B C A

Structural
Engineering
Incorporated

JOB No 14207

DATE: 2/6/14

STRUCTURAL CALCULATIONS

For

NEW ELEVATED WALKWAYS AND ROOF CANOPY

At

MODULAR RENOVATION
VA STOCKTON
777 SOUTH FREEDOM ROAD
FRENCH CAMP, CA.

REGISTERED PROFESSIONAL ENGINEER
GEOFFREY S. CLIFFORD
S3662
Exp : 3/31/2015
STRUCTURAL
STATE OF CALIFORNIA

2-6-14

CLIENT: ADVANCED DESIGN CONSULTANTS, INC

BCA Structural Engineering, Inc. 1300 Industrial Road, Suite 1
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SHEET NUMBER	DESCRIPTION
1	CODE, LOADS AND MATERIALS
2 & 3	SEISMIC SITE CALCULATION
4 TO 11	ROOF DESIGN
12 TO 22	WALKWAY DESIGN
F-1	FOUNDATION DESIGN INFORMATION
F-1	NON MOMENT FRAME FOOTINGS
L-1	GENERAL LATERAL INFORMATION & LOADS
L-2	WIND LOADING
L-3 TO L-9	MOMENT FRAME 1
L-10 TO L-16	MOMENT FRAME 2
L-17 TO L-23	MOMENT FRAME 3
L-24 TO L-36	BASE PLATE AND FOOTING DESIGN

BC|A STRUCTURAL ENGINEERING
1300 #1 Industrial Road
San Carlos, CA 94070
650-508-2500
FAX 650-508-2505

DESIGNED G. C.
CHECKED
DATE 1-24-14
JOB No. 14207
SHT 1 OF

PROJECT
SUBJECT

CODES: 2013 C.B.C. 2012 IBC ASCE-7-10

DESIGN LOADS:

SLOPED ROOF:	w/ clg finish	
Roof Material	2.0	psf
Decking	2.5	psf
Framing	3.0	psf
Insulat/Sprinkler	0.0	psf
Finish	0.0	psf
Dead load	7.5	psf
Adjust dead load for slope:	0.5 /12	
Adjusted dead load	8.0	psf
Live load	20.0	psf
Total load	28.0	psf

Roof Live Load Calculations
R2 = 1 for F<=4
R2 = 1.2-0.05F for 4<F<12
R2 = 0.6 F>=12

FLOOR:	at conv. frmg.	
Decking	4.0	psf
Plyd	0.0	psf
Framing	3.0	psf
Insulat/Sprinkler	0.0	psf
Gypsum	0.0	psf
Dead load	7.0	psf
Live load	100.0	psf
Total load	107.0	psf

SEISMIC:

Cs = Sds W / R/I Cs= 0.205 W
V= Cs * F V= 0.205 W
Working Stress Design V/1.4 = **V= 0.147 W**
See CBC 1605.3.2

I =	1	< 300 occupants		
R =	3.5	Ordinary Steel Momer		
Fa =	1	F=	1	1 Story
Sms =	1.077	F=	1.1	2 Story
Sds =	0.718	F=	1.2	3 Story
Site Class =	D			

Seismic Design Category = C

Information from USGS Ground Motion Parameter Calculator
See Output

MATERIALS:

CONCRETE: fc = 3000 psi
REINFORCING: Fy = 40,000 psi for #4 & smaller, Fy = 60,000 psi for #5 & larger
TIMBER: Framing No. 2 DF Fb = 900 psi Fv = 180 psi E = 1.6EE6
4 x Beams No. 1 DF Fb = 1000 psi Fv = 180 psi E = 1.7 EE6
S.S DF Fb= 1500 psi Fv= 180 psi E= 1.9 EE6
Cf for 4"=1.5 Cf for 6"=1.3 Cf for 8"=1.2 & 1.3 Cf for 10"=1.1 & 1.2
Cf for 4x12 = 1.1
6 x Beams No. 1 DF Fb = 1300 psi Fv = 170 psi E = 1.6 EE6
GLULAMS: 24F -V4 DF/DF Fb = 2400 PSI Fv = 265 PSI E = 1.8 EE6

LATITUDE & LONGITUDE CONVERSION					
Latitude			Longitude		
deg	min	sec	deg*	min	sec
37	52	58.89	-121	16	54.97
DECIMAL EQUIVALENT					
Latitude			Longitude		
37.8830			-121.2819		

* Longitude deg should be entered as a NEGATIVE in the Western Hemisphere

USGS DATA	
SDs	0.718
SD1	0.396
Sms	1.077
Sm1	0.594
Fa	1.000
Fv	1.500
Ss	1.077 - 0.968 -
S1	0.396

PER USGS PRINTOUT

STRUCTURAL DESIGN CATEGORY	D Min

USGS Design Maps Summary Report

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User-Specified Input

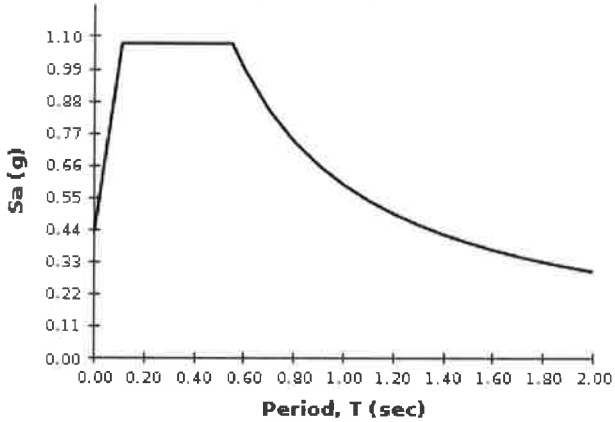
Report Title	VA Stockton Fri January 24, 2014 19:54:05 UTC
Building Code Reference Document	2012 International Building Code (which utilizes USGS hazard data available in 2008)
Site Coordinates	37.883°N, 121.2819°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

USGS-Provided Output

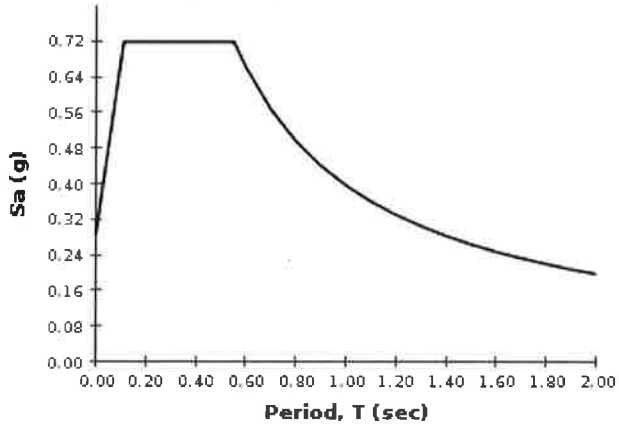
S_S =	0.968 g	S_{MS} =	1.077 g	S_{DS} =	0.718 g
S_1 =	0.349 g	S_{M1} =	0.594 g	S_{D1} =	0.396 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.

MCE_R Response Spectrum



Design Response Spectrum



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JOB No. 14207.
SHT 4 OF

PROJECT
SUBJECT

ROOF

USE 'B' DECK AS ROOF MATERIAL & SECONDARY STRUCTURE FOR FLAT ROOF DECKS

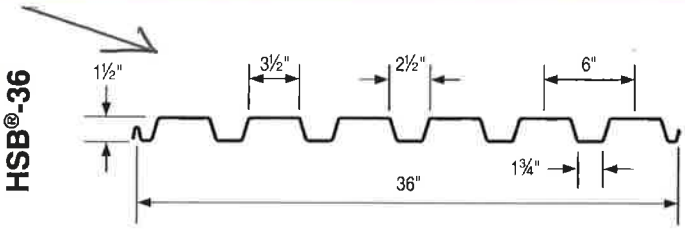
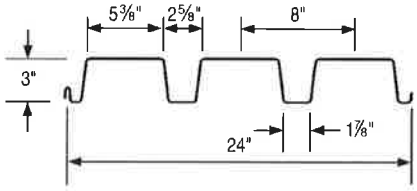
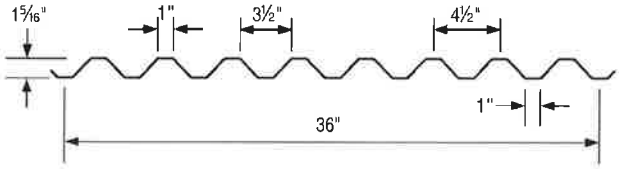
USE 'B' DECK FOR SECONDARY STRUCTURE WITH CURVED ARCHITECTURAL METAL ROOF AT CURVED ROOF.

MAXIMUM SPAN = 9'-6 CAPACITY OF 1½ B DECK x 20 ga

CAPACITY OF 1½ x 20ga B DECK AT 9'-6" SPAN = 40 PSF > 28 PSF
OK

USE 1½ x 20 ga B DECK

5

Type	Profile (dimensions in inches)	Gage	Weight Galv psf / N/m²	Weight Painted psf / N/m²	Section Properties per ft (m) of width I in.⁴ / mm⁴	+ S in.³ / mm³	– S in.³ / mm³
PLB™-36 HSB®-36		22	1.9 / 91.0	1.8 / 86.2	0.175 / 238,978	0.187 / 10,054	0.198 / 10,645
		20	2.3 / 110.1	2.2 / 105.3	0.216 / 294,967	0.235 / 12,634	0.248 / 13,333
		18	2.9 / 138.9	2.8 / 134.1	0.302 / 412,408	0.322 / 17,312	0.335 / 18,011
		16	3.5 / 167.6	3.4 / 162.8	0.377 / 514,827	0.411 / 22,097	0.417 / 22,419
PLN™-24 N-24		22	2.2 / 105.3	2.1 / 100.5	0.737 / 1,006,438	0.361 / 19,408	0.446 / 23,978
		20	2.6 / 124.5	2.5 / 119.7	0.917 / 1,252,244	0.466 / 25,053	0.548 / 29,462
		18	3.5 / 167.6	3.4 / 162.8	1.283 / 1,752,050	0.664 / 35,698	0.737 / 39,623
		16	4.2 / 201.1	4.1 / 196.3	1.655 / 2,260,049	0.851 / 45,752	0.914 / 49,139
DEEP VERCOR™		26	1.1 / 52.7		0.073 / 99,688	0.099 / 5,323	0.103 / 5,538
		24	1.4 / 67.0		0.098 / 133,828	0.138 / 7,419	0.140 / 7,527
		22	1.7 / 81.4		0.123 / 167,967	0.175 / 9,409	0.174 / 9,355
		20	2.1 / 100.5		0.143 / 195,279	0.207 / 11,129	0.206 / 11,075

PROPOSED RECKING

1. Section properties have been computed in accordance with the "Specification for the Design of Cold-Formed Steel Structural Members" published by AISI. The section properties are based on the following steel strengths:

Profile	Minimum Yield Strength (F_y)	Bending Strength (F_b)
PLB™-36 or HSB®-36	38 ksi (*262,000 kPa*)	22.8 ksi (*157,200 kPa*)
PLN™-24 or N-24	38 ksi (*262,000 kPa*)	22.8 ksi (*157,200 kPa*)
Deep VERCOR™	80 ksi (*551,581 kPa*)	36.0 ksi (*248,211 kPa*)

2. Section properties and values shown apply to all available widths.
3. Material thickness is subject to AISI tolerances. See ICC ES Report ESR-1735P for decimal thickness of material.
4. Weights shown are approximations for design purposes.
5. All dimensions are nominal and are subject to manufacturing tolerances.

Metric Conversions

in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
1	25	1¾	44	2⅝	67	4½	114	8	203
1 5/16	33	1⅞	48	3	76	5⅜	137	24	610
1½	38	2½	64	3½	89	6	152	36	914

Type PLB™-36 or HSB®-36

1½" (*38 mm*) Deep Roof Deck
Primer Painted or Galvanized

VERTICAL LOADS

ALLOWABLE UNIFORM LOADS (psf, *N/m²*)

SPAN (ft-in., *mm*)

SPAN	GAGE		4'-0" *1,220*	5'-0" *1,520*	5'-6" *1,680*	6'-0" *1,830*	6'-6" *1,980*	7'-0" *2,130*	7'-6" *2,290*	8'-0" *2,440*	8'-6" *2,590*	9'-0" *2,740*	9'-6" *2,900*	10'-0" *3,050*	10'-6" *3,200*	11'-0" *3,350*	11'-6" *3,500*	12'-0" *3,660*
SINGLE	22	STRESS	178 *8,523*	114 *5,458*	94 *4,501*	79 *3,783*	67 *3,208*	58 *2,777*	51 *2,442*	44 *2,107*	39 *1,867*	35 *1,676*	31 *1,484*	28 *1,341*				
		L/240	✦✦✦	92 *4,405*	69 *3,304*	53 *2,538*	42 *2,011*	34 *1,628*	27 *1,293*	22 *1,053*	19 *910*	16 *766*	13 *622*	11 *527*				
	20	STRESS	223 *10,677*	143 *6,847*	118 *5,650*	99 *4,740*	85 *4,070*	73 *3,495*	64 *3,064*	56 *2,681*	49 *2,346*	44 *2,107*	40 *1,915*	36 *1,724*	32 *1,532*	30 *1,436*	27 *1,293*	25 *1,197*
		L/240	222 *10,629*	113 *5,410*	85 *4,070*	66 *3,160*	52 *2,490*	41 *1,963*	34 *1,628*	28 *1,341*	23 *1,101*	19 *910*	17 *814*	14 *670*	12 *575*	11 *527*	9 *431*	8 *383*
	18	STRESS	300 *14,364*	196 *9,385*	162 *7,757*	136 *6,512*	116 *5,554*	100 *4,788*	87 *4,166*	76 *3,639*	68 *3,256*	60 *2,873*	54 *2,586*	49 *2,346*	44 *2,107*	40 *1,915*	37 *1,772*	34 *1,628*
		L/240	✦✦✦	159 *7,613*	119 *5,698*	92 *4,405*	72 *3,447*	58 *2,777*	47 *2,250*	39 *1,867*	32 *1,532*	27 *1,293*	23 *1,101*	20 *958*	17 *814*	15 *718*	13 *622*	11 *527*
	16	STRESS	300 *14,364*	250 *11,970*	207 *9,911*	174 *8,331*	148 *7,086*	127 *6,081*	111 *5,315*	98 *4,692*	86 *4,118*	77 *3,687*	69 *3,304*	62 *2,969*	57 *2,729*	52 *2,490*	47 *2,250*	43 *2,059*
		L/240	✦✦✦	198 *9,480*	149 *7,134*	115 *5,506*	90 *4,309*	72 *3,447*	59 *2,825*	48 *2,298*	40 *1,915*	34 *1,628*	29 *1,389*	25 *1,197*	21 *1,005*	19 *910*	16 *766*	14 *670*
DOUBLE	22	STRESS	188 *9,001*	120 *5,746*	99 *4,740*	84 *4,022*	71 *3,399*	61 *2,921*	54 *2,586*	47 *2,250*	42 *2,011*	37 *1,772*	33 *1,580*	30 *1,436*				
		L/240	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	32 *1,532*	28 *1,341*				
	20	STRESS	236 *11,300*	151 *7,230*	125 *5,985*	105 *5,027*	89 *4,261*	77 *3,687*	67 *3,208*	59 *2,825*	52 *2,490*	47 *2,250*	42 *2,011*	38 *1,819*	34 *1,628*	31 *1,484*	29 *1,389*	26 *1,245*
		L/240	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	47 *2,250*	40 *1,915*	34 *1,628*	29 *1,389*	26 *1,245*	22 *1,053*	20 *958*
	18	STRESS	300 *14,364*	204 *9,768*	168 *8,044*	141 *6,751*	121 *5,794*	104 *4,980*	91 *4,357*	80 *3,830*	70 *3,352*	63 *3,016*	56 *2,681*	51 *2,442*	46 *2,202*	42 *2,011*	39 *1,867*	35 *1,676*
		L/240	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	56 *2,681*	48 *2,298*	41 *1,963*	36 *1,724*	31 *1,484*	28 *1,341*
	16	STRESS	300 *14,364*	254 *12,162*	210 *10,055*	176 *8,427*	150 *7,182*	129 *6,177*	113 *5,410*	99 *4,740*	88 *4,213*	78 *3,735*	70 *3,352*	63 *3,016*	57 *2,729*	52 *2,490*	48 *2,298*	44 *2,107*
		L/240	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	✦✦✦	70 *3,352*	60 *2,873*	51 *2,442*	45 *2,155*	39 *1,867*	34 *1,628*
TRIPLE	22	STRESS	235 *11,252*	150 *7,182*	124 *5,937*	105 *5,027*	89 *4,261*	77 *3,687*	67 *3,208*	59 *2,825*	52 *2,490*	46 *2,202*	42 *2,011*	38 *1,819*				
		L/240	✦✦✦	✦✦✦	✦✦✦	100 *4,788*	79 *3,783*	63 *3,016*	51 *2,442*	42 *2,011*	35 *1,676*	30 *1,436*	25 *1,197*	22 *1,053*				
	20	STRESS	295 *14,125*	188 *9,001*	156 *7,469*	131 *6,272*	112 *5,363*	96 *4,597*	84 *4,022*	74 *3,543*	65 *3,112*	58 *2,777*	52 *2,490*	47 *2,250*	43 *2,059*	39 *1,867*	36 *1,724*	33 *1,580*
		L/240	✦✦✦	✦✦✦	✦✦✦	124 *5,937*	97 *4,644*	78 *3,735*	63 *3,016*	52 *2,490*	44 *2,107*	37 *1,772*	31 *1,484*	27 *1,293*	23 *1,101*	20 *958*	18 *862*	15 *718*
	18	STRESS	300 *14,364*	255 *12,209*	210 *10,055*	177 *8,475*	151 *7,230*	130 *6,224*	113 *5,410*	99 *4,740*	88 *4,213*	79 *3,783*	71 *3,399*	64 *3,064*	58 *2,777*	53 *2,538*	48 *2,298*	44 *2,107*
		L/240	✦✦✦	✦✦✦	✦✦✦	173 *8,283*	136 *6,512*	109 *5,219*	89 *4,261*	73 *3,495*	61 *2,921*	51 *2,442*	44 *2,107*	37 *1,772*	32 *1,532*	28 *1,341*	25 *1,197*	22 *1,053*
	16	STRESS	300 *14,364*	300 *14,364*	262 *12,545*	220 *10,534*	188 *9,001*	162 *7,757*	141 *6,751*	124 *5,937*	110 *5,267*	98 *4,692*	88 *4,213*	79 *3,783*	72 *3,447*	65 *3,112*	60 *2,873*	55 *2,633*
		L/240	✦✦✦	✦✦✦	✦✦✦	216 *10,342*	170 *8,140*	136 *6,512*	111 *5,315*	91 *4,357*	76 *3,639*	64 *3,064*	54 *2,586*	47 *2,250*	40 *1,915*	35 *1,676*	31 *1,484*	27 *1,293*

VENT CAP
40 PSF

Type PLB™-36

7

- **7 Hilti Fastener Pattern at Supports**
  X-EDN19 at Supports 0.250-0.313" (*6.4-8.0 mm*) thick
- **Sidelaps Connected with PunchLok® Tool**
- **Primer Painted or Galvanized**

Allowable Diaphragm Shear Values, q (plf, *kN/m*) and Flexibility Factors, F ((in./lb)x10^6, (*mm/N*)x10^6)

