# Structural Calculations Alta Mira Residence

Portland, Oregon (Chris Thelen)



June 5, 2012 Job Number: 15-T070



FROELICH

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Client:DOWAProject:Alta Mira ResidenceProj.#:15-T070Date:5-5-2015By: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)		
	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:

Li	ve Load =	40	psf	(IBC Table 1607.1)	
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## Wind Load:

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

## Seismic Load:

Occupancy Category =	II	(IBC Table 1604.5)
Seismic Importance Factor $(I_E) =$	1.00	(ASCE7-10 Table 11.5-1)
Site Class =	D	*
Mapped Spectral Acceleration Values $(S_s) =$	0.995	g
Mapped Spectral Acceleration Values $(S_1) =$	0.428	g
Design Spectral Response Parameter $(S_{DS}) =$	0.731	g
Design Spectral Response Parameter $(S_{D1}) =$	0.449	g
Seismic Design Category =	D	
Response Modification Coefficient (R) =	6.5	Light-framed walls sheathed with wood panels Shear Walls (Bearing Wall System)

## Soils Data:

Allowable Bearing Pressure =	2000	psf *	
Exterior Footing Depth =	18	inches*	
Exterior rooting Depti	10	menes	

\* 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:	Comp. Shingles (3-layers) 14" Roof Joist @ 16" oc Insulation 1/2" Gyp. Ceiling 15/32" Plywood Misc. To Us	tal:	DL (psf) 6.0 4.0 1.6 2.0 1.6 1.5 <u>16.7</u> psf <b>17.0 psf</b>	Roof Pitch rise= 0.8 run= 12 Slope Corrected DL= total/cos(-tan(roof slope)) DL= 0.0
2nd Floo	or: 3/4" Plywood 11-7/8" LPI's @ 16" o.c. 1" gypcrete Insulation 1/2" Gyp. Ceiling Carpet Misc.		DL (psf) 2.4 3.5 8.0 1.6 2.0 2.0 0.5	
	To Us	tal: e:	20 psf 20.0 psf	
Exterior	Walls: 1/2" Plywood 2x6 DF Studs @ 16" o.c. Insulation 1/2" Gyp. Misc.		DL (psf) 1.6 1.5 1.6 2.0 1.0	
	To Us	tal: e:	7.7 psf 8.0 psf	

	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: 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 Beam Span: 20'-0" 1 ft * 2x snow load at eve over hangs Loads: Roof DL: 17 psf x 13.00 ft = 221 plf SL: 25 psf x 13.00 ft = 350 plf Solar DL: 5 psf x 6.50 ft = 33 plf	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         Loading       Trib.         Roof DL:       22       psf       x 10.50         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

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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"1ft * 2x snow load at eve over hangs Loads:LoadingTrib. tTrib. t1.00ft = 17plf1ftRoof DL:17 25 psfpsfx1.00ft = 50plfTriangular to-Roof DL:17 tpsfx5.00 5.00ft = 85plfendRoof DL:17 25 psfpsfx5.00 5.00ft = 150plfend	4x8DF#2

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COMPANY	PROJECT

May 29, 2015 17:30 RB1

## **Design Check Calculation Sheet**

Sizer 2004a

## LOADS (lbs, psf, or plf) :

Load Type		Distribution	Magnitude		Location [ft]		Pat-	
			Start	End	Start	End	tern	
Load1	Dead	Full UDL	238.0				No	
Load2	Snow	Full UDL	350.0				Yes	

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

	۵'	
Dead Live	2017 2800	2017 2800
Total	4817	4817
Total Bearing: LC number Length	2 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	Analysis Value	Design Value	Analysis/Design
Shear	fv = 103	Fv' = 276	fv/Fv' = 0.37
Bending(+)	fb = 1880	Fb' = 2760	fb/Fb' = 0.68
Live Defl'n	0.39 = L/494	0.53 = L/360	0.73
Total Defl'n	0.67 = L/287	0.80 = L/240	0.84

## ADDITIONAL DATA:

ADDITIONA	L DAIA.										
FACTORS: F	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cn	LC#
Fb'+ 240	0 1.15	1.00	1.00	1.000	1.000	1.00	1.00	1.00	1.00	-	2
Fv' 24	0 1.15	1.00	1.00	-	-	-		1.00	1.00	1.00	2
Fcp' 65	0 –	1.00	1.00	-	-	-	-	1.00		-	-
E' 1.	8 million	1.00	1.00	-	-	-		1.00			2
(All LC'	: LC# 2 = : LC# 2 =	D+S, D+S 1.00(D S=snow ted in	V = EI= Dead Lo W=wi the A	4817, V 1328e0 ad Defl nd I=i nalysis	design 6 lb-in ection) mpact output	2 + Liv C=cons )	re Load tructi	Defle on CL	d=conc		ed)

#### **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.
- 5. GLULAM: bearing length based on smaller of Fcp(tension), Fcp(comp'n).





May 28, 2015 10:20 RB2

PROJECT

## Design Check Calculation Sheet

Sizer 2004a

#### LOADS (lbs, psf, or plf) :

Load	Туре	Distribution	Magnitude		Locatio	Pat-	
			Start	End	Start	End	tern
Load1	Dead	Full UDL	221.0				No
Load1 Load2	Snow	Full UDL	350.0				No
Load3	Dead	Full UDL	33.0				No

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

	7	 	2						
	0'							20	0'
Dead	2846								846
Live	3500							35	500
Total	6346							63	346
Bearing:		 							
LC number	2								2
Length	1.21		 	 	 	 	 	 1.	.21

## 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:

ADDIT	IONAL	DATA.										
FACTORS	5: 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	-	1.00	-	-	-	-	1.00	-	1.00	2
Fcp'	750	-	-	1.00	-	-	-	-	1.00	-	-	-
E'	2.1	million	-	1.00	-	-	-	-	1.00	-	-	2
Shear Deflec Total (D=c	: ction: Deflec dead L	LC# 2 = LC# 2 = LC# 2 = tion = 1 =live \$ are list	D+S, D+S L.50(I S=snov	V = EI= Dead Lo W=wi	6346, V 3361e0 ad Defle nd I=in	design 6 lb-in ection) mpact	2 + Li C=con	ve Load	l Defle			ed)

#### **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.





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
Load2	Snow	Full UDL	288.0				Yes

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

	0'	∆ 3'	∆ 9'	∆ 15'	18'
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 :

Cr	iterion	Analysis Value	Design Value	Analysis/Design
She	ear	fv = 81	Fv' = 207	fv/Fv' = 0.39
Ber	ding(+)	fb = 390	Fb' = 1337	fb/Fb' = 0.29
Ber	ding(-)	fb = 706	Fb' = 1343	fb/Fb' = 0.53
Liv	e Defl'n	0.02 = <l 999<="" td=""><td>0.20 = L/360</td><td>0.08</td></l>	0.20 = L/360	0.08
Tot	al 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 De (D=dea (All 1	(-): : ion: eflec ad I LC's	LC# 7 = LC# 8 = LC# 8 = LC# 4 = ction = 1 LC# 4 = ction = 1 are list	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)	

#### **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	Туре	Distribution	Magnit	ude	Locatio	on [ft]	Pat-
			Start	End	Start	End	tern
Load1	Dead	Full UDL	297.0				No
Load1 Load2	Snow	Full UDL	363.0				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 = 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:

I	ADDITIO	MAL	DATA.											
	FACTORS:	F	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci		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	1.00	-	-	
	E'	1.6	million	1.00	1.00	-	-	-	-	1.00	1.00	-	2	
	Shear Deflect: Total De (D=dea	: ion: eflec ad 1	LC# 2 = LC# 2 = LC# 2 = ction = 1 L=live 3 are list	D+S, D+S 1.50(I S=snov	V = EI= Dead Lo W=wi	1998, V 178e0 ad Defl nd I=i	design 6 lb-in ection) mpact	12 + Liv C=cons	re Load	l Defle			ed)	

#### **DESIGN NOTES:**

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





May 7, 2015 15:48 RB5

PROJECT

## Design Check Calculation Sheet

Sizer 2004a

#### LOADS (lbs, psf, or plf) :

Load	Туре	Distribution	Magnit	ude	Locatio	on [ft]	Pat-
			Start	End	Start	End	tern
Load1	Dead	Full UDL	306.0				No
Load2	Snow	Full UDL	475.0				No
Load3	Dead	Full UDL	90.0				No

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

		<u>\</u>
	0'	20'
Dead Live Total	4188 4750 8938	4188 4750 8938
Bearing: LC number Length	2 2.50	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:**

FACTO	RS: 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	-	-	-	-	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

(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.

5. GLULAM: bearing length based on smaller of Fcp(tension), Fcp(comp'n).





May 7, 2015 16:16 RB7

PROJECT

## Design Check Calculation Sheet

Sizer 2004a

#### LOADS (lbs, psf, or plf) :

Load	Туре	Distribution	Magnit	ude	Locatio	on [ft]	Pat-
			Start	End	Start	End	tern
Load1	Dead	Full UDL	242.0				No
Load1 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	MAL	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	-	-	-	-	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 De (D=dea	: ion: eflec ad I	LC# 2 = LC# 2 = LC# 2 = ction = LC# 2 = are lis	D+S, D+S 1.50(E S=snov	V = EI= Dead Lo W=wi	2481, V 664e0 ad Defl nd I=i	/ design 06 lb-in .ection) .mpact	12 + Liv C=cons	ve Load	l Defle			ed)	

#### **DESIGN NOTES:**

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





COMPANY PROJECT

RB8 May 28, 2015 11:07

## **Design Check Calculation Sheet**

Sizer 2004a

#### LOADS (lbs, psf, or plf) :

Load	Туре	Distribution	Magni	tude	Locatio	on [ft]	Pat-
			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'	∆ 4'	
Dead Live Total	29 29	618 618	342 342
Bearing: LC number Length	1 1.00	1 1.00	1

## 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 :

Crite	rion	Analysis Value		Design	Value	Analysis/	Design
Shear		fv = 18		Fv' =	162	fv/Fv'	= 0.11
Bendin	g (+)	fb = 101		Fb' =	1051	fb/Fb'	= 0.10
Bendin	g (-)	fb = 97		Fb' =	1051	fb/Fb'	= 0.09
Live	Defl'n	negligible					
Total	Defl'n	0.01 = < L/999	)	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	-	1	
Fb'-	900	0.90	1.00	1.00	0.998	1.300	1.00	1.00	1.00	1.00	-	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	-	-	
Е'	1.6	million	1.00	1.00	-	-	-	-	1.00	1.00	-	1	
Bending	(+):	LC# 1 =	D onl	y, M =	258	lbs-ft							
Bending	(-):	LC# 1 =	D onl	y, M =	247	lbs-ft							
Shear	:	LC# 1 =	D onl	y, V =	387	, V des	ign =	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	S	
Column C1	Location: Garage Main Door Height: 9'-0" Loads: RB1 DL = SL =	2017 lbs 2800 lbs 4817 lbs	(2) 2x6 DF Ok on Typ FTG
Column C2	Location: Beam above Dining Height: 9'-0" Loads: RB2 DL = SL =	2749 lbs 3500 lbs 6249 lbs	(2) 2x6 DF 24"x24"x10" Conc FTG w/ (3) #4 bars EW
Column C3	Location: Front Living Height: 9'-0" Loads: RB3 DL = SL = Wind OOP= 13.2 psf (6ft)= 8	1511 lbs 1868 lbs 3379 lbs 1 plf	4x6 DF #4 24"x24"x10" Conc FTG w/ (3) #4 bars EW
Column C4	Location: Garage BEAM Height: 9'-0'' Loads: RB6 DL = SL =	3778 lbs 5369 lbs 9147 lbs	6X6 df #2 36X36"x10" Conc FTG w/ (4) #4 bars EW
Column C5	Location: Garage Floor Height: 9'-0" Loads: RB6 DL = SL = FB3 DL= LL=	3778 lbs 5369 lbs 4393 lbs <u>3120 lbs</u> 16660 lbs	6x6 DF #2 36x36x10" Conc FTG w/ (4) #4 bars EW
Column C6	Location: Garage Right of opening Height: 5'-0" Loads: FB3 DL= LL=	2920 lbs 2080 lbs 5000 lbs	6x6 DF #2 24"x24"x10" Conc FTG w/ (3) #4 bars EW

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COMPANY PROJECT

C3 May 11, 2015 15:32

## **Design Check Calculation Sheet**

Sizer 2004a

## LOADS (lbs, psf, or plf) :

Load	Туре	e Distribution Magnitude		tude	Locatio	Pat-	
			Start	End	Start	End	tern
Load1	Dead	Axial	1511	(Eccer	tricity	= 0.25	in)
Load2	Snow	Axial	1868	(Eccer	tricity	= 0.25	in)
Load3	Wind	Full UDL	81.0		_		No

## MAXIMUM REACTIONS (Ibs):

	0'	
Dead		
Dead Live Total	364	
Total	364	3

## 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 & s	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	1.00	2	
Fc'comb	1350	1.60	-	-	0.252	-	-	-	-	-	3	
E'	1.6	million	1.00	1.00	-	-	-	-	1.00	1.00	4	
Fc*	1350	1.15	1.00	1.00	-	1.100	-	-	1.00	1.00	2	
		LC# 4 =										
		LC# 4 =					5	364	lbs			
		LC# 4 =										
		ction =					+ Liv	e Load	Defle	ection.		
Axial		LC# 2 =										
Eq.15.4	4-1 :	Crit.LC										
		FCE = 12										
		L=live						tructi	on CL	d=conce	entrated	.)
(All	LC's	are lis	ted in	the A	nalysis	output	)					

## **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**

**Footing Thicknes** 

Pedestal dimensions...

