

**STRUCTURAL CALCULATIONS:**

**PROJECT NO.:**

251477

**PROJECT NAME:**

Nevada County Homekey+

**PROJECT TYPE:**

Addition and Remodel

**PROJECT ADDRESS:**

12875 Rattlesnake Rd.  
Grass Valley, CA 95945

**ARCHITECT:**

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149 Crown Point Court, Suite C  
Grass Valley, CA 95945

**PROJECT ENGINEER:**

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**DATE:**

March 16, 2026



Monte Gillan

Jun 01, 2026

1:39 pm



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## DESIGN PARAMETERS

**Code:** 2025 CBC (based upon the 2024 IBC)

**Design Materials :**

( Please refer to General Notes & Specifications for more detailed information)

**Wood :** Douglas Fir-Larch

**Foundations:**

Concrete	2500 psi
Rebar	60 ksi

**Note:**

The intent of lateral design is to prevent structural failures, in the event of seismic activities or high-winds, but not to prevent the damage of architectural finishes or systems. The lateral calculations herein conform to the specifications of the current California Building Code (CBC). Ashley & Vance Engineering Inc. provides no guarantees, expressed or implied, as to the adequacy of the CBC provisions.

These calculations, specifications, details and drawings are instruments of service and are the property of Ashley & Vance Engineering Inc. The information contained herein is for use on the specific project referenced above and shall not be used otherwise without the written authorization of Ashley & Vance Engineering Inc.

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Load Sheet

**ROOF LOADS**

Typical Roof Live Loads 20.0 psf

Snow Load	<b>Ps = 0.7·Ce·Ct·Cs·Pg</b>	
Ground Snow Load: Pg (psf)		103.0 psf
Exposure Factor: Ce		1.0 psf
Thermal Factor: Ct		1.2 psf
Roof Slope Factor: Cs		1.0 psf
Minimum Roof Snow Load per Jurisdiction		0.0 psf
		<b>87.0 psf</b>

Typical Roof Dead Loads

Asphalt Shingles		3.0 psf
1/2" Plywood		1.7 psf
Wood Framing		2.8 psf
10" Batt Insulation		0.8 psf
5/8" Gyp. Board Ceiling		2.8 psf
Misc. Mechanical / Solar		3.9 psf
Total Dead Load		<b>15.0 psf</b>

**FLOOR LOADS**

Typical Floor Live Loads 40 psf

Typical Floor Dead Loads

Hardwood		4.0 psf
3/4" Plywood		2.5 psf
Wood Framing		3.3 psf
10" Batt Insulation		0.8 psf
5/8" Gyp. Board Ceiling		2.8 psf
Misc. Loads		1.6 psf
Total Dead Load		<b>15.0 psf</b>

Partition Load

Assumed Partition Load 20 psf

Wall Dead Weight 10 psf

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Criteria Sheet

**DEFLECTION CRITERIA:**

Construction	L	S	E   W	D + L
Roof	240	240	240	180
Floor	360	---	---	240
Exterior Walls	---	---	240	---
Interior Partitions	240	---	---	---

**LOAD CASE LEGEND**

**ASCE 07 Equations**

- 2 D + L
- 3 D + L<sub>R</sub>|0.7S
- 4 D + 0.75[L + L<sub>R</sub>|0.7S]
- 5 D + 0.6W
- 6 D + 0.75(0.6W) + 0.75(L + L<sub>R</sub>|0.7S)
- 7 0.6D - 0.6W
- 8 (1.0 + 0.14\*S<sub>DS</sub>)D + 0.7Ω<sub>0</sub>E
- 9 (1.0 + 0.105\*S<sub>DS</sub>)D + 0.525Ω<sub>0</sub>E + 0.75L + 0.1S
- 10 (0.6 - 0.14\*S<sub>DS</sub>)D - 0.7Ω<sub>0</sub>E\*