GAGE	SIDELAP ATTACH-MENT		SPAN (ft-in., *mm*) 4'-0" *1,220*	5'-0" *1,520*	6'-0" *1,830*	7'-0" *2,130*	8'-0" *2,440*	9'-0" *2,740*	10'-0" *3,050*	11'-0" *3,350*	12'-0" *3,660*
22	VSC @ 24"	q	563 *8.22*	514 *7.50*	432 *6.30*	411 *6.00*	362 *5.28*	351 *5.12*	318 *4.64*		
		F	17.0+23R *97.1+131R*	17.9+27R *102.2+154R*	30.6+31R *174.7+177R*	31.5+35R *179.9+200R*	48.5+38R *276.9+217R*	49.2+42R *280.9+240R*	70.4+45R *402.0+257R*		
	VSC @ 18"	q	637 *9.30*	565 *8.25*	475 *6.93*	443 *6.47*	417 *6.09*	374 *5.46*	359 *5.24*		
		F	10.4+23R *59.4+131R*	12.3+27R *70.2+154R*	19.8+31R *113.1+177R*	22.2+35R *126.8+200R*	25.1+38R *143.3+217R*	36.3+42R *207.3+240R*	39.6+45R *226.1+257R*		
	VSC @ 12"	q	699 *10.20*	609 *8.89*	546 *7.97*	499 *7.28*	463 *6.76*	435 *6.35*	411 *6.00*		
		F	7.8+23R *44.5+131R*	9.6+27R *54.8+154R*	11.6+31R *66.2+177R*	13.8+35R *78.8+200R*	16.4+38R *93.6+217R*	19.2+42R *109.6+240R*	22.4+45R *127.9+257R*		
	VSC @ 8"	q	804 *11.73*	720 *10.51*	634 *9.25*	592 *8.64*	541 *7.90*	516 *7.53*	482 *7.03*		
		F	5.9+23R *33.7+131R*	6.5+27R *37.1+154R*	7.7+31R *44.0+177R*	8.4+35R *48.0+200R*	9.9+38R *56.5+217R*	10.7+42R *61.1+240R*	12.6+45R *71.9+257R*		
	VSC @ 6"	q	891 *13.00*	783 *11.43*	707 *10.32*	650 *9.49*	607 *8.86*	572 *8.35*	542 *7.91*		
		F	5.3+23R *30.3+131R*	5.7+27R *32.5+154R*	6.2+31R *35.4+177R*	6.8+35R *38.8+200R*	7.5+38R *42.8+217R*	8.3+42R *47.4+240R*	9.0+45R *51.4+257R*		
	VSC @ 4"	q	1039 *15.16*	917 *13.38*	831 *12.13*	767 *11.19*	717 *10.46*	676 *9.87*	617 *9.00*		
		F	4.7+23R *26.8+131R*	4.8+27R *27.4+154R*	5.1+31R *29.1+177R*	5.4+35R *30.8+200R*	5.7+38R *32.5+217R*	6.0+42R *34.3+240R*	6.5+45R *37.1+257R*		
20	VSC @ 24"	q	677 *9.88*	615 *8.98*	517 *7.55*	490 *7.15*	433 *6.32*	419 *6.11*	380 *5.55*	371 *5.41*	344 *5.02*
		F	15.2+13R *86.8+74R*	16.1+15R *91.9+86R*	27.8+17R *158.7+97R*	28.8+19R *164.5+108R*	44.6+21R *254.7+120R*	45.5+23R *259.8+131R*	65.4+25R *373.4+143R*	66.3+27R *378.6+154R*	90.0+29R *513.9+166R*
	VSC @ 18"	q	762 *11.12*	673 *9.82*	567 *8.27*	528 *7.71*	497 *7.25*	446 *6.51*	428 *6.25*	412 *6.01*	381 *5.56*
		F	9.1+13R *52.0+74R*	11.0+15R *62.8+86R*	17.9+17R *102.2+97R*	20.3+19R *115.9+108R*	23.0+21R *131.3+120R*	33.5+23R *191.3+131R*	36.8+25R *210.1+143R*	40.2+27R *229.5+154R*	54.2+29R *309.5+166R*
	VSC @ 12"	q	833 *12.16*	724 *10.57*	649 *9.47*	593 *8.65*	550 *8.03*	516 *7.53*	488 *7.12*	464 *6.77*	444 *6.48*
		F	6.8+13R *38.8+74R*	8.4+15R *48.0+86R*	10.4+17R *59.4+97R*	12.5+19R *71.4+108R*	15.0+21R *85.7+120R*	17.6+23R *100.5+131R*	20.6+25R *117.6+143R*	23.7+27R *135.3+154R*	27.2+29R *155.3+166R*
	VSC @ 8"	q	952 *13.89*	852 *12.43*	749 *10.93*	699 *10.20*	640 *9.34*	610 *8.90*	570 *8.32*	551 *8.04*	522 *7.62*
		F	5.1+13R *29.1+74R*	5.6+15R *32.0+86R*	6.8+17R *38.8+97R*	7.4+19R *42.3+108R*	8.8+21R *50.2+120R*	9.6+23R *54.8+131R*	11.4+25R *65.1+143R*	12.3+27R *70.2+154R*	14.4+29R *82.2+166R*
	VSC @ 6"	q	1053 *15.37*	923 *13.47*	834 *12.17*	767 *11.19*	715 *10.43*	674 *9.84*	640 *9.34*	611 *8.92*	564 *8.23*
		F	4.4+13R *25.1+74R*	4.8+15R *27.4+86R*	5.4+17R *30.8+97R*	6.0+19R *34.3+108R*	6.6+21R *37.7+120R*	7.4+23R *42.3+131R*	8.1+25R *46.3+143R*	8.9+27R *50.8+154R*	9.8+29R *56.0+166R*
	VSC @ 4"	q	1221 *17.82*	1077 *15.72*	976 *14.24*	900 *13.13*	842 *12.29*	795 *11.60*	756 *11.03*	671 *9.79*	564 *8.23*
		F	3.9+13R *22.3+74R*	4.1+15R *23.4+86R*	4.4+17R *25.1+97R*	4.7+19R *26.8+108R*	5.0+21R *28.6+120R*	5.3+23R *30.3+131R*	5.6+25R *32.0+143R*	6.0+27R *34.3+154R*	6.5+29R *37.1+166R*

USE SCREWS AT SIDE SEAM CONN

X-EDN19 = Hilti X-EDN19 THQ12 fastener
VSC = Verco Sidelap Connection

PLB™ HILTI

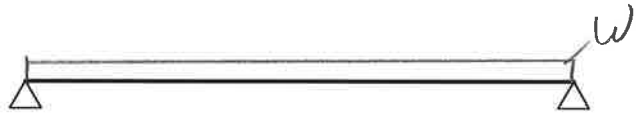
BC|A STRUCTURAL ENGINEERING
1300 #1 Industrial Road
San Carlos, CA 94070
650-508-2500
FAX 650-508-2505

DESIGNED G. C.
CHECKED
DATE 1-24-14

JOB No. 14207
SHT 8 OF

PROJECT
SUBJECT BEAMS: SEE COMPUTER PRINTOUT

ROOF MEMBER - LEFT TO RIGHT ROOFS



R = 1366 lbs

R = 1366 lbs
DL = 466 lbs
LL = 900 lbs

USE TS 6x5x3/16

LOADS

WDL = 6(8) = 48 PLF
LL = 6(20) = 120 PLF

ROOF MEMBER - TOP TO BOTT. ROOFS

R = 1002 lbs

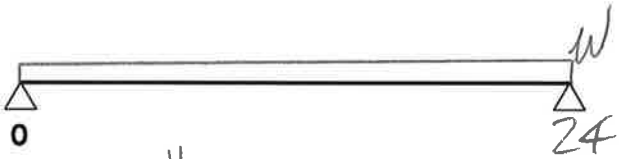
R = 1002 lbs
DL = 352 lbs
LL = 650 lbs

USE TS 6x5x3/16

LOADS

WDL = 5(8) = 40 PLF
LL = 5(20) = 100 PLF

CURVED ROOF MEMBER



R = 2800 lbs

R = 2800 lbs
DL = 1120 lbs
LL = 1680 lbs

USE TS 10x5x3/8

LOADS

WDL = 7(8) = 56 PLF
LL = 7(20) = 140 PLF

BCA Structural Engineering Inc
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Project Title: Modular Renovation VA Stockton
Engineer: G.C. Project ID: 14207
Project Descr:

Printed: 24 JAN 2014, 3:52PM

Steel Beam

File = s:\ENERCA~1\data\2014JO~1\14207.ec6
ENERCALC, INC. 1983-2013, Build:6.13.8.31, Ver:6.13.8.31

Lic. # : KW-06002019 Licensee : BCA Structural Engineering Inc

Description : ROOF MEMBER - LEFT TO RIGHT ROOFS

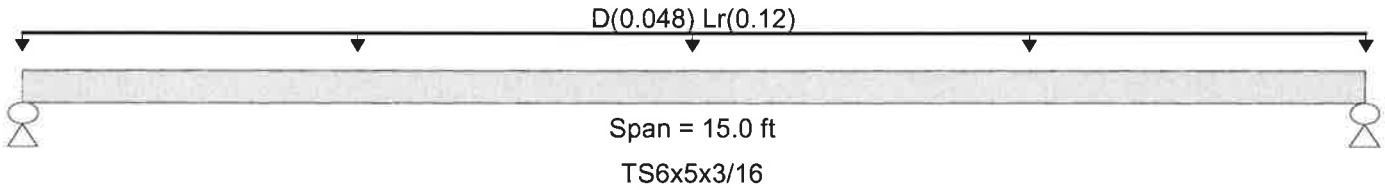
CODE REFERENCES

Calculations per AISC 360-05, IBC 2009, ASCE 7-10
Load Combination Set : ASCE 7-02

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending
Load Combination ASCE 7-02

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0480, Lr = 0.120 k/ft, Tributary Width = 1.0 ft, (W)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.274 : 1**	Maximum Shear Stress Ratio =	**0.043 : 1**
Section used for this span	**TS6x5x3/16**	Section used for this span	**TS6x5x3/16**
Ma : Applied	5.122 k-ft	Va : Applied	1.366 k
Mn / Omega : Allowable	18.708 k-ft	Vn/Omega : Allowable	31.588 k
Load Combination	+D+Lr+H	Load Combination	+D+Lr+H
Location of maximum on span	7.500ft	Location of maximum on span	15.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	0.231 in	Ratio =	780
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.350 in	Ratio =	514
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+Lr	1	0.3500	7.575		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.366	1.366
D Only	0.466	0.466
Lr Only	0.900	0.900
D+Lr	1.366	1.366

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Project Title: Modular Renovation VA Stockton
Engineer: G.C. Project ID: 14207
Project Descr:

10

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Steel Beam

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Lic. # : KW-06002019 Licensee : BCA Structural Engineering Inc

Description : ROOF MEMBER - TOP TO BOTT ROOFS

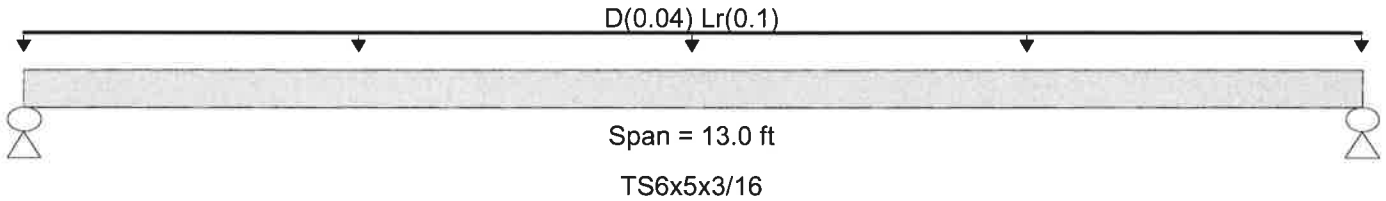
CODE REFERENCES

Calculations per AISC 360-05, IBC 2009, ASCE 7-10
Load Combination Set : ASCE 7-02

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending
Load Combination ASCE 7-02

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.040, Lr = 0.10 k/ft, Tributary Width = 1.0 ft, (W)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.174 : 1**	Maximum Shear Stress Ratio =	**0.032 : 1**
Section used for this span	**TS6x5x3/16**	Section used for this span	**TS6x5x3/16**
Ma : Applied	3.255 k-ft	Va : Applied	1.002 k
Mn / Omega : Allowable	18.708 k-ft	Vn/Omega : Allowable	31.588 k
Load Combination	+D+Lr+H	Load Combination	+D+Lr+H
Location of maximum on span	6.500 ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	0.108 in	Ratio =	1,438
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.167 in	Ratio =	934
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+Lr	1	0.1671	6.565		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.002	1.002
D Only	0.352	0.352
Lr Only	0.650	0.650
D+Lr	1.002	1.002

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Project Title: Modular Renovation VA Stockton
Engineer: G.C. Project ID: 14207
Project Descr:

11

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Steel Beam

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Lic. # : KW-06002019 Licensee : BCA Structural Engineering Inc

Description : ROOF MEMBER - CURVED ROOF

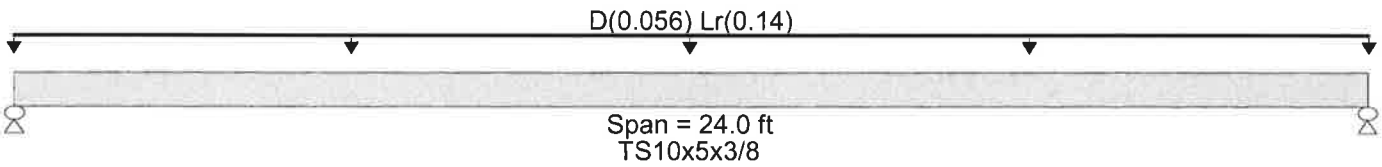
CODE REFERENCES

Calculations per AISC 360-05, IBC 2009, ASCE 7-10
Load Combination Set : ASCE 7-02

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending
Load Combination ASCE 7-02

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0560, Lr = 0.140 k/ft, Tributary Width = 1.0 ft, (W)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.227** : 1	Maximum Shear Stress Ratio =	**0.027** : 1
Section used for this span	**TS10x5x3/8**	Section used for this span	**TS10x5x3/8**
Ma : Applied	16.800 k-ft	Va : Applied	2.80 k
Mn / Omega : Allowable	74.142 k-ft	Vn/Omega : Allowable	103.280 k
Load Combination	+D+Lr+H	Load Combination	+D+Lr+H
Location of maximum on span	12.000ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	0.284 in	Ratio =	1,014
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.473 in	Ratio =	609
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+Lr	1	0.4730	12.120		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.800	2.800
D Only	1.120	1.120
Lr Only	1.680	1.680
D+Lr	2.800	2.800

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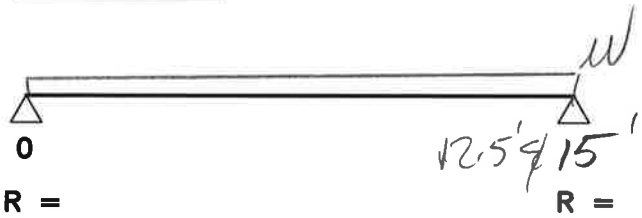
DESIGNED G. C.
CHECKED
DATE 1-24-14

JOB No. 14207
SHT 12 OF

PROJECT
SUBJECT BEAMS: SEE COMPUTER PRINTOUT

WALKWAY FLOOR JOIST



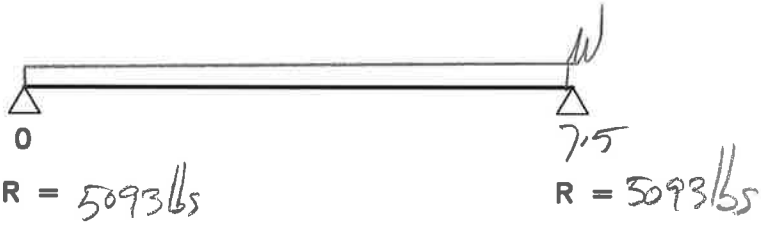
2x12 @16 AT 12'-6 SPAN & 2x4 @16 C/5'-0 SPAN JOIST

USE 1000S200-54 @ 16" O/C

LOADS

$W_{DL} = 1.33(7) = 10$ PLF
$W_L = 1.33(100) = 133$ PLF

WALKWAY GIRDER



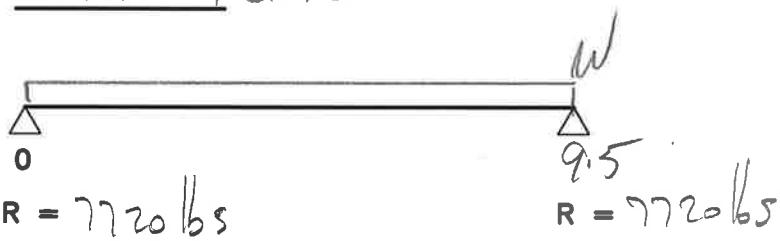
6x12

USE TS 8x4x1/4

LOADS

$W_{DL} = 12.5(7) = 88$ PLF
$W_L = 12.5(100) = 1250$ PLF

WALK WAY GIRDER



USE TS 8x4x1/4

LOADS

$W_{DL} = 15(7) = 105$ PLF
$W_L = 15(100) = 1500$ PLF

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Project Title: Modular Renovation VA Stockton
Engineer: G.C. Project ID: 14207
Project Descr:

13

Printed: 29 JAN 2014, 9:55AM

Wood Beam

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ENERCALC, INC. 1983-2013, Build:6.13.8.31, Ver:6.13.8.31

Lic. # : KW-06002019 Licensee : BCA Structural Engineering Inc

Description : FLOOR JOIST 12'-6" SPAN

CODE REFERENCES

Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-10
Load Combination Set : ASCE 7-02

Material Properties

Analysis Method : Load Resistance Factor D
Load Combination ASCE 7-02

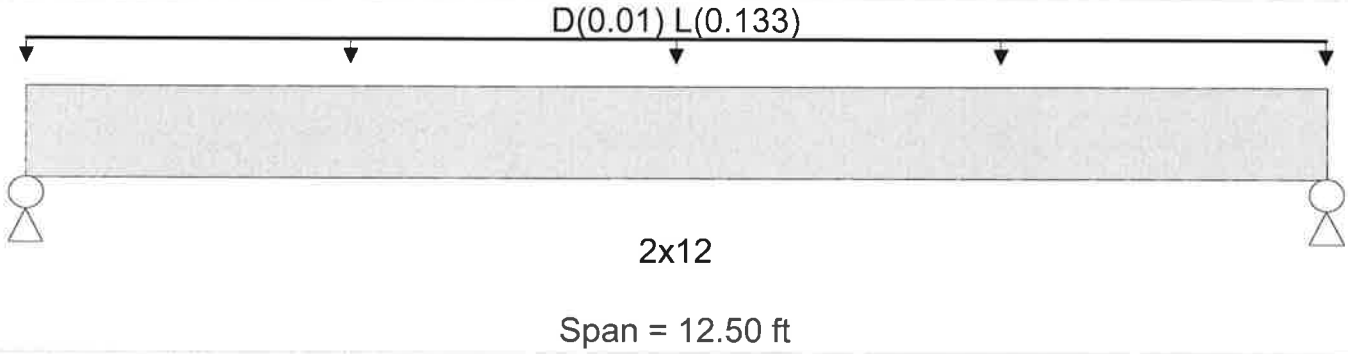
Wood Species : Douglas Fir - Larch
Wood Grade : No.1

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling

Fb - Tension	1,000.0 psi
Fb - Compr	1,000.0 psi
Fc - Prll	1,500.0 psi
Fc - Perp	625.0 psi
Fv	180.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,700.0 ksi
Eminbend - xx	620.0 ksi
Density	32.210 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.010, L = 0.1330 , Tributary Width = 1.0 ft, (W)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.771: 1**	Maximum Shear Stress Ratio	=	**0.274 : 1**
Section used for this span		**2x12**	Section used for this span		**2x12**
fb : Actual	=	1,665.19 psi	fv : Actual	=	106.66 psi
FB : Allowable	=	2,160.00 psi	Fv : Allowable	=	388.80 psi
Load Combination		+1.20D+0.50Lr+1.60L+1.60H	Load Combination		+1.20D+0.50Lr+1.60L+1.60H
Location of maximum on span	=	6.250 ft	Location of maximum on span	=	11.588 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	0.243 in	Ratio =	617
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.261 in	Ratio =	574
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.2611	6.296		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.894	0.894
D Only	0.063	0.063
L Only	0.831	0.831
D+L	0.894	0.894

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Project Title: Modular Renovation VA Stockton
Engineer: G.C. Project ID: 14207
Project Descr:

14

Printed: 29 JAN 2014, 9:54AM

Wood Beam

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Lic. # : KW-06002019 Licensee : BCA Structural Engineering Inc

Description : FLOOR JOIST 15'-0" SPAN

CODE REFERENCES

Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-10
Load Combination Set : ASCE 7-02

