CITY OF SACRAMENTO
1231 I Street, Sacramento, CA 95814

Permit No: 0012736
Insp Area: 2

Site Address: 8528 CARLIN AV SAC
Parcel No: 117-0840-053

Sub-Type: REM
Housing (Y/N): N

CONTRACTOR
KYOCERA SOLAR INC
1 LIGHT SKY CT
SACRAMENTO CA 95828

OWNER
NGUYEN JOHN K/MILAGROS R ZA
8528 CARLIN AV
SACRAMENTO CA 95823

ARCHITECT

Nature of Work: INSTALL SOLAR ELECTRIC (PHOTOVOLTAIC) SYSTEM ON ROOF

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 C10 License Number 777036 Date 10/31/00 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 herby authorize representative(s) of this city to enter upon the abovementioned property for inspection purposes.

Date 10/31/00 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.

X 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 TOKIO MARINE & FIRE INS CO Policy Number WC1109073 Exp Date 05/01/2001

____ (This section need not be completed if the permit is ...) 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 10/31/00 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.

0012736R

Plans on microfilm

B&B

BUEHLER & BUEHLER
ASSOCIATES
STRUCTURAL
ENGINEERS INC

ISSUED

OCT 3 1 2000

Sacramento Building Division

DEPT. OF PLANNING & DEVELOPMENT
APPROVED
UNDER
TITLE 15
CITY CODE
City of
SACRAMENTO, CALIF.
BUILDING INSPECTION DIVISION

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 permit or approve the violation of any City Ordinance or State Law.

13 April, 2000

Ms. Paula Mitchell
Sacramento Municipal Utility District
6301 S Street
Sacramento, CA 95817-1899
Mail Stop 401

Verify (e)-trusses in field. Matt P. 10/27/00

Subject: ***SMUD Solar - Nguyen Residence***
BBA Project No.: 99242.00

Dear Paula,

We have visited the site and completed this report of our findings for the subject building. Please see the attached field observation and summary sheet for background information.

Our conclusion is that the roof structure of the subject building is suitable for proposed installation of solar panels.

This conclusion is based on our limited observations of the structure. We observed the general structural conditions and found no significant structural defects. Roof loads were reviewed, and the following conclusions can be drawn. For the trussed areas no calculations were performed. The proposed solar panels, weighing approximately 4 psf, add relatively light dead loads. Roof load capacity should be adequate if the added weight of the solar panels is considered to replace part of the live-load capacity in the trussed areas. For the rafter condition, the existing framing is acceptable with the added load of the solar panels without exception.

Sincerely,

Eric A. Fuller
BUEHLER & BUEHLER ASSOCIATES
Structural Engineers, Inc.

REGISTERED PROFESSIONAL ENGINEER
M. TODD
THORP
No. 2930
Exp. 6/30/00
STRUCTURAL
STATE OF CALIFORNIA

FOLSOM BLVD
SACRAMENTO CA

SMUD Solar - Structural Report
Field Observations and Summary Sheet

Owner: John and Milagros Nguyen
Address: 8528 Carlin Avenue
Sacramento, Ca. 95823

Date of site visit: 13 April, 2000
Present: Rudy Iwasco, John and Milagros Nguyen

General Description:
This is a two-story residence of wood-frame construction which was constructed approximately ten years ago. The foundation is concrete. The floor is a concrete slab-on-grade. The house faces east. The main ridge runs east and west. Roofing is composition shingles.

Observations:
Roof sheathing is OSB sheathing. Typical roof framing is prefabricated wood trusses at 24"cc supported on both interior and exterior walls. Trusses are gable type with a 5:12 slope of the top chord and a flat bottom chord. Roof framing over the main living area is 2x rafters at 24" cc supported on interior and exterior walls.

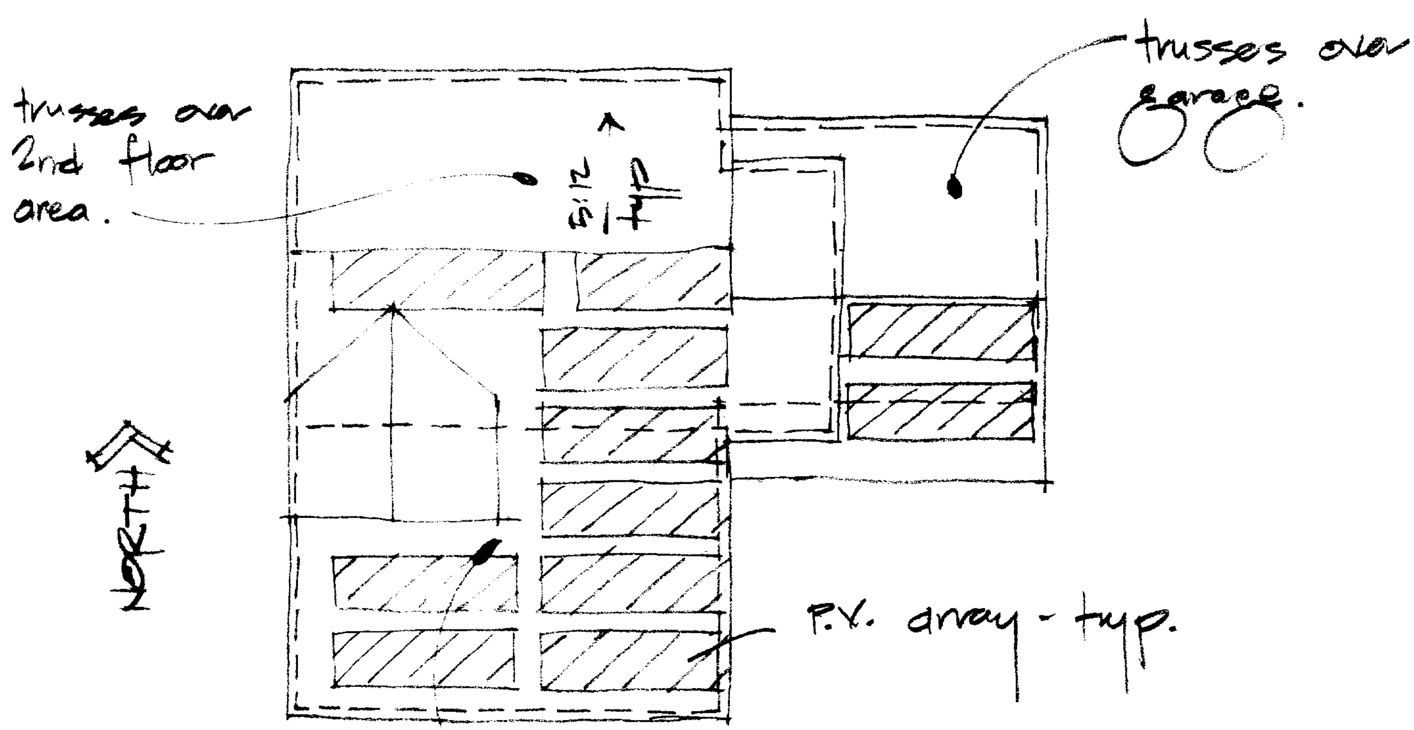
Observations were made from the exterior and from the attic space above the ceiling. The building appears to be in generally good condition without signs of structural deficiencies in the foundation, floor or roof. No evidence of roof leaks or structural failure was observed from the attic space.

B&B

NGUYEN RESIDENCE : 8528 CARLIN AVE.

