CITY OF SACRAMENTO

1231 I Street, Sacramento, CA 95814

Permit No: 9714446

Insp Area:

Site Address: 6710 RIPTIDE WY SAC

Parcel No: 0300670047

Sub-Type: RES

Housing (Y/N):

CONTRACTOR		***OWNER***		***ARCHITECT***
WARREN ROOFING		TAKEUCHI KAY & JEAN S		
3701 LOWRY DR		6710 RIPTIDE WY		
NORTH HIGHLANDS CA	95660	SACRAMENTO CA	95831	
Phone: 916-331-4311		Phone:		Phone:

Nature of Work: 24SQS REROOF& TEAR OFF40 YR COMP

CONSTRUCTION LENDING AGENCY : I hereby affirm under penalty of perjury that there is a construction lending agency for the performance of the work for which this permit is issued (Sec. 3097, Civ. C).

Lender's Name_____ Lender'sAddress_____

LICENSED CONTRACTORS DECLARATION: I hereby affirm under penalty of perjury that I am licensed under provisions of Chapter 9 (commencing with section 7000) of Division 3 of the Business and Professions Code and my license is in full force and effect.

License Class C 39 License Number 602852 Date 10/27/97 Contractor Signature [signature]

OWNER-BUILDER DECLARATION: I hereby affirm under penalty of perjury that I am exempt from the contractors License Law for the following reason (Sec. 7031.5, Business and Professions Code; any city or county which requires a permit to construct, alter, improve, demolish, or repair any structure, prior to its issuance, also requires the applicant for such permit to file a signed statement that he or she is licensed pursuant to the provisions of the Contractors License Law (Chapter 9 (commencing with Section 7000) of Division 8 of the Business and Professions Code) or that he or she is exempt therefrom and the basis for the alleged exemption. Any violation of Section 7031.5 by any applicant for a permit subjects the applicant to a civil penalty of not more than five hundred dollars ($500.00);

_____ I, as a owner of the property, or my employees with wages as their sole compensation, will do the work, and the structure is not intended or offered for sale (Sec. 7044, Business and Professional Code: The Contractors Law does not apply to an owner of property who builds or imporves thereon, and who does such work himself or herself or through his or her own employees, provided that such improvements are not intended or offered for sale. If, however, the building or improvement is sold within one year of completion, the owner-builder will have the burden of proving that he or she did not build or improve for the purpose of sale.)

_____ I, as owner of the property, am exclusively contracting with licensed contractors to construct the project (Sec. 7044, Business and Professions Code: The contractors License Law does not apply to an owner of property who builds or improves thereon, and who contracts for such projects with a contractor(s) licensed pursuant to the Contractors License Law).

_____ I am exempt under Sec._____ B & PC for this reason:_____

Date_____ Owner Signature_____

IN ISSUING THIS BUILDING PERMIT, the applicant represents, and the city relies on the representation of the applicant, that the applicant verified all measurements and locations shown on the application or accompanying drawings and that the improvement to be constructed does not violate any law or private agreement relating to permissible or prohibited locations for such improvements. This building permit does not authorize any illegal location of any improvement or the violation of any private agreement relating to location of improvements.

Date [signature] 10/27/97 Applicant/Agent Signature [signature]

WORKER'S COMPENSATION DECLARATION: I hereby affirm under penalty of perjury one of the following declarations:

_____ I have and will maintain a certificate of consent to self-insure for workers' compensation as provided for by Section 3700 of the Labor Code, for the performance of work for which the permit is issued.

_____ I have and will maintain workers' compensation insurance, as required by Section 3700 of the Labor Code, for the performance of the work for which this permit is issued. My workers' compensation insurance carrier and policy number are:

Carrier NO Empl. Policy Number_____

_____ (This section need not be completed if the permit is for $100 or less) I certify that in the performance of the work for which this permit is issued, I shall not employ any person in any manner so as to become subject to the workers' compensation laws of California and agree that if I should become subject to the workers' compensation provisions of Section 3700 of the Labor Code, I shall forthwith comply with those provisions.

Date 10/27/97 Applicant Signature [signature]

WARNING: FAILURE TO SECURE WORKER'S COMPENSATION COVERAGE IS UNLAWFUL AND SHALL SUBJECT AN EMPLOYER TO CRIMINAL PENALTIES AND CIVIL FINES UP TO ONE HUNDRED THOUSAND DOLLARS ($100,000) IN ADDITION TO THE COST OF COMPENSATION, DAMAGES AS PROVIDED FOR IN SECTION 3706 OF THE LABOR CODE, INTEREST AND ATTORNEY'S FEE.

THIS PERMIT SHALL EXPIRE BY LIMITATION IF WORK IS NOT COMMENCED WITHIN 180 DAYS.

PERMIT NO. 97-14446

CITY OF SACRAMENTO
1231 I ST. ROOM 200
BUILDING INSPECTIONS DIVISION

AREA NO. 2

WHEN CORRECTIONS HAVE BEEN MADE, CALL **264-5191** FOR REINSPECTION OF WORK.

