

CITY OF SACRAMENTO

1231 I Street, Sacramento, CA 95814

Permit No: 0612441

Insp Area: 2

Thos Bros: 337A4

Site Address: 7752 SLEEPY RIVER WY SAC

Parcel No: 031-0490-048

Sub-Type: RES

Housing (Y/N): N

CONTRACTOR  
MONARCH ROOFING INC  
8262 ALPINE AVE SUITE A  
SACRAMENTO, CA 95826

OWNER  
KRAPPENHOF BARRETT  
7752 SLEEPY RIVER WY  
SACRAMENTO, CA 95831

ARCHITECT

IN PROGRESS  
INSPECTION REQUIRED

PAID  
CITY OF SACRAMENTO  
AUG 14 2006

Nature of Work: REROOF T/O INSTALL METAL BATTEN SYSTEM AND 42 SQRS LIGHT WEIGHT TILE

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's Address \_\_\_\_\_

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 C31 License Number 806787 Date 8-14-06 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 License Law does not apply to an owner of property who builds or improves thereon, and who does such work himself or herself or through his/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/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.

I certify that I have read this application and state that all information is correct. I agree to comply with all city and county ordinances and state laws relating to building construction and hereby authorize representative(s) of this city to enter upon the abovementioned property for inspection purposes.

Date 8-14-06 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:

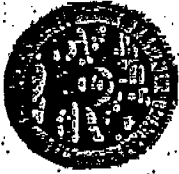
Carrier AMERICAN HOME ASSURANCE Policy Number 005-00016796 Exp Date 04/30/2007

(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 8-14-06 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.



**CITY OF SACRAMENTO**  
**PLANNING & BUILDING DEPARTMENT**  
 BUILDING DIVISION

www.cityofsacramento.org  
 Help Line: 1-916-808-5656 OR 1-866-EZ-PERMIT  
 Inspector: 1-916-808-7622

Fax # 916-808-1901 Downtown Permit Center, New City Hall  
 915 I Street, 3<sup>rd</sup> Floor, Sacramento, CA 95814

North Permit Center  
 2101 Arena Blvd., Suite 200, Sacramento, CA 95834

Fax # 916-808-9370

Activity # 0612441

**FAXED PERMIT APPLICATION**  
 (certain restrictions apply)

Date: 8-14-06

*Faxed request must be received in this office by 3:00 P.M. to be processed the following workday.  
 Note: Contractors must have a current certificate of Worker's Compensation Insurance.*

*Note: Work started before a Building Permit is issued will be subject to a surcharge.*

**IN ORDER TO PROCESS THIS REQUEST, ALL THE FOLLOWING INFORMATION MUST BE PROVIDED:**

RESIDENTIAL  APARTMENTS (4+ units per building)  COMMERCIAL (limited)

Job Address: 7752 SLEEPY RIVER WAY Unit # 241500

Contact Person: Miguel Cabello Contract Price \$ 452-5032

Property Owner: RON KRAFT Contractor: MONARCH POOLING License # 806787

Address: 7752 SLEEPY RIVER WAY Address: 8260 ALPINE AVENUE # A

City/State/Zip: SACRAMENTO CA 95831 City/State/Zip: SACRAMENTO CA 95826

Phone: 399-9902 Phone: 452-5032 Fax: 456-1703

Nature of Work: (Provide detailed description of work & indicating type of work in selections below)

Description of Work: LEAK off CEILING SHAKE install metal batten system and  
Re-roof with light weight tile

Reroof (excluding tile)  
 Tear-Off  
 Resheet  
 House  Garage  
 # Stories: 1  
 # Squares: 432  
 Material: TILE  
 Siding  
 Wood  
 T-111  
 Horiz  
 Vinyl  
 Stucco

HVAC Installations (Residential Only)  
 Change-out  New  
 Heat Pump  
 Package  
 Split system  
 Roof mount  
 Cut-in  
 Heat pump or elect. unit to gas.  
 Wall furnace  
 Other (describe below)  
 Value of duct work: \_\_\_\_\_  
 Equipment: \$ \_\_\_\_\_  
 Cut-in: \$ \_\_\_\_\_

Water Heater (Residential Only)  
 Gas  Electric  
 Change-out  
 Electric to Gas  
 Relocate  
 New  
 Dry Rot or Termites  
 Damage Repair  
 (Describe Locations Below)

Minor Electric and/or Minor Plumbing (Residential Only)  
 Electric Service Change # amps  
 New electric circuits  
 Re-wire  
 Water Service Replacement  
 Sewer Service Replacement  
 Gas Line Replacement  
 Re-plumb  
 Water  Waste

Public Utilities Safety Inspection (Residential and single apartment units Only)  
 SMUD  
 PG&E

◆ NOTE:  
 Correction Notice items will require an additional building permit.

\*Design Review approval may be required.

\*Design Review approval may be required.



PZSE - INC. - STRUCTURAL ENGINEERING - 4701 LAKEVIEW - FAIR OAKS, CA 95622 - TEL: (916) 981-3960 - FAX: (916) 981-6562 - E-MAIL: paul@pzse.com

PZSE, Inc. - Structural Engineering  
4701 Lakeview  
Fair Oaks, CA 95622

TEL: (916) 981-3960  
FAX: (916) 981-6562  
E-mail: paul@pzse.com

**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.

**Roof Structure:**

1. Scab a 1 3/4" x 11 7/8" LVL beam to the existing 2x8 crosstie and nail together with 16d's @ 6" oc. The ends of the LVL may be clipped as required to meet the slope of the rafters. The support at the interior wall shall be a 2x8 x 2'-8" long ledger attached to the double top plate with 16d's @ 2" oc staggered. Support the existing ridge, hip and valley boards to the LVL beam with 2x4 struts. See details 1 and 2.
2. Scab a 2x6 rafter to the existing 2x6 rafters with 16d's @ 12" on center where the span is greater than 12'-0". The rafter to be scabbed to the existing rafter may be held short of the intersecting bearing wall, hip, valley, ridge or purlin by no more than 4". See detail 1.
3. Add a 2x6 DF#2 x 36'-0" long purlin with 2x4 struts to the bearing walls below. See detail 1.
4. Provide additional 2x4 struts from the existing purlins to the bearing walls below. The maximum spacing between the new and existing 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 1.

It shall be noted that small hairline cracking may occur at exterior stucco and interior gypboard finished walls that are load bearing or distributing roof strut loads. These cracks are a natural occurrence as the existing structure re-distributes the new roof weight. They are cosmetic in nature and are not an indication of a structural hazard or failure.

It shall be noted that some deflection of the rafters may be evident after installation of the tile. The existing roof framing has deflected but this may not be readily evident due to the uneven nature of the existing roofing material. Concrete tile is a very consistent and uniform product and when installed in an even plane, even small deflections can become apparent. This is only a cosmetic issue and not a structural concern.

The inspection consisted of visual observation only, made solely to determine the structural capacity of the existing roof. Analysis does not determine any effects on the overall structure under lateral forces or effects on the foundation unless specifically noted in the calculations and in this document. 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 that 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



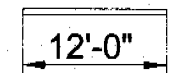
LOADING:

Rafter:

Dr = 11.4 psf x 2'-0" = 22.8 plf  
 Lr = 16.0 psf x 2'-0" = 32.0 plf

2x6 #2

22.8 / 32.0

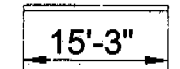


Rafter:

Dr = 11.4 psf x 2'-0" = 22.8 plf  
 Lr = 16.0 psf x 2'-0" = 32.0 plf

2 - 2x6 #2

22.8 / 32.0

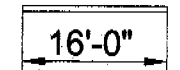


B1:

Dr = 11.4 psf x 7'-0" = 80 plf  
 Lr = 16.0 psf x 7'-0" = 112 plf

4x12 #2

80 / 112

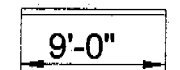


B2:

Dr = 11.4 psf x 7'-0" = 80 plf  
 Lr = 16.0 psf x 7'-0" = 112 plf

4x10 #1

80 / 112

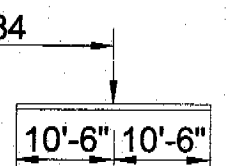


LVL:

