



August 30, 2021

IQ Homebuilders  
Attn: Brett Shelton

Re: 2350 SW Old Port Rd., Lee's Summit Missouri (Lot 722 Eagle Creek)

Vista Structural Engineering, LLC, was asked to address the following framing inspection item for the house being built at 2350 SW Old Port Rd.:

**2X10 floor joist(s) have holes drilled within 2" of each other.** *Per the attached detail, we assume the area of each joist(s) containing drilled holes is entirely notched, therefore only the remaining un-notched depth of the joist is considered for structural shear and bending stress. This notch extends for the first 2'-4" of span above the garage. Per the attached calculations, the calculated maximum shear force at this reduced depth section does not exceed the allowable shear. However, the calculated maximum bending stress at this reduced depth section exceeds the allowable bending stress for Douglas Fir lumber per NDS values. Therefore, we advise to scab on (1) additional 2x board at the notched location of each joist of concern at the location shown on the following pages. We recommend approval of the attachment method of the scabbed 2x board per the detail on the following pages, for the described 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

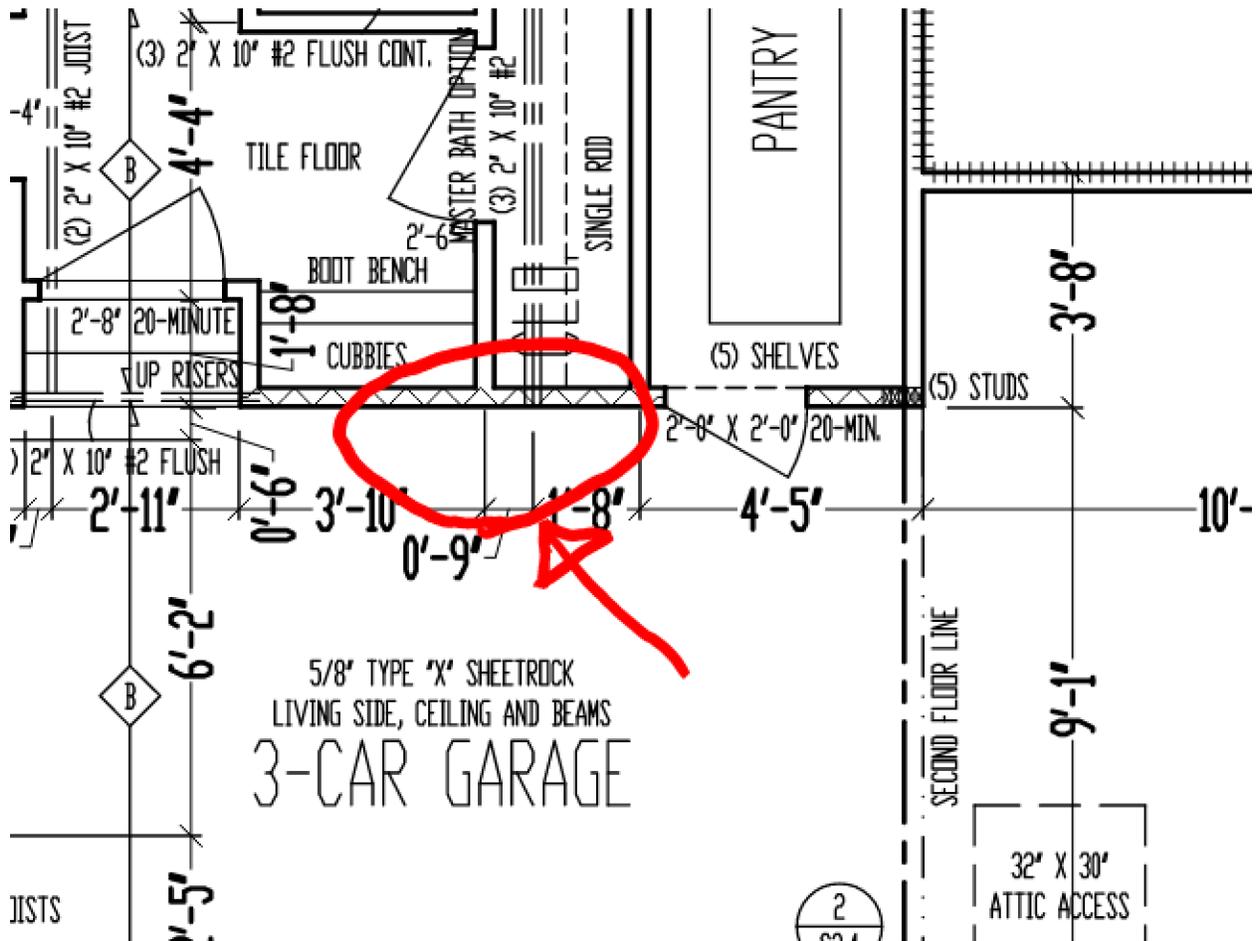
Dennis Heier, P.E.



