November 17, 2022

IQ Homebuilders
Attn: Brett Shelton

Re: 2030 SW Red Barn Lane, Lee's Summit, MO

Vista Structural Engineering, LLC, was asked to address the following rough-in inspection items for the project located at above referenced address. Please see the following attached partial plan mark up, calculations, and site photos for reference.

Inspection comment: Address notching of two out of four of the 2x10's directly under the 16" LVL beam between the kitchen and great room.

Vista Structural's response: *Per the attached structural calculations, the (2) 1 ¾" x 16" LVL's can be extended to bear directly above the steel beam in the basement, which is located 11" forward of the location of where the (4) studs are currently framed. We recommend relocated the (4) studs directly over the center of the steel beam in the basement below. This will remove the point load from the quad 2x10 that was cut, and eliminate the need for this quad 2x10 joist. A partial plan view of the main floor has been attached for clarification on the following page of this report. On the third page of this report is a picture for clarification.*

Inspection comment: Address 1 ½"-diameter and two ¾"-diameter holes drilled through the 2x10 joist above the wet bar.

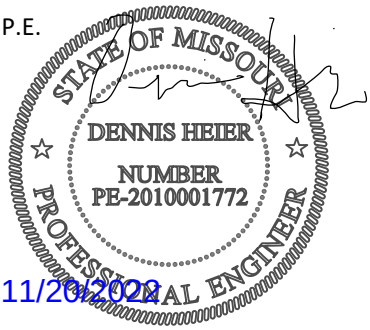
Vista Structural's response: *Per the attached calculations, no further action needs to be taken (no repair required). The applied design bending stress at the location of the holes is 921 psi, while the allowable bending stress per NDS code is 1138 psi. We recommend approval of the existing joist in its current condition.*

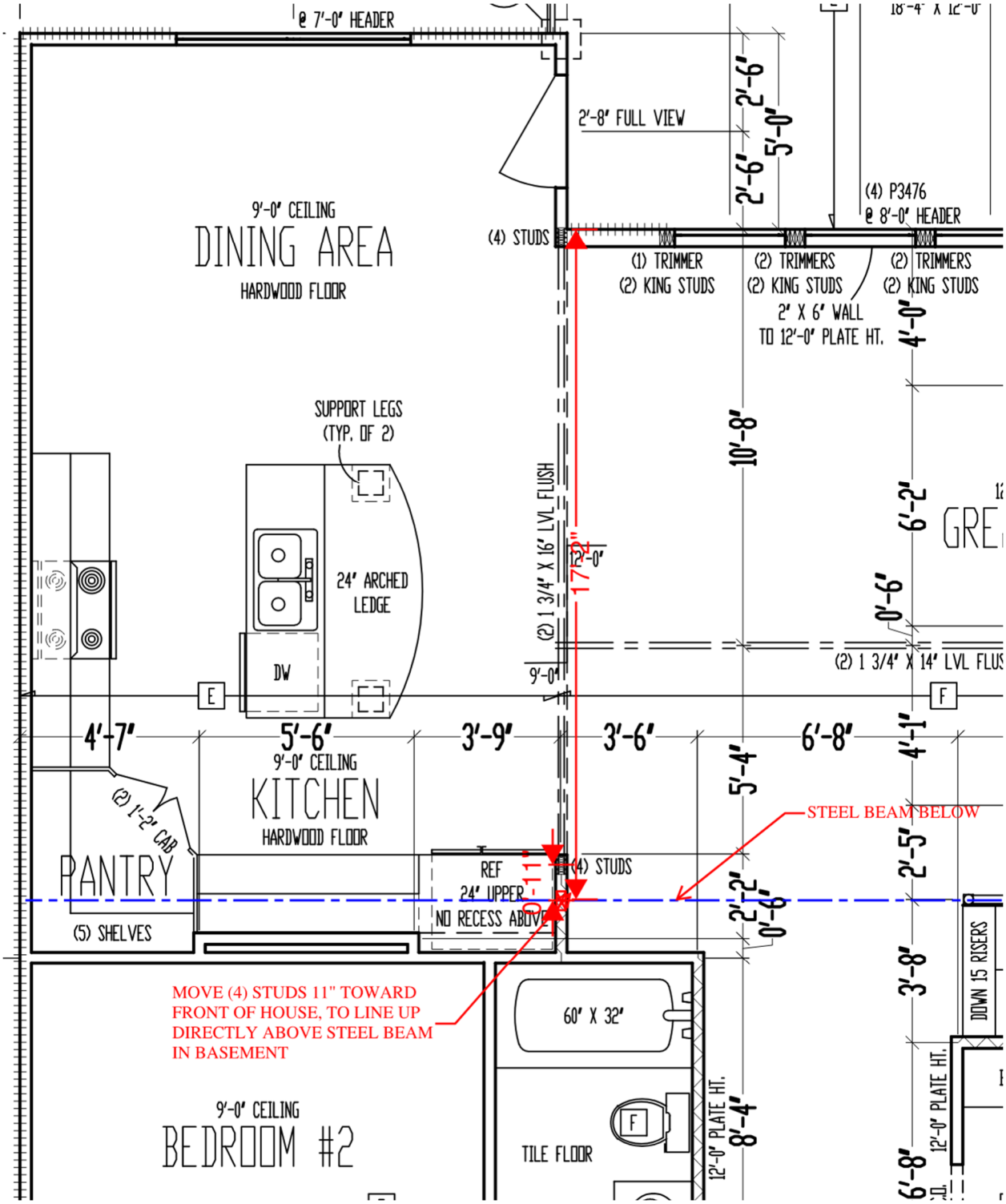
Our firm appreciates the opportunity to serve you. If you have any questions or if you need anything further, please feel free to contact us.