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

## **General Information**

Material Properties			2.50 ksi				
fc : Concrete 28 day strer	fc : Concrete 28 day strength						
fy : Rebar Yield	=	60.0 ksi					
Ec : Concrete Elastic Mod	ulus	=	2,850.0 ksi				
Concrete Density		=	145.0 pcf				
φ Values Flexure		=	0.90				
Shear		=	0.750				
Analysis Settings							
Min Steel % Bending Rein	ıf.	=					
Min Allow % Temp Reinf.		=	0.00180				
Min. Overturning Safety F	actor	=	1.50 : 1				
Min. Sliding Safety Factor		=	1.50 : 1				
Add Ftg Wt for Soil Press	ure	:	Yes				
Use ftg wt for stability, mo	ments & shears	:	Yes				
Add Pedestal Wt for Soil F		:	No				
Use Pedestal wt for stabili	ty, mom & shear	:	No				
Dimensions							
Width parallel to X-X Axis	=	3.0 ft					
Length parallel to Z-Z Axis	=	3.0 ft					

=

10.0 in

4

# 4

Soil Design Values Allowable Soil Bearing Increase Bearing By Footing Weight	=	2.0 ksf 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	=	0.0 ft	
Allowable pressure increase per foot of dept	1=	0.0 ksf	
when footing base is below	=	0.0 ft	
Increases based on footing plan dimension			
Allowable pressure increase per foot of dept		0.0 ksf	
when maximum length or width is greate	r‡	0.0 ft	

Project Title: Engineer: Project Descr:



processial offinensions px : parallel to X-X Axis pz : parallel to Z-Z Axis Height Rebar Centerline to Edge of	= = = Concrete	(	0.0 in 0.0 in 0.0 in
at Bottom of footing	=	;	3.0 in
Reinforcing			
Demonstration V.V.A.da			
Bars parallel to X-X Axis Number of Bars 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**

Number of Bars

Reinforcing Bar Size

		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

Printed: 12 MAY 2015, 8:43AM File = q:\!Jobs\2015\1IYO0Z~Y\Framing\calcs.ec6 ENERCALC, INC. 1983-2015, Build:6.15.4.10, Ver:6.15.4.10 Ligensee : FROELICH CONSULTING ENGINEERS

Project ID:

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 C5 FTG Description :

## DESIGN SUMMARY

Printed: 12 MAY 2015, 643AM File = q:\Jobs\2015\11YO0Z-YYFraming\calcs.ec6 ENERCALC, INC. 1983-2015, Build:6.15.4.10, Ver.6.15.4.10 Licensee : FROELICH CONSULTING ENGINEERS

DESIGN SUMMARY					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
Reference	Oolumin Oize	Allowable Load	Grain, Pc <sup>⊥</sup> (lbs)	Grain, Pc <sup>⊥</sup> (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
	(1) - 2x4 DF#2	1800	3281	2126
No	(2) - 2x4 DF#2	3650	6563	4253
Inch	(3) - 2x4 DF#2	5600	9844	6379
Ainchwall	(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
Alter States	(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
Inch	(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
č.	PT 4x4 HF #2**	2850	7656	4961
805t	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 @5ft LL= 800 lb	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

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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	Туре	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:

ł	ADDITIO	INAL	DAIA.										
	FACTORS:	F	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
I	Fb'+	900	1.00	1.00	1.00	0.992	1.300	1.00	1.00	1.00	1.00	-	2
l	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 De (D=dea	: ion: eflec ad 1	LC# 2 = LC# 2 = LC# 2 = ction = L=live are lis	D+L, D+L 1.50(I S=snov	V = EI= Dead Lo W=wi	1278, V 178e0 ad Defl .nd I=i	/ design 06 lb-in .ection) .mpact	12 + Liv C=cons	ve Load	Defle			ed)

#### **DESIGN NOTES:**

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





PROJECT

May 8, 2015 15:44 FB2

## 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	170.0				No
Load1 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		DAIA.										
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 De (D=dea	: ion: eflec ad I	LC# 2 = LC# 2 = LC# 2 = ction = L=live are lis	D+L, D+L 1.50(E S=snow	V = EI= Dead Lo W=wi	1548, V 178e0 ad Defl .nd I=i	design 6 lb-in ection) mpact	12 + Liv C=cons	re Load	Defle			.ed)

#### **DESIGN NOTES:**

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





COMPANY PROJECT

#### FB3 May 28, 2015 11:27

## **Design Check Calculation Sheet**

Sizer 2004a

#### LOADS (lbs, psf, or plf) :

Load	Туре	Distribution	Magnit	ude	Locati	on [ft]	Pat-
			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.

ł	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	-	-	-	-	1.00	1.00	-	-	
	Е'	1.6	million	1.00	1.00	-	-	-	-	1.00	1.00	-	2	
	Shear Deflec Total (D=d	: tion: Deflec ead I	LC# 2 = LC# 2 = LC# 2 = ction = L=live are lis	D+L, D+L 1.50(E S=snow	V = EI= Dead Lo W=wi	5000, V 1115e0 ad Defl nd I=i	design 6 lb-in .ection) .mpact	2 + Liv C=cons		l Defle			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	Туре	Distribution	Magnit	ude	Locatio	on [ft]	Pat-
			Start	End	Start	End	tern
Loadl	Dead	Full UDL	100.0				No
Load2	Live	Full UDL	200.0				No

#### MAXIMUM REACTIONS (lbs) 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' = 240	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	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	-	-	-	-	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
Bendin	q(+):	LC# 2 =	D+L,	M =	2477 lb	s-ft						

Shear : LC# 2 = D+L, W = 2477 IbS-It Shear : LC# 2 = D+L, V = 1238, V design = 932 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.

5. GLULAM: bearing length based on smaller of Fcp(tension), Fcp(comp'n).





May 12, 2015 15:57 FB5

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	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'	∆ 10'
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	5: F	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cn	LC#	
Fb'+	2400	1.00	1.00	1.00		1.000	1.00	1.00	1.00	1.00	-	2	
Fv'	240	1.00	1.00	1.00	-	-	-	-	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	
Shear Deflec Total (D=c	: tion: Defle lead	LC# 2 = LC# 2 = LC# 2 = ction = 1 L=live \$ are list	D+L, D+L 1.50(I S=snov	V = EI= Dead Lo W=wi	1267, V 879e0 ad Defl nd I=i	design 6 lb-in ection) mpact	12 + Liv C=cons	re Load	Defle		entrat	ed)	

## 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.

5. GLULAM: bearing length based on smaller of Fcp(tension), Fcp(comp'n).





PROJECT

COMPANY

May 27, 2015 14:16 FB6

## **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	240.0				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	: 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	
1	Fv'	240	1.00	1.00	1.00	-	-	-	-	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	
	Bendin	g(+):	LC# 2 =	D+L,	M =	5818 lb	s-ft							
	Shear	:	LC# 2 =	D+L,	V =	2909, V	design	n = .	2364 lb	S				
	Deflec	tion:	LC# 2 =	D+L	EI =	383e0	6 lb-in	n2						
1	motal	Doflo	ation -	1 50/	Doad I	and Dofl	oction	+ Tin	To Toad	Doflo	ation			

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.
5. GLULAM: bearing length based on smaller of Fcp(tension), Fcp(comp'n).

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

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## 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 Suppor		
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

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

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## 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 Solutions								
Depth	Series	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)	Syste
Member Reaction (lbs)	739 @ 23' 5 1/2"	1219 (1.75")	Passed (61%)	1.15	1.0 D + 1.0 S (All Spans)	Mem
Shear (Ibs)	739 @ 23' 5 1/2"	2237	Passed (33%)	1.15	1.0 D + 1.0 S (All Spans)	Buildi
Moment (Ft-Ibs)	4267 @ 11' 11"	5739	Passed (74%)	1.15	1.0 D + 1.0 S (All Spans)	Build
Live Load Defl. (in)	0.454 @ 11' 11"	0.771	Passed (L/611)		1.0 D + 1.0 S (All Spans)	Desig
Total Load Defl. (in)	0.873 @ 11' 11"	1.157	Passed (L/318)		1.0 D + 1.0 S (All Spans)	Meml

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.

		Bearing Length		Loads to Supports (Ibs)			
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 <sup>1</sup>	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

• <sup>1</sup> 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	LBV2.37/14X D4	2.50"	6-10d common	4-10d common	2-10d x 1-1/2	Web Stiffeners		

				Snow	
Loads	Location	Spacing	(0.90)	(1.15)	Comments
1 - Uniform (PSF)	0 to 23' 9"	16"	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
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 Image: Comparison of Comparison 5/28/2015 2:37:52 PM Forte v4.6, Design Engine: V6.1.1.5 *Joist.4te* 

SUSTAINABLE FORESTRY INITIATIVE

## MEMBER REPORT Roof, Roof: Joist Master 1 piece(s) 14" TJI® 360 @ 24" 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)	1109 @ 23' 5 1/2"	1242 (1.75")	Passed (89%)	1.15	1.0 D + 1.0 S (All Spans)	м
Shear (lbs)	1109 @ 23' 5 1/2"	2248	Passed (49%)	1.15	1.0 D + 1.0 S (All Spans)	В
Moment (Ft-Ibs)	6401 @ 11' 11"	8435	Passed (76%)	1.15	1.0 D + 1.0 S (All Spans)	В
Live Load Defl. (in)	0.575 @ 11' 11"	0.771	Passed (L/483)		1.0 D + 1.0 S (All Spans)	D
Total Load Defl. (in)	1.105 @ 11' 11"	1.157	Passed (L/251)		1.0 D + 1.0 S (All Spans)	M

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 Length			s to Suppor	ts (lbs)			
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 <sup>1</sup>	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

• <sup>1</sup> 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

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

Mem	ber N	lotes
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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* 

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: Floor DL= 20 psf LL= 40 psf	11 7/8 TJI110 @ 16" OC

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May 8, 2015 14:33 FJ1

## **Design Check Calculation Sheet**

Sizer 2004a

## LOADS (lbs, psf, or plf) :

Load	Туре	Type Distribution		tude	Locatio	Pat-	
			Start	End	Start	End	tern
Load1	Dead	Full Area	55.00	(16.0)*			No
Load2	Live	Point	1500		6.50		No

tary 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	: 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	
Fv'	180		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	-	2	
Shear Deflec Total (D=d	: tion: Deflee ead	LC# 2 = LC# 2 = LC# 2 = ction = 1 L=live \$ are list	D+L, D+L L.50(I S=snov	V = EI= Dead Lo W=wi	1287, V 706e0 ad Defl .nd I=i	design 6 lb-in ection) mpact	12 + Liv C=cons	re Load	l Defle			(ed)	

#### **DESIGN NOTES:**

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





May 8, 2015 14:58 FJ1\_LSL

PROJECT

#### Design Check Calculation Sheet

Sizer 2004a

#### LOADS (lbs, psf, or plf) :

Load	Туре	Distribution	Magnit	tude	Locatio	Pat-	
			Start	End	Start	End	tern
Load1	Dead	Full Area	55.00	(1.33)*			No
Load2	Live	Point	1500		6.50		No

\*Tributary Width (ft)