Pdr = 11.4 psf x 7' x 7' = 558 lbs  
 Plr = 16.0 psf x 7' x 7' = 784 plf

1-3/4"x11 7/8" LVL

558 / 784



## Timber Beam & Joist

### Description RAFTERS AND BEAMS

#### Timber Member Information Code Ref: 1997/2001 NDS, 2000/2003 IBC, 2003 NFPA 5000. Base allowables are user defined

	rafter	rafter	B1	B2	LVL
Timber Section	2x6	2-2x6	4x12	4x10 MicroLam: 1.75x11.	
Beam Width	in 1.500	3.000	3.500	3.500	1.750
Beam Depth	in 5.500	5.500	11.250	9.250	11.875
Le: Unbraced Length	ft 0.00	0.00	0.00	0.00	0.00
Timber Grade	Douglas Fir - Larch, No.2	Douglas Fir - Larch, No.2	Douglas Fir - Larch, No.2	Douglas Fir - Larch, No.1	Truss Joist - MacMillan,
Fb - Basic Allow	psi 875.0	875.0	875.0	1,000.0	2,600.0
Fv - Basic Allow	psi 95.0	95.0	95.0	95.0	285.0
Elastic Modulus	ksi 1,600.0	1,600.0	1,600.0	1,700.0	1,900.0
Load Duration Factor	1.250	1.250	1.250	1.250	1.250
Member Type	Sawn	Sawn	Sawn	Sawn	Manuf/Pine
Repetitive Status	Repetitive	Repetitive	No	No	No

#### Center Span Data

Span	ft	12.00	15.25	16.00	9.00	21.00
Dead Load	#/ft	22.80	22.80	80.00	80.00	
Live Load	#/ft	32.00	32.00	112.00	112.00	
Point #1 DL	lbs					558.00
LL	lbs					784.00
@ X	ft					10.500

#### Results Ratio = 0.9572 0.7730 0.8300 0.3116 0.6325

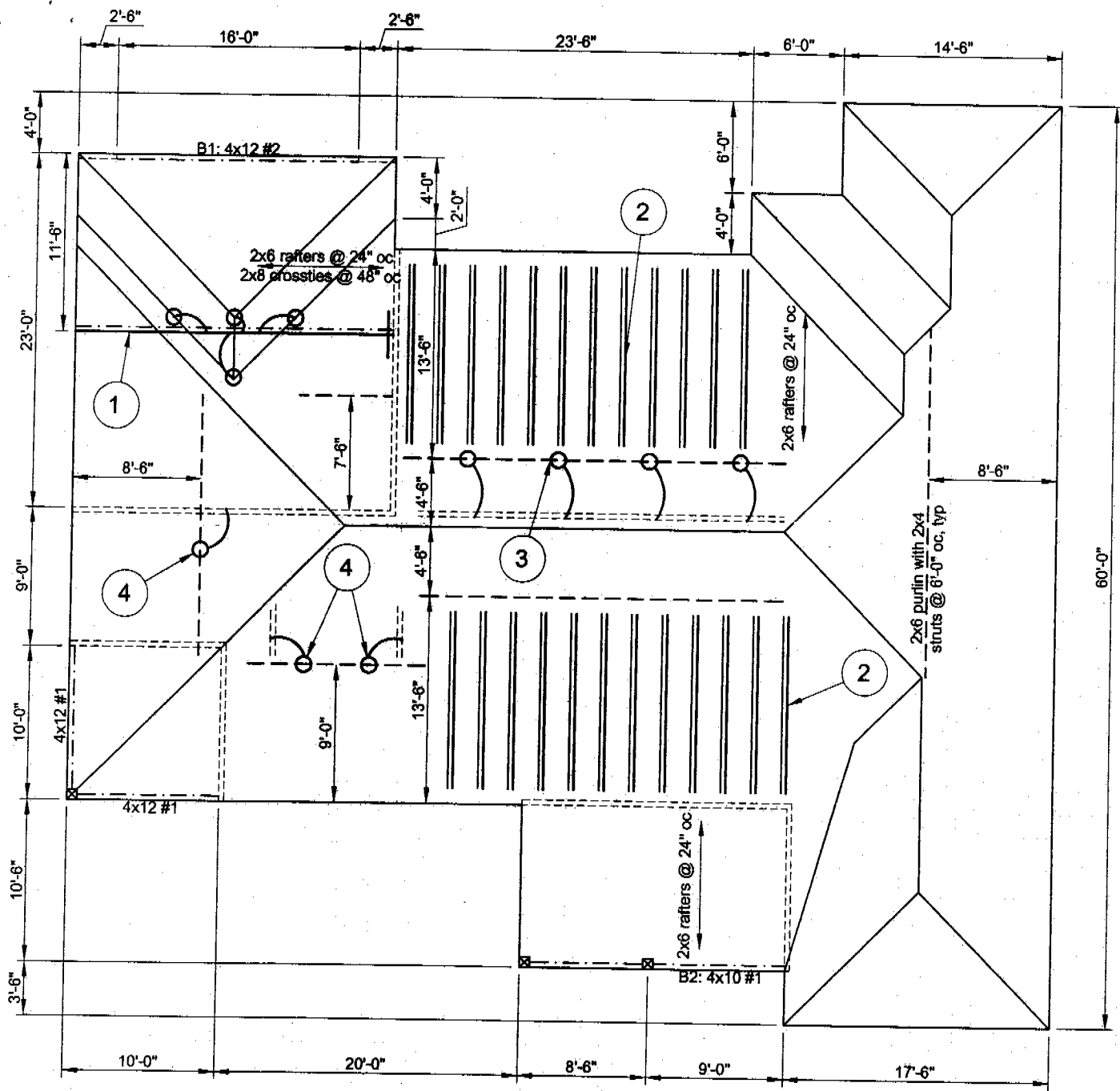
Mmax @ Center	in-k	11.84	19.12	73.73	23.33	84.55
@ X =	ft	6.00	7.62	8.00	4.50	10.50
fb : Actual	psi	1,565.2	1,263.9	998.6	467.4	2,055.6
Fb : Allowable	psi	1,635.2	1,635.2	1,203.1	1,500.0	3,250.0
		Bending OK	Bending OK	Bending OK	Bending OK	Bending OK
fv : Actual	psi	55.5	35.9	52.0	33.3	48.4
Fv : Allowable	psi	118.8	118.8	118.8	118.8	356.3
		Shear OK	Shear OK	Shear OK	Shear OK	Shear OK

#### Reactions

@ Left End DL	lbs	136.80	173.85	640.00	360.00	279.00
LL	lbs	192.00	244.00	896.00	504.00	392.00
Max. DL+LL	lbs	328.80	417.85	1,536.00	864.00	671.00
@ Right End DL	lbs	136.80	173.85	640.00	360.00	279.00
LL	lbs	192.00	244.00	896.00	504.00	392.00
Max. DL+LL	lbs	328.80	417.85	1,536.00	864.00	671.00

#### Deflections Ratio OK Deflection OK Deflection OK Deflection OK Deflection OK

Center DL Defl	in	-0.320	-0.417	-0.178	-0.030	-0.401
L/Defl Ratio		450.5	438.9	1,081.5	3,588.8	628.5
Center LL Defl	in	-0.449	-0.585	-0.249	-0.042	-0.563
L/Defl Ratio		320.9	312.8	772.5	2,563.5	447.3
Center Total Defl	in	-0.768	-1.002	-0.426	-0.072	-0.964
Location	ft	6.000	7.625	8.000	4.500	10.500
L/Defl Ratio		187.4	182.6	450.6	1,495.3	261.3



**FRAMING NOTES:**

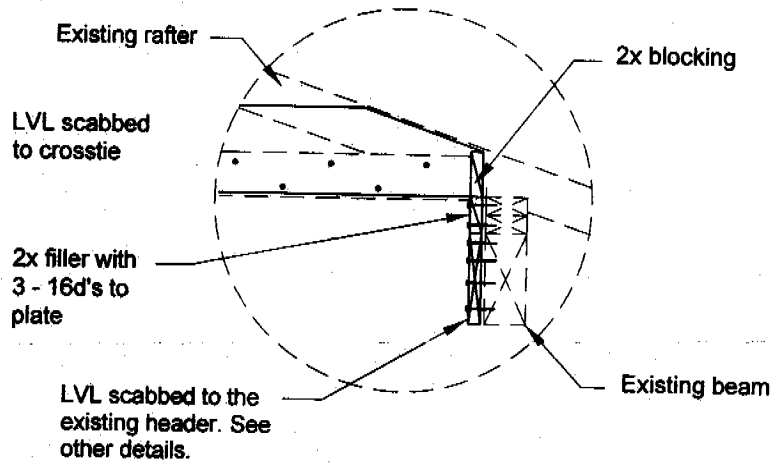
1. Scab a 1-3/4" x 11-7/8" LVL to the existing 2x6 crossie with 16d's @ 6" oc. The ends of the LVL may be clipped as required to meet the slope of the rafters. The support at the interior wall shall be a 2x8 x 2'-8" long ledger attached to the double top plate with 16d's @ 2" oc staggered. Support the existing ridge, hip and valley rafters to the LVL below with 2x4 struts. See detail 2.
2. Scab a 2x6 to existing 2x6 rafters where the span is greater than 12'-0" (total 25).
3. Add a 2x6 DF#2 x 36'-0" long purlin with 2x4 struts to bearing below.
4. Add 2x4 struts to bearing below (total 3).