Sincerely,

Vista Structural Engineering, LLC

Dennis Heier, P.E.




@ 7'-0" HEADER
2'-8" FULL VIEW
2'-6"
2'-6"
5'-0"
(4) P3476
@ 8'-0" HEADER
9'-0" CEILING
DINING AREA
HARDWOOD FLOOR
(4) STUDS
(1) TRIMMER
(2) KING STUDS
(2) TRIMMERS
(2) KING STUDS
2" X 6" WALL
TO 12'-0" PLATE HT.
(2) TRIMMERS
(2) KING STUDS
4'-0"
SUPPORT LEGS
(TYP. OF 2)
10'-8"
6'-2"
24" ARCHED
LEDGE
DW
(2) 1 3/4" X 16" LVL FLUSH
17 3/4"
12'-0"
9'-0"
0'-6"
(2) 1 3/4" X 14" LVL FLUS
E
F
4'-7"
5'-6"
3'-9"
3'-6"
6'-8"
4'-1"
9'-0" CEILING
KITCHEN
HARDWOOD FLOOR
5'-4"
(2) 1'-2" CAB
PANTRY
STEEL BEAM BELOW
REF
24" UPPER
NO RECESS ABOVE
11"
(4) STUDS
2'-5"
2'-2"
0'-6"
(5) SHELVES
3'-8"
DOWN 15 RISERS
MOVE (4) STUDS 11" TOWARD
FRONT OF HOUSE, TO LINE UP
DIRECTLY ABOVE STEEL BEAM
IN BASEMENT
60" X 32"
9'-0" CEILING
BEDROOM #2
TILE FLOOR
F
12'-0" PLATE HT.
8'-4"
12'-0" PLATE HT.
6'-8"


RELOCATE
(4) STUDS
TO HERE
CENTERLINE
OF STEEL
BEAM BELOW

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: 20 NOV 2022, 10:23AM

Wood Beam

File: RHF067 VIEWPOINT.ec6

Lic. # : KW-06010523 — Vista Structural Engineering, LLC

DESCRIPTION: 16" LVL BEAM BETWEEN KITCHEN AND GREAT ROOM

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
Load Combination : IBC 2018

