350.0 psi	Density	31.210 pcf	Iy	12.375 in ⁴	
Fc - Perp	625.0 psi					
E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial		Allow Stress Modification Factors	
	Basic	1,600.0	1,600.0	1,600.0 ksi	Cf or Cv for Bending	1.30
	Minimum	580.0	580.0		Cf or Cv for Compression	1.10
					Cf or Cv for Tension	1.30
					Cm : Wet Use Factor	1.0
					Ct : Temperature Factor	1.0
					Cfu : Flat Use Factor	1.0
					Kf : Built-up columns	1.0 <small>NDS 15.3.2</small>
					Use Cr : Repetitive ?	No
					Brace condition for deflection (buckling) along columns :	
					X-X (width) axis :	Unbraced Length for buckling ABOUT Y-Y Axis = 10 ft, K = 1.0
					Y-Y (depth) axis :	Unbraced Length for buckling ABOUT X-X Axis = 10 ft, K = 1.0

Applied Loads

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

Column self weight included : 35.761 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 10.0 ft, D = 0.40, S = 0.40 k

BENDING LOADS . . .

Lat. Uniform Load creating Mx-x, W = 0.0360 k/ft

Lat. Point Load at 9.250 ft creating Mx-x, W = 0.450 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.1786 : 1**

Load Combination	+D+0.60W
Governing NDS Formula	1Comp + Mxx, NDS Eq. 3.9-3
Location of max. above base	5.906 ft
At maximum location values are . . .	
Applied Axial	0.4358 k
Applied Mx	0.3807 k-ft
Applied My	0.0 k-ft
Fc : Allowable	289.917 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.5963 k	Bottom along Y-Y	0.2138 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.1783 in	at	5.235 ft	above base
for load combination : W Only				
Along X-X	0.0 in	at	0.0 ft	above base
for load combination : n/a				

Other Factors used to calculate allowable stresses . . .

	<u>Bending</u>	<u>Compression</u>	<u>Tension</u>
--	----------------	--------------------	----------------

PASS Maximum Shear Stress Ratio = **0.1129 : 1**

Load Combination	+D+0.60W
Location of max. above base	10.0 ft
Applied Design Shear	32.523 psi
Allowable Shear	288.0 psi

Load Combination Results

Load Combination	C _D	C _P	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
			Stress Ratio	Status	Location	Stress Ratio	Status	Location
D Only	0.900	0.212	0.09339	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+S	1.150	0.168	0.1768	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750S	1.150	0.168	0.1557	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.60W	1.600	0.122	0.1786	PASS	5.906 ft	0.1129	PASS	10.0 ft
+D+0.450W	1.600	0.122	0.1360	PASS	5.906 ft	0.08470	PASS	10.0 ft
+D+0.750S+0.450W	1.600	0.122	0.1557	PASS	5.906 ft	0.08470	PASS	10.0 ft
+0.60D+0.60W	1.600	0.122	0.1714	PASS	5.906 ft	0.1129	PASS	10.0 ft
+0.60D	1.600	0.122	0.05466	PASS	0.0 ft	0.0	PASS	10.0 ft