JOB LOCATION 6710 Riptide

INSPECTION REQUESTED Final Roofing

THE UNDERSIGNED (X) BUILDING ( ) PLUMBING ( ) MECHANICAL ( ) ELECTRICAL
INSPECTOR THIS DAY INSPECTED THIS STRUCTURE FOR THE REQUESTED INSPECTION AND FOUND THE FOLLOWING VIOLATIONS OF CITY AND/OR STATE LAWS GOVERNING SAME:

F 04509

Permit Issued For Comp Roofing

Provide Engineering on Tile Roof

INSPECTOR [signature] DATE 11/17/97

BUILDING INSPECTIONS 264-5716

INSPECTOR'S COPY

6710 Riptide Wy 97-14446

Paul Zacher-Structural Engineer
4701 Lakeside Way
Fair Oaks, CA 95628
TEL: 916.961.3938
FAX: 916.961.3938

September 25, 1997

Warren Roofing
4415 Granite Drive, #600
Rocklin, CA 95677
TEL: 916.630.9300
FAX: 916.630.1001

Attn.: Mr. Brian,

re: Job 97147

Subject: Structural Investigation Report of the Roof for the Residence located at 6710 Riptide Way, Sacramento, CA 95822.

As requested by Mr. Brian, this is a report to determine what needs should be addressed to correct any structural deficiencies of the roof. Paul Zacher visited the site September 25, 1997. The investigation was made to determine the existing condition of the structure.

The following is based on visual observations with no subsurface investigation being made.

DESCRIPTION:

Type of Facility:	Residence.
Year Built:	Estimated 1970's vintage.
Occupancy:	Residential.
No. of Stories:	One.
Dimensions:	Approximately 1800 square feet with a first story plate height of 8 feet.

CONSTRUCTION:

Roof:

The roof covering will consist of Monier Duralite Shake Tile over 1/2" solid sheathing. The living area is conventionally framed with 2x6 rafters spaced at 24" on center with 2x6 purlins supported from 6'-0" to 12'-0" on center by 2x4 struts bearing on walls or

beams below. The garage area is framed with 2x6 rafters spaced at 24" on center and 2x6 cross ties spaced at 4'-0" to 6'-0" on center.

CONCLUSIONS:

Roof:

The living and garage areas lack sufficient structural capacity for the applied live and dead loads.

RECOMMENDATIONS:

If any of the following recommendations do not correspond to actual field conditions, the engineer of record shall be notified for further investigation and evaluation before continuing work.

Living Area:

1. Scab a 2x8 DF#2 x 8'-0" long purlin to the existing 2x6 purlin that spans 8'-0" with 16d's @ 3" on center. See details 1 and 3.

2. Scab a 2x12 DF#2 x 12'-0" long purlin to the existing 2x6 purlin which spans 12'-0" with 16d's @ 3" on center. See details 1 and 3.

3. Add a 1/2" OSB gusset plate adjacent to each existing strut and rafter connection where the minimum slope of the struts is less than 45 degrees from the horizontal. Attach it with 8d's at 6" on center at the edges. See details 1 and 4.

4. At the North and South side of the residence add 2x6 collar ties at 4'-0" on center to tie the existing rafters together. Nail the collar ties to the existing rafter with 4 - 10d commons at each connection. Place the collar tie as close to the purlins as possible. See detail 1.

Garage Truss:

5. Scab a 1 3/4" x 14" microlam purlin to the existing 2x6 cross tie with 16d's at 12" on center. See details 2 and 5.

6. Add a 2x6 purlin with 2x4 struts to the beam below. The maximum spacing between the struts shall not exceed 6'-0" on center. The unbraced length of the struts shall not exceed 8'-0" and the minimum slope of the struts shall not be less than 45 degrees from the horizontal.. See detail 2.

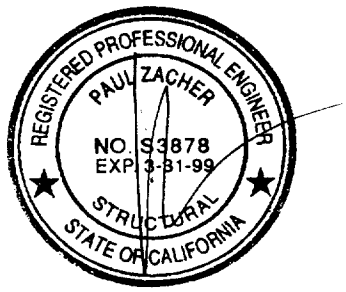
7. Add 2x6 collar ties at 4'-0" on center to tie the existing rafters together. Nail the collar ties to the existing rafter with 4 -10d commons at each connection. See detail 2.

The inspection consisted of visual observation only, made solely to determine the structural capacity of the existing roof. No warranties, expressed or implied, are made or intended in conjunction with this report. The inspection was made only to the portions that were accessible. The specific items noted were those that were observable and there may be defects which are not observable, or are hidden by architectural and structural materials.

If you have any questions on the above, do not hesitate to call.

Sincerely,

Paul Zacher, P.E., S.E.
file



DESIGN LOADING:

Roof Pitch	4	in 12
Pitch Adjustment Factor	1.05	

LOCATION: ROOF

MATERIAL	WEIGHT	
Monier Duralite Shake	7.40	psf
Roofing felt	0.50	psf
1/2" OSB/ plywood	1.50	psf
1x4 skip sht'g	1.09	psf
2x6 rafters @ 24" oc	1.00	psf
Load	11.5	psf
Roof Pitch Adjustment	0.62	psf
Total Load	12.1	psf

LOCATION: VAULT

MATERIAL	WEIGHT	
Monier Duralite Shake	7.40	psf
Roofing felt	0.50	psf
1/2" OSB/ plywood	1.50	psf
1x4 skip sht'g	1.09	psf
2x6 rafters @ 24" oc	1.00	psf
Batt/blown insul	0.50	psf
1/2" Gypboard	2.50	psf
Load	14.5	psf
Roof Pitch Adjustment	0.78	psf
Total Load	15.3	psf

BEAM DESIGN FOR UNIFORM LOAD: RAFTER

(Values for DF Larch #2)

Width, b	1.5	inches
Depth, d	5.5	inches
Length of beam	12	feet
Dead load roof	12.1	psf
Live load roof	16	psf
Contributory width of roof load	2	feet
Dead load floor	0	psf
Live load floor	0	psf
Contributory width of floor load	0	feet
Dead load wall	0	plf
Live load defl ratio	240	
Toal load defl ratio	180	
Total dead load	24.2	plf
Total live load	32	plf