**NOTES:**

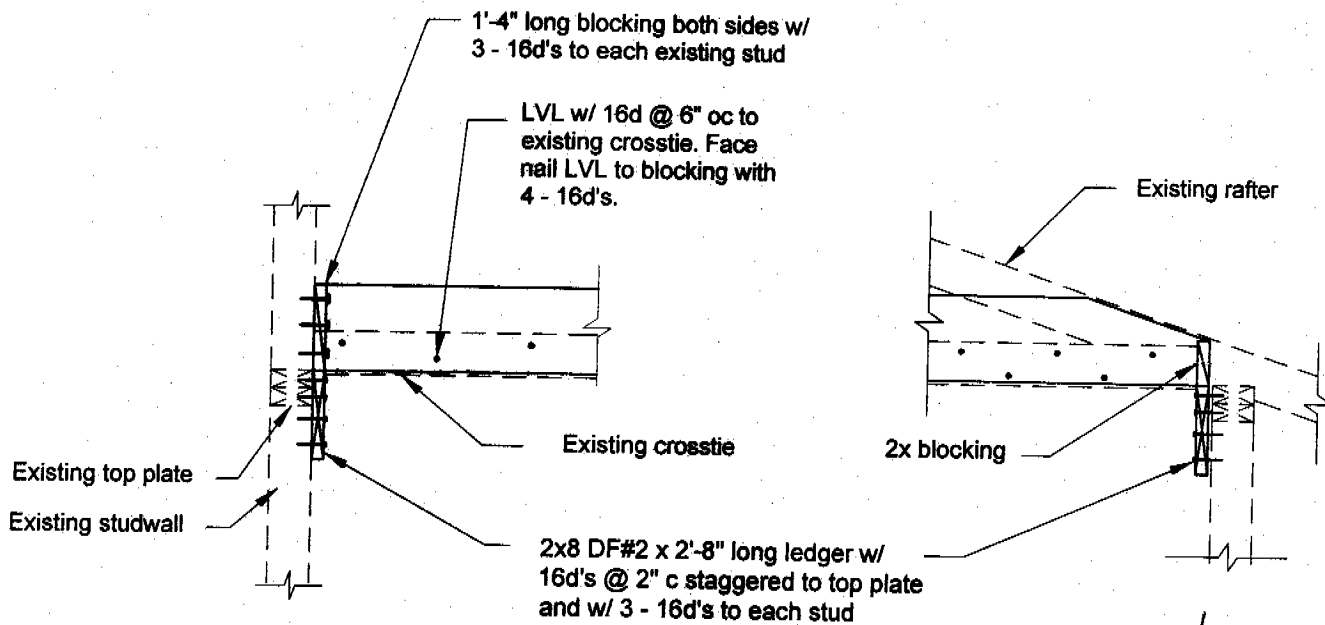
- A. This is a reroof project. The new roofing material shall be a Light Weight Concrete Tile. The tile shall weigh less than or equal to 7.3 psf.
- B. All framing members including rafters, purlins, joists and beams are existing unless otherwise noted in the framing notes above.
- C. All rafters are 2x6 DF#2 and hips and valleys are 2x8 DF#2 unless otherwise noted.
- D. All existing rafter, hips, valleys, rafter ties, and purlins are braced per UBC Section 2320.1 "Roof and Ceiling Framing" unless otherwise shown.
- E. All structural wood members that were observed appear to be in sound condition and without structural defect.

**1 ROOF PLAN - KRAFT**  
Not to Scale





**ALTERNATE CONNECTION AT BEAM**

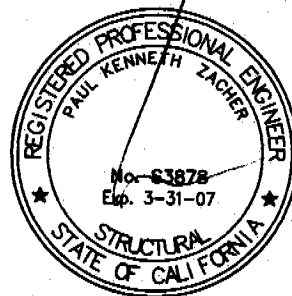


2

**LEDGER CONNECTION**

scale: 1/2" = 1'-0"

7





ICC Evaluation Service, Inc.
www.icc-es.org

Business/Regional Office # 5360 Workman Mill Road, Whittier, California 90601 # (562) 699-0543
Regional Office # 900 Montclair Road, Suite A, Birmingham, Alabama 35213 # (205) 599-9800
Regional Office # 4051 West Flossmoor Road, Country Club Hills, Illinois 60478 # (708) 799-2305

Legacy report on the 1997 Uniform Building Code™

DIVISION: 07—THERMAL AND MOISTURE PROTECTOR
Section: 07320—Roof Tile

Malibu tiles and 7.0 psf (34 kg/m²) for Ponderosa and Bel Air tiles.

EAGLE AND EAGLELITE INTERLOCKING CONCRETE ROOFING TILES

2.2 Installation:

EAGLE ROOFING PRODUCTS
3546 NORTH RIVERSIDE AVENUE
RIALTO, CALIFORNIA 92377

2.2.1 New Construction: Installation shall be in accordance with the Concrete and Clay Roof Tile Installation Manual for Moderate Climate Regions. See evaluation report ER-6034P.

1.0 SUBJECT

Eagle and Eaglelite™ Interlocking Concrete Roofing Tiles.

2.2.2 Reroofing: Eagle tiles, as described in Section 2.1.1, provide a Class A roof when installed over existing asphalt shingle roofs. Care should be taken to ensure both horizontal and vertical alignment on the roof. Foreign matter must be cleaned from all interlocking areas. Cracked or broken tiles must be removed from the roof. Damaged or rusted flashing should be replaced. Existing framing must be adequate for the additional load. Structural data verifying adequacy should be submitted to the building official. The existing roof must be inspected in accordance with Appendix Chapter 15, Section 1515, of the 1997 Uniform Building Code™ (UBC). When reroofing wood shake roofs, existing shakes must be removed and solid decking and tile must be installed, as with new construction. When installed over existing spaced sheathing boards, underlayment complying with the UBC or an underlayment recognized specifically for this type of use in an ICC-ES evaluation report, installed with or without battens, may be used. One layer of No. 30 felt or approved equal underlayment must be installed on the roof prior to application of tile. In lieu of this underlayment's being provided, the building official may determine that the existing roof covering provides the required underlayment protection.

2.0 DESCRIPTION

2.1 General:

2.1.1 Eagle Tiles: Eagle conventional-weight interlocking concrete roofing tiles are produced in high-profile (Capistrano), low-profile (Malibu), and flat-profile styles with either smooth surfaces (Bel Air Standard, Bel Air Estate or Bel Air Double Eagle) or textured surfaces (Ponderosa Standard, Ponderosa Estate, Ponderosa Double Eagle or Ponderosa Golden Eagle). Ridge and rake trim units are produced to match each product.

Details not covered under this section are identical to those described in Section 2.2.1.