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



## 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:**

FORS: F	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Ci	Cn	LC#	
+ 2360	1.00	-	1.00	1.000	1.00	-	1.00	1.00	-	-	2	
410	1.00	-	1.00	-	-	-	-	1.00	-	1.00	2	
o' 875	-	-	1.00	-	-	-	-	1.00	-	-	-	
1.5	million	-	1.00	-	-	-	-	1.00	-	-	2	
nding(+):	LC# 2 =	D+L,	M =	6561 lb:	s-ft							
ear :	LC# 2 =	D+L,	V =	1269, V	design	=	1190 lb	S				
Election:	LC# 2 =	D+L	EI=	379e0	6 lb-in	2						
al Defle	ction = 1	1.50(	Dead Lo	ad Defle	ection)	+ Li	ve Load	Defle	ction			
(D=dead	L=live S	S=sno	w W=wi	nd I=ir	mpact	C=con:	structi	on CL	d=cond	centrat	.ed)	
(All LC's	are list	ted i	n the A	nalysis	output	)						
I E I	' 410 p' 875 1.5 nding(+): ear : flection: tal Defle (D=dead	'+ 2360 1.00 ' 410 1.00 p' 875 - 1.5 million nding(+): LC# 2 = ear : LC# 2 = flection: LC# 2 = tal Deflection = 3 (D=dead L=live 5	<pre>'+ 2360 1.00 - ' 410 1.00 - p' 875 nding(+): LC# 2 = D+L, ear : LC# 2 = D+L, flection: LC# 2 = D+L tal Deflection = 1.50( (D=dead L=live S=sno</pre>	<pre>'+ 2360 1.00 - 1.00 ' 410 1.00 - 1.00 p' 875 1.00 1.5 million - 1.00 nding(+): LC# 2 = D+L, M = ear : LC# 2 = D+L, V = flection: LC# 2 = D+L, V = flection: LC# 2 = D+L EI= tal Deflection = 1.50(Dead Lc (D=dead L=live S=snow W=wi</pre>	<pre>'+ 2360 1.00 - 1.00 1.000 ' 410 1.00 - 1.00 - p' 875 1.00 - nding(+): LC# 2 = D+L, M = 6561 lb ear : LC# 2 = D+L, V = 1269, V flection: LC# 2 = D+L EI= 379e0 tal Deflection = 1.50(Dead Load Defl (D=dead L=live S=snow W=wind I=in)</pre>	<pre>'+ 2360 1.00 - 1.00 1.000 1.00 ' 410 1.00 - 1.00 p' 875 1.00 nding(+): LC# 2 = D+L, M = 6561 lbs-ft ear : LC# 2 = D+L, V = 1269, V design flection: LC# 2 = D+L EI= 379e06 lb-in tal Deflection = 1.50(Dead Load Deflection) (D=dead L=live S=snow W=wind I=impact</pre>	<pre>'+ 2360 1.00 - 1.00 1.000 1.00 - ' 410 1.00 - 1.00 p' 875 1.00 1.5 million - 1.00 mding(+): LC# 2 = D+L, M = 6561 lbs-ft ear : LC# 2 = D+L, V = 1269, V design = flection: LC# 2 = D+L EI= 379e06 lb-in2 tal Deflection = 1.50 (Dead Load Deflection) + Li</pre>	<pre>'+ 2360 1.00 - 1.00 1.000 1.00 - 1.00 ' 410 1.00 - 1.00 p' 875 1.00 1.5 million - 1.00 nding(+): LC# 2 = D+L, M = 6561 lbs-ft ear : LC# 2 = D+L, V = 1269, V design = 1190 lb flection: LC# 2 = D+L EI= 379e06 lb-in2 tal Deflection = 1.50(Dead Load Deflection) + Live Load (D=dead L=live S=snow W=wind I=impact C=constructi</pre>	<pre>'+ 2360 1.00 - 1.00 1.000 1.00 - 1.00 1.00 ' 410 1.00 - 1.00 1.00 p' 875 1.00 1.00 1.5 million - 1.00 1.00 nding(+): LC# 2 = D+L, M = 6561 lbs-ft ear : LC# 2 = D+L, V = 1269, V design = 1190 lbs flection: LC# 2 = D+L EI= 379e06 lb-in2 tal Deflection = 1.50(Dead Load Deflection) + Live Load Defle (D=dead L=live S=snow W=wind I=impact C=construction CL</pre>	<pre>'+ 2360 1.00 - 1.00 1.000 1.00 - 1.00 1.00 - ' 410 1.00 - 1.00 1.00 - p' 875 1.00 1.00 - 1.5 million - 1.00 1.00 - moding(+): LC# 2 = D+L, M = 6561 lbs-ft ear : LC# 2 = D+L, V = 1269, V design = 1190 lbs flection: LC# 2 = D+L EI= 379e06 lb-in2 tal Deflection = 1.50(Dead Load Deflection) + Live Load Deflection (D=dead L=live S=snow W=wind I=impact C=construction CLd=cond)</pre>	<pre>'+ 2360 1.00 - 1.00 1.000 1.00 - 1.00 1.00 ' 410 1.00 - 1.00 1.00 - 1.00 p' 875 1.00 1.00 1.5 million - 1.00 1.00 moding(+): LC# 2 = D+L, M = 6561 lbs-ft ear : LC# 2 = D+L, V = 1269, V design = 1190 lbs flection: LC# 2 = D+L EI= 379e06 lb-in2 tal Deflection = 1.50(Dead Load Deflection) + Live Load Deflection. (D=dead L=live S=snow W=wind I=impact C=construction CLd=concentrat</pre>	<pre>'+ 2360 1.00 - 1.00 1.000 1.00 - 1.00 1.00 2 ' 410 1.00 - 1.00 1.00 - 1.00 2 p' 875 1.00 1.00 1.5 million - 1.00 1.00 2 mding(+): LC# 2 = D+L, M = 6561 lbs-ft ear : LC# 2 = D+L, V = 1269, V design = 1190 lbs flection: LC# 2 = D+L EI= 379e06 lb-in2 tal Deflection = 1.50(Dead Load Deflection) + Live Load Deflection. (D=dead L=live S=snow W=wind I=impact C=construction CLd=concentrated)</pre>

#### **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 REPORT Main Floor, Dining/Master 1 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)
T1-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 Edge<sup>TM</sup> Panel (24" Span Rating) that is nailed down.

Additional considerations for the TJ-Pro<sup>™</sup> Rating include: None

Supports	Bearing Length			Load	s to Suppor		
	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

#### Weyerhaeuser Notes

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

SUSTAINABLE FORESTRY INITIATIVE

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PASSED f 75

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

## PASSED f 75





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 <sup>™</sup> 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<sup>TM</sup> Panel (24" Span Rating) that is glued and nailed down.

Additional considerations for the TJ-Pro<sup>™</sup> Rating include: None

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

#### Weyerhaeuser Notes

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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

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5/28/2015 2:40:55 PM Forte v4.6, Design Engine: V6.1.1.5 *Joist.4te*
Alex Office 6969 SW Hampton Portland. Oregon 9 503-624-7005 Centred Oregon 745 NW Mt. Washing Bend. Oregon 9770 541-383-1828 www.froelick engineer	7223 PROJECT: gton Dr. #205 1 DATE:	PAGE 37 of 75
512	span Hest)= LL Hest]= DL	Wp = 9ft (8psf) + Ht (22psf) = 94pif Wz = 1ft (25psf) = 25pif USE: - 1173TJ1360 @ 16">C. - ITS 2.37/11.89
	0'-0"	0L = 637 p16 LL = 560 p4
SL = 12ft (25 ps) LL = 6.5ft (40	r)= ≤00 p4	
FLOUP = Z SNOW = -	(+ (17654) = 34 pit + (3654) = 77 pit + (30654) = 40pit + (70654) = 50 pit + (70654) = 50 pit	$p_{L} = 146 p_{1}F$ $LL = 130 p_{1}F$
Wind = 12:5 pcf Seismic = 10 pcf		(CEE ATTACHED CALOS) MERNING CALCULATION SHOWN
	COMPUN	ATIONS OF WIND, CEISMIC, MINY MAX LOAUS HAVE BEEN CHECKED



### 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+)		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<sup>™</sup> Rating include: None

		Bearing Length			Loads to S			
Supports	Total	Available	Required	Dead	Floor Live	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 <sup>1</sup>	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

• <sup>1</sup> 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 (Ib)	0	N/A	94	-	25	

### Weyerhaeuser Notes

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

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Page 1 of 1

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

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

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39 of 75 Page: \_\_\_\_\_ Date: MAY 13,2015

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

# **Cantilevered Retaining Wall Design**

Code: IBC 2009

Criteria		Soil Data		III TO STATE	C. C. Saladaran	The state of the s
Retained Height Nall height above soil Slope Behind Wall Height of Soil over Toe Nater 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 Toe Active Pressure Passive Pressure Soil Density, Heel Soil Density, Toe Footing  Soil Friction Soil height to ignore for passive pressure	= 2,000.0 psf Method = 30.0 psf/ft = 150.0 psf/ft = 110.00 pcf = 110.00 pcf = 0.450 = 12.00 in			
				Thum	nail	1
Suraharga Laada			d to Stom			-
		Lateral Load Applie	ed to Stem	Adjacent Footing		d
Surcharge Over Heel	= 95.0 ps	f Lateral Load =	0.0 #/ft	Adjacent Footing	Load	<b>d</b> 0.0 lbs
Surcharge Over Heel Used To Resist Sliding	= 95.0 ps & Overturning	Lateral Load = Height to Top =	0.0 #/ft 14.50 ft	Adjacent Footing Adjacent Footing Load Footing Width	Load = =	<b>d</b> 0.0 lbs 0.00 ft
Surcharge Over Heel Used To Resist Sliding	= 95.0 ps g & Overturning = 55.0 ps	f Lateral Load = Height to Top = Height to Bottom =	0.0 #/ft 14.50 ft	Adjacent Footing Adjacent Footing Load Footing Width Eccentricity	Load	d 0.0 lbs 0.00 ft 0.00 in
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Ove	= 95.0 ps g & Overturning = 55.0 ps erturning	Lateral Load = Height to Top = Height to Bottom = The above lateral load has been increased	0.0 #/ft 14.50 ft	Adjacent Footing Adjacent Footing Load Footing Width	Load = = =	<b>d</b> 0.0 lbs 0.00 ft
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Ove Axial Load Applie Axial Dead Load	= 95.0 ps & Overturning = 55.0 ps erturning ed to Stem = 637.0 lbs	Lateral Load = 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	Adjacent Footing Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist	Load = = =	d 0.0 lbs 0.00 ft 0.00 in 0.00 ft
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Ove <b>Axial Load Applie</b> Axial Dead Load Axial Live Load	= 95.0 ps g & Overturning = 55.0 ps erturning ed to Stem = 637.0 lbs = 560.0 lbs	Lateral Load = 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	Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist Footing Type Base Above/Below Soil	Load = = = =	d 0.0 lbs 0.00 ft 0.00 in 0.00 ft Line Load
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Ove <b>Axial Load Applie</b> Axial Dead Load Axial Live Load Axial Load Eccentricity	= 95.0 ps & Overturning = 55.0 ps erturning ed to Stem = 637.0 lbs = 560.0 lbs = 0.0 in	Lateral Load = 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	Load = = = =	d 0.0 lbs 0.00 ft 0.00 in 0.00 ft Line Load 0.0 ft
Surcharge Over Toe	= 95.0 ps & Overturning = 55.0 ps erturning ed to Stem = 637.0 lbs = 560.0 lbs = 0.0 in	Lateral Load = 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	Load = = = =	d 0.0 lbs 0.00 ft 0.00 in 0.00 ft Line Load 0.0 ft

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					-
<b>Design Summary</b>					
Wall Stability Ratios					
Overturning	=		3.48	OK	(
Sliding	=		1.85	OK	<
Total Bearing Load	=		8,673	lbs	
resultant ecc.	=		7.33	in	
Soil Pressure @ Toe	=		1,887	psf	OK
Soil Pressure @ Heel	=		591	psf	OK
Allowable Soil Pressure Less	= Thi	an	2,000 Allowable		
ACI Factored @ Toe	=		2,667	psf	
ACI Factored @ Heel	=		834		
Footing Shear @ Toe	=		21.6	psi	OK
Footing Shear @ Heel	=		16.8	psi	OK
Allowable	=		75.0	psi	
Sliding Calcs (Vertical Co	om	рог	nent NOT	Us	ed)
Lateral Sliding Force	=		2,216.1	lbs	
less 100% Passive Force	=	-	458.3	lbs	
less 100% Friction Force	=	-	3,650.8	lbs	
Added Force Reg'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

### Footing Dimensions & Strengths

Toe Width		=	2	.25 ft
Heel Width		=	4	.75
Total Footing Wi	dth	=	7	.00
Footing Thicknes	SS	=	14	.00 in
Key Width		=	12	.00 in
Key Depth		=	0	.00 in
Key Distance fro	m Toe	=	2	.00 ft
fc = 2,500 Footing Concrete		Fy =		000 psi .00 pcf
Min. As %		=	0.00	the second s
Cover @ Top	2.00	@ E	stm.=	3.00 in