Base design values:

Shear, Fv	95	psi
Bending, Fb	875	psi
Comp. perp. to grain, Fc	625	psi
Mod of Elasticity, E	1600000	psi
Load duration factor, Cd	1.25	
Size Factor, Cf	1.30	
Repetitive factor, Cr	1.15	

Dead load reaction	145	lbs
Live load reaction	192	lbs
Total load reaction	337	lbs

Allowable shear, Fv'	119	psi	Horizontal Shear OK
Actual shear, fv	57	psi	
Allowable bending, Fb'	1635	psi	Bending OK
Actual bending, fb	1605	psi	
Allowable live load defl	0.60	inches	Live Load Deflection OK
Actual live load defl	0.45	inches	
Allowable total load defl	0.80	inches	Total Load Deflection OK
Actual total load defl	0.79	inches	

Bearing length req'd	0.36	inches

BEAM DESIGN FOR UNIFORM LOAD: PATIO

(Values for DF Larch #1)

Width, b	3.5	inches
Depth, d	7.25	inches
Length of beam	8.75	feet
Dead load roof	12.1	psf
Live load roof	16	psf
Contributory width of roof load	7	feet
Dead load floor	0	psf
Live load floor	0	psf
Contributory width of floor load	0	feet
Dead load wall	0	plf
Live load defl ratio	240	
Toal load defl ratio	180	
Total dead load	84.7	plf
Total live load	112	plf

Base design values:

Shear, Fv	95	psi
Bending, Fb	1000	psi
Comp. perp. to grain, Fc	625	psi
Mod of Elasticity, E	1700000	psi
Load duration factor, Cd	1.25	
Size Factor, Cf	1.30	

Dead load reaction	371	lbs
Live load reaction	490	lbs
Total load reaction	861	lbs

Allowable shear, Fv'	119	psi	Horizontal Shear OK
Actual shear, fv	44	psi	
Allowable bending, Fb'	1625	psi	Bending OK
Actual bending, fb	737	psi	
Allowable live load defl	0.44	inches	Live Load Deflection OK
Actual live load defl	0.08	inches	
Allowable total load defl	0.58	inches	Total Load Deflection OK
Actual total load defl	0.14	inches	

Bearing length req'd	0.39	inches

BEAM DESIGN FOR UNIFORM LOAD: PURLIN AT VAULT

(Values for DF Larch #2)

Width, b	3	inches	
Depth, d	5.5	inches	
Length of beam	8	feet	
Dead load roof	12.1	psf	
Live load roof	16	psf	
Contributory width of roof load	8.83	feet	
Dead load floor	0	psf	
Live load floor	0	psf	
Contributory width of floor load	0	feet	
Dead load wall	0	plf	
Live load defl ratio	240		
Toal load defl ratio	180		
Total dead load	106.843	plf	
Total live load	141.28	plf	
Base design values:			
Shear, Fv	95	psi	
Bending, Fb	875	psi	
Comp. perp. to grain, Fc	625	psi	
Mod of Elasticity, E	1600000	psi	
Load duration factor, Cd	1.25		
Size Factor, Cf	1.30		
Repetitive factor, Cr	1.15		
Dead load reaction	427	lbs	
Live load reaction	565	lbs	
Total load reaction	992	lbs	
Allowable shear, Fv'	119	psi	Horizontal Shear OK
Actual shear, fv	80	psi	
Allowable bending, Fb'	1635	psi	Bending OK
Actual bending, fb	1575	psi	
Allowable live load defl	0.40	inches	Live Load Deflection OK
Actual live load defl	0.20	inches	
Allowable total load defl	0.53	inches	Total Load Deflection OK
Actual total load defl	0.34	inches	
Bearing length req'd	0.53	inches	

BEAM DESIGN FOR UNIFORM LOAD: PURLIN AT VAULT

(Values for DF Larch #2)

Width, b	1.5	inches
Depth, d	11.25	inches
Length of beam	12	feet
Dead load roof	12.1	psf
Live load roof	16	psf
Contributory width of roof load	5.92	feet
Dead load floor	0	psf
Live load floor	0	psf
Contributory width of floor load	0	feet
Dead load wall	0	plf
Live load defl ratio	240	
Toal load defl ratio	180	
Total dead load	71.632	plf
Total live load	94.72	plf

Base design values:		
Shear, Fv	95	psi
Bending, Fb	875	psi
Comp. perp. to grain, Fc	625	psi
Mod of Elasticity, E	1600000	psi
Load duration factor, Cd	1.25	
Size Factor, Cf	1.00	
Repetitive factor, Cr	1.15	

Dead load reaction	430	lbs
Live load reaction	568	lbs
Total load reaction	998	lbs

Allowable shear, Fv'	119	psi	Horizontal Shear OK
Actual shear, fv	75	psi	
Allowable bending, Fb'	1258	psi	Bending OK
Actual bending, fb	1136	psi	
Allowable live load defl	0.60	inches	Live Load Deflection OK
Actual live load defl	0.16	inches	
Allowable total load defl	0.80	inches	Total Load Deflection OK
Actual total load defl	0.27	inches	

Bearing length req'd	1.06	inches

PAUL ZACHER - STRUCTURAL ENGINEERS
4701 LAKESIDE WAY
FAIR OAKS, CA 95628
TEL: 916.961.3938
FAX: 916.961.3938

Title : WARREN\ TAKEUCHI **Job #** 97147
Dsgnr: P.K. ZACHER, S.E. **Date:** 8:27PM, 25 SEP 97
Description : ROOF INSPECTION