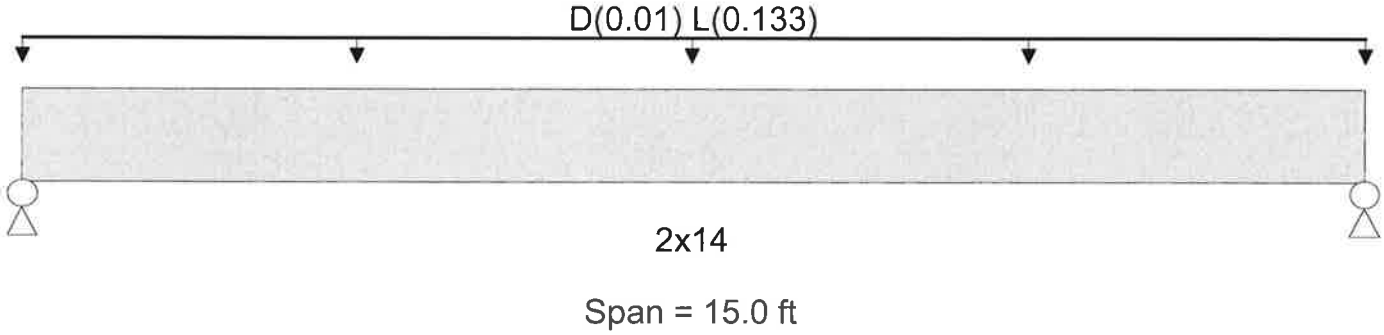
Material Properties

Analysis Method : Load Resistance Factor D
Load Combination ASCE 7-02

Wood Species : Douglas Fir - Larch
Wood Grade : No.1

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling

Fb - Tension	1000 psi	*E : Modulus of Elasticity*	
Fb - Compr	1000 psi	Ebend- xx	1700 ksi
Fc - Prll	1500 psi	Eminbend - xx	620 ksi
Fc - Perp	625 psi		
Fv	180 psi		
Ft	675 psi	Density	32.21 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.010, L = 0.1330 , Tributary Width = 1.0 ft, (W)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.889 : 1**	Maximum Shear Stress Ratio	=	**0.279 : 1**
Section used for this span		**2x14**	Section used for this span		**2x14**
fb : Actual	=	1,728.62 psi	fv : Actual	=	108.67 psi
FB : Allowable	=	1,944.00 psi	Fv : Allowable	=	388.80 psi
Load Combination		+1.20D+0.50Lr+1.60L+1.60H	Load Combination		+1.20D+0.50Lr+1.60L+1.60H
Location of maximum on span	=	7.500 ft	Location of maximum on span	=	13.905 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	0.308 in	Ratio =	583
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.331 in	Ratio =	543
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.3314	7.555		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.073	1.073
D Only	0.075	0.075
L Only	0.998	0.998
D+L	1.073	1.073

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Project Title: Modular Renovation VA Stockton
Engineer: G.C. Project ID: 14207
Project Descr:

15

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Wood Beam

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Lic. # : KW-06002019 Licensee : BCA Structural Engineering Inc

Description : WALKWAY GIRDER 7.5 FT SPAN WOOD

CODE REFERENCES

Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-10
Load Combination Set : ASCE 7-02

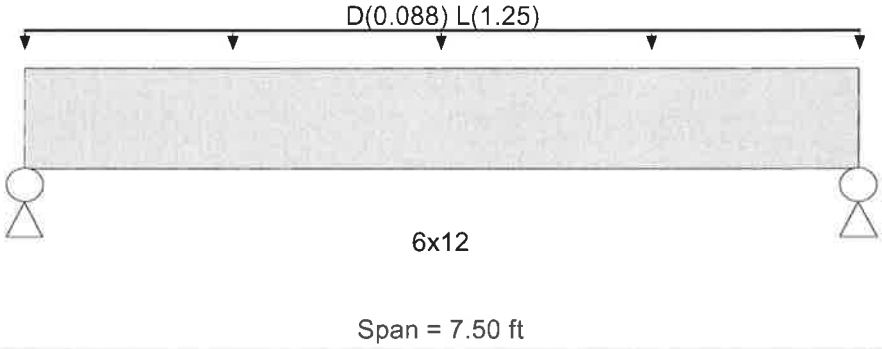
Material Properties

Analysis Method : Load Resistance Factor D
Load Combination ASCE 7-02

Wood Species : Douglas Fir - Larch
Wood Grade : No.1

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling

Fb - Tension	1350 psi	*E : Modulus of Elasticity*	
Fb - Compr	1350 psi	Ebend- xx	1600 ksi
Fc - Prll	925 psi	Eminbend - xx	580 ksi
Fc - Perp	625 psi		
Fv	170 psi		
Ft	675 psi	Density	32.21 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0880, L = 1.250 ksf, Tributary Width = 1.0 ft, (W)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.507 : 1**	Maximum Shear Stress Ratio	=	**0.383 : 1**
Section used for this span		**6x12**	Section used for this span		**6x12**
fb : Actual	=	1,477.31 psi	fv : Actual	=	140.54 psi
FB : Allowable	=	2,916.00 psi	Fv : Allowable	=	367.20 psi
Load Combination		+1.20D+0.50Lr+1.60L+1.60H	Load Combination		+1.20D+0.50Lr+1.60L+1.60H
Location of maximum on span	=	3.750 ft	Location of maximum on span	=	6.542 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	0.080 in	Ratio =	1121
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.087 in	Ratio =	1036
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.0868	3.777		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	5.071	5.071
D Only	0.383	0.383
L Only	4.688	4.688
D+L	5.071	5.071

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Project Title: Modular Renovation VA Stockton
Engineer: G.C. Project ID: 14207
Project Descr:

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Wood Beam

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ENERCALC, INC. 1983-2013, Build:6.13.8.31, Ver:6.13.8.31

Lic. # : KW-06002019 Licensee : BCA Structural Engineering Inc

Description : WALKWAY GIRDER 9.5 FT SPAN WOOD

CODE REFERENCES

Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-10
Load Combination Set : ASCE 7-02

Material Properties

Analysis Method : Load Resistance Factor D
Load Combination ASCE 7-02

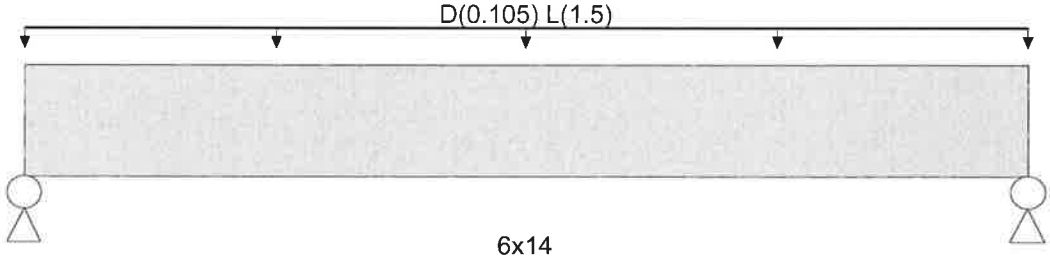
Wood Species : Douglas Fir - Larch
Wood Grade : No.1

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling

Fb - Tension	1,350.0 psi
Fb - Compr	1,350.0 psi
Fc - Prll	925.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	32.210 pcf



Span = 9.50 ft

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.1050, L = 1.50 ksf, Tributary Width = 1.0 ft, (W)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.717 : 1**	Maximum Shear Stress Ratio	=	**0.510 : 1**
Section used for this span		**6x14**	Section used for this span		**6x14**
fb : Actual	=	2,063.03 psi	fv : Actual	=	187.24 psi
FB : Allowable	=	2,878.09 psi	Fv : Allowable	=	367.20 psi
Load Combination		+1.20D+0.50Lr+1.60L+1.60H	Load Combination		+1.20D+0.50Lr+1.60L+1.60H
Location of maximum on span	=	4.750 ft	Location of maximum on span	=	8.391 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	0.153 in	Ratio =	743
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.166 in	Ratio =	688
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.1657	4.785		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	7.703	7.703
D Only	0.578	0.578
L Only	7.125	7.125
D+L	7.703	7.703

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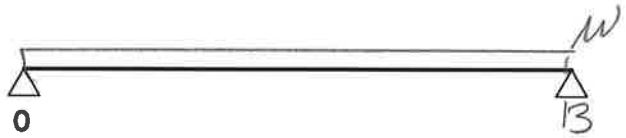
DATE 1-30-14

JOB No. 14207
SHT 17 OF

PROJECT
SUBJECT BEAMS: SEE COMPUTER PRINTOUT

FB-1



R = 2154 lbs

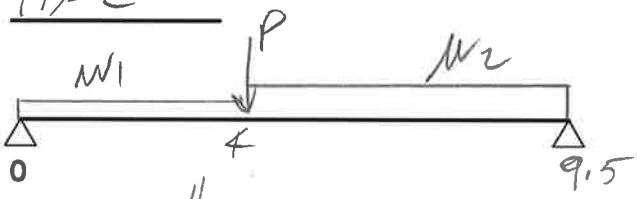
R = 2154 lbs
DL = 204 lbs
LL = 1950 lbs

USE 4x14.

LOADS

$W_{DL} = 3(7) = 21$ PLF
$LL = 3(100) = 300$ PLF

FB-2



R = 3791 lbs

R = 5186 lbs
DL = 442 lbs
LL = 4744 lbs

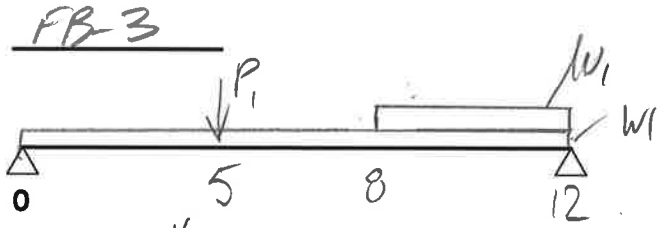
USE 6x14

LOADS

FB-1

$P_{DL} = 204$ lbs
$LL = 1950$ lbs
$W_{1DL} = 2.5(7) = 18$ PLF
$LL = 2.5(100) = 250$ PLF
$W_{2DL} = 9.5(7) = 67$ PLF
$LL = 9.5(100) = 950$ PLF

FB-3



R = 3838 lbs

R = 3259 lbs

USE 6x14

LOADS

FB-2

$P_{1DL} = 442$ lbs
$LL = 4744$ lbs
$W_{1DL} = 1(7) = 7$ PLF
$LL = 1(100) = 100$ PLF

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Project Descr:

18

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Wood Beam

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Description : FB-1

CODE REFERENCES

Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-10
Load Combination Set : ASCE 7-02

Material Properties

Analysis Method : Load Resistance Factor D
Load Combination ASCE 7-02

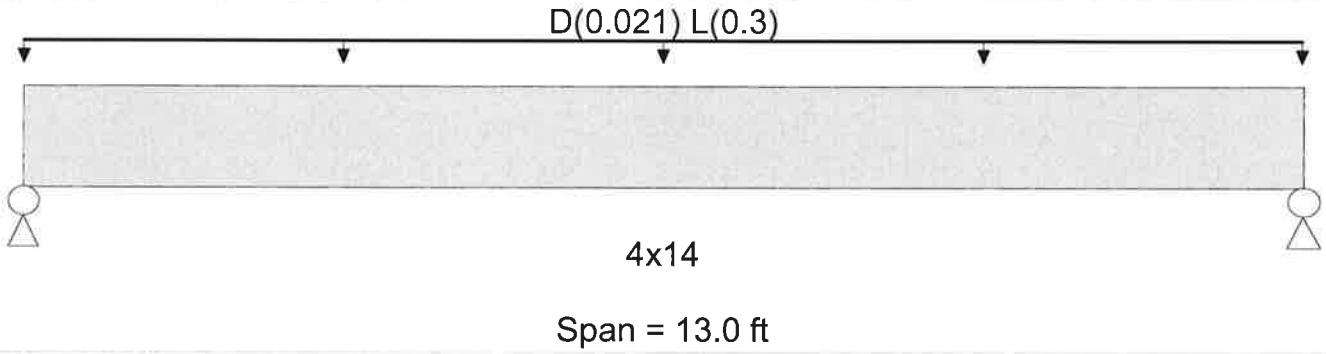
Wood Species : Douglas Fir - Larch
Wood Grade : No.1

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling

Fb - Tension	1,000.0 psi
Fb - Compr	1,000.0 psi
Fc - Prll	1,500.0 psi
Fc - Perp	625.0 psi
Fv	180.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,700.0 ksi
Eminbend - xx	620.0 ksi
Density	32.210 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0210, L = 0.30 , Tributary Width = 1.0 ft, (W)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.593 : 1**	Maximum Shear Stress Ratio	=	**0.233 : 1**
Section used for this span		**4x14**	Section used for this span		**4x14**
fb : Actual	=	1,281.34 psi	fv : Actual	=	90.56 psi
FB : Allowable	=	2,160.00 psi	Fv : Allowable	=	388.80 psi
Load Combination		+1.20D+0.50Lr+1.60L+1.60H	Load Combination		+1.20D+0.50Lr+1.60L+1.60H
Location of maximum on span	=	6.500 ft	Location of maximum on span	=	11.909 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	0.168 in	Ratio =	927
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.186 in	Ratio =	840
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.1857	6.547		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.154	2.154
D Only	0.204	0.204
L Only	1.950	1.950
D+L	2.154	2.154

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Project Descr:

19

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Wood Beam

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Description : FB-2

CODE REFERENCES

Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-10
Load Combination Set : ASCE 7-02

Material Properties

Analysis Method : Load Resistance Factor D
Load Combination ASCE 7-02

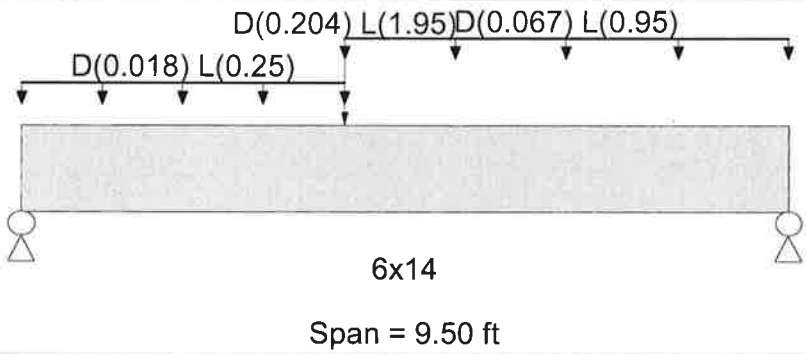
Wood Species : Douglas Fir - Larch
Wood Grade : No.1

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling

Fb - Tension	1350 psi
Fb - Compr	1350 psi
Fc - Prll	925 psi
Fc - Perp	625 psi
Fv	170 psi
Ft	675 psi

E : Modulus of Elasticity

Ebend- xx	1600 ksi
Eminbend - xx	580 ksi
Density	32.21 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.0180, L = 0.250 k/ft, Extent = 0.0 -->> 4.0 ft, Tributary Width = 1.0 ft, (W1)
Uniform Load : D = 0.0670, L = 0.950 k/ft, Extent = 4.0 -->> 9.50 ft, Tributary Width = 1.0 ft, (W2)
Point Load : D = 0.2040, L = 1.950 k @ 4.0 ft, (P)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.508 : 1**	Maximum Shear Stress Ratio	=	**0.348 : 1**
Section used for this span		**6x14**	Section used for this span		**6x14**
fb : Actual	=	1,461.66 psi	fv : Actual	=	127.74 psi
FB : Allowable	=	2,878.09 psi	Fv : Allowable	=	367.20 psi
Load Combination		+1.20D+0.50Lr+1.60L+1.60H	Load Combination		+1.20D+0.50Lr+1.60L+1.60H
Location of maximum on span	=	4.473 ft	Location of maximum on span	=	8.391 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	0.103 in	Ratio =	1111
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.113 in	Ratio =	1012
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.1126	4.819		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.791	5.186
D Only	0.361	0.442
L Only	3.431	4.744
D+L	3.791	5.186

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Project Descr:

20

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Wood Beam

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Description : FB-3

CODE REFERENCES

Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-10
Load Combination Set : ASCE 7-02

Material Properties

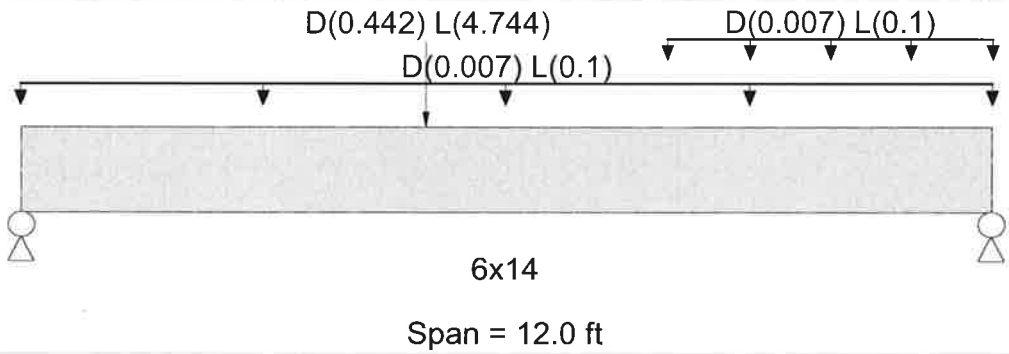
Analysis Method : Load Resistance Factor D
Load Combination ASCE 7-02

Wood Species : Douglas Fir - Larch
Wood Grade : No.1

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling

Fb - Tension	1350 psi
Fb - Compr	1350 psi
Fc - Prll	925 psi
Fc - Perp	625 psi
Fv	170 psi
Ft	675 psi

E : Modulus of Elasticity	
Ebend- xx	1600 ksi
Eminbend - xx	580 ksi
Density	32.21 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0070, L = 0.10 , Tributary Width = 1.0 ft, (W)
Uniform Load : D = 0.0070, L = 0.10 k/ft, Extent = 8.0 -->> 12.0 ft, Tributary Width = 1.0 ft, (W)
Point Load : D = 0.4420, L = 4.744 k @ 5.0 ft, (P)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.686 : 1**	Maximum Shear Stress Ratio	=	**0.318 : 1**
Section used for this span		**6x14**	Section used for this span		**6x14**
fb : Actual	=	1,975.74 psi	fv : Actual	=	116.63 psi
FB : Allowable	=	2,878.09 psi	Fv : Allowable	=	367.20 psi
Load Combination		+1.20D+0.50Lr+1.60L+1.60H	Load Combination		+1.20D+0.50Lr+1.60L+1.60H
Location of maximum on span	=	4.993 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	0.191 in	Ratio =	754
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.212 in	Ratio =	678
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.2122	5.781		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.838	3.259
D Only	0.404	0.349
L Only	3.434	2.910
D+L	3.838	3.259

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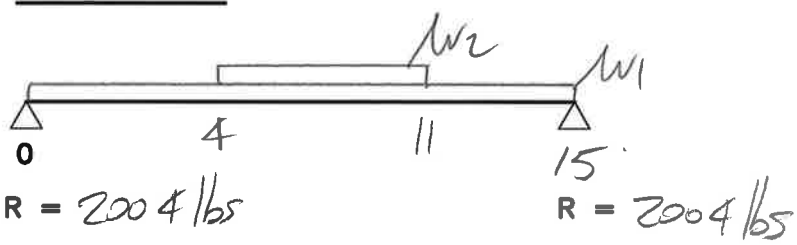
DESIGNED G. C.
CHECKED
DATE 1-30-14

JOB No. 14207
SHT 21 OF

PROJECT
SUBJECT BEAMS: SEE COMPUTER PRINTOUT

FB-4



R = 2004 lbs R = 2004 lbs

USE 4x14

LOADS

$w_{DL} = 1(7) = 7$ PLF
$w = 1(100) = 100$ PLF
$w_{2DL} = 3(7) = 21$ PLF
$w = 3(100) = 300$ PLF

R = R =

USE

LOADS

R = R =

USE

LOADS

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Project Title: Modular Renovation VA Stockton
Engineer: G.C. Project ID: 14207
Project Descr:

22

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Wood Beam

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Description : FB-4

CODE REFERENCES

Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-10
Load Combination Set : ASCE 7-02