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

Dsgnr: AT

40 of 75 Page: Date: MAY 13,2015

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

### **Cantilevered Retaining Wall Design**

Code: IBC 2009

Stem Construction		op Stem	2nd	
Design Height Above Etg	<i>A</i> –	Stem OK	Stem OK	
Design Height Above Ftg		3.00	0.00	
Wall Material Above "Ht" Thickness	=	Concrete 8.00	Concrete 8.00	
Rebar Size	=	# 5	# 5	
Rebar Spacing	=	16.00	8.00	
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	psr =	100.0	100.0	
			6.19	
Rebar Depth 'd'	in =	6.19		
LAP SPLICE IF ABOVE	in =	18.31	22.04	
LAP SPLICE IF BELOW HOOK EMBED INTO FT	in =	18.31	9.28	
		haso roduc	ed by stress	ratio
			y stress ratio	
Masonry Data	camer	it reduced b	y ou coo ruu	
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	
Fy	psi =	60,000.0	60,000.0	
Footing Design Res	sults			
	Тое	Heel		
Factored Pressure =	2,667		psf	
Mu': Upward =	6,253			
Mu' : Downward =	1,233		ft-#	
Mu: Design =	5,021	6,222	ft-#	
Actual 1-Way Shear =	21.58	16.81	psi	
Allow 1-Way Shear =	75.00		psi	
Too Deinforcing - # 5	@ 16	EQ in		

Actual 1-Way Shear = Allow 1-Way Shear = 75.00 Toe Reinforcing = #5@16.50 in

Heel Reinforcing Key Reinforcing = # 5 @ 15.00 in = 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	=	-32.5	1.08	-35.2					
Adjacent Footing Load	=								
Added Lateral Load	=								
Load @ Stem Above Soil	=								
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/Overturning Vertical Loads used fo			= = 8,672.8	<b>3.48</b> 3 lbs					

		RE	SISTING	
		Force lbs	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 Ster	n =	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	=	123.8	1.13	139.2
Stem Weight(s)	=	1,000.0	2.58	2,583.3
Earth @ Stem Transition	s =			
Footing Weight	=	1,225.0	3.50	4,287.5
Key Weight	=		2.50	
Vert. Component	=			

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

Total =8,112.8lbsR.M.=33,128.7\* Axial live load NOT included in total displayed, or used for overturning<br/>resistance, but is included for soil pressure calculation.33,128.7

DESIGNER NOTES:



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

Dsgnr: AT

43 of 75 Page: \_\_\_\_\_ 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

Criteria			Soil Data				and the second second	and the second se
Retained Height Wall height above soil Slope Behind Wall Height of Soil over Toe Water height over heel	= = =	10.00 ft 0.00 ft 0.00 : 1 12.00 in 0.0 ft	Allow Soil Bearing Equivalent Fluid Pressu Heel Active Pressure Toe Active Pressure Passive Pressure Soil Density, Heel Soil Density, Toe Footing  Soil Friction Soil height to ignore for passive pressure		30.0 psf/ft 30.0 psf/ft 150.0 psf/ft 110.00 pcf 110.00 pcf 0.450			
						Thomas		
Surcharge Loads			Lateral Load App	olied	to Stem	Thum Adjacent Footing		
Surcharge Loads Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Ove	= & O =	55.0 psf	Lateral Load Height to Top Height to Bottom	elied	to Stem 0.0 #/ft 14.50 ft 10.00 ft	Adjacent Footing Adjacent Footing Load Footing Width Eccentricity		0.0 lbs 0.00 ft 0.00 in
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Over	g & O = erturn	verturning 55.0 psf ing	Lateral Load Height to Top Height to Bottom The above lateral load has been increased	= =	0.0 #/ft 14.50 ft	Adjacent Footing Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist Footing Type	Loa = = =	<b>d</b> 0.0 lbs 0.00 ft
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Ove <b>Axial Load Applie</b> Axial Dead Load Axial Live Load	= erturn ed to = =	verturning 55.0 psf ing	Lateral Load Height to Top Height to Bottom The above lateral load	= = =	0.0 #/ft 14.50 ft 10.00 ft	Adjacent Footing Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist	Loa = = =	0.0 lbs 0.00 ft 0.00 in 0.00 ft
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Ove <b>Axial Load Applie</b> Axial Dead Load Axial Live Load	= erturn ed to = = = =	verturning 55.0 psf ing <b>Stem</b> 146.0 lbs 560.0 lbs 0.0 in	Lateral Load Height to Top Height to Bottom The above lateral load has been increased by a factor of Wind on Exposed Ster	= = n =	0.0 #/ft 14.50 ft 10.00 ft 1.00 0.0 psf	Adjacent Footing Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist Footing Type Base Above/Below Soil at Back of Wall	Loa( = = = =	d 0.0 lbs 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	erturn ed to = = = = = =	verturning 55.0 psf ing <b>Stem</b> 146.0 lbs 560.0 lbs 0.0 in <b>nic Load</b> 1.000	Lateral Load Height to Top Height to Bottom The above lateral load has been increased by a factor of	= = n =	0.0 #/ft 14.50 ft 10.00 ft 1.00	Adjacent Footing Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist Footing Type Base Above/Below Soil at Back of Wall	Loa( = = = =	d 0.0 lbs 0.00 ft 0.00 in 0.00 ft Line Load 0.0 ft

**Top Stem** 

ft =

=

=

=

=

=

-

lbs =

ft-# =

ft-# =

Stem OK

Concrete

3.00

8.00

# 5

18.00

Edge

0.597

1,303.4

3,263.4

5,470.9

2nd

Stem OK

Concrete

0.00

8.00

# 5 9.00

Edge

0.853

2,564.0

9,040.0

10,601.6

Dsgnr: AT

Page: 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**

**Design Height Above Ftg** 

Wall Material Above "Ht"

Total Force @ Section

Code: IBC 2009

<b>Design Summary</b>			Stem Construction
Wall Stability Ratios Overturning Sliding Total Bearing Load	= =	2.32 OK 1.45 Ratio < 1 5.744 lbs	Design Height Above Wall Material Above 1.5! Thickness Rebar Size Rebar Spacing
resultant ecc. Soil Pressure @ Toe Soil Pressure @ Heel Allowable Soil Pressure Less ACI Factored @ Toe ACI Factored @ Heel Footing Shear @ Toe Footing Shear @ Heel Allowable Sliding Calcs (Vertical C Lateral Sliding Force less 100% Passive Force less 100% Friction Force	= = Than = = = = : : : : : : : : : : : : : : :	9.03 in 1,902 psf OK 187 psf OK 2,000 psf Allowable 2,700 psf 265 psf 28.5 psi OK 20.7 psi OK 75.0 psi ment NOT Used) 1,883.1 lbs 393.8 lbs	Rebar Spacing Rebar Placed at Design Data fb/FB + fa/Fa Total Force @ Section MomentActual MomentAllowable ShearAllowable Wall Weight Rebar Depth 'd' LAP SPLICE IF ABC LAP SPLICE IF BEL HOOK EMBED INTO Lap s Hook
Added Force Req'd for 1.5 : 1 Stability	=	98.1 lbs NG	fm Fs Solid Grouting Modular Ratio 'n'
Load Factors Building Code		IBC 2009	Short Term Factor
Dead Load		1.200	Equiv. Solid Thick.
Live Load		1.600	Masonry Block Type
Earth, H		1.600	Masonry Design Met
Wind, W		1.600	Concrete Data
Seismic, E		1.000	fc Fy
Footing Dimension	ns &	Strengths	Footing Design
Toe Width	=	2.25 ft	
Heel Width	=	3.25	Factored Pressure =
Total Footing Width	=	5.50	Mu' : Upward =
Footing Thickness	=	12.00 in	Mu' : Downward =
Key Width	=	12.00 in	Mu: Design =
Key Depth	=	0.00 in	Actual 1-Way Shear =
Key Distance from Toe	=	2.00 ft	Allow 1-Way Shear = Toe Reinforcing =

2,500 psi

2.00

Footing Concrete Density

fc =

Min. As %

Cover @ Top

Fy =

=

=

60,000 psi

150.00 pcf

0.0018

@ Btm.= 3.00 in

		0,410.0	10,001.0	
ShearActual	psi =	16.9	33.2	
ShearAllowable	e psi=	67.1	75.0	
Wall Weight	psf =	100.0	100.0	
Rebar Depth 'd'	in =	6.19	6.19	
LAP SPLICE IF A	BOVE in =	15.61	19.95	
LAP SPLICE IF BE	ELOW in =	15.61		
HOOK EMBED IN	TO FTG in =		8.25	
			ced by stress r	atio
Masonry Data	ok embedme	ent reduced b	y stress ratio	
fm	psi =			
Fs	psi =			
Solid Grouting	=			
oond orouting				
Modular Ratio 'n'	=			
Short Term Factor	=			
Equiv. Solid Thick.	. =			
Masonry Block Ty	pe =	Medium W	eight	
Masonry Design M	lethod =	ASD		
Concrete Data				
fc	psi =		2,500.0	
Fy	psi =	60,000.0	60,000.0	
Footing Desig	n Results			
Tooting Booig	Troounc			
	Toe	Heel		
Factored Pressure	= 2,70		5 psf	
Mu': Upward	= 5,99			
Mu': Downward	= 1,14			
Mu: Design	= 4,85 = 28.4			
Actual 1-Way Shear Allow 1-Way Shear	= 28.4			
Toe Reinforcing	= #5@10		, hai	
Heel Reinforcing	= #5@1			
Key Reinforcing	= None Sp			
	-			

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

Dsgnr: AT

45 of 75 Page: 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

11,958.7

377.2

278.4

139.2

2,583.3

2,268.8

1,446.7

#### Summary of Overturning & Resisting Forces & Moments .....OVERTURNING. Force Distance .....RESISTING..... Force Distance Moment Moment Item lbs ft ft-# ft ft-# lbs Heel Active Pressure 6,655.0 Soil Over Heel 1,815.0 3.67 2,841.7 4.21 = = 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 = 146.0 2.58 Added Lateral Load = \* Axial Live Load on Stem = 560.0 2.58 Load @ Stem Above Soil = Soil Over Toe 247.5 1.13 = Surcharge Over Toe Seismic Earth Load = 78.1 6.60 515.5 = 123.8 1.13 Stem Weight(s) = 1,000.0 Seismic Stem Self Wt 112.0 6.00 672.0 2.58 = Earth @ Stem Transitions = 1,883.1 7,580.5 Total = O.T.M. = Footing Weight 825.0 2.75 = **Resisting/Overturning Ratio** = 2.32 Key Weight = 2.50 Vertical Loads used for Soil Pressure = 5,743.9 lbs Vert. Component = Total = 5,183.9 lbs R.M.=

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

17,605.6 \* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

**DESIGNER NOTES:** 



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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 ....

2,000.0 psf 30.0 psf/ft

30.0 psf/ft 150.0 psf/ft

110.00 pcf 110.00 pcf

0.450

12.00 in

Alta Mira 15-T070

Dsgnr: AT

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

Thumbnail

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=

=

=

=

Adjacent Footing Load

Adjacent Footing Load Footing Width

Base Above/Below Soil

Wall to Ftg CL Dist

at Back of Wall

Poisson's Ratio

Eccentricity

Footing Type

Cod	de:	IBC	2009	

0.0 lbs

0.00 ft

0.00 in

0.00 ft

0.0 ft

Line Load

0.300

Date: MAY 13,2015

Criteria		Soil Data
Retained Height Wall height above soil Slope Behind Wall Height of Soil over Toe Water height over heel	= 8.00 ft = 0.00 ft = 0.00 : 1 = 12.00 in = 0.0 ft	Allow Soil Bearing= 2,0Equivalent Fluid Pressure MethodHeel Active Pressure=Toe Active Pressure=Passive Pressure=1Soil Density, Heel=11Soil Density, Toe=11Footing  Soil Friction=00Soil height to ignore for passive pressure=12
Surcharge Loads		Lateral Load Applied to S
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Ove Axial Load Applie	= 55.0 psf rturning	Lateral Load = 12 Height to Top = 12. Height to Bottom = 8. The above lateral load has been increased 1.
Axial Dead Load Axial Live Load Axial Load Eccentricity	= 146.0 lbs = 130.0 lbs = 0.0 in	by a factor of Wind on Exposed Stem = 0
<b>Design Summary</b>		Stem Construction
Wall Stability Ratios		Design Height Above Ftg
Overturning Sliding Total Bearing Load	= 2.13 OK = 1.54 OK = 4,066 lbs	Wall Material Above "Ht" Thickness Rebar Size Rebar Spacing
resultant ecc. Soil Pressure @ Toe Soil Pressure @ Heel Allowable	= 9.23 in = 1,688 psf OK = 24 psf OK = 2,000 psf	Rebar Placed at <b>Design Data</b> fb/FB + fa/Fa Total Force @ Section II MomentActual ft
Soil Pressure Less ACI Factored @ Toe ACI Factored @ Heel Footing Shear @ Toe	= 2,374 psf = 34 psf = 16.7 psi OK	MomentAllowable ft ShearActual p ShearAllowable p
Footing Shear @ Heel Allowable Sliding Calcs (Vertical C	= 15.2 psi OK = 75.0 psi	Wall Weight p Rebar Depth 'd' LAP SPLICE IF ABOVE
Lateral Sliding Force less 100% Passive Force less 100% Friction Force	= 1,451.3 lbs = - 458.3 lbs	LAP SPLICE IF BELOW HOOK EMBED INTO FTG Lap splice a Hook ember
Added Force Req'd for 1.5 : 1 Stability	= 0.0 lbs OK = 0.0 lbs OK	Masonry Data fm p Fs p Solid Grouting
		Modular Ratio 'n' Short Term Factor
Load Factors Building Code Dead Load	IBC 2009 1.200	Equiv. Solid Thick. Masonry Block Type