Jurisdiction : Sacramento County

ROOF LAYOUT :



2x10 rafters @ 1st floor vaulted roof.

☐ DEAD LOADS:

comp shtg / 7/16" OSB / 2x trusses @ 24" cc / 5/8" gyp bd / insulation = 10.0 psf

Increase for slope/misc. = 2.0 psf

Total = 12.0 psf

☐ CHECK RAFTERS @ VAULT - 16' span:

W = (12+4+16) 2 = 64 plf
(d.l. of p.v. system)

capacity of 2x10 df #2 = 54 psf (bndg/shr)
= 86 psf (defl.)

w/ LDF of 125% : 68 psf (bndg/shr) is ok.

POINT 2
STRUCTURAL
ENGINEERS

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PHONE: (916) 442-4842 FAX:(916) 442-4848

PROJECT		PROJECT NO.
CLIENT		
ENGINEER	DATE	PAGE of

Kyocera Residential PV Panel System
Structural Calculations

REGISTERED PROFESSIONAL ENGINEER
WILLIAM P. LARSON
No. 3148
Exp. 12/31/01
STRUCTURAL
STATE OF CALIFORNIA

POINT 2 Structural Engineers
Job No. 2000-069

June 00

POINT 2
STRUCTURAL
ENGINEERS

2300 N STREET, SUITE 4, SACRAMENTO, CA 95816-5757
PHONE: (916) 442-4842 FAX:(916) 442-4848

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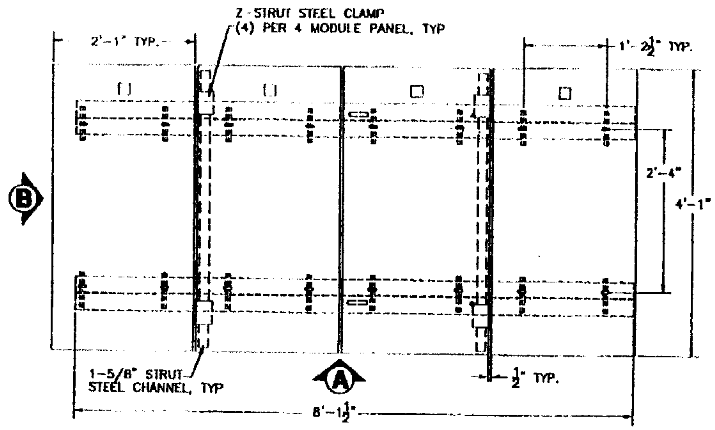
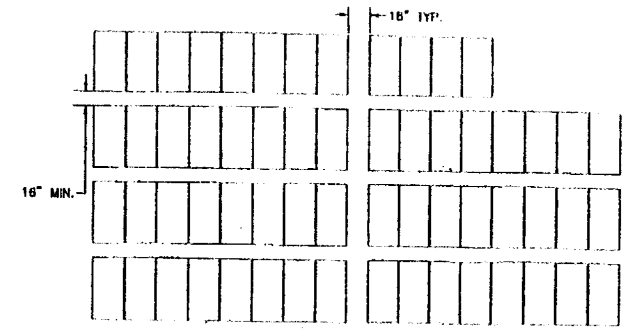
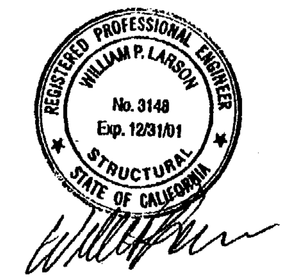


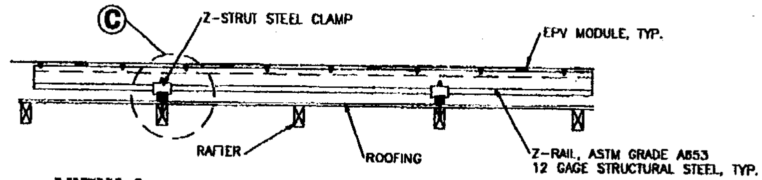
(4) EPV MODULE PANEL



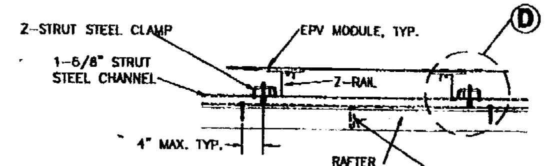
60 MODULE ARRAY

THIS IS A 60 MODULE OR 1.86kW ARRAY WITH AMPLE ROOF AREA AND NO OBSTRUCTIONS. PANEL CONFIGURATIONS ARE SUBJECT TO ACTUAL ROOF AREA, OBSTRUCTIONS, SHADING, ETC.



