Structural Calculations Alta Mira Residence

Portland, Oregon (Chris Thelen)



June 5, 2012 Job Number: 15-T070



FROELICH

*** LIMITATIONS *** ENGINEER WAS RETAINED IN A LIMITED CAPACITY FOR THIS PROJECT. DESIGN IS BASED UPON INFORMATION PROVIDED BY THE CLIENT, WHO IS SOLELY RESPONSIBLE FOR ACCURACY OF SAME. NO RESPONSIBILITY AND / OR LIABILITY IS ASSUMED BY, OR IS TO BE ASSIGNED TO THE ENGINEER FOR ITEMS BEYOND THAT SHOWN ON THESE SHEETS.

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www.froelich-engineers.com



Client:	DOWA
Project:	Alta Mira Residence
Proj. #:	15-T070
Date:	5-5-2015
By:	TWN

FROELICH ENGINEERSI Project Design Criteria

Project Description

2-level single family residence. Wood framed with conventional foundation.

Project Location

Portland, OR 45.4835° 122.6936° Elevation = Approx. 740 ft

General

Building Department:	Portland, OR
Building Code(s):	2012 International Building Code (IBC)
	2014 Oregon Structural Specialty Code (OSSC)
a. 21 Tele . 2010. 21 1	ASCE7-10
	Snow Load Analysis for Oregon (3rd ed. December 2007)

Roof Live Load:

Ground Snow Load =	12	psf (Snow Load Analysis for Oregon 2007)
Minimum Roof Snow Load =	25	psf (Snow Load Analysis for Oregon 2007)
Snow Importance Factor $(I_s) =$	1.00	(ASCE7-10 Table 7-4)
Deflection Criteria =	L/240	

Floor Live Loads:

	Live Load =	40	psf (IBC Table 1607.1)	
--	-------------	----	------------------------	--

Wind Load:

Basic (3-Second Gust) Wind Speed =	120	mph	
Exposure =	В		
Wind Importance Factor $(I_w) =$	1.00	(ASCE7-10 Table 6-1)	

Seismic Load:

.00 D 995 428	(ASCE7-10 Table 11.5-1) * g g
428	
428	
	g
731	g
449	g
D	
5.5	Light-framed walls sheathed with wood panels Shear Walls (Bearing Wall System)
4 I	49 D

Soils Data:

Allowable Bearing Pressure = 2000 psf *
Exterior Footing Depth = 18 inches*

* Per Geotechnical Engineering Report

By:

Carlson Geotechnical Project No. G1504162 Dated April 30, 2015

FROELICH CONSULTING ENGINEERS, INC.

client:	Arcon Group
project:	Alta Mira
job number:	15-T070
date:	5/7/2015
by:	AT

Dead Load Estimates:

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Roof:			DL (psf)	
	Comp. Shingles (3-lay		6.0	
	14" Roof Joist @ 16" o	DC 0	4.0	2.221.2
	Insulation		1.6	Roof Pitch
	1/2" Gyp. Ceiling		2.0	rise= 0.8
	15/32" Plywood		1.6	run= 12
	Misc.		1.5	
				Slope Corrected
		Total:	<u>16.7</u> psf	DL= total/cos(-tan(roof slope)
		Use:	17.0 psf	DL= 0.0
2nd Flo			DL (psf)	
	3/4" Plywood		2.4	
	11-7/8" LPI's @ 16" o.	C.	3.5	
	1" gypcrete		8.0	
	Insulation		1.6	
	1/2" Gyp. Ceiling		2.0	
	Carpet		2.0	
	Misc.		0.5	
		Total:	20 psf	
		Use:	20.0 psf	
Exterior			DL (psf)	
	1/2" Plywood		1.6	
	2x6 DF Studs @ 16" c).C.	1.5	
	2x6 DF Studs @ 16" of Insulation).C.	1.5 1.6	
	2x6 DF Studs @ 16" o Insulation 1/2" Gyp.).C.	1.5 1.6 2.0	
	2x6 DF Studs @ 16" of Insulation).C.	1.5 1.6	
	2x6 DF Studs @ 16" o Insulation 1/2" Gyp.	o.c. Total: Use:	1.5 1.6 2.0	

	FROELICH CONSULTING ENGINEERS client: Arcon project: Alta Mira job number: 15-T070 date: 5/28/2015 by: AT ROOF BEAMS	
Roof Beam RB1	Location: Garage Door Span: 16'-3" 1 ft * 2x snow load at eve over hangs Loads: Loading Trib. Roof DL: 17 psf x 14'-0" ft = 238 plf SL: 25 psf x 14'-0" ft = 350 plf	5 1/2 x 12 24F-V4 GL
Roof Beam RB2	Location:Spanning Ridge BeamSpan:20'-0"1ft* 2x snow load at eve over hangsLoads:Image: Trib.Roof DL:17psfx13.00ftsL:25psfx13.00ftsolar DL:5psfx6.50ftslar33plf	7 x 14 2.1E PSL
Roof Beam RB3	Location: Living Room Window Span: 3'-0", 6'-0", 6'-0", 3'-0" Loads: 1 ft * 2x snow load at eve over hangs Loads: 1 ft * 2x snow load at eve over hangs Roof DL: 22 psf x SL: 25 psf x 10.50 ft = 231 plf Wind OOP= 13.2 psf x 3.00 ft = 39.6 plf	4x8 DF#2 Cont
Roof Beam RB4	Location: Master Span: 6'-0" 1 ft * 2x snow load at eve over hangs Loads: Roof DL: 22 psf x 13.50 ft = 297 plf SL: 25 psf x 13.50 ft = 363 plf	4x8 DF#2
Roof Beam RB5	Location: Above Living Span: 20'-0" 1 ft * 2x snow load at eve over hangs Loads: Roof DL: 17 psf x 18.00 ft = 306 plf SL: 25 psf x 18.00 ft = 475 plf Solar DL: 5 psf x 18.00 ft = 90 plf	5 1/2 x 18 24F-V4 GL

Roof Beam RB6	Not Used	
Roof Beam RB7	Location: Master Bath Span: 9'-0" 1 ft * 2x snow load at eve over hangs Loads: Roof DL: 22 psf x 11.00 ft = 242 plf SL: 25 psf x 11.00 ft = 300 plf	4 x 12 DF#2
Roof Beam RB8	Location: Side Garage Span: 5'-0", 5'-0" 1 ft * 2x snow load at eve over hangs Loads: Roof DL: 17 psf x 1.00 ft = 17 plf 1ft SL: 25 psf x 1.00 ft = 50 plf Triangular to-	4x8DF#2
	LoadingTrib.Roof DL:17psf x 5.00 ft=85plfSL:25psf x 5.00 ft=150plf	



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1	Wood Works [®]
	SOFTWARE FOR WORD DESIGN

May 29, 2015 17:30 RB1

Design Check Calculation Sheet Sizer 2004a LOADS (lbs, psf, or plf) : Load Distribution Magnitude Location [ft] Type Pat-End Start End Start tern Full UDL Load Dead 238.0 No 350.0 Load2 Snow Full UDL Yes MAXIMUM REACTIONS (lbs) and BEARING LENGTHS (in) : 占 Δ 0' 16' 2017 2017 Dead Live 2800 2800 Total 4817 4817 Bearing: LC number 2 2 Length 1.45 1.45 Glulam-Unbal., West Species, 24F-1.8E WS, 5-1/8x12" Self Weight of 14.16 plf automatically included in loads; Lateral support: top= full, bottom= at supports; Load combinations: ICC-IBC; Analysis vs. Allowable Stress (psi) and Deflection (in) using NDS 2001 : Criterion Value Analysis Value Design Analysis/Design 276 Shear fv = 103 EV fv/Fv -----0.37 fb/Fb' =Fb' = 2760fb = 1880Bending(+) 0.68 Live Defl'n Total Defl'n 0.53 = 0.39 = L/494 L/360 0.73 0.67 = L/287 0.80 = L/240 0.84 ADDITIONAL DATA: CL Cfrt FACTORS: F CM CV CEU Cr LC# CD Ct Notes Cn 2400 1.15 1.00 1.000 Fb1+ 1,00 1.000 1.00 1.00 1.00 1.00 2 Fv' 240 1.15 1.00 1.00 --1.00 1.00 1.00 2 --Fcp' 650 1.00 1.00 -2 -..... 1,00 -----2 1.8 million 1.00 1.00 -1.00 -..... E' Bending(+): LC# 2 = D+S, M = 19269 lbs-ft : LC# 2 = D+S, V = 4817, V design = n: LC# 2 = D+S EI= 1328e06 lb-in2 Shear 4215 lbs Deflection: LC# 2 = D+STotal Deflection = 1.00(Dead Load Deflection) + Live Load Deflection. (D=dead L=live S=snow W=wind I=impact C=construction CLd=concentrated) (All LC's are listed in the Analysis output) _=no pattern load in this span) (Load Pattern: s=S/2, X=L+S or L+C, DESIGN NOTES: 1. Please verify that the default deflection limits are appropriate for your application. 2. Glulam design values are for materials conforming to AITC 117-2001 and manufactured in accordance with ANSI/AITC A190.1-1992. GLULAM: bxd = actual breadth x actual depth.

Glulam Beams shall be laterally supported according to the provisions of NDS Clause 3.3.3.





May 28, 2015 10:20 RB2

PROJECT

Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnit	ude	Locatio	Pat-	
			Start	End	Start	End	tern
Loadl	Dead	Full UDL	221.0				No
Load2	Snow	Full UDL	350.0				No
Load3	Dead	Full UDL	33.0				No

MAXIMUM REACTIONS (lbs) and BEARING LENGTHS (in) :

		 	 	 	 	 	 	(*****	
	∆ 0'								△ 20'
Dead Live Total	2846 3500 6346								284 350 634
Bearing: LC number Length	2 1.21								1.2

PSL, 2.1E, 3100Fb, 7x14"

Self Weight of 30.62 plf automatically included in loads; Lateral support: top= 16.00 bottom= at supports; [in] Load combinations: ICC-IBC;

Analysis vs. Allowable Stress (psi) and Deflection (in) using NDS 2001 :

Criterion	Analysis Value	Design Value	Analysis/Design
Shear	fv = 86	Fv' = 328	fv/Fv' = 0.26
Bending(+)	fb = 1665	Fb' = 3504	fb/Fb' = 0.48
Live Defl'n	0.37 = L/640	0.67 = L/360	0.56
Total Defl'n	0.83 = L/288	1.00 = L/240	0.83

ADDITIONAL DATA.

ADDITT	UNAL	DATA.											
FACTORS	: F	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Ci	Cn	LC#	
Fb'+	3100	1.15	-	1.00	1.000	0.98	-	1.00	1.00	-	-	2	
Fv'	285	1.15	20	1.00		-	-	-	1.00	-	1.00	2	
Fcp'	750	<u>1</u>	<u>-</u>	1.00	742	2	23	-	1.00	0220	-	100	
E'	2.1	million	-	1.00	1077	-		-	1.00	-	150	2	
Shear Deflec Total (D=d	: tion: Deflec ead 1	LC# 2 = LC# 2 = LC# 2 = ction = 1 L=live S are list	D+S, D+S L.50(S=sno	V = EI= Dead Lo W W=wi	6346, V 3361e0 ad Defl nd I=i	design 6 lb-in ection) mpact	2 + Li C=con	ve Load	l Defle			ed)	

DESIGN NOTES:

 Please verify that the default deflection limits are appropriate for your application.
 SCL-BEAMS (Structural Composite Lumber): the attached SCL selection is for preliminary design only. For final member design contact your local SCL manufacturer.

3. Size factors vary from one manufacturer to another for SCL materials. They can be changed in the database editor.





May 7, 2015 15:50 RB3

PROJECT

Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Туре	Distribution	Magnit	ude	Locatio	Pat-	
			Start	End	Start	End	tern
Load1	Dead	Full UDL	231.0				No
Load1 Load2	Snow	Full UDL	288.0				Yes

MAXIMUM REACTIONS (Ibs) and BEARING LENGTHS (in) :

	۵'	∆ 3'	∆ 9'	∆ 15'	
Dead Live Total	178 333 511	1200 1544 2744	1511 1868 3379	1200 1544 2744	178 333 511
Bearing: LC number Length Cb	7 1.00 1.00	13 1.00 1.43	8 1.17 1.32	15 1.00 1.43	12 1.00 1.00

Lumber-soft, D.Fir-L, No.2, 4x8"

Self Weight of 6.03 plf automatically included in loads; Lateral support: top= at supports, bottom= at supports; Load combinations: ICC-IBC;

Analysis vs. Allowable Stress (psi) and Deflection (in) using NDS 2001 :

Criterion	Analysis Value	Design Value	Analysis/Design
Shear	fv = 81	Fv' = 207	fv/Fv' = 0.39
Bending(+)	fb = 390	Fb' = 1337	fb/Fb' = 0.29
Bending(-)	fb = 706	Fb' = 1343	fb/Fb' = 0.53
Live Defl'n	0.02 = <l 999<="" td=""><td>0.20 = L/360</td><td>0.08</td></l>	0.20 = L/360	0.08
Total Defl'n	0.03 = <l 999<="" td=""><td>0.30 = L/240</td><td>0.10</td></l>	0.30 = L/240	0.10

ADDITIONAL DATA:

ADDITIC	INAL	DATA.											
FACTORS:	F	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#	
Fb'+	900	1.15	1.00	1.00	0.994	1.300	1.00	1.00	1.00	1.00	-	7	
Fb'-	900	1.15	1.00	1.00	0.998	1.300	1.00	1.00	1.00	1.00	-	8	
Fv'	180	1.15	1.00	1.00	-	-	-	-	1.00	1.00	1.00	8	
Fcp'	625	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-	
Е'	1.6	million	1.00	1.00	-	-	-	-	1.00	1.00	-	4	
Bending Shear Deflect Total Do (D=dea (All 1	(-): : ion: eflec ad l LC's	LC# 7 = LC# 8 = LC# 8 = LC# 4 = ction = L=live 3 are lis	D+S (D+S (D+S (1.50(D S=snow ted in	patter patter patter bead Lo W=wi the A	n: sSSs n: sSSs n: sSss ad Defl nd I=i nalysis), M =), V =) EI= ection) mpact output	1804 1690 17 + Liv C=cons)	lbs-f , V de 8e06 l e Load tructi	t sign = b-in2 Defle on CL	ction. d=conc	entrat	ed)	
(Load	Patt	tern: s=	5/2,	X=L+S	or L+C,	=no	patter	n load	l in th	is spa	n)		

DESIGN NOTES:

1. Please verify that the default deflection limits are appropriate for your application.

2. Continuous or Cantilevered Beams: NDS Clause 4.2.5.5 requires that normal grading provisions be extended to the middle 2/3 of 2 span beams and to the full length of cantilevers and other spans. 3. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.





May 7, 2015 15:59 RB4

PROJECT

Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnit	ude	Locatio	Pat-	
			Start	End	Start	End	tern
Load1	Dead	Full UDL	297.0				No
Load2	Snow	Full UDL	363.0				No

MAXIMUM REACTIONS (lbs) and BEARING LENGTHS (in) :



Lumber-soft, D.Fir-L, No.2, 4x8"

Self Weight of 6.03 plf automatically included in loads; Lateral support: top= at supports, bottom= at supports; Load combinations: ICC-IBC;

Analysis vs. Allowable Stress (psi) and Deflection (in) using NDS 2001 :

Criterion	Analysis Value	Design Value	Analysis/Design		
Shear	fv = 94	Fv' = 207	fv/Fv' = 0.46		
Bending(+)	fb = 1173	Fb' = 1333	fb/Fb' = 0.88		
Live Defl'n	0.06 = <l 999<="" td=""><td>0.20 = L/360</td><td>0.30</td></l>	0.20 = L/360	0.30		
Total Defl'n	0.13 = L/537	0.30 = L/240	0.45		

ADDITIONAL DATA:

		- DAIA.											
FACTORS:	F	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#	
Fb'+	900	1.15	1.00	1.00	0.991	1.300	1.00	1.00	1.00	1.00	-	2	
Fv'	180	1.15	1.00	1.00		-	÷.	. 	1.00	1.00	1,00	2	
Fcp'	625	-	1.00	1.00	-	4	-	1 44 1	1.00	1.00	-	-	
Ε'	1.6	million	1.00	1.00	-	-	-		1.00	1.00	-	2	
Shear Deflect: Total De (D=dea	: ion: efle ad	LC# 2 = LC# 2 = LC# 2 = ction = L=live 3 are lis	D+S, D+S 1.50(I S=snov	V = EI= Dead Lo W=wi	1998, V 178e0 ad Defl nd I=i	/ design 06 lb-in .ection) .mpact	2 + Liv C=cons	ve Load	Defle			ed)	

DESIGN NOTES:

1. Please verify that the default deflection limits are appropriate for your application.

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COMPANY PROJECT

May 7, 2015 15:48 RB5

Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnit	ude	Locatio	Pat-	
			Start	End	Start	End	tern
Loadl	Dead	Full UDL	306.0				No
Load2	Snow	Full UDL	475.0				No
Load3	Dead	Full UDL	90.0				No

MAXIMUM REACTIONS (lbs) and BEARING LENGTHS (in) :

	ل ٥'	
Dead Live Total Bearing: LC number	4188 4750 8938	4188 4750 8938
LC number Length	2 2.50	2 2.50

Glulam-Unbal., West Species, 24F-V4 DF, 5-1/2x18"

Self Weight of 22.79 plf automatically included in loads;

Lateral support: top= at supports, bottom= at supports; Load combinations: ICC-IBC;

Analysis vs. Allowable Stress (psi) and Deflection (in) using NDS 2001 :

Criterion	Analysis Value	Design Value	Analysis/Design	
Shear	fv = 115	Fv' = 276	fv/Fv' = 0.42	
Bending(+)	fb = 1806	Fb' = 2497	fb/Fb' = 0.72	
Live Defl'n	0.36 = L/675	0.67 = L/360	0.53	
Total Defl'n	0.83 = L/290	1.00 = L/240	0.83	

ADDITIONAL DATA:

FACTORS	5: F	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cn	LC#
Fb'+	2400	1.15	1.00	1.00	0.905	1.000	1.00	1.00	1.00	1.00	-	2
Fv'	240	1.15	1.00	1.00	-	1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 -	-	-	1.00	1.00	1.00	2
Fcp'	650	-	1.00	1.00	-	-	-	-	1.00	-	-	-
E'	1.8	million	1.00	1.00	-	-	-		1.00	-		2

Bending(+): LC# 2 = D+S, M = 44690 lbs-ft
Shear : LC# 2 = D+S, V = 8938, V design =
Deflection: LC# 2 = D+S EI= 4811e06 lb-in2

Total Deflection = 1.50 (Dead Load Deflection) + Live Load Deflection.

(D=dead L=live S=snow W=wind I=impact C=construction CLd=concentrated)

(All LC's are listed in the Analysis output)

DESIGN NOTES:

1. Please verify that the default deflection limits are appropriate for your application.

2. Glulam design values are for materials conforming to AITC 117-2001 and manufactured in accordance with ANSI/AITC A190.1-1992

7597 lbs

3. GLULAM: bxd = actual breadth x actual depth.

4. Glulam Beams shall be laterally supported according to the provisions of NDS Clause 3.3.3.



COMPANY PROJECT

RB7 May 7, 2015 16:16

Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnit	ude	Locatio	Pat-	
			Start	End	Start	End	tern
Loadl	Dead	Full UDL	242.0		1		No
Loadl Load2	Snow	Full UDL	300.0				No

MAXIMUM REACTIONS (Ibs) and BEARING LENGTHS (in) :



Lumber-soft, D.Fir-L, No.2, 4x12"

Self Weight of 9.35 plf automatically included in loads;

Lateral support: top= at supports, bottom= at supports; Load combinations: ICC-IBC;

Analysis vs. Allowable Stress (psi) and Deflection (in) using NDS 2001 :

Criterion	Analysis Value	Design Value	Analysis/Design		
Shear	fv = 75	Fv' = 207	fv/Fv' = 0.36		
Bending(+)	fb = 907	Fb' = 1114	fb/Fb' = 0.81		
Live Defl'n	0.07 = <l 999<="" td=""><td>0.30 = L/360</td><td>0.22</td></l>	0.30 = L/360	0.22		
Total Defl'n	0.15 = L/717	0.45 = L/240	0.33		

ADDITIONAL DATA.