1.600

1.000

Wind, W

Seismic, E

Lateral Load Ap	plied	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	-m =	0.0 psf	

S	em Construction		Fop Stem	2nd	
	Design Height Above Ftg	ft =	Stem OK 2.00	Stem OK 0.00	
	Wall Material Above "Ht"	=	Concrete	Concrete	
	Thickness	=	8.00	8.00	
	Rebar Size	=	# 4	# 5	
	Rebar Spacing	=	15.00	15.00	
	Rebar Placed at	=	Edge	Edge	
	Design Data		Luge	Luge	
	fb/FB + fa/Fa	=	0.679	0.909	
	Total Force @ Section	lbs =	1,169.0	1,875.9	
	MomentActual	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		
	HOOK EMBED INTO FT	G in =		9.50	
				ced by stress	
	Masonry Data Hook emb	edmei	nt reduced b	by stress ratio	0
	fm	psi =			
	Fs	psi =			
	Solid Grouting	=			
	9				
	Modular Ratio 'n'	=			
	Short Term Factor	=			
	Equiv. Solid Thick.	=			
	Masonry Block Type	=	Medium W	eight	
	Masonry Design Method	=	ASD		
	Concrete Data				
	fc	psi =	2,000.0	2,500.0	
	Fy	psi =	60,000.0	60,000.0	

Dsgnr: AT

48 of 75

Page: \_\_\_\_\_ 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

<b>Footing Dim</b>	ensio	ns & S	Stren	gths
Toe Width		=	2	.25 ft
Heel Width		=	2	.50
Total Footing Wi	dth	=	4	.75
Footing Thicknes	SS	=	14	.00 in
Key Width		=	12	.00 in
Key Depth		=	0	.00 in
Key Distance fro	m Toe	=	2	.00 ft
fc = 2,500		Fy =		00 psi
Footing Concrete	Density	y =	150	.00 pcf
Min. As %		=	0.00	)18
Cover @ Top	2.00	@ E	8tm.=	3.00 in

Footing Desig	n I	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

		0V	ERTURNING				RE	SISTING	
Item		Force lbs	Distance ft	Moment ft-#			Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	1,260.4	3.06	3,851.3	Soil Over Heel	=	1,613.3	3.83	6,184.4
Surcharge over Heel	=	237.5	4.58	1,088.5	Sloped Soil Over Heel	=			
Toe Active Pressure	=	-70.4	0.72	-50.9	Surcharge Over Heel	=	174.2	3.83	667.6
Surcharge Over Toe	=	-32.5	1.08	-35.2	Adjacent Footing Load	=			
Adjacent Footing Load	=				Axial Dead Load on Sten	n =	146.0	2.58	377.2
Added Lateral Load	=	56.3	11.42	642.2	* Axial Live Load on Stem	=	130.0	2.58	335.8
Load @ Stem Above So	il =				Soil Over Toe	=	247.5	1.13	278.4
					Surcharge Over Toe	=	123.8	1.13	139.2
					Stem Weight(s)	=	800.0	2.58	2,066.7
					Earth @ Stem Transition	s =			
Total	=	1,451.3	O.T.M. =	5,495.9	Footing Weight	=	831.3	2.38	1,974.2
Resisting/Overturnin	g Rat	io	=	2.13	Key Weight	=		2.50	
Vertical Loads used f	for So	il Pressure	= 4,066.	0 lbs	Vert. Component	=			
					Tota	al =	3,936.0	bs R.M.=	11,687.8
					* Axial live load NOT inclu- resistance, but is include				overturning

DESIGNER NOTES:



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

### **Cantilevered Retaining Wall Design**

Title : Alta Mira Job # : 15-T070

Description....

Dsgnr: AT

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

Code: IBC 2009

Criteria			Soil Data					
Retained Height Wall height above soil Slope Behind Wall Height of Soil over Toe Water height over heel	-	8.00 ft 0.00 ft 0.00 : 1 12.00 in 0.0 ft	Equivalent Fluid Pressure MethodHeel Active Pressure=Toe Active Pressure=Passive Pressure=Soil Density, Heel=	30.0	psf/ft psf/ft psf/ft pcf pcf	Thum		
Surcharge Loads			Lateral Load Applied to	Stem		Adjacent Footing		
				Jucin		In the second	Constant State	
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Over Axial Load Applie	= erturnir	55.0 psf	Height to Top = 1 Height to Bottom = The above lateral load	12.5 #/ 2.50 ft 8.00 ft 1.00	'n	Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist Footing Type Base Above/Below Soil		0.0 lbs 0.00 ft 0.00 in 0.00 ft Line Load
Axial Dead Load	=	146.0 lbs	Wind on Exposed Stem =	0.0 ps	ef	at Back of Wall	=	0.0 ft
Axial Live Load Axial Load Eccentricity	= =	130.0 lbs 0.0 in		0.0 p	51	Poisson's Ratio	=	0.300
<b>Design Summary</b>			Stem Construction		Stem OK	2nd Stem OK		
Vall Stability Ratios			Design Height Above Ftg	ft =	2.00			
Overturning	=	1.88 OK	Wall Material Above "Ht"	=	Concrete			
Sliding	=	1.56 OK	Thickness	=	8.00			
Catal Dearing Load	_	2.259 lba	Rebar Size	=	# 4 15.00			
Fotal Bearing Load resultant ecc.	=	3,358 lbs 9.86 in	Rebar Spacing Rebar Placed at <b>Design Data</b>	=	Edge			
Soil Pressure @ Toe	=	1,900 psf OK	fb/FB + fa/Fa	=	0.506	0.707		
Soil Pressure @ Heel	=	0 psf OK	Total Force @ Section	lbs =	920.3	1,544.3		
Allowable Soil Pressure Less	= Then	2,000 psf	MomentActual	ft-# =	2,192.1	4,652.6		
ACI Factored @ Toe	=	2,675 psf	MomentAllowable	ft-# =	4,330.1	6,578.7		
ACI Factored @ Heel	=	0 psf	ShearActual	psi =	12.7			
Footing Shear @ Toe	=	18.4 psi OK	ShearAllowable	psi =	67.1	75.0		
Footing Shear @ Heel	=	15.9 psi OK	Wall Weight	psf =	100.0			
Allowable	=	75.0 psi	Rebar Depth 'd'	in =	6.25			
liding Calcs (Vertical C	Compo		LAP SPLICE IF ABOVE	in =	12.00			
Lateral Sliding Force	=	1,181.3 lbs	LAP SPLICE IF BELOW		12.00			
less 100% Passive Force		393.8 lbs	HOOK EMBED INTO FT		hase red	7.31 uced by stress ratio		
less 100% Friction Force	. = -	1,452.6 lbs				by stress ratio		
Added Force Req'd	=	0.0 lbs OK	Masonry Data					
for 1.5 : 1 Stability	=	0.0 lbs OK	fm	psi =				
			Fs Solid Grouting	psi = =				
and Eastars			Modular Ratio 'n'	=				
oad Factors Building Code		IBC 2009	Short Term Factor	=				
Dead Load		1.200	Equiv. Solid Thick.	=		A/- :		
Live Load		1.600	Masonry Block Type		Medium \	Veight		
Earth, H		1.600	Masonry Design Method	=	ASD			
Wind, W		1.600	Concrete Data	nci -	2 000 0	2 500 0		
Seismic, E		1.000	fc	psi =	2,000.0 60,000.0			
and the second se			Fy	psi =	00,000.0	00,000.0		

50 of 75 Date: MAY 13,2015

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

Footing Dim	ensior	ns & S	Stren	gths
Toe Width		=	1	.75 ft
Heel Width		=	2	.25
Total Footing W	idth	=	4	.00
Footing Thicknes	SS	=	12	.00 in
Key Width		=	12	.00 in
Key Depth		=	0	.00 in
Key Distance fro	om Toe	=	2	.00 ft
fc = 2,500 Footing Concrete Min. As %		Fy = =		000 psi .00 pcf
Cover @ Top	2.00	-	0.00	3.00 in

Footing Design Results									
		Toe	Heel						
Factored Pressure	=	2,675	0 ps						
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 ps						
Allow 1-Way Shear	=	75.00	75.00 ps						
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	i			RI	ESISTING	
Item		Force lbs	Distance ft	Moment ft-#			Force Ibs	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	=	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	5 =			
Total	=	1,181.3	O.T.M. =	4,207.8	Footing Weight	=	600.0	2.00	1,200.0
Resisting/Overturning	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	bs R.M.=	7,893.8
					* Axial live load NOT include resistance, but is included				overturning

DESIGNER NOTES:



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### **Cantilevered Retaining Wall Design**

Alta Mira 15-T070

Title Job #

Description ....