The tiles are composed of Type II portland cement, washed sand, and proprietary additives. Mineral coloring oxides are added to or are mixed with portland cement and water for surface application following extrusion. Units are cured under controlled temperature and humidity conditions. Tiles are 17 inches (432 mm) long, 12 3/8 inches (315 mm) wide, and nominally 1/2 inch (12.7 mm) thick. They are manufactured in either flat or profile style with 3/4-inch-wide (19 mm) interlocking sidelaps designed to resist surface water penetration and maintain proper alignment. All tiles have protruding head lugs on the underside, which provide for mechanical attachment over wooden battens, or provide a stable foundation for nail attachment to solid decking. Two nail holes are provided in each tile for use where half tiles are needed at roof edges, chimneys, skylights, etc. Approximate installed dry weights with 3-inch (76 mm) head laps are 9.5 psf (46 kg/m²) for Capistrano tiles, 9.5 psf (46 kg/m²) for Malibu tiles and 10.0 psf (49 kg/m²) for Ponderosa and Bel Air tiles.

2.3 Roof Classification:

When installed over solid sheathing in accordance with this report, Eagle and Eaglelite roofing tiles are Class A roof coverings in accordance with Section 1504.1 of the UBC. When installed over spaced or solid sheathing in accordance with this report, the tiles are noncombustible roof coverings in accordance with Section 1504.2 of the UBC. The tiles are Class A roof coverings when installed over existing asphalt shingles in accordance with Section 2.2.2 of this report.

2.1.2 Eaglelite Tiles: Eaglelite tiles are produced in the same size, manner and shapes as the conventional-weight Eagle tiles described in Section 2.1.1, except for substitution of lightweight aggregates and additives for sand. Approximate installed dry weights with 3-inch (76 mm) head laps are 5.7 psf (28 kg/m²) for Capistrano tiles, 5.5 psf (27 kg/m²) for

2.4 Identification:

The name EAGLE and the evaluation report number (ER-4660) are imprinted on each tile. A tag on each shipping pallet indicates the producing plant location, product identification and the installed weight for Eagle and Eaglelite tiles. The tiles are identified by the product name "Eagle" on a tag and a light-colored strip across the headlap area.



Handwritten signature and date: 8-14-06

ICC-ES legacy reports are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, Inc., express or implied, as to any finding or other matter in this report, or as to any product covered by the report.



**3.0 EVIDENCE SUBMITTED**

Results of tests in accordance with the ICC-ES Interim Criteria for Clay and Concrete Roof Tiles (AC180), dated January 2002, and a quality control manual.

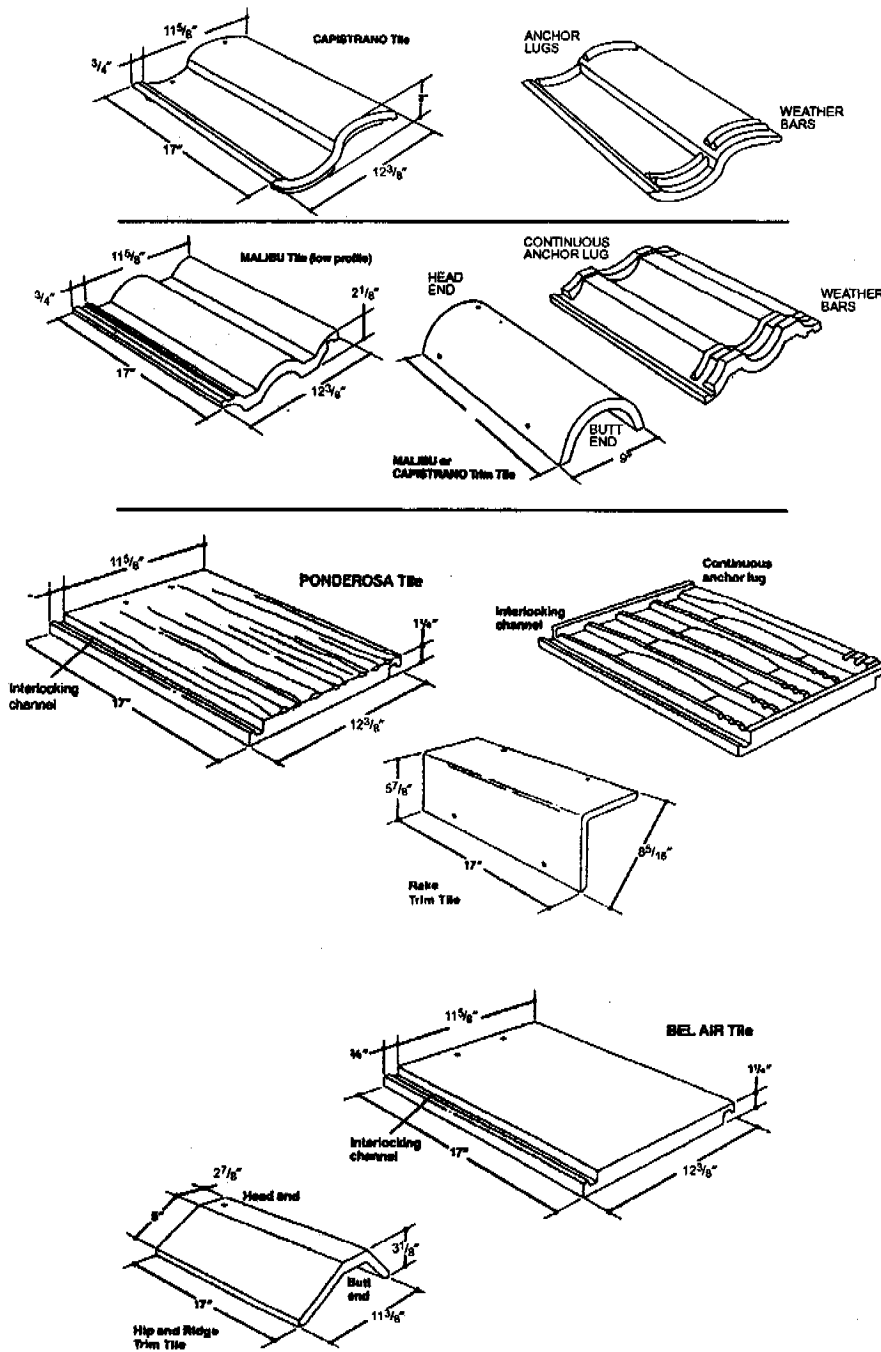
**4.0 FINDINGS**

That the Eagle Concrete Roofing Tiles described in this report comply with the 1997 *Uniform Building Code*™, subject to the following conditions:

**4.1** Tiles are manufactured, identified and installed in accordance with this report and the manufacturer's instructions.

**4.2** Tiles are manufactured at Eagle Roofing Products facilities located in Rialto, California, and Phoenix, Arizona.

This report is subject to re-examination in two years.



FIELD AND TRIM SPECIFICATIONS



P.K. Zacher, S.E.

Job #: 02-234

Date: 6/15/02

4701 Lakeside Way  
Fair Oaks, CA 95628  
TEL: (916) 981-3960  
FAX: (916) 981-6552

LOADING

WIND UPLIFT = 0.97 PSF ↑

TILE (DL) = 8.0 PSF (INCLUDES STAGGER)

TILE (SLIDING ON 0.12 SLOPE) = 8.0 PSF x  $\frac{6}{180}$  = 4.77 PSF

THERMO PLST = 0.5 PSF

FLEXURAL CAPACITY OF BATTEN (22 GAGE)

DE = 8.5 PSF x 13.12 / 12 = 9.6 PSF

9.6 / 180

LR = 10.0 PSF x 18.0

2°

$S_{REQD} = \frac{1.5 (27.6) (2)}{55,000} = 0.0050 \text{ in}^3$

$S_{ACTUAL} = \frac{I}{L} = \frac{0.017}{7.16} = 0.0297 \text{ in}^3 > 0.005 \text{ O.K.}$

FLEXURAL CAPACITY OF

COUNTER BATTEN (22 GAGE)

NOT APPLICABLE AS THIS MEMBER IS PLACED DIRECTLY OVER AND IS SUPPORTED BY A WOOD RAFTER

AXIAL CAPACITY OF

COUNTER BATTEN (25 GAGE)

AREA = 0.104 in<sup>2</sup>

T = 4.77 PSF x 27 x 12 = 19#

TALLOW = 0.6 x 55,000 x 0.104 = 2059# > 19# O.K.