ADDITIO	INAL	DATA.											
FACTORS:	F	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#	
Fb ' +	900	1.15	1.00	1.00	0.978	1.100	1.00	1.00	1.00	1.00	-	2	
Fv'	180	1.15	1.00	1.00	5	-		177.1	1.00	1.00	1.00	2	
Fcp'	625	-	1.00	1.00	-	72	-	177.5	1.00	1.00	-	-	
E'	1.6	million	1.00	1.00	-	÷.	**		1.00	1.00	(ee.	2	
Shear Deflect Total De (D=dea	: ion: efle ad	LC# 2 = LC# 2 = LC# 2 = ction = L=live s are list	D+S, D+S 1.50(1 S=snov	V = EI= Dead Lo W W=wi	2481, V 664e0 ad Defl nd I=i	design 6 lb-in ection) mpact	12 + Liv C=cons	re Load	Defle			ed)	

DESIGN NOTES:

Please verify that the default deflection limits are appropriate for your application.
 Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.





PROJECT

COMPANY

May 28, 2015 11:07 RB8

Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magni	tude	Locatio	Pat-	
	12		Start	End	Start	End	tern
Load1	Dead	Triangular	0.0	85.0	0.00	8.00	No
Load2	Dead	Triangular	0.0	150.0	0.00	8.00	No

MAXIMUM REACTIONS (Ibs) and BEARING LENGTHS (in) :

	0'	<u> </u> 4'	
Dead	29	618	342
Live Total	2.9	618	342
Bearing: LC number Length	1 1.00	1 1.00	1.00

Lumber-soft, D.Fir-L, No.2, 4x8"

Self Weight of 6.03 plf automatically included in loads;

Lateral support: top= 24.00 bottom= at supports; [in] Load combinations: ICC-IBC;

Analysis vs. Allowable Stress (psi) and Deflection (in) using NDS 2001 :

Criterion	Analysis Value	Design Value	Analysis/Design
Shear	fv = 18	Fv' = 162	fv/Fv' = 0.11
Bending(+)	fb = 101	Fb' = 1051	fb/Fb' = 0.10
Bending (-)	fb = 97	Fb' = 1051	fb/Fb' = 0.09
Live Defl'n	negligible		
Total Defl'n	0.01 = <l 999<="" td=""><td>0.20 = L/240</td><td>0.03</td></l>	0.20 = L/240	0.03

ADDITIONAL DATA:

FACTORS:	F	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fb'+	900	0.90	1.00	1.00	0.998	1.300	1.00	1.00	1.00	1.00	220	1
Fb'-	900	0.90	1.00	1.00	0.998	1.300	1.00	1.00	1.00	1.00	1576	1
Fv'	180	0.90	1.00	1.00	-	-	-	-	1.00	1.00	1.00	1
Fcp'	625	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.6	million	1.00	1.00	-	-	-	+	1.00	1.00	-	1

Bending(+): LC# 1 = D only, M = 258 lbs-ft Bending(-): LC# 1 = D only, M = 247 lbs-ft Shear : LC# 1 = D only, V = 387, V design = 300 lbs Deflection: LC# 1 = D only EI= 178e06 lb-in2 Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection. (D=dead L=live S=snow W=wind I=impact C=construction CLd=concentrated) (All LC's are listed in the Analysis output)

DESIGN NOTES:

1. Please verify that the default deflection limits are appropriate for your application.

2. Continuous or Cantilevered Beams: NDS Clause 4.2.5.5 requires that normal grading provisions be extended to the middle 2/3 of 2 span beams and to the full length of cantilevers and other spans.

	FROELICH CONSULTING ENGINEERS client: Pahlisch Homes project: Keystone job number: 15-B158 date: 5/28/2015 by: BL Columns & Footings		
Column	Location: Garage Main Door		
C1	Height: 9'-0" Loads:		(2) 2x6 DF
	RB1 DL = SL =	2017 lbs 2800 lbs 4817 lbs	Ok on Typ FTG
Column C2	Location: Beam above Dining Height: 9'-0" Loads:		(2) 2x6 DF
	RB2 DL = SL =	2749 lbs 3500 lbs 6249 lbs	24"x24"x10" Conc FTG w/ (3) #4 bars EW
Column C3	Location: Front Living Height: 9'-0"		4x6 DF #4
s	Loads: RB3 DL = SL =	1511 lbs 1868 lbs 3379 lbs	24"x24"x10" Conc FTG w/ (3) #4 bars EW
Column C4	Wind OOP= 13.2 psf (6ft)= 8 Location: Garage BEAM Height: 9'-0"	1 plf	6X6 df #2
	Loads: RB6 DL = SL =	3778 lbs 5369 lbs 9147 lbs	36X36"x10" Conc FTG w/ (4) #4 bars EW
Column C5	Location: Garage Floor Height: 9'-0"		6x6 DF #2
	Loads: RB6 DL = SL = FB3 DL= LL=	3778 lbs 5369 lbs 4393 lbs <u>3120 lbs</u> 16660 lbs	36x36x10" Conc FTG w/ (4) #4 bars EW
Column C6	Location: Garage Right of opening Height: 5'-0"		6x6 DF #2
	Loads: FB3 DL= LL=	2920 lbs 2080 lbs	24"x24"x10" Conc FTG w/ (3) #4 bars EW

14 of 75



PROJECT

COMPANY

C3 May 11, 2015 15:32

Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnit	ude	Locatio	Pat-	
			Start	End	Start	End	tern
Load1	Dead	Axial	1511	(Eccer	tricity	= 0.25	in)
Load1 Load2	Snow	Axial	1868	(Eccer	tricity	= 0.25	in)
Load3	Wind	Full UDL	81.0	20112-000-2010			No

MAXIMUM REACTIONS (Ibs):

	0'	
Dead Live Total	364 364	36 36

Lumber Post, D.Fir-L, No.2, 4x6"

Self Weight of 4.57 plf automatically included in loads; Pinned base; Loadface = width(b); Ke x Lb: 1.00 x 8.00= 8.00 [ft]; Ke x Ld: 1.00 x 9.00= 9.00 [ft]; Lateral support: top = Lb, bottom = Lb; Load

combinations: ICC-IBC;

Analysis vs. Allowable Stress (psi) and Deflection (in) using NDS 2001 :

Criterion	Analysis Value	Design Value	Analysis/Design
Shear	fv = 28	Fv' = 288	fv/Fv' = 0.10
Bending(+)	fb = 558	Fb' = 1872	fb/Fb' = 0.30
Axial	fc = 178	Fc' = 580	fc/Fc' = 0.31
Combined (axia)	+ eccentric & sc	de load bending)	Eq.15.4 - 1 = 0.35
Axial Bearing	fc = 178	$Fc^* = 1708$	$fc/Fc^* = 0.10$
Live Defl'n	0.15 = L/701	0.60 = L/180	0.26
Total Defl'n	0.15 = L/701	0.60 = L/180	0.26

ADDITIONAL DATA:

FACTORS	: F	CD	CM	Ct	CL/CP	CF	Cfu	Cr	Cfrt	Ci	LC#	
Fb'+	900	1.60	1.00	1.00	1.000	1.300	1.00	1.00	1.00	1.00	4	
Fv'	180	1.60	1.00	1.00		-	-	+	1.00	1.00	4	
FC'	1350	1.15	1.00	1.00	0.339	1.100				1.00	4 2 3 4 2	
Fc'comb	1350	1.60	-	-	0.252	-	-	-	-	12	3	
E'	1.6	million	1.00	1.00	-	-	-	-	1.00	1.00	4	
Fc*	1350	1.15	1.00	1.00	-	1.100		177	1.00	1.00	2	
		LC# 4 =										
		LC# 4 =						364	lbs			
		LC# 4 =										
Total	Defle	ction =	1.50(D	ead Lo	ad Defl	ection)	+ Liv	re Loac	l Defle	ection.		
		LC# 2 =										
Eq.15.	4-1 :	Crit.LC	#= 3	fb=	418 F	'b'= 187	2					
		FCE = 12	47	Pxe/S	=fc(6xe	e/d)=	41					
(D=de	ead :	L=live :	S=snow	W=wi	nd I=i	mpact	C=cons	tructi	on CL	d=conce	entrate	:d)
		are list										
	2-202-20	and the second	restant and	112-28-388 BJ		a a de la composition	12	and the second				-

DESIGN NOTES:

1. Please verify that the default deflection limits are appropriate for your application.

Title Block Line 1 You can change this area using the "Settings" menu item and then using the "Printing & Title Block" selection. Title Block Line 6

General Footing

Lic. # : KW-06005580 Description : C5 FTG

Code References

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10 Load Combinations Used : ASCE 7-10

General Information

Length parallel to Z-Z Axis

Footing Thicknes

Material Properties		
fc : Concrete 28 day strength	=	2.50 ksi
fy : Rebar Yield	=	60.0 ksi
Éc : Concrete Elastic Modulus	=	2,850.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750
Analysis Settings		
Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.50 : 1
Min. Sliding Safety Factor	=	1.50 : 1
Add Ftg Wt for Soil Pressure	3	Yes
Use ftg wt for stability, moments & shears	1	Yes
Add Pedestal Wt for Soil Pressure	4	No
Use Pedestal wt for stability, mom & shear		No
Dimensions		
Width parallel to X-X Axis =	3.0 ft	

Soil Design Values Allowable Soil Bearing	=	2.0 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			
Footing base depth below soil surface	=	0.0 ft	
Allowable pressure increase per foot of	depti=	0.0 ksf	
when footing base is below	=	0.0 ft	
Increases based on footing plan dimension			
Allowable pressure increase per foot of	depl =	0.0 ksf	
when maximum length or width is great	eater‡	0.0 ft	

Pedestal dimensions		
px : parallel to X-X Axis	=	0.0 in
pz : parallel to Z-Z Axis	=	0.0 in
Height	=	0.0 in
Rebar Centerline to Edge of	Concrete	
at Bottom of footing	-	3.0 in

=

Ξ

3.0 ft

10.0 in

Reinforcing

Bars parallel to X-X Axis Number of Bars	=		4	
Reinforcing Bar Size	=	#	4	
Bars parallel to Z-Z Axis				
Number of Bars	=		4	
Reinforcing Bar Size	=	#	4	

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

Applied Loads								
		D	Lr	L	S	W	E	Н
P : Column Load	=	8.171	0.0	3.120	5.369	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	0.0	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

Primed: 12 MAY 2015, 8-43AM File = q:\Jobs\2015\11YO0Z-Y\Framing\calcs.ec6 ENERCALC, INC. 1983-2015, Build:6.15.4.10, Ver:6.15.4.10 Licensee : FROELICH CONSULTING ENGINEERS



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Title Block Line 1 You can change this area using the "Settings" menu item and then using the "Printing & Title Block* selection. Title Block Line 6

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General Footing

Lic. # : KW-06005580 Description : C5 FTG

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16 of 75 Project ID:

Printed 12 MAY 2015, 8 43AM File = q:\Uobs\2015\11YO0Z~YVFraming\calcs.ec6 ENERCALC, INC. 1983-2015, Build:6.15.4.10, Ver6.15.4.10 Licensee : FROELICH CONSULTING ENGINEERS

DESIGN SU	IMMARY				Design OK
	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8680	Soil Bearing	1.736 ksf	2.0 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	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
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	0.3109	Z Flexure (+X)	2.494 k-ft	8.024 k-ft	+1.20D+0.50L+1.60S+1.60H
PASS	0.3109	Z Flexure (-X)	2.494 k-ft	8.024 k-ft	+1.20D+0.50L+1.60S+1.60H
PASS	0.3109	X Flexure (+Z)	2.494 k-ft	8.024 k-ft	+1.20D+0.50L+1.60S+1.60H
PASS	0.3109	X Flexure (-Z)	2.494 k-ft	8.024 k-ft	+1.20D+0.50L+1.60S+1.60H
PASS	0.3168	1-way Shear (+X)	23.757 psi	75.0 psi	+1.20D+0.50L+1.60S+1.60H
PASS	0.3168	1-way Shear (-X)	23.757 psi	75.0 psi	+1.20D+0.50L+1.60S+1.60H
PASS	0.3168	1-way Shear (+Z)	23.757 psi	75.0 psi	+1.20D+0.50L+1.60S+1.60H
PASS	0.3168	1-way Shear (-Z)	23.757 psi	75.0 psi	+1.20D+0.50L+1.60S+1.60H
PASS	0.6516	2-way Punching	97.742 psi	150.0 psi	+1.20D+0.50L+1.60S+1.60H

FROELICH CONSULTING ENGINEERS INC.,

Client: Pahlisch Homes Project: Project #: By: PRG

Columns 9'-0" Height

Reference	Column Size	Maximum	DF PL Perp to	HF PL Perp to
		Allowable Load		Grain, Pc [⊥] (lbs
	(1) - 2x4 DF	1400	3281	2126
	(2) - 2x4 DF	2850	6563	4253
	(3) - 2x4 DF	4450	9844	6379
	(4) - 2x4 DF	5750	13125	8505
Ainchwall	(1) - 2x4 DF#2	1800	3281	2126
No	(2) - 2x4 DF#2	3650	6563	4253
Inch	(3) - 2x4 DF#2	5600	9844	6379
N.	(4) - 2x4 DF#2	7300	13125	8505
	4x4 DF#2	4250	7656	4961
	(2) - 2x6 DF**	2700	10313	6683
	(2) - 2x6 DF#2**	3300	10313	6683
	4x6 DF #2**	8000	12031	7796
	(1) - 2x6 DF	4100	5156	3341
	(2) - 2x6 DF	8300	10313	6683
	(3) - 2x6 DF	12750	15469	10024
	(4) - 2x6 DF	15900	20625	13365
6-Inch Wall	(1) - 2x6 DF#2	5750	5156	3341
NS	(2) - 2x6 DF#2	11500	10313	6683
non l	(3) - 2x6 DF#2	17750	15469	10024
6	(4) - 2x6 DF#2	22700	20625	13365
	4x6 DF #2	13500	12031	7796
	4x6 DF #1	14500	12031	7796
	6x6 DF #2	13700	18906	12251
	6x6 DF #1	18800	18906	12251
	6x6 DF #2**	12800	18906	12251
	6x6 DF #1**	17700	18906	12251
x	PT 4x4 HF #2**	2850	7656	4961
POSt	PT 4x4 HF #1**	3250	7656	4961
	PT 6x6 HF #2**	9000	18906	12251
	PT 6x6 HF #1**	12450	18906	12251

** Indicates column is unbraced

The following assumptions have been made:

1.) Column Ht= 9'-0"

2.) Fully braced weak axis

- If uniform only braced on once axis
- 3.) Evenly distributed Live Load(40 psf) and Dead Load (17 psf)
- 4.) An Eccentricity of 0.25" is used.

5.) DF Fc \perp = 625 psi & HF Fc \perp = 405 psi

6.) The perpendicular to grain allowable loads do not include the NDS Bearing Area Factor (Cb) per NDS 3.10.4

7.) Shaded values are limited to the plate perpendicular to grain alloawable bearing loads

	FROELICH CONSULTING ENGINEERS client: Arcon project: Alta Mira job number: 15-T070 date: 5/28/2015 by: AT	
	Floor Beams	
Floor Beam FB1	Location: Rec Room Span: 6'-0" Loads: Floor DL : 20 psf x 7.00 ft = 140 plf Floor LL : 40 psf x 7.00 ft = 280 plf	4x8 DF#2
Floor Beam FB2	Location: Studio Span: 6'-0" Loads: Floor DL : 20 psf x 8.50 ft = 170 plf Floor LL : 40 psf x 8.50 ft = 340 plf	4x8 DF#2
Floor Beam FB3	Location: Under Garage Span: 10'-0" Loads: Floor DL : 55 psf x 13.00 ft = 715 plf Floor LL : 40 psf x 13.00 ft = 520 plf	6X12 DF#2
Floor Beam FB4	Location: Under Entry Span: 8'-0" Loads: Floor DL : 20 psf x 5.00 ft = 100 plf Floor LL : 40 psf x 5.00 ft = 200 plf	3 1/2 x 11 7/8 24F-V4 GL
Floor Beam FB5	Location: Under Entry Span: 10'-0" Loads: Floor DL: 20 psf x 2.00 ft = 40 plf Floor LL: 40 psf x 2.00 ft = 80 plf FB4 DL= 438 lb LL= 800 lb @5ft	3 1/2 x 11 7/8 24F-V4 GL
Floor Beam FB6	Location: At Lower Entry Span: 8'-0" Loads: Floor DL: 20 psf x 12.00 ft = 240 plf Floor LL: 40 psf x 12.00 ft = 480 plf	3 1/2 x 9 24F-V4 GL



MAIN LEVEL FLOOR FRAMING PLAN





COMPANY PROJECT

May 8, 2015 15:34 FB1

Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnit	ude	Locatio	on [ft]	Pat-
			Start	End	Start	End	tern
Load1	Dead	Full UDL	140.0				No
Load2	Live	Full UDL	280.0				No

MAXIMUM REACTIONS (Ibs) and BEARING LENGTHS (in) :



Lumber-soft, D.Fir-L, No.2, 4x8"

Self Weight of 6.03 plf automatically included in loads;

Lateral support: top= at supports, bottom= at supports; Load combinations: ICC-IBC;

Analysis vs. Allowable Stress (psi) and Deflection (in) using NDS 2001 :

Criterion	Analysis Value	Design Value	Analysis/Design
Shear	fv = 60	Fv' = 180	fv/Fv' = 0.34
Bending(+)	fb = 750	Fb' = 1161	fb/Fb' = 0.65
Live Defl'n	0.05 = <l 999<="" td=""><td>0.20 = L/360</td><td>0.23</td></l>	0.20 = L/360	0.23
Total Defl'n	0.08 = L/879	0.30 = L/240	0.27

ADDITIONAL DATA:

/ Donne													
FACTORS:	F	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#	
Fb'+	900	1.00	1.00	1.00	0.992	1.300	1.00	1.00	1.00	1.00	-	2	
Fv'	180	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2	
Fcp'	625	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-	
E'	1.6	million	1.00	1.00	-	-	-	-	1.00	1.00	-	2	
Shear Deflect Total D (D=de	: ion: eflea ad	LC# 2 = LC# 2 = LC# 2 = ction = L=live are lis	D+L, D+L 1.50(1 S=snov	V = EI= Dead Lo W=Wi	1278, V 178e0 ad Defl nd I=i	design 6 lb-ir ection) mpact	12 + Liv C=cons	ve Loac	l Defle			ed)	

DESIGN NOTES:

1. Please verify that the default deflection limits are appropriate for your application.





COMPANY PROJECT

May 8, 2015 15:44 FB2

Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnit	ude	Locatio	on [ft]	Pat-
			Start	End	Start	End	tern
Load1	Dead	Full ODL	170.0				NO
Load2	Live	Full UDL	340.0				No

MAXIMUM REACTIONS (Ibs) and BEARING LENGTHS (in) :



Lumber-soft, D.Fir-L, No.2, 4x8"

Self Weight of 6.03 plf automatically included in loads;

Lateral support: top= at supports, bottom= at supports; Load combinations: ICC-IBC;

Analysis vs. Allowable Stress (psi) and Deflection (in) using NDS 2001 :

Criterion	Analysis Value	Design Value	Analysis/Design		
Shear	fv = 73	Fv' = 180	fv/Fv' = 0.41		
Bending(+)	fb = 909	Fb' = 1161	fb/Fb' = 0.78		
Live Defl'n	0.06 = <l 999<="" td=""><td>0.20 = L/360</td><td>0.28</td></l>	0.20 = L/360	0.28		
Total Defl'n	0.10 = L/726	0.30 = L/240	0.33		

ADDITIONAL DATA:

ADDITIO			011	04	OT.	07	0.5.	0-	O.C.	01	0	1.04	
FACTORS:		CD		Ct	CL	CF	Cfu				Cn	LC#	
Fb'+	900	1.00	1.00	1.00	0.992	1.300	1.00	1.00	1.00	1.00	~	2	
Fv'	180	1.00		1.00	-	+		-	1.00	1.00	1.00	2	
Fcp'	625	-	1.00	1.00	-		-	+	1,00	1.00	-	2	
E'	1.6	million	1.00	1.00	77				1.00	1.00	70	2	
Deflect: Total De	ion: efle	LC# 2 = LC# 2 = ction =	D+L 1.50(1	EI= Dead Lo	178e0 ad Defl	6 lb-ín ection)	2 + Liv	ve Load	l Defle				
		L=live : are lis				· · · · · · · · · · · · · · · · · · ·		structi	lon CI	d=conc	entrat	ed)	

DESIGN NOTES:

1. Please verify that the default deflection limits are appropriate for your application.





May 28, 2015 11:27 FB3

Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnit	ude	Locati	on [ft]	Pat-
	1000		Start	End	Start	End	tern
Load1	Dead	Full UDL	715.0				No
Load2	Live	Full UDL	520.0				No

MAXIMUM REACTIONS (Ibs) and BEARING LENGTHS (in) :



Timber-soft, D.Fir-L, No. 1, 6x12"

Self Weight of 15.02 plf automatically included in loads; Lateral support: top= full, bottom= at supports; Load combinations: ICC-IBC;

Analysis vs. Allowable Stress (psi) and Deflection (in) using NDS 2001 :

Criterion	Analysis Value	Design Value	Analysis/Design		
Shear	fv = 90	Fv' = 170	fv/Fv' = 0.53		
Bending(+)	fb = 990	Fb' = 1350	fb/Fb' = 0.73		
Live Defl'n	0.04 = < L/999	0.27 = L/360	0.16		
Total Defl'n	0.13 = L/719	0.40 = L/240	0.33		

ADDITIONAL DATA.