**SEISMIC CRITERIA**

S<sub>DS</sub> = 0.690  
 Ω<sub>0</sub> = 2.5

**LOAD MATRIX**

Description:		D	L <sub>R</sub>	L	L <sub>2</sub>	S	W	E	
1r = 1 ft of roof trib	Roof	15	20	0	0	87	0	0	psf
2f = 2 ft of floor trib	Floor	15	0	40	0	0	0	0	psf
3g = 3 ft of garage trib	Garage	0	0	0	0	0	0	0	psf
4d = 4 ft of deck trib	Deck	0	0	0	0	0	0	0	psf
5w = 5 ft of wall trib	Wall	10	0	0	0	0	0	0	psf

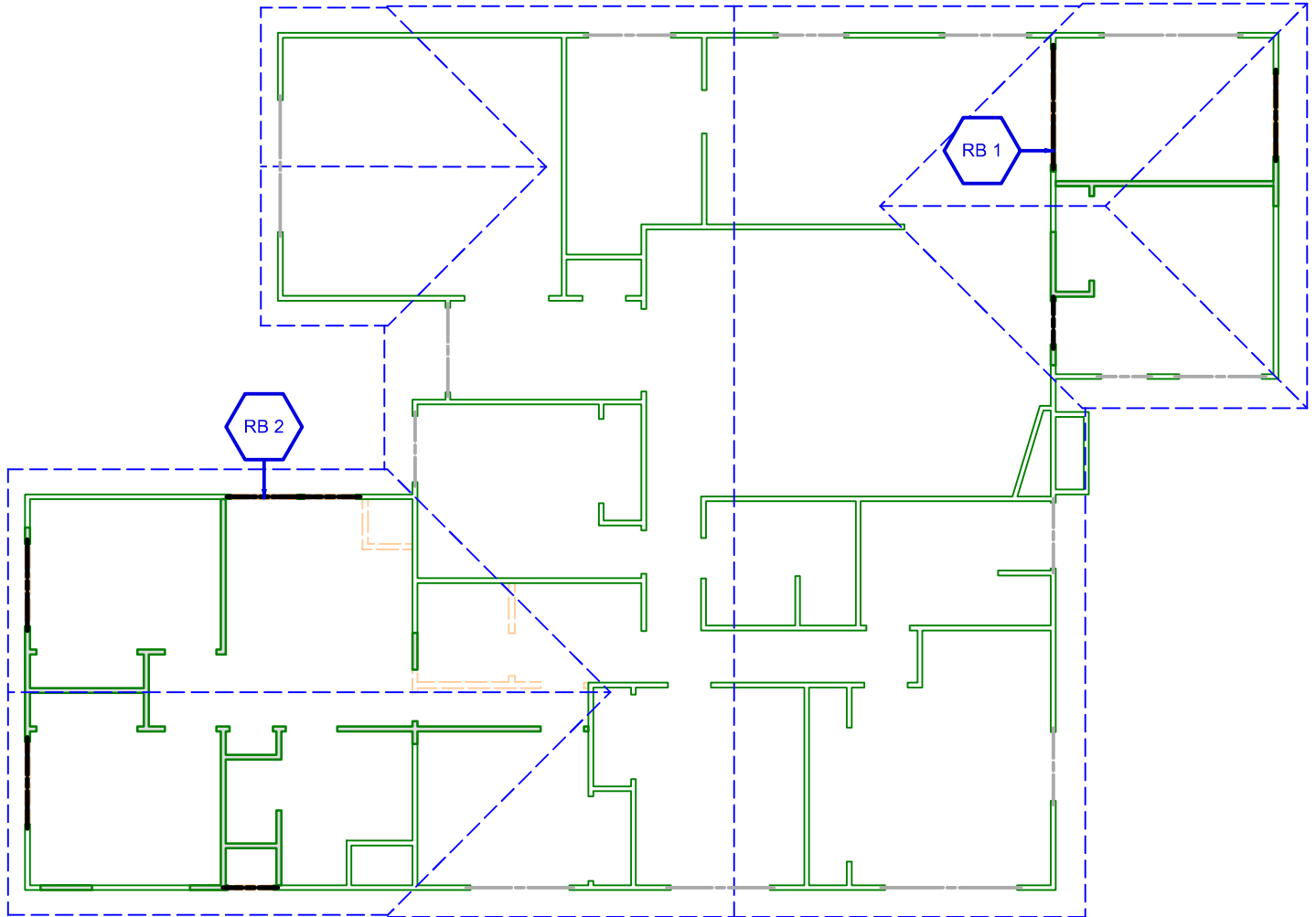


Nevada County Homekey+ Rattlesnake  
Residence

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Roof Framing Layout



JOB SET

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**Beam/Joist Input Data**

Description:		D	L <sub>R</sub>	L	S	W	E	
1r = 1 ft of roof trib	Roof	15	20	0	87	0	0	psf
2f = 2 ft of floor trib	Floor	15	0	40	0	0	0	psf
3g = 3 ft of garage trib	Garage	0	0	0	0	0	0	psf
4d = 4 ft of deck trib	Deck	0	0	0	0	0	0	psf
5w = 5 ft of wall trib	Wall	10	0	0	0	0	0	psf

S<sub>DS</sub> = 0.690

Ω<sub>o</sub> = 2.5

**ROOF BEAMS**

adVanceBeam 2.0

Member	Trib (ft)	SPAN INFO		D (plf)	L <sub>R</sub> (plf)	L (plf)	S (plf)	W (plf)	E (plf)	Span/Load Type	BEAM DESIGN				
		L/X <sub>a</sub> (ft)	L <sub>u</sub> /X <sub>b</sub> (ft)								Force	Loc(ft)	%Max		