# VISTA STRUCTURAL ENGINEERING, LLC

14718 NW DELIA STREET  
PORTLAND, OREGON 97229

PHONE: 971.645.0901  
VISTASTRUCTURAL.COM

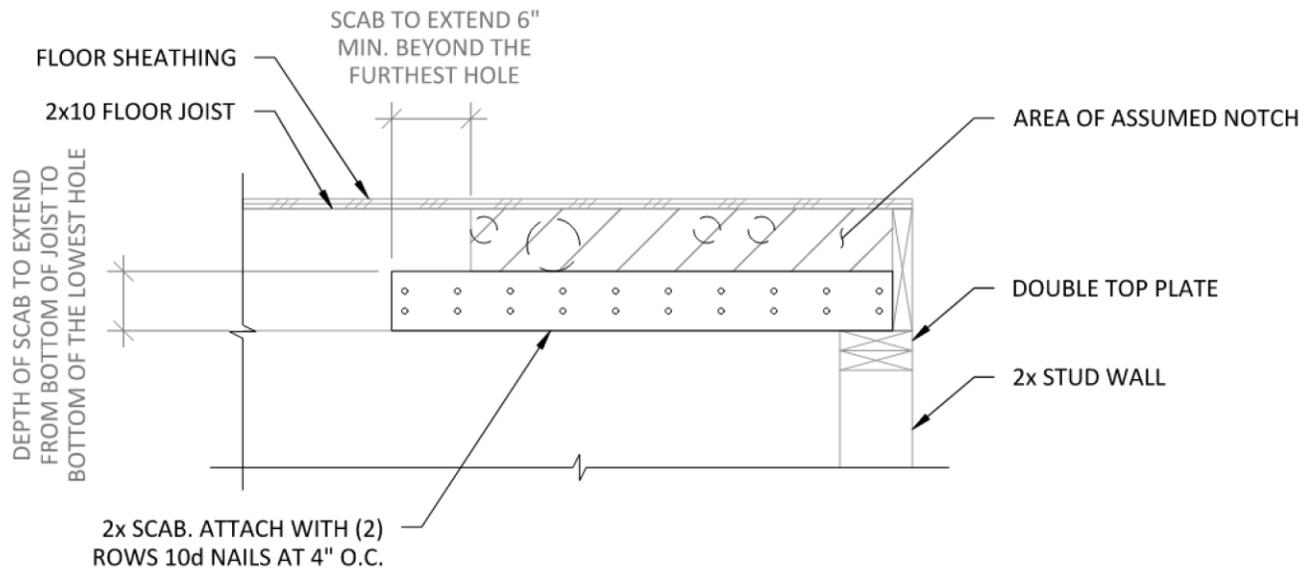


Approximate location of joist(s) with holes drilled, above garage.

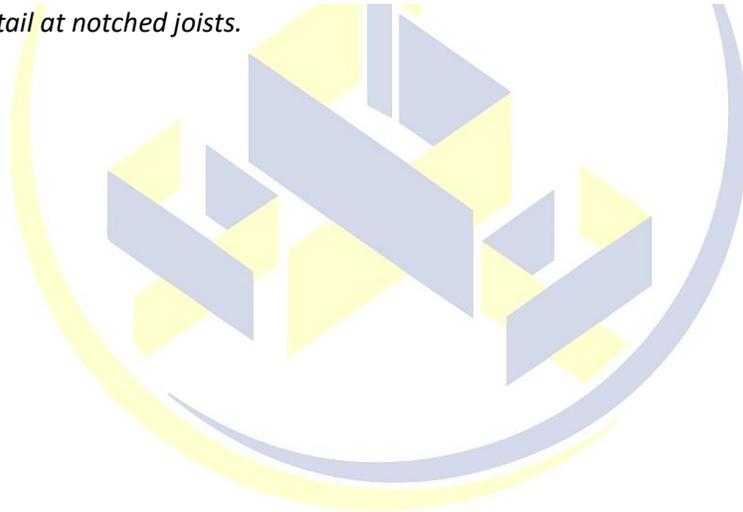
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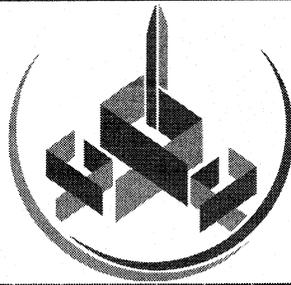
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*Scab attachment detail at notched joists.*



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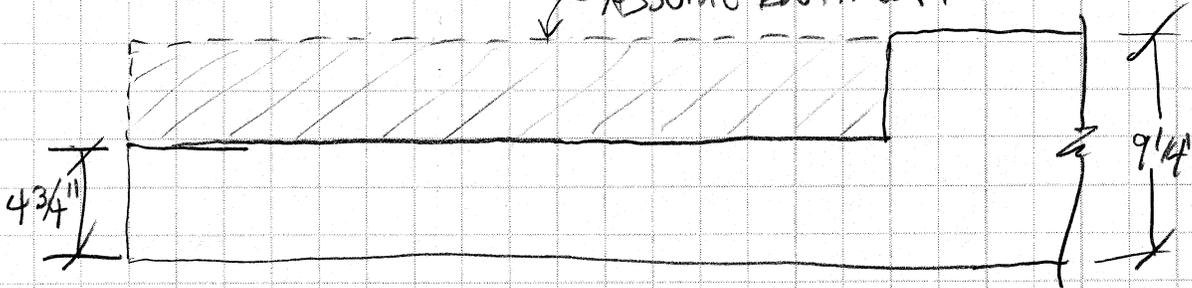