ADDIT	UNAL	DATA.											
FACTORS	: F	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#	
Fb'+	1350	1.00	1.00	1.00	1.000	1.000	1.00	1.00	1.00	1.00	-	2	
Fv'	170	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2	
Fcp'	625	-	1.00	1.00		8	-	-	1.00	1.00	-	**	
E'	1.6	million	1.00	1.00		-	-	177.1	1.00	1.00	-	2	
Shear Deflec	: tion:	LC# 2 = LC# 2 = LC# 2 =	D+L, D+L	EI=	5000, V 1115e0	design 6 lb-ir	2						
(D=d	ead 1	ction = L=live : are lis	S=snow	v W=wi	nd I=i	mpact	C=cons					ed)	

DESIGN NOTES:

1. Please verify that the default deflection limits are appropriate for your application.





PROJECT

May 12, 2015 15:46 FB4

Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnit	ude	Locati	on [ft]	Pat-
			Start	End	Start	End	tern
Load1	Dead	Full UDL	100.0				No
Load2	Live	Full UDL	200.0				No

MAXIMUM REACTIONS (Ibs) and BEARING LENGTHS (in) :



Glulam-Unbal., West Species, 24F-V4 DF, 3-1/2x11-7/8"

Self Weight of 9.57 plf automatically included in loads;

Lateral support: top= full, bottom= at supports; Load combinations: ICC-IBC;

Analysis vs. Allowable Stress (psi) and Deflection (in) using NDS 2001 :

Criterion	Analysis Value	Design Value	Analysis/Design
Shear	fv = 34	Fv' = 2.40	fv/Fv' = 0.14
Bending(+)	fb = 361	Fb' = 2400	fb/Fb' = 0.15
Live Defl'n	0.02 = <l 999<="" td=""><td>0.27 = L/360</td><td>0.08</td></l>	0.27 = L/360	0.08
Total Defl'n	0.04 = <l 999<="" td=""><td>0.40 = L/240</td><td>0.10</td></l>	0.40 = L/240	0.10

ADDITIONAL DATA:

FACTORS:	F	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cn	LC#
Fb'+	2400	1.00	1.00	1.00	1.000	1.000	1.00	1.00	1,00	1.00	-	2
Fv'	240	1.00	1.00	1.00	-	75	-	(77)	1.00	1.00	1.00	2
Fcp'	650	-	1.00	1.00	-	÷	-	(H)	1.00	(147)		
E'	1.8	million	1.00	1,00	3 6 -	2	-	-	1.00	-	-	2
Bending	(+):	LC# 2 =	D+L,	М =	2477 lb	s-ft						
Shear	:	LC# 2 =	D+L,	V =	1238, V	design	=	932 lb	S			
Deflect	ion:	LC# 2 =	D+L	EI=	879e0	6 lb-in	2					

(All LC's are listed in the Analysis output)

DESIGN NOTES:

1. Please verify that the default deflection limits are appropriate for your application.

2. Glulam design values are for materials conforming to AITC 117-2001 and manufactured in accordance with ANSI/AITC A190.1-1992

3. GLULAM: bxd = actual breadth x actual depth.

4. Glulam Beams shall be laterally supported according to the provisions of NDS Clause 3.3.3.





May 12, 2015 15:57 FB5

PROJECT

COMPANY

Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Type Distribution		ude	Location [ft]		Pat-
			Start	End	Start	End	tern
Loadl	Dead	Full UDL	40.0				No
Load2	Live	Full UDL	80.0				No
Load3	Dead	Point	438		5.00		No
Load4	Live	Point	800		5.00		No

MAXIMUM REACTIONS (lbs) and BEARING LENGTHS (in) :

	0,	
Dead Live Total	467 800 1267	46 80 126
Bearing: LC number Length	2 1.00	1.0

Glulam-Unbal., West Species, 24F-V4 DF, 3-1/2x11-7/8"

Self Weight of 9 57 plf automatically included in loads;

Lateral support: top= full, bottom= at supports; Load combinations: ICC-IBC;

Analysis vs. Allowable Stress (psi) and Deflection (in) using NDS 2001 :

Criterion	Analysis Value	Design Value	Analysis/Design
Shear	fv = 41	Fv' = 240	fv/Fv' = 0.17
Bending(+)	fb = 688	Fb' = 2400	fb/Fb' = 0.29
Live Defl'n	0.05 = <l 999<="" td=""><td>0.33 = L/360</td><td>0.16</td></l>	0.33 = L/360	0.16
Total Defl'n	0.10 = <l 999<="" td=""><td>0.50 = L/240</td><td>0.20</td></l>	0.50 = L/240	0.20

ADDITIONAL DATA:

FACTORS	: F		CD		CM	Ct	CL		CV	Cfu	Cr	Cfrt	Notes	Cn	LC#
Fb'+	2400	1	.00)	1.00	1.00	1.00	00	1.000	1.00	1.00	1.00	1.00	-	2
Fv'	240	1	.00	0	1.00	1.00	-		-	: -	-	1.00	1.00	1.00	2
Fcp'									-						+
E'	1.8	mil	lic	on	1.00	1.00	14-1 1		-	24	2	1.00	-	4	2
Bendir	ıg(+):	LC#	2		D+L,	M =	4715	lb	s-ft						
Shear	· .	I.C.#	2		D+L.	V =	1267.	v	design	- 722	1139 1	hs			

Shear : LC# 2 = D+L, V = 1267, V design = 1139 lbs Deflection: LC# 2 = D+L EI= 879e06 lb-in2 Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection. (D=dead L=live S=snow W=wind I=impact C=construction CLd=concentrated) (All LC's are listed in the Analysis output)

DESIGN NOTES:

1. Please verify that the default deflection limits are appropriate for your application.

2. Glulam design values are for materials conforming to AITC 117-2001 and manufactured in accordance with ANSI/AITC A190.1-1992

3. GLULAM: bxd = actual breadth x actual depth.

4. Glulam Beams shall be laterally supported according to the provisions of NDS Clause 3.3.3.





PROJECT

May 27, 2015 14:16 FB6

Design Check Calculation Sheet

COMPANY

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnit	ude	Locati	on [ft]	Pat-	
	7,5%-		Start End		Start End		tern	
Load1	Dead	Full UDL	240.0		1		No	
Load2	Live	Full UDL	480.0				No	

MAXIMUM REACTIONS (lbs) and BEARING LENGTHS (in) :



Glulam-Unbal., West Species, 24F-V4 DF, 3-1/2x9"

Self Weight of 7.25 plf automatically included in loads;

Lateral support: top= full, bottom= at supports; Load combinations: ICC-IBC;

Analysis vs. Allowable Stress (psi) and Deflection (in) using NDS 2001 :

Criterion	Analysis Value	Design Value	Analysis/Design
Shear	fv = 113	Fv' = 240	fv/Fv' = 0.47
Bending(+)	fb = 1478	Fb' = 2400	fb/Fb' = 0.62
Live Defl'n	0.12 = L/830	0.27 = L/360	0.43
Total Defl'n	0.20 = L/468	0.40 = L/240	0.51

ADDITIONAL DATA:

FACTORS	5: F	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cn	LC#
Fb'+	2400	1.00	1.00	1.00	1.000	1.000	1.00	1.00	1.00	1.00	-	2
Fv'	240	1.00	1.00	1.00	-	=	-	(77)	1.00	1.00	1.00	2
Fcp'	650	-	1.00	1.00		-		-	1.00	-	-	-
E'	1.8	million	1.00	1.00	-	-	-	-	1.00		20 00	2

Bending(+): LC# 2 = D+L, M =5818 lbs-ft

: LC# 2 = D+L, V =2909, V design = Shear Deflection: LC# 2 = D+L EI= 383e06 lb-in2

Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection. (D=dead L=live S=snow W=wind I=impact C=construction CLd=concentrated)

(All LC's are listed in the Analysis output)

DESIGN NOTES:

1. Please verify that the default deflection limits are appropriate for your application.

2. Glularn design values are for materials conforming to AITC 117-2001 and manufactured in accordance with ANSI/AITC A190.1-1992

2364 lbs

3. GLULAM: bxd = actual breadth x actual depth.

4. Glulam Beams shall be laterally supported according to the provisions of NDS Clause 3.3.3.

	FROELICH CONSULTING ENGINE client: Arcon Group project: Alta Mira Res job number: 15-T070 date: 05/07/15 by: AT ROOF JOISTS	ERS		
Roof Joist RJ1	Location: Garage Side Span: 25'-0" ' Loads: Ro	of DL = 17 SL = 25	psf psf	14" TJI 560 @ 24" OC
Roof Joist RJ2	Location: Over Living/Dining Span: 16'-0" Loads: Ro Solor Par	of DL = 17 nel DL= 5 SL = 25	psf psf psf	14" TJI230 @ 24" OC
Roof Joist RJ3	Location: Over Master Span: 23'-0" Loads: Ro Solor Par	of DL = 17 nel DL= 5 SL = 25	psf psf psf	14" TJI230@ 16" OC or 14" TJI360@ 24" OC

FORTE MEMBER REPORT Level, Roof: Joist 1 piece(s) 14" TJI® 560 @ 24" OC

Overall Sloped Length: 26' 1 1/4"



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)	
Member Reaction (lbs)	1090 @ 4 1/2"	1984 (3.50")	Passed (55%)	1.15	1.0 D + 1.0 S (All Spans)	
Shear (lbs)	1051 @ 5 1/2"	2749	Passed (38%)	1.15	1.0 D + 1.0 S (All Spans)	
Moment (Ft-lbs)	6660 @ 12' 11 1/2"	12966	Passed (51%)	1.15	1.0 D + 1.0 S (All Spans)	
Live Load Defl. (in)	0.542 @ 12' 11 1/2"	0.842	Passed (L/559)		1.0 D + 1.0 S (All Spans)	
Total Load Defl. (in)	0.913 @ 12' 11 1/2"	1.263	Passed (L/332)		1.0 D + 1.0 S (All Spans)	

System : Roof Member Type : Joist Building Use : Residential Building Code : IBC Design Methodology : ASD Member Pitch: 1/12

Deflection criteria: LL (L/360) and TL (L/240).

• Bracing (Lu): All compression edges (top and bottom) must be braced at 6' 6 7/16" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.

		Bearing Length			s to Support		
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Beveled Plate - SPF	5.50"	5.50"	1.75"	442	648	1090	Blocking
2 - Beveled Plate - SPF	5.50"	5.50"	1.75"	442	648	1090	Blocking

· Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Loads	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 25' 11"	24"	17.0	25.0	Roof

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The product application, input design loads, dimensions and support information have been provided by Forte Software Operator

B SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
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5/29/2015 5:27:19 PM Forte v4.6, Design Engine: V6.1.1.5

Page 1 of 1

SOLUTIONS REPORT Roof, Roof: Joist Living Dining Current Solution: : 1 piece(s) 14" TJI® 230 @ 24" OC

Overall Sloped Length: 16' 10 3/8"



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.; Drawing is Conceptual

Design Results	Actual @ Location	Allowed	Result	LDF
Member Reaction (lbs)	773 @ 16' 5 1/2"	1219 (1.75")	Passed (63%)	1.15
Shear (lbs)	773 @ 16' 5 1/2"	2237	Passed (35%)	1.15
Moment (Ft-lbs)	3107 @ 8' 5"	5739	Passed (54%)	1.15
Live Load Defl. (in)	0.173 @ 8' 5"	0.537	Passed (L/999+)	
Total Load Defl. (in)	0.333 @ 8' 5"	0.806	Passed (L/581)	

System : Roof Member Type : Joist Building Use : Residential Building Code : IBC Design Methodology : ASD Member Pitch : 0.8/12

Connector: Simpson Strong-Tie Connectors					
Support	Model	Top Nails	Face Nails	Member Nails	Accessories
2 - Top Mount Hanger	LBV2.37/14X D4	6-10d common	4-10d common	2-10d x 1-1/2	Web Stiffeners

All Product So	olutions		e de la composition	144 A.	
Depth	Series	The second second	Plies	Spacing	Wood Volume
14"	TJI® 230		1	24"	0.60

The purpose of this report is for product comparison only. Load and support information necessary for professional design review is not displayed here. Please print an individual Member Report for submittal purposes.

Forte Software Operator	Job Notes
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5/28/2015 2:35:23 PM Forte v4.6, Design Engine: V6.1.1.5 Joist.4te

MEMBER REPORT Roof, Roof: Joist Master 1 piece(s) 14" TJI® 230 @ 16" OC

Overall Sloped Length: 23' 10 9/16"



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)	S
Member Reaction (lbs)	739 @ 23' 5 1/2"	1219 (1.75")	Passed (61%)	1.15	1.0 D + 1.0 S (All Spans)	м
Shear (Ibs)	739 @ 23' 5 1/2"	2237	Passed (33%)	1.15	1.0 D + 1.0 S (All Spans)	B
Moment (Ft-lbs)	4267 @ 11' 11"	5739	Passed (74%)	1.15	1.0 D + 1.0 S (All Spans)	B
Live Load Defl. (in)	0.454 @ 11' 11"	0.771	Passed (L/611)		1.0 D + 1.0 S (All Spans)	D
Total Load Defl. (in)	0.873 @ 11' 11"	1.157	Passed (L/318)		1.0 D + 1.0 S (All Spans)	М

System : Roof Member Type : Joist Building Use : Residential Building Code : IBC Design Methodology : ASD Member Pitch: 0.8/12

· Deflection criteria: LL (L/360) and TL (L/240).

 Bracing (Lu): All compression edges (top and bottom) must be braced at 3' 11 3/16" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.

	08.80	Bearing Leng	ith	Load	s to Suppor	ts (lbs)	
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Beveled Plate - DF	5.50"	5.50"	1.75"	366	397	763	Blocking
2 - Hanger on 14" LVL beam	3.50"	Hanger ¹	1.75"	364	394	758	See note 1

Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

• At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger

• ¹ See Connector grid below for additional information and/or requirements.

Connector: Simpson Stron	ig-Tie Connectors					
Support	Model	Seat Length	Top Nails	Face Nails	Member Nails	Accessories
2 - Top Mount Hanger	LBV2.37/14X D4	2.50"	6-10d common	4-10d common	2-10d x 1-1/2	Web Stiffeners

Loads	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 23' 9"	16"	23.0	25.0	Roof

Member Notes		A State of the second	CONTRACTOR STRATEGY		
Joist over Master (RJ3)					

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The product application, input design loads, dimensions and support information have been provided by Forte Software Operator

 Forte Software Operator
 Job Notes

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 Freelich Engineers

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5/28/2015 2:37:52 PM Forte v4.6, Design Engine: V6.1.1.5 Joist.4te

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PASSED of 75

(SUSTAINABLE FORESTRY INITIATIVE

MEMBER REPORT Roof, Roof: Joist Master 1 piece(s) 14" TJI® 360 @ 24" OC

PASSED f 75

Overall Sloped Length: 23' 10 9/16"



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1109 @ 23' 5 1/2"	1242 (1.75")	Passed (89%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1109 @ 23' 5 1/2"	2248	Passed (49%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	6401 @ 11' 11"	8435	Passed (76%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.575 @ 11' 11"	0.771	Passed (L/483)		1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	1.105 @ 11' 11"	1.157	Passed (L/251)		1.0 D + 1.0 S (All Spans)

System : Roof Member Type : Joist Building Use : Residential Building Code : IBC Design Methodology : ASD Member Pitch: 0.8/12

Deflection criteria: LL (L/360) and TL (L/240).

 Bracing (Lu): All compression edges (top and bottom) must be braced at 3' 6 5/8" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.

		Bearing Leng	ith	Load	s to Support	ts (lbs)	A Charten
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Beveled Plate - DF	5.50"	5.50"	1.75"	549	596	1145	Blocking
2 - Hanger on 14" LVL beam	3.50"	Hanger ¹	1.75"	546	592	1138	See note 1

• Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger

• 1 See Connector grid below for additional information and/or requirements.