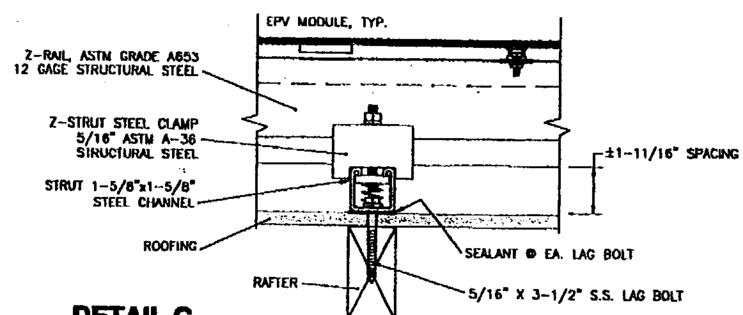


VIEW A

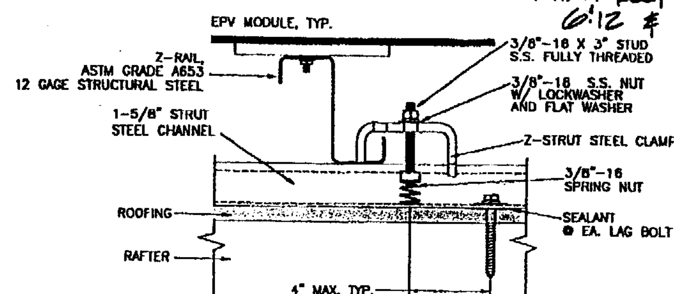


VIEW B

ADD (1) 5/16" φ x 3½" LAG SCREW WHEN ROOF PITCH EXCEEDS 6:12 & PANELS ARE LOCATED WITHIN 10' OF RIDGE



DETAIL C



DETAIL D

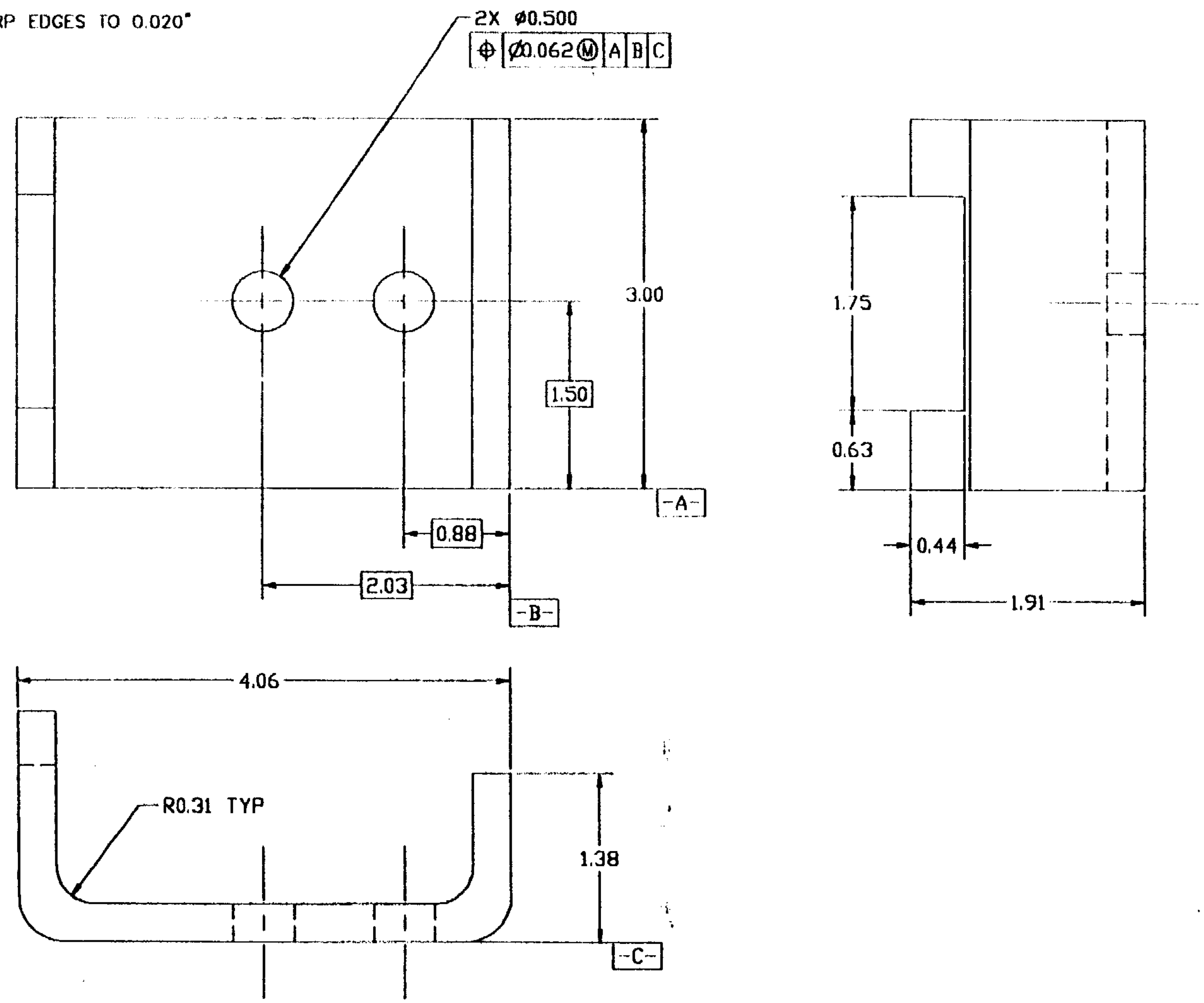
REVISION DATE	
MATERIAL	N/A
FINISH	N/A
THIRD ANGLE PROJECTION	
APPROVALS	DATE
DRAWN JJK	6-16-00
APPROVED	
REV.	
B.O.M. #	XXXX-XXXX
DO NOT SCALE DRAWING	

KYOCERA SOLAR, INC.
SACRAMENTO, CALIFORNIA

EPV PANEL
MOUNTING DETAILS
FOR RESIDENTIAL ROOF TOPS

SIZE	SALES ORDER #	DRAWING NO.
B	XXXXX	EPV2-1
SCALE N/A	REV. NC	SHEET 1 of 1

NOTES:
1. BREAK ALL SHARP EDGES TO 0.020"



REVISION DATE

MATERIAL: 3" X 5/16" ASTM A36 STRUCTURAL FLAT BAR

FINISH: HOT DIPPED GALV. PER ASTM A123

THIRD ANGLE PROJECTION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE: DECIMALS: .XX ± 0.03, .XXX ± 0.010; FRACTIONS: ± N/A; ANGLES: ± 0.5°

APPROVALS		DATE
DRAWN	LEE ULRICH	06-15-00
APPROVED		
REV.		
B.O.M. #	XXXX-XXXX	

DO NOT SCALE DRAWING

KYOCERA SOLAR, INC.
SACRAMENTO, CALIFORNIA USA

Z-STRUT CLAMP

SIZE	SALES ORDER #	DRAWING NO.
B	XXXXX	Z-STRUT CLAMP

SCALE 1:1 REV. NC SHEET 1 OF 1

POINT 2
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ENGINEERS

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STRUCTURAL DESIGN CRITERIA

Building Codes

- 1997 Uniform Building Code
- ASCE 7-95 Minimum Design Loads for Buildings and Other Structures.
- AISC Manual for Steel Construction
- AISI Cold formed steel Design Manual
- ANSI NDS-1991 Revised National Design Specification for Wood Construction.

Design Criteria

- Non snow load location
- Panels average installation height of 40 feet
- Roof slopes between 2:12 and 8:12
- Wind exposure category C
- Importance factor 1.0
- Basic Wind Speed 90mph

Design Assumptions

- Panel rails are supported torsionally and laterally by PV panel adhesive
- Runners are supported with steel standoffs at 24" on center into 2x thickness framing members.

Materials

- Cold formed steel ASTM A653M-95 Grade SQ Fy=40
- Wood Douglas fir No 2 or better

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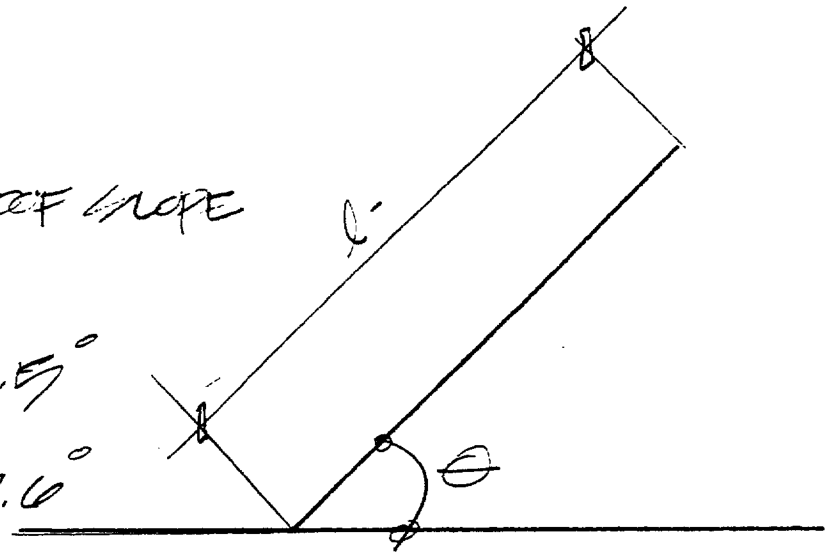
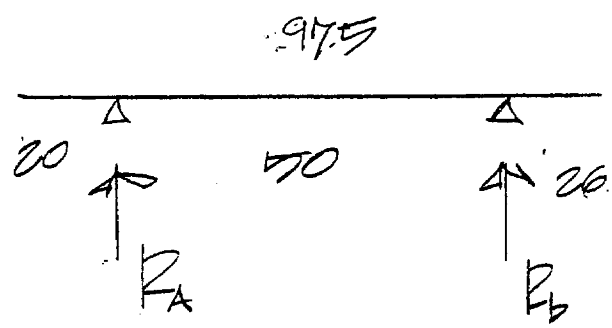
PANEL RAIL