RB 1	22.0 r			330	440	0	1914	0	0		<b>(2)-1 3/4" x 9 1/2" LVL</b>				
	0.0 f			0	0	0	0	0	0						
	0.0 g			0	0	0	0	0	0		Bending	-10kft	3.5	78%	
	0.0 d			0	0	0	0	0	0		Shear	-5,879#	0	81%	
	1.0 w			10	0	0	0	0	0						
<b>Spans</b>											<b>REACTIONS</b>				
	1	7.0	7.0	340	440	0	1914	0	0	Simple Span	Roller 1	0	---	599#	5,879#
											Roller 2	7	---	599#	5,879#
<b>Additional Loads</b>											<b>DEFLECTIONS</b>				
											I / x	Defl(in)	Loc(ft)	%Max	
											Max(ASD)	---	0.18	3.5	---
											L 240	1767	0.05	3.5	14%
											E W S 240	406	0.21	3.5	59%
											D+L 180	997	0.08	3.5	18%
RB 2	14.0 r			210	280	0	1218	0	0		<b>4x8 D.F. #1</b>				
	0.0 f			0	0	0	0	0	0						
	0.0 g			0	0	0	0	0	0		Bending	-2.9kft	2.3	78%	
	0.0 d			0	0	0	0	0	0		Shear	-2,619#	0	75%	
	1.0 w			10	0	0	0	0	0						
<b>Spans</b>											<b>REACTIONS</b>				
	1	4.5	4.5	220	280	0	1218	0	0	Simple Span	Roller 1	0	---	249#	2,619#
											Roller 2	5	---	249#	2,619#
<b>Additional Loads</b>											<b>DEFLECTIONS</b>				
											I / x	Defl(in)	Loc(ft)	%Max	
											Max(ASD)	---	0.06	2.25	---
											L 240	3950	0.01	2.25	6%
											E W S 240	820	0.07	2.25	29%
											D+L 180	2212	0.02	2.25	8%
	Eave Snow	1	0.0	4.5	0	0	0	131	0	0	Dist Load				

