

**Structural Calculations**

for

**NEW SINGLE FAMILY DWELLING**

**Smersh Residence**

2423 60th Ave SE

Mercer Island, WA 98040

*1ST CORRECTION RESPONSE*

prepared by:

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Job No. 22004

Date: 7/25/23



ROOF RANGING (REVISION)

RH 10 Roof Header

SPAN = 7'-0"

Use 2' x 9 1/4 SL

$$P = \frac{(1.4 + 25 \text{ psf}) \left(\frac{24'}{2}\right) \left(\frac{26'}{2}\right)}{2 \text{ SL}} = \frac{2110 + 3110 \text{ \#}}{2 \text{ SL}} \text{ CE} = 6''$$

RH 8 Roof Beam

SPAN = 12'-3"

$$P = \frac{(1020 + 1430 \text{ \#})}{2 \text{ SL}} \text{ @ 15' SPAN} \quad \text{Use } 5' \times 9 \frac{1}{2} \text{ SL}$$

UPPER FLOOR FRAMING REVISIONS(VF4) UPPER FLOOR BEAM

SPAN = 13'-6"

Use 5/8" x 11/8" PL

$$w = \frac{(10)(9')}{12} = 9.1 \text{ #/ft}$$

$$P_1 = \frac{1250 + 1730}{12 + 3} \text{ #} \quad e_x = 7'-3"$$

$$P_2 = \frac{2910 + 3900}{12 + 3} \text{ #} \quad e_x = 11'-3"$$

$$P_3 = \frac{6400}{12 + 3} \text{ #} \quad e_x = 9" \quad (\text{sw VF.4, SEE ORIG. PLAN & NOTES})$$

**Multiple Simple Beam**

Project File: 22004\_SmershRes\_.ec6

LIC#: KW-06018000, Build:20.23.05.25

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**Description :** PCR1 - Revised Roof Framing

**Wood Beam Design :** RH10 - Roof Header

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

**BEAM Size :** 3.5x9.25, Parallam PSL, Fully Unbraced

Using Allowable Stress Design with IBC 2021 Load Combinations, Major Axis Bending

Wood Species : iLevel Truss Joist

Wood Grade : Parallam PSL 2.2E

Fb - Tension	2,900.0 psi	Fc - Prll	2,900.0 psi	Fv	290.0 psi	Ebend- xx	2,200.0 ksi	Density	45.070 pcf
Fb - Compr	2,900.0 psi	Fc - Perp	750.0 psi	Ft	2,025.0 psi	Eminbend - xx	1,118.19 ksi		

Applied Loads

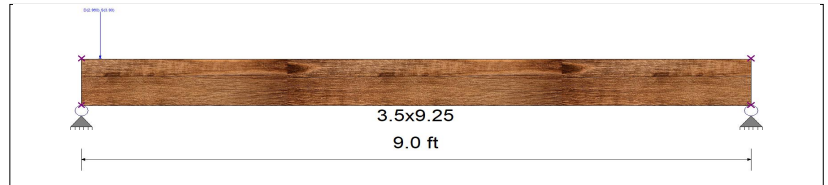
1Point: D = 2.960, S = 3.90 k @ 0.250 ft

Design Summary

Max fb/Fb Ratio = **0.123** : 1  
 fb : Actual : 399.96 psi at 0.270 ft in Span # 1  
 Fb : Allowable : 3,239.27 psi  
 Load Comb : +D+S

Max fv/FvRatio = **0.927** : 1  
 fv : Actual : 309.01 psi at 0.000 ft in Span # 1  
 Fv : Allowable : 333.50 psi  
 Load Comb : +D+S

Max Reactions (k)	<u>D</u>	<u>Lr</u>	<u>L</u>	<u>S</u>	<u>W</u>	<u>E</u>	<u>H</u>
Left Support	2.88			3.79			
Right Support	0.08			0.11			



Max Deflections

Transient Downward	0.017 in	Total Downward	0.031 in
Ratio	6218	Ratio	3535
LC: S Only		LC: +D+S	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

**Wood Beam Design :** RB8 - Roof Beam

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

**BEAM Size :** 5.25x9.5, Parallam PSL, Fully Unbraced

Using Allowable Stress Design with IBC 2021 Load Combinations, Major Axis Bending