Job #: 02-234

Date: 6/15/02

EASIER CAPACITY

COUNTER BATTEN TO BELLS

SHEAR

$$V = 9.77 \text{ kip} \times 20 \times 20 \times 10 \text{ #}$$

$$F_c = \frac{F_{cs}}{F_{cs}} = \frac{4650}{59,000} = 0.151$$

$$K_1 = 1 + \left[ \frac{E(1+0.14) + E(100,000)(1+2(0.14))(0.155)^2}{0.14} \right]^{1/2}$$

$\rightarrow \times 4650 (0.155)^2$

$$= 1 + \left[ 3.282 + 0.0272 \right]^{1/2} = 0.596$$

$$K_2 = 1 + \left[ \frac{E(1+0.14) + E(100,000)(2+0.14)(0.155)^2}{0.14} \right]^{1/2}$$

$\rightarrow \times 4650 (0.155)^2$

$$= 1 + \left[ 6.8 + 0.0272 \right]^{1/2} = 24.530$$

MODE III

$$Z = \frac{K_1 D_s F_{cs}}{K_0 (1+2p_c)} = \frac{0.596 (0.155) (3 \times 2) 4650}{2.2 (1+2(0.147))} = 405 \text{ #}$$

MODE III

$$Z = \frac{K_2 D_s F_{cs}}{K_0 (2+p_c)} = \frac{24.530 (0.155) (3 \times 2) (4650)}{2.2 (2+0.141)} = 97 \text{ #}$$

P.K. Zacher, S.E.

710 LINDSAY WAY  
Fair Oaks, CA 95628  
TEL (916) 881-3960  
FAX (916) 881-6552

Job #: 02-239

Date: 6/15/02

MODE IV

$$Z = \frac{D^2}{K_D} \left[ \frac{2 \text{ Fem } F_{10}}{5(1+K_D)} \right]^{1/2}$$

$$Z = \frac{(0.125)^2}{1.2} \left[ \frac{2 \times 4050 \times 109,000}{5(1+0.141)} \right]^{1/2} = 13.2"$$

Z = 9.2" > 19" OK

COUNTER BATTEN TO DELTA

UPLIFT

$$T = (11 \text{ psf} - 8 \text{ psf}) \times 2' \times 2' = 12 \text{ lbs}$$

$$\text{New CAPACITY} = 50 \text{ lbs} \times 1.15 = 57.5 \text{ lbs} > 12 \text{ lbs}$$

HAF CHANNEL CAPACITY

SINCE THE HEAD OF THE 1/2" DIA. HAF CHANNEL IS EQUIVALENT TO THE DIAMETER OF A #6 SCREW, THE PULL OUT (OR DRILL THROUGH) VALUE IS 52 LBS PER THE ATTACHED SHEET. THIS IS ADEQUATE TO MEET THE REQUIRED UPLIFT FORCE OF 12 LBS.

Job #: 02-234  
Date: 10/15/02

BATTEN TO COUNTER BATTEN

SHEAR:

$V = 477 \text{ PSF} \times 20 \times 2 = 19 \text{ k}$

A # 8 SCREW HAS A SHEAR VALUE OF 90 lbs

PER THE ATTACHED CHART THIS VALUE IS ADEQUATE TO RESIST THE APPLIED SHEAR FORCE OF 19 lbs

UPLIFT:

$T = (1/2)(1 \text{ PSF} - 8 \text{ PSF}) \times 20 \times 20 = 12 \text{ k}$

A # 8 SCREW HAS A UPLIFT VALUE OF 57 lbs

PER THE ATTACHED CHART THE VALUE IS ADEQUATE TO RESIST THE APPLIED UPLIFT FORCE OF 12 lbs

TILE TO BATTEN:

THE FOLLOWING IS BASED ON THE ASSUMPTION THAT TILE IS EQUIVALENT TO CYCLOPS BLOCK IN SHEAR, BEARING & FLEXURAL STRENGTH

SHEAR:

$V = 477 \text{ PSF} \times 1/2 (\text{1 SCREW PER TILE}) = 477 \text{ PSF}$

A QUADRIPOLE " SWESD 1582" SCREW HAS A CAPACITY OF 100 lbs (SAFE) = 47.1 lbs (BASED ON A SAFETY FACTOR OF 2) THIS VALUE IS ADEQUATE TO RESIST THE APPLIED SHEAR FORCE

Job #: 02-234

Date: 6/15/02

TILE TO METAL

LIFT:

$$W = (1.0 P.F. + 8 P.F.) = 12 \text{ lbs}$$

No values are given for the pull out of  
 GYPSUM BOARD (TILE) TO OR ON METAL. HOWEVER, THE  
 LIFT FAILURE MAY BE BROKEN INTO A MINIMUM  
 OF 2 COMPONENTS. FOR PURPOSES OF THIS DOCUMENT,  
 THE 2 COMPONENTS OF CONCERN ARE THE SCREW  
 TO TILE FAILURE AND THE SCREW TO METAL  
 FAILURE. THE SCREW TO METAL CAPACITY IS  
 PER THE ATTACHED QUIKDRIVE CATALOG AND  
 IS 125 lbs/in  $\phi$  (16 GA. BATH W/ A  
 SAFETY EXCERPT E.G.) THIS VALUE IS ADEQUATE  
 TO RESIST THE APPLIED LIFT FORCE. THE  
 SCREW TO TILE CAPACITY IS ADDRESSED AS FOLLOWS  
 THESE SCREWS ARE USED TO HOLD GYPSUM BOARD  
 CEILING IN PLACE SINCE 1/2" THICK GYPSUM  
 WEIGH 5 P.F. (SUSTAINS LONG TERM LOAD) AND  
 THE APPLIED LIFT FORCE IS 12 LBS (SHORT TERM  
 LOAD). THESE VALUES ARE ADEQUATE W/

OBSERVATION.

**WIND FORCE DISTRIBUTION:**

DESCRIPTION: Lateral Design Front - Rear Direction

**METHOD 2: Primary Frames and Systems**

$P = C_e C_q q_s I$

$C_e$  = Exposure factor

B

Formula 18-1

$C_q$  = Pressure coeff.

1.3 or 1.4

Table 16-G

Basic wind speed

70

Table 16-H

Figure 16-1

$q_s$  = wind stag. pressure

12.6

Table 16-F

$I_w$  = Importance factor

1

Table 16-K

Roof Pitch:

N

For enter 6 if 6:12. For gabled end or hip roof elevation only. Otherwise, enter N

Level	Story Ht feet	Exposed Width (ft)	Projected Area (sf)	Diaphragm Shear (lbs)	Story Shear
Top of Roof	21	60			
1st floor top plate	9	78.75	1074.375	12671	
1st floor	0	78.75			12671

$P_{uplift} = C_e C_q q_s I$

8.44

psf

Note: The exposure coefficient,  $C_e$  is taken at the mean roof height

**METHOD 1: Elements and Components**

Not in areas of discontinuities (enclosed or unenclosed):

Interpolate between tributary areas of 10 and 100 sf

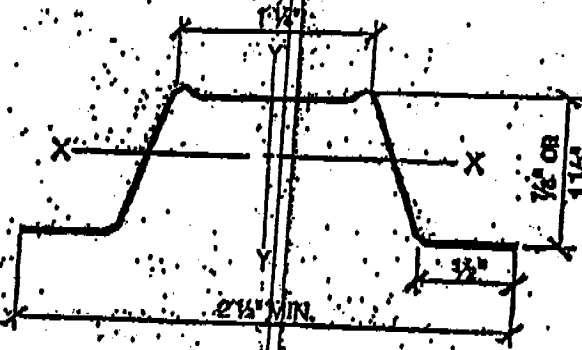
Wall Elements:			
	Direction of wind	Tributary Area (sf)	Pressure, p (psf)
Slope > 12:12	Inward	10	10.13
		100	7.60
	Outward	10	10.13
		100	7.60
Roof Elements:			
	Direction of wind	Tributary Area (sf)	Pressure, p (psf)
Slope < 7:12	Outward	10	10.97
		100	8.44
Slope 7:12 to 12:12	Inward	10	10.97
		100	18.27
	Outward	10	10.97
		100	8.44

## (Hat) Furring (F) Channel Section Properties

22 PAGE.

Section	$I_x$	$I_y$	$S_x$	$S_y$	$r_x$	$r_y$
087F125-18	0.0178	0.0188	0.070	0.008	28.4	1.1
087F125-27	0.0289	0.0293	0.104	0.013	44.8	1.1
087F125-30	0.0290	0.0312	0.118	0.014	60.9	1.1
087F125-33	0.0329	0.0340	0.127	0.015	65.4	1.1
087F125-43	0.0428	0.0451	0.163	0.019	70.1	1.1
180F125-18	0.0178	0.0188	0.089	0.029	64.4	1.1
180F125-27	0.0289	0.0293	0.140	0.048	83.4	1.1
180F125-30	0.0290	0.0312	0.154	0.050	104.9	1.1
180F125-33	0.0329	0.0340	0.170	0.058	118.8	1.1
180F125-43	0.0428	0.0451	0.220	0.070	147.5	1.1

- Minimum bare metal thickness is 85% of design thickness.
- Moment of inertia given is for deflection calculations.
- Effective properties are given as the minimum value for either positive or negative bending.
- Effective properties based on  $F_y = 33 \text{ ksi}$ .