ENGR:

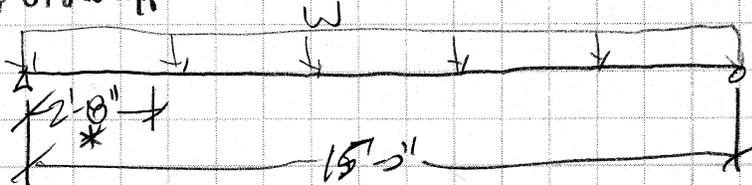
DMH

JOIST ABOVE GREAT ROOM

ASSUME ENTIRELY NOTCHED



\*LENGTH OF NOTCH



$$w = 6.10 \text{ \#/in}$$

$$d = 180''$$

$$x = 32''$$

$$R = \frac{wd}{2} = \frac{(6.10)(180)}{2}$$

$$= 549 \#$$

$$M = \frac{wx}{2}(l-x) = \frac{(6.10)(32)}{2}(180-32)$$

$$= 14,445 \text{ in-}\#$$

$$F'_b = C_F C_p F_b = (1.3)(1.15)(900 \text{ psi})$$

$$= 1346 \text{ psi}$$

$$f_b = \frac{3}{2} \frac{R}{bd} = \frac{3}{2} \frac{549 \#}{(1.5'')(4.75'')}$$

$$= 116 \text{ psi}$$

$$S_{REQ} = \frac{M}{F'_b} = \frac{14,445 \text{ in-}\#}{1346 \text{ psi}}$$

$$= 10.73 \text{ in}^3$$

$$F_b = 180 \text{ psi} > f_b$$

OK, NO UPGRADE REQ'D

DETERMINE MIN. WIDTH @ NOTCH =

$$S_{REQ} = \frac{bd^2}{6}$$

$$b_{MIN} = \frac{6S_{REQ}}{d^2} = \frac{(6)(10.73 \text{ in}^3)}{(4.75 \text{ in})^2}$$

$$= 2.85 \text{ in}$$

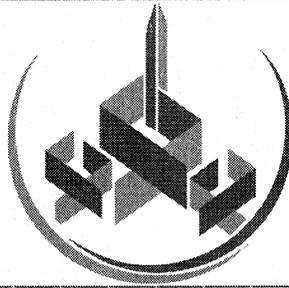
SCAB ON ADDITIONAL 2X AT NOTCH TO ACHIEVE 3" WIDTH. EXTEND MIN. 6" BEYOND NOTCH

2350 SW Old Port Rd.

30 AUG 2021

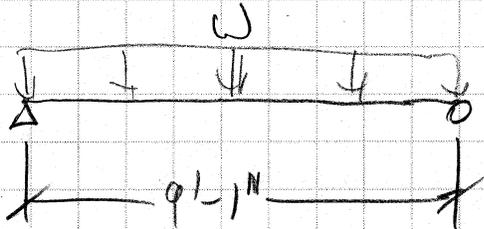
ENGR:

DMH



**VISTA**  
- STRUCTURAL -  
ENGINEERING, LLC

JOISTS ABOVE GARAGE



$$w = 1.33' \times 55 \text{ psf} = 73 \#/\text{ft} \\ = 6.10 \#/\text{in}$$

$$l = 109''$$

ASSUME ONLY  $4\frac{1}{2}''$  DEPTH  
REMAINING FOR FIRST  $2'-4''$  OF SPAN

DETERMINE MAX SHEAR  
(AT ENDS OF JOISTS):

$$R = \frac{wl}{2} = \frac{(6.10 \#/\text{in})(109'')}{2} \\ = 332 \#$$

DETERMINE MAX BENDING STRESS  
AT NOTCH, WHICH WILL OCCUR  
AT  $2'-4''$  ( $28''$ )

$$f_v = \frac{\frac{3}{2}R}{bd} = \frac{(\frac{3}{2})(332)}{(1.5'')(4.5'')} \\ = 74 \text{ psi}$$

$$M_{2'4''} = \frac{wx}{2}(l-x) \\ = \frac{(6.10 \#/\text{in})(28'')}{2} (109' - 28'') \\ = 6917 \text{ in-}\#$$

$$F_v = 180 \text{ psi, per NDS} > f_v \\ \text{OK}$$

SECTIONAL MODULUS AT NOTCH:

$$S_x = \frac{bd^2}{6} = \frac{(1.5'')(4.5'')^2}{6} \\ = 5.06 \text{ in}^3$$

$$f_b = \frac{M}{S} = \frac{6917 \text{ in-}\#}{5.06 \text{ in}^3} = 1367 \text{ psi}$$

$$F_b = 900 \text{ psi}$$

THEREFORE, SCAB ON ADDITIONAL  
 $2 \times$  AT NOTCH, TO EXTEND MIN.  
 $6''$  BEYOND NOTCH