Wood Column

Lic. #: KW-06010523

DESCRIPTION: King studs at ends of header above great room rear wall

Maximum Reactions

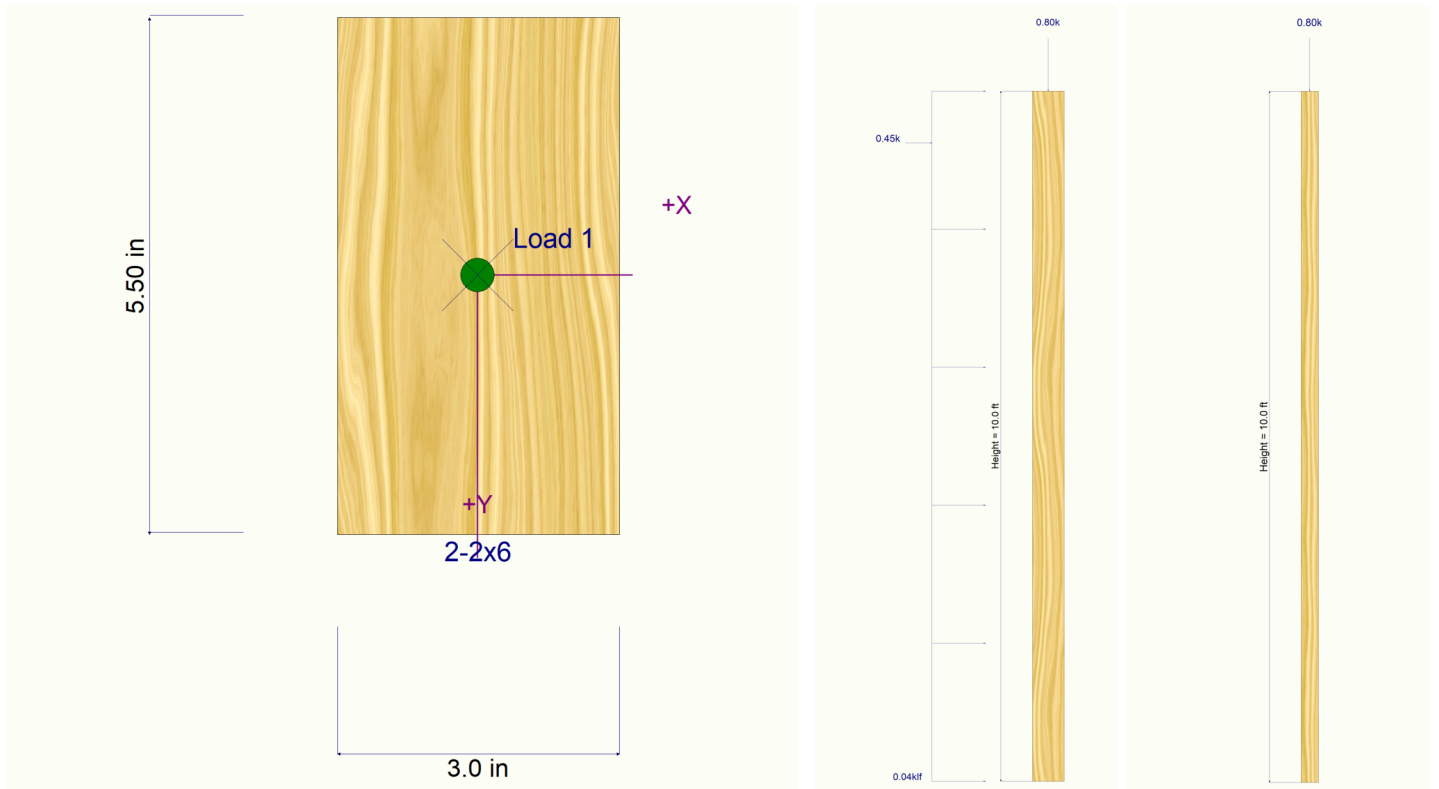
Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	My - End Moments		k-ft	Mx - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top		@ Base	@ Top
D Only						0.436					
+D+S						0.836					
+D+0.750S						0.736					
+D+0.60W				0.128	0.358	0.436					
+D+0.450W				0.096	0.268	0.436					
+D+0.750S+0.450W				0.096	0.268	0.736					
+0.60D+0.60W				0.128	0.358	0.261					
+0.60D						0.261					
S Only						0.400					
W Only				0.214	0.596						

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+D+S	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+D+0.750S	0.0000	in	0.000	ft	0.0000	in	0.000	ft
+D+0.60W	0.0000	in	0.000	ft	0.1070	in	5.235	ft
+D+0.450W	0.0000	in	0.000	ft	0.0802	in	5.235	ft
+D+0.750S+0.450W	0.0000	in	0.000	ft	0.0802	in	5.235	ft
+0.60D+0.60W	0.0000	in	0.000	ft	0.1070	in	5.235	ft
+0.60D	0.0000	in	0.000	ft	0.0000	in	0.000	ft
S Only	0.0000	in	0.000	ft	0.0000	in	0.000	ft
W Only	0.0000	in	0.000	ft	0.1783	in	5.235	ft