## (Hat) Furring (F) Channel Allowable Ceiling Spans $L/240$

Section	Depth	Type	Span (ft)												
			10	12	14	16	18	20	22	24	26	28			
087F125	18	Single	8'-0"	7'-0"	6'-0"	5'-0"	4'-0"	3'-0"	2'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
		Multiple	8'-0"	7'-0"	6'-0"	5'-0"	4'-0"	3'-0"	2'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
087F125	27	Single	9'-0"	8'-0"	7'-0"	6'-0"	5'-0"	4'-0"	3'-0"	2'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
		Multiple	9'-0"	8'-0"	7'-0"	6'-0"	5'-0"	4'-0"	3'-0"	2'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
087F125	30	Single	9'-0"	8'-0"	7'-0"	6'-0"	5'-0"	4'-0"	3'-0"	2'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
		Multiple	9'-0"	8'-0"	7'-0"	6'-0"	5'-0"	4'-0"	3'-0"	2'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
087F125	33	Single	9'-0"	8'-0"	7'-0"	6'-0"	5'-0"	4'-0"	3'-0"	2'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
		Multiple	9'-0"	8'-0"	7'-0"	6'-0"	5'-0"	4'-0"	3'-0"	2'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
180F125	18	Single	10'-0"	9'-0"	8'-0"	7'-0"	6'-0"	5'-0"	4'-0"	3'-0"	2'-0"	1'-0"	1'-0"	1'-0"	1'-0"
		Multiple	10'-0"	9'-0"	8'-0"	7'-0"	6'-0"	5'-0"	4'-0"	3'-0"	2'-0"	1'-0"	1'-0"	1'-0"	1'-0"
180F125	27	Single	11'-0"	10'-0"	9'-0"	8'-0"	7'-0"	6'-0"	5'-0"	4'-0"	3'-0"	2'-0"	1'-0"	1'-0"	1'-0"
		Multiple	11'-0"	10'-0"	9'-0"	8'-0"	7'-0"	6'-0"	5'-0"	4'-0"	3'-0"	2'-0"	1'-0"	1'-0"	1'-0"
180F125	30	Single	11'-0"	10'-0"	9'-0"	8'-0"	7'-0"	6'-0"	5'-0"	4'-0"	3'-0"	2'-0"	1'-0"	1'-0"	1'-0"
		Multiple	11'-0"	10'-0"	9'-0"	8'-0"	7'-0"	6'-0"	5'-0"	4'-0"	3'-0"	2'-0"	1'-0"	1'-0"	1'-0"
180F125	33	Single	11'-0"	10'-0"	9'-0"	8'-0"	7'-0"	6'-0"	5'-0"	4'-0"	3'-0"	2'-0"	1'-0"	1'-0"	1'-0"
		Multiple	11'-0"	10'-0"	9'-0"	8'-0"	7'-0"	6'-0"	5'-0"	4'-0"	3'-0"	2'-0"	1'-0"	1'-0"	1'-0"

Allowable ceiling spans based on effective properties.  
 Multiple span indicates two or more equal spans with channel continuous over center support.  
 Bearing length = 0.75".

## Screw Table Notes

1. Screw spacing and edge distance shall not be less than  $3 \times D$ . ( $D$  = Nominal screw diameter)
2. The allowable screw values are based on the steel properties of the members being connected, per AISI section E4.
3. When connecting materials of different metal thicknesses or yield strength, the lowest applicable values should be used.
4. Screw strength needs to be verified by the screw manufacturer.
5. Values include a 3.0 factor of safety.
6. Applied loads may be multiplied by 0.75 for seismic or wind loading, per AISI A 5.1.3.
7. Penetration of screws through joined materials should not be less than 3 exposed threads. Screws should be installed and tightened in accordance with screw manufacturer's recommendations.
8. Values based on a tensile to yield steel property ratio of 1.08.

## Allowable Loads For Screw Connections

BATTEN TO COUNTER BATTEN  
METAL TO METAL

22. GAGE

Screw Size	Pitch	Metal Thickness (t)				Steel Yield Strength (F <sub>y</sub> )		Allowable Load (P)			
		33	36	45	50	33	36	60	65	70	75
18	0.0188	33	36	45	50	104	110	69	71	73	75
27	0.0243	33	36	45	50	120	126	80	83	86	89
30	0.0312	33	36	45	50	142	148	96	100	104	108
36	0.0413	33	36	45	50	178	185	120	125	130	135
42	0.0540	33	36	45	50	215	222	144	150	156	162
48	0.0713	33	36	45	50	252	260	170	177	184	191
54	0.0917	33	36	45	50	290	300	200	208	216	224
60	0.117	33	36	45	50	328	338	230	239	248	256
66	0.150	33	36	45	50	366	377	260	270	280	290
72	0.194	33	36	45	50	404	416	290	301	312	323
78	0.249	33	36	45	50	442	455	320	332	344	356
84	0.315	33	36	45	50	480	494	350	363	376	389
90	0.393	33	36	45	50	518	533	380	394	408	422
96	0.483	33	36	45	50	556	572	410	425	440	455
102	0.585	33	36	45	50	594	611	440	456	472	488
108	0.699	33	36	45	50	632	650	470	487	504	521
114	0.835	33	36	45	50	670	689	500	518	536	554
120	0.993	33	36	45	50	708	728	530	549	568	587

## Weld Table Notes

1. Weld capacities based on AISI, section E2.
2. When connecting materials of different metal thickness or yield strength, the lowest applicable values should be used.
3. Values include a 2.5 factor of safety.
4. Applied loads may be multiplied by 0.75 for seismic or wind loading, per AISI A 5.1.3.
5. Values based on a tensile to yield steel property ratio of 1.08.

## Allowable Loads For Fillet Welds And Flare Groove Welds

Weld Size	Pitch	Metal Thickness (t)		Steel Yield Strength (F <sub>y</sub> )		Allowable Load (P)	
		33	36	45	50	33	36
1/8	0.0451	33	36	45	50	482	505
3/16	0.0588	33	36	45	50	578	605
1/4	0.0743	33	36	45	50	674	705
5/16	0.0917	33	36	45	50	770	805
3/8	0.120	33	36	45	50	866	905
1/2	0.150	33	36	45	50	962	1005
5/8	0.194	33	36	45	50	1058	1105
3/4	0.249	33	36	45	50	1154	1205
7/8	0.315	33	36	45	50	1250	1305
1	0.393	33	36	45	50	1346	1405

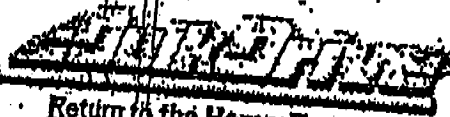
## Pull & Shear Testing

Test data provided by screw suppliers and is not certified by Quik Drive USA, Inc.