Material Properties

Analysis Method : Load Resistance Factor D
Load Combination ASCE 7-02

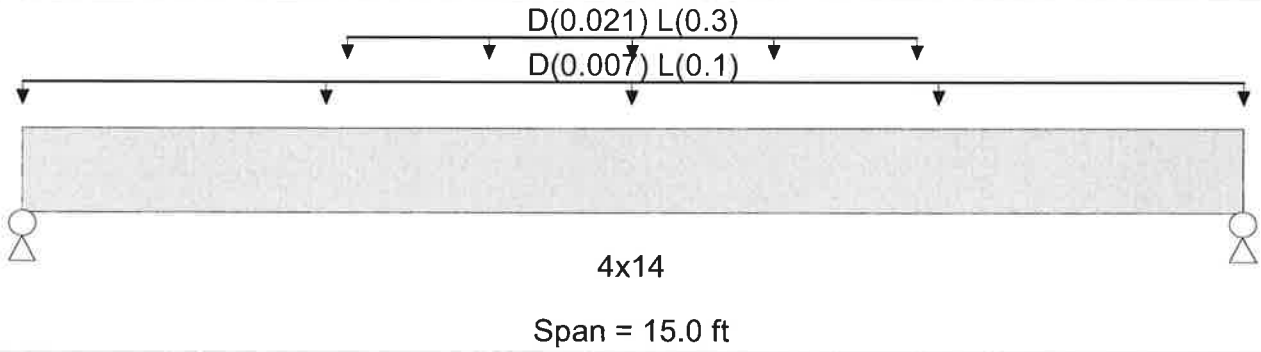
Wood Species : Douglas Fir - Larch
Wood Grade : No.1

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling

Fb - Tension	1,000.0 psi
Fb - Compr	1,000.0 psi
Fc - Prll	1,500.0 psi
Fc - Perp	625.0 psi
Fv	180.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,700.0 ksi
Eminbend - xx	620.0 ksi
Density	32.210 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0070, L = 0.10 , Tributary Width = 1.0 ft, (W1)
Uniform Load : D = 0.0210, L = 0.30 k/ft, Extent = 4.0 -->> 11.0 ft, Tributary Width = 1.0 ft, (W2)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.827: 1**	Maximum Shear Stress Ratio	=	**0.243 : 1**
Section used for this span		**4x14**	Section used for this span		**4x14**
fb : Actual	=	1,787.32 psi	fv : Actual	=	94.66 psi
FB : Allowable	=	2,160.00 psi	Fv : Allowable	=	388.80 psi
Load Combination		+1.20D+0.50Lr+1.60L+1.60H	Load Combination		+1.20D+0.50Lr+1.60L+1.60H
Location of maximum on span	=	7.500 ft	Location of maximum on span	=	13.905 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward L+Lr+S Deflection	0.300 in	Ratio =	599
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.332 in	Ratio =	542
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.3317	7.555		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.004	2.004
D Only	0.204	0.204
L Only	1.800	1.800
D+L	2.004	2.004

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PROJECT
SUBJECT

DESIGNED G. C.
CHECKED
DATE 1-24-14

JOB No. 14207
SHT F-1 OF

FOUNDATION DESIGN

ASSUME A SOIL BEARING CAPACITY OF 1500 PSF PER CBC TABLE 1806.2

POINT LOADS - SEE MOMENT FRAME DESIGN FOR FOOTING AT MOMENT FRAMES

FB-2. $\sqrt{\frac{3791}{1500}} = 1.58$ SAY 2'-0 SQ

FB-3 $\sqrt{\frac{\overset{6518}{3259(2)}}{1500}} = 2.08$ SAY 2'-6 SQ

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PROJECT	DESIGNED G. C.	JOB No. 14207.
SUBJECT	CHECKED	SHT L-1 OF
	DATE 1-24-14	

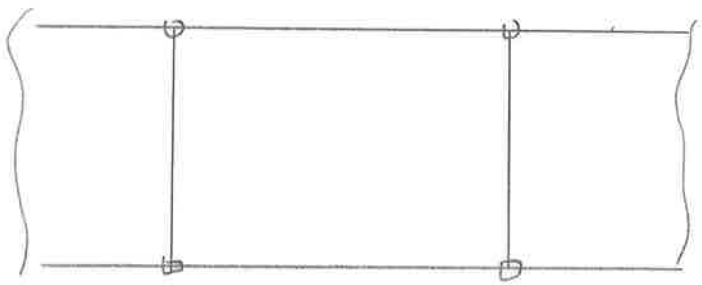
LATERAL DESIGN

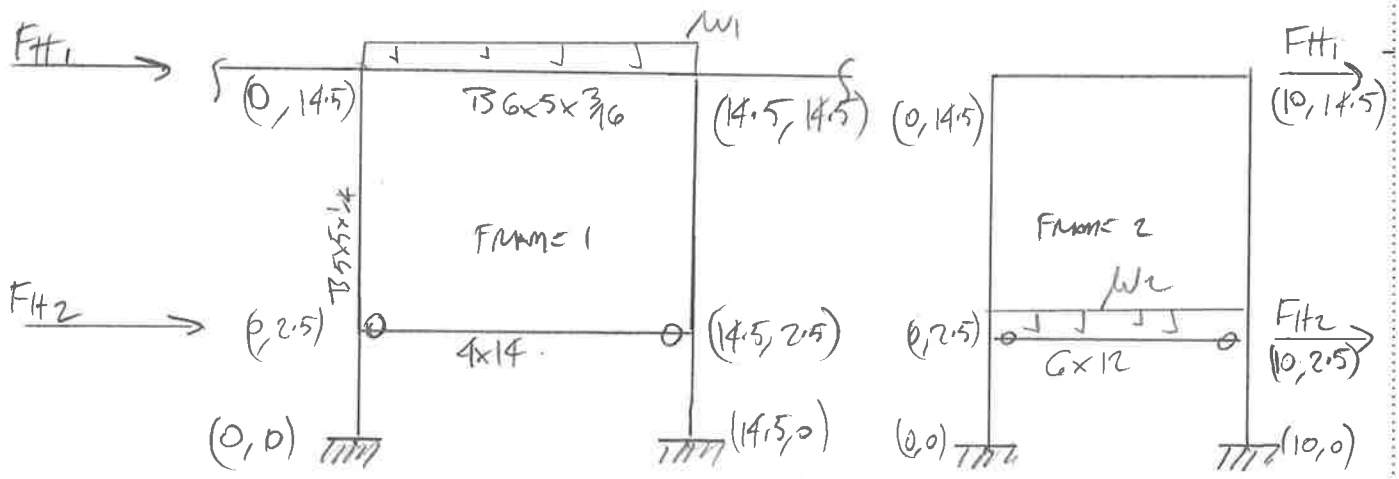
WIND LOAD = SEE SHEET
SEISMIC = 0.147 W

REDUNDANCY = 1.3 SEISMIC LOADS

ROOF = (8) x 0.147 x 1.3 = 1.52 PSF
/FLOOR

$DL = (0.6 - 0.14 S_{ds}) = (0.6 - 0.14(0.718)) = 0.5\,DL$





TYPICAL COVERED WALKWAY

SEISMIC

$F_{H1} = 12(14.5)1.52 = 265\ lbs/10 = 27$ PLF on $265/14.5 = 18.3$ PLF

$F_{H2} = 10(14.5)1.52 = 221\ lbs/10 = 22$ PLF on $221/14.5 = 15.3$ PLF

$W_{1DL} = 48$ PLF $\quad W_{2DL} = 105$ PLF
$W_L = 120$ PLF $\quad W_L = 150$ PLF

WIND LOAD = $1.0(14.5)(11.5) = 210$ lb - SEISMIC GOVERNS

BC|A STRUCTURAL ENGINEERING
1300 #1 Industrial Road
San Carlos, CA 94070
650-508-2500
FAX 650-508-2505

PROJECT
SUBJECT

DESIGNED G. C.
CHECKED
DATE 1-24-14

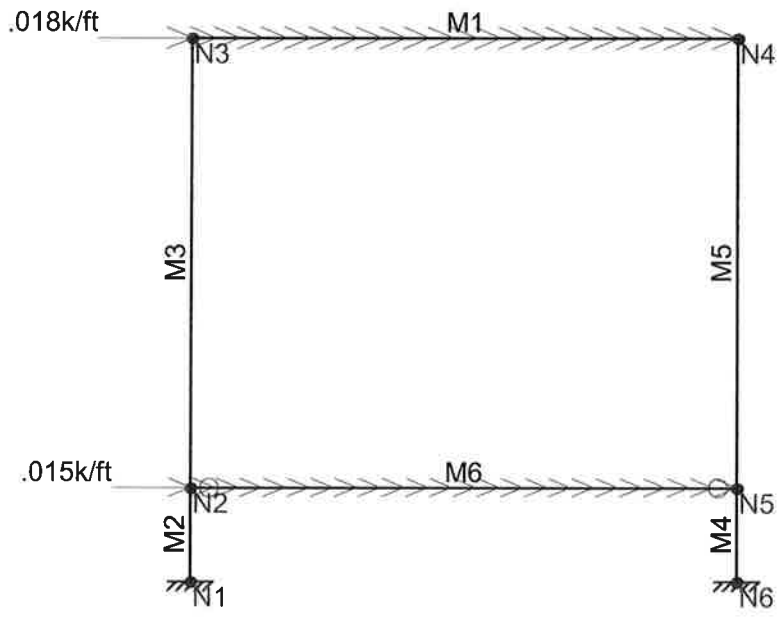
JOB No. 4207.
SHT L-2 OF

WIND LOAD: Category 2 110 MPH Exp B Method 2 ASCE 7-10 (Chapter 28 pg 245)

Allowable Strength Design 0.6 W λ = 1 Iw = 1

WIND ZONE	DESIGN CRITERIA FOR 0 to 5 DEG			
A	Ps = λ Iw ps30 =	11.5		psf
B	Ps = λ Iw ps30 =	-6.0		psf
C	Ps = λ Iw ps30 =	7.6		psf
D	Ps = λ Iw ps30 =	-3.5		psf
E	Ps = λ Iw ps30 =	-13.9	0	psf
F	Ps = λ Iw ps30 =	-7.9	0	psf
G	Ps = λ Iw ps30 =	-9.6	0	psf
H	Ps = λ Iw ps30 =	-6.1	0	psf
		E oh	G oh	
OVER HANG	Ps = λ Iw ps30 =	-19.38	-15.2	psf

L-3



Loads: BLC 3, EARTHQUAKE
Solution: Envelope

BCA Structural Engineerin...		SK - 1
G.C.	MOMENT FRAME 1	Jan 29, 2014 at 5:26 PM
12295		Frame 1.r2d

C-4

Global

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automaticly Iterate Stiffness for Walls?	Yes
Maximum Iteration Number for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
Wall Mesh Size (in)	12
Eigensolution Convergence Tol. (1.E-)	4
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 13th(360-05): ASD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	None
Cold Formed Steel Code	AISI S100-07: ASD
Wood Code	AF&PA NDS-05/08: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-08
Masonry Code	ACI 530-05: ASD
Aluminum Code	AA ADM1-05: ASD - Building

Number of Shear Regions	4
Region Spacing Increment (in)	4
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E5 F)	Density[k/ft^3]	Yield[ksi]
1	A36 Gr.36	29000	11154	.3	.65	.49	36
2	A572 Gr.50	29000	11154	.3	.65	.49	50
3	A992	29000	11154	.3	.65	.49	50
4	A500 Gr.42	29000	11154	.3	.65	.49	42
5	A500 Gr.46	29000	11154	.3	.65	.49	46

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in2]	I (90,270) [i...	I (0,180) [in4]
1	BEAM	HSS6x5x3	Beam	Tube	A500 Gr.46	Typical	3.63	14.6	19.3
2	COLUMN	HSS5x5x4	Column	Tube	A500 Gr.46	Typical	4.3	16	16

Wood Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in2]	I (90,270) [i...	I (0,180) [in4]
1	WOOD1A	4X14	Beam	Rectangular	DF/SPine	Typical	46.375	47.341	678.476

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Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lb-out[ft]	Lb-in[ft]	Lcomp top[ft]	Lcomp bot[ft]	K-out	K-in	Cb	Function
1	M1	BEAM	14.5								Lateral
2	M2	COLUMN	2.5								Lateral
3	M3	COLUMN	12								Lateral
4	M4	COLUMN	2.5								Lateral
5	M5	COLUMN	12								Lateral

Wood Design Parameters

	Label	Shape	Length[ft]	Le-out[ft]	Le-in[ft]	le-bend to...	le-bend bo...	K-out	K-in	CV	Cr	Out sway	In sway
1	M6	WOOD1A	14.5										

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Rotation[k-ft/rad]	Footing
1	N1	Reaction	Reaction	Reaction	
2	N6	Reaction	Reaction	Reaction	

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Joint	Point	Distributed
1	DEAD LOAD	DL		-1			1
2	LIVE LOAD	LL					1
3	EARTHQUAKE	EL					2

Member Distributed Loads (BLC 1 : DEAD LOAD)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.048	-.048	0	0

Member Distributed Loads (BLC 2 : LIVE LOAD)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.12	-.12	0	0

Member Distributed Loads (BLC 3 : EARTHQUAKE)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.018	.018	0	0
2	M6	X	.015	.015	0	0

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Moment [k-ft]	LC
1	N1	max	-.319	2	1.479	1	1.64	1
2		min	-.693	1	.246	2	1.388	2
3	N6	max	.206	1	1.724	1	1.294	2
4		min	-.168	2	.486	2	1.078	1
5	Totals:	max	-.487	1	3.203	1		
6		min	-.487	1	.731	2		

L-6

Envelope Member Section Forces

	Member	Sec		Axial[k]	LC	Shear[k]	LC	Moment[k-ft]	LC
1	M1	1	max	.109	1	1.185	1	1.176	1
2			min	-.092	2	.099	2	-.524	2
3		2	max	.175	1	.532	1	-.684	2
4			min	-.026	2	-.01	2	-1.937	1
5		3	max	.242	1	-.12	2	-.448	2
6			min	.04	2	-.122	1	-2.679	1
7		4	max	.308	1	-.229	2	.184	2
8			min	.107	2	-.776	1	-1.051	1
9		5	max	.374	1	-.339	2	2.947	1
10			min	.173	2	-1.43	1	1.214	2
11	M2	1	max	1.479	1	.695	1	1.64	1
12			min	.246	2	.319	2	1.388	2
13		2	max	1.47	1	.695	1	1.206	1
14			min	.241	2	.319	2	1.188	2
15		3	max	1.461	1	.695	1	.989	2
16			min	.237	2	.319	2	.771	1
17		4	max	1.452	1	.695	1	.789	2
18			min	.232	2	.319	2	.337	1
19		5	max	1.443	1	.695	1	.59	2
20			min	.228	2	.319	2	-.097	1
21	M3	1	max	1.361	1	.093	2	.59	2
22			min	.187	2	-.106	1	-.097	1
23		2	max	1.317	1	.093	2	.311	2
24			min	.165	2	-.106	1	.221	1
25		3	max	1.273	1	.093	2	.539	1
26			min	.143	2	-.106	1	.033	2
27		4	max	1.229	1	.093	2	.857	1
28			min	.121	2	-.106	1	-.245	2
29		5	max	1.185	1	.093	2	1.176	1
30			min	.099	2	-.106	1	-.524	2
31	M4	1	max	1.724	1	.169	2	1.294	2
32			min	.486	2	-.205	1	1.078	1
33		2	max	1.714	1	.169	2	1.206	1
34			min	.481	2	-.205	1	1.188	2
35		3	max	1.705	1	.169	2	1.334	1
36			min	.476	2	-.205	1	1.083	2
37		4	max	1.696	1	.169	2	1.462	1
38			min	.472	2	-.205	1	.977	2
39		5	max	1.687	1	.169	2	1.59	1
40			min	.467	2	-.205	1	.872	2
41	M5	1	max	1.605	1	.378	1	1.59	1
42			min	.426	2	.174	2	.872	2
43		2	max	1.561	1	.378	1	.456	1
44			min	.404	2	.174	2	.351	2
45		3	max	1.518	1	.378	1	-.171	2
46			min	.382	2	.174	2	-.679	1
47		4	max	1.474	1	.378	1	-.692	2
48			min	.361	2	.174	2	-1.813	1
49		5	max	1.43	1	.378	1	-1.214	2
50			min	.339	2	.174	2	-2.947	1
51	M6	1	max	-.226	2	.082	1	0	1
52			min	-.802	1	.041	2	0	1
53		2	max	-.171	2	.041	1	-.111	2
54			min	-.747	1	.02	2	-.222	1
55		3	max	-.116	2	0	1	-.148	2
56			min	-.692	1	0	1	-.296	1
57		4	max	-.06	2	-.02	2	-.111	2

L-7

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	Shear[k]	LC	Moment[k-ft]	LC
58			min	-.636	1	-.041	1	-.222	1
59		5	max	-.005	2	-.041	2	0	1
60			min	-.581	1	-.082	1	0	1

Envelope Member Section Stresses

	Member	Sec		Axial[ksi]	LC	Shear[ksi]	LC	Top Bending[k...	LC	Bottom Bendin...	LC
1	M1	1	max	.03	1	.622	1	.977	2	2.193	1
2			min	-.025	2	.052	2	-2.193	1	-.977	2
3		2	max	.048	1	.279	1	3.612	1	-1.276	2
4			min	-.007	2	-.005	2	1.276	2	-3.612	1
5		3	max	.067	1	-.063	2	4.996	1	-.836	2
6			min	.011	2	-.064	1	.836	2	-4.996	1
7		4	max	.085	1	-.12	2	1.96	1	.344	2
8			min	.029	2	-.407	1	-.344	2	-1.96	1
9		5	max	.103	1	-.178	2	-2.264	2	5.497	1
10			min	.048	2	-.75	1	-5.497	1	2.264	2
11	M2	1	max	.344	1	.347	1	-2.602	2	3.074	1
12			min	.057	2	.159	2	-3.074	1	2.602	2
13		2	max	.342	1	.347	1	-2.228	2	2.26	1
14			min	.056	2	.159	2	-2.26	1	2.228	2
15		3	max	.34	1	.347	1	-1.446	1	1.854	2
16			min	.055	2	.159	2	-1.854	2	1.446	1
17		4	max	.338	1	.347	1	-.632	1	1.48	2
18			min	.054	2	.159	2	-1.48	2	.632	1
19		5	max	.336	1	.347	1	.182	1	1.106	2
20			min	.053	2	.159	2	-1.106	2	-.182	1
21	M3	1	max	.317	1	.046	2	.182	1	1.106	2
22			min	.043	2	-.053	1	-1.106	2	-.182	1
23		2	max	.306	1	.046	2	-.415	1	.584	2
24			min	.038	2	-.053	1	-.584	2	.415	1
25		3	max	.296	1	.046	2	-.062	2	1.011	1
26			min	.033	2	-.053	1	-1.011	1	.062	2
27		4	max	.286	1	.046	2	.46	2	1.608	1
28			min	.028	2	-.053	1	-1.608	1	-.46	2
29		5	max	.276	1	.046	2	.982	2	2.204	1
30			min	.023	2	-.053	1	-2.204	1	-.982	2
31	M4	1	max	.401	1	.084	2	-2.022	1	2.426	2
32			min	.113	2	-.102	1	-2.426	2	2.022	1
33		2	max	.399	1	.084	2	-2.228	2	2.262	1
34			min	.112	2	-.102	1	-2.262	1	2.228	2
35		3	max	.397	1	.084	2	-2.03	2	2.502	1
36			min	.111	2	-.102	1	-2.502	1	2.03	2
37		4	max	.394	1	.084	2	-1.832	2	2.741	1
38			min	.11	2	-.102	1	-2.741	1	1.832	2
39		5	max	.392	1	.084	2	-1.635	2	2.981	1
40			min	.109	2	-.102	1	-2.981	1	1.635	2
41	M5	1	max	.373	1	.189	1	-1.635	2	2.981	1
42			min	.099	2	.087	2	-2.981	1	1.635	2
43		2	max	.363	1	.189	1	-.657	2	.854	1
44			min	.094	2	.087	2	-.854	1	.657	2
45		3	max	.353	1	.189	1	1.272	1	-.32	2
46			min	.089	2	.087	2	.32	2	-1.272	1
47		4	max	.343	1	.189	1	3.399	1	-1.298	2
48			min	.084	2	.087	2	1.298	2	-3.399	1
49		5	max	.332	1	.189	1	5.526	1	-2.275	2
50			min	.079	2	.087	2	2.275	2	-5.526	1