* θ VARIES ON ROOF SLOPE
* DESIGN BASIS

  2:12 — 9.5°
  to
  8:12 — 37.6°

$l = 97.5''$



DESIGN LOADS

ASCE 7-95

* NO SNOW
* HEIGHT ABOVE GROUND LEVEL 40' MAX
* WIND EXPOSURE CATEGORY C
* BASIC WIND SPEED 90 MPH
* IMPORTANCE FACTOR I

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VELOCITY PRESSURE (6.5)

$q_z = .00256 K_z K_{zt} V^2 I$

(TABLE 6.3) $K_z = 1.04$

(SEC. 6.5.5) ASSUME MIN $K_{zt} = 1.0$

(TABLE 6.2) $I = .87$

$q_z = .00256(1.04)(1.0)(90)^2(.87) = 18.72$ psf

GUST FACTOR (6.6)

$G = .85$ (SECTION 6.6.1)

PRESSURE & FORCE COEFFICIENTS (6.7)

A.) MONOSLOPE ROOFS $10° < \theta < 30°$

AREA TRIB TO ONE PANEL

$A = \left[\frac{23.5''(48'')}{144}\right]2 = 15.67 \square'$

① $GC_p = -1.25$

② $GC_p = -1.5$

③ $GC_p = -2.7$

PG4

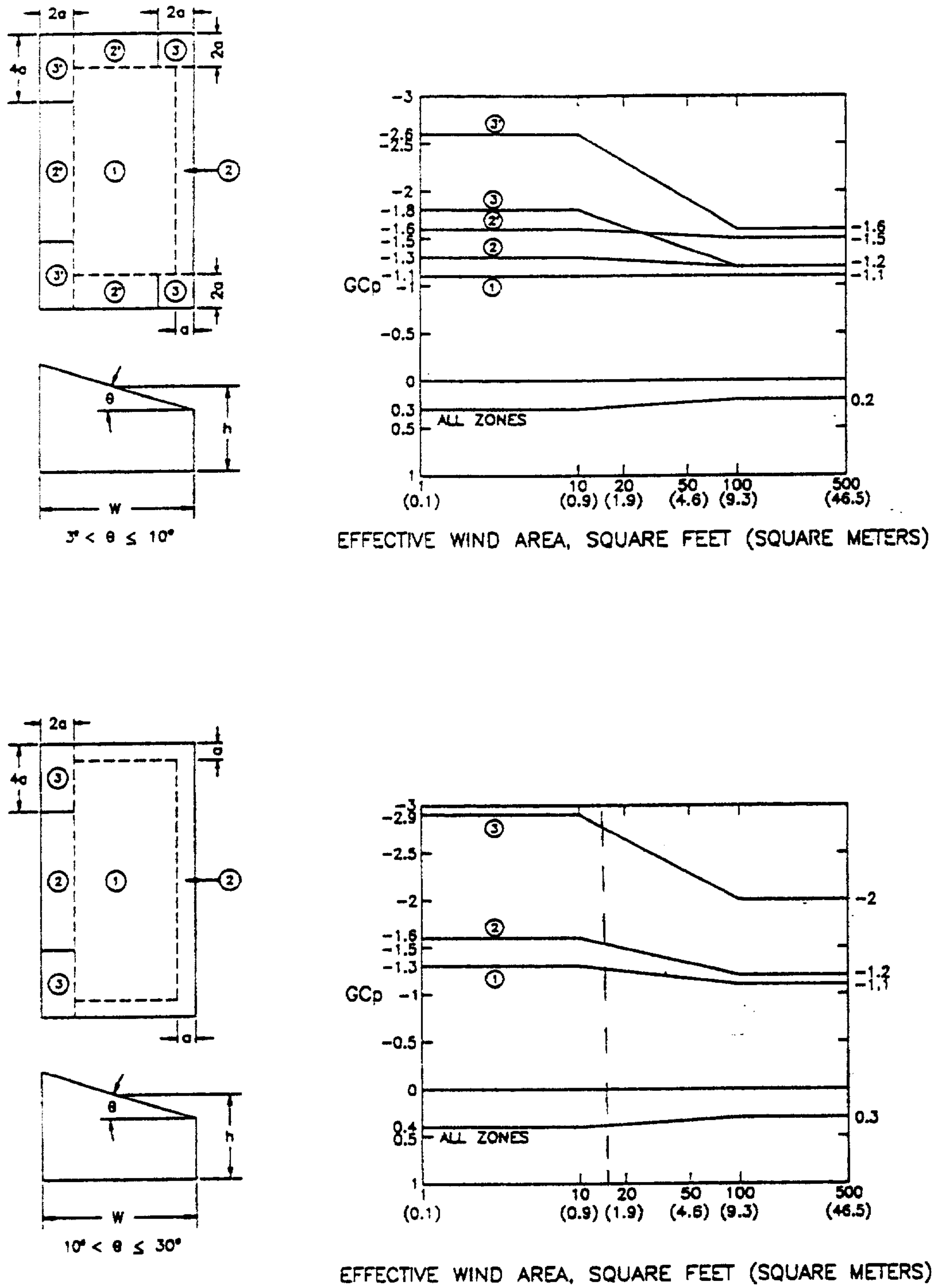

FIG. 6-7A. Monoslope Roofs (Refer to notes on page 28).

FIG. 6-7. External Pressure Coefficients, GC_p, for Loads on Building Components and Cladding for Monoslope Roofs and Sawtooth Roofs with Two or More Spans on Enclosed or Partially Enclosed Buildings with Mean Roof Height, *h*, Less than or Equal to 60 ft (18 m)

PRESSURE & FORCE COEFFICIENTS CONT.

B) GABLED & HIPPED ROOF.

$\theta > 10$ & $\leq 45°$

① $GC_p = -.90$ & $.48$

② $GC_p = -2.2$

③ $GC_p = -3.5$

INTERNAL PRESSURE COEF. (TABLE 6.4)