SCREW	Ultimate Loads (lbs)						
Pull test for screws: one piece metal.							
(steel gauge) 12	14	16	18	20	22	24	26
DWF114, 158	626	634	450	272			185
PHSS-1, 34, 114	626	634	450	272			185
PHSD-1, 34, 114	735	590	344	288			180
DWFSD114Z, 158Z	705	523	320	231			105
DWC114, 158, 178	524	538		270			
Shear strength test for screws: metal to metal ultimate load (lbs)							

(steel gauge) 12	14	16	18	20	22	24	26
DWF114, 158		957		690	670		320
PHSS-1, 34, 114		957		690	670		320
PHSD-1, 34, 114		1140	1040	805	658		320
DWFSD114Z, 158Z		1220	760	613	505		
Shear test: gypsum board to metal (pounds)							
(steel gauge)	18ga		18ga		22ga		
DWFSD114Z, 158Z	130		135		140		180
DWF114, 114 PH, 158	147		158				

### Technical Data



Return to the Home Page

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 E-mail: info@QuikDrive.com

FOR ATTACHING TILE TO MEDIUM BATTEN



# ICBO Evaluation Service, Inc.

5360 WORKMAN MILL ROAD • WHITTIER, CALIFORNIA 90601-2299

A subsidiary corporation of the International Conference of Building Officials

## EVALUATION REPORT

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ER-4488

Reissued May 1, 2000

Filing Category: WALL COVERING (288)

**THERMO-SHEATH SHEATHING**  
**NATIONAL SHELTER PRODUCTS, INC.**  
22526 S.E. 64TH PLACE, SUITE 230  
ISSAQUAH, WASHINGTON 98027

### 1.0 SUBJECT

Thermo-Sheath Sheathing.

### 2.0 DESCRIPTION

#### 2.1 General:

Thermo-Sheath sheathing, a laminated board consisting of a kraft-paper core with aluminized facings, is recognized as a bracing material and weather-resistive barrier for wood-framed wall construction and as an underlayment for concrete roof tiles. The sheathing has a nominal size of either 48<sup>3</sup>/<sub>4</sub> by 96 inches (1238 by 2438 mm) or 48 by 96 inches (1219 by 2438 mm). Four sheathings are recognized:

1. Thermo-Sheath Standard, nominal 0.078 inch (2 mm) thick, green print identification.
2. Thermo-Sheath Structural, nominal 0.105 inch (2.7 mm) thick, red print identification.
3. Thermo-Sheath Structural Plus, nominal 0.115 inch (2.9 mm) thick, black print identification.
4. Thermo-Sheath Super Structural, nominal 0.137 inch (3.5 mm) thick, blue print identification.

#### 2.2 Materials:

**2.2.1 Core:** The core consists of multiple layers of filler and paperboard adhered with a polyvinyl alcohol adhesive.

**2.2.2 Facings:** The facing materials consist of either aluminum foil or aluminized polyethylene adhered to 40-pound (18 kg) kraft paper.

#### 2.3 Installation:

**2.3.1 Walls:** Sheathing, having a nominal thickness of 0.105, 0.115, and 0.137 inch (2.7, 2.9 and 3.5 mm), complies as bracing for wood-framed construction in accordance with Section 2320.11.3 of the code when installed vertically on wood framing. The 0.078-inch-thick (2 mm) sheathing is restricted to nonstructural applications. The sheathing edges are supported by studs, top and bottom plates and solid blocking. Table 1 provides installation details for sheathing used structurally, including fastener details, stud spacing and allowable shear values.

Nonstructural applications of the sheathing require that wood-framed walls be braced in accordance with Section 2320.11.3 of the code. Fasteners shall be stainless steel, aluminized, hot-dipped galvanized or electrogalvanized steel. Table 1 lists the fastener schedule for structural applications. Nonstructural sheathing applications require similar fasten-

ers with maximum spacing of 4 inches (102 mm) on center at panel edges and 8 inches (204 mm) on center at intermediate supports.

Panel edges are butt joints or are lapped a minimum of <sup>3</sup>/<sub>4</sub> inch (19 mm).

**2.3.2 Underlayment:** Sheathing having a nominal thickness of 0.078 inch (2 mm) complies as an underlayment for concrete and clay roof tiles specifically recognized in an NES or ICBO ES evaluation report. The tile report holder must approve this use. The Thermo-Sheath product is installed under the spaced sheathing and is fastened 12 inches (305 mm) on center along each rafter with 1-inch-long (25.4 mm) galvanized roofing nails or No. 16 gage galvanized staples having 1-inch-long (25.4 mm) legs and <sup>3</sup>/<sub>8</sub>-inch-wide (9.5 mm) crowns. The sheathing installation requires a minimum 2-inch (51 mm) horizontal lap.

Reroofing applications require that the sheathing be applied over the existing spaced sheathing boards and be fastened to the rafters as previously described.

#### 2.4 Identification:

Each sheet bears a stamped label indicating the company name, National Shelter Products, Inc.; the product name; the board thickness; the evaluation report number (ER-4488); and the name of the quality control agency, Ramtech Laboratories, Inc. The labels are color-coded to facilitate easier product identification in the field. See Table 1.

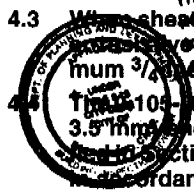
### 3.0 EVIDENCE SUBMITTED

Reports on racking shear, transverse strength, tensile strength, mullen-burst strength, water absorption, moisture vapor transmission, and linear expansion tests, and a quality control manual.

### 4.0 FINDINGS

That the Thermo-Sheath Sheathing described in this report complies with the 1997 *Uniform Building Code*<sup>™</sup>, subject to the following conditions:

- 4.1 Installation complies with this report and the manufacturer's instructions.
- 4.2 An approved exterior wall covering, capable of resisting loads perpendicular to the face of the wall, is installed over the sheathing.
- 4.3 When sheathing is installed as an approved weather-resistant barrier, the sheathing joints have a minimum <sup>3</sup>/<sub>4</sub> inch (19 mm) lap or approved flashing.
- 4.4 The 0.105, 0.115, and 0.137 inch thick (2.7, 2.9 and 3.5 mm) sheathing complies as bracing as specified in Section 2320.11.3 of the code when installed in accordance with Table 1.



8-14-00

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4.5 The 0.078-inch-thick (2 mm) sheathing is permitted to be an underlayment for concrete and clay roof tiles specifically recognized in an evaluation report.

Products, Inc., in Constantine, Michigan, with quality control inspections by Ramtech Laboratories, Inc. (AA-655).

4.6 The sheathing is manufactured for National Shelter

This report is subject to re-examination in two years.

TABLE 1—ALLOWABLE SHEAR LOAD (PLF)<sup>1,2,3</sup>

THERMO-SHEATH PRODUCT NAME	PRODUCT IDENTIFICATION COLOR	SHEATHING THICKNESS (inch)	FASTENER	FASTENER SPACING (inches on center)	WOOD STUD SPACING (inches on center)	ALLOWABLE SHEAR LOAD (lbs. per foot)
Structural Sheathing	Red	0.105	No. 11 ga. galv. roofing nails or No. 16 ga. x $\frac{7}{16}$ -inch-crown staples. Minimum fastener length is $1\frac{1}{4}$ inches	3 — panel edges 6 — intermediate supports	16	130
Structural Plus Sheathing	Black	0.115	No. 11 ga. galv. roofing nails or No. 16 ga. x $\frac{7}{16}$ -inch-crown staples. Minimum fastener length is $1\frac{1}{4}$ inches	3 — panel edges 6 — intermediate supports	16	150
			No. 16 ga. x 1-inch-crown staples. Minimum fastener length is $1\frac{1}{4}$ inches	2 — panel edges 6 — intermediate supports	16	180
Super Structural Sheathing	Blue	0.137	No. 11 ga. galv. roofing nails or No. 16 ga. x $\frac{7}{16}$ -inch-crown staples. Minimum fastener length is $1\frac{1}{4}$ inches	3 — panel edges 3 — intermediate supports	24	185

For SI: 1 inch = 25.4 mm, 1 lb/ft = 14.6 kN/m.

<sup>1</sup>For wind or seismic forces, in pounds per foot, for panels installed vertically on Douglas fir-larch or southern pine studs having a nominal thickness not less than 2 inches (51 mm).

<sup>2</sup>Staple crown must not puncture the sheathing. Staples are installed with the crown parallel to the framing.

<sup>3</sup>The sheathing is applied in minimum 4-by-8-foot (1.2 by 2.4 m) sheets. Blocking having a nominal thickness not less than 2 inches (51 mm) is provided at horizontal joints when the wall height exceeds the length of the sheathing panel. The maximum height-to-width ratio is 2:1.



