Structural Calculations
Alta Mira Residence

Portland, Oregon
(Chris Thelen)

June 5, 2012
Job Number: 15-T070

FROELICH
ENGINEERS PC

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

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FROELICH
ENGINEERS

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

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:

Live Load =	40	psf (IBC Table 1607.1)

Wind Load:

Basic (3-Second Gust) Wind Speed =	120	mph
Exposure =	B	
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*

* 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:

Roof:	DL (psf)
Comp. Shingles (3-layers)	6.0
14" Roof Joist @ 16" oc	4.0
Insulation	1.6
1/2" Gyp. Ceiling	2.0
15/32" Plywood	1.6
Misc.	1.5
Total:	16.7 psf
Use:	**17.0 psf**

Roof Pitch
rise= 0.8
run= 12

Slope Corrected
DL= total/cos(-tan(roof slope))
DL= 0.0

2nd Floor:	DL (psf)
3/4" Plywood	2.4
11-7/8" LPI's @ 16" o.c.	3.5
1" gypcrete	8.0
Insulation	1.6
1/2" Gyp. Ceiling	2.0
Carpet	2.0
Misc.	0.5
Total:	20 psf
Use:	**20.0 psf**

Exterior Walls:	DL (psf)
1/2" Plywood	1.6
2x6 DF Studs @ 16" o.c.	1.5
Insulation	1.6
1/2" Gyp.	2.0
Misc.	1.0
Total:	7.7 psf
Use:	**8.0 psf**