Support	Model	Seat Length	Top Nails	Face Nails	Member Nails	Accessories
2 - Top Mount Hanger	LBV2.37/14X D4	2.50"	6-10d common	4-10d common	2-10d x 1-1/2	Web Stiffeners

			Dead	Snow	
Loads	Location	Spacing	(0.90)	(1.15)	Comments
1 - Uniform (PSF)	0 to 23' 9"	24"	23.0	25.0	Roof

Member Notes

Joist over Master

(RJ3)

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The product application, input design loads, dimensions and support information have been provided by Forte Software Operator

Forte Software Operator	Job Notes
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5/28/2015 2:38:13 PM Forte v4.6, Design Engine: V6.1.1.5 *Joist.4te*

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SUSTAINABLE FORESTRY INITIATIVE

	FROELICH CONSULTING ENGINEERS client: Arcon project: Alta Mira job number: 15-T070 date: 05/28/15 by: AT FLOOR JOISTS	
Floor Joist FJ1	Location: Garage Span: 13'-0" Loads: Floor DL= 55 psf Floor LL= 40 psf or LL= 3000 lb *Distributed between 2 joist	4x12 DF#2 @ 16" OC or 1 3/4 x 11 7/8 1.55E LSL @12" OC
Floor Joist FJ2	Location: Below Dining/Master Span: 17'-0" Loads: Floor DL= 20 psf LL= 40 psf	11 7/8 TJI360 @ 16" OC
Floor Joist FJ3	Location: Under Living Span: 13'-6" Loads:	11 7/8 TJI110 @ 16" OC

20 psf 40 psf Floor DL= LL=





May 8, 2015 14:33 FJ1

Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magni	itude	Locatio	on [ft]	Pat-
			Start	End	Start	End	tern
Load1	Dead	Full Area	55.00	(16.0)*			No
Load2	Live	Point	1500		6.50		NO

"Tributary Width (in)

MAXIMUM REACTIONS (lbs) and BEARING LENGTHS (in) :



Lumber-soft, D.Fir-L, No.1, 4x12"

Spaced at 16" c/c; Self Weight of 9.35 plf automatically included in loads;

Lateral support: top= full, bottom= at supports; Repetitive factor: applied where permitted (refer to online help); Load combinations: ICC-IBC;

Analysis vs. Allowable Stress (psi) and Deflection (in) using NDS 2001 :

Criterion	Analysis Value	Design Value	Analysis/Design
Shear	fv = 46	Fv' = 180	fv/Fv' = 0.26
Bending(+)	fb = 1076	Fb' = 1265	fb/Fb' = 0.85
Live Defl'n	0.17 = L/928	0.43 = L/360	0.39
Total Defl'n	0.28 = L/555	0.65 = L/240	0.43

ADDITIONAL DATA:

FACTORS	5: F	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fb'+	1000	1.00	1.00	1.00	1.000	1.100	1.00	1.15	1.00	1.00	-	2 2
Fv'	180	1.00	1.00	1.00	-	-	-		1.00	1.00	1.00	2
Fcp'	625	-	1.00	1.00	-		-		1.00	1.00	-	-
E'	1.7	million	1.00	1.00	-	-	-	**	1.00	1.00	-	2
Shear	:	LC# 2 = LC# 2 = LC# 2 =	D+L,	v =	1287, V	desigr		210 lt)S			
		ction =						re Loac	nefle	ction		
(D=0	lead 1	L=live : are lis	S=snot	w=wi	nd I=i	mpact	C=cons					ed)

DESIGN NOTES:

1. Please verify that the default deflection limits are appropriate for your application.

2. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

-L, No.1, 4x12" If automatically included in loa





May 8, 2015 14:58 FJ1_LSL

PROJECT

Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnit	tude	Locatio	on [ft]	Pat-
			Start	End	Start	End	tern
Load1	Dead	Full Area	55.00	(1.33)*	- menouse		No
Load2	Live	Point	1500		6.50		No

*Tributary Width (ft)

MAXIMUM REACTIONS (lbs) and BEARING LENGTHS (in) :

	<u></u> 0'	
Dead Live Total Bearing:	519 750 1269	519 750 1269
Bearing: LC number Length	2 1.00	2 1.00

LSL, 1.55E, 2360Fb, 1-3/4x11-7/8", 1-ply

Self Weight of 6.49 plf automatically included in loads;

Lateral support: top= full, bottom= at supports; Load combinations: ICC-IBC;

Analysis vs. Allowable Stress (psi) and Deflection (in) using NDS 2001 :

Criterion	Analysis Value	Design Value	Analysis/Design
Shear	fv = 86	Fv' = 410	fv/Fv' = 0.21
Bending(+)	fb = 1914	Fb' = 2360	fb/Fb' = 0.81
Live Defl'n	0.31 = L/497	0.43 = L/360	0.72
Total Defl'n	0.52 = L/301	0.65 = L/240	0.79

ADDITIONAL DATA:

	CD.	Che	Ch	CT	017	CEN	<i>P</i>	Cent	C1.5	00	TCH	
					5 S L S L S L S S S S S S S S S S S S S	CIU			61	CII		
2360	1.00	-	1.00	1.000	1.00	-	1.00	1.00	-	=	2	
410	1.00	-	1.00	-	-		100	1.00	-	1.00	2	
875	-	1	1.00	-	\leftrightarrow	-	1	1.00	-	÷.	-	
1.5	million		1.00	ы. С	(++)	-	-	1.00	20 11		2	
ion: Deflec	LC# 2 =	D+L L.50(1	EI= Dead Lo	379e0 ad Defle	6 lb-in ection)	12 + Li	ve Load	l Defle			ed)	
	410 875 1.5 g(+): : :ion: Deflec	2360 1.00 410 1.00 875 - 1.5 million g(+): LC# 2 = : LC# 2 = cion: LC# 2 = Deflection = 1	2360 1.00 - 410 1.00 - 875 1.5 million - g(+): LC# 2 = D+L, : LC# 2 = D+L, tion: LC# 2 = D+L Deflection = 1.50(1)	2360 1.00 - 1.00 410 1.00 - 1.00 875 1.00 1.5 million - 1.00 g(+): LC# 2 = D+L, M = : LC# 2 = D+L, V = tion: LC# 2 = D+L EI= Deflection = 1.50 (Dead Lc	2360 1.00 - 1.00 1.000 410 1.00 - 1.00 - 875 1.00 - 1.5 million - 1.00 - g(+): LC# 2 = D+L, M = 6561 lbs : LC# 2 = D+L, V = 1269, V cion: LC# 2 = D+L EI= 37960 Deflection = 1.50 (Dead Load Deflection	2360 1.00 - 1.00 1.000 1.00 410 1.00 - 1.00 875 1.00 1.5 million - 1.00 g(+): LC# 2 = D+L, M = 6561 lbs-ft : LC# 2 = D+L, V = 1269, V design tion: LC# 2 = D+L EI= 379e06 lb-in Deflection = 1.50 (Dead Load Deflection)	2360 1.00 - 1.00 1.000 1.00 - 410 1.00 - 1.00 875 1.00 1.5 million - 1.00 g(+): LC# 2 = D+L, M = 6561 lbs-ft : LC# 2 = D+L, V = 1269, V design = cion: LC# 2 = D+L EI= 379e06 lb-in2 Deflection = 1.50 (Dead Load Deflection) + Li	2360 1.00 - 1.00 1.000 1.00 - 1.00 410 1.00 - 1.00 875 1.00 1.5 million - 1.00 g(+): LC# 2 = D+L, M = 6561 lbs-ft : LC# 2 = D+L, V = 1269, V design = 1190 lb cion: LC# 2 = D+L EI= 379e06 lb-in2 Deflection = 1.50 (Dead Load Deflection) + Live Load	2360 1.00 - 1.00 1.000 1.00 - 1.00 1.00 410 1.00 - 1.00 1.00 875 1.00 1.00 1.5 million - 1.00 1.00 g(+): LC# 2 = D+L, M = 6561 lbs-ft : LC# 2 = D+L, V = 1269, V design = 1190 lbs tion: LC# 2 = D+L EI= 379e06 lb-in2 Deflection = 1.50 (Dead Load Deflection) + Live Load Deflection	2360 1.00 - 1.00 1.000 1.00 - 1.00 1.00 - 410 1.00 - 1.00 1.00 - 875 1.00 1.00 - 1.5 million - 1.00 1.00 - g(+): LC# 2 = D+L, M = 6561 lbs-ft : LC# 2 = D+L, V = 1269, V design = 1190 lbs cion: LC# 2 = D+L EI= 379e06 lb-in2 Deflection = 1.50 (Dead Load Deflection) + Live Load Deflection	2360 1.00 - 1.00 1.000 1.00 - 1.00 1.00 410 1.00 - 1.00 1.00 - 1.00 875 1.00 1.00 1.5 million - 1.00 1.00 g(+): LC# 2 = D+L, M = 6561 lbs-ft : LC# 2 = D+L, V = 1269, V design = 1190 lbs cion: LC# 2 = D+L EI= 379e06 lb-in2 Deflection = 1.50 (Dead Load Deflection) + Live Load Deflection.	2360 1.00 - 1.00 1.000 1.00 - 1.00 1.00 2 410 1.00 - 1.00 1.00 - 1.00 2 875 1.00 1.00 1.5 million - 1.00 1.00 2 g(+): LC# 2 = D+L, M = 6561 lbs-ft : LC# 2 = D+L, V = 1269, V design = 1190 lbs tion: LC# 2 = D+L EI= 379e06 lb-in2

DESIGN NOTES:

1. Please verify that the default deflection limits are appropriate for your application.

2. SCL-BEAMS (Structural Composite Lumber): the attached SCL selection is for preliminary design only. For final member design contact your local SCL manufacturer.

3. Size factors vary from one manufacturer to another for SCL materials. They can be changed in the database editor.

4. BUILT-UP SCL-BEAMS: contact manufacturer for connection details when loads are not applied equally to all plys.

MEMBER REPORTMain Floor, Dining/Master1 piece(s) 11 7/8" TJI® 360 @ 16" OC

Overall Length: 17' 11"



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	708 @ 4 1/2"	1505 (3.50")	Passed (47%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	680 @ 5 1/2"	1705	Passed (40%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2947 @ 8' 11 1/2"	6180	Passed (48%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.261 @ 8' 11 1/2"	0.429	Passed (L/790)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.391 @ 8' 11 1/2"	0.858	Passed (L/527)		1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	45	45	Passed		

System : Floor Member Type : Joist Building Use : Residential Building Code : IBC Design Methodology : ASD

• Deflection criteria: LL (L/480) and TL (L/240).

 Bracing (Lu): All compression edges (top and bottom) must be braced at 4' 9 5/16" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.

A structural analysis of the deck has not been performed.

• Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser EdgeTM Panel (24" Span Rating) that is nailed down.

Additional considerations for the TJ-Pro[™] Rating include: None

		Bearing Length			s to Suppor		
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
1 - Stud wall - DF	5.50"	4.25"	1.75"	239	478	717	1 1/4" Rim Board
2 - Stud wall - DF	5.50"	4.25"	1.75"	239	478	717	1 1/4" Rim Board

Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

			Dead	Floor Live	
Loads	Location	Spacing	(0.90)	(1.00)	Comments
1 - Uniform (PSF)	0 to 17' 11"	16"	20.0	40.0	Residential - Living Areas

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The product application, input design loads, dimensions and support information have been provided by Forte Software Operator

SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
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Page 1 of 1

MEMBER REPORT Main Floor, Living 1 piece(s) 11 7/8" TJI® 110 @ 16" OC

Overall Length: 14' 5"



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	568 @ 4 1/2"	1375 (3.50")	Passed (41%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	540 @ 5 1/2"	1560	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1868 @ 7' 2 1/2"	3160	Passed (59%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.147 @ 7' 2 1/2"	0.342	Passed (L/999+)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.221 @ 7' 2 1/2"	0.683	Passed (L/744)		1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	50	45	Passed		

System : Floor Member Type : Joist Building Use : Residential Building Code : IBC Design Methodology : ASD

Deflection criteria: LL (L/480) and TL (L/240).

• Bracing (Lu): All compression edges (top and bottom) must be braced at 3' 7 3/16" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.

A structural analysis of the deck has not been performed.

Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge'[™] Panel (24" Span Rating) that is glued and nailed down.
 Additional considerations for the TJ-Pro[™] Rating include: None

Additional considerations for the 13-Pro[®] Rating include: wone

Supports		Bearing Length			s to Suppor	ts (lbs)	
	Total	Available	Required	Dead	Floor Live	Total	Accessories
1 - Stud wall - DF	5.50"	4.25"	1.75"	192	384	576	1 1/4" Rim Board
2 - Stud wall - DF	5.50"	4.25"	1.75"	192	384	576	1 1/4" Rim Board

Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

				Dead	Floor Live	
Loads		Location	Spacing	(0.90)	(1.00)	Comments
1 - Uniform (PSF)	0 to 14' 5"	16"	20.0	40.0	Residential - Living Areas

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The product application, input design loads, dimensions and support information have been provided by Forte Software Operator

SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
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Page 1 of 1
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Address of the second s	CLIENT: PROJECT: NUMBER: DATE: BY: $M_{0} = P(t (8 psf) + 1)((22psf) = P^{4}p)f$ $M_{2} = 1(f + 25psf) = 25pt$
$\Lambda \Sigma_{i}$ Ω^{2}_{i}	USE2 - 1173731360 @ 16"0C. - ITS 2.37/11.83
RETAINING WALLS - Cantilevered Schedule for 4'-0" - 10'-0"	
Max DL=> ROOF = 1214 (17psf)= WALL = 111 (B psf)= Floor = 65ft (55psf	77 pit 02 = 657 pit
SL = 12ff (25psf) = 200 LL = 6.5ff (40psf) = 2	
MIN DL => POOL CAL (MAN WALL SHE CAR CLOUD = Z RE (MA CLOUD = Z RE (MA CLOUD = CHICOSE LL SHE MA	1 > 72 + 6 2454) = 40+6 c(1 = 120+6) c(1 = 120+6)
Unit = 128 per Consume to perf	- GOVIRUINIA CALCULATION SHOWN
	COMPANYANG CALCULATION SAMAN AMAL LOADS HAVE BEEN CHILCKED

FORTE

MEMBER REPORT Main Floor, Cant Joist 1 piece(s) 11 7/8" TJI® 360 @ 16" OC

Overall Length: 4' 7"



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	394 @ 1' 4 3/4"	3000 (5.25")	Passed (13%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	187 @ 1' 2"	1705	Passed (11%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-209 @ 1' 4 3/4"	6180	Passed (3%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.001 @ 2' 10 1/8"	0.072	Passed (L/999+)	22	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.005 @ 0	0.200	Passed (2L/999+)		1.0 D + 0.75 L + 0.75 S (Alt Spans)
TJ-Pro [™] Rating	74	45	Passed		

System : Floor Member Type : Joist Building Use : Residential Building Code : IBC Design Methodology : ASD

Deflection criteria: LL (L/480) and TL (L/240).

· Overhang deflection criteria: LL (2L/480) and TL (0.2").

 Bracing (Lu): All compression edges (top and bottom) must be braced at 4' 3 1/2" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.

A structural analysis of the deck has not been performed.

• Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.

* Additional considerations for the TJ-Pro™ Rating include: None

	Bearing Length			Loads to Supports (lbs)				
Supports	Total	Available	Required	Dead	Floor	Snow	Total	Accessories
1 - Stud wall - DF	5.50"	5.50"	3.50"	224	170	37	431	Blocking
2 - Hanger on 11 7/8" DF beam	3.50"	Hanger ¹	1.75™	-8	93/-2	~12	93/-22	See note 1

Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

• At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger

¹ See Connector grid below for additional information and/or requirements.

Connector: Simpson Strong-Tie Connectors

Support	Model	Seat Length	Top Nails	Face Nails	Member Nails	Accessories
2 - Top Mount Hanger	ITS2.37/11.88	2.00"	4-10d x 1-1/2	2-10d x 1-1/2	N/A	

Loads	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 4' 7"	16"	20.0	40.0	-	Residential - Living Areas
2 - Point (lb)	0	N/A	94	•	25	

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Forte Software Operator	Job Notes
Allan Tompkins Froelich Engineers (541) 550-5375 atompkins@froelich-engineers.com	

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(A) SUSTAINABLE FORESTRY INITIATIVE

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Retain Pro 9 © 1989 - 2011 Ver: 9.27 8171 Registration #: RP-1110505 RP9.27

Title	2	Alta Mira
Job #	1	15-T070

Dsgnr: AT

This Wall in File: Q:\!Jobs\2015\15-T070 Alta Mira Residence

Cantilevered Retaining Wall Design

Code: IBC 2009

Criteria		Soil Data					and a state
Retained Height Vall height above soil Slope Behind Wall Height of Soil over Toe Vater height over heel	= 10.00 ft = 0.00 ft = 0.00 : 1 = 12.00 in = 0.0 ft	Allow Soil Bearing Equivalent Fluid Pressure Heel Active Pressure Passive Pressure Soil Density, Heel Soil Density, Toe Footing Soil Friction Soil height to ignore for passive pressure		2,000.0 psf od 30.0 psf/ft 30.0 psf/ft 150.0 psf/ft 110.00 pcf 110.00 pcf 0.450 12.00 in	Thum		
Surcharge Loads		Lateral Load Appl	ied to	Stem	Adjacent Footing I		
					ridjuoonit i ooting i		
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Over	= 95.0 psf g & Overturning = 55.0 psf	Lateral Load Height to Top Height to Bottom The above lateral load	= = =	0.0 #/ft 14.50 ft 10.00 ft	Adjacent Footing Load Footing Width Eccentricity		10. 10. 10. 10. 10. 10. 10. 10. 10. 10.
Used To Resist Sliding Surcharge Over Toe Used for Sliding & Ove	= 95.0 psf g & Overturning = 55.0 psf erturning	Height to Top	=	0.0 #/ft 14.50 ft	Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist Footing Type		0.0 lb 0.00 ft 0.00 in
Used To Resist Sliding Surcharge Over Toe	= 95.0 psf g & Overturning = 55.0 psf erturning ed to Stem = 637.0 lbs = 560.0 lbs	Height to Top Height to Bottom The above lateral load has been increased	=	0.0 #/ft 14.50 ft 10.00 ft	Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist		0.0 lb: 0.00 ft 0.00 in 0.00 ft
Used To Resist Sliding Surcharge Over Toe Used for Sliding & Ove Axial Load Applie Axial Dead Load Axial Live Load	= 95.0 psf a Overturning = 55.0 psf erturning ed to Stem = 637.0 lbs = 560.0 lbs = 0.0 in	Height to Top Height to Bottom The above lateral load has been increased by a factor of	-	0.0 #/ft 14.50 ft 10.00 ft 1.00	Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist Footing Type Base Above/Below Soil at Back of Wall	= = =	0.0 lb: 0.00 ft 0.00 in 0.00 ft Line Load 0.0 ft
Used To Resist Sliding Surcharge Over Toe Used for Sliding & Ove Axial Load Applie Axial Dead Load Axial Live Load Axial Load Eccentricity	= 95.0 psf = 55.0 psf erturning = 637.0 lbs = 637.0 lbs = 0.0 in eismic Load = 1.000	Height to Top Height to Bottom The above lateral load has been increased by a factor of Wind on Exposed Stem		0.0 #/ft 14.50 ft 10.00 ft 1.00 0.0 psf	Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist Footing Type Base Above/Below Soil at Back of Wall	= = =	0.0 lb: 0.00 ft 0.00 in 0.00 ft Line Load 0.0 ft

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 Registration #: RP-1110505
 RP9.27

Alta Mira 15-T070 Title Job # Description....

Dsgnr: AT

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This Wall in File: Q:\!Jobs\2015\15-T070 Alta Mira Residence

Cantilevered Retaining Wall Design

Code: IBC 2009

Design Summary			Ste
Wall Stability Ratios			1
Overturning	=	3.48 OK	
Sliding	=	1.85 OK	
Total Bearing Load	=	8,673 lbs	
resultant ecc.	=	7.33 in	03
Soil Pressure @ Toe	=	1,887 psf OK	
Soil Pressure @ Heel	=	591 psf OK	
Allowable Soil Pressure Less	= 5 Than	2,000 psf Allowable	
ACI Factored @ Toe	=	2,667 psf	
ACI Factored @ Heel	=	834 psf	
Footing Shear @ Toe	=	21.6 psi OK	
Footing Shear @ Heel	=	16.8 psi OK	
Allowable	=	75.0 psi	
	100000000000000000000000000000000000000	onent NOT Used)	
Lateral Sliding Force less 100% Passive Force	=	2,216.1 lbs 458.3 lbs	
less 100% Friction Force			
Added Force Req'd	=	0.0 lbs OK	
for 1.5 : 1 Stability	=	0.0 lbs OK	
Load Factors Building Code		IBC 2009	
Dead Load		1.200	
Live Load		1.600	
Earth, H		1.600	
Wind, W		1.600	
Seismic, E		1.000	
p			·r
Footing Dimensio	ns &	Strengths	1.
Toe Width	=	2.25 ft	
Heel Width	=	4.75	Fa
Total Footing Width		7.00	M

LIGEL MAIDULI		10000		.15
Total Footin	g Width	=	7	.00
Footing Thio	kness	=	14	.00 in
Key Width		=	12	.00 in
Key Depth		=	0	.00 in
Key Distance	e from Toe	=	2	.00 ft
fc = 2 Footing Cor	2,500 psi Icrete Densi	Fy = ty =		000 psi .00 pcf
Min. As %		=	0.00	018
Cover @ To	p 2.00	@	Btm.=	3.00 in

em Construction	T	op Stem	2nd	
Design Height Above Ftg		Stem OK	Stem OK	
Wall Material Above "Ht"	ft = =	3.00	0.00	
Thickness	=	Concrete 8.00	Concrete	
Rebar Size	-	# 5	8.00 # 5	
Rebar Spacing	-	16.00	# 5	
Rebar Placed at	-	Edge	Edge	
Design Data		Luge	Luge	
fb/FB + fa/Fa	=	0.700	0.942	
Total Force @ Section	lbs =	1,593.6	2,978.5	
MomentActual	ft-# =	4,279.0	11,112.7	
MomentAllowable	ft-# =	6,114.9	11,799.2	
ShearActual	psi =	20.8	38.8	
ShearAllowable	psi =	67.1	75.0	
Wall Weight	psf =	100.0	100.0	
Rebar Depth 'd'	in =	6.19	6.19	
LAP SPLICE IF ABOVE	in =	18.31	22.04	
LAP SPLICE IF BELOW	in =	18.31	22.04	
HOOK EMBED INTO FT		10.01	9.28	
Masonry Data	the street brace	nt reduced b	y stress ratio	
fm	psi =			
Fs	psi =			
Solid Grouting	=			
Modular Ratio 'n'	=			
Short Term Factor	=			
Equiv. Solid Thick.	=	1913 1929 - 1938	1012	
Masonry Block Type	=	Medium We	eight	
Masonry Design Method	=	ASD		
Concrete Data				
fc	psi =	2,000.0	2,500.0	
Fy	psi =	60,000.0	60,000.0	
Footing Design Res	sults			
	Toe	Heel		
Factored Pressure =	2,667		psf	
Mu': Upward =	6,253			
Mu' : Downward =	1,233	16,148	π-#	