Scope : STRUCTURAL ENGINEERING

9

General Timber Beam

Description FAMILY ROOM VAULT

General Information

Section Name	6x12	Center Span	23.00 ft	....Lu	2.00 ft
Beam Width	5.500 in	Left Cantilever	ft	....Lu	0.00 ft
Beam Depth	11.500 in	Right Cantilever	ft	....Lu	0.00 ft
Member Type	Sawn	DOUGLAS FIR-LARCH, No.1			
LL & ST Do Not Act Together		Fb Allow	1,350.0 psi		
Load Dur. Factor	1.250	Fv Allow	85.0 psi		
Beam End Fixity	Pin-Pin	Fc Allow	925.0 psi		
Wood Density	34.000 pcf	E	1,600.0 ksi		

Uniform Loads

Uniform Loads Over Full Span

Center	DL	38.00 #/ft	LL	#/ft
Left Cantilever	DL	#/ft	LL	#/ft
Right Cantilever	DL	#/ft	LL	#/ft

Point Loads

Dead Load	427.0 lbs	lbs	lbs	lbs	lbs	lbs
Live Load	565.0 lbs	lbs	lbs	lbs	lbs	lbs
...distance	11.500 ft	0.000 ft	0.000 ft	0.000 ft	0.000 ft	0.000 ft

Summary

Beam Design OK

Span= 23.00ft, Beam Width = 5.500in x Depth = 11.5in, Ends are Pin-Pin

Max Stress Ratio	0.483 : 1				
Maximum Moment	8.2 k-ft		Maximum Shear * 1.5		1.3 k
Allowable	17.0 k-ft		Allowable		6.7 k
Max. Positive Moment	8.22 k-ft	at 11.500 ft	Shear:	@ Left	0.93 k
Max. Negative Moment	0.00 k-ft	at 23.000 ft		@ Right	0.93 k
Max @ Left Support	0.00 k-ft		Camber:	@ Left	0.000 in
Max @ Right Support	0.00 k-ft			@ Center	0.573 in
Max. M allow	17.01			@ Right	0.000 in
fb 813.34 psi	fv 21.30 psi	Reactions...			
Fb 1,683.50 psi	Fv 106.25 psi	Left DL	0.65k	Max	0.93k
		Right DL	0.65 k	Max	0.93 k

Deflections

Center Span...	Dead Load	Total Load
Deflection	-0.382 in	-0.604 in
Location	11.500 ft	11.500 ft
Length/Defl	722.1	456.88

Left Cantilever...	Dead Load	Total Load
Deflection	0.000 in	0.000 in
...Length/Defl	0.0	0.0

Right Cantilever...		
Deflection	0.000 in	0.000 in
...Length/Defl	0.0	0.0

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4701 LAKESIDE WAY
FAIR OAKS, CA 95628
TEL: 916.961.3938
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Title : WARREN\ TAKEUCHI **Job #** 97147
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10

General Timber Beam

Description FAMILY ROOM VAULT

Stress Calcs

Bending Analysis

Ck	24.972	Rb	4.348	Sxx	121.229 in3	Area	63.250 in2
Cf	1.000						

	Max Moment	Sxx Req'd	Allowable fb
@ Center	8.22 k-ft	58.57 in3	1,683.50 psi
@ Left Support	0.00 k-ft	0.00 in3	1,687.50 psi
@ Right Support	0.00 k-ft	0.00 in3	1,687.50 psi

Shear Analysis	@ Left Support	@ Right Support
Design Shear	1.35 k	1.35 k
Area Required	12.678 in2	12.678 in2
Actual Stress : fv	106.25 psi	106.25 psi

Bearing @ Supports

Max. Left Reaction	0.93 k	Bearing Length Req'd	0.183 in
Max. Right Reaction	0.93 k	Bearing Length Req'd	0.183 in

Query Values

M, V, & D @ Specified Locations		Moment	Shear	Deflection
@ Center Span Location =	0.00 ft	0.00 k-ft	0.93 k	0.0000 in
@ Right Cant. Location =	0.00 ft	0.00 k-ft	0.00 k	0.0000 in
@ Left Cant. Location =	0.00 ft	0.00 k-ft	0.00 k	0.0000 in

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Title : WARREN\ TAKEUCHI **Job #** 97147
Dsgnr: P.K. ZACHER, S.E. **Date:** 8:28PM, 25 SEP 97
Description : ROOF INSPECTION

Scope : STRUCTURAL ENGINEERING

General Timber Beam

Description LIVING ROOM VAULT

General Information

Section Name	4x14	Center Span	14.00 ft	.....Lu	2.00 ft
Beam Width	3.500 in	Left Cantilever	ft	.....Lu	0.00 ft
Beam Depth	13.250 in	Right Cantilever	ft	.....Lu	0.00 ft
Member Type	Sawn	DOUGLAS FIR-LARCH, No.1			
LL & ST Do Not Act Together		Fb Allow	1,000.0 psi		
Load Dur. Factor	1.250	Fv Allow	95.0 psi		
Beam End Fixity	Pin-Pin	Fc Allow	1,450.0 psi		
Wood Density	34.000 pcf	E	1,700.0 ksi		

Uniform Loads

Uniform Loads Over Full Span

Center	DL	55.00 #/ft	LL	#/ft
Left Cantilever	DL	#/ft	LL	#/ft
Right Cantilever	DL	#/ft	LL	#/ft