Code: IBC 2009

Surcharge Over Heel=95.0 psfUsed To Resist Sliding & Overturning=12.5 #/ftSurcharge Over Toe=55.0 psfUsed for Sliding & Overturning=12.5 #/ftAxial Load Applied to Stem=8.00 ftAxial Load Cad=637.0 lbsAxial Load Eccentricity=0.0 inDesign Summary=2.48 OKVall Stability Ratios=2.48 OKOverturning=2.48 OKSliding=2.05 OKSoil Pressure @ Toe=1.768 psf OKSoil Pressure @ Toe=1.768 psf OKAllowable=2.000 psfSoil Pressure @ Heel=2.00 psfSoil Pressure @ Toe=2.529 psfACI Factored @ Toe=2.529 psfAllowable=75.0 psiLiding Calcs (Vertical Component NOT Used)Lateral Sliding Force=Lateral Sliding Force=333.3 lbsless 100% Passive Force = -1.416.9 lbsAdded Force Req'd=0.0 lbs OKfor 1.5 : 1 Stability=0.0 lbs OKfor 1		33103000mm
Surcharge Over Heel $= 95.0 \text{ psf}$ Used To Resist Sliding & OverturningSurcharge Over Toe $= 55.0 \text{ psf}$ Used for Sliding & OverturningAxial Load Applied to Stem $= 12.5 \#/ft$ Height to TopAxial Load Applied to Stem $= 637.0 \text{ lbs}$ Axial Load Eccentricity $= 0.0 \text{ inf}$ Axial Load Cad $= 637.0 \text{ lbs}$ Axial Load Eccentricity $= 0.0 \text{ inf}$ Design Summary $= 2.48 \text{ OK}$ $= 0.0 \text{ psf}$ Vall Stability Ratios Overturning $= 2.48 \text{ OK}$ $= 59.1 \text{ inf}$ Solid ressure @ Toe $= 1.768 \text{ psf OK}$ Soil Pressure @ Toe $= 1.768 \text{ psf OK}$ Soil Pressure @ Toe $= 2.000 \text{ psf}$ Soil Pressure @ Toe $= 2.000 \text{ psf}$ $= 2.000 \text{ psf}$ Soil Pressure (@ Toe $= 2.529 \text{ psf}$ ACI Factored @ Toe $= 2.529 \text{ psf}$ AOL Factored @ Heel $= 300 \text{ psf}$ Soil Pressure Less Than Allowable ACI Factored @ Heel $= 300 \text{ psf}$ Soil Pressure Less Than Allowable ACI Factored @ Heel $= 300 \text{ psf}$ Soil Pressure $= 75.0 \text{ psi}$ Iding Calcs (Vertical Component NOT Used) .ateral Sliding Force $= 855.8 \text{ lbs}$ Added Force Req'd $= 0.0 \text{ lbs OK}$ Added Force Req'd $= 0.0 \text{ lbs OK}$ fm< $= 2.52 \text{ psi} \text{ ssi}$ Soil Grouting $= 12.00 \text{ lbs OK}$ Added Force Req'd $= 0.0 \text{ lbs OK}$ fm $= 2.53 \text{ lbs}$ Sear $= 53 \text{ si} \text{ lss}$ Soil Ore Respired $= 0.0 \text{ lbs OK}$ fm $= 2.52 \text{ psi} \text{ ss}$ Soil Pressure force $= -1.416.9 \text{ lbs}$ Added Force Req'd $= 0.0 \text{ lbs OK}$ $= 55.8 \text{ lbs}$ Soil Pressure $= 0.00 \text{ lbs OK}$	Thum	onail
Surcharge Over Heel $=$ $95.0 \text{ psf}$ Used To Resist Sliding & Overturning $=$ $12.5 \#/ft$ Surcharge Over Toe $=$ $55.0 \text{ psf}$ Used for Sliding & Overturning $=$ $55.0 \text{ psf}$ Axial Load Applied to Stem $=$ $50.0 \text{ psf}$ Axial Load Load $=$ $637.0 \text{ lbs}$ Axial Load Eccentricity $=$ $0.0 \text{ in}$ Design Summary $=$ $2.48 \text{ OK}$ Xall stability Ratios $=$ $2.05 \text{ OK}$ Overturning $=$ $2.05 \text{ OK}$ Yall Stability Ratios $=$ $5.91 \text{ in}$ Soil Pressure @ Toe $=$ $1.768 \text{ psf}$ OKAllowable $=$ $2.000 \text{ psf}$ Soil Pressure @ Toe $=$ $1.768 \text{ psf}$ OKAllowable $=$ $2.000 \text{ psf}$ Soil Pressure @ Toe $=$ $2.529 \text{ psf}$ Col Factored @ Toe $=$ $2.529 \text{ psf}$ Footing Shear @ Toe $=$ $2.529 \text{ psf}$ Allowable $=$ $75.0 \text{ psi}$ Allowable $=$ $75.0 \text{ psi}$ Lateral Sliding Force $=$ $333.3 \text{ lbs}$ ess 100% Passive Force $=$ $333.3 \text{ lbs}$ ess 100% Passive Force $=$ $333.3 \text{ lbs}$ ess 100% Passive Force $=$ $333.3 \text{ lbs}$ ess 100% Priction Force $=$ $1.416.9 \text{ lbs}$ Ad	Adjacent Footing I	
Axial Load Eccentricity=0.0 inDesign SummaryStem ConstructionTop StemVall Stability RatiosDesign Height Above Ftgft =2.00 COverturning=2.48 OKOKSliding=2.05 OKWall Material Above "Ht"=ConcreteThickness=8.00Rebar Size=#4Cotal Bearing Load=3.709 lbsRebar Size=#Soil Pressure @ Toe=1.768 psf OKOKRebar Placed at=EdgeSoil Pressure @ Heel=2.000 psfSoil Pressure @ Heel=0.321Total Force @ SectionIbs =606.1Allowable=2.529 psfMomentActualft.# =1.307.7MomentActualft.# =1.307.7Kol Factored @ Toe=2.529 psfOKShearAllowableft.# =4.069.4Kol Factored @ Toe=2.529 psfOKShearAllowableft.# =4.069.4Kol Factored @ Toe=2.529 psfOKMomentActualft.# =1.307.7MomentAllowable=75.0 psiShearAllowablepsi =8.5Larp Splice If ABOVEin =6.25LAP SPLICE IF ABOVEin =12.00LAP SPLICE IF ABOVEin =12.00LAP SPLICE IF BELOW in =12.00LAP SPLICE IF Med Porce=333.3 lbsShearLap splice above base redureMook embedment reduced thefmpsi =Fs <td>Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist Footing Type Base Above/Below Soil at Back of Wall</td> <td>= 0.0 lbs = 0.00 ft = 0.00 in = 0.00 ft Line Load = 0.0 ft</td>	Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist Footing Type Base Above/Below Soil at Back of Wall	= 0.0 lbs = 0.00 ft = 0.00 in = 0.00 ft Line Load = 0.0 ft
Jail Stability Ratios Overturning $=$ 2.48 OK SolidingDesign Height Above Ftgft = $2.00$ Stem OKSoliding $=$ 2.05 OK $=$ 2.05 OKWall Material Above "Ht" $=$ Concrete Thickness $=$ 8.00 Rebar Size $=$ # 4 Rebar Spacing $=$ 16.00 Rebar Placed at $=$ EdgeSoil Pressure @ Toe $=$ 1.768 psf OK Soil Pressure @ Heel $=$ 210 psf OK Soil Pressure Less Than Allowable ACI Factored @ Toe $=$ 2,529 psf Soil Pressure Less Than Allowable ACI Factored @ Heel $=$ 300 psf ShearActual $ft = 1,307.7$ MomentAllowable $ft = 4,069.4$ ShearAllowable $ft = 4,069.4$ ShearAllowable $ft = 4,069.4$ ShearAllowable $ft = 1,307.7$ MomentAllowable $ft = 1,307.7$ MomentAllowable $ft = 1,307.7$ MomentAllowable $ft = 1,307.7$ MomentAllowable $ft = 1,307.7$ ShearAllowable $ft = 1,307.7$ MomentAllowable $ft = 1,200$ 	Poisson's Ratio	= 0.300
Overturning=2.48 OKWall Material Above "Ht"=ConcreteSliding=2.05 OKWall Material Above "Ht"=ConcreteSliding=3.709 lbs=8.00resultant ecc.=5.91 inRebar Size=#Soil Pressure @ Toe=1.768 psf OKRebar Spacing=16.00Allowable=210 psf OKRebar Placed at=EdgeAllowable=2.000 psfTotal Force @ SectionIbs =606.1Allowable=2.529 psfMomentActualft-#=1,307.7ACI Factored @ Toe=2.529 psfMomentActualft-#=4,069.4Footing Shear @ Toe=2.2.2 psi OKShearActualpsi =67.1Mowable=75.0 psiShearAllowablepsi =67.1Allowable=75.0 psiWall Weightpsf =100.0Aded Force Req'd=0.0 lbs OKImage SizeImage SizeImage SizeAdded Force Req'd=0.0 lbs OKfmpsi =Fsfor 1.5 : 1 Stability=0.0 lbs OKfmpsi =Solid Grouting=Solid Grouting=Solid Grouting=	2nd Stem OK	
Soil Pressure @ Toe = 1,768 psf OK Soil Pressure @ Heel = 210 psf OK Allowable = 2,000 psf Soil Pressure Less Than Allowable 	Concrete 8.00 # 4 16.00	
Store areaStore partFooting Shear @ Toe=22.2 psi OKFooting Shear @ Heel=8.5 psi OKAllowable=75.0 psiAllowable=75.0 psiiding Calcs(Vertical Component NOT Used)Lateral Sliding Force=855.8 lbsess 100% Passive Force=333.3 lbsess 100% Friction Force=Added Force Req'd=0.0 lbs OKfor 1.5 : 1 Stability=0.0 lbs OKfor 1.5 : 1 Stability=0.0 lbs OK	<b>0.739</b> 1,121.0 3,030.7 4,099.3	
ess 100% Passive Force = -       333.3 lbs         ess 100% Friction Force = -       1,416.9 lbs         Added Force Req'd =       0.0 lbs OK        for 1.5 : 1 Stability =       0.0 lbs OK         Final Stability =       0	75.0 100.0 6.25 13.84	
Added Force Req'd = 0.0 lbs OK <b>Masonry Data</b> for 1.5 : 1 Stability = 0.0 lbs OK fm psi = Fs psi = Solid Grouting =		
Madulas Data Ist		
oad FactorsModular Ratio 'n'=Building CodeIBC 2009Short Term Factor=Dead Load1.200Equiv. Solid Thick.=Live Load1.600Masonry Block Type=Medium WEarth, H1.600Concrete Data		

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

Dsgnr: AT

Dsgnr: AT

54 of 75 Page:

 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 & S	Stren	gths
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 Footing Concret		Fy = / =		000 psi .00 pcf
Min. As %		=	0.00	18
Cover @ Top	2.00	@ E	stm.=	3.00 in

Footing Design Results									
		Toe	Heel						
Factored Pressure	=	2,529	300 ps	sf					
Mu': Upward	=	2,511	769 ft-	#					
Mu' : Downward	=	469	1,568 ft-	#					
Mu: Design	=	2,041	799 ft-	#					
Actual 1-Way Shear	=	22.18	8.45 ps	si					
Allow 1-Way Shear	=	75.00	75.00 ps	si					
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

		OV	ERTURNING				RE	SISTING	
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	2.96	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 Sten	n =	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
					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 t	for So	il Pressure	= 3,708.	7 Ibs	Vert. Component	=			
					Tota	al =	3,148.7 1	s R.M.=	6,868.8
					* Axial live load NOT inclu- resistance, but is include				overturning

DESIGNER NOTES:

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

Date: MAY 13,2015



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# Cantilovorod Poteining Mall Desig

Title

Job #

Description ....

Alta Mira 15-T070

Date: MAY 13,2015

riteria		
	Soil Data	
etained Height = 6.00 ft	Allow Soil Bearing = 2,000.0 psf	
/all height above soil = 0.00 ft	Equivalent Fluid Pressure Method Heel Active Pressure = 30.0 psf/ft	
ope Behind Wall = 0.00 : 1	Heel Active Pressure = 30.0 psf/ft Toe Active Pressure = 30.0 psf/ft	
eight of Soil over Toe = 12.00 in	Passive Pressure = 150.0 ps//ft	
	Soil Density, Heel = 110.00 pcf	
/ater height over heel = 0.0 ft	Soil Density, Toe = 110.00 pcf	
	Footing  Soil Friction = 0.450	
	Soil height to ignore for passive pressure = 12.00 in	
	101 passing process ( 1200 m)	
		**************************************
		Thumbnail
Surcharge Loads	Lateral Load Applied to Stem Adjacent	Footing Load
Surcharge Over Heel = 0.0 psf	Lateral Load = 12.5 #/ft Adjacent Foo	
Used To Resist Sliding & Overturning	Height to Top = 12.50 ft Footing Width	
Surcharge Over Toe = 55.0 psf	Height to Bottom = 8.00 ft Eccentricity	= 0.00 in
Used for Sliding & Overturning	The above lateral load Wall to Ftg C	
Axial Load Applied to Stem	has been increased 1.00 Footing Type by a factor of Race Abaye	
Axial Dead Load = 146.0 lbs	Base ADUVE/	= 0.0 #
Axial Live Load = 130.0 lbs	Wind on Exposed Stem = 0.0 psf at Back of Poisson's Ra	
Axial Load Eccentricity = 0.0 in	FUISSUITS ITA	- 0.300
Design Summary	Stem Construction Top Stem 2nd Stem OK Stem OK	
II Stability Ratios	Design Height Above Ftg ft = 2.00 0.00	
verturning = 1.99 O		
iding = 2.06 O	- 0.00 0.00	
tal Bearing Load = 2.492 lbs	Rebar Size         =         #         4         #         4           Rebar Spacing         =         18.00         18.00	
tal Bearing Load = 2,492 lbs resultant ecc. = 8.34 in	Rebar Spacing = 18.00 18.00 Rebar Placed at = Edge Edge	
	Design Data	
oil Pressure @ Toe = 1,787 ps	OK fb/FB + fa/Fa = 0.269 0.625	
oil Pressure @ Heel = 0 ps	OK Total Force @ Section lbs = 440.3 872.3	
Allowable = 2,000 ps	MomentActual ft-# = 976.1 2,284.6	
Soil Pressure Less Than Allowable	MomentAllowable ft-# = 3,632.0 3,655.6	
Cl Factored @ Toe = 2,521 ps	ShearActual psi = 6.3 12.1	
CI Factored @ Heel = 0 ps	Shear Allowable psi = 67.1 75.0	
boting Shear @ Toe = 11.0 ps	UN	
boting Shear @ Heel = 13.0 ps	OK Rebar Depth 'd' in = 6.25 6.25	
Allowable = 75.0 ps	1 AD SDI ICE IE ABOVE in = 12.00 12.00	
ling Calcs (Vertical Component NOT U	EAC $LAP$ SPLICE IF BELOW in = 12.00	
teral Sliding Force = 678.8 lbs	HOOK EMBED INTO FTG in = 6.00	
ss 100% Passive Force = - 333.3 lbs ss 100% Friction Force = - 1,063.0 lbs	Lap splice above base reduced by stress	
dded Force Req'd = 0.0 lbs	OK Masonry Data Hook embedment reduced by stress rati	0
$\dots$ for 1.5 : 1 Stability = 0.0 lbs		
	Fs psi =	
	Solid Grouting =	
ad Factors	Modular Ratio 'n' =	
ad Factors Building Code IBC 2009	Short Term Factor =	
Dead Load 1.200	Equiv. Solid Thick. =	
ive Load 1.600	Masonry Block Type = Medium Weight	
Earth, H 1.600	Masonry Design Method = ASD	
Vind, W 1.600	Concrete Data	
Seismic, E 1.000	fc psi = 2,000.0 2,500.0	
1.000	Fy psi = 60,000.0 60,000.0	

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

Dsgnr: AT

Retain Pro 9 © 1989 - 2011 Ver: 9.27 8171

Dsgnr: AT

Page: 57 of 75 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

Footing Dim	ensior	ns & S	Strengths
Toe Width		=	1.00 ft
Heel Width		=	2.25
Total Footing Wi	idth	=	3.25
Footing Thicknes	SS	=	10.00 in
Key Width		=	12.00 in
Key Depth		=	0.00 in
Key Distance fro	om Toe	=	2.00 ft
fc = 2,500	Opsi	Fy =	60,000 psi
Footing Concrete	e Density	· =	150.00 pcf
Min. As %		=	0.0018
Cover @ Top	2.00	@ E	8tm.= 3.00 in