Factored Pressure	=	2,667	834	pst
Mu': Upward	=	6,253	9,926	ft-#
Mu' : Downward	=	1,233	16,148	ft-#
Mu: Design	=	5,021	6,222	ft-#
Actual 1-Way Shear	=	21.58	16.81	psi
Allow 1-Way Shear	=	75.00	75.00	psi
Toe Reinforcing	=	# 5 @ 16.50 in		5
Heel Reinforcing	=	# 5 @ 15.00 in		
Key Reinforcing		None Spec'd		

Other Acceptable Sizes & Spacings

Toe: #4@ 10.75 in, #5@ 16.50 in, #6@ 23.50 in, #7@ 31.75 in, #8@ 42.00 in, #9@ 4 Heel: #4@ 9.75 in, #5@ 15.00 in, #6@ 21.50 in, #7@ 29.00 in, #8@ 38.25 in, #9@ 48 Key: Not req'd, Mu < S * Fr

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Date: MAY 13,2015

This Wall in File: Q:\!Jobs\2015\15-T070 Alta Mira Residence

Retain Pro 9 © 1989 - 2011 Ver: 9.27 8171 Registration #: RP-1110505 RP9.27

Cantilevered Retaining Wall Design

Code: IBC 2009

Summary of Overturning & Resisting Forces & Moments

		OV	OVERTURNING					
Item		Force Ibs	Distance ft	Moment ft-#				
Heel Active Pressure	=	1,870.4	3.72	6,962.1				
Surcharge over Heel	=	289.3	5.58	1,615.4				
Toe Active Pressure	=	-70.4	0.72	-50.9				
Surcharge Over Toe	ंच	-32.5	1.08	-35.2				
Adjacent Footing Load	=							
Added Lateral Load	=							
Load @ Stem Above So	il =							
Seismic Earth Load	=	79.3	6.70	531.2				
Seismic Stem Self Wt	=	112.0	6.17	690.7				
Total	=	2,216.1	O.T.M. =	9,515.9				
Resisting/Overturnin Vertical Loads used f			= = 8,672.	3.48 8 lbs				

		RES	SISTING	
1997 (Mar 1997)		Force Ibs	Distance ft	Moment ft-#
Soil Over Heel	=	4,491.7	4.96	22,271.2
Sloped Soil Over Heel	=			
Surcharge Over Heel	=	387.9	4.96	1,923.4
Adjacent Footing Load	=			
Axial Dead Load on Stem	1 =	637.0	2.58	1,645.6
* Axial Live Load on Stem	=	560.0	2.58	1,446.7
Soil Over Toe	=	247.5	1.13	278.4
Surcharge Over Toe	æ	123.8	1.13	139.2
Stem Weight(s)	=	1,000.0	2.58	2,583.3
Earth @ Stem Transitions	5 =			
Footing Weight	=	1,225.0	3.50	4,287.5
Key Weight	=		2.50	
Vert. Component	=			
			1201020	

If seismic included the min. OTM and sliding ratios may be 1.1 per IBC '09, 1807.2.3.

Total = 8,112.8 lbs R.M.= 33,128.7 * Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.



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Alta Mira Title Job # 15-T070 Description

Dsgnr: AT

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This Wall in File: Q:\!Jobs\2015\15-T070 Alta Mira Residence

Retain Pro 9 © 1989 - 2011 Ver: 9.27 8171 Cantilevered Retaining Wall Design Registration #: RP-1110505 **RP9.27** Soil Data Criteria Allow Soil Bearing 2,000.0 psf **Retained Height** = 10.00 ft = Equivalent Fluid Pressure Method Wall height above soil = 0.00 ft Heel Active Pressure 30.0 psf/ft Slope Behind Wall = 0.00:1 Toe Active Pressure = 30.0 psf/ft Height of Soil over Toe 12.00 in 150.0 psf/ft = **Passive Pressure** = Soil Density, Heel 110.00 pcf Water height over heel = 0.0 ft = Soil Density, Toe 110.00 pcf = Footing||Soil Friction 0.450 = Soil height to ignore 12.00 in for passive pressure = Thumbnail Surcharge Loads Lateral Load Applied to Stem Adjacent Footing Load Surcharge Over Heel Adjacent Footing Load 0.0 lbs 0.0 psf = Lateral Load = 0.0 #/ft Footing Width Used To Resist Sliding & Overturning ...Height to Top 0.00 ft = 14.50 ft = Surcharge Over Toe -55.0 psf ...Height to Bottom = 10.00 ft Eccentricity =0.00 in Used for Sliding & Overturning Wall to Ftg CL Dist 0.00 ft = The above lateral load 1.00 has been increased by a factor of Footing Type Line Load Axial Load Applied to Stem Base Above/Below Soil -0.0 ft Axial Dead Load 146.0 lbs = Wind on Exposed Stem = 0.0 psf at Back of Wall 560.0 lbs Axial Live Load 0.300 Poisson's Ratio = Axial Load Eccentricity 0.0 in

Earth Pressure Seismic Load

Multiplier Used -1.000 (Multiplier used on soil density)

Stem Weight Seismic Load

Fp / Wp Weight Multiplier

Uniform Seismic Force =

Total Seismic Force

0.112 g =

10.000

110.000

2

Added seismic base force

80.0 lbs

Code: IBC 2009

Retain Pro 9 © 1989 - 2011 Ver: 9.27 8171 Registration #: RP-1110505 RP9.27

Cantileve

Date: MAY 13,2015

Design Summary				Stem
Wall Stability Ratios				Des
Overturning	=		2.32 OK	W
Sliding	=		1.45 Ratio < 1.5	5! Th
				Re
Total Bearing Load	=		5,744 lbs	Re
resultant ecc.	=		9.03 in	Re
Call Desserves @ Tas	-		1 000 mat OK	Des
Soil Pressure @ Toe Soil Pressure @ Heel	H H		1,902 psf OK 187 psf OK	fb
-	-		2,000 psf	To
Allowable Soil Pressure Less	22	an		M
ACI Factored @ Toe	=	an	2,700 psf	M
ACI Factored @ Heel	=		265 psf	St
Footing Shear @ Toe	-		28.5 psi OK	St
Footing Shear @ Heel	-		20.7 psi OK	N
Allowable	2		75.0 psi	Re
	-			LA
Sliding Calcs (Vertical C	om	po	가 가는 것이 있는 것 것 같아	LA
Lateral Sliding Force	=		1,883.1 lbs	Н
less 100% Passive Force		-	393.8 lbs	
less 100% Friction Force	-	-	2,332.8 lbs	
Added Force Req'd	=		0.0 lbs OK	Mas
for 1.5 : 1 Stability	=		98.1 lbs NG	fn
				Fs
				Se
Load Factors				M
Loud raciola				St

Load Factors	
Building Code	IBC 2009
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Footing Dimensions & Strengths

Toe Width		=	2.25 ft
Heel Width	1	=	3.25
Total Footi	ng Width	=	5.50
Footing Th	ickness	=	12.00 in
Key Width		=	12.00 in
Key Depth		=	0.00 in
Key Distan	ice from Toe	=	2.00 ft
fc =	2,500 psi	Fy =	60,000 psi
Footing Co	ncrete Densit	ty =	150.00 pcf
Min. As %		=	0.0018
Cover @ T	op 2.00	@ E	8tm.= 3.00 ir

ft = = =	Stem OK 3.00 Concrete 8.00	Stem OK 0.00 Concrete
=	Concrete	Concrete
=		
=		8.00
	# 5	# 5
	18.00	9.00
=	Edge	Edge
	90	
=	0.597	0.853
lbs =	1,303.4	2,564.0
ft-# =	3,263.4	9,040.0
ft-# =	5,470.9	10,601.6
psi =	16.9	33.2
Second Second	67.1	75.0
and the second second		100.0
		6.19
1.000		19.95
		10.00
Long Street Street	10.01	8.25
	e base reduc	A.541
bedme	nt reduced b	y stress ratio
-		
-		
=		
=		
=	Medium We	eiaht
=		
psi =	2,000.0	2.500.0
psi =	60,000.0	60,000.0
		12
suits		
	= Ibs = ft-# = psi = psf = in = in = G in = e above bedme psi = psi = = = = = = = = = =	= 0.597 lbs = 1,303.4 ft-# = 3,263.4 ft-# = 5,470.9 psi = 16.9 psi = 67.1 psf = 100.0 in = 6.19 in = 15.61 G in = 15.61

		100	Heel	10
Factored Pressure	=	2,700	265	psf
Mu' : Upward	=	5,994	2,156	ft-#
Mu' : Downward	=	1,144	5,839	ft-#
Mu: Design	=	4,850	3,683	ft-#
Actual 1-Way Shear	=	28.49	20.69	psi
Allow 1-Way Shear	=	75.00	75.00	psi
Toe Reinforcing	z	# 5 @ 16.50 in		an.
Heel Reinforcing	=	# 5 @ 15.00 in		
Key Reinforcing	=	None Spec'd		

Other Acceptable Sizes & Spacings

Toe: #4@ 13.25 in, #5@ 20.50 in, #6@ 29.00 in, #7@ 39.25 in, #8@ 48.25 in, #9@ 4 Heel: #4@ 11.75 in, #5@ 18.25 in, #6@ 25.75 in, #7@ 35.25 in, #8@ 46.25 in, #9@ 4 Key: Not req'd, Mu < S * Fr

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	This Wall in Fi	e: Q:\!Jobs\2015	15-T070 Alta Mira Residence
vered Retaining \		Code: IBC 2009	
Construction	Top Stem	2nd	

Title : Alta Mira Job # : 15-T070

Description

Dsgnr: AT

.

Dsgnr: AT

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This Wall in File: Q:\!Jobs\2015\15-T070 Alta Mira Residence

Retain Pro 9 © 1989 - 2011 Ver: 9.27 8171 Registration #: RP-1110505 RP9.27

Cantilevered Retaining Wall Design

Code: IBC 2009

115 C		OV	ERTURNING	l			RE	SISTING	5.55
ltem		Force Ibs	Distance ft	Moment ft-#			Force Ibs	Distance ft	Moment ft-#
Heel Active Pressure	=	1,815.0	3.67	6,655.0	Soil Over Heel	=	2,841.7	4.21	11,958.
Surcharge over Heel	=				Sloped Soil Over Heel	=			
Toe Active Pressure	=	-60.0	0.67	-40.0	Surcharge Over Heel	=			
Surcharge Over Toe	=	-30.0	1.00	-30.0	Adjacent Footing Load	=			
Adjacent Footing Load	=				Axial Dead Load on Ster	m =	146.0	2.58	377.3
Added Lateral Load	=				* Axial Live Load on Stem	=	560.0	2.58	1,446.
Load @ Stem Above So	il =				Soil Over Toe	=	247.5	1.13	278.4
Seismic Earth Load	=	78.1	6.60	515.5	Surcharge Over Toe	=	123.8	1.13	139.3
Seismic Stem Self Wt	=	112.0	6.00	672.0	Stem Weight(s)	=	1,000.0	2.58	2,583.3
					Earth @ Stem Transitior	1S =			
Total	=	1,883.1	O.T.M. =	7,580.5	Footing Weight	=	825.0	2.75	2,268.8
Resisting/Overturnin	g Rat	io	=	2.32	Key Weight	=		2.50	
Vertical Loads used	for So	il Pressure	= 5,743.	9 Ibs	Vert. Component	=			
					Tot	al =	5,183.9	bs R.M.=	17.605.6

If seismic included the min. OTM and sliding ratios may be 1.1 per IBC '09, 1807.2.3.

K.M. * Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.



Retain Pro 9 © 1989 - 2011 Ver: 9.27 8171 Registration #: RP-1110505 RP9.27

Cantilevered Retaining Wall Design

...

Title

Job #

Description

Alta Mira

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15-T070

Nal	I Des	ign					
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Dsgnr: AT

Thumbnail

=

= =

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=

=

Adjacent Footing Load

Adjacent Footing Load Footing Width Eccentricity

Base Above/Below Soil

Wall to Ftg CL Dist

at Back of Wall

Poisson's Ratio

Footing Type

Code: IBC 2009

0.0 lbs

0.00 ft

0.00 in

0.00 ft

0.0 ft

Line Load

0.300

Criteria		
Retained Height	=	8.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00:1
Height of Soil over Toe	=	12.00 in
Water height over heel	=	0.0 ft
Water height over heel	=	0.0 f

Soil Data		
Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure	e Meth	hod
Heel Active Pressure	=	30.0 psf/ft
Toe Active Pressure	=	30.0 psf/ft
Passive Pressure	-	150.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing Soil Friction	=	0.450
Soil height to ignore for passive pressure	=	12.00 in

Lateral Load Applied to Stem			
Lateral Load	=	12.5 #/ft	
Height to Top	=	12.50 ft	
Height to Bottom	=	8.00 ft	
The above lateral load has been increased by a factor of		1.00	
Wind on Exposed Ste	em =	0.0 psf	

tem Construction		Top Stem	2nd	
Design Height About Fit		Stem OK	Stem OK	
Design Height Above Ftg		2.00	0.00	
Wall Material Above "Ht" Thickness	=	Concrete 8.00	Concrete 8.00	
Rebar Size	-	# 4	# 5	
Rebar Spacing	-	15.00	15.00	
Rebar Placed at	-			
Design Data		Edge	Edge	
fb/FB + fa/Fa	=	0.679	0.909	
Total Force @ Section	lbs =	1,169.0	1,875.9	
Moment. Actual	ft-# =	2,938.2	5,979.1	
MomentAllowable	ft-# =	4,330.1	6,578.7	
ShearActual	psi =	16.0	25.7	
ShearAllowable	psi =	67.1	75.0	
Wall Weight	psf=	100.0	100.0	
Rebar Depth 'd'	in =	6.25	6.19	
LAP SPLICE IF ABOVE	in =	14.20	21.27	
LAP SPLICE IF BELOW	in =	14.20	177. A. 197. A	
HOOK EMBED INTO FT	G in =		9.50	
Lap splice	above	e base reduc	ed by stress ratio	
Hook emt	bedme	nt reduced b	y stress ratio	
Masonry Data	psi =			
Fs	psi =			
Solid Grouting	= 104			
Solid Croding				
Modular Ratio 'n'	=			
Short Term Factor	=			
Equiv. Solid Thick.	=			
Masonry Block Type	=	Medium We	eight	
Masonry Design Method	=	ASD		
Concrete Data				
fc	psi =	2,000.0	2,500.0	
Fy	psi =	60,000.0	60,000.0	

Surcharge Loads Surcharge Over Heel = 95.0 psf Used To Resist Sliding & Overturning

Axial Load Applied	ιı	0	Stem		
Axial Dead Load	=		146.0 lbs		
Axial Live Load Axial Load Eccentricity	8 8		130.0 lbs 0.0 in		
Design Summary					
Wall Stability Ratios					
Overturning	=		2.13 OK		
Sliding	=		1.54 OK		
Total Bearing Load	=		4,066 lbs		
resultant ecc.		= 9.23 in			
Soil Pressure @ Toe	=		1,688 psf OK		
Soil Pressure @ Heel	=		24 psf OK		
Allowable Soil Pressure Less	= Th	an	2,000 psf Allowable		
ACI Factored @ Toe	=		2,374 psf		
ACI Factored @ Heel	=		34 psf		
Footing Shear @ Toe	=		16.7 psi OK		
Footing Shear @ Heel	=		15.2 psi OK		
Allowable	=		75.0 psi		
Sliding Calcs (Vertical C	om	ро	nent NOT Used)		
Lateral Sliding Force	=		1,451.3 lbs		
less 100% Passive Force	-	-	458.3 lbs		
less 100% Friction Force	=	-	1,771.2 lbs		
Added Force Reg'd	Н		0.0 lbs OK		
for 1.5 : 1 Stability	=		0.0 lbs OK		

Load Factors	
Building Code	IBC 2009
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

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This Wall in File: Q:\!Jobs\2015\15-T070 Alta Mira Residence

 Retain Pro 9 © 1989 - 2011 Ver: 9.27
 8171

 Registration #: RP-1110505
 RP9.27

Cantilevered Retaining Wall Design

Code: IBC 2009

Footing Dimensions & Strengths					
Toe Width		=	2.25 ft		
Heel Width		=	2.50		
Total Footing W	lidth	=	4.75		
Footing Thickne	SS	=	14.00 in		
Key Width		=	12.00 in		
Key Depth		=	0.00 in		
Key Distance fro	om Toe	=	2.00 ft		
fc = 2,50	0 psi	Fy =	60,000 psi		
Footing Concret	e Density	,	150.00 pcf		
Min. As %		=	0.0018		
Cover @ Top	2.00	@ E	3tm.= 3.00 in		

Footing Design Results					
		Toe	Heel		
Factored Pressure	=	2,374	34 psf		
Mu': Upward	=	5,074	563 ft-#		
Mu' : Downward	=	1,233	2,738 ft-#		
Mu: Design	=	3,841	2,175 ft-#		
Actual 1-Way Shear	=	16.66	15.19 psi		
Allow 1-Way Shear	=	75.00	75.00 psi		
Toe Reinforcing	=	# 5 @ 16.50 in			
Heel Reinforcing	=	# 5 @ 15.00 in			
Key Reinforcing = None Spec'd					

Other Acceptable Sizes & Spacings

Toe: #4@ 10.75 in, #5@ 16.50 in, #6@ 23.50 in, #7@ 31.75 in, #8@ 42.00 in, #9@ 4 Heel: Not req'd, Mu < S * Fr Key: Not req'd, Mu < S * Fr

Summary of Overturning & Resisting Forces & Moments

		RESISTING	
	Force lbs	Distance ft	Moment ft-#
el =	1,613.3	3.83	6,184.4
Over Heel =	(
ver Heel =	174.2	3.83	667.6
oting Load =			
oad on Stem =	146.0	2.58	377.2
ad on Stem =	130.0	2.58	335.8
e =	247.5	i 1.13	278.4
ver Toe =	123.8	1.13	139.2
t(s) =	800.0	2.58	2,066.7
m Transitions =			
ght =	831.3	2.38	1,974.2
=		2.50	
nent =			
Total =	= 3.936.0	bs R.M.=	11.687.8
d	ent = Total = NOT include	ent = Total = 3,936.0 NOT included in total displ	ent =