OPEN BUILDINGS $GC_{pi} = 0.0$

PG 6

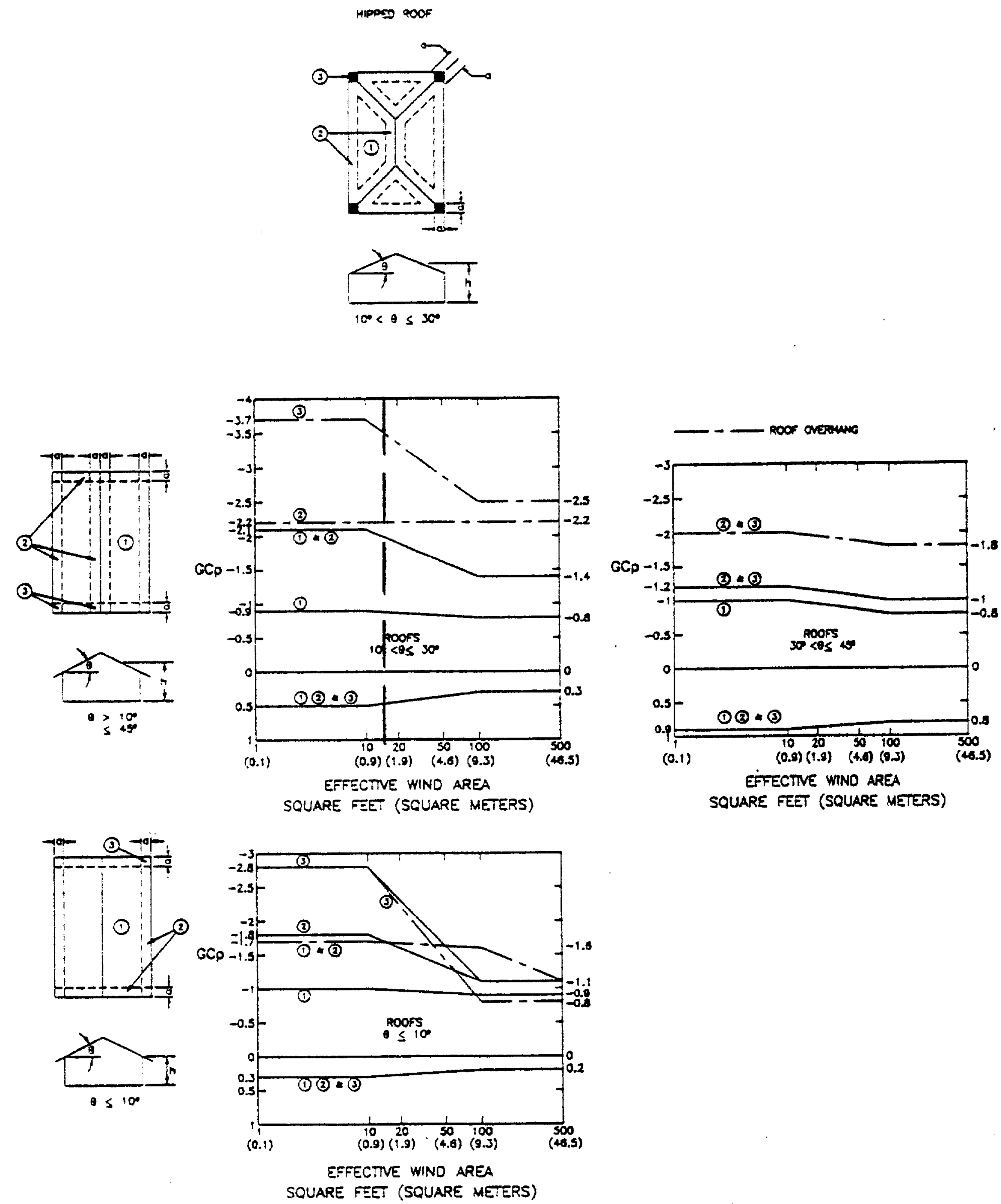

FIG. 6-5B. Gabled and Hipped Roofs (Refer to Notes on Fig. 6-5)

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DESIGN WIND PRESSURE. TABLE 6.1

WORST CASE $GC_p = -2.2$

$P = qGC_p$

$= 18.72(2.2) = 41.28$ psf

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4 EPV PANEL.

TOTAL PANEL AREA

$\frac{4(25)(49)}{144} = 34.03\ ft^2$

TOTAL PROJECTED AREA WIND LOAD.

$F = 34.03\ ft^2\ (41.28\ psf) = 1404\#$

CHECK 4 - 5/16" Ø x 3 1/2" SS LAG SCREWS

WITHDRAWAL CAPACITY.

G = 0.50 5/16" Ø

W = 266 #/in

2 1/2" PENETRATION =

$W_{CAP} = 266(2.5) = 665$ / LAG.

665(4 LAGS) = 2660 > 1404#

SHEAR CAPACITY

12GA SIDE PL G = .50 5/16" Ø

$Z_{\parallel} = 310$ $Z_{\perp} = 210$

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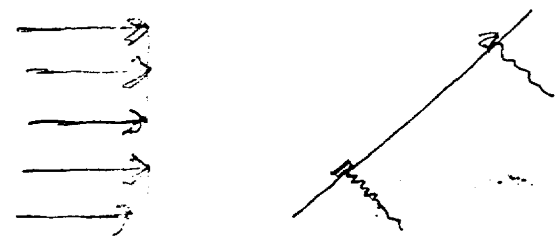
SHEAR CAPACITY (CONT)

$Z = Z11(C_D)(C_M)(C_t)$

$Z = 310(1.6)(.75)(.7)$

$= 260$ #/LAG



$$Z_\alpha' = \frac{(W_p)Z}{W_p\cos^2\alpha + Z\sin^2\alpha} \qquad \angle\alpha\ \text{MAX} = 33.7°$$

$$Z_\alpha' = \frac{(2.5)266(260)}{(2.5)266(\cos^2 33.7) + 260(\sin^2 33.7)}$$

$$= \frac{172{,}900}{2.5(266)(.69215) + 260(.308)}$$

$= 320$ #

CAP $Z\alpha' = 320(4) = 1279 > 780$ (SEE PG C3)

USE 4 LAG SCREWS – 5/16" Ø x 3 1/2

√ 6:12 SLOPE $\alpha = 26.6°$

$$Z_\alpha' = \frac{266(2.5)(260)}{2.5\ 266(\cos^2 26.6) + 260(\sin^2(26.6))}$$

$$= \frac{172{,}900}{532 + 52}$$

$= 296$

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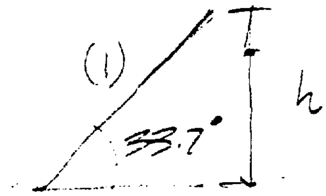
ADJUST PROJECTED AREA FOR SLOPE.

8:12



h = SIN 33.7 = .555

6:12

h = SIN 26.6 = .448

ADJUSTED FORCE

8:12 F = 1404(.555) = 780 ←

PART IX: LAG SCREWS

9.1-GENERAL

9.1.1-Quality of Lag Screws

Design provisions and design values herein apply to lag screws conforming to ANSI/ASME Standard B18.2.1-1981 (Reference 3). See Appendix L for lag screw dimensions.

9.1.2-Fabrication and Assembly

9.1.2.1 Lead holes for lag screws shall be bored as follows:

(a) The clearance hole for the shank shall have the same diameter as the shank, and the same depth of penetration as the length of unthreaded shank.

(b) The lead hole for the threaded portion shall have a diameter equal to 65% to 85% of the shank diameter in wood with $G > 0.6$, 60% to 75% in wood with $0.5 < G \leq 0.6$, and 40% to 70% in wood with $G \leq 0.5$ (see Table 9A) and a length equal to at least the length of the threaded portion. The larger percentile in each range shall apply to lag screws of greater diameters.

9.1.2.2 Lead holes or clearance holes shall not be required for 3/8" and smaller diameter lag screws loaded primarily in withdrawal in wood with $G \leq 0.5$ (see Table 9A), provided that edge distances, end distances, and spacing are sufficient to prevent unusual splitting.

9.1.2.3 The threaded portion of the lag screw shall be inserted in its lead hole by turning with a wrench, not by driving with a hammer.

9.1.2.4 Soap or other lubricant shall be used on the lag screws or in the lead holes to facilitate insertion and prevent damage to the lag screw.

9.2-WITHDRAWAL DESIGN VALUES

9.2.1-Withdrawal from Side Grain

Table 9.2A contains nominal withdrawal design values for a single lag screw inserted in side grain, with the lag screw axis perpendicular to the wood fibers. The withdrawal design value for a lag screw depends upon the specific gravity of the species (see Table 9A). Tabulated nominal design values, W, shall be multiplied by all applicable adjustment factors (see Table 7.3.1) to obtain allowable design values, W'.