Point Loads

Dead Load	430.0 lbs	lbs	lbs	lbs	lbs	lbs
Live Load	568.0 lbs	lbs	lbs	lbs	lbs	lbs
...distance	7.000 ft	0.000 ft	0.000 ft	0.000 ft	0.000 ft	0.000 ft

Summary

Beam Design OK

Span= 14.00ft, Beam Width = 3.500in x Depth = 13.25in, Ends are Pin-Pin

Max Stress Ratio	0.456 : 1				
Maximum Moment	4.8 k-ft		Maximum Shear * 1.5		1.2 k
Allowable	10.6 k-ft		Allowable		5.5 k
Max. Positive Moment	4.84 k-ft	at 7.000 ft	Shear:	@ Left	0.88 k
Max. Negative Moment	0.00 k-ft	at 0.000 ft		@ Right	0.88 k
Max @ Left Support	0.00 k-ft		Camber:	@ Left	0.000 in
Max @ Right Support	0.00 k-ft			@ Center	0.117 in
Max. M allow	10.61		Reactions...	@ Right	0.000 in
fb 567.18 psi	fv 26.70 psi		Left DL 0.60k	Max	0.88k
Fb 1,243.26 psi	Fv 118.75 psi		Right DL 0.60 k	Max	0.88 k

Deflections

Center Span...	Dead Load	Total Load
Deflection	-0.078 in	-0.127 in
...Location	7.000 ft	7.000 ft
...Length/Defl	2,152.7	1,326.09

Left Cantilever...	Dead Load	Total Load
Deflection	0.000 in	0.000 in
...Length/Defl	0.0	0.0
Right Cantilever...		
Deflection	0.000 in	0.000 in
...Length/Defl	0.0	0.0

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Description : ROOF INSPECTION
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Date: 8:28PM, 25 SEP 97

Scope : STRUCTURAL ENGINEERING

12

General Timber Beam

Description LIVING ROOM VAULT

Stress Calcs

Bending Analysis

Ck	29.908	Rb	7.656	Sxx	102.411 in3	Area	46.375 in2
Cf	1.000						

	Max Moment	Sxx Req'd	Allowable fb
@ Center	4.84 k-ft	46.72 in3	1,243.26 psi
@ Left Support	0.00 k-ft	0.00 in3	1,250.00 psi
@ Right Support	0.00 k-ft	0.00 in3	1,250.00 psi

Shear Analysis	@ Left Support	@ Right Support
Design Shear	1.24 k	1.24 k
Area Required	10.427 in2	10.427 in2
Actual Stress : fv	118.75 psi	118.75 psi

Bearing @ Supports

Max. Left Reaction	0.88 k	Bearing Length Req'd	0.174 in
Max. Right Reaction	0.88 k	Bearing Length Req'd	0.174 in

Query Values

M, V, & D @ Specified Locations		Moment	Shear	Deflection
@ Center Span Location =	0.00 ft	0.00 k-ft	0.88 k	0.0000 in
@ Right Cant. Location =	0.00 ft	0.00 k-ft	0.00 k	0.0000 in
@ Left Cant. Location =	0.00 ft	0.00 k-ft	0.00 k	0.0000 in

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FAIR OAKS, CA 95628
TEL: 916.961.3938
FAX: 916.961.3938

Title : WARREN\ TAKEUCHI **Job #** 97147
Dsgnr: P.K. ZACHER, S.E. **Date:** 8:31PM, 25 SEP 97
Description : ROOF INSPECTION

Scope : STRUCTURAL ENGINEERING 13

General Timber Beam

Description GARAGE

General Information

Section Name	MICROLAM	Center Span	21.33 ft	.....Lu	2.00 ft
Beam Width	1.750 in	Left Cantilever	ft	.....Lu	0.00 ft
Beam Depth	14.000 in	Right Cantilever	ft	.....Lu	0.00 ft
Member Type	Sawn	DOUGLAS FIR-LARCH, No.1			
LL & ST Do Not Act Together		Fb Allow	2,600.0 psi		
Load Dur. Factor	1.250	Fv Allow	285.0 psi		
Beam End Fixity	Pin-Pin	Fc Allow	750.0 psi		
Wood Density	34.000 pcf	E	18,000.0 ksi		

Trapezoidal Loads

#1 DL @ Left	136.00 #/ft	LL @ Left	180.00 #/ft	Start Loc	8.330 ft
DL @ Right	136.00 #/ft	LL @ Right	180.00 #/ft	End Loc	21.330 ft

Summary

Beam Design OK

Span= 21.33ft, Beam Width = 1.750in x Depth = 14.in, Ends are Pin-Pin

Max Stress Ratio 0.931 : 1

Maximum Moment	12.9 k-ft	Maximum Shear * 1.5	3.8 k
Allowable	13.9 k-ft	Allowable	8.7 k

Max. Positive Moment	12.91 k-ft	at	12.286 ft	Shear: @ Left	1.25 k
Max. Negative Moment	-0.00 k-ft	at	21.330 ft	@ Right	2.86 k
Max @ Left Support	0.00 k-ft			Camber: @ Left	0.000 in
Max @ Right Support	0.00 k-ft			@ Center	0.089 in
Max. M allow	13.86			@ Right	0.000 in

				Reactions...			
fb	2,709.40 psi	fv	153.41 psi	Left DL	0.54k	Max	1.25k
Fb	2,909.79 psi	Fv	356.25 psi	Right DL	1.23 k	Max	2.86 k

Deflections

Center Span...	Dead Load	Total Load	Left Cantilever...	Dead Load	Total Load
Deflection	-0.059 in	-0.138 in	Deflection	0.000 in	0.000 in
..Location	11.177 ft	11.177 ft	...Length/Defl	0.0	0.0
..Length/Defl	4,323.1	1,860.59	**Right Cantilever...**		
			Deflection	0.000 in	0.000 in
			...Length/Defl	0.0	0.0