L-8

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	LC	Shear[ksi]	LC	Top Bending[k...	LC	Bottom Bendin...	LC
51	M6	1	max	-.005	2	.003	1	0	1	0	1
52			min	-.017	1	.001	2	0	1	0	1
53		2	max	-.004	2	.001	1	.026	1	-.013	2
54			min	-.016	1	0	2	.013	2	-.026	1
55		3	max	-.002	2	0	1	.035	1	-.017	2
56			min	-.015	1	0	1	.017	2	-.035	1
57		4	max	-.001	2	0	2	.026	1	-.013	2
58			min	-.014	1	-.001	1	.013	2	-.026	1
59		5	max	0	2	-.001	2	0	1	0	1
60			min	-.013	1	-.003	1	0	1	0	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	L/y Ratio	LC
1	M1	1	max	.233	1	0	2	NC	2
2			min	.229	2	-.002	1	NC	1
3		2	max	.233	1	-.033	2	5347.631	2
4			min	.229	2	-.142	1	1243.983	1
5		3	max	.233	1	-.033	2	5428.945	2
6			min	.229	2	-.194	1	908.352	1
7		4	max	.233	1	-.011	2	NC	2
8			min	.229	2	-.12	1	1481.936	1
9		5	max	.233	1	0	2	NC	2
10			min	.229	2	-.003	1	NC	1
11	M2	1	max	0	1	0	1	NC	1
12			min	0	1	0	1	NC	1
13		2	max	0	2	-.001	2	NC	2
14			min	0	1	-.002	1	NC	1
15		3	max	0	2	-.005	2	6279.432	2
16			min	0	1	-.005	1	5578.005	1
17		4	max	0	2	-.01	2	2986.815	2
18			min	0	1	-.011	1	2839.264	1
19		5	max	0	2	-.016	1	1832.944	1
20			min	0	1	-.017	2	1791.5	2
21	M3	1	max	0	2	-.016	1	NC	1
22			min	0	1	-.017	2	NC	2
23		2	max	0	2	-.043	1	5343.382	1
24			min	0	1	-.062	2	3194.766	2
25		3	max	0	2	-.08	1	2279.8	1
26			min	-.001	1	-.12	2	1395.499	2
27		4	max	0	2	-.138	1	1180.611	1
28			min	-.002	1	-.179	2	885.157	2
29		5	max	0	2	-.229	2	679.588	2
30			min	-.002	1	-.233	1	664.515	1
31	M4	1	max	0	1	0	1	NC	1
32			min	0	1	0	1	NC	1
33		2	max	0	2	0	1	NC	1
34			min	0	1	-.001	2	NC	2
35		3	max	0	2	-.004	1	7326.864	1
36			min	0	1	-.005	2	6575.206	2
37		4	max	0	2	-.01	1	3104.082	1
38			min	0	1	-.01	2	3032.415	2
39		5	max	0	2	-.017	2	1764.622	2
40			min	0	1	-.018	1	1676.59	1
41	M5	1	max	0	2	-.017	2	NC	2
42			min	0	1	-.018	1	NC	1
43		2	max	0	2	-.07	2	NC	2

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Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	L/y Ratio	LC
44			min	-.001	1	-.09	1	7625.506	1
45		3	max	0	2	-.137	2	NC	2
46			min	-.002	1	-.182	1	2532.597	1
47		4	max	0	2	-.197	2	6648.577	2
48			min	-.002	1	-.245	1	2168.546	1
49		5	max	0	2	-.229	2	NC	2
50			min	-.003	1	-.233	1	NC	1
51	M6	1	max	.017	2	0	2	NC	2
52			min	.016	1	0	1	NC	1
53		2	max	.017	2	-.004	2	NC	2
54			min	.017	1	-.007	1	NC	1
55		3	max	.017	1	-.005	2	NC	2
56			min	.017	2	-.01	1	NC	1
57		4	max	.018	1	-.004	2	NC	2
58			min	.017	2	-.007	1	NC	1
59		5	max	.018	1	0	2	NC	2
60			min	.017	2	0	1	NC	1

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Rotation [rad]	LC
1	N1	max	0	1	0	2	0	2
2		min	0	2	0	1	0	1
3	N2	max	.017	2	0	2	-7.481e-4	1
4		min	.016	1	0	1	-9.588e-4	2
5	N3	max	.233	1	0	2	-1.112e-3	2
6		min	.229	2	-.002	1	-3.258e-3	1
7	N4	max	.233	1	0	2	1.865e-3	1
8		min	.229	2	-.003	1	-2.548e-4	2
9	N5	max	.018	1	0	2	-1.05e-3	2
10		min	.017	2	0	1	-1.294e-3	1
11	N6	max	0	2	0	2	0	1
12		min	0	1	0	1	0	2

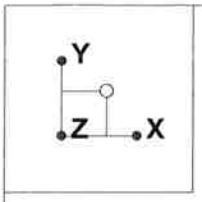
Envelope AISC 13th(360-05): ASD Steel Code Checks

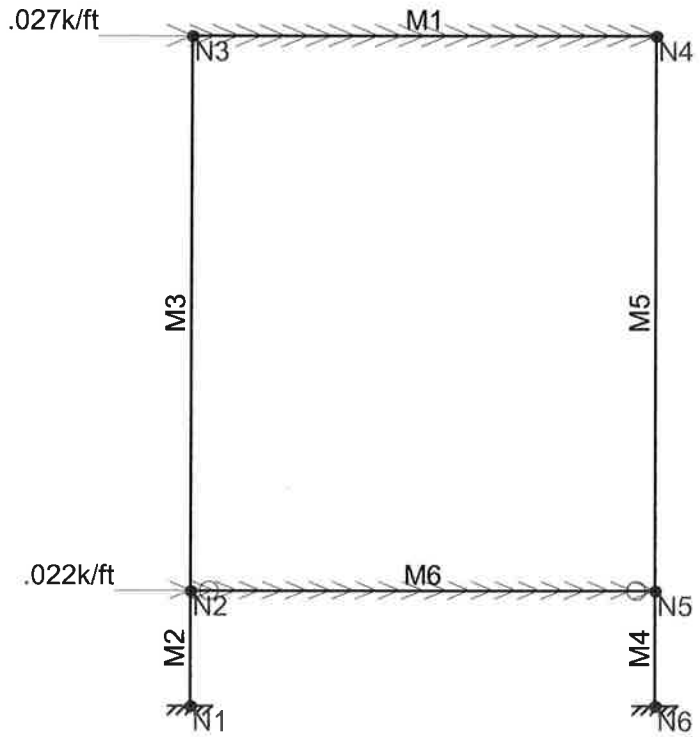
	Member	Shape	Code Ch...	Loc[ft]	LC	Shear C...	Loc[ft]	LC	Pnc/om [k]	Pnt/om [k]	Mn/om [k-ft]	Cb	Eqn
1	M1	HSS6x5x3	.172	14.5	1	.045	14.5	1	60.261	99.988	17.491	1....	H1-1b
2	M2	HSS5x5x4	.100	0	1	.021	0	1	116.532	118.443	17.468	1....	H1-1b
3	M3	HSS5x5x4	.075	12	1	.003	0	1	81.415	118.443	17.468	1....	H1-1b
4	M4	HSS5x5x4	.098	2.5	1	.006	0	1	116.532	118.443	17.468	1....	H1-1b
5	M5	HSS5x5x4	.177	12	1	.011	0	1	81.415	118.443	17.468	2....	H1-1b

Envelope Wood Code Checks

	Member	Shape	Code Ch...	Loc[ft]	LC	Shear Ch...	Loc[ft]	LC	Fc'[ksi]	Ft'[ksi]	Fb'[ksi]	Fv'[ksi]	Eqn
1	M6	4X14	.059	6.797	1	.015	0	1	.2	.608	.984	.175	3.9-1

C-10





Loads: BLC 3, EARTHQUAKE
Solution: Envelope

BCA Structural Engineerin...		SK - 2
G.C.	MOMENT FRAME 1	Jan 29, 2014 at 5:40 PM
12295		Frame 2.r2d

L-11

Global

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automaticly Iterate Stiffness for Walls?	Yes
Maximum Iteration Number for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
Wall Mesh Size (in)	12
Eigensolution Convergence Tol. (1.E-)	4
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 13th(360-05): ASD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	None
Cold Formed Steel Code	AISI S100-07: ASD
Wood Code	AF&PA NDS-05/08: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-08
Masonry Code	ACI 530-05: ASD
Aluminum Code	AA ADM1-05: ASD - Building

Number of Shear Regions	4
Region Spacing Increment (in)	4
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E5 F)	Density[k/ft^3]	Yield[ksi]
1	A36 Gr.36	29000	11154	.3	.65	.49	36
2	A572 Gr.50	29000	11154	.3	.65	.49	50
3	A992	29000	11154	.3	.65	.49	50
4	A500 Gr.42	29000	11154	.3	.65	.49	42
5	A500 Gr.46	29000	11154	.3	.65	.49	46

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in2]	I (90,270) [i...	I (0,180) [in4]
1	BEAM	HSS6x5x3	Beam	Tube	A500 Gr.46	Typical	3.63	14.6	19.3
2	COLUMN	HSS5x5x4	Column	Tube	A500 Gr.46	Typical	4.3	16	16

Wood Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in2]	I (90,270) [i...	I (0,180) [in4]
1	WOOD1A	6X12	Beam	Rectangular	DF	Typical	63.25	159.443	697.068

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Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lb-out[ft]	Lb-in[ft]	Lcomp top[ft]	Lcomp bot[ft]	K-out	K-in	Cb	Function
1	M1	BEAM	10								Lateral
2	M2	COLUMN	2.5								Lateral
3	M3	COLUMN	12								Lateral
4	M4	COLUMN	2.5								Lateral
5	M5	COLUMN	12								Lateral

Wood Design Parameters

	Label	Shape	Length[ft]	Le-out[ft]	Le-in[ft]	le-bend to...	le-bend bo...	K-out	K-in	CV	Cr	Out sway	In sway
1	M6	WOOD1A	10										

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Rotation[k-ft/rad]	Footing
1	N1	Reaction	Reaction	Reaction	
2	N6	Reaction	Reaction	Reaction	

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Joint	Point	Distributed
1	DEAD LOAD	DL		-1			1
2	LIVE LOAD	LL					1
3	EARTHQUAKE	EL					2

Member Distributed Loads (BLC 1 : DEAD LOAD)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M6	Y	-.105	-.105	0	0

Member Distributed Loads (BLC 2 : LIVE LOAD)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M6	Y	-1.5	-1.5	0	0

Member Distributed Loads (BLC 3 : EARTHQUAKE)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.027	.027	0	0
2	M6	X	.022	.022	0	0

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Moment [k-ft]	LC
1	N1	max	-.252	2	8.192	1	1.348	1
2		min	-.258	1	.255	2	1.326	2
3	N6	max	-.232	1	8.559	1	1.33	1
4		min	-.238	2	.621	2	1.317	2
5	Totals:	max	-.49	1	16.752	1		
6		min	-.49	2	.876	2		

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Envelope Member Section Forces

	Member	Sec		Axial[k]	LC	Shear[k]	LC	Moment[k-ft]	LC
1	M1	1	max	-.129	1	-.122	1	-.858	1
2			min	-.132	2	-.152	2	-.885	2
3		2	max	-.061	1	-.152	1	-.486	2
4			min	-.064	2	-.167	2	-.516	1
5		3	max	.006	1	-.183	2	-.048	2
6			min	.003	2	-.183	1	-.096	1
7		4	max	.074	1	-.198	2	.428	2
8			min	.071	2	-.214	1	.401	1
9		5	max	.141	1	-.214	2	.975	1
10			min	.138	2	-.245	1	.943	2
11	M2	1	max	8.192	1	.266	1	1.348	1
12			min	.255	2	.252	2	1.326	2
13		2	max	8.183	1	.266	1	1.182	1
14			min	.251	2	.252	2	1.168	2
15		3	max	8.174	1	.266	1	1.015	1
16			min	.246	2	.252	2	1.011	2
17		4	max	8.165	1	.266	1	.853	2
18			min	.241	2	.252	2	.849	1
19		5	max	8.156	1	.266	1	.696	2
20			min	.237	2	.252	2	.683	1
21	M3	1	max	.054	1	.132	2	.696	2
22			min	-.064	2	.128	1	.683	1
23		2	max	.01	1	.132	2	.301	2
24			min	-.086	2	.128	1	.298	1
25		3	max	-.034	1	.132	2	-.088	1
26			min	-.108	2	.128	1	-.095	2
27		4	max	-.078	1	.132	2	-.473	1
28			min	-.13	2	.128	1	-.49	2
29		5	max	-.122	1	.132	2	-.858	1
30			min	-.152	2	.128	1	-.885	2
31	M4	1	max	8.559	1	.239	1	1.33	1
32			min	.621	2	.239	2	1.317	2
33		2	max	8.55	1	.239	1	1.18	1
34			min	.616	2	.239	2	1.168	2
35		3	max	8.541	1	.239	1	1.031	1
36			min	.612	2	.239	2	1.018	2
37		4	max	8.532	1	.239	1	.881	1
38			min	.607	2	.239	2	.869	2
39		5	max	8.523	1	.239	1	.732	1
40			min	.602	2	.239	2	.72	2
41	M5	1	max	.421	1	.142	1	.732	1
42			min	.301	2	.139	2	.72	2
43		2	max	.377	1	.142	1	.305	1
44			min	.28	2	.139	2	.304	2
45		3	max	.333	1	.142	1	-.112	2
46			min	.258	2	.139	2	-.122	1
47		4	max	.289	1	.142	1	-.527	2
48			min	.236	2	.139	2	-.548	1
49		5	max	.245	1	.142	1	-.943	2
50			min	.214	2	.139	2	-.975	1
51	M6	1	max	-.12	2	8.102	1	0	1
52			min	-.13	1	.301	2	0	1
53		2	max	-.065	2	4.051	1	-.564	2
54			min	-.075	1	.15	2	-15.191	1
55		3	max	-.01	2	0	1	-.752	2
56			min	-.02	1	0	1	-20.255	1
57		4	max	.045	2	-.15	2	-.564	2

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Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	Shear[k]	LC	Moment[k-ft]	LC
58			min	.035	1	-4.051	1	-15.191	1
59		5	max	.1	2	-.301	2	0	1
60			min	.09	1	-8.102	1	0	1

Envelope Member Section Stresses

	Member	Sec		Axial[ksi]	LC	Shear[ksi]	LC	Top Bending[k...	LC	Bottom Bendin...	LC
1	M1	1	max	-.035	1	-.064	1	1.651	2	-1.601	1
2			min	-.036	2	-.08	2	1.601	1	-1.651	2
3		2	max	-.017	1	-.08	1	.962	1	-.906	2
4			min	-.018	2	-.088	2	.906	2	-.962	1
5		3	max	.002	1	-.096	2	.179	1	-.09	2
6			min	0	2	-.096	1	.09	2	-.179	1
7		4	max	.02	1	-.104	2	-.747	1	.799	2
8			min	.019	2	-.112	1	-.799	2	.747	1
9		5	max	.039	1	-.112	2	-1.759	2	1.818	1
10			min	.038	2	-.129	1	-1.818	1	1.759	2
11	M2	1	max	1.905	1	.133	1	-2.486	2	2.527	1
12			min	.059	2	.126	2	-2.527	1	2.486	2
13		2	max	1.903	1	.133	1	-2.191	2	2.215	1
14			min	.058	2	.126	2	-2.215	1	2.191	2
15		3	max	1.901	1	.133	1	-1.895	2	1.904	1
16			min	.057	2	.126	2	-1.904	1	1.895	2
17		4	max	1.899	1	.133	1	-1.593	1	1.6	2
18			min	.056	2	.126	2	-1.6	2	1.593	1
19		5	max	1.897	1	.133	1	-1.281	1	1.305	2
20			min	.055	2	.126	2	-1.305	2	1.281	1
21	M3	1	max	.013	1	.066	2	-1.281	1	1.305	2
22			min	-.015	2	.064	1	-1.305	2	1.281	1
23		2	max	.002	1	.066	2	-.559	1	.564	2
24			min	-.02	2	.064	1	-.564	2	.559	1
25		3	max	-.008	1	.066	2	.177	2	-.164	1
26			min	-.025	2	.064	1	.164	1	-.177	2
27		4	max	-.018	1	.066	2	.918	2	-.887	1
28			min	-.03	2	.064	1	.887	1	-.918	2
29		5	max	-.028	1	.066	2	1.659	2	-1.609	1
30			min	-.035	2	.064	1	1.609	1	-1.659	2
31	M4	1	max	1.99	1	.119	1	-2.469	2	2.493	1
32			min	.144	2	.119	2	-2.493	1	2.469	2
33		2	max	1.988	1	.119	1	-2.189	2	2.213	1
34			min	.143	2	.119	2	-2.213	1	2.189	2
35		3	max	1.986	1	.119	1	-1.909	2	1.932	1
36			min	.142	2	.119	2	-1.932	1	1.909	2
37		4	max	1.984	1	.119	1	-1.63	2	1.652	1
38			min	.141	2	.119	2	-1.652	1	1.63	2
39		5	max	1.982	1	.119	1	-1.35	2	1.372	1
40			min	.14	2	.119	2	-1.372	1	1.35	2
41	M5	1	max	.098	1	.071	1	-1.35	2	1.372	1
42			min	.07	2	.069	2	-1.372	1	1.35	2
43		2	max	.088	1	.071	1	-.57	2	.572	1
44			min	.065	2	.069	2	-.572	1	.57	2
45		3	max	.077	1	.071	1	.228	1	-.209	2
46			min	.06	2	.069	2	.209	2	-.228	1
47		4	max	.067	1	.071	1	1.028	1	-.989	2
48			min	.055	2	.069	2	.989	2	-1.028	1
49		5	max	.057	1	.071	1	1.828	1	-1.768	2
50			min	.05	2	.069	2	1.768	2	-1.828	1

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Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	LC	Shear[ksi]	LC	Top Bending[k...	LC	Bottom Bendin...	LC
51	M6	1	max	-.002	2	.192	1	0	1	0	1
52			min	-.002	1	.007	2	0	1	0	1
53		2	max	-.001	2	.096	1	1.504	1	-.056	2
54			min	-.001	1	.004	2	.056	2	-1.504	1
55		3	max	0	2	0	1	2.005	1	-.074	2
56			min	0	1	0	1	.074	2	-2.005	1
57		4	max	0	2	-.004	2	1.504	1	-.056	2
58			min	0	1	-.096	1	.056	2	-1.504	1
59		5	max	.002	2	-.007	2	0	1	0	1
60			min	.001	1	-.192	1	0	1	0	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	L/y Ratio	LC
1	M1	1	max	.216	1	0	2	NC	2
2			min	.215	2	-.002	1	NC	1
3		2	max	.216	1	-.007	2	NC	2
4			min	.215	2	-.01	1	NC	1
5		3	max	.216	1	-.002	2	NC	2
6			min	.215	2	-.006	1	NC	1
7		4	max	.216	1	.004	2	NC	2
8			min	.215	2	0	1	NC	1
9		5	max	.216	1	0	2	NC	2
10			min	.215	2	-.003	1	NC	1
11	M2	1	max	0	1	0	1	NC	1
12			min	0	1	0	1	NC	1
13		2	max	0	2	-.001	2	NC	2
14			min	0	1	-.001	1	NC	1
15		3	max	0	2	-.005	2	6508.009	2
16			min	-.001	1	-.005	1	6414.001	1
17		4	max	0	2	-.01	2	3056.548	2
18			min	-.002	1	-.01	1	3019.101	1
19		5	max	0	2	-.017	2	1810.279	2
20			min	-.002	1	-.017	1	1792.031	1
21	M3	1	max	0	2	-.017	2	NC	2
22			min	-.002	1	-.017	1	NC	1
23		2	max	0	2	-.064	2	NC	2
24			min	-.002	1	-.064	1	NC	1
25		3	max	0	2	-.124	1	NC	1
26			min	-.002	1	-.124	2	NC	2
27		4	max	0	2	-.18	2	NC	2
28			min	-.002	1	-.18	1	NC	1
29		5	max	0	2	-.215	2	NC	2
30			min	-.002	1	-.216	1	NC	1
31	M4	1	max	0	1	0	1	NC	1
32			min	0	1	0	1	NC	1
33		2	max	0	2	-.001	2	NC	2
34			min	0	1	-.001	1	NC	1
35		3	max	0	2	-.005	2	6538.683	2
36			min	-.001	1	-.005	1	6473.72	1
37		4	max	0	2	-.01	2	3062.597	2
38			min	-.002	1	-.01	1	3030.868	1
39		5	max	0	2	-.017	2	1809.009	2
40			min	-.003	1	-.017	1	1789.514	1
41	M5	1	max	0	2	-.017	2	NC	2
42			min	-.003	1	-.017	1	NC	1
43		2	max	0	2	-.065	2	NC	2