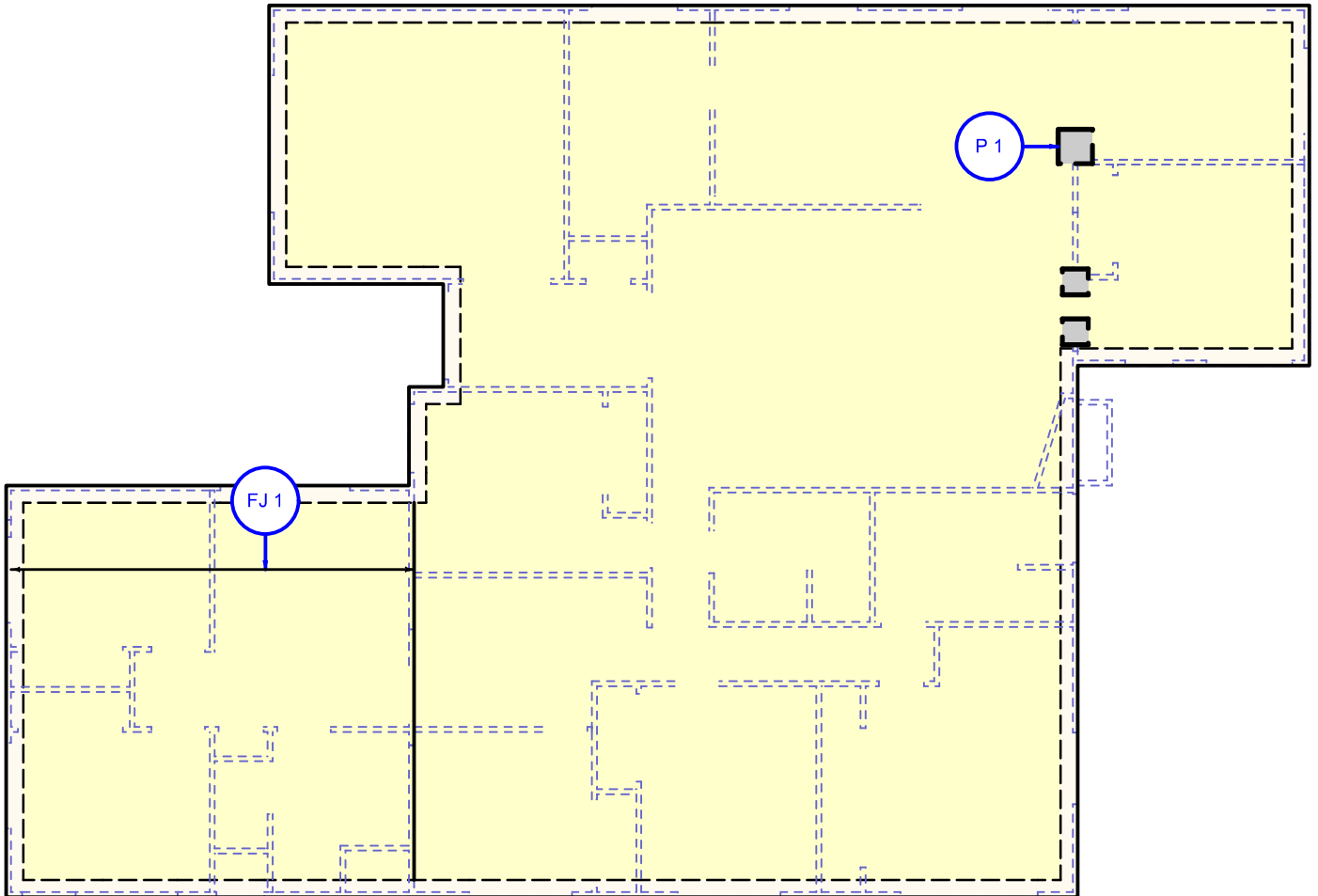


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Foundation Layout



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Beam/Joist Input Data

Description:		D	L <sub>R</sub>	L	S	W	E	
1r = 1 ft of roof trib	Roof	15	20	0	87	0	0	psf
2f = 2 ft of floor trib	Floor	15	0	40	0	0	0	psf
3g = 3 ft of garage trib	Garage	0	0	0	0	0	0	psf
4d = 4 ft of deck trib	Deck	0	0	0	0	0	0	psf
5w = 5 ft of wall trib	Wall	10	0	0	0	0	0	psf