Retain Pro 9 © 1989 - 2011 Ver: 9.27 8171 Registration #: RP-1110505 RP9.27

Cantilevered Retaining Wall Design

Code:	IBC	2009	

Criteria			Soil Data		
Retained Height	=	8.00 ft	Allow Soil Bearing = 2	2,000.0	psf
Wall height above soil	=	0.00 ft	Equivalent Fluid Pressure Metho		
Slope Behind Wall	=	0.00:1	Heel Active Pressure =		psf/ft psf/ft
Height of Soil over Toe	=	12.00 in	Passive Pressure =	150.0	
Water height over heel	=	0.0 ft		110.00	
Trater height over heer		0.0 1		110.00	
			Footing Soil Friction =	0.450	
			Soil height to ignore		
			for passive pressure =	12.00	in
Surcharge Loads			Lateral Load Applied to	Stem	
Surcharge Over Heel	=	0.0 psf	Lateral Load =	12.5 #/	ft /
Used To Resist Sliding	g & Ov	verturning		2.50 ft	F
Surcharge Over Toe	=	55.0 psf		8.00 ft	E
Used for Sliding & Ove			The above lateral load has been increased	1.00	N F
Axial Load Applie	ed to	Stem	by a factor of	1.00	
Axial Dead Load	=	146.0 lbs	Wind on Exposed Stem =	0.0 ps	
Axial Live Load Axial Load Eccentricity	=	130.0 lbs 0.0 in		0.0 p	. 1
Design Summary			Stem Construction	1	op Stem
all Stability Ratios			Design Height Above Ftg	ft =	Stem OK 2.00
Dverturning	=	1.88 OK	Wall Material Above "Ht"	=	Concrete
Sliding	=	1.56 OK	Thickness	=	8.00
atal Dansing Land	-	0.050 lba	Rebar Size	=	# 4
otal Bearing Load resultant ecc.	=	3,358 lbs 9.86 in	Rebar Spacing Rebar Placed at	=	15.00 Edge
			Design Data		Luge
Soil Pressure @ Toe	=	1,900 psf OK	fb/FB + fa/Fa	=	0.506
Soil Pressure @ Heel	=	0 psf OK 2,000 psf	Total Force @ Section	lbs =	920.3
Allowable Soil Pressure Less			MomentActual	ft-# =	2,192.1
CI Factored @ Toe	=	2,675 psf	MomentAllowable	ft-# =	4,330.1
CI Factored @ Heel	=	0 psf	ShearActual	psi =	12.7
Footing Shear @ Toe	=	18.4 psi OK	ShearAllowable	psi =	67.1
ooting Shear @ Heel	=	15.9 psi OK	Wall Weight	psf=	100.0
Allowable	=	75.0 psi	Rebar Depth 'd' LAP SPLICE IF ABOVE	in =	6.25 12.00
iding Calcs (Vertical (Compo		LAP SPLICE IF ABOVE		12.00
ateral Sliding Force	=	1,181.3 lbs	HOOK EMBED INTO FT		12.00
ess 100% Passive Forc ess 100% Friction Force		393.8 lbs 1,452.6 lbs	Lap splice	e above	base redu
	=	0.0 lbs OK	Masonry Data Hook emi	bedmer	nt reduced
Added Force Req'd for 1.5 : 1 Stability	=	0.0 lbs OK	fm	psi =	
		0.0 100 011	Fs	psi =	
			Solid Grouting	=	
			Modular Ratio 'n'	=	
oad Factors		20100000000000000000000000000000000000	Short Term Factor	=	
Building Code		IBC 2009	Equiv. Solid Thick.	=	
Dead Load		1.200	Masonry Block Type	=	Medium W
Live Load		1.600	Masonry Design Method	=	ASD
Earth, H		1.600	Concrete Data		nateteel T
Wind, W Seismic, E		1.600 1.000	fc	psi =	2,000.0
JEISITIIC, E		1.000	Fy	psi =	60,000.0

Lateral Load Appl	ied	to Stem	
Lateral Load	=	12.5 #/ft	
Height to Top	=	12.50 ft	
Height to Bottom	=	8.00 ft	
The above lateral load has been increased by a factor of		1.00	
Wind on Exposed Stom	312	0.0 pof	

Adjacent Footing Load						
Adjacent Footing Load	=	0.0 lbs				
Footing Width	=	0.00 ft				
Eccentricity	=	0.00 in				
Wall to Ftg CL Dist	=	0.00 ft				
Footing Type		Line Load				
Base Above/Below Soil at Back of Wall	=	0.0 ft				
Poisson's Ratio	=	0.300				

Thumbnail

		001101010	001101010	
ickness	=	8.00	8.00	
ebar Size	=	# 4	# 5	
ebar Spacing	=	15.00	15.00	
ebar Placed at ign Data	=	Edge	Edge	
/FB + fa/Fa	=	0.506	0.707	
tal Force @ Section	lbs =	920.3	1,544.3	
omentActual	ft-# =	2,192.1	4,652.6	
omentAllowable	ft-# =	4,330.1	6,578.7	
nearActual	psi =	12.7	21.3	
earAllowable	psi =	67.1	75.0	
all Weight	psf =	100.0	100.0	
ebar Depth 'd'	in =	6.25	6.19	
P SPLICE IF ABOVE	in =	12.00	16.55	
P SPLICE IF BELOW	in =	12.00		
OOK EMBED INTO FT	G in =		7.31	
Lap splice	above	e base redu	ced by stress ratio	
onry Data Hook emi	pedmer	nt reduced b	y stress ratio	
1	psi =			

2nd

Stem OK 0.00

Concrete

fm	psi =			
Fs	psi =			
Solid Grouting	=			
Modular Ratio 'n'	=			
Short Term Factor	=			
Equiv. Solid Thick.	=			
Masonry Block Type	=	Medium We	eight	
Masonry Design Method	=	ASD		
Concrete Data				
fc	psi =	2,000.0	2,500.0	
Fv	nsi =	60 000 0	60 000 0	

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Title : Alta Mira Job # : 15-T070 Description....

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This Wall in File: Q:\!Jobs\2015\15-T070 Alta Mira Residence

Retain Pro 9 © 1989 - 2011 Ver: 9.27 8171 Registration #: RP-1110505 RP9.27

Cantilevered Retaining Wall Design

Code: IBC 2009

Footing Din	nensio	ns & S	Streng	gths
Toe Width		=	1.	75 ft
Heel Width		=	2.	25
Total Footing W	/idth	=	4.	00
Footing Thickne	ess	=	12.0	00 in
Key Width		=	12.0	00 in
Key Depth		=	0.0	00 in
Key Distance fr	om Toe	=	2.0	00 ft
fc = 2,50	0 psi	Fy =		00 psi
Footing Concre	te Density	y =	150.	00 pcf
Min. As %		=	0.00	18
Cover @ Top	2.00	@ E	stm.=	3.00 in

Footing Design Results							
		Toe	Heel				
Factored Pressure	=	2,675	0 p	sf			
Mu' : Upward	=	3,420	176 ft	-#			
Mu' : Downward	=	692	1,808 ft	-#			
Mu: Design	=	2,728	1,631 ft	-#			
Actual 1-Way Shear	==	18.45	15.88 p	si			
Allow 1-Way Shear	=	75.00	75.00 p	si			
Toe Reinforcing	=	# 5 @ 16.50 in					
Heel Reinforcing	=	# 5 @ 15.00 in					
Key Reinforcing	=	None Spec'd					

Other Acceptable Sizes & Spacings

Toe: #4@ 13.25 in, #5@ 20.50 in, #6@ 29.00 in, #7@ 39.25 in, #8@ 48.25 in, #9@ 4 Heel: Not req'd, Mu < S * Fr Key: Not req'd, Mu < S * Fr

Summary of Overturning & Resisting Forces & Moments

		OV	ERTURNING				R	ESISTING	
Item		Force Ibs	Distance ft	Moment ft-#			Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	1,215.0	3.00	3,645.0	Soil Over Heel	=	1,393.3	3.21	4,470.3
Surcharge over Heel	=				Sloped Soil Over Heel	×			
Toe Active Pressure	=	-60.0	0.67	-40.0	Surcharge Over Heel	=			
Surcharge Over Toe	=	-30.0	1.00	-30.0	Adjacent Footing Load	=			
Adjacent Footing Load	=				Axial Dead Load on Stem	n =	146.0	2.08	304.2
Added Lateral Load	=	56.3	11.25	632.8	* Axial Live Load on Stem	=	130.0	2.08	270.8
Load @ Stem Above So	il =				Soil Over Toe	=	192.5	0.88	168.4
					Surcharge Over Toe	=	96.3	0.88	84.2
					Stem Weight(s)	=	800.0	2.08	1,666.7
	-				Earth @ Stem Transitions	3 =			
Total	=	1,181.3	O.T.M. =	4,207.8	Footing Weight	=	600.0	2.00	1,200.0
Resisting/Overturnin	g Rat	io	=	1.88	Key Weight	=		2.50	
Vertical Loads used f	for So	il Pressure	= 3,358.1	lbs	Vert. Component	=			
					Tota	=	3,228.1	lbs R.M.=	7,893.8
					* Axial live load NOT include resistance, but is included	ded in d for s	total display	ed, or used for calculation.	overturning



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IBC 2009 c de

					L-	1		
Criteria			Soil Data			E.C.	1990	and the second
Retained Height	=	6.00 ft		2,000.0	psf		- Marine	
Wall height above soil	=	0.00 ft	Equivalent Fluid Pressure Method Heel Active Pressure =		psf/ft			
Slope Behind Wall	=	0.00:1	Toe Active Pressure =		psf/ft			
Height of Soil over Toe	=	12.00 in	Passive Pressure =		psf/ft			
Water height over heel	=	0.0 ft	Soil Density, Heel =	110.00	pcf			
				110.00	pcf			
			Footing Soil Friction =	0.450				
			Soil height to ignore for passive pressure =	12.00	in	and the second se		
			for passive pressure =	12.00				
						Contraction of the second second		
						Thum	onail	
Surcharge Loads			Lateral Load Applied to	Stem		Adjacent Footing	_oad	1
Surcharge Over Heel	=	95.0 psf	Lateral Load =	12.5 #/	'ft	Adjacent Footing Load	=	0.0 lbs
Used To Resist Sliding			Height to Top = 1	2.50 ft		Footing Width	=	0.00 ft
Surcharge Over Toe Used for Sliding & Ove	= rturni	55.0 psf	0	8.00 ft		Eccentricity	=	0.00 in
		-	The above lateral load has been increased	1.00		Wall to Ftg CL Dist Footing Type	=	0.00 ft Line Load
Axial Load Applie	a to	Stem	by a factor of			Base Above/Below Soil		
Axial Dead Load	=	637.0 lbs	Wind on Exposed Stem =	0.0 ps		at Back of Wall	=	0.0 ft
Axial Live Load Axial Load Eccentricity	8 8	560.0 lbs 0.0 in		00109-0311-020		Poisson's Ratio	=	0.300
Design Summary			Stem Construction	1_1	op Stem	2nd		
all Stability Ratios			Design Height Above Ftg	ft =	Stem OK 2.00			
Overturning	=	2.48 OK	Wall Material Above "Ht"	=	Concrete			
Sliding	=	2.05 OK	Thickness	=	8.00	8.00		
			Rebar Size	=	# 4			
otal Bearing Load .resultant ecc.	-	3,709 lbs 5.91 in	Rebar Spacing	=	16.00			
incountaint coo.		0.01 11	Rebar Placed at Design Data		Edge	Edge		
Soil Pressure @ Toe	=	1,768 psf OK	fb/FB + fa/Fa	=	0.321	0.739		
Soil Pressure @ Heel		210 psf OK 2,000 psf	Total Force @ Section	lbs =	606.1	1,121.0		
Allowable Soil Pressure Less	= Than		MomentActual	ft-# =	1,307.7			
CI Factored @ Toe	=	2,529 psf	MomentAllowable	ft-# =	4,069.4	1 250,000,000		
CI Factored @ Heel	=	300 psf	ShearActual	psi =	8.5			
Footing Shear @ Toe	=	22.2 psi OK	ShearAllowable	psi =	67.1	75.0		
ooting Shear @ Heel	=	8.5 psi OK	Wall Weight	psf=	100.0			
Allowable	=	75.0 psi	Rebar Depth 'd' LAP SPLICE IF ABOVE	in =	6.25 12.00			
ding Calcs (Vertical C			LAP SPLICE IF ABOVE	in = in =	12.00			
ateral Sliding Force	=	855.8 lbs	HOOK EMBED INTO FT		.2.00	6.16		
ess 100% Passive Force ess 100% Friction Force	79 (C)	333.3 lbs 1 416 9 lbs	Lap splice	above		uced by stress ratio		
Added Force Reg'd	=	0.0 lbs OK	Masonry Data Hook emb	bedmer	nt reduced	by stress ratio		
for 1.5 : 1 Stability	=	0.0 lbs OK	fm	psi =				
		0.0 100 011	Fs	psi =				
			Solid Grouting	=				
and Factors			Modular Ratio 'n'	=				
oad Factors Building Code		IBC 2009	Short Term Factor	=				
Dead Load		1.200	Equiv. Solid Thick.	=	Modium	Voicht		
Live Load		1.600	Masonry Block Type Masonry Design Method		Medium V ASD	vergni		
Earth, H		1.600	Concrete Data	(10)	AUD			-
Mand MM		1.600			0 000 0			
Wind, W Seismic, E		1.000	fc	psi =	2,000.0	2,500.0		

Page: 53 of 75 Date: MAY 13,2015

Title : Alta Mira Job # : 15-T070 Description.... This Wall in File: Q:\!Jobs\2015\15-T070 Alta Mira Residence

Dsgnr: AT

: Alta Mira Title Job # 15-T070 Description

Dsgnr: AT

This Wall in File: Q:\!Jobs\2015\15-T070 Alta Mira Residence

 Retain Pro 9 © 1989 - 2011 Ver: 9.27
 8171

 Registration #: RP-1110505
 RP9.27

Cantilevered Retaining Wall Design

Code: IBC 2009

Footing Dim	ensior	ns & \$	Strengths
Toe Width		=	1.50 ft
Heel Width		=	2.25
Total Footing W	idth	=	3.75
Footing Thickne	SS	=	10.00 in
Key Width		=	12.00 in
Key Depth		=	0.00 in
Key Distance fro	om Toe	=	2.00 ft
fc = 2,50	0 psi	Fy =	60.000 psi
Footing Concret		=	150.00 pcf
Min. As %		=	0.0018
Cover @ Top	2.00	@1	Btm.= 3.00 in

Footing Design Results Heel 300 psf Toe Factored Pressure 2,529 -2,511 769 ft-# Mu' : Upward = Mu

Mu': Downward	=	469	1,568 ft-#
Mu: Design	=	2,041	799 ft-#
Actual 1-Way Shear	=	22.18	8.45 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	# 4 @ 17.25 in	
Heel Reinforcing	=	# 4 @ 18.00 in	
Key Reinforcing	=	None Spec'd	

Other Acceptable Sizes & Spacings

Toe: #4@ 17.25 in, #5@ 26.50 in, #6@ 37.75 in, #7@ 48.25 in, #8@ 48.25 in, #9@ 4 Heel: Not req'd, Mu < S * Fr Key: Not req'd, Mu < S * Fr

Summary of Overturning & Resisting Forces & Moments

			ERTURNING				R	ESISTING	
ltem		Force lbs	Distance ft	Moment ft-#			Force Ibs	Distance ft	Moment ft-#
Heel Active Pressure	=	700.4	2.28	1,595.4	Soil Over Heel	=	1,045.0	2.96	3,091.5
Surcharge over Heel	=	177.0	3.42	604.9	Sloped Soil Over Heel	=			
Toe Active Pressure	=	-50.4	0.61	-30.8	Surcharge Over Heel	=	150.4	2.96	445.0
Surcharge Over Toe	=	-27.5	0.92	-25.2	Adjacent Footing Load	=			
Adjacent Footing Load	=				Axial Dead Load on Ster	m =	637.0	1.83	1,167.8
Added Lateral Load	=	56.3	11.08	623.4	* Axial Live Load on Stem	=	560.0	1.83	1,026.7
Load @ Stem Above So	il =				Soil Over Toe	=	165.0	0.75	123.8
					Surcharge Over Toe	=	82.5	0.75	61.9
					Stem Weight(s)	=	600.0	1.83	1,100.0
	0.00		-		Earth @ Stem Transition	s =			
Total	=	855.8	O.T.M. =	2,767.7	Footing Weight	=	468.8	1.88	878.9
Resisting/Overturnin	g Rat	io	=	2.48	Key Weight	=		2.50	
Vertical Loads used	for So	il Pressure	= 3,708.	7 Ibs	Vert. Component	=			
					Tota	al =	3,148.7	lbs R.M.=	6,868.8
					 * Axial live load NOT inclu resistance, but is include 				overturning



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 Retain Pro 9 © 1989 - 2011 Ver: 9.27
 8171

 Registration #: RP-1110505
 RP9.27

Cantilevered Retaining Wall Design

Title

Job #

Description

: Alta Mira

15-T070

Code: IBC 2009

Date: MAY 13,2015

Registration #: RP-1110505		RP9.27 (Cantilevered Retaining	Wall	Design			Code: IBC
Criteria			Soil Data				11/2/20	
Retained Height Wall height above soil Slope Behind Wall Height of Soil over Toe Water height over heel		6.00 ft 0.00 ft 0.00 : 1 12.00 in 0.0 ft	Equivalent Fluid Pressure MethoHeel Active Pressure=Toe Active Pressure=Passive Pressure=Soil Density, Heel=Soil Density, Toe=	30.0 30.0 150.0 110.00 110.00	psf/ft psf/ft psf/ft psf pcf			
			Footing Soil Friction = Soil height to ignore for passive pressure =	0.450 12.00		Thum	bnail	
Surcharge Loads			Lateral Load Applied to	Stem		Adjacent Footing	Load	1
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Over	= erturn	55.0 psf ing	Height to Top = 1 Height to Bottom = The above lateral load	12.5 # 2.50 ft 8.00 ft		Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist	= = = =	0.0 lbs 0.00 ft 0.00 in 0.00 ft
Axial Load Applie			has been increased by a factor of	1.00		Footing Type Base Above/Below Soil	=	Line Load
Axial Dead Load Axial Live Load Axial Load Eccentricity	= = =	146.0 lbs 130.0 lbs 0.0 in	Wind on Exposed Stem =	0.0 p	sf	at Back of Wall Poisson's Ratio	=	0.0 ft 0.300
Design Summary			Stem Construction		Top Stem	2nd		
Wall Stability Ratios Overturning Sliding		1.99 OK 2.06 OK 2.492 lbs	Design Height Above Ftg Wall Material Above "Ht" Thickness Rebar Size Bebar Spacing		Stem Ok 2.00 Concrete 8.00 # 4 18.00	0 0.00 e Concrete 0 8.00 4 # 4		
Total Bearing Load resultant ecc.	=	8.34 in	Rebar Spacing Rebar Placed at Design Data	=	Edge			
Soil Pressure @ Toe Soil Pressure @ Heel Allowable Soil Pressure Less ACI Factored @ Toe ACI Factored @ Heel	= = Thai = =	1,787 psf OK 0 psf OK 2,000 psf n Allowable 2,521 psf 0 psf	fb/FB + fa/Fa Total Force @ Section MomentActual MomentAllowable ShearActual	= Ibs = ft-# = ft-# = psi =	0.269 440.3 976.1 3,632.0 6.3	8 872.3 1 2,284.6 0 3,655.6 3 12.1		
Footing Shear @ Toe Footing Shear @ Heel Allowable Sliding Calcs (Vertical C	= = = Comp	11.0 psi OK 13.0 psi OK 75.0 psi onent NOT Used)	ShearAllowable Wall Weight Rebar Depth 'd' LAP SPLICE IF ABOVE	psi = psf = in = in =	67.1 100.0 6.25 12.00) 100.0 5 6.25) 12.00		
Lateral Sliding Force less 100% Passive Force less 100% Friction Force	= = -	678.8 lbs 333.3 lbs 1,063.0 lbs		G in = e above		6.00 uced by stress ratio by stress ratio		
Added Force Req'd for 1.5 : 1 Stability	=	0.0 lbs OK 0.0 lbs OK	0	psi = psi = =				
Load Factors Building Code Dead Load Live Load Earth, H		IBC 2009 1.200 1.600 1.600	Modular Ratio 'n' Short Term Factor Equiv. Solid Thick. Masonry Block Type Masonry Design Method		Medium V ASD	Weight		
Wind, W Seismic, E		1.600 1.000	Concrete Data fc Fy	psi = psi =	2,000.0 60,000.0			

This Wall in File: Q:\!Jobs\2015\15-T070 Alta Mira Residence

Dsgnr: AT

Alta Mira 15-T070 Title Job # Description

Dsgnr: AT

Page: 57 of 75 Date: MAY 13,2015

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Retain Pro 9 © 1989 - 2011 Ver: 9.27 8171 Registration #: RP-1110505 RP9.27

Cantilevered Retaining Wall Design

Code: IBC 2009

Footing Dimen	isions &	Strengths
Toe Width	=	1.00 ft
Heel Width	:=	2.25
Total Footing Width) =	3.25
Footing Thickness	್	10.00 in
Key Width	=	12.00 in
Key Depth	=	0.00 in
Key Distance from	Toe =	2.00 ft
fc = 2,500 ps	si Fy =	60,000 psi
Footing Concrete D		150.00 pcf
Min. As %	=	0.0018
Cover @ Top 2	2.00 @1	Btm.= 3.00 in