9.2.2-End Grain Factor, C_{eg}

When lag screws are loaded in withdrawal from end grain, the tabulated nominal withdrawal design values, W, shall be multiplied by the end grain factor, $C_{eg} = 0.75$.

9.2.3-Tensile Strength of Lag Screw

When lag screws are loaded in withdrawal, the allowable tensile strength of the lag screw at the net (root) section shall not be exceeded (see 7.2.3).

9.3-LATERAL DESIGN VALUES

9.3.1-Wood-to-Wood Connections

For single shear (two member) wood-to-wood connections (see Appendix I) where:

(a) the lag screw is inserted in the side grain of the main member with the lag screw axis perpendicular to the wood fibers

(b) edge distances, end distances and spacing are sufficient to develop full design values (see 9.4)

(c) the depth of lag screw penetration in the main member is greater than or equal to the minimum penetration required for reduced design values (see 9.3.3)

(d) lag screw thread length is as specified in Appendix L (for lag screws with thread length greater than that specified in Appendix L, nominal lateral design values shall be permitted to be determined using D = root diameter of threaded portion of lag screw)

the nominal lag screw lateral design values, Z, shall be the lesser of:

YIELD MODE

[Eq. 9.3-1]

$$Z = \frac{D\, t_s\, F_{es}}{4K_\theta} \qquad \text{MODE } I_s$$

[Eq. 9.3-2]

$$Z = \frac{k\, D\, t_s\, F_{em}}{2.8\,(2 + R_e)\, K_\theta} \qquad \text{MODE } III_s$$

[Eq. 9.3-3]

$$Z = \frac{D^2}{3K_\theta}\sqrt{\frac{1.75\, F_{em}\, F_{yb}}{3\,(1 + R_e)}} \qquad \text{MODE IV}$$

TABLE 7.3.1 - APPLICABILITY OF ADJUSTMENT FACTORS FOR CONNECTIONS

		LOAD DURATION FACTOR [1]	WET SERVICE FACTOR [2]	TEMPERATURE FACTOR	GROUP ACTION FACTOR	GEOMETRY FACTOR [3]	PENETRATION DEPTH FACTOR [3]	END GRAIN FACTOR [3]	METAL SIDE PLATE FACTOR [3]	DIAPHRAGM FACTOR [3]	TOE-NAIL FACTOR [3]
BOLTS	Z' = (Z)	(C_D)	(C_M)	(C_t)	(C_g)	(C_Δ)	•	•	•	•	•
LAG SCREWS	W' = (W)	(C_D)	(C_M)	(C_t)	•	•	•	(C_{eg})	•	•	•
	Z' = (Z)	(C_D)	(C_M)	(C_t)	(C_g)	(C_Δ)	(C_d)	(C_{eg})	•	•	•
SPLIT RING and SHEAR PLATE CONNECTORS	P' = (P)	(C_D)	(C_M)	(C_t)	(C_g)	(C_Δ)	(C_d)	•	(C_{st})	•	•
	Q' = (Q)	(C_D)	(C_M)	(C_t)	(C_g)	(C_Δ)	(C_d)	•	•	•	•
WOOD SCREWS	W' = (W)	(C_D)	(C_M)	(C_t)	•	•	•	•	•	•	•
	Z' = (Z)	(C_D)	(C_M)	(C_t)	•	•	(C_d)	(C_{eg})	•	•	•
NAILS and SPIKES	W' = (W)	(C_D)	(C_M)	(C_t)	•	•	•	•	•	•	(C_{tn})
	Z' = (Z)	(C_D)	(C_M)	(C_t)	•	•	(C_d)	(C_{eg})	•	(C_{di})	(C_{tn})
METAL PLATE CONNECTORS	Z' = (Z)	(C_D)	(C_M)	(C_t)	•	•	•	•	•	•	•
DRIFT BOLTS and DRIFT PINS	W' = (W)	(C_D)	(C_M)	(C_t)	•	•	•	(C_{eg})	•	•	•
	Z' = (Z)	(C_D)	(C_M)	(C_t)	(C_g)	(C_Δ)	(C_d)	(C_{eg})	•	•	•
SPIKE GRIDS	Z' = (Z)	(C_D)	(C_M)	(C_t)	•	(C_Δ)	•	•	•	•	•

1. The load duration factor, C_D, shall not exceed 1.6 for connections (see 7.3.2).
2. The wet service factor, C_M, shall not apply to toe-nails loaded in withdrawal (see 12.2.3).
3. Specific information concerning geometry factors (C_Δ), penetration depth factors (C_d), end grain factors (C_{eg}), metal side plate factors (C_{st}), diaphragm factors (C_{di}) and toe-nail factors (C_{tn}) is provided in Parts VIII, IX, X, XI, XII and XIV of this Specification.

7.3-ADJUSTMENT OF DESIGN VALUES

7.3.1-Applicability of Adjustment Factors

Nominal design values (Z, W) shall be multiplied by all applicable adjustment factors to determine allowable design values (Z', W'). Table 7.3.1 specifies the adjustment factors which apply to nominal lateral design values (Z) and nominal withdrawal design values (W) for each fastener type. The actual load applied to a connection shall not exceed the allowable design value (Z', W') for the connection.

7.3.2-Load Duration Factor, C_D

Nominal design values shall be multiplied by the load duration factors, $C_D \leq 1.6$, specified in 2.3.2 and Appendix B, except when the capacity of the connection is controlled by metal strength (see 7.2.3 and Appendix B.3). The impact load duration factor shall not apply to connections.

7.3.3-Wet Service Factor, C_M

Nominal design values are for connections in wood seasoned to a moisture content of 19% or less and used under continuously dry conditions, as in most covered structures. For connections in wood that is unseasoned or partially seasoned, or when connections are exposed to wet service conditions in use, nominal design values shall be multiplied by the wet service factors, C_M, specified in Table 7.3.3.

7.3.4-Temperature Factor, C_t

Nominal design values shall be multiplied by the following temperature factors, C_t, for connections that will experience sustained exposure to elevated temperatures up to 150°F (see Appendix C):

TABLE 7.3.4-TEMPERATURE FACTORS, C_t, FOR CONNECTIONS

In Service Moisture Conditions[1]	C_t		
	T≤100°F	100°F<T≤125°F	125°F<T≤150°F
Dry	1.0	0.8	0.7
Wet	1.0	0.7	0.5

1. Wet and dry service conditions for connections are specified in 7.3.3.

7.3.5-Fire Retardant Treatment

Allowable design values for connections in lumber and structural glued laminated timber pressure-treated with fire retardant chemicals shall be obtained from the company providing the treatment and redrying service (see 2.3.5). The impact load duration factor shall not apply to connections in wood pressure-treated with fire retardant chemicals (see Table 2.3.2).

7.3.6-Group Action Factor, C_g

7.3.6.1 Nominal lateral design values for split ring connectors, shear plate connectors, bolts with D ≤ 1", or lag screws in a row shall be multiplied by the following group action factor, C_g:

TABLE 9.2A-LAG SCREW WITHDRAWAL DESIGN VALUES (W)[1]

Tabulated withdrawal design values (W) are in pounds per inch of thread penetration into side grain of main member. Length of thread penetration in main member shall not include the length of the tapered tip (see Appendix L).