Footing Desig	n I	Results	
		Toe	Heel
Factored Pressure	=	2,521	0 psf
Mu': Upward	=	1,110	213 ft-#
Mu' : Downward	=	209	1,378 ft-#
Mu: Design	=	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	
Heel Reinforcing	=	# 4 @ 18.00 in	
Key Reinforcing	=	None Spec'd	
Other Acceptable S	ize	s & Spacings	
Toe: Not req'd, M Heel: Not req'd, M Key: Not req'd, M	u <	S*Fr	

# Summary of Overturning & Resisting Forces & Moments

		OV	ERTURNING				R	ESISTING	
Item		Force lbs	Distance ft	Moment ft-#			Force lbs	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 Ster	m =	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 Soi	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	ns =			
Total	=	678.8	O.T.M. =	2,162.8	Footing Weight	=	406.3	1.63	660.2
Resisting/Overturning	g Rat	io	=	1.99	Key Weight	=		2.50	
Vertical Loads used f	or So	il Pressure	= 2,492.	3 lbs	Vert. Component	=			
					Tot * Axial live load NOT inclu resistance, but is include	al = ided in ed for s	total display	bs <b>R.M.=</b> ed, or used for calculation.	4,306.3 overturning

**DESIGNER NOTES:** 

8.in Conc w/ #4 @ 18.in o/c • • • 4'-0" -1 3/4" 6'-0" 6'-0" ٠ • 8.in Conc w/ #4 @ 18.in o/c • 2'-0" --1 3/4" 1'-0" 2" \* • \* \* ١ V ٧ 10" • . . • 3" ۷ #4@17.25in @ Toe #4@18.in @ Heel Designer select all horiz. reinf. 2'-3" See Appendix A 3'-3"

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58 of 75

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

### **Cantilevered Retaining Wall Design**

Title : Alta Mira Job # : 15-T070

Description ....

Code: IBC 2009

Date: MAY 13,2015

Criteria			Soil Data					
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=Equivalent Fluid Pressure MethodHeel Active Pressure=Toe Active Pressure=Passive Pressure=Soil Density, Heel=Soil Density, Toe=Footing  Soil Friction=Soil height to ignore for passive pressure=	30.0 30.0	) psf/ft ) psf/ft ) psf/ft ) pcf ) pcf	Thum	bnail	
Surcharge Loads			Lateral Load Applied to	Stem		Adjacent Footing		
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Over Axial Load Applie	g & Ov = erturni	55.0 psf ing	Lateral Load = Height to Top = Height to Bottom = The above lateral load has been increased	12.5 # 12.50 ft 8.00 ft 1.00	/ft	Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist Footing Type	= = =	0.0 lbs 0.00 ft 0.00 in 0.00 ft Line Load
Axial Dead Load Axial Live Load Axial Load Eccentricity	=	637.0 lbs 560.0 lbs 0.0 in	by a factor of Wind on Exposed Stem =	0.0 p	sf	Base Above/Below Soil at Back of Wall Poisson's Ratio	=	0.0 ft 0.300
Design Summary	-	0.0 11	Stem Construction		Top Stem	2nd		
Vall Stability Ratios			Design Height Above Ft	g ft=	Stem Ok 2.00			
Overturning	=	1.71 OK	Wall Material Above "Ht	-	Concrete			
Sliding	=	2.42 OK	Thickness	=	8.00			
			Rebar Size	=	# 4			
Total Bearing Load resultant ecc.	=	2,263 lbs 3.37 in	Rebar Spacing Rebar Placed at <b>Design Data</b>	=	18.00 Edge			
Soil Pressure @ Toe	=	1,758 psf OK	fb/FB + fa/Fa	=	0.168	0.383		
Soil Pressure @ Heel	=	253 psf OK	Total Force @ Section	lbs =	235.2	558.1		
Allowable Soil Pressure Less	= Than	2,000 psf	MomentActual	ft-# =	611.0	1,400.2		
ACI Factored @ Toe	=	2,548 psf	MomentAllowable	ft-# =	3,632.0	3,655.6		
ACI Factored @ Heel	=	367 psf	ShearActual	psi =	3.6			
Footing Shear @ Toe	=	16.0 psi OK	ShearAllowable	psi =	67.1			
Footing Shear @ Heel	=	1.5 psi OK	Wall Weight	psf =	100.0			
Allowable	=	75.0 psi	Rebar Depth 'd' LAP SPLICE IF ABOVE	in = in =	6.25 12.00			
liding Calcs (Vertical C			LAP SPLICE IF BELOW		12.00			
Lateral Sliding Force less 100% Passive Force	=	454.0 lbs 333.3 lbs	HOOK EMBED INTO FI	TG in =		6.00		
less 100% Friction Force			Lap splic	e above	e base red	uced by stress ratio		
Added Force Reg'd	=	0.0 lbs OK	Masonry Data	bedme	nt reduced	by stress ratio		
for 1.5 : 1 Stability	=	0.0 lbs OK	fm Fs Solid Grouting	psi = psi = =				
				=				
oad Factors			Modular Ratio 'n' Short Term Factor	=				
Building Code		IBC 2009	Equiv. Solid Thick.	=				
Dead Load Live Load		1.200 1.600	Masonry Block Type	=	Medium \	Neight		
Earth, H		1.600	Masonry Design Method	= t	ASD			
			Concrete Data		0 000 0	2 500 0		
		1.000						
Wind, W Seismic, E		1.600 1.000	fc Fy	psi = psi =	2,000.0 60,000.0			

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

Dsgnr: AT

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Dsgnr: AT

60 of 75 Page: \_\_\_\_\_\_ 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

<b>Footing Dimer</b>	nsions &	Strengths
Toe Width	=	1.25 ft
Heel Width	=	1.00
Total Footing Width	n =	2.25
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 p	si Fy =	60,000 psi
Footing Concrete D	Density =	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00 @	Btm.= 3.00 in

Footing Desig	gn I	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	
Heel Reinforcing	=	# 4 @ 18.00 in	
Key Reinforcing	=	None Spec'd	
Other Acceptable \$	Size	s & Spacings	
Toe: Not req'd, N Heel: Not req'd, M Key: Not req'd, N	1u <	S*Fr	

### Summary of Overturning & Resisting Forces & Moments

		0\	<b>ERTURNING</b>	i			RE	SISTING	
tem		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	=			
Foe 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 Stem	=	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.
oad @ 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.
					Earth @ Stem Transitions	=			
Total	=	454.0	O.T.M. =	1,434.6	Footing Weight	=	281.3	1.13	316.4
Resisting/Overturnin	g Rat	io	=	1.71	Key Weight	=		2.50	
Vertical Loads used	for So	il Pressure	= 2,262.	8 lbs	Vert. Component	=			
					Total	-	1,702.8	D DM =	2.458.8

DESIGNER NOTES:



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**Retaining Wall Froelich Engineers** 

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

### **Cantilevered Retaining Wall Design**

Title Job #

Description ....

Code: IBC 2009

Criteria			Soil Data				<b>.</b>	
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 MethoHeel Active Pressure=Toe Active Pressure=Passive Pressure=Soil Density, Heel=	30.0 30.0	) psf/ft ) psf/ft ) psf/ft ) pcf ) pcf			
Suraharga Laada			Lateral Load Applied to	Stor		Thum!		
Surcharge Loads			Lateral Load Applied to	Sten	1	Adjacent Footing		the strength of the local sectors of
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Over Axial Load Applie	= rturni	55.0 psf ng	Height to Bottom = The above lateral load has been increased	12.5 # 2.50 ft 8.00 ft 1.00		Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist Footing Type		0.0 lbs 0.00 ft 0.00 in 0.00 ft Line Load
Axial Dead Load	=	146.0 lbs	by a factor of Wind on Exposed Stem =	0.0 p	sf	Base Above/Below Soil at Back of Wall	=	0.0 ft
Axial Live Load Axial Load Eccentricity	=	130.0 lbs 0.0 in		,		Poisson's Ratio	=	0.300
<b>Design Summary</b>			Stem Construction		Top Stem Stem Of			
Vall Stability Ratios Overturning Sliding Total Bearing Load resultant ecc.		1.72 OK 2.82 OK 1,451 lbs 6.53 in	Design Height Above Ftg Wall Material Above "Ht" Thickness Rebar Size Rebar Spacing Rebar Placed at		2.0( Concrete 8.0( # 4 18.0( Edge	0 0.00 e Concrete 0 8.00 4 # 4 0 18.00		
Soil Pressure @ Toe Soil Pressure @ Heel	= =	1,371 psf OK 0 psf OK	Ibn D · Ian a	=	<b>0.14</b> 152.3			
Allowable Soil Pressure Less			Total Force @ Section MomentActual MomentAllowable	lbs = ft-# = ft-# =	528. <sup>4</sup> 3,632.0	1 1,068.6		
ACI Factored @ Toe ACI Factored @ Heel	=	1,943 psf 0 psf	ShearActual	psi =	2.5			
Footing Shear @ Toe Footing Shear @ Heel Allowable	= = =	10.7 psi OK 4.9 psi OK 75.0 psi	\A/all \A/oight	psi = psf = in = in =	67.1 100.0 6.25 12.00	0 100.0 5 6.25		
iding Calcs (Vertical C ateral Sliding Force ess 100% Passive Force ess 100% Friction Force	= ; = -	328.8 lbs 333.3 lbs	LAP SPLICE IF BELOW HOOK EMBED INTO FT Lap splice	in = G in = e above	12.00 e base red			
Added Force Req'd for 1.5 : 1 Stability	=	0.0 lbs OK 0.0 lbs Ok	Masonry Data	psi = psi = =				
oad Factors		IRC 2000	Modular Ratio 'n' Short Term Factor	=				
Building Code Dead Load Live Load Earth, H		IBC 2009 1.200 1.600 1.600	Equiv. Solid Thick. Masonry Block Type Masonry Design Method	=	Medium ASD	Weight		
Wind, W Seismic, E		1.600	Concrete Data fc Fy	psi = psi =	2,000.0			

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

Dsgnr: AT

: Alta Mira

15-T070

spyker addition

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63 of 75 Page: \_\_\_\_\_\_ 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

Footing Dim	ension	s & S	Strengths	
Toe Width		=	1.25 ft	
Heel Width		=	1.25	
Total Footing W	idth	=	2.50	
Footing Thicknes	SS	=	10.00 in	
Key Width		=	12.00 in	
Key Depth		=	0.00 in	
Key Distance fro	om Toe	=	2.00 ft	
fc = 2,500	Opsi I	=y =	60,000 psi	
Footing Concrete	e Density	=	150.00 pcf	
Min. As %		=	0.0018	
Cover @ Top	2.00	@ E	stm.= 3.00 in	1

Footing Desig	n I	Results					
		Toe	Heel	_			
Factored Pressure	=	1,943	0	psf			
Mu': Upward	=	1,220	1	ft-#			
Mu': Downward	=	326	135	ft-#			
Mu: Design	=	894	133	ft-#			
Actual 1-Way Shear	=	10.71	4.92	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 S	size	s & Spacings					
Toe: Not req'd, Mu < S * Fr							
Heel: Not req'd, Mu < S * Fr							

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

### Summary of Overturning & Resisting Forces & Moments

		01	<b>ERTURNING</b>				RE	SISTING	
Item		Force lbs	Distance ft	Moment ft-#			Force Ibs	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
					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 f	for So	il Pressure	= 1,451.4	4 lbs	Vert. Component	=			
					Tota	al =	1.321.4	s R.M.=	1,950.8
					* Axial live load NOT inclu resistance, but is include	ded ir d for s	total displaye	ed, or used for alculation.	roverturning

**DESIGNER NOTES:** 



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### FROELICH CONSULTING ENGINEERS, INC.