		Toe	Heel
Factored Pressure	=	2,521	0 psf
Mu': Upward	=	1,110	213 ft-#
Mu': Downward	=	209	1,378 ft-#
Mu: Design	Ξ	901	1,165 ft-#
Actual 1-Way Shear	=	11.02	13.01 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	# 4 @ 17.25 in	18
Heel Reinforcing	=	# 4 @ 18.00 in	
Key Reinforcing	=	None Spec'd	
Other Acceptable S	Size	s & Spacings	
Toe: Not reg'd, M	u <	S*Fr	
Heel: Not reg'd, M			
Key: Not reg'd, M	u <	S*Fr	

Summary of Overturning & Resisting Forces & Moments

		0V	ERTURNING				R	ESISTING	
Item		Force lbs	Distance ft	Moment ft-#			Force Ibs	Distance ft	Moment ft-#
Heel Active Pressure	=	700.4	2.28	1,595.4	Soil Over Heel	=	1,045.0	2.46	2,569.0
Surcharge over Heel	=				Sloped Soil Over Heel	=			
Toe Active Pressure	=	-50.4	0.61	-30.8	Surcharge Over Heel	=			
Surcharge Over Toe	=	-27.5	0.92	-25.2	Adjacent Footing Load	=			
Adjacent Footing Load	=				Axial Dead Load on Sten	n =	146.0	1.33	194.7
Added Lateral Load	=	56.3	11.08	623.4	* Axial Live Load on Stem	=	130.0	1.33	173.3
Load @ Stem Above So	il =				Soil Over Toe	=	110.0	0.50	55.0
					Surcharge Over Toe	=	55.0	0.50	27.5
					Stem Weight(s)	=	600.0	1.33	800.0
					Earth @ Stem Transition	s =			
Total	=	678.8	O.T.M. =	2,162.8	Footing Weight	=	406.3	1.63	660.2
Resisting/Overturnin	g Rat	io	=	1.99	Key Weight	=		2.50	
Vertical Loads used f	or So	il Pressure	= 2,492.	3 Ibs	Vert. Component	=			
					Tota	=	2,362.3	lbs R.M.=	4,306.3
					* Axial live load NOT incluing resistance, but is included				overturning



Cantilevered Retaining Wall Design

Title Job #

Description

Alta Mira 15-T070

Code: IBC 2009

Criteria			Soil Data						0000
Retained Height Wall height above soil Slope Behind Wall Height of Soil over Toe Water height over heel		4.00 ft 0.00 ft 12.00 in 0.0 ft	Equivalent Fluid Pressure Me Heel Active Pressure Toe Active Pressure Passive Pressure Soil Density, Heel Soil Density, Toe Footing Soil Friction Soil height to ignore	ethod = = = 1 = 1 = 1	30.0	psf/ft psf/ft psf/ft pcf pcf	Thum	pnail	
Surcharge Loads			Lateral Load Applied	to i	Stem		Adjacent Footing		
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Ove	= rturni	55.0 psf ng	Lateral Load = Height to Top = Height to Bottom = The above lateral load has been increased	12 12 8	12.5 #/ 2.50 ft 3.00 ft	-	Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist		0.0 lbs 0.00 ft 0.00 in 0.00 ft
Axial Load Applie	d to	Stem	by a factor of		1.00		Footing Type Base Above/Below Soil		Line Load
Axial Dead Load Axial Live Load Axial Load Eccentricity		637.0 lbs 560.0 lbs 0.0 in	Wind on Exposed Stem =		0.0 ps	f	at Back of Wall Poisson's Ratio	=	0.0 ft 0.300
Design Summary			Stem Construction		T	op Stem	2nd		
Wall Stability Ratios		1	Design Height Above	e Fta	ft =	Stem OK 2.00			
Overturning	=	1.71 OK	Wall Material Above	1250	=	Concrete			
Sliding	=	2.42 OK	Thickness		=	8.00			
Total Bearing Load	=	2.263 lbs	Rebar Size Rebar Spacing		=	# 4 18.00	2		
resultant ecc.	=	3.37 in	Rebar Placed at		-	Edge			
			Design Data			Lugo	Lugo		
Soil Pressure @ Toe Soil Pressure @ Heel	=	1,758 psf OK 253 psf OK	fb/FB + fa/Fa		=	0.168			
Allowable	=	2,000 psf	Total Force @ Section		lbs =	235.2			
Soil Pressure Less			MomentActual		ft-# =	611.0			
ACI Factored @ Toe	=	2,548 psf	MomentAllowable	9	ft-# =	3,632.0			
ACI Factored @ Heel	=	367 psf	ShearActual ShearAllowable		psi = psi =	3.6 67.1			
Footing Shear @ Toe	н	16.0 psi OK	Wall Weight		psi =	100.0			
Footing Shear @ Heel	=	1.5 psi OK	Rebar Depth 'd'		in =	6.25			
Allowable	=	75.0 psi	LAP SPLICE IF ABC	OVE	in =	12.00			
liding Calcs (Vertical C Lateral Sliding Force			LAP SPLICE IF BEL		in =	12.00			
less 100% Passive Force	= .	454.0 lbs 333.3 lbs	HOOK EMBED INTO				6.00		
less 100% Friction Force		766.3 lbs					uced by stress ratio		
Added Force Reg'd	=	0.0 lbs OK	Masonry Data	emb	eamer	it reduced	by stress ratio		
for 1.5 : 1 Stability	=	0.0 lbs OK	fm		psi =				
		1.11990.000 (1.11970) 1.11970.000	Fs		psi =				
			Solid Grouting		=				
and Easters			Modular Ratio 'n'		=				
.oad Factors Building Code		IBC 2009	Short Term Factor		=				
Dead Load		1.200	Equiv. Solid Thick.		=		Africant		
Live Load		1.600	Masonry Block Type			Medium V	veight		
Earth, H		1.600	Masonry Design Met	inod	=	ASD			
Wind, W		1.600	Concrete Data		psi =	2,000.0	2,500.0		
		1.000			P MI	-, 000.0			

This Wall in File: Q:\!Jobs\2015\15-T070 Alta Mira Residence

Dsgnr: AT

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Title : Alta Mira Job # : 15-T070 Description....

Dsgnr: AT

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Retain Pro 9 © 1989 - 2011 Ver: 9.27 8171 Registration #: RP-1110505 RP9.27

Cantilevered Retaining Wall Design

Code: IBC 2009

Footing Dime	nsions 8	Stren	gths	
Toe Width	=	1	.25 ft	
Heel Width	=	1	.00	
Total Footing Widt	th =	2	.25	
Footing Thickness	. =	10	.00 in	
Key Width	=	12	.00 in	
Key Depth		= 0.00 in		
Key Distance from	n Toe 🛛 =	2	.00 ft	
fc = 2,500 g	osi Fy =	= 60,0	000 psi	
Footing Concrete	Density =	150	.00 pcf	
Min. As %	=	0.00	018	
Cover @ Top	2.00 @	Btm.=	3.00 in	

Footing Desig	jn	Results		
		Toe	Heel	
Factored Pressure	=	2,548	367	psf
Mu' : Upward	=	1,675	26	ft-#
Mu' : Downward	=	326	52	ft-#
Mu: Design	=	1,350	26	ft-#
Actual 1-Way Shear	=	16.04	1.53	psi
Allow 1-Way Shear	×	75.00	75.00	psi
Toe Reinforcing	=	# 4 @ 17.25 in		0.0062
Heel Reinforcing	=	# 4 @ 18.00 in		
Key Reinforcing	=	None Spec'd		
Other Acceptable S	Size	es & Spacings		
Toe: Not reg'd, M				

Heel: Not req'd, Mu < S * Fr Key: Not req'd, Mu < S * Fr

Summary of Overturning & Resisting Forces & Moments

		OV	ERTURNING				R	ESISTING	
ltem		Force lbs	Distance ft	Moment ft-#			Force Ibs	Distance ft	Moment ft-#
Heel Active Pressure	=	350.4	1.61	564.6	Soil Over Heel	=	146.7	2.08	305.6
Surcharge over Heel	=	125.2	2.42	302.6	Sloped Soil Over Heel	=			
Toe Active Pressure	=	-50.4	0.61	-30.8	Surcharge Over Heel	=	31.7	2.08	66.0
Surcharge Over Toe	=	-27.5	0.92	-25.2	Adjacent Footing Load	=			
Adjacent Footing Load	=				Axial Dead Load on Ster	n =	637.0	1.58	1,008.6
Added Lateral Load	=	56.3	11.08	623.4	* Axial Live Load on Stem	=	560.0	1.58	886.7
Load @ Stem Above So	il =				Soil Over Toe	=	137.5	0.63	85.9
					Surcharge Over Toe	=	68.8	0.63	43.0
					Stem Weight(s)	=	400.0	1.58	633.3
					Earth @ Stem Transition	s =			
Total	=	454.0	O.T.M. =	1,434.6	Footing Weight	=	281.3	1.13	316.4
Resisting/Overturnin	g Rati	io	=	1.71	Key Weight	=		2.50	
Vertical Loads used f	for Soi	I Pressure	= 2,262.8	3 lbs	Vert. Component	=			
					Tota	al =	1,702.8	lbs R.M.=	2,458.8
					* Axial live load NOT inclu resistance, but is include	ded in d for s	n total display soil pressure	red, or used for calculation.	roverturning





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Cantilevered Ret	aining Wall Design
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Title Job #

Description

Alta Mira

15-T070

Code: IBC 2009

Date: MAY 13,2015

Criteria			Soil Data		toning the
Retained Height Wall height above soil Slope Behind Wall Height of Soil over Toe Water height over heel	-	4.00 ft 0.00 ft 12.00 in 0.0 ft	Allow Soil Bearing = 2,000.0 psf Equivalent Fluid Pressure Method Heel Active Pressure = 30.0 psf/ft Toe Active Pressure = 30.0 psf/ft Passive Pressure = 150.0 psf/ft Soil Density, Heel = 110.00 pcf Soil Density, Toe = 110.00 pcf Footing Soil Friction = 0.450 Soil height to ignore for passive pressure = 12.00 in		
			Thum		
Surcharge Loads			Lateral Load Applied to Stem Adjacent Footing	Load	1
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Ove Axial Load Applie	= rturni	55.0 psf ng	Lateral Load=12.5 #/ftAdjacent Footing LoadHeight to Top=12.50 ftFooting WidthHeight to Bottom=8.00 ftEccentricityThe above lateral loadWall to Ftg CL DistHas been increased1.00by a factor ofEccent footing TypeBase Abate (Palew Seill)		0.0 lbs 0.00 ft 0.00 in 0.00 ft Line Load
Axial Dead Load	=	146.0 lbs	Base Above/Below Soil Wind on Exposed Stem = 0.0 psf at Back of Wall	=	0.0 ft
Axial Live Load Axial Load Eccentricity	=	130.0 lbs 0.0 in	Poisson's Ratio	=	0.300
Design Summary			Stem Construction Top Stem 2nd		
Wall Stability Ratios		The second se	Design Height Above Ftg ft = 2.00 0.00		
Overturning	=	1.72 OK	Wall Material Above "Ht" = Concrete Concrete		
Sliding	=	2.82 OK	Thickness = 8.00 8.00		
			Rebar Size = # 4 # 4		
Total Bearing Load	=	1,451 lbs	Rebar Spacing = 18.00 18.00		
resultant ecc.	=	6.53 in	Rebar Placed at = Edge Edge		
Soil Pressure @ Toe	=	1,371 psf OK	Design Data fb/FB + fa/Fa = 0.145 0.292		
Soil Pressure @ Heel	=	0 psf OK	Total Force @ Section lbs = 152.3 392.3		
Allowable	=	2,000 psf	MomentActual ft-# = 528.1 1,068.6		
Soil Pressure Less			MomentAllowable ft-# = 3,632.0 3,655.6		
ACI Factored @ Toe	=	1,943 psf	ShearActual psi = 2.5 5.7		
ACI Factored @ Heel	=	0 psf	ShearAllowable psi = 67.1 75.0		
Footing Shear @ Toe	=	10.7 psi OK	Wall Weight psf = 100.0 100.0		
Footing Shear @ Heel	=	4.9 psi OK	Rebar Depth 'd' in = 6.25 6.25		
Allowable	=	75.0 psi	LAP SPLICE IF ABOVE in = 12.00 12.00		
Sliding Calcs (Vertical C			LAP SPLICE IF BELOW in = 12.00		
Lateral Sliding Force less 100% Passive Force	=	328.8 lbs 333.3 lbs	HOOK EMBED INTO FTG in = 6.00		
less 100% Friction Force		594.6 lbs	Lap splice above base reduced by stress ratio		
Added Force Reg'd	=	0.0 lbs OK	Masonry Data Hook embedment reduced by stress ratio		
for 1.5 : 1 Stability	-	0.0 lbs OK	fm psi =		
		0.0 103 01	Fs psi =		
			Solid Grouting =		
			Modular Batio 'n' =		
Load Factors			Modular Ratio 'n' = Short Term Factor =		
Building Code		IBC 2009	Equiv. Solid Thick. =		
Dead Load		1.200	Masonry Block Type = Medium Weight		
Live Load		1.600	Masonry Design Method = ASD		
Earth, H		1.600	Concrete Data		
			Concrete Data		
Wind, W		1.600	fc psi = 2,000.0 2,500.0		

This Wall in File: Q:\!Jobs\2015\15-T070 Alta Mira Residence

Dsgnr: AT

Retain Pro 9 © 1989 - 2011 Ver: 9.27 8171 Registration #: RP-1110505 RP9.27

Retain Pro 9 © 1989 - 2011 Ver: 9.27 8171 Registration #: RP-1110505 RP9.27

Cantilevered Retaining Wall Design

Code: IBC 2009

Footing Dim	ensions	885	Strengths
Toe Width		=	1.25 ft
Heel Width		=	1.25
Total Footing W	idth	=	2.50
Footing Thickne	SS	=	10.00 in
Key Width		=	12.00 in
Key Depth		= 0.00 in	
Key Distance fro	om Toe	=	2.00 ft
fc = 2,50	Opsi F	y =	60,000 psi
Footing Concret	e Density	=	150.00 pcf
Min. As %		=	0.0018
Cover @ Top	2.00	@ E	8tm.= 3.00 ir

	Toe	Heel
=	1,943	0 ps
=	1,220	1 ft-:
=	326	135 ft-
=	894	133 ft-#
=	10.71	4.92 ps
=	75.00	75.00 ps
=	# 4 @ 17.25 in	
=	# 4 @ 18.00 in	
=	None Spec'd	
Size	es & Spacings	
u <	S*Fr	
	= = = = = Size	= 1,943 = 1,220 = 326 = 894 = 10.71

Title Job #

Description

Alta Mira 15-T070

Dsgnr: AT

This Wall in File: Q:\!Jobs\2015\15-T070 Alta Mira Residence

Key: Not req'd, Mu < S * Fr

Summary of Overturning & Resisting Forces & Moments

		0V	ERTURNING				R	ESISTING	
Item		Force Ibs	Distance ft	Moment ft-#			Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	350.4	1.61	564.6	Soil Over Heel	=	256.7	2.21	566.8
Surcharge over Heel	=				Sloped Soil Over Heel	=			
Toe Active Pressure	=	-50.4	0.61	-30.8	Surcharge Over Heel	=			
Surcharge Over Toe	=	-27.5	0.92	-25.2	Adjacent Footing Load	-			
Adjacent Footing Load	=				Axial Dead Load on Ster	n =	146.0	1.58	231.2
Added Lateral Load	=	56.3	11.08	623.4	* Axial Live Load on Stem	=	130.0	1.58	205.8
Load @ Stem Above So	il =				Soil Over Toe	=	137.5	0.63	85.9
					Surcharge Over Toe	=	68.8	0.63	43.0
					Stem Weight(s)	=	400.0	1.58	633.3
		11 10 10 10 10	-	2: 2041-2: 20	Earth @ Stem Transition	s =		*	
Total	=	328.8	O.T.M. =	1,132.0	Footing Weight	=	312.5	1.25	390.6
Resisting/Overturnin	g Rat	io	=	1.72	Key Weight	=		2.50	
Vertical Loads used I	for So	il Pressure	= 1,451.4	4 lbs	Vert. Component	=			
					Tot	al =	1,321.4	lbs R.M.=	1,950.8
					* Axial live load NOT inclu resistance, but is include				overturning

DESIGNER NOTES:



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64 of 75

FROELICH CONSULTING ENGINEERS, INC.

Arcon
Alta Mira
15-T070
5/7/15
AT

Seismic Weight

House Roof:

Roof Area:		2,500 ft ²
Weight:	2500 SF (17psf) +1400SF (5psf)=	49,500 lbs
Wall Area:	4.5ft [2 (56ft+50ft)]=	954 ft ²
Weight:	$957 ft^2 (8 psf) =$	7,632 lbs
	Total Weight:	57,132 lbs

House 2nd Floor:

Floor Area:			1,850 ft ²
Weight:	1850ft ² (20psf) =		37,000 lbs
Wall Area:	4.5ft (110ft)=		495 ft ²
Weight:	495ft ² (8psf) =		3,960 lbs
		Total Weight:	40,960 lbs

FROELICH

FROELICH CONSULTING ENGINEERS, INC.

client: Arcon project: Alta Mira job number: 15-B070 date: 5/8/2015 by: AT

SEISMIC FORCE CALCULATION

(Per ASCE7-10)

	Risk Category =	H	
	Importance I =	1.00	
	Soil Site Class =	D	
	Soil Shear Wave Vel. vs =	1000	ft/s
Site Class B Short Pe	eriod Spectral Response Acceleration S _S =	0.995	g
Site Class B 1 Se	cond Spectral Response Acceleration S ₁ =	0.428	g
	Site Class Adjustment Coefficients Fa=	1.10	
	F _v =	1.58	
S _{MS} =F _a *S _S	S _{MS} =	1.096	g
S _{M1} = F _v *S ₁	S _{M1} =	0.674	g
S DS = (2/3) S MS	S _{DS} =	0.731	g
	Seismic Design Category =	D	
S D1 = (2/3) S M1	S _{D1} =	0.449	g
	Seismic Design Category =	D	
	R =	6.5	
	Period Parameters Ct =	0.02	
	x =	0.75	
	Height of Structure h _n =	22.00	ft
$T_a = C_t * h_n^x$	Approximate Period T _a =	0.203	sec
	C _u =	1.554	
$T = T_a^*C_u$	Upper Limit Period T =	0.316	sec
$C_{S} = S_{DS}/(R/I)$	Seismic Response Coefficient Cs =	0.112	
$C_{s} = S_{D1}/(T^{*}(R/I))$	Upper Limit Cs =	0.340	
	Lower Limit Cs =	0.032	
	redundancy ρ =	1.000	
	Weight W =	98092	lbs
$V = C_S W^*p$	Seismic Base Shear V =	11031	
Vasd=0.7*V	ASD Seismic Base Shear Vasd =	7722	lbs

Vertical Distribution of Seismic Force

level x	hx	Wx	hxWx	hxWx/∑hxWx	Fx
Roof	19.50	57132	1114074	0.751	5802
2nd Flr.	9.00	40960	368640	0.249	1920
otals:		98092	1482714		7722

FROELICH CONSULTING ENGINEERS, INC.

client: Arcon Group project: Alta Mira job #: 15-T070 date: 5/7/2015 by: AT



WIND FORCE CALCULATION - MWFRS (Front to Back)

ASCE 7-10 SECTION 27.2 DIRECTONAL ANALYTICAL

Basic Wind Speeds	Input	
3 Second Gust V _{3s} =	120 mph	
Wind Directionality Factor K _d =	0.85	Table 26.6-1 (page 250)
Risk Catigory =	11	Table 1.5-1 (page 2)
Wind Exposure Category =	В	
Building Parameters		
Longitudinal Dimension of Bldg L =	50 ft	

4.9

56 ft	
20 ft	
22 ft	
0.20 sec	Eq. 12.8-7 (page 90)
	20 ft 22 ft

Output - Fundamental Frequency f =

Hz > 1 Hz Therefore Rigid

Topographic Effects	Input	(2 Dimensio	nal Ridge)
Hill Height H =	0	ft	Figure 26.8-1
Length of $1/2$ hill height L _h =	1000	ft	Figure 26.8-1
Dist. From Crest to Bldg. x =	0	ft	Figure 26.8-1
Height Above Local Grade z = Horizontal Attenuation Factor μ =	0 1.5	ft	Figure 26.8-1 Figure 26.8-1
Height Attenuation Factor γ =	3		Figure 26.8-1
Shape Factor K1/(H/Lh) =	1.30		Figure 26.8-1
Output - Topographic Multipl	iers K ₁ =	0.00	
	K ₂ =	1.00	
	K ₃ =	1.00	
Topographic Fac	ctor K _{zt} =	1.00	

