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VALIM WY

**Anderson Engineering Consultants**

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David Knutson Roofing  
1520 Main Avenue  
Sacramento, CA. 95838

June 12, 2005

Subject: Lightweight Tile Re-roof  
561 Valim Way  
Sacramento, CA. 95831

# CITY COPY

Dear David,

Pursuant to your request, Anderson Engineering Consultants has reviewed the roof framing of the structure at the above address for structural adequacy. The house is approximately 25 to 30 years old, and is conventionally framed. The roof is comprised of the following:

- Single 2x6 rafters at 24" o.c. with an 11'-6" maximum span
- 2x6 Purlins with 2x4 struts at 48" o.c.
- 2x8 hip and valley boards.

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CITY OF SACRAMENTO

JUN 17 2005

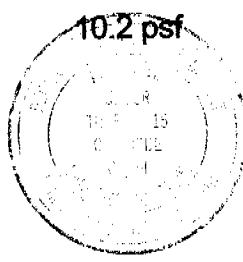
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Calculations show the rafters are adequate.

The roof has a pitch of 6:12 and appears to be in sound condition. The hip and valley boards are 2x8 and braced adequately to bearing members. The total dead load on the rafters including roofing material does not exceed 11 psf. Calculations also show rafters are adequate.

- Lightweight Tile = 7.2 psf
- Thermo-ply / light gage metal system = 0.5 psf
- Existing skip sheathing = 1.5 psf
- 2x6 roof framing = 1.0 psf

10.2 psf



This set of plans and specifications must be kept on the job at all times and it is unlawful to make any changes or alterations from the same without written permission from the Building Inspection Division.

The approval of this plan and specification shall not be held to warrant or approve the violation of any City Ordinance or State Law

J/KG 6-17-05

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It is our opinion that using your proposed re-roof system consisting of the following will not compromise the structural integrity of the roof system:

- 7/8" - 22 gage hat channel fastened to the rafters with 10d-galvanized nails (or equal) at 24" o.c.
- "Thermo-ply" underlayment fastened to the hat channel with #10 self-tapping screws (or equal).
- 7/8" - 22 gage steel hat channel battens over the "Thermo-ply" underlayment fastened with #10 self tapping screws (or equal) at every rafter.
- Lightweight Eaglelite concrete tile weighing no more than 7.2 psf.

The determination of the roof's structural integrity is based on observation and known mechanical properties of wood.

After re-roofing minor cracking of the ceiling and interior and exterior walls may occur. In addition, a small amount of deflection in the rafters may be observed. These conditions are cosmetic only and do not affect the structural integrity of the roof framing.

Should you have any questions, please do not hesitate to contact us.

Sincerely,



Carl Anderson, P.E.

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Project: LAW - Location: MAX RAFTER SPAN

Summary:

1.5 IN x 5.5 IN x 11.5 FT @ 24 O.C. / #2 - Douglas Fir-Larch - Dry Use  
 Section Adequate By: 2.5% Controlling Factor: Moment of Inertia / Depth Required 5.46 In

Rafter Span Deflections:

Dead Load:	DLD-Interior=	0.36	IN
Live Load:	L.LD-Interior=	0.47	IN = L/326
Total Load:	TLD-Interior=	0.84	IN = L/184

Rafter End Loads and Reactions:

Upper Live Load:	92 PLF	184 LB	
Upper Dead Load:	71 PLF	141 LB	
Upper Total Load:	163 PLF	325 LB	
Lower Live Load:	92 PLF	184 LB	
Lower Dead Load:	71 PLF	141 LB	
Lower Total Load:	163 PLF	325 LB	
Upper Equiv. Tributary Width:	UTWeq=	5.75	FT
Lower Equiv. Tributary Width:	LTWeq=	5.75	FT

Rafter Data:

Interior Span:	L=	11.5	FT
Eave Span:	L-Eave=	0.0	FT
Rafter Spacing:	Spacing=	24.0	IN O.C.
Rafter Pitch:	RP=	6.0	: 12
Roof sheathing applied to top of joists-Top of rafters fully braced.			
Live Load Deflect. Criteria:	L/	240	
Total Load Deflect. Criteria:	L/	180	

Non-Snow Live Load:

Roof Loaded Area:	RLA=	23.0	SF
Live Load Method:	Method =	One	

Rafter Loads:

Roof Live Load:	LL=	16.0	PSF
Roof Dead Load:	DL=	11.0	PSF
Roof Duration Factor:	Cd=	1.25	

Slope Adjusted Spans And Loads:

Interior Span:	L-adj=	12.86	FT
Rafter Live Load:	wL-adj=	26	PLF
Rafter Dead Load:	wD-adj=	20	PLF
Rafter Total Load:	wT-adj=	45	PLF

Properties For: #2- Douglas Fir-Larch

Bending Stress:	Fb=	900	PSI
Shear Stress:	Fv=	180	PSI
Modulus of Elasticity:	E=	1600000	PSI
Stress Perpendicular to Grain:	Fc-perp=	625	PSI

Adjusted Properties

Fb' (Tension):	Fb'=	1682	PSI
Adjustment Factors: Cd=1.25 Cf=1.30 Cr=1.15			
Fv':	Fv'=	225	PSI
Adjustment Factors: Cd=1.25			

Design Requirements:

Controlling Moment:	M=	936	FT-LB
6.429 Ft from left support of span 2 (Center Span)			
Critical moment created by combining all dead loads and live loads on span(s) 2			
Controlling Shear:	V=	274	LB
At a distance d from right support of span 2 (Center Span)			
Critical shear created by combining all dead loads and live loads on span(s) 2			

Comparisons With Required Sections:

Section Modulus (Moment):	Sreq=	6.68	IN3
	S=	7.56	IN3
Area (Shear):	Areq=	1.82	IN2
	A=	8.25	IN2
Moment of Inertia (Deflection):	Ireq=	20.30	IN4
	I=	20.80	IN4

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LOCATION:

501 VAMUM WAY  
SACRAMENTO

\* 2x6 @ 24" o.c.  
--- 2x6 PRELIM'S w/ 2x4  
--- STUDS @ 48" o.c.