Wood Species : iLevel Truss Joist

Wood Grade : Parallam PSL 2.2E

Fb - Tension	2900 psi	Fc - Prll	2900 psi	Fv	290 psi	Ebend- xx	2200 ksi	Density	45.07 pcf
Fb - Compr	2900 psi	Fc - Perp	750 psi	Ft	2025 psi	Eminbend - xx	1118.19 ksi		

Applied Loads

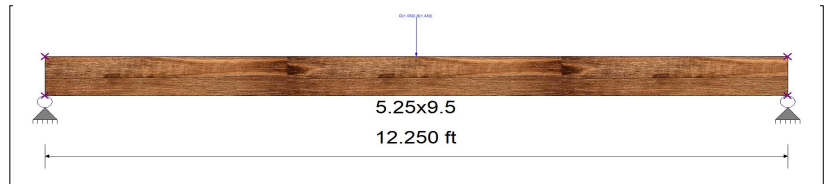
1Point: D = 1.030, S = 1.430 k @ 6.125 ft

Design Summary

Max fb/Fb Ratio = **0.348** : 1  
 fb : Actual : 1,144.82 psi at 6.125 ft in Span # 1  
 Fb : Allowable : 3,286.38 psi  
 Load Comb : +D+S

Max fv/FvRatio = **0.111** : 1  
 fv : Actual : 36.99 psi at 0.000 ft in Span # 1  
 Fv : Allowable : 333.50 psi  
 Load Comb : +D+S

Max Reactions (k)	<u>D</u>	<u>Lr</u>	<u>L</u>	<u>S</u>	<u>W</u>	<u>E</u>	<u>H</u>
Left Support	0.52			0.72			
Right Support	0.52			0.72			



Max Deflections

Transient Downward	0.115 in	Total Downward	0.198 in
Ratio	1275	Ratio	741
LC: S Only		LC: +D+S	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

**Multiple Simple Beam**

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LIC# : KW-06018000, Build:20.23.05.25

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**Description :** PCR1 - Upper Floor Framing Revisions

**Wood Beam Design :** UFB4 - Upper Floor Beam

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

**BEAM Size :** 5.25x11.875, Parallam PSL, Fully Braced

Using Allowable Stress Design with IBC 2021 Load Combinations, Major Axis Bending

Wood Species : iLevel Truss Joist

Wood Grade : Parallam PSL 2.2E

Fb - Tension	2900 psi	Fc - Prll	2900 psi	Fv	290 psi	Ebend- xx	2200 ksi	Density	45.07 pcf
Fb - Compr	2900 psi	Fc - Perp	750 psi	Ft	2025 psi	Eminbend - xx	1118.19 ksi		

Applied Loads

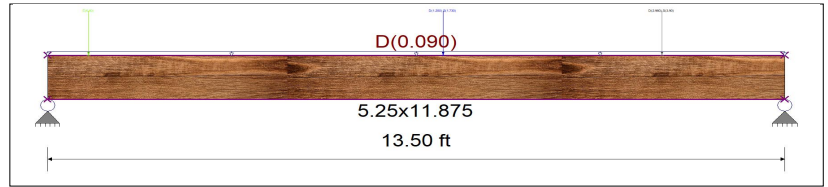
Unif Load: D = 0.090 k/ft, Trib= 1.0 ft  
 1Point: D = 1.250, S = 1.730 k @ 7.250 ft  
 2Point: D = 2.960, S = 3.90 k @ 11.250 ft  
 3Point: E = 6.40 k @ 0.750 ft

Design Summary

Max fb/Fb Ratio = **0.593** : 1  
 fb : Actual : 1,976.01 psi at 7.245 ft in Span # 1  
 Fb : Allowable : 3,335.00 psi  
 Load Comb : +D+S

Max fv/FvRatio = **0.566** : 1  
 fv : Actual : 188.62 psi at 12.555 ft in Span # 1  
 Fv : Allowable : 333.50 psi  
 Load Comb : +D+S

Max Reactions (k)	D	Lr	L	S	W	E	H
Left Support	1.68			1.45		6.04	
Right Support	3.75			4.18		0.36	



Max Deflections

Transient Downward	0.200 in	Total Downward	0.390 in
Ratio	810	Ratio	415
LC: S Only		LC: +D+S	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	