Specific Gravity G	Lag Screw Unthreaded Shank Diameter, D										
	1/4"	5/16"	3/8"	7/16"	1/2"	5/8"	3/4"	7/8"	1"	1-1/8"	1-1/4"
0.73	397	469	538	604	668	789	905	1016	1123	1226	1327
0.71	381	450	516	579	640	757	868	974	1077	1176	1273
0.68	357	422	484	543	600	709	813	913	1009	1103	1193
0.67	349	413	473	531	587	694	796	893	987	1078	1167
0.58	281	332	381	428	473	559	641	719	795	869	940
0.55	260	307	352	395	437	516	592	664	734	802	868
0.51	232	274	314	353	390	461	528	593	656	716	775
0.50	225	266	305	342	378	447	513	576	636	695	752
0.49	218	258	296	332	367	434	498	559	617	674	730
0.47	205	242	278	312	345	408	467	525	580	634	686
0.46	199	235	269	302	334	395	453	508	562	613	664
0.44	186	220	252	283	312	369	423	475	525	574	621
0.43	179	212	243	273	302	357	409	459	508	554	600
0.42	173	205	235	264	291	344	395	443	490	535	579
0.41	167	198	226	254	281	332	381	428	473	516	559
0.40	161	190	218	245	271	320	367	412	455	497	538
0.39	155	183	210	236	261	308	353	397	438	479	518
0.38	149	176	202	227	251	296	340	381	422	461	498
0.37	143	169	194	218	241	285	326	367	405	443	479
0.36	137	163	186	209	231	273	313	352	389	425	460
0.35	132	156	179	200	222	262	300	337	373	407	441
0.31	110	130	149	167	185	218	250	281	311	339	367

1. Tabulated withdrawal design values (W) for lag screw connections shall be multiplied by all applicable adjustment factors (see Table 7.3.1).

in which

$$k = -1 + \sqrt{\frac{2(1+R_e)}{R_e} + \frac{F_{yb}(2+R_e)D^2}{2 F_{em} t_s^2}}$$

R_e = F_{em}/F_{es}

t_s = thickness of side member, inches

F_{em} = dowel bearing strength of main member (member holding point), psi (see Table 9A)

F_{es} = dowel bearing strength of side member, psi (see Table 9A)

F_{yb} = bending yield strength of lag screw, psi

D = unthreaded shank diameter of lag screw, inches

K_θ = $1 + (\theta_{max}/360^\circ)$

θ_{max} = maximum angle of load to grain ($0^\circ \le \theta \le 90^\circ$) for any member in a connection

When a member is loaded at an angle to grain, the dowel bearing strength, $F_{e\theta}$, for the member shall be determined as follows (see Appendix J):

[Eq. 9.3-4]

$$F_{e\theta} = \frac{F_{e\|} F_{e\perp}}{F_{e\|} \sin^2\theta + F_{e\perp} \cos^2\theta}$$

in which

θ = angle between direction of load and direction of grain (longitudinal axis of member)

Table 9.3A provides nominal lateral design values for various cut thread lag screw connections with wood side members. Nominal lag screw design values, Z, shall be multiplied by all applicable adjustment factors (see Table 7.3.1) to obtain allowable lag screw design values, Z'. Design values for one species of wood shall be permitted to be used for other species having the same or higher dowel bearing strength, F_e (see Table 9A).

TABLE 9A-DOWEL BEARING STRENGTH FOR LAG SCREW CONNECTIONS

Species Combination	Specific[1] Gravity G	Dowel bearing strength in pounds per square inch (psi)											
		$F_{c\parallel}$	$F_{c\perp}$ D=1/4"	$F_{c\perp}$ D=5/16"	$F_{c\perp}$ D=3/8"	$F_{c\perp}$ D=7/16"	$F_{c\perp}$ D=1/2"	$F_{c\perp}$ D=5/8"	$F_{c\perp}$ D=3/4"	$F_{c\perp}$ D=7/8"	$F_{c\perp}$ D=1"	$F_{c\perp}$ D=1-1/8"	$F_{c\perp}$ D=1-1/4"
Aspen	0.39	4350	3100	2800	2550	2350	2200	1950	1800	1650	1550	1450	1400
Balsam Fir	0.36	4050	2750	2500	2250	2100	1950	1750	1600	1500	1400	1300	1250
Beech Birch-Hickory	0.71	7950	7400	6650	6050	5600	5250	4700	4300	3950	3700	3500	3300
Coast Sitka Spruce	0.39	4350	3100	2800	2550	2350	2200	1950	1800	1650	1550	1450	1400
Cottonwood	0.41	4600	3350	3000	2750	2550	2350	2100	1950	1800	1650	1600	1500
Douglas Fir-Larch	0.50	5600	4450	4000	3650	3400	3150	2800	2600	2400	2250	2100	2000
Douglas Fir-Larch (North)	0.49	5500	4350	3900	3550	3300	3050	2750	2500	2300	2150	2050	1950
Douglas Fir-South	0.46	5150	3950	3550	3250	3000	2800	2500	2300	2100	2000	1850	1750
Eastern Hemlock	0.41	4600	3350	3000	2750	2550	2350	2100	1950	1800	1650	1600	1500
Eastern Hemlock-Tamarack	0.41	4600	3350	3000	2750	2550	2350	2100	1950	1800	1650	1600	1500
Eastern Hemlock-Tamarack (North)	0.47	5250	4100	3650	3350	3100	2900	2600	2350	2200	2050	1900	1850
Eastern Softwoods	0.36	4050	2750	2500	2250	2100	1950	1750	1600	1500	1400	1300	1250
Eastern Spruce	0.41	4600	3350	3000	2750	2550	2350	2100	1950	1800	1650	1600	1500
Eastern White Pine	0.36	4050	2750	2500	2250	2100	1950	1750	1600	1500	1400	1300	1250
Engelmann Spruce-Lodgepole Pine[2] (MSR 1650f and higher grades)	0.46	5150	3950	3550	3250	3000	2800	2500	2300	2100	2000	1850	1750
Engelmann Spruce-Lodgepole Pine[2] (MSR 1500f and lower grades)	0.38	4250	3000	2700	2450	2250	2100	1900	1750	1600	1500	1400	1350
Hem-Fir	0.43	4800	3600	3200	2950	2700	2550	2250	2050	1900	1800	1700	1600
Hem-Fir (North)	0.46	5150	3950	3550	3250	3000	2800	2500	2300	2100	2000	1850	1750
Mixed Maple	0.55	6150	5150	4600	4200	3900	3650	3250	2950	2750	2550	2400	2300
Mixed Oak	0.68	7600	6950	6250	5700	5250	4950	4400	4050	3750	3500	3300	3100
Mixed Southern Pine	0.51	5700	4600	4100	3750	3450	3250	2900	2650	2450	2300	2150	2050
Mountain Hemlock	0.47	5250	4100	3650	3350	3100	2900	2600	2350	2200	2050	1900	1850
Northern Pine	0.42	4700	3450	3100	2850	2600	2450	2200	2000	1850	1750	1650	1550
Northern Red Oak	0.68	7600	6950	6250	5700	5250	4950	4400	4050	3750	3500	3300	3100
Northern Species	0.35	3900	2650	2400	2150	2000	1900	1700	1550	1400	1350	1250	1200
Northern White Cedar	0.31	3450	2250	2000	1800	1700	1600	1400	1300	1200	1100	1050	1000
Ponderosa Pine	0.43	4800	3600	3200	2950	2700	2550	2250	2050	1900	1800	1700	1600
Red Maple	0.58	6500	5550	4950	4500	4200	3900	3500	3200	2950	2750	2600	2500
Red Oak	0.67	7500	6850	6100	5550	5150	4850	4300	3950	3650	3400	3200	3050
Red Pine	0.44	4950	3700	3300	3050	2800	2600	2350	2150	2000	1850	1750	1650
Redwood, close grain	0.44	4950	3700	3300	3050	2800	2600	2350	2150	2000	1850	1750	1650
Redwood, open grain	0.37	4150	2900	2600	2350	2200	2050	1850	1650	1550	1450	1350	1300
Sitka Spruce	0.43	4800	3600	3200	2950	2700	2550	2250	2050	1900	1800	1700	1600
Southern Pine	0.55	6150	5150	4600	4200	3900	3650	3250	2950	2750	2550	2400	2300
Spruce-Pine-Fir	0.42	4700	3450	3100	2850	2600	2450	2200	2000	1850	1750	1650	1550
Spruce-Pine-Fir (South)	0.36	4050	2750	2500	2250	2100	1950	1750	1600	1500	1400	1300	1250
Western Cedars	0.36	4050	2750	2500	2250	2100	1950	1750	1600	1500	1400	1300	1250
Western Cedars (North)	0.35	3900	2650	2400	2150	2000	1900	1700	1550	1400	1350	1250	1200
Western Hemlock	0.47	5250	4100	3650	3350	3100	2900	2600	2350	2200	2050	1900	1850
Western Hemlock (North)	0.46	5150	3950	3550	3250	3000	2800	2500	2300	2100	2000	1850	1750
Western White Pine	0.40	4500	3250	2900	2650	2450	2300	2050	1850	1750	1600	1500	1450
Western Woods	0.36	4050	2750	2500	2250	2100	1950	1750	1600	1500	1400	1300	1250
White Oak	0.73	8200	7750	6900	6300	5850	5450	4900	4450	4150	3850	3650	3450
Yellow Poplar	0.43	4800	3600	3200	2950	2700	2550	2250	2050	1900	1800	1700	1600