Stress Calcs

Bending Analysis

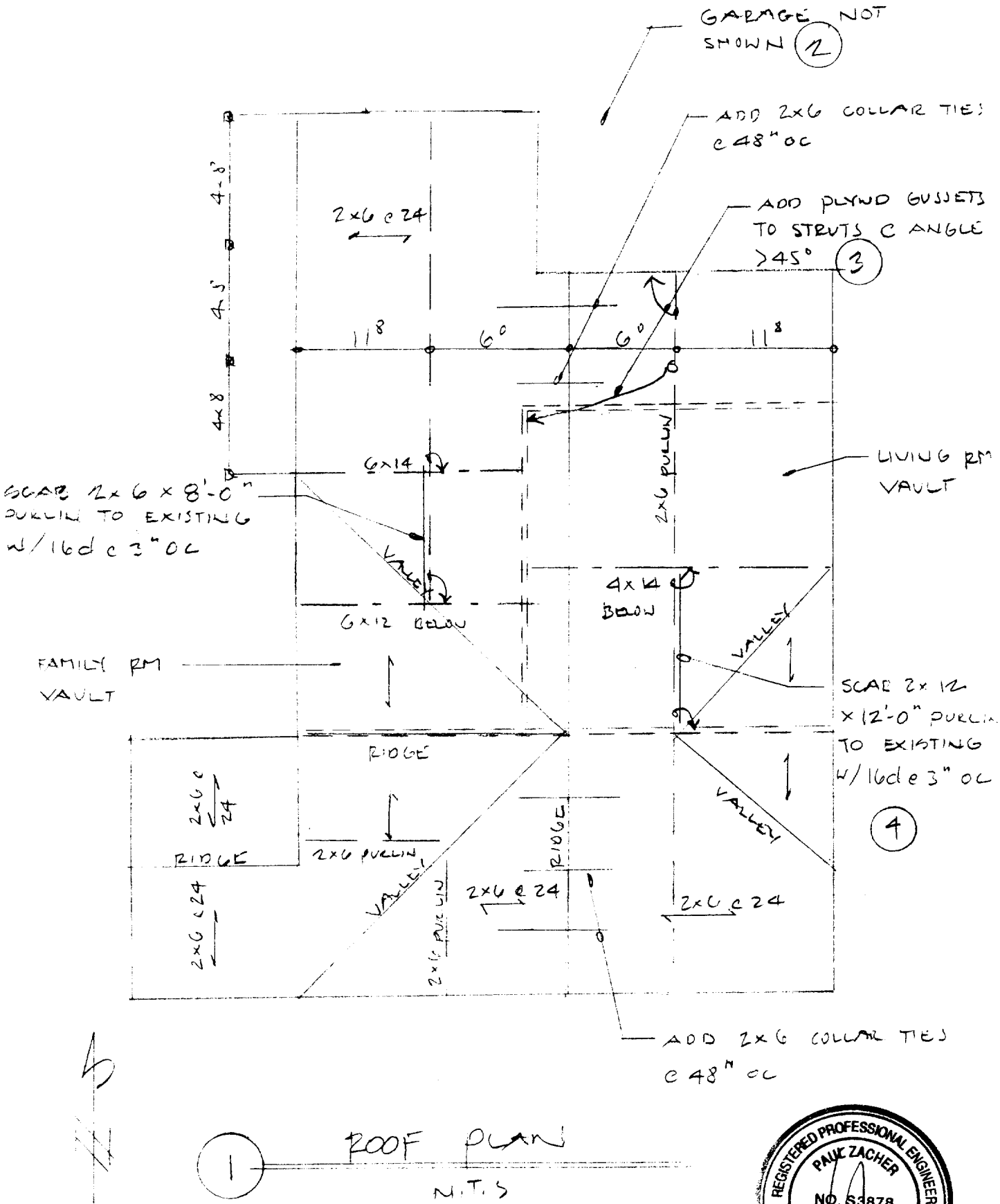
Ck 60.355 Rb 16.014 Sxx 57.167 in3 Area 24.500 in2
Cf 0.900

	Max Moment	Sxx Req'd	Allowable fb
@ Center	12.91 k-ft	53.23 in3	2,909.79 psi
@ Left Support	0.00 k-ft	0.00 in3	2,925.00 psi
@ Right Support	0.00 k-ft	0.00 in3	2,925.00 psi

Shear Analysis	@ Left Support	@ Right Support
Design Shear	1.88 k	3.76 k
Area Required	5.271 in2	10.550 in2
Actual Stress : fv	356.25 psi	356.25 psi