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Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	L/y Ratio	LC
44			min	-.003	1	-.065	1	NC	1
45		3	max	0	2	-.125	2	NC	2
46			min	-.003	1	-.127	1	NC	1
47		4	max	0	2	-.181	2	9158.117	2
48			min	-.003	1	-.183	1	8686.912	1
49		5	max	0	2	-.215	2	NC	2
50			min	-.003	1	-.216	1	NC	1
51	M6	1	max	.017	1	0	2	NC	2
52			min	.017	2	-.002	1	NC	1
53		2	max	.017	1	-.009	2	NC	2
54			min	.017	2	-.235	1	515.221	1
55		3	max	.017	1	-.012	2	9883.11	2
56			min	.017	2	-.329	1	367.095	1
57		4	max	.017	1	-.009	2	NC	2
58			min	.017	2	-.235	1	515.221	1
59		5	max	.017	1	0	2	NC	2
60			min	.017	2	-.003	1	NC	1

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Rotation [rad]	LC
1	N1	max	0	1	0	2	0	2
2		min	0	2	0	1	0	1
3	N2	max	.017	1	0	2	-9.803e-4	2
4		min	.017	2	-.002	1	-9.848e-4	1
5	N3	max	.216	1	0	2	-5.401e-4	2
6		min	.215	2	-.002	1	-5.774e-4	1
7	N4	max	.216	1	0	2	-4.335e-4	1
8		min	.215	2	-.003	1	-4.681e-4	2
9	N5	max	.017	1	0	2	-9.877e-4	2
10		min	.017	2	-.003	1	-9.995e-4	1
11	N6	max	0	2	0	2	0	2
12		min	0	1	0	1	0	1

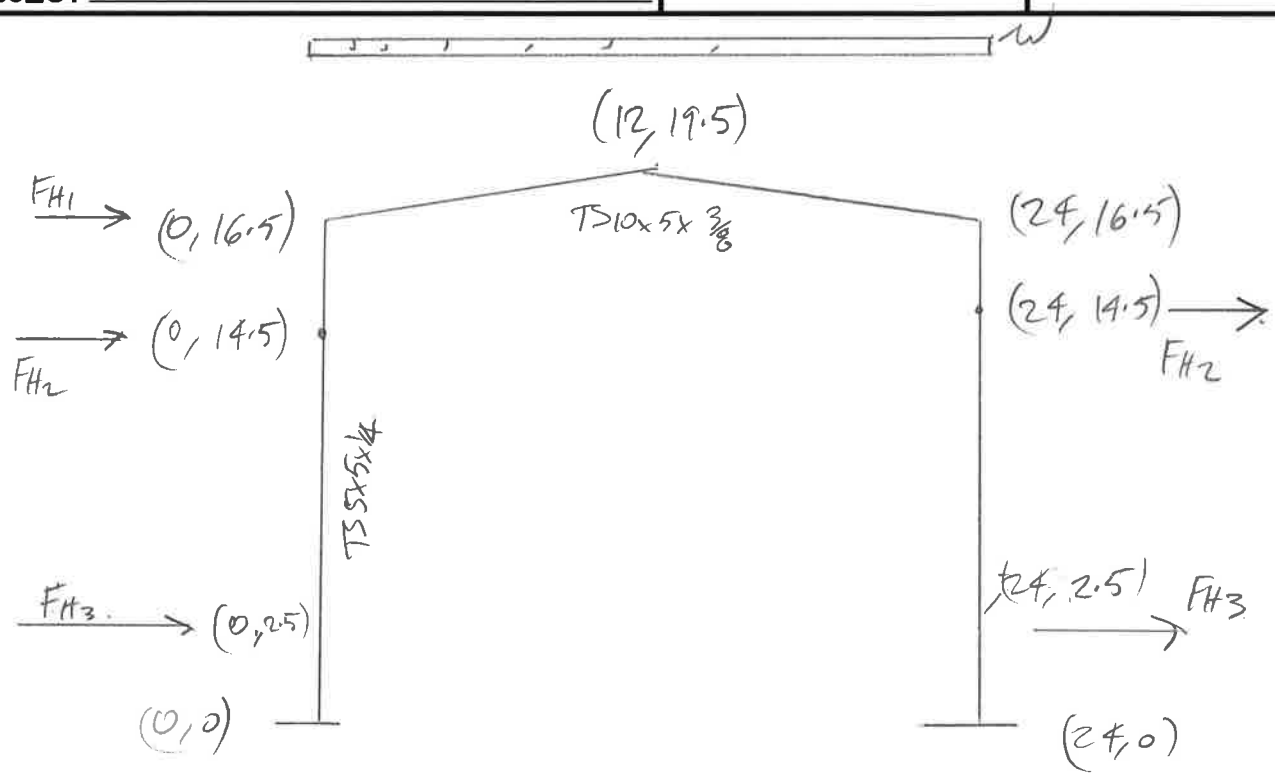
Envelope AISC 13th(360-05): ASD Steel Code Checks

	Member	Shape	Code Ch...	Loc[ft]	LC	Shear C...	Loc[ft]	LC	Pnc/om [k]	Pnt/om [k]	Mn/om [k-ft]	Cb	Eqn
1	M1	HSS6x5x3	.057	10	1	.008	10	1	78.588	99.988	17.491	2....	H1-1b
2	M2	HSS5x5x4	.112	0	1	.008	0	1	116.532	118.443	17.468	1....	H1-1b
3	M3	HSS5x5x4	.051	12	2	.004	0	2	81.415	118.443	17.468	2....	H1-1b
4	M4	HSS5x5x4	.113	0	1	.007	0	1	116.532	118.443	17.468	1....	H1-1b
5	M5	HSS5x5x4	.057	12	1	.004	0	1	81.415	118.443	17.468	2....	H1-1b

Envelope Wood Code Checks

	Member	Shape	Code Ch...	Loc[ft]	LC	Shear Ch...	Loc[ft]	LC	Fc'[ksi]	Ft'[ksi]	Fb'[ksi]	Fv'[ksi]	Eqn
1	M6	6X12	1.260	5	1	1.130	0	1	.727	.95	1.591	.17	3.9-3

BC|A STRUCTURAL ENGINEERING	1300 #1 Industrial Road San Carlos, CA 94070 650-508-2500 FAX 650-508-2505	DESIGNED G. C.	JOB No. H207
PROJECT		CHECKED	SHT L-17 OF
SUBJECT		DATE 1-24-14	



$F_{H1} = .7(28)(1.52) = 298 \text{ lbs}/24 = 12.5 \text{ PLF}$

$F_{H2} = .6(9)(1.52) = 82 \text{ lbs}$

$F_{H3} = 5(19)1.52 = 145 \text{ lbs}$

$W_{DL} = 56 \text{ PLF}$

$w = 140 \text{ PLF}$

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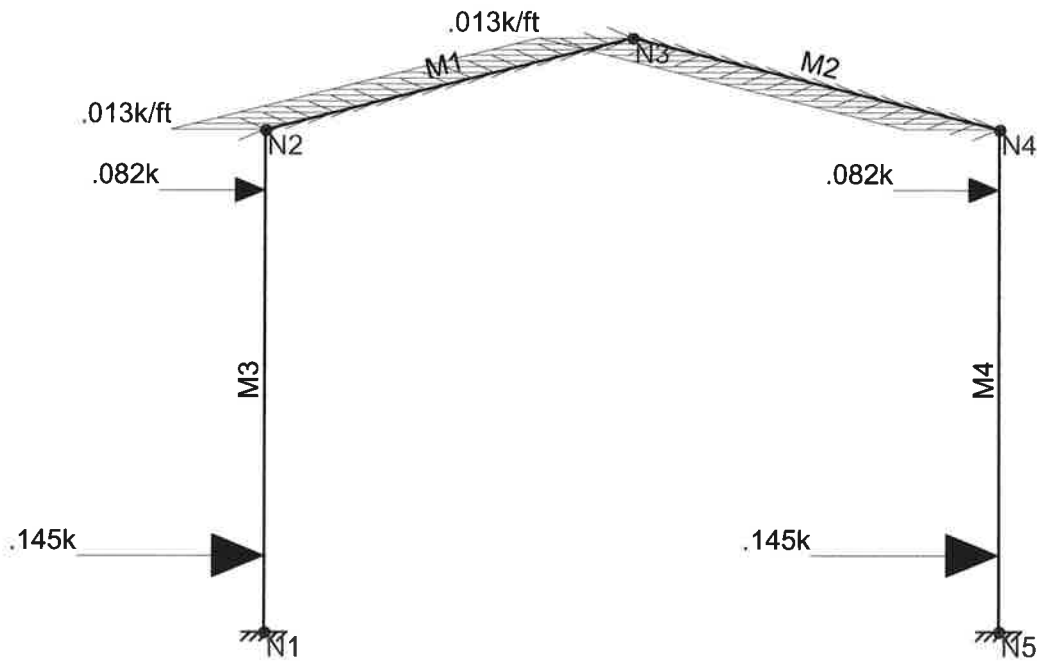

Loads: BLC 3, EARTHQUAKE

BCA Structural Engineerin...		SK - 1
G.C.	MOMENT FRAME 3	Jan 29, 2014 at 5:51 PM
14207		Frame 3.r2d

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Global

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automaticly Iterate Stiffness for Walls?	Yes
Maximum Iteration Number for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
Wall Mesh Size (in)	12
Eigensolution Convergence Tol. (1.E-)	4
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 13th(360-05): ASD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	None
Cold Formed Steel Code	AISI S100-07: ASD
Wood Code	AF&PA NDS-05/08: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-08
Masonry Code	ACI 530-05: ASD
Aluminum Code	AA ADM1-05: ASD - Building

Number of Shear Regions	4
Region Spacing Increment (in)	4
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E5 F)	Density[k/ft^3]	Yield[ksi]
1	A36 Gr.36	29000	11154	.3	.65	.49	36
2	A572 Gr.50	29000	11154	.3	.65	.49	50
3	A992	29000	11154	.3	.65	.49	50
4	A500 Gr.42	29000	11154	.3	.65	.49	42
5	A500 Gr.46	29000	11154	.3	.65	.49	46

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in2]	I (90,270) [i...	I (0,180) [in4]
1	BEAM	HSS10x5x6	Beam	Tube	A500 Gr.46	Typical	9.67	40.6	120
2	COLUMN	HSS5x5x4	Column	Wide Flange	A500 Gr.46	Typical	4.3	16	16

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lb-out[ft]	Lb-in[ft]	Lcomp top[ft]	Lcomp bot[ft]	K-out	K-in	Cb	Function
1	M1	BEAM	12.369								Lateral
2	M2	BEAM	12.369								Lateral
3	M3	COLUMN	16.5								Lateral
4	M4	COLUMN	16.5								Lateral

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Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Rotation[k-ft/rad]	Footing
1	N1	Reaction	Reaction	Reaction	
2	N5	Reaction	Reaction	Reaction	

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Joint	Point	Distributed
1	DEAD LOAD	DL		-1			2
2	LIVE LOAD	LL					2
3	EARTHQUAKE	EL				4	2

Member Distributed Loads (BLC 1 : DEAD LOAD)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.056	-.056	0	0
2	M2	Y	-.056	-.056	0	0

Member Distributed Loads (BLC 2 : LIVE LOAD)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.14	-.14	0	0
2	M2	Y	-.14	-.14	0	0

Member Distributed Loads (BLC 3 : EARTHQUAKE)

	Member Label	Direction	Start Magnitude[k/ft,F]	End Magnitude[k/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.013	.013	0	0
2	M2	X	.013	.013	0	0

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Moment [k-ft]	LC
1	N1	max	-.052	1	2.899	1	1.969	2
2		min	-.318	2	.503	2	.43	1
3	N5	max	-.445	2	3.246	1	4.447	1
4		min	-.711	1	.838	2	2.748	2
5	Totals:	max	-.763	2	6.146	1		
6		min	-.763	1	1.341	2		

Envelope Member Section Forces

	Member	Sec		Axial[k]	LC	Shear[k]	LC	Moment[k-ft]	LC
1	M1	1	max	.814	1	2.539	1	1.624	1
2			min	.005	2	.393	2	-1.108	2
3		2	max	.68	1	1.843	1	-2.101	2
4			min	.009	2	.25	2	-5.151	1
5		3	max	.546	1	1.147	1	-2.654	2
6			min	.013	2	.107	2	-9.773	1
7		4	max	.412	1	.451	1	-2.765	2
8			min	.017	2	-.035	2	-12.243	1
9		5	max	.277	1	-.178	2	-2.434	2
10			min	.021	2	-.245	1	-12.561	1
11	M2	1	max	.362	1	-.092	1	-2.434	2
12			min	.103	2	-.148	2	-12.561	1
13		2	max	.571	1	-.272	2	-1.786	2
14			min	.173	2	-.77	1	-11.227	1
15		3	max	.78	1	-.395	2	-.755	2

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Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	Shear[k]	LC	Moment[k-ft]	LC
16			min	.244	2	-1.447	1	-7.8	1
17		4	max	.989	1	-.519	2	.66	2
18			min	.315	2	-2.125	1	-2.277	1
19		5	max	1.198	1	-.643	2	5.34	1
20			min	.386	2	-2.802	1	2.458	2
21	M3	1	max	2.899	1	.319	2	1.969	2
22			min	.503	2	.061	1	.43	1
23		2	max	2.839	1	.174	2	.887	2
24			min	.473	2	-.084	1	.416	1
25		3	max	2.779	1	.174	2	.764	1
26			min	.442	2	-.084	1	.167	2
27		4	max	2.718	1	.174	2	1.112	1
28			min	.412	2	-.084	1	-.552	2
29		5	max	2.658	1	.092	2	1.624	1
30			min	.382	2	-.166	1	-1.108	2
31	M4	1	max	3.246	1	.726	1	4.447	1
32			min	.838	2	.448	2	2.748	2
33		2	max	3.186	1	.581	1	1.687	1
34			min	.808	2	.303	2	1.134	2
35		3	max	3.126	1	.581	1	-.118	2
36			min	.778	2	.303	2	-.71	1
37		4	max	3.065	1	.581	1	-1.37	2
38			min	.748	2	.303	2	-3.107	1
39		5	max	3.005	1	.499	1	-2.458	2
40			min	.718	2	.221	2	-5.34	1

Envelope Member Section Stresses

	Member	Sec		Axial[ksi]	LC	Shear[ksi]	LC	Top Bending[k...	LC	Bottom Bendin...	LC
1	M1	1	max	.084	1	.406	1	.554	2	.812	1
2			min	0	2	.063	2	-.812	1	-.554	2
3		2	max	.07	1	.295	1	2.575	1	-1.051	2
4			min	0	2	.04	2	1.051	2	-2.575	1
5		3	max	.056	1	.184	1	4.887	1	-1.327	2
6			min	.001	2	.017	2	1.327	2	-4.887	1
7		4	max	.043	1	.072	1	6.122	1	-1.382	2
8			min	.002	2	-.006	2	1.382	2	-6.122	1
9		5	max	.029	1	-.029	2	6.28	1	-1.217	2
10			min	.002	2	-.039	1	1.217	2	-6.28	1
11	M2	1	max	.037	1	-.015	1	6.28	1	-1.217	2
12			min	.011	2	-.024	2	1.217	2	-6.28	1
13		2	max	.059	1	-.043	2	5.614	1	-.893	2
14			min	.018	2	-.123	1	.893	2	-5.614	1
15		3	max	.081	1	-.063	2	3.9	1	-.377	2
16			min	.025	2	-.232	1	.377	2	-3.9	1
17		4	max	.102	1	-.083	2	1.139	1	.33	2
18			min	.033	2	-.34	1	-.33	2	-1.139	1
19		5	max	.124	1	-.103	2	-1.229	2	2.67	1
20			min	.04	2	-.448	1	-2.67	1	1.229	2
21	M3	1	max	.674	1	.159	2	-.806	1	3.692	2
22			min	.117	2	.03	1	-3.692	2	.806	1
23		2	max	.66	1	.087	2	-.779	1	1.663	2
24			min	.11	2	-.042	1	-1.663	2	.779	1
25		3	max	.646	1	.087	2	-.314	2	1.432	1
26			min	.103	2	-.042	1	-1.432	1	.314	2
27		4	max	.632	1	.087	2	1.035	2	2.085	1
28			min	.096	2	-.042	1	-2.085	1	-1.035	2

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Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	LC	Shear[ksi]	LC	Top Bending[k...	LC	Bottom Bendin...	LC
29		5	max	.618	1	.046	2	2.077	2	3.046	1
30			min	.089	2	-.083	1	-3.046	1	-2.077	2
31	M4	1	max	.755	1	.362	1	-5.152	2	8.338	1
32			min	.195	2	.224	2	-8.338	1	5.152	2
33		2	max	.741	1	.29	1	-2.126	2	3.164	1
34			min	.188	2	.151	2	-3.164	1	2.126	2
35		3	max	.727	1	.29	1	1.33	1	-.222	2
36			min	.181	2	.151	2	.222	2	-1.33	1
37		4	max	.713	1	.29	1	5.825	1	-2.569	2
38			min	.174	2	.151	2	2.569	2	-5.825	1
39		5	max	.699	1	.249	1	10.012	1	-4.609	2
40			min	.167	2	.111	2	4.609	2	-10.012	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	L/y Ratio	LC
1	M1	1	max	.432	2	-.095	1	NC	1
2			min	.357	1	-.109	2	NC	2
3		2	max	.432	2	-.153	2	7067.078	2
4			min	.357	1	-.284	1	2166.814	1
5		3	max	.432	2	-.185	2	4988.755	2
6			min	.357	1	-.443	1	1380.786	1
7		4	max	.432	2	-.202	2	6461.506	2
8			min	.357	1	-.545	1	1657.517	1
9		5	max	.432	2	-.202	2	NC	2
10			min	.357	1	-.575	1	NC	1
11	M2	1	max	.586	1	.025	2	NC	2
12			min	.476	2	-.339	1	NC	1
13		2	max	.586	1	.039	2	NC	2
14			min	.476	2	-.294	1	1980.389	1
15		3	max	.586	1	.064	2	3818.184	2
16			min	.476	2	-.184	1	1760.781	1
17		4	max	.585	1	.093	2	2188.961	2
18			min	.476	2	-.028	1	3067.442	1
19		5	max	.585	1	.14	1	NC	1
20			min	.476	2	.117	2	1602.287	2
21	M3	1	max	0	1	0	1	NC	1
22			min	0	1	0	1	NC	1
23		2	max	0	2	-.014	1	NC	1
24			min	-.001	1	-.061	2	3221.046	2
25		3	max	0	2	-.063	1	3155.376	1
26			min	-.003	1	-.195	2	1015.6	2
27		4	max	0	2	-.172	1	1151.346	1
28			min	-.004	1	-.342	2	579.433	2
29		5	max	0	2	-.37	1	535.43	1
30			min	-.006	1	-.445	2	444.694	2
31	M4	1	max	0	1	0	1	NC	1
32			min	0	1	0	1	NC	1
33		2	max	0	2	-.086	2	5354.759	2
34			min	-.002	1	-.138	1	NC	1
35		3	max	0	2	-.263	2	NC	2
36			min	-.003	1	-.412	1	1779.277	1
37		4	max	-.001	2	-.43	2	3152.456	2
38			min	-.005	1	-.63	1	1109.698	1
39		5	max	-.002	2	-.49	2	NC	2
40			min	-.006	1	-.602	1	NC	1

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Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Rotation [rad]	LC
1	N1	max	0	2	0	2	0	1
2		min	0	1	0	1	0	2
3	N2	max	.445	2	0	2	-1.311e-3	2
4		min	.37	1	-.006	1	-5.129e-3	1
5	N3	max	.486	1	-.091	2	2.059e-4	1
6		min	.468	2	-.471	1	1.98e-4	2
7	N4	max	.602	1	-.002	2	4.303e-3	1
8		min	.49	2	-.006	1	5.175e-4	2
9	N5	max	0	1	0	2	0	2
10		min	0	2	0	1	0	1

Envelope AISC 13th(360-05): ASD Steel Code Checks

	Member	Shape	Code Ch...	Loc[ft]	LC	Shear C...	Loc[ft]	LC	Pnc/om [k]	Pnt/om [k]	Mn/om [k-ft]	Cb	Eqn
1	M1	HSS10x5x6	.183	11.21	1	.025	0	1	187.14	266.359	69.78	1.29	H1-1b
2	M2	HSS10x5x6	.181	0	1	.027	12.369	1	187.14	266.359	69.78	1....	H1-1b
3	M3	HSS5x5x4	.117	0	2	.010	0	2	58.305	118.443	17.468	2....	H1-1b
4	M4	HSS5x5x4	.331	16.5	1	.022	0	1	58.305	118.443	17.468	2....	H1-1b

BC|A STRUCTURAL ENGINEERING
1300 #1 Industrial Road
San Carlos, CA 94070
650-508-2500
FAX 650-508-2505

DESIGNED G. C.
CHECKED
DATE 1-30-14
JOB No. 14207
SHT L-24 OF
PROJECT
SUBJECT

FRAME - 1 - REACTIONS

	Y - k	Mo - k-ft
N1	1.479	1.64
	0.246	1.388
N6	1.724	1.294
	0.486	1.078

FRAME 2 - REACTIONS

	Y - k	Mo - k-ft
N1	8.192	1.348
	0.255	1.326
N6	8.559	1.33
	0.621	1.317

FRAME 1 & 2

TOTALS

Y = 10.28 k - MAX
Y = 0.5 k - MIN
DL = 3.43 k
LL = 6.85 k

MAX M° = 1.64 k-ft
×1.4 = 2.296 k-ft
STRENGTH.