1. Specific gravity based on weight and volume when oven-dry.
2. Applies only to Engelmann Spruce-Lodgepole Pine Machine Stress Rated (MSR) structural lumber.

TABLE 9.3B-LAG SCREW DESIGN VALUES (Z) for SINGLE SHEAR (two member) CONNECTIONS[1,2,3] with 1/4" ASTM A36 steel side plate, or ASTM A446, Grade A steel side plate (for t_s < 1/4")

STEEL SIDE PLATE	LAG SCREW DIAMETER	G=0.67 RED OAK		G=0.55 MIXED MAPLE SOUTHERN PINE		G=0.50 DOUGLAS FIR-LARCH		G=0.49 DOUGLAS FIR-LARCH (N)		G=0.46 DOUGLAS FIR (S) HEM-FIR (N)	
t_s inches	D inches	$Z_\parallel$ lbs.	$Z_\perp$ lbs.	$Z_\parallel$ lbs.	$Z_\perp$ lbs.	$Z_\parallel$ lbs.	$Z_\perp$ lbs.	$Z_\parallel$ lbs.	$Z_\perp$ lbs.	$Z_\parallel$ lbs.	$Z_\perp$ lbs.
1/4"	1/4	330	260	310	230	300	220	300	210	290	200
	5/16	450	330	410	290	400	280	400	270	390	260
	3/8	550	390	510	350	490	330	480	320	470	310
	7/16	700	480	650	430	620	400	620	400	600	380
	1/2	870	580	810	520	780	490	770	480	750	460
	5/8	1290	820	1190	720	1140	680	1140	670	1100	640
	3/4	1810	1100	1660	960	1600	910	1580	890	1540	860
	7/8	2420	1410	2220	1240	2130	1170	2120	1140	2060	1100
	1	3130	1760	2870	1540	2750	1460	2730	1430	2650	1380
	1-1/8	3930	2150	3610	1880	3460	1770	3430	1750	3340	1670
	1-1/4	4840	2580	4440	2260	4260	2120	4220	2090	4100	1990
3 gage t_s=0.239"	1/4	300	230	270	210	260	190	260	190	260	180
	5/16	400	300	370	270	360	250	360	250	350	240
	3/8	500	350	460	320	440	300	440	290	430	280
7 gage t_s=0.179"	1/4	270	210	250	180	240	170	240	170	230	160
	5/16	370	270	340	240	330	230	330	230	320	220
	3/8	460	320	420	290	410	270	400	270	390	260
10 gage t_s=0.134"	1/4	250	190	230	170	220	160	220	160	210	150
	5/16	350	260	330	230	310	220	310	210	300	210
	3/8	440	310	400	280	390	260	390	260	380	250
11 gage t_s=0.120"	1/4	250	190	230	170	220	160	220	160	210	150
	5/16	350	260	320	230	310	210	310	210	300	200
	3/8	430	310	400	270	380	260	380	250	370	240
12 gage t_s=0.105"	1/4	240	190	220	170	210	160	210	150	210	150
	5/16	350	250	320	220	310	210	300	210	300	200
	3/8	430	300	400	270	380	250	380	250	370	240
14 gage t_s=0.075"	1/4	240	180	220	160	210	150	210	150	200	140

1. Tabulated lateral design values (Z) for lag screw connections shall be multiplied by all applicable adjustment factors (Table 7.3.1).
2. Tabulated lateral design values (Z) are for "full diameter" lag screws (see Reference 3) inserted in side grain with lag screw axis perpendicular to wood fibers, and with the following lag screw bending yield strengths (F_{yb}):
   - F_{yb} = 70,000 psi for D = 1/4"
   - F_{yb} = 60,000 psi for D = 5/16"
   - F_{yb} = 45,000 psi for D ≥ 3/8"
3. Tabulated lateral design values (Z) are based on dowel bearing strengths (F_e) of 58,000 psi for ASTM A36 steel, and 45,000 psi for ASTM A446, Grade A steel.

0012736

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August 2, 2000

CITY OF SACRAMENTO
PERMIT ASSISTANCE

OCT 23 2000

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City of Sacramento
Building Inspection Division
1231 "I" St.
Sacramento, CA 95814

Dear Sir or Madam:

As the Prime Contractor for SMUD's Photovoltaic Program, Kyocera Solar, Inc. hereby authorizes SMUD to act as our agent for purposes of obtaining permits and other permit/inspection related issues. The following persons are approved to act as agent for these matters: SMUD Personnel: David Rienhart, Paula Mitchell, Rudy Iwasko, Debbie Thompson. KSI Personnel: Matt Lafferty, Dave Metcalf, Lee Ulrich, Kevin Hahner.

The following information may prove helpful to you:

California Contractor's License #:	777036	Class:	C-10 Electrical
Expiration Date:	4/30/2002	Status:	Active
Contractor Bonding Company:	International Business and Mercantile Reassurance Company		
Bond #:	GCL1203491	Amount:	$7,500.00
Worker's Compensation Company:	Tokio Marine & Fire Insurance Company		
Policy #:	WC1109073	Expiration Date:	5/1/2001

KSI, formerly known as Utility Power Group, will continue to Design, Install & Certify PV Systems to the highest standards.

KSI thanks you for your ongoing cooperation and assistance. It is only through the combined cooperative efforts of everyone involved that we may forge ahead in our endeavor to provide clean energy for our community.

Sincerely,

Matt Lafferty

Matt Lafferty
Field Superintendent; RME

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OCT 31 2000

Sacramento Building Division