Bearing @ Supports

Max. Left Reaction 1.25 k Bearing Length Req'd 0.954 in



(1) ROOF PLAN

N.T.S

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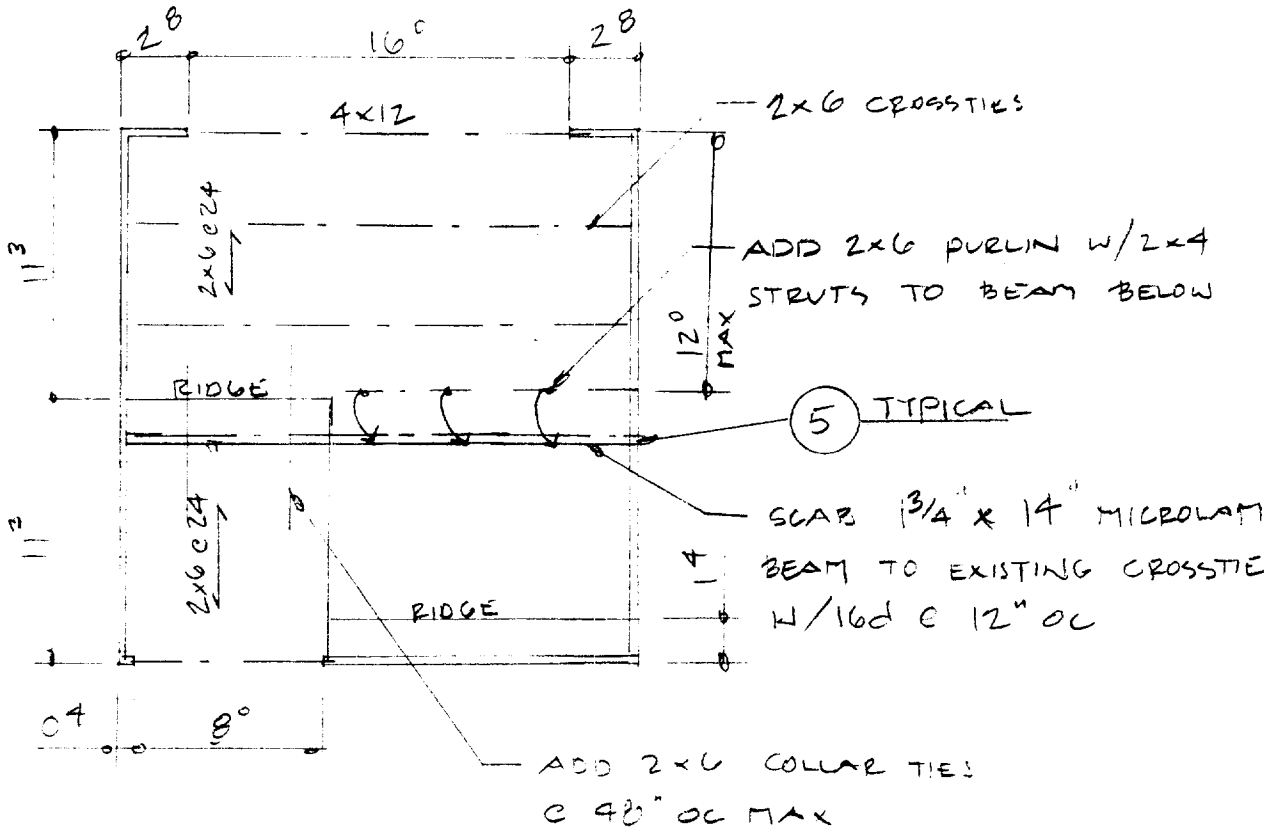
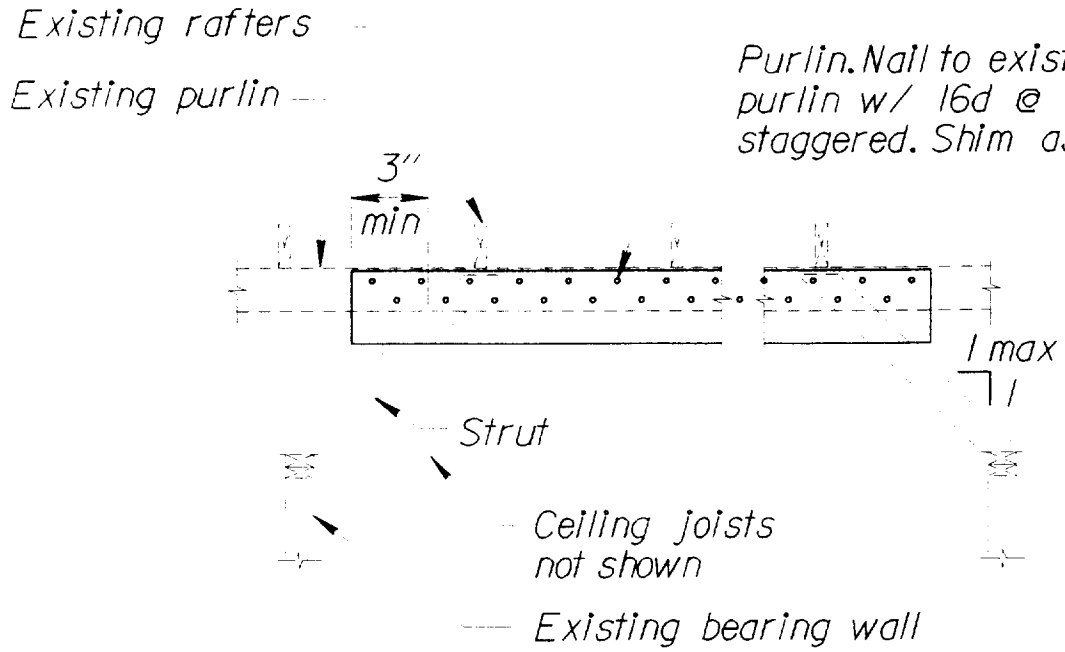


2 GARAGE ROOF

N.T.S.