BASE PLATE 3/4 × 12 × 12

FTG 2'-9" SQ W/ 3-#5 BARS TOP & BOTT

BC|A STRUCTURAL ENGINEERING
1300 #1 Industrial Road
San Carlos, CA 94070
650-508-2500
FAX 650-508-2505

DESIGNED G. C.
CHECKED
DATE 1-30-14

JOB No. 14207.
SHT L-25 OF

PROJECT
SUBJECT

FRAME 3 - REACTIONS

	Y-k	Mo-k-ft
N 1	2.899	1.969
	0.583	0.43
N 5	3.246	4.447 × 1.4 = 6.2258 k-ft
	0.838	2.748

$P_L = 1.082$ k
$W = 2.164$ k

BASE PLATE 3/4 x 12 x 12

FTG 4'-0 SQ w/ 4-#5 BARS TOP & BOTT.

BCA Structural Engineering Inc
1300 Industrial Road Suite 1B
San Carlos, CA 94070
Ph (650) 508-2500
Fax (650) 508-2505

Project Title: Modular Renovation VA Stockton
Engineer: G.C. Project ID: 14207
Project Descr:

Printed: 30 JAN 2014, 9:46AM

Steel Base Plate

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ENERCALC, INC. 1983-2013, Build:6.13.8.31, Ver:6.13.8.31

Lic. # : KW-06002019 Licensee : BCA Structural Engineering Inc

Description : BASE PLATE FRAME 1 & 2

Code References

Calculations per AISC 360-05 & Design Guide # 1, ASCE 7-05
Load Combination Set : ASCE 7-02

General Information

Material Properties

AISC Design Method	Allowable Strength Design			
Steel Plate Fy	=	36.0 ksi		
Concrete Support f'c	=	3.0 ksi	Ω_c : ASD Safety Factor	2.50
Assumed Bearing Area : Full Bearing			Allowable Bearing Fp per J8	2.550 ksi

Column & Plate

Column Properties

Steel Section : HSS5x5x1/4

Depth	5 in	Area	4.3 in^2
Width	5 in	Ixx	16 in^4
Flange Thickness	0.233 in	Iyy	16 in^4
Web Thickness	0 in		

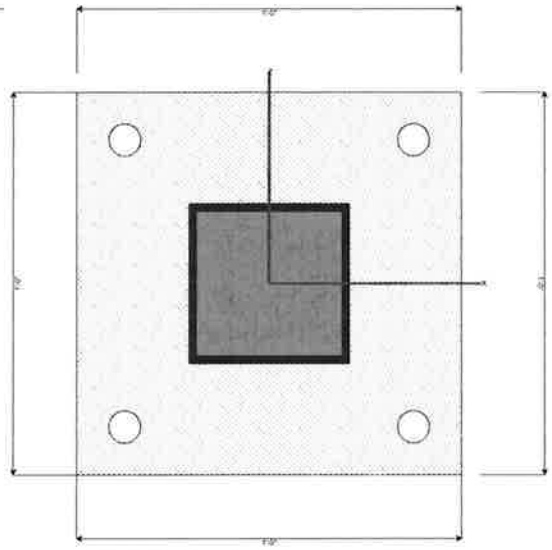


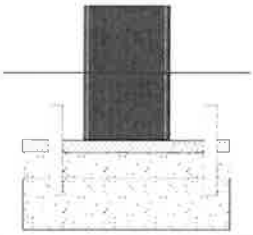
Plate Dimensions

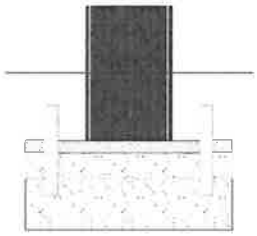
N : Length	12.0 in
B : Width	12.0 in
Thickness	0.750 in

Column assumed welded to base plate.

Support Dimensions

Width along "X"	12.0 in
Length along "Z'	12.0 in

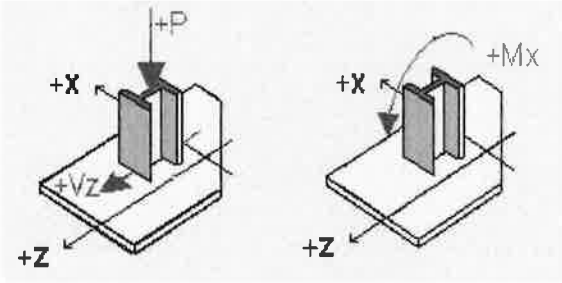




Applied Loads

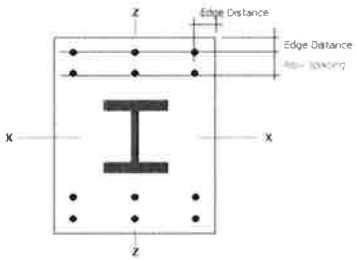
	P-Y	V-Z	M-X
D : Dead Load	3.430 k	0.0 k	0.0 k-ft
L : Live	6.850 k	0.0 k	0.0 k-ft
Lr : Roof Live	0.0 k	0.0 k	0.0 k-ft
S : Snow	0.0 k	0.0 k	0.0 k-ft
W : Wind	0.0 k	0.0 k	0.0 k-ft
E : Earthquake	0.0 k	0.0 k	2.296 k-ft
H : Lateral Earth	0.0 k	0.0 k	0.0 k-ft

" P " = Gravity load, "+" sign is downward.
"+" Moments create higher soil pressure at +Z edge.
"+" Shears push plate towards +Z edge.



Anchor Bolts

Anchor Bolt or Rod Description	1"
Max of Tension or Pullout Capacity.....	26.50 k
Shear Capacity.....	9.420 k
Edge distance : bolt to plate.....	1.50 in
Number of Bolts in each Row.....	2.0
Number of Bolt Rows.....	1.0



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Project Title: Modular Renovation VA Stockton
Engineer: G.C. Project ID: 14207
Project Descr:

C-26

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Steel Base Plate

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Lic. # : KW-06002019 Licensee : BCA Structural Engineering Inc

Description : BASE PLATE FRAME 1 & 2

GOVERNING DESIGN LOAD CASE SUMMARY

Plate Design Summary

Design Method	Allowable Strength Design
Governing Load Combination	+0.60D+0.70E+H
Governing Load Case Type	Axial + Moment, L/2 < Eccentricity, Tension on Bc
Design Plate Size	**1'-0" x 1'-0" x 0 -3/4"**
Pa : Axial Load	2.058 k
Ma : Moment	1.607 k-ft

Mu : Max. Moment	0.799	k-in
fb : Max. Bending Stress	5.680	ksi
Fb : Allowable :	21.557	ksi
Fy / Omega		
Bending Stress Ratio	0.263	
	Bending Stress OK	
fu : Max. Plate Bearing Stress	1.020	ksi
Fp : Allowable :	1.020	ksi
min(0.85*f'c*sqrt(A2/A1), 1.7* f'c)/Omega		
Bearing Stress Ratio	1.000	
	Bearing Stress OK	
Tension in each Bolt	0.350	
Allowable Bolt Tension	26.500	
Tension Stress Ratio	0.013	

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Project Title: Modular Renovation VA Stockton
Engineer: G.C. Project ID: 14207
Project Descr:

L-27

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Steel Base Plate

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Description : BASE PLATE FRAME 1 & 2 with min vert

Code References

Calculations per AISC 360-05 & Design Guide # 1, ASCE 7-05
Load Combination Set : ASCE 7-02

General Information

Material Properties

AISC Design Method	Allowable Strength Design			
Steel Plate Fy	=	36.0 ksi		
Concrete Support f'c	=	3.0 ksi	Ω_c : ASD Safety Factor.	2.50
Assumed Bearing Area : Full Bearing			Allowable Bearing Fp per J8	2.550 ksi

Column & Plate

Column Properties

Steel Section : HSS5x5x1/4

Depth	5 in	Area	4.3 in^2
Width	5 in	Ixx	16 in^4
Flange Thickness	0.233 in	Iyy	16 in^4
Web Thickness	0 in		

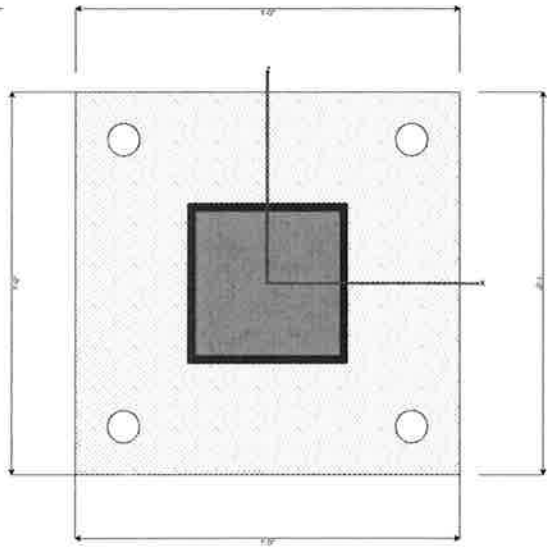


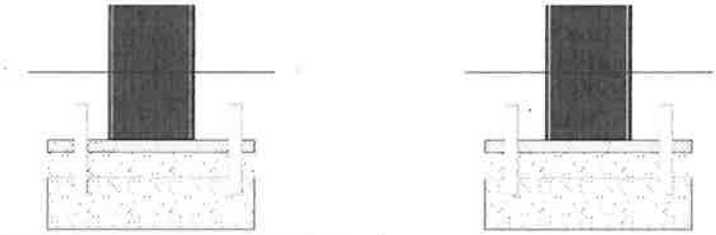
Plate Dimensions

N : Length	12.0 in
B : Width	12.0 in
Thickness	0.750 in

Column assumed welded to base plate.

Support Dimensions

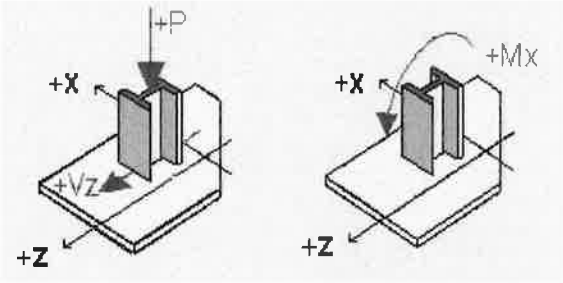
Width along "X"	12.0 in
Length along "Z'	12.0 in



Applied Loads

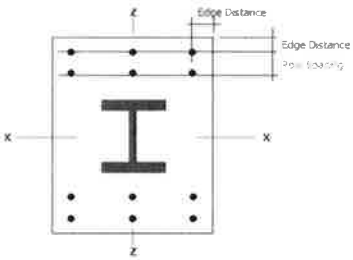
	P-Y	V-Z	M-X
D : Dead Load	0.20 k	0.0 k	0.0 k-ft
L : Live	0.30 k	0.0 k	0.0 k-ft
Lr : Roof Live	0.0 k	0.0 k	0.0 k-ft
S : Snow	0.0 k	0.0 k	0.0 k-ft
W : Wind	0.0 k	0.0 k	0.0 k-ft
E : Earthquake	0.0 k	0.0 k	2.296 k-ft
H : Lateral Earth	0.0 k	0.0 k	0.0 k-ft

" P " = Gravity load, "+" sign is downward.
"+" Moments create higher soil pressure at +Z edge.
"+" Shears push plate towards +Z edge.



Anchor Bolts

Anchor Bolt or Rod Description	1"	
Max of Tension or Pullout Capacity.....	26.50	k
Shear Capacity.....	9.420	k
Edge distance : bolt to plate.....	1.50	in
Number of Bolts in each Row.....	2.0	
Number of Bolt Rows.....	1.0	



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Project Title: Modular Renovation VA Stockton
Engineer: G.C. Project ID: 14207
Project Descr:

L-28

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Steel Base Plate

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Description : BASE PLATE FRAME 1 & 2 with min vert

GOVERNING DESIGN LOAD CASE SUMMARY

Plate Design Summary

Design Method	Allowable Strength Design
Governing Load Combination	+D+0.70E+H
Governing Load Case Type	Axial + Moment, L/2 < Eccentricity, Tension on Bc
Design Plate Size	**1'-0" x 1'-0" x 0 -3/4"**
Pa : Axial Load	0.200 k
Ma : Moment	1.607 k-ft

Mu : Max. Moment	0.570 k-in
fb : Max. Bending Stress	4.050 ksi
Fb : Allowable :	21.557 ksi
Fy / Omega	
Bending Stress Ratio	0.188
	Bending Stress OK
fu : Max. Plate Bearing Stress	1.020 ksi
Fp : Allowable :	1.020 ksi
min(0.85*f'c*sqrt(A2/A1), 1.7* f'c)/Omega	
Bearing Stress Ratio	1.000
	Bearing Stress OK
Tension in each Bolt	0.871
Allowable Bolt Tension	26.500
Tension Stress Ratio	0.033

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Project Descr:

L-29

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Steel Base Plate

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Lic. # : KW-06002019 Licensee : BCA Structural Engineering Inc

Description : BASE PLATE FRAME 3

Code References

Calculations per AISC 360-05 & Design Guide # 1, ASCE 7-05
Load Combination Set : ASCE 7-02

General Information

Material Properties

AISC Design Method	Allowable Strength Design			
Steel Plate Fy	=	36.0 ksi		
Concrete Support f'c	=	3.0 ksi	Ω_c : ASD Safety Factor.	2.50
Assumed Bearing Area : Full Bearing			Allowable Bearing Fp per J8	2.550 ksi

Column & Plate

Column Properties

Steel Section : HSS5x5x1/4

Depth	5 in	Area	4.3 in^2
Width	5 in	Ixx	16 in^4
Flange Thickness	0.233 in	Iyy	16 in^4
Web Thickness	0 in		

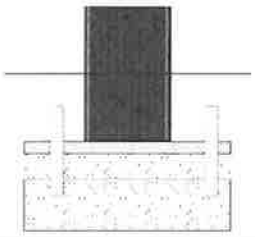
Plate Dimensions

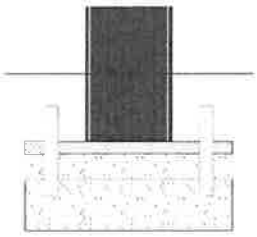
N : Length	12.0 in
B : Width	12.0 in
Thickness	0.750 in

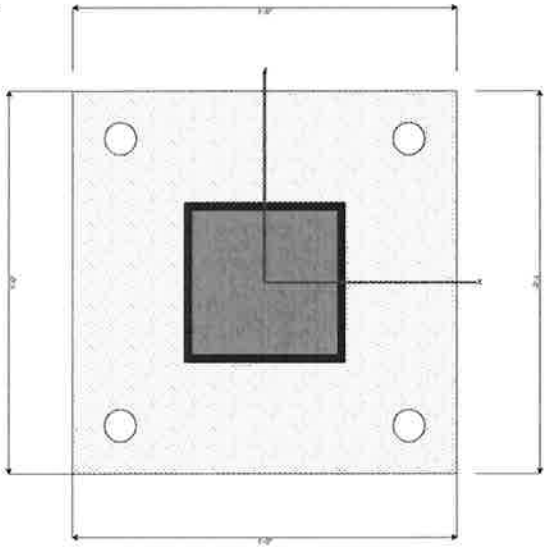
Column assumed welded to base plate.

Support Dimensions

Width along "X"	12.0 in
Length along "Z'	12.0 in



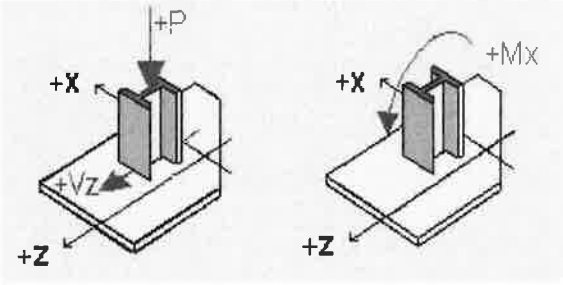




Applied Loads

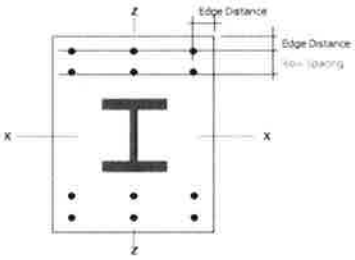
	P-Y	V-Z	M-X
D : Dead Load	1.082 k	0.0 k	0.0 k-ft
L : Live	2.164 k	0.0 k	0.0 k-ft
Lr : Roof Live	0.0 k	0.0 k	0.0 k-ft
S : Snow	0.0 k	0.0 k	0.0 k-ft
W : Wind	0.0 k	0.0 k	0.0 k-ft
E : Earthquake	0.0 k	0.0 k	6.226 k-ft
H : Lateral Earth	0.0 k	0.0 k	0.0 k-ft

" P " = Gravity load, "+" sign is downward. "+" Moments create higher soil pressure at +Z edge.
"+" Shears push plate towards +Z edge.