# ICBO Evaluation Service, Inc.

5360 WORKMAN MILL ROAD • WHITTIER, CALIFORNIA 90601-2299

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## EVALUATION REPORT

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ER-4488

Reissued May 1, 2000

Filing Category: WALL COVERING (288)

**THERMO-SHEATH SHEATHING**  
**NATIONAL SHELTER PRODUCTS, INC.**  
22526 S.E. 64TH PLACE, SUITE 230  
ISSAQUAH, WASHINGTON 98027

### 1.0 SUBJECT

Thermo-Sheath Sheathing.

### 2.0 DESCRIPTION

#### 2.1 General:

Thermo-Sheath sheathing, a laminated board consisting of a kraft-paper core with aluminized facings, is recognized as a bracing material and weather-resistive barrier for wood-framed wall construction and as an underlayment for concrete roof tiles. The sheathing has a nominal size of either 48<sup>3</sup>/<sub>4</sub> by 96 inches (1238 by 2438 mm) or 48 by 96 inches (1219 by 2438 mm). Four sheathings are recognized:

1. Thermo-Sheath Standard, nominal 0.078 inch (2 mm) thick, green print identification.
2. Thermo-Sheath Structural, nominal 0.105 inch (2.7 mm) thick, red print identification.
3. Thermo-Sheath Structural Plus, nominal 0.115 inch (2.9 mm) thick, black print identification.
4. Thermo-Sheath Super Structural, nominal 0.137 inch (3.5 mm) thick, blue print identification.

#### 2.2 Materials:

**2.2.1 Core:** The core consists of multiple layers of filler and paperboard adhered with a polyvinyl alcohol adhesive.

**2.2.2 Facings:** The facing materials consist of either aluminum foil or aluminized polyethylene adhered to 40-pound (18 kg) kraft paper.

#### 2.3 Installation:

**2.3.1 Walls:** Sheathing, having a nominal thickness of 0.105, 0.115, and 0.137 inch (2.7, 2.9 and 3.5 mm), complies as bracing for wood-framed construction in accordance with Section 2320.11.3 of the code when installed vertically on wood framing. The 0.078-inch-thick (2 mm) sheathing is restricted to nonstructural applications. The sheathing edges are supported by studs, top and bottom plates and solid blocking. Table 1 provides installation details for sheathing used structurally, including fastener details, stud spacing and allowable shear values.

Nonstructural applications of the sheathing require that wood-framed walls be braced in accordance with Section 2320.11.3 of the code. Fasteners shall be stainless steel, aluminized, hot-dipped galvanized or electrogalvanized steel. Table 1 lists the fastener schedule for structural applications. Nonstructural sheathing applications require similar fasten-

ers with maximum spacing of 4 inches (102 mm) on center at panel edges and 8 inches (204 mm) on center at intermediate supports.

Panel edges are butt joints or are lapped a minimum of <sup>3</sup>/<sub>4</sub> inch (19 mm).

**2.3.2 Underlayment:** Sheathing having a nominal thickness of 0.078 inch (2 mm) complies as an underlayment for concrete and clay roof tiles specifically recognized in an NES or ICBO ES evaluation report. The tile report holder must approve this use. The Thermo-Sheath product is installed under the spaced sheathing and is fastened 12 inches (305 mm) on center along each rafter with 1-inch-long (25.4 mm) galvanized roofing nails or No. 16 gage galvanized staples having 1-inch-long (25.4 mm) legs and <sup>3</sup>/<sub>8</sub>-inch-wide (9.5 mm) crowns. The sheathing installation requires a minimum 2-inch (51 mm) horizontal lap.

Reroofing applications require that the sheathing be applied over the existing spaced sheathing boards and be fastened to the rafters as previously described.

#### 2.4 Identification:

Each sheet bears a stamped label indicating the company name, National Shelter Products, Inc.; the product name; the board thickness; the evaluation report number (ER-4488); and the name of the quality control agency, Ramtech Laboratories, Inc. The labels are color-coded to facilitate easier product identification in the field. See Table 1.

### 3.0 EVIDENCE SUBMITTED

Reports on racking shear, transverse strength, tensile strength, mullen-burst strength, water absorption, moisture vapor transmission, and linear expansion tests, and a quality control manual.

### 4.0 FINDINGS

**That the Thermo-Sheath Sheathing described in this report complies with the 1997 Uniform Building Code™ subject to the following conditions:**

- 4.1 Installation complies with the set of plans and specifications must be subject to the following conditions:
  - approved by the authority having jurisdiction and it is unlawful to make any changes or alterations without the written permission from the manufacturer.
- 4.2 An approved exterior wall covering is capable of resisting loads perpendicular to the face of the wall, is installed over the sheathing.
- 4.3 When sheathing is installed as an approved weather-resistive barrier, the sheathing joints have minimum <sup>3</sup>/<sub>4</sub>-inch (19 mm) laps of approved flashing.
- 4.4 The 0.105-, 0.115-, and 0.137-inch-thick (2.7, 2.9 and 3.5 mm) sheathing complies as bracing as specified in Section 2320.11.3 of the code when installed in accordance with Table 1.

Evaluation reports of ICBO Evaluation Service, Inc., are issued solely to provide information to Class A members of ICBO, utilizing the code upon which the report is based. Evaluation reports are not to be construed as representing aesthetics or any other attributes not specifically addressed nor as an endorsement or recommendation for use of the subject report.

This report is based upon independent tests or other technical data submitted by the applicant. The ICBO Evaluation Service, Inc., technical staff has reviewed the test results and/or other data, but does not possess test facilities to make an independent verification. There is no warranty by ICBO Evaluation Service, Inc., express or implied, as to any "Finding" or other matter in the report or as to any product covered by the report. This disclaimer includes, but is not limited to, merchantability.

4.5 The 0.078-inch-thick (2 mm) sheathing is permitted to be an underlayment for concrete and clay roof tiles specifically recognized in an evaluation report.

Products, Inc., in Constantine, Michigan, with quality control inspections by Ramtech Laboratories, Inc. (AA-655).

4.6 The sheathing is manufactured for National Shelter

This report is subject to re-examination in two years.

TABLE 1—ALLOWABLE SHEAR LOAD (PLF)<sup>1,2,3</sup>

THERMO-SHEATH PRODUCT NAME	PRODUCT IDENTIFICATION COLOR	SHEATHING THICKNESS (inch)	FASTENER	FASTENER SPACING (inches on center)	WOOD STUD SPACING (inches on center)	ALLOWABLE SHEAR LOAD (lbs. per foot)
Structural Sheathing	Red	0.105	No. 11 ga. galv. roofing nails or No. 16 ga. x <sup>7</sup> / <sub>16</sub> -inch-crown staples. Minimum fastener length is 1 <sup>1</sup> / <sub>4</sub> inches	3 — panel edges 6 — intermediate supports	16	130
Structural Plus Sheathing	Black	0.115	No. 11 ga. galv. roofing nails or No. 16 ga. x <sup>7</sup> / <sub>16</sub> -inch-crown staples. Minimum fastener length is 1 <sup>1</sup> / <sub>4</sub> inches	3 — panel edges 6 — intermediate supports	16	150
			No. 16 ga. x 1-inch-crown staples. Minimum fastener length is 1 <sup>1</sup> / <sub>4</sub> inches	2 — panel edges 6 — intermediate supports	16	180
Super Structural Sheathing	Blue	0.137	No. 11 ga. galv. roofing nails or No. 16 ga. x <sup>7</sup> / <sub>16</sub> -inch-crown staples. Minimum fastener length is 1 <sup>1</sup> / <sub>4</sub> inches	3 — panel edges 3 — intermediate supports	24	185

For SI: 1 inch = 25.4 mm, 1 lb/ft = 14.6 kN/m.

<sup>1</sup>For wind or seismic forces, in pounds per foot, for panels installed vertically on Douglas fir-larch or southern pine studs having a nominal thickness not less than 2 inches (51 mm).

<sup>2</sup>Staple crown must not puncture the sheathing. Staples are installed with the crown parallel to the framing.

<sup>3</sup>The sheathing is applied in minimum 4-by-8-foot (1.2 by 2.4 m) sheets. Blocking having a nominal thickness not less than 2 inches (51 mm) is provided at horizontal joints when the wall height exceeds the length of the sheathing panel. The maximum height-to-width ratio is 2:1.