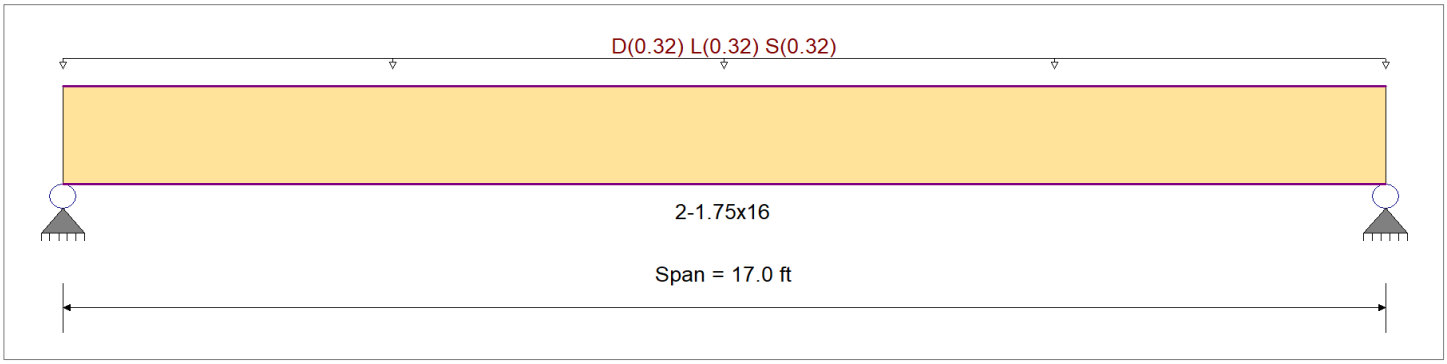
Wood Species : iLevel Truss Joist
Wood Grade : MicroLam LVL 2.0 E

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

Fb +	2600 psi
Fb -	2600 psi
Fc - Prll	2510 psi
Fc - Perp	750 psi
Fv	285 psi
Ft	1555 psi

E : Modulus of Elasticity

Ebend- xx	2000 ksi
Eminbend - xx	1016.535 ksi
Density	42.01 pcf



Applied Loads

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

Uniform Load : D = 0.020, L = 0.020, S = 0.020 ksf, Tributary Width = 16.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.808 : 1	Maximum Shear Stress Ratio	=	0.471 : 1
Section used for this span		2-1.75x16	Section used for this span		2-1.75x16
fb: Actual	=	2,322.32 psi	fv: Actual	=	154.22 psi
Fb: Allowable	=	2,875.28 psi	Fv: Allowable	=	327.75 psi
Load Combination		+D+0.750L+0.750S	Load Combination		+D+0.750L+0.750S
Location of maximum on span	=	8.500 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	0.253 in	Ratio =	805 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.633 in	Ratio =	322 >=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 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 = 17.0 ft	1	0.413	0.241	0.90	0.962	1.00	1.00	1.00	1.00	1.00	11.56	928.93	2250.22	2.30	61.69	256.50
+D+L					0.962	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.743	0.433	1.00	0.962	1.00	1.00	1.00	1.00	1.00	23.12	1,857.86	2500.24	4.61	123.38	285.00
+D+S					0.962	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.646	0.376	1.15	0.962	1.00	1.00	1.00	1.00	1.00	23.12	1,857.86	2875.28	4.61	123.38	327.75
+D+0.750L					0.962	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.520	0.303	1.25	0.962	1.00	1.00	1.00	1.00	1.00	20.23	1,625.63	3125.30	4.03	107.96	356.25
+D+0.750L+0.750S					0.962	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.808	0.471	1.15	0.962	1.00	1.00	1.00	1.00	1.00	28.90	2,322.32	2875.28	5.76	154.22	327.75
+0.60D					0.962	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 17.0 ft	1	0.139	0.081	1.60	0.962	1.00	1.00	1.00	1.00	1.00	6.94	557.36	4000.38	1.38	37.01	456.00

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Vista Structural Engineering, LLC