Gust Effects	Input				
Integral Length Scale Factor $l =$	320	ft	Table 26.9	9-1	
Integral Length Scale					
	Nominal Height of Boundary $z_g = 1200$		Table 26.9		
3 sec Gust Exponent α =	7.00		Table 26.9		
Turbulence Intensity Factor c =	0.30		Table 26.9		
Power Law Exponent ε =	0.33		Table 26.9		
Minimum Height z _{min} =	30		Table 26.9	9-1	
Integral Length Scale of Turbul	lence L _z =	310	ft		
Output - Background Response F	actor Q =	0.90			
Intensity of Turbu	lence $I_z =$	0.30			
Gust Effect F	actor G =	0.86			
Pressure Coefficients	Input				
Length to Width R		0.89			
Height to Length R		0.36			
Roof Pitch =		: 12 =	3.81	deg	
Velocity Pressure Exposure Coefficients K _h		(see below)	Table 27.3	3-1 (page 26	(1)
External Pressure Coeff	ficients C _p	(see below)	Figure 27.	4-1 (page 20	64)
Direction C _p		Height (ft)	K _h	q _z (psf)	Velocity
Wall Windward 0.8		15	0.57	18.0	Pressure
Wall Leeward -0.5		20	0.62	19.6	Output q _z
Roof Windward 0.4		25	0.67	20.8	
Roof Leeward -0.6		30	0.70	22.0	
		40	0.76	23.8	
		50	0.81	25.4	
		60	0.85	26.8	
		70	0.89	28.0	
		80	0.93	29.1	
		90	0.96	30.0	
		100	0.99	31.0	
		120	1.04	32.6	
Γ	h =	20	0.62	19.6	q _h

		p (psf) - GC,				10 psf min	
Inter	nal Pressure C	Coefficient GC _{pi} =	-0.18	Fig. 26.11-1 (page 258)	Wall	Roof
				Horizontal Eff	ects		Horiz.
	Direction -	Windward	Leeward	Roof WW	Roof LW	WW+LW	RWW+RLW
Height	15	9.6	-3.0			12.5	
ft	20	10.2	-3.0			13.2	
	25	10.7	-3.0			13.7	_
	30	11.2	-3.0			14.2	
	40	12.0	-3.0			14.9	
	50	12.6	-3.0			15.6	
	60	13.2	-3.0			16.2	
	70	13.7	-3.0			16.7	
	80	14.2	-3.0		1 - Di	17.1	
	90	14.6	-3.0			17.5	
	100	14.9	-3.0			17.9	
	120	15.6	-3.0			18.6	
	20	10.2	-3.0	0.41	-0.23	13.2	0.67

*All wind componets have been adjusted by 0.6 per Allowable Stress Design Load combinations ASCE7-10 (page 8)

sign Wi	ind Pressures	p (psf) - GC	_{pi} = (+)			10 psf min	per 6.1.4.1
Inter	nal Pressure C	Coefficient GC _{pi} =	= 0.18	Fig. 26.11-1 (page 258)	Wall	Roof
				Horizontal Eff	ects		Horiz.
-	Direction -	Windward	Leeward	Roof WW	Roof LW	WW+LW	RWW+RLW
Height	15	5.4	-7.2			12.5	
ft	20	6.0	-7.2			13.2	
	25	6.5	-7.2		1	13.7	
	30	7.0	-7.2			14.2	gi a li s'il a
	40	7.8	-7.2			14.9	
	50	8.4	-7.2			15.6	
	60	9.0	-7.2			16.2	
	70	9.5	-7.2			16.7	
	80	9.9	-7.2			17.1	
	90	10.3	-7.2			17.5	
	100	10.7	-7.2		6 C 11	17.9	
	120	11.4	-7.2			18.6	
	20	6.0	-7.2	0.13	-0.51	13.2	0.67

*All wind componets have been adjusted by 0.6 per Allowable Stress Design Load combinations ASCE7-10 (page 8)

FROELICH CONSULTING ENGINEERS, INC.

client: Arcon project: Alta Mira job number: 15-T070 date: 5/14/2015 by: AT



130.2 plf

1102 lbs 686 lbs

> 699 lbs 686 lbs

2521 lbs 2901 lbs

Lov	ver Floor Wind:
PLf	= 12.4psf (10.5ft)=
Up	per North Wall Line(From East)
	Fw = 10.2 psf [(4.5ft)(13 ft)+25SF]=
	Fe = (.5)(13ft/55ft) x 5802lb
*W	indward Design
Up	per North Wall Line(From West)
	Fw = 10.2 psf [(4.5ft)(6.5 ft)+10SF]=
	Fe = (.5)(13ft/55ft) x 5802lb
*W	indward Design
Up	per Back of Garage Wall Line
	Fw = 13.2 psf [(4.5ft)(28 ft)+65SF]=
	Fe = (1/2) x 5802lb
Up	per South Wall Line

1221 lbs
1582 lbs

Upper East/West Wall Line

Fw = 74 plf (25 ft)=	1850 lbs
$Fe = (1/2) \times 5802Ib$	2901 lbs
Lawer Back of Concer Well Line	
Lower Back of Garage Wall Line	

Fw = 130.2 plf x 15ft= 1953 lbs Fe = 1920lb(.5)= 960 lbs

Lower South Wall Line

Fw = 130.2 plf x 15ft=	1953 lbs
Fe = 1920lb(.5)=	960 lbs

Lower East Wall Line

Fw =	130.2 plf x 31.5ft=	4101 lbs
Fe =	1920lb(31.5/50)=	1210 lbs

Lower West Wall Line

Fw = 130.2 plf x 18.5ft=	2409 lbs
Fe = 1920lb(18.5/50)=	710 lbs

Client: Arcon	First Floo	r Shear Walls and Hold Downs
Project: Alta Mira	Roof DL:	17 psf
Proj. #: 15-T070	Wall DL:	8 psf
Date: 6/9/15	Floor DL:	20 psf
By: AT		

L, (f1)	Lt (ft)	har (ft)	hl (ft)	hl/L	Lower Seismic	Upper Seismic	Lower Wind	Upper Wind	Ms W (lb*ft)	Mu W (lb*fi)	Ms EQ (lb*ft)	Mu EQ (lb*ft)	Rtrib (ft)	Wtrib (ft)	Ftrib (ft)	Mr (lb*ft)	Lo (in)	Tu W (lb)	Ts W (lb)	Sheathing W Design (plf)	Tu W (Ib)	Ts W (lb)	Sheathing EQ Design (plf)	Hold Downs	Nailing
1		1	1					1							1			i i							
wer - I	Back of	Garag	e Wal	Line																					
16.00	16,00		Production in the local division in the loca	0.6	960	2901	1953	2521	65476	40266	63759	34749	25	18	12	62131	0.000	-1367	209	280	-1711	102	241	Not Req'd	6/12
		A																							
L	Lt	hu	hl	hl/L	Lower	Upper	Lower	Upper	Ms W	Mu W	Ms EQ	Mu EQ	Rtrib	Wtrib	Ftrib	Mr	Lo	Tu W	Ts W	Sheathing W	Tu W	Ts W	Sheathing EQ	Hold Downs	Nailing
(1)	(ft)	(ft)	(ft)		Seismic	Seismic	Wind	Wind	()6*Å)	(lb*fi)	(lb*ft)	(lb*ft)	(ft)	(ft)	(ft)	(lb*ft)	(in)	(lb)	(lb)	Design (plf)	(lb)	(lb)	Design (plf)		
ower -S	_		e																						
7.00	13.00	9	9	1.3	960	1582	1953	1221	21956	15382	20837	12319	11.5	18	6	6755	8.625	1373	2420	244	886	2242	196	HTT4 w/ SSTB16	6/12
6.00	13.00	9	9	1.5	960	1582	1953	1221	18820	13184	17861	10559	8.5	18	8.5	4952	8.625	1559	2626	244	1062	2444	196	HTT4 w/ SSTB16	6/12
LT	Lt	bu	hi	hl/L	1.ower	Upper	Lower	Upper	Ms W	Mu W	Ms EQ	Mu EQ	Rtrib	Wtrib	Ftrib	Mr	Ló	TuW	Ts W	Sheathing W	Tu W	Ts W	Sheathing EQ	Hold Downs	Nailing
(ft)	(ft)	(ft)	(ft)	100	Seismic	Seismic	Wind	Wind	(lb*ft)	(lb*ft)	(lb*ft)	(lb*ft)	(ft)	(ft)	(ft)	(lb*ft)	(in)	(lb)	(lb)	Design (plf)	(lb)	(1b)	Design (plf)		
															T										
ower -E	ast Wal	ll Line							11.200																
6.00	6:00	9	9	1.5	1210	0	4101	0	36909	36909	10890	10890	2	18	2	2354	12.000	6911	6911	684	1707	1707	202	HDU8	2/12
L	Lt	hu	hl	hl/L	Lower	Upper	Lower	Upper	Ms W	Mu W	Ms EQ	Mu EQ		Wtrib	111330	Mr	1.0	Tu W	Ts W	Sheathing W	Tu W	Ts W	Sheathing EQ	Hold Downs	Nailing
(fl)	(ft)	(ft)	(ft)		Seismic	Seismic	Wind	Wind	(īb*ß)	(ib*ft)	(lb*ft)	(lb*ft)	(ft)	(ft)	(ft)	(lb*ft)	(in)	(lb)	(Ib)	Design (plf)	(15)	(1b)	Design (plf)		
ower - V	Vest W	all Lin	6			-					-		_		-						-				
8.00	25 00	-	9	1.1	710	2901	2409	1850	18186	12266	19683	10400	2	18	2	4186	8,625	1110	1923	170	853	2128	144	HTT4 w/ SSTB16	6/12
			1.00			and the second se		100 million (100 m				12277					Contraction of the Contraction o								

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	Alta M 15-T07 6/9/15				Upper Roof DL: Wall DL: Floor DL:		Shear \ 17 8 20	psf psf	and H	old I)owns							
L	Lı	hu	h/L	Wind	Seismic	Mu W	Mu EQ	Rtrib	Wtrib	Ftrib	Mr	Lo	Tu W	Sheathing W	Tu EQ	Sheathing EQ	Hold Downs	Nailing
(ft)	(ft)	(ft)		(1b)	(lb)	(lb*ft)	(lb*ft)	(ft)	(ft)	(ft)	(lb*ft)	(in)	(lb)	Design (plf)	(lb)	Design (plf)		
orth W	/all Lin	c		ii														1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1
3.200	6.40	9.0	2.8	1102	686	4959	3087	13.5	9.0	0	926	0.000	1260	172	675	151	HTT4	6/12
3.200	6.40	9.0	2.8	1102	686	4959	3087	13.5	9.0	0	926	0.000	1260	172	675	151	HTT4	6/12
3.200	6.40	9.0	2.8	699	686	3146	3087	8.5	9.0	0	665	0.000	775	109	757	151	HTT4	6/12
3,200	6,40	9.0	2.8	699	686	3146	3087	8.5	9.0	0	665	0.000	775	109	757	151	HTT4	6/12
		1	10 1	31/ - I	Columba I	Mu W	Mu EQ	Dealth	most I	Decile	24		20. IV	T	T. FO			
(ft)	Lt (ft)	hu (ft)	h/L	Wind (lb)	Seismic (lb)	(lb*ft)	(lb*ft)	Rtrib (ft)	Wtrib (ft)	Ftrib (ft)	Mr (lb*ft)	Lo	Tu W	Sheathing W	Tu EQ	Sheathing EQ	Hold Downs	Nailing
(11)	(11)	uŋ		(10)	(10)	(10.11)	(10 11)	(ii)	(11)	(ii)	(10 11)	(in)	(lb)	Design (plf)	(lb)	Design (plf)		and the second
ack of	Garage	Wall Li	ne															
29.000	29.00	9.0	0.3	2521	2901	22689	26109	25	9.0	0	125393	0.000	-3542	87	-3424	100	Not Req'd	6/12
T I	Lt	hu	h/L	Wind	Seismic	Mu	Mu EQ	Rtrib	Wtrib	Ftrib	Mr	Lo	Tu W	Sheathing W	Tu EQ	Sheathing EQ	Hold Downs	Nailing
(ft)	(ft)	(ft)		(lb)	(lb)	(lb*ft)	(15*ft)	(ft)	(ft)	(ft)	(lb*ft)	(ft)	(1b)	Design (plf)	(lb)	Design (plf)	Hold Downs	Training
	()	4-52		0.07	5.47	312.14	0.4.1.0		64		1.59	1-2	()	Design (pil)	()	1 Design (pit)		
outh W	all Lin	e																
6.000	9.00	9.0	1.5	1221	1582	7326	9492	13.5	9.0	0	3256	0.000	678	136	1039	176	MST37	6/12
3.000	9.00	9.0	3.0	1221	1582	3663	4746	10.5	9.0	0	676	0.000	996	136	1357	264	MST37	4/12
L	Lt	hu	h/L	Wind	Seismic	Mu	Mu EQ	Rtrib	Wtrib	Ftrib	Mr	Lo	Tu W	Sheathing W	Tu EQ	Sheathing EQ	Hold Downs	Nailing
(ft)	(ft)	(ft)	20000	(lb)	(lb)	(lb*ft)	(16*ft)	(ft)	(ft)	(ft)	(lb*ft)	(ft)	(lb)	Design (plf)	(lb)	Design (plf)	Hold Donies	
											-							
Vest W			1.70	1000	2001	0225	12055	10	0.01	-	20/0	0.000	1020	T 172 T	1004	1 071	METODATE	(112
5.350	10.70	<u>9.0</u> 9.0	1.7	1850 1850	2901 2901	8325 8325	13055 13055	10	8.0 8.0	5	2868 2868	0.000	<u>1020</u> 1020	173 173	1904 1904	271 271	MST37/HTT4 MST37/HTT4	6/12
5.550	10.70	9.0	L/	1830	2901	6525	13035	10	0.0	2	2808	0.000	1020	1/3	1904	2/1	M313//H114	0/12
L	Lt	hu	h/L.	Wind	Seismic	Mu	Mu EQ	Rtrib	Wtrib	Ftrib	Mr	Lo	Tu W	Sheathing W	Tu EQ	Sheathing EQ	Hold Downs	Nailing
(ft)	(ft)	(fi)		(lb)	(lb)	(lb*fi)	(lb*ft)	(ft)	(ft)	(ft)	(lb*ft)	(ft)	(lb)	Design (plf)	(lb)	Design (plf)		
ast Wa		0.0	0.01	1950	2001	16650	261001	2	0.01	0	20.80	0.000	1120	1 145 1	1075	250	MCT40	4/12
11.200	11,20	9.0	0.8	1850	2901	16650	26109	2	9.0	0	3989	0.000	1130	165	1975	259	MST48	4/12

Controls

Controls

Right

FROELICH CONSULTING ENGINEERS, INC.

client: Arcon project: Alta Mira job number: 15-T070 date: 5/14/2015 by: AT

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Bearing at Shear Wall and Bending in Footing

Location: Lower Entry Wall

Foundation Properties:

fc (Concrete) =	2500	psi
Density (Reinforced Concrete) =	145	pcf
E (Concrete) =	2850	ksi
fy (Steel) =	60	ksi
Es (Steel) =	29000	ksi
Soil Bearing (1/3 Stress Increce) =	2000	psf

Foundation Loading:

Force Uplift (Wind):	(+/-)	6911	lbs
Force Uplift (Seismic):	(+/-)	0	lbs
Beam DL (Left) =		0	lbs
LL =	RB?	0	lbs
SL =		0	
Beam DL (Right) =		0	lbs
LL =	RB?	0	lbs
SL =		0	

4	
1	
	ELICH

72 in

Hold Down Edge Dist: 9 W/S? in Embed depth (to plate): 6 W/S? in L1 (depth past plate): 1.5 in Clear Cover: 3 in Load Cases (Bearing, Ibs)1: Left 140 01 0.0

(16-8)	D+F	0	0
(16-9)	D+H+F+L =	0	0
(16-10)	D+H+F+(S) =	0	0
(16-11)	D+H+F+0.75L+0.75S =	0	0
(16-12)W	D+H+F+(0.6W)=	6911	6911
(16-12)E	D+H+F+(0.7E)=	0	0
(16-13)	D+H+F+0.75L+0.75S+0.75(0.6W) =	5183.25	5183.25
(16-14)	D+H+F+0.75L+0.75S+0.75(0.7E) =	0	0

Load Cases (Uplift w/ beam DL, Ibs)2:

Wall Dims/Hold down cover:

Wall Width:

(16-15)	0.6D + 0.6W+H=	-6911	-6911
(16-16)	0.6(D+F)+0.7E+H =	0	0

entedred):	
16.0	ft
6.0	ft
5.0	ft
11.0	ft
	6.0 5.0

Notes:

1) 0.6 and 0.7 are concidered in wind and seismic force calc
 2) Hold down edge distance and embedment depth can be reduced to account for Beam dead loads

Results:

Bending in Footing:



Required Footing Dim's for Bearing:

Footing Width:	24	in	Bars (EW):	3	#4 Bars
Total FTG Length:	24	in			
Footing Depth:	12	in	Bars placed 3 in	nches Clear fr	om bottom

* Rebar spacing is based on ACI min steel

Foundation At Garage Slab With Equivalent Exterior Grade (6x12)

Location: Garage Exterior Wall

Max Axial Load:					Foundation Geometry	
Roof Trib=	9.00	ft	Roof DL =	153	plf	Stem H = 32 in
Wall Trib=	19.00	ft	SL =	225	plf	Stem T = 6 in
Floor Trib =	3	ft	Wall DL =	152	plf	Footing H = 6 in
			Floor DL =	60	plf	Footing W = 12 in
			LL =	120	plf	

Load Cas	es:	Dead	Live (1)	Total	Wind (2)	Eq (2)
(16-8)	D+F	365	NA	365	NA	NA
(16-9)	D+H+F+L =	365	120	485	NA	NA
(16-10)	D+H+F+(S) =	365	225	590	NA	NA
(16-11)	D+H+F+0.75L+0.75S =	365	259	624	NA	NA

Note:

:

1) Foundation is supported both sides by soil pressure (2012 IBC 1807.1.1)

2) 7.5 " wide to meet Structrul plain concrete (2012 IBC 1905.1.8)

3) Vertical Dowels required because not supported top/bottom (ACI 318-11 22.6)

Footing Dead Load = 266 plf



Foundation At Garage Slab With Equivalent Exterior Grade (7x15)

Location: Garage Exterior Wall

Max Axial Load:					Foundation Geometry			
Roof Trib=	9.00	ft	Roof DL =	153	plf	Stem H =	31	in
Wall Trib=	19.00	ft	SL =	225	plf	Stem T =	8	in
Floor Trib =	9	ft	Wall DL =	152	plf	Footing H =	7	in
			Floor DL =	180	plf	Footing W =	15	in
			LL =	360	plf			

Load Cas	es:	Dead	Live (1)	Total	Wind (2)	Eq (2)
(16-8)	D+F	485	NA	485	NA	NA
(16-9)	D+H+F+L =	485	360	845	NA	NA
(16-10)	D+H+F+(S) =	485	225	710	NA	NA
(16-11)	D+H+F+0.75L+0.75S =	485	439	924	NA	NA

Note:

Foundation is supported both sides by soil pressure (2012 IBC 1807.1.1)
 7.5 " wide to meet Structrul plain concrete (2012 IBC 1905.1.8)

3) Vertical Dowels required because not supported top/bottom (ACI 318-11 22.6)

Footing Dead Load = 355 plf





Note:

15"x7" Cont. FTG w/ 8" Stemwall w/ #4 Bar Top/Bottom Per IBC/OSSC 1905.1.8(a)(c)2 w/ #4 Bar dowels 48 in o.c. (By inspection)