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

# Seismic Weight

House Roof:

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

House 2nd Floor:

Floor Area:			1,850 ft <sup>2</sup>
Weight:	$1850 \text{ft}^2 (20 \text{psf}) =$		37,000 lbs
Wall Area:	4.5ft (110ft)=		495 ft <sup>2</sup>
Weight:	$495 ft^2 (8psf) =$		3,960 lbs
		Total Weight:	40,960 lbs

### FROELICH CONSULTING ENGINEERS, INC.

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



SEISMIC FORCE CALCULATION

(Per ASCE7-10)

	Risk Category =	11	
	Importance I =	1.00	
	Soil Site Class =	D	
	Soil Shear Wave Vel. v <sub>s</sub> =	1000	ft/s
Site Class B Short P	eriod Spectral Response Acceleration S <sub>S</sub> =	0.995	g
Site Class B 1 Se	econd Spectral Response Acceleration S <sub>1</sub> =	0.428	g
	Site Class Adjustment Coefficients F <sub>a</sub> =	1.10	
	F <sub>v</sub> =	1.58	
S <sub>MS</sub> =F <sub>a</sub> *S <sub>S</sub>	S <sub>MS</sub> =	1.096	g
$S_{M1} = F_v * S_1$	S <sub>M1</sub> =	0.674	g
$S_{DS} = (2/3)S_{MS}$	S <sub>DS</sub> =	0.731	g
	Seismic Design Category =	D	
$S_{D1} = (2/3)S_{M1}$	S <sub>D1</sub> =	0.449	g
	Seismic Design Category =	D	
	R =	6.5	
	Period Parameters Ct =	0.02	
	x =	0.75	
	Height of Structure h <sub>n</sub> =	22.00	ft
$T_a = C_t * h_n^x$	Approximate Period T <sub>a</sub> =	0.203	sec
	C <sub>u</sub> =	1.554	
$T = T_a * C_u$	Upper Limit Period T =	0.316	sec
$C_{S} = S_{DS}/(R/I)$	Seismic Response Coefficient C <sub>S</sub> =	0.112	
$C_{S} = S_{D1}/(T^{*}(R/I))$	Upper Limit C <sub>S</sub> =	0.340	
	Lower Limit C <sub>S</sub> =	0.032	
	redundancy $\rho$ =	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
Totals:		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 3 Second Gust V <sub>3s</sub> =	Input 120 mph	
Wind Directionality Factor K <sub>d</sub> =	0.85	Table 26.6-1 (page 250)
Risk Catigory =	П	Table 1.5-1 (page 2)
Wind Exposure Category =	В	
<b>Building Parameters</b>		
Longitudinal Dimension of Bldg L =	50 ft	
Transverse Dimension of Bldg B =	56 ft	
Mean Roof Height h =	20 ft	
Highest Roof Level h <sub>n</sub> =	22 ft	
Approximate Fundamental Period T <sub>a</sub> =	0.20 sec	Eq. 12.8-7 (page 90)
Output - Fundamental Fred	quency f =	4.9 Hz > 1 Hz Therefore Rigid
Topographic Effects	Input (2 Din	nensional Ridge)

input	(2 Dimensi	onal Ridge)
0	ft	Figure 26.8-1
1000	ft	Figure 26.8-1
0	ft	Figure 26.8-1
0	ft	Figure 26.8-1
1.5		Figure 26.8-1
3		Figure 26.8-1
1.30		Figure 26.8-1
liers $K_1 =$	0.00	
K <sub>2</sub> =	1.00	
K <sub>3</sub> =	1.00	
ctor K <sub>zt</sub> =	1.00	
	$0 \\ 1000 \\ 0 \\ 1.5 \\ 3 \\ 1.30 \\$	0 ft 1000 ft 0 ft 1.5 3 1.30 Niers $K_1 = 0.00$ $K_2 = 1.00$ $K_3 = 1.00$

# 68 of 75

Gust Effects		Input				
	Scale Factor $l =$	320	ft	Table 26.	9-1	
	ength Scale					
	of Boundary z <sub>g</sub> =	1200		Table 26.	9-1	
3 sec G	ust Exponent $\alpha$ =	7.00		Table 26.	9-1	
	ensity Factor c =	0.30		Table 26.	9-1	
Power L	aw Exponent $\varepsilon$ =	0.33		Table 26.	9-1	
Minim	ium Height z <sub>min</sub> =	30	ft	Table 26.	9-1	
Integral Len	gth Scale of Turbul	ence L <sub>z</sub> =	310	ft		
Output - Backo	round Response Fa	actor $\Omega =$	0.90			
Output Duong	Intensity of Turbu		0.30			
	Gust Effect Fa		0.86			
	Gust Ellect 1		0.00			
Pressure Coe	fficients	Input				
	Length to Width Ra	atio L/B =	0.89			
	Height to Length R	atio h/L =	0.36			
	Roof Pitch =	1	: 12 =	3.81	deg	
Velocity Press	ure Exposure Coeffi	icients K <sub>h</sub>	(see below)	Table 27.	3-1 (page 26	1)
Exter	nal Pressure Coeffi	cients $C_p$	(see below)	Figure 27	.4-1 (page 20	64)
Direction	Cp		Height (ft)	K <sub>h</sub>	q <sub>z</sub> (psf)	Velocity
Wall Windward	0.8		15	0.57	18.0	Pressure
Wall Leeward	-0.5		20	0.62	19.6	Output q <sub>z</sub>
Roof Windward	0.4		25	0.67	20.8	- 112
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	
			120	1.01	02.0	
		h =	20	0.62	19.6	q <sub>h</sub>

Design Wi	ind Pressure	s p (psf) - GC <sub>p</sub>	<u>i = (-)</u>			10 psf min	per 6.1.4.1
Inter	nal Pressure	Coefficient GC <sub>pi</sub> =	-0.18	-0.18 Fig. 26.11-1 (page 258)			Roof
				Horizontal Effe	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			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

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

Design Wi	nd Pressure	es p (psf) - GC <sub>p</sub>	<u>i = (+)</u>			10 psf min	per 6.1.4.1
Inter	nal Pressure	Coefficient GC <sub>pi</sub> =	0.18	Fig. 26.11-1 (	oage 258)	Wall	Roof
				Horizontal Effe	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			13.7	
	30	7.0	-7.2			14.2	
	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			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)

1102 lbs

686 lbs

699 lbs

686 lbs

2521 lbs 2901 lbs

1221 lbs

1582 lbs

1850 lbs

2901 lbs

1953 lbs

960 lbs

1953 lbs

960 lbs

4101 lbs

1210 lbs

FROELICH CONSULTING ENGINEERS, INC. client: Arcon project: Alta Mira job number: 15-T070 date: 5/14/2015 by: AT FROELICH ENGINEERS Lower Floor Wind: PLf= 12.4psf (10.5ft)= 130.2 plf Upper North Wall Line(From East) Fw = 10.2 psf [(4.5ft)(13 ft)+25SF]= Fe = (.5)(13ft/55ft) x 5802lb \*Windward Design Upper North Wall Line(From West) Fw = 10.2 psf [(4.5ft)(6.5 ft)+10SF]= Fe = (.5)(13ft/55ft) x 5802lb \*Windward Design Upper Back of Garage Wall Line Fw = 13.2 psf [(4.5ft)(28 ft)+65SF]=  $Fe = (1/2) \times 5802lb$ **Upper South Wall Line** Fw = 13.2 psf [(4.5ft)(15 ft)+25SF]= Fe = (15/55) x 5802lb Upper East/West Wall Line Fw = 74 plf (25 ft)=  $Fe = (1/2) \times 5802lb$ Lower Back of Garage Wall Line Fw = 130.2 plf x 15ft= Fe = 1920lb(.5)= Lower South Wall Line Fw = 130.2 plf x 15ft= Fe = 1920lb(.5)= Lower East Wall Line Fw = 130.2 plf x 31.5ft= Fe = 1920lb(31.5/50)=

### Lower West Wall Line

.

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

Client: Arcon	First Floor 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	Lt	hu	hl	hl/L	Lower	Upper	Lower Wind	Upper	Ms W (lb*ft)	Mu W (lb*ft)	Ms EQ (lb*ft)	Mu EQ	Rtrib		Ftrib	Mr (lb*ft)	Lo	Tu W	Ts W (lb)	Sheathing W	Tu W	Ts W	Sheathing EQ	Hold Downs	Nailing
(ft)	(ft)	(ft)	(ft)		Seismic	Seismic	wind	Wind	(10-11)	(10-11)	(10-11)	(lb*ft)	(ft)	(ft)	(ft)	(10.11)	(in)	(lb)	(10)	Design (plf)	(lb)	(lb)	Design (plf)		
	Back of G		_																						
16.00	16.00	9	9	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
L	Lt	hu	hl	hl/L	Lower	Upper	Lower	Upper	Ms W	Mu W	Ms EQ	Mu EQ		Wtrib		Mr	Lo	Tu W	Ts W	Sheathing W	Tu W	Ts W	Sheathing EQ	Hold Downs	Nailing
(ft)	(ft)	(ft)	(ft)		Seismic	Seismic	Wind	Wind	(lb*ft)	(lb*ft)	(lb*ft)	(lb*ft)	(ft)	(ft)	(ft)	(lb*ft)	(in)	(lb)	(lb)	Design (plf)	(lb)	(lb)	Design (plf)		
ower -S	outh Wa	all Lin	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
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
(ft)	(ft)	(ft)	(ft)		Seismic	Seismic	Wind	Wind	(lb*ft)	(lb*ft)	(lb*ft)	(lb*ft)	(ft)	(ft)	(ft)	(1b*ft)	(in)	(lb)	(lb)	Design (plf)	(lb)	(lb)	Design (plf)		
Ì															T			T						l l	
ower -E	ast Wall	Line																							
6.00	6.00		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
	0.00			1.0																1					
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
(ft)	(ft)	(ft)	(ft)		Seismic	Seismic	Wind	Wind	(lb*ft)	(lb*ft)	(lb*ft)	(lb*ft)	(ft)	(ft)	(ft)	(lb*ft)	(in)	(lb)	(1b)	Design (plf)	(lb)	(lb)	Design (plf)		
													-		-			Î		· · · · · ·				1	
		ll Lin	0																						
ower - 1	Nest Wa						the state of the state of the								-									and an	
ower - \ 8.00	25.00	_	9	11	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

71 of 75

Client:						Floor			and H	lold E	owns							
•	Alta M				Roof DL:		17											
	15-T07	0			Wall DL:		8											
	6/9/15				Floor DL	:	20	psf										
By:	AT																	
L	Lt	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)		(lb)	(lb)	(lb*ft)	(lb*ft)	(ft)	(ft)	(ft)	(lb*ft)	(in)	(lb)	Design (plf)	(lb)	Design (plf)		
Vouth V	Vall I in																	and the second
3.200	Vall Lin 6.40	e 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		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		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		0.000	775	109	757	151	HTT4	6/12
L	Lt	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)		(lb)	(lb)	(lb*ft)	(lb*ft)	(ft)	(ft)	(ft)	(lb*ft)	(in)	(lb)	Design (plf)	(lb)	Design (plf)		
Back of	Garage	Wall Lin	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
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)		(lb)	(lb)	(lb*ft)	(lb*ft)	(ft)	(ft)	(ft)	(lb*ft)	(ft)	(lb)	Design (plf)	(lb)	Design (plf)		
South W	_																	
6.000	9.00	9.0	1.5	1221	1582	7326	9492	13.5	9.0	0		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
			1.07	NY? 1	Culture	N	N. 50	D. 1	111	Pu.it	NG 1	T	<b>T</b> 11		T 50			
L (ft)	Lt (ft)	hu (ft)	h/L	Wind (lb)	Seismic (lb)	Mu (lb*ft)	Mu EQ (lb*ft)	Rtrib (ft)	Wtrib (ft)	Ftrib (ft)	Mr (lb*ft)	Lo (ft)	Tu W (lb)	Sheathing W	Tu EQ	Sheathing EQ	Hold Downs	Nailing
(11)	(11)	(11)		(10)	(10)	(10-11)	(10-11)	(11)	(11)	(11)	(10-11)	(11)	(10)	Design (plf)	(lb)	Design (plf)	1	
West W	all Line	l					I									an ang san ang		
5.350	10.70	9.0	1.7	1850	2901	8325	13055	10	8.0	5	2868	0.000	1020	173	1904	271	MST37/HTT4	6/12
5.350	10.70	9.0	1.7	1850	2901	8325	13055	10	8.0	5	2868	0.000	1020	173	1904	271	MST37/HTT4	6/12
																-		
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)		(lb)	(lb)	(lb*ft)	(lb*ft)	(ft)	(ft)	(ft)	(lb*ft)	(ft)	(lb)	Design (plf)	(lb)	Design (plf)		
East Wa	all Line																	
	11.20	9.0	0.8	1850	2901	16650	26109	2	9.0	0	3989	0.000	1130	165	1975	259	MST48	4/12

FROELICH CONSULTING ENGINEERS, INC. client: Arcon project: Alta Mira job number: 15-T070 date: 5/14/2015

by: AT

## 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	

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Wall Dims/Hold down cover:	
Wall Width:	
Hold Down Edge Dist:	

Embed depth (to plate): L1 (depth past plate): Clear Cover:

72	in		
9	in	W/S?	Controls
6	in	W/S?	Controls
1.5	in		
3	lin		

Load Cas	es (Bearing, Ibs)1:	Left	Right
(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:

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

# Geometery Input (Wall segment centedred):Considered wall Length:16.0ftShear Wall Segment:6.0ftRight Point Load Location:5.0ftLeft Point Load Location:11.0ft

### 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:



\* Rebar spacing is based on ACI min steel

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### 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 Case	<u>es:</u>	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:

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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 Case	<u>es:</u>	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:

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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 = 355 plf



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)