DESCRIPTION: 16" LVL BEAM BETWEEN KITCHEN AND GREAT ROOM

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.6329	8.562		0.0000	0.000

Vertical Reactions

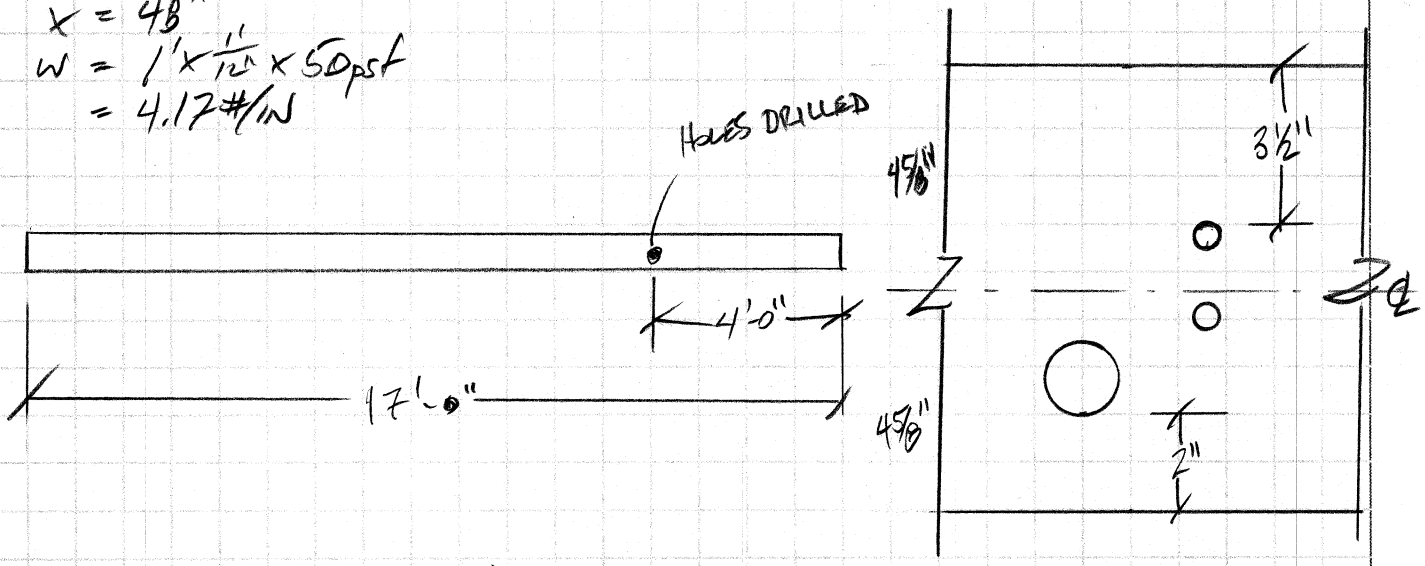
Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	6.800	6.800
Overall MINimum	2.720	2.720
D Only	2.720	2.720
+D+L	5.440	5.440
+D+S	5.440	5.440
+D+0.750L	4.760	4.760
+D+0.750L+0.750S	6.800	6.800
+0.60D	1.632	1.632
L Only	2.720	2.720
S Only	2.720	2.720

PROJ: 2030 SW RED BARN
DATE: 11/21/2022
CLIENT: IQ
ENGR: DMH

VISTA STRUCTURAL ENGINEERING, LLC

$\ell = 204"$
$x = 48"$
$w = 1' \times \frac{11}{12} \times 50psf$
$= 4.17\#/IN$



MOMENT @ HOLE LOCATION:

$$M_{4'} = \frac{wx}{2}(\ell - x) = \frac{(4.17\#/IN)(48IN)}{2}(204" - 48")$$

$= 15,612\ IN-\#$

PER ATTACHED CALCULATIONS: $S_{x(MIN)} = 16.94\ IN^3$

$$f_b = \frac{M_{4'}}{S_{x(MIN)}} = \frac{15,612\ IN-\#}{16.94\ IN^3}$$

$= 921\ psi$

$$F'_b = (900\ psi)(1.1)(1.15)$$

(F_b; 1.1 = SIZE FACTOR; C_R = 1.15)

$= 1138\ psi > f_b$ OK

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General Section Property Calculator