S<sub>ps</sub> = 0.690  
 Ω<sub>o</sub> = 2.5

**FLOOR JOISTS**

adVanceBeam 2.0

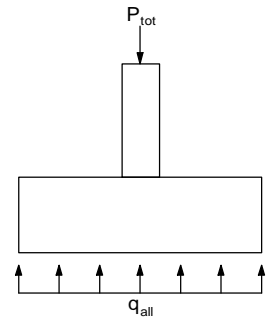
Member	Trib (ft)	SPAN INFO		D (psf)	L <sub>R</sub> (psf)	L (psf)	S (psf)	W (psf)	E (psf)	Span/Load Type	JOIST DESIGN				
		L/X <sub>a</sub> (ft)	L <sub>u</sub> /X <sub>b</sub> (ft)								Trib, Forces & Reactions are on per foot basis				
FJ 1	0.0 r			0	0	0	0	0	0		<b>2x8 D.F. #2 @ 16" o.c.</b>				
	1.0 f			15	0	40	0	0	0			<b>Force</b>	<b>Loc(ft)</b>	<b>%Max</b>	
	0.0 g			0	0	0	0	0	0		<b>Bending</b>	<b>-990#ft</b>	<b>6.0</b>	<b>98%</b>	
	0.0 d			0	0	0	0	0	0		<b>Shear</b>	<b>-330#</b>	<b>0</b>	<b>34%</b>	
	0.0 w			0	0	0	0	0	0						
<b>Spans</b>											<b>REACTIONS</b>				
	1	12.0	1.0	15	0	40	0	0	0	Simple Span	Roller 1	0	---	45plf	330plf
											Roller 2	12	---	45plf	330plf
<b>Additional Loads</b>											<b>DEFLECTIONS</b>				
											I / x	Defl(in)	Loc(ft)	%Max	
											Max(ASD)	0.45	6.0	---	
											L 360	441	0.33	6.0	82%
											E W S	---	0.00	0.0	---
											D+L 240	321	0.45	6.0	75%

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**Pad Footing Design Calculation:**

$q_{all} = 1,500$  psf Allowable Bearing Pressure (per Table 1806.2)  
 + 33% Increase for Transient Loading  
 $q_{all} = 1,995$  psf Allowable Bearing Pressure with Transient Loading

\* Allowable Bearing Capacity Based on ASD Load Combinations (ASCE 7-22 2.4.1)  
 \* Reinforcement design based on LRFD Load Combinations (Per ASCE 7-22 2.3.1)



Pad	Reactions on Footing	Point Loads						Bearing Design	Pad Design
		D	LR	L	L2	S	W		
P1	RB 1	1.19 k	1.54 k			6.70 k			<b>Use (3) #4 @ 9" oc EW</b> Bending Check $q_u = 14.11$ psi $M_u = 14.49$ kip-in $A_s \text{ Req'd} = 0.518$ in. <sup>2</sup> $A_s = 0.589$ in <sup>3</sup> <b>OK</b> Shear Check $V_u = 5.16$ kips (2-Way) $\phi V_c = 78.30$ kips $V_u/\phi V_c = 0.07$ <b>OK</b>
	Totals	1.19 k	1.54 k			6.70 k			
Worst Case Load Combinations (per ASCE 7-22 2.4 & 2.3)									
ASD Static: Case 3: D + 0.7S									
LRFD Design: Case 3: 1.2D + 1.0S + 1.0L									