Anchor Bolts

Anchor Bolt or Rod Description	1"	
Max of Tension or Pullout Capacity.....	26.50	k
Shear Capacity.....	9.420	k
Edge distance : bolt to plate.....	1.50	in
Number of Bolts in each Row.....	2.0	
Number of Bolt Rows.....	1.0	



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Project Title: Modular Renovation VA Stockton
Engineer: G.C. Project ID: 14207
Project Descr:

L-30

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Steel Base Plate

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Description : BASE PLATE FRAME 3

GOVERNING DESIGN LOAD CASE SUMMARY

Plate Design Summary

Design Method	Allowable Strength Design
Governing Load Combination	+D+0.70E+H
Governing Load Case Type	Axial + Moment, L/2 < Eccentricity, Tension on Bc
Design Plate Size	**1'-0" x 1'-0" x 0 -3/4"**
Pa : Axial Load	1.082 k
Ma : Moment	4.358 k-ft

Mu : Max. Moment	1.551 k-in
fb : Max. Bending Stress	11.031 ksi
Fb : Allowable :	21.557 ksi
Fy / Omega	
Bending Stress Ratio	0.512
	Bending Stress OK
fu : Max. Plate Bearing Stress	1.020 ksi
Fp : Allowable :	1.020 ksi
min(0.85*f'c*sqrt(A2/A1), 1.7* f'c)/Omega	
Bearing Stress Ratio	1.000
	Bearing Stress OK
Tension in each Bolt	2.263
Allowable Bolt Tension	26.500
Tension Stress Ratio	0.085

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Engineer: G.C. Project ID: 14207
Project Descr:

L-31

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General Footing

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Description : FRAME 1 & 2 FOOTING

Code References

Calculations per ACI 318-08, IBC 2009, CBC 2010, ASCE 7-10
Load Combinations Used : ASCE 7-02

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.0010
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	1.50 ksf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

Increases based on footing Depth

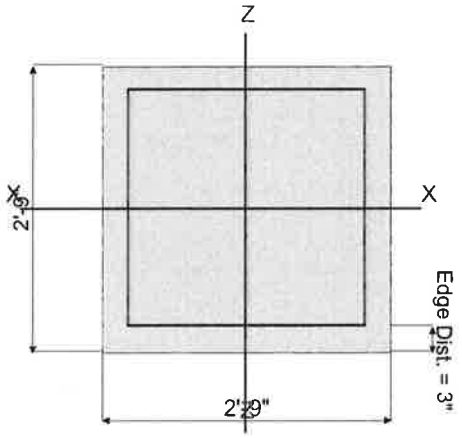
Footing base depth below soil surface	=	2.0 ft
Allowable pressure increase per foot of deptl	=	0.30 ksf
when footing base is below	=	1.0 ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depl	=	0.0 ksf
when maximum length or width is greater	=	0.0 ft

Dimensions

Width parallel to X-X Axis	=	2.750 ft
Length parallel to Z-Z Axis	=	2.750 ft
Footing Thicknes	=	24.0 in



Pedestal dimensions...

px : parallel to X-X Axis	=	12.0 in
pz : parallel to Z-Z Axis	=	12.0 in
Height		0.0 in

Rebar Centerline to Edge of Concrete..
at Bottom of footing = 3.0 in

Reinforcing

Bars parallel to X-X Axis		
Number of Bars	=	3
Reinforcing Bar Size	=	# 5
Bars parallel to Z-Z Axis		
Number of Bars	=	3.0
Reinforcing Bar Size	=	# 5

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a

Applied Loads

		D	Lr	L	S	W	E	H
P : Column Load	=	3.430	0.0	6.850	0.0	0.0	0.0	0.0 k
OB : Overburden	=	0.0	0.0	0.0	0.0	0.0	0.0	0.0 ksf
M-xx	=	0.0	0.0	0.0	0.0	0.0	0.0	0.0 k-ft
M-zz	=	0.0	0.0	0.0	0.0	0.0	2.296	0.0 k-ft
V-x	=	0.0	0.0	0.0	0.0	0.0	0.0	0.0 k
V-z	=	0.0	0.0	0.0	0.0	0.0	0.0	0.0 k

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Project Title: Modular Renovation VA Stockton
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Project Descr:

L-32

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General Footing

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Description : FRAME 1 & 2 FOOTING

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9806	Soil Bearing	1.765 ksf	1.80 ksf	+D+0.750L+0.750S+0.5250E+H about Z-
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	2.886	Overturning - Z-Z	1.607 k-ft	4.639 k-ft	0.6D+0.7E
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.02850	Z Flexure (+X)	0.8963 k-ft	31.454 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.02850	Z Flexure (-X)	0.8963 k-ft	31.454 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.02850	X Flexure (+Z)	0.8963 k-ft	31.454 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.02850	X Flexure (-Z)	0.8963 k-ft	31.454 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	n/a	1-way Shear (+X)	0.0 psi	82.158 psi	n/a
PASS	n/a	1-way Shear (-X)	0.0 psi	82.158 psi	n/a
PASS	n/a	1-way Shear (+Z)	0.0 psi	82.158 psi	n/a
PASS	n/a	1-way Shear (-Z)	0.0 psi	82.158 psi	n/a
PASS	n/a	2-way Punching	0.0 psi	82.158 psi	n/a

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc	Actual Soil Bearing Stress +Z	+Z	-X	-X	Actual / Allowable Ratio

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status

Footing Has NO Overturning

Sliding Stability

All units k

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Sliding SafetyRatio	Status

Footing Has NO Sliding

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.3985	+Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +1.40D	0.3985	-Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	0.8963	+Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	0.8963	-Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +1.20D+1.60L+0.50S+1.60H	0.8963	+Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +1.20D+1.60L+0.50S+1.60H	0.8963	-Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +1.20D+1.60Lr+0.50L	0.5149	+Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +1.20D+1.60Lr+0.50L	0.5149	-Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +1.20D+1.60Lr+0.80W	0.3416	+Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +1.20D+1.60Lr+0.80W	0.3416	-Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +1.20D+0.50L+1.60S	0.5149	+Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +1.20D+0.50L+1.60S	0.5149	-Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +1.20D+1.60S+0.80W	0.3416	+Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +1.20D+1.60S+0.80W	0.3416	-Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +1.20D+0.50Lr+0.50L+1.60W	0.5149	+Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +1.20D+0.50Lr+0.50L+1.60W	0.5149	-Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +1.20D+0.50L+0.50S+1.60W	0.5149	+Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +1.20D+0.50L+0.50S+1.60W	0.5149	-Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +1.20D+0.50L+0.20S+E	0.5149	+Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +1.20D+0.50L+0.20S+E	0.5149	-Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +0.90D+1.60W+1.60H	0.2562	+Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +0.90D+1.60W+1.60H	0.2562	-Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +0.90D+E+1.60H	0.2562	+Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
X-X, +0.90D+E+1.60H	0.2562	-Z	Bottom	0.288	Min Temp %	0.3382	31.454	OK
Z-Z, +1.40D	0.3985	-X	Bottom	0.288	Min Temp %	0.3382	31.454	OK

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Project Title: Modular Renovation VA Stockton
Engineer: G.C. Project ID: 14207
Project Descr:

L-33

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General Footing

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Description : FRAME 1 & 2 FOOTING

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z. +1.20D+1.60L+0.50S+1.60H	0.8963	-X	Bottom	0.288	Min Temp %	0.3382	31.454	OK
Z-Z. +1.20D+1.60L+0.50S+1.60H	0.8963	+X	Bottom	0.288	Min Temp %	0.3382	31.454	OK
Z-Z. +1.20D+1.60Lr+0.50L	0.5149	-X	Bottom	0.288	Min Temp %	0.3382	31.454	OK
Z-Z. +1.20D+1.60Lr+0.50L	0.5149	+X	Bottom	0.288	Min Temp %	0.3382	31.454	OK
Z-Z. +1.20D+1.60Lr+0.80W	0.3416	-X	Bottom	0.288	Min Temp %	0.3382	31.454	OK
Z-Z. +1.20D+1.60Lr+0.80W	0.3416	+X	Bottom	0.288	Min Temp %	0.3382	31.454	OK
Z-Z. +1.20D+0.50L+1.60S	0.5149	-X	Bottom	0.288	Min Temp %	0.3382	31.454	OK
Z-Z. +1.20D+0.50L+1.60S	0.5149	+X	Bottom	0.288	Min Temp %	0.3382	31.454	OK
Z-Z. +1.20D+1.60S+0.80W	0.3416	-X	Bottom	0.288	Min Temp %	0.3382	31.454	OK
Z-Z. +1.20D+1.60S+0.80W	0.3416	+X	Bottom	0.288	Min Temp %	0.3382	31.454	OK
Z-Z. +1.20D+0.50Lr+0.50L+1.60W	0.5149	-X	Bottom	0.288	Min Temp %	0.3382	31.454	OK
Z-Z. +1.20D+0.50Lr+0.50L+1.60W	0.5149	+X	Bottom	0.288	Min Temp %	0.3382	31.454	OK
Z-Z. +1.20D+0.50L+0.50S+1.60W	0.5149	-X	Bottom	0.288	Min Temp %	0.3382	31.454	OK
Z-Z. +1.20D+0.50L+0.50S+1.60W	0.5149	+X	Bottom	0.288	Min Temp %	0.3382	31.454	OK
Z-Z. +1.20D+0.50L+0.20S+E	0.3152	-X	Bottom	0.288	Min Temp %	0.3382	31.454	OK
Z-Z. +1.20D+0.50L+0.20S+E	0.7146	+X	Bottom	0.288	Min Temp %	0.3382	31.454	OK
Z-Z. +0.90D+1.60W+1.60H	0.2562	-X	Bottom	0.288	Min Temp %	0.3382	31.454	OK
Z-Z. +0.90D+1.60W+1.60H	0.2562	+X	Bottom	0.288	Min Temp %	0.3382	31.454	OK
Z-Z. +0.90D+E+1.60H	0.05646	-X	Bottom	0.288	Min Temp %	0.3382	31.454	OK
Z-Z. +0.90D+E+1.60H	0.4559	+X	Bottom	0.288	Min Temp %	0.3382	31.454	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+1.20D+0.50Lr+1.60L+1.60H	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+1.20D+1.60L+0.50S+1.60H	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+1.20D+1.60Lr+0.50L	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+1.20D+1.60Lr+0.80W	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+1.20D+0.50L+1.60S	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+1.20D+1.60S+0.80W	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+1.20D+0.50Lr+0.50L+1.60W	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+1.20D+0.50L+0.50S+1.60W	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+1.20D+0.50L+0.20S+E	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+0.90D+1.60W+1.60H	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+0.90D+E+1.60H	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK

Punching Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	0 psi	164.317 psi	0	OK
+1.20D+0.50Lr+1.60L+1.60H	0 psi	164.317 psi	0	OK
+1.20D+1.60L+0.50S+1.60H	0 psi	164.317 psi	0	OK
+1.20D+1.60Lr+0.50L	0 psi	164.317 psi	0	OK
+1.20D+1.60Lr+0.80W	0 psi	164.317 psi	0	OK
+1.20D+0.50L+1.60S	0 psi	164.317 psi	0	OK
+1.20D+1.60S+0.80W	0 psi	164.317 psi	0	OK
+1.20D+0.50Lr+0.50L+1.60W	0 psi	164.317 psi	0	OK
+1.20D+0.50L+0.50S+1.60W	0 psi	164.317 psi	0	OK
+1.20D+0.50L+0.20S+E	0 psi	164.317 psi	0	OK
+0.90D+1.60W+1.60H	0 psi	164.317 psi	0	OK
+0.90D+E+1.60H	0 psi	164.317 psi	0	OK

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Project Title: Modular Renovation VA Stockton
Engineer: G.C. Project ID: 14207
Project Descr:

L-34

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General Footing

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Description : FRAME 3 FOOTING

Code References

Calculations per ACI 318-08, IBC 2009, CBC 2010, ASCE 7-10
Load Combinations Used : ASCE 7-02

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.0010
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	1.50 ksf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

Increases based on footing Depth

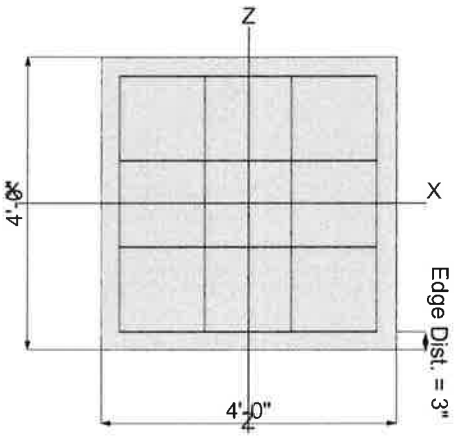
Footing base depth below soil surface	=	2.0 ft
Allowable pressure increase per foot of deptl	=	0.30 ksf
when footing base is below	=	1.0 ft

Increases based on footing plan dimension

Allowable pressure increase per foot of dept	=	0.0 ksf
when maximum length or width is greater	=	0.0 ft

Dimensions

Width parallel to X-X Axis	=	4.0 ft
Length parallel to Z-Z Axis	=	4.0 ft
Footing Thicknes	=	24.0 in



Pedestal dimensions...

px : parallel to X-X Axis	=	12.0 in
pz : parallel to Z-Z Axis	=	12.0 in
Height	=	0.0 in

Rebar Centerline to Edge of Concrete..
at Bottom of footing = 3.0 in

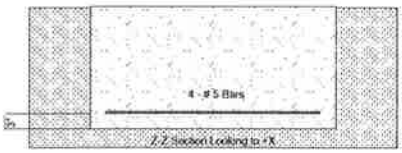
Reinforcing

Bars parallel to X-X Axis

Number of Bars	=	4
Reinforcing Bar Size	=	# 5

Bars parallel to Z-Z Axis

Number of Bars	=	4
Reinforcing Bar Size	=	# 5



Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a

Applied Loads

		D	Lr	L	S	W	E	H
P : Column Load	=	1.082	0.0	2.164	0.0	0.0	0.0	0.0 k
OB : Overburden	=	0.0	0.0	0.0	0.0	0.0	0.0	0.0 ksf
M-xx	=	0.0	0.0	0.0	0.0	0.0	0.0	0.0 k-ft
M-zz	=	0.0	0.0	0.0	0.0	0.0	6.226	0.0 k-ft
V-x	=	0.0	0.0	0.0	0.0	0.0	0.0	0.0 k
V-z	=	0.0	0.0	0.0	0.0	0.0	0.0	0.0 k

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Project Title: Modular Renovation VA Stockton
Engineer: G.C. Project ID: 14207
Project Descr:

L-35

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General Footing

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Description : FRAME 3 FOOTING

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.4285	Soil Bearing	0.7713 ksf	1.80 ksf	+0.60D+0.70E+H about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	1.576	Overturning - Z-Z	4.358 k-ft	6.866 k-ft	0.6D+0.7E
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.03660	Z Flexure (+X)	1.057 k-ft	28.871 k-ft	+1.20D+0.50L+0.20S+E
PASS	0.02514	Z Flexure (-X)	0.7259 k-ft	28.871 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.02514	X Flexure (+Z)	0.7259 k-ft	28.871 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	0.02514	X Flexure (-Z)	0.7259 k-ft	28.871 k-ft	+1.20D+0.50Lr+1.60L+1.60H
PASS	n/a	1-way Shear (+X)	0.0 psi	82.158 psi	n/a
PASS	0.0	1-way Shear (-X)	0.0 psi	0.0 psi	n/a
PASS	n/a	1-way Shear (+Z)	0.0 psi	82.158 psi	n/a
PASS	n/a	1-way Shear (-Z)	0.0 psi	82.158 psi	n/a
PASS	n/a	2-way Punching	1.90 psi	82.158 psi	+1.20D+0.50Lr+1.60L+1.60H

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc	Actual Soil Bearing Stress +Z	+Z	-X	-X	Actual / Allowable Ratio

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status

Footing Has NO Overturning

Sliding Stability

All units k

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Sliding SafetyRatio	Status

Footing Has NO Sliding

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.5630	+Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +1.40D	0.5630	-Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	0.7259	+Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +1.20D+0.50Lr+1.60L+1.60H	0.7259	-Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +1.20D+1.60L+0.50S+1.60H	0.7259	+Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +1.20D+1.60L+0.50S+1.60H	0.7259	-Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +1.20D+1.60Lr+0.50L	0.5586	+Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +1.20D+1.60Lr+0.50L	0.5586	-Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +1.20D+1.60Lr+0.80W	0.4826	+Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +1.20D+1.60Lr+0.80W	0.4826	-Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +1.20D+0.50L+1.60S	0.5586	+Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +1.20D+0.50L+1.60S	0.5586	-Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +1.20D+1.60S+0.80W	0.4826	+Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +1.20D+1.60S+0.80W	0.4826	-Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +1.20D+0.50Lr+0.50L+1.60W	0.5586	+Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +1.20D+0.50Lr+0.50L+1.60W	0.5586	-Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +1.20D+0.50L+0.50S+1.60W	0.5586	+Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +1.20D+0.50L+0.50S+1.60W	0.5586	-Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +1.20D+0.50L+0.20S+E	0.5586	+Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +1.20D+0.50L+0.20S+E	0.5586	-Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +0.90D+1.60W+1.60H	0.3619	+Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +0.90D+1.60W+1.60H	0.3619	-Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +0.90D+E+1.60H	0.3619	+Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
X-X, +0.90D+E+1.60H	0.3619	-Z	Bottom	0.288	Min Temp %	0.310	28.871	OK
Z-Z, +1.40D	0.5630	-X	Bottom	0.288	Min Temp %	0.310	28.871	OK

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Project Title: Modular Renovation VA Stockton
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Project Descr:

L-36

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General Footing

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Description : FRAME 3 FOOTING

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z, +1.20D+1.60L+0.50S+1.60H	0.7259	-X	Bottom	0.288	Min Temp %	0.310	28.871	OK
Z-Z, +1.20D+1.60L+0.50S+1.60H	0.7259	+X	Bottom	0.288	Min Temp %	0.310	28.871	OK
Z-Z, +1.20D+1.60Lr+0.50L	0.5586	-X	Bottom	0.288	Min Temp %	0.310	28.871	OK
Z-Z, +1.20D+1.60Lr+0.50L	0.5586	+X	Bottom	0.288	Min Temp %	0.310	28.871	OK
Z-Z, +1.20D+1.60Lr+0.80W	0.4826	-X	Bottom	0.288	Min Temp %	0.310	28.871	OK
Z-Z, +1.20D+1.60Lr+0.80W	0.4826	+X	Bottom	0.288	Min Temp %	0.310	28.871	OK
Z-Z, +1.20D+0.50L+1.60S	0.5586	-X	Bottom	0.288	Min Temp %	0.310	28.871	OK
Z-Z, +1.20D+0.50L+1.60S	0.5586	+X	Bottom	0.288	Min Temp %	0.310	28.871	OK
Z-Z, +1.20D+1.60S+0.80W	0.4826	-X	Bottom	0.288	Min Temp %	0.310	28.871	OK
Z-Z, +1.20D+1.60S+0.80W	0.4826	+X	Bottom	0.288	Min Temp %	0.310	28.871	OK
Z-Z, +1.20D+0.50Lr+0.50L+1.60W	0.5586	-X	Bottom	0.288	Min Temp %	0.310	28.871	OK
Z-Z, +1.20D+0.50Lr+0.50L+1.60W	0.5586	+X	Bottom	0.288	Min Temp %	0.310	28.871	OK
Z-Z, +1.20D+0.50L+0.50S+1.60W	0.5586	-X	Bottom	0.288	Min Temp %	0.310	28.871	OK
Z-Z, +1.20D+0.50L+0.50S+1.60W	0.5586	+X	Bottom	0.288	Min Temp %	0.310	28.871	OK
Z-Z, +1.20D+0.50L+0.20S+E	0.07552	-X	Bottom	0.288	Min Temp %	0.310	28.871	OK
Z-Z, +1.20D+0.50L+0.20S+E	1.057	+X	Bottom	0.288	Min Temp %	0.310	28.871	OK
Z-Z, +0.90D+1.60W+1.60H	0.3619	-X	Bottom	0.288	Min Temp %	0.310	28.871	OK
Z-Z, +0.90D+1.60W+1.60H	0.3619	+X	Bottom	0.288	Min Temp %	0.310	28.871	OK
Z-Z, +0.90D+E+1.60H	0.0	-X	Top	0.288	Min Temp %	0.310	28.871	OK
Z-Z, +0.90D+E+1.60H	0.9630	+X	Bottom	0.288	Min Temp %	0.310	28.871	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+1.20D+0.50Lr+1.60L+1.60H	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+1.20D+1.60L+0.50S+1.60H	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+1.20D+1.60Lr+0.50L	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+1.20D+1.60Lr+0.80W	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+1.20D+0.50L+1.60S	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+1.20D+1.60S+0.80W	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+1.20D+0.50Lr+0.50L+1.60W	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+1.20D+0.50L+0.50S+1.60W	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+1.20D+0.50L+0.20S+E	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+0.90D+1.60W+1.60H	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK
+0.90D+E+1.60H	0 psi	0 psi	0 psi	0 psi	0 psi	82.158 psi	0	OK

Punching Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	1.474 psi	164.317 psi	0.00897	OK
+1.20D+0.50Lr+1.60L+1.60H	1.9 psi	164.317 psi	0.01157	OK
+1.20D+1.60L+0.50S+1.60H	1.9 psi	164.317 psi	0.01157	OK
+1.20D+1.60Lr+0.50L	1.462 psi	164.317 psi	0.0089	OK
+1.20D+1.60Lr+0.80W	1.263 psi	164.317 psi	0.007688	OK
+1.20D+0.50L+1.60S	1.462 psi	164.317 psi	0.0089	OK
+1.20D+1.60S+0.80W	1.263 psi	164.317 psi	0.007688	OK
+1.20D+0.50Lr+0.50L+1.60W	1.462 psi	164.317 psi	0.0089	OK
+1.20D+0.50L+0.50S+1.60W	1.462 psi	164.317 psi	0.0089	OK
+1.20D+0.50L+0.20S+E	1.475 psi	164.317 psi	0.008978	OK
+0.90D+1.60W+1.60H	0.9475 psi	164.317 psi	0.005766	OK
+0.90D+E+1.60H	1.132 psi	164.317 psi	0.006888	OK