File: RHF067 VIEWPOINT.ec6

Lic. # : KW-06010523

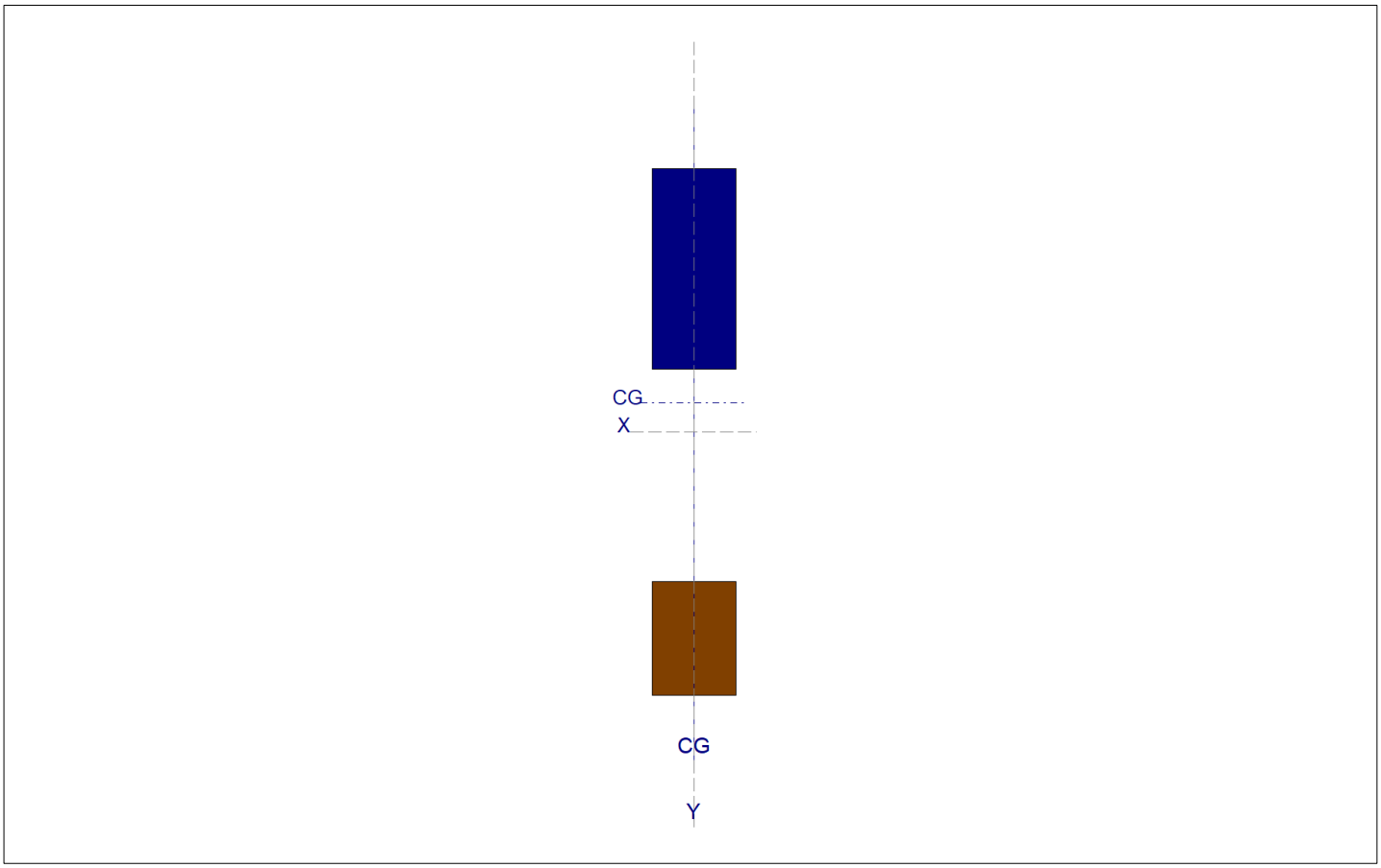
Vista Structural Engineering, LLC

DESCRIPTION: section of drilled joist

Final Section Properties

Total Area	:	8.250 in^2	Ixx	:	87.018 in^4	Sxx : - Y	: 16.942 in^3
			Iyy	:	1.546 in^4	Sxx : +Y	: 21.154 in^3
Calculated final C.G. distance from Datum :						Syy : - X	: 2.062 in^3
X cg Dist.	:	0.0 in	Zxx	:	22.594 in^3	Syy : +X	: 2.062 in^3
Y cg Dist.	:	0.5114 in	Zyy	:	3.094 in^3		
Edge Distances from CG. :						r xx	: 3.248 in
+X	:	0.750 in	+Y	:	4.114 in	r yy	: 0.4330 in
-X	:	-0.750 in	-Y	:	in		

Rotation of All Components @ Angle : 0.00 deg CCW



Rectangular & Circular Shapes

Rectangular Shape : 1	Height =	3.500 in	Width =	1.500 in	Rotation =	0 deg CCW
	Area =	5.250 in^2	Xcg =	0.000 in		
			Ycg =	2.875 in		

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General Section Property Calculator

File: RHF067 VIEWPOINT.ec6

Lic. # : KW-06010523

Vista Structural Engineering, LLC

DESCRIPTION: section of drilled joist

Rectangular Shape : 2

Height =	2.000 in	Width =	1.500 in	Rotation =	0 deg CCW
Area =	3.000 in^2	Xcg =	0.000 in		
		Ycg =	-3.625 in		