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3 BEAM DETAIL

1" = 1'-0"

If "Length" of panel is greater that 24", add intermediate struts at 24" oc max

Add 2x4 shim as req'd w/ 16d @ 8" oc to existing member

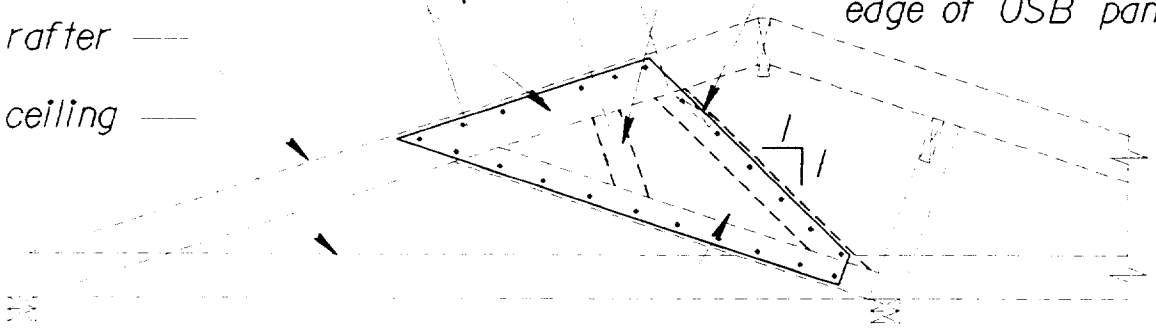
Length

24" oc max

Add 2x4 at strut location to brace edge of OSB panel

Existing rafter

Existing ceiling joist



Add 1/2" OSB w/ 8d @ 6" oc edges, 12" oc field at each existing strut to rafter connection (Approx 4'-0" oc)

Existing bearing wall

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4 STRUT REINFORCEMENT DETAIL

1/2" = 1'-0"

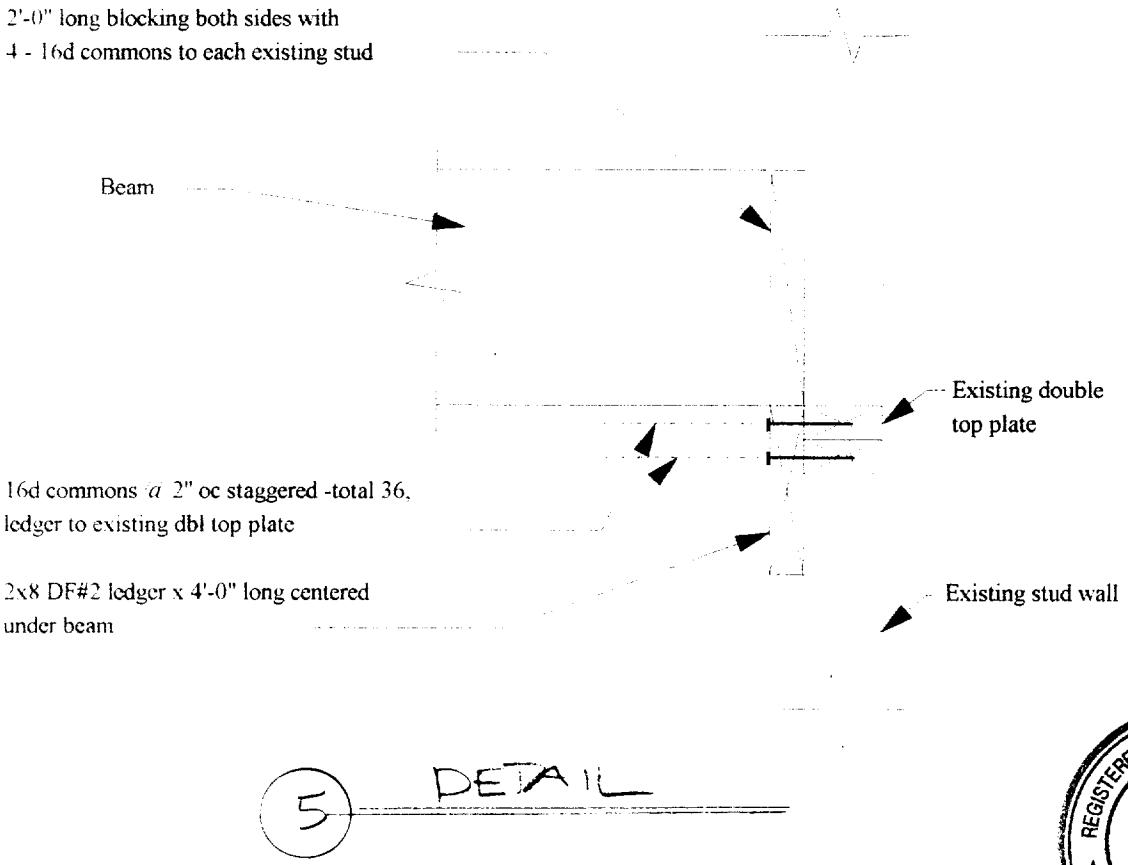
LEDGER DESIGN:

WOOD TO WOOD CONNECTION: Ledger to double top plate

Assumptions

1. Point load from beam is equally distributed to each supporting stud.
2. Allowable foundation pressure is 1000 plf.

Width, b	1.5	inches	
Depth, d	7.25	inches	
Maximum reaction	2860	lbs	
Base design values:			
Shear, Fv	95	psi	
Bending, Fb	875	psi	
Comp. perp to grain, Fc	625	psi	
Mod of elasticity, E	1600000	psi	
Load duration factor, Cd	1.25		
Size factor, Cf	1.20		
Allowable shear, Fv'	119	psi	Horizontal Shear OK
Actual shear, fv	79	psi	
Allowable bending, Fb'	1313	psi	Bending OK
Actual bending, fb	144	psi	
Length of ledger required	2.86	feet	
Length of ledger used	4	feet	
Number of nails required	36	16d commons ledger to top plate	



5 DETAIL

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