Sketches



Wood Beam

Lic. #: KW-06010523

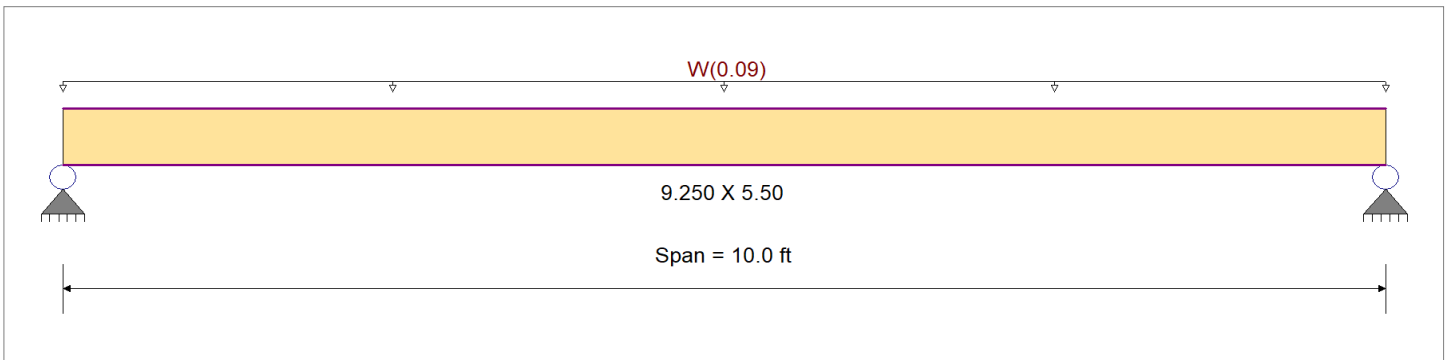
DESCRIPTION: Header above windows at great room - resistance to wind load

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	900.0 psi	E : Modulus of Elasticity
Load Combination IBC 2018	Fb -	900.0 psi	Ebend- xx
	Fc - Prll	1,350.0 psi	Eminbend - xx
Wood Species : DouglasFir-Larch	Fc - Perp	625.0 psi	
Wood Grade : No.2	Fv	180.0 psi	Density
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	Ft	575.0 psi	31.210pcf



Applied Loads

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

Uniform Load : W = 0.0180 ksf, Tributary Width = 5.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.110 : 1	Maximum Shear Stress Ratio =	0.025 : 1
Section used for this span	9.250 X 5.50	Section used for this span	9.250 X 5.50
fb: Actual =	173.69 psi	fv: Actual =	7.26 psi
Fb: Allowable =	1,584.00 psi	Fv: Allowable =	288.00 psi
Load Combination =	+0.60W	Load Combination =	+0.60W
Location of maximum on span =	5.000ft	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	0.099 in	Ratio =	1208 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.060 in	Ratio =	2014 >=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		
	Length = 10.0 ft	1			0.90	1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	0.00	162.00
+0.60W	Length = 10.0 ft	1	0.110	0.025	1.60	1.100	1.00	1.00	1.00	1.00	1.00	0.68	173.69	1584.00	0.25	7.26	288.00	0.00	0.00
+0.450W	Length = 10.0 ft	1	0.082	0.019	1.60	1.100	1.00	1.00	1.00	1.00	1.00	0.51	130.27	1584.00	0.18	5.45	288.00	0.00	0.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
W Only	1	0.0993	5.036		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.450	0.450

Vista Structural Engineering, LLC
14718 NW Delia St.
Portland, Oregon 97229
(971) 233-6099
dennis@vistastructural.com

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 3 APR 2023, 1:09PM

Wood Beam

File: HHF127.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.10.31
Vista Structural Engineering, LLC

Lic. #: KW-06010523

DESCRIPTION: Header above windows at great room - resistance to wind load

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MINimum	0.450	0.450
+0.60W	0.270	0.270
+0.450W	0.203	0.203
W Only	0.450	0.450