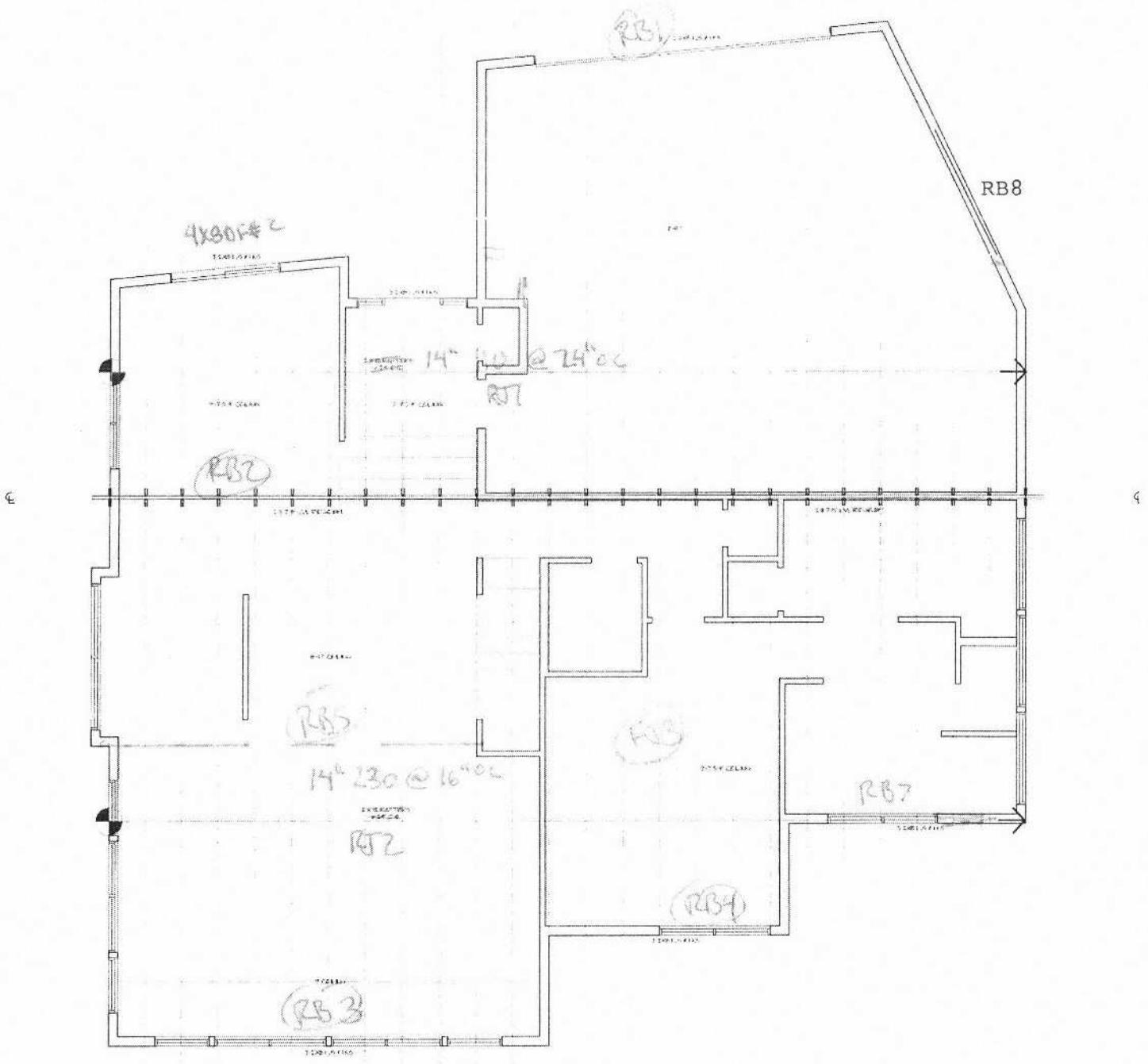
FROELICH CONSULTING ENGINEERS

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: Loading / Trib. Roof DL: 17 psf x 14'-0" ft = 238 plf SL: 25 psf x 14'-0" ft = 350 plf	5 1/2 x 12 24F-V4 GL
Roof Beam RB2	Location: Spanning Ridge Beam Span: 20'-0" 1 ft * 2x snow load at eve over hangs Loads: Loading / Trib. 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 ft = 231 plf SL: 25 psf x 10.50 ft = 288 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: Loading / Trib. 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: Loading / Trib. Roof DL: 17 psf x 18.00 ft = 306 plf SL: 25 psf x 18.00 ft = 475 plf Solar DL: 5 psf x 18.00 ft = 90 plf	5 1/2 x 18 24F-V4 GL

Roof Beam RB6	Not Used	
Roof Beam RB7	Location: Master Bath Span: 9'-0" Loads: 1 ft * 2x snow load at eve over hangs Loading Trib. 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" Loads: 1 ft * 2x snow load at eve over hangs Loading Trib. Roof DL: 17 psf x 1.00 ft = 17 plf SL: 25 psf x 1.00 ft = 50 plf 1ft Triangular to- Loading Trib. Roof DL: 17 psf x 5.00 ft = 85 plf SL: 25 psf x 5.00 ft = 150 plf end	4x8DF#2


RB8
RB7
RB2
RB5
RB3
RB4
RB1

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	May 29, 2015 17:30	RB1

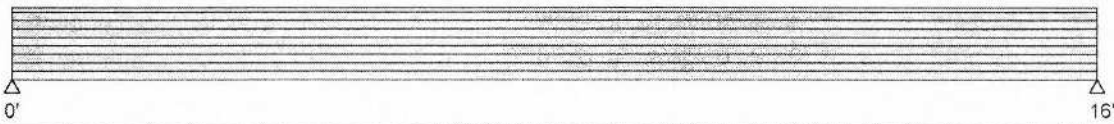
Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

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

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



Dead	2017		2017
Live	2800		2800
Total	4817		4817
Bearing:			
LC number	2		2
Length	1.45		1.45

Glulam-Unbal., West Species, 24F-1.8E WS, 5-1/8x12"

Self Weight of 14.16 plf automatically included in loads;
Lateral support: top= full, bottom= at supports, Load combinations: ICC-IBC;

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

Criterion	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:

FACTORS:	F	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cn	LC#
Fb'+	2400	1.15	1.00	1.00	1.000	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

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Bending(+): LC# 2 = D+S, M =  19269 lbs-ft
Shear     : LC# 2 = D+S, V =   4817, V design =   4215 lbs
Deflection: LC# 2 = D+S   EI=   1328e06 lb-in2
Total Deflection = 1.00(Dead Load Deflection) + Live Load Deflection.
  (D=dead  L=live  S=snow  W=wind  I=impact  C=construction  CLd=concentrated)
  (All LC's are listed in the Analysis output)
  (Load Pattern: s=S/2,  X=L+S or L+C,  _=no pattern load in this span)
```

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).

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COMPANY	PROJECT
May 28, 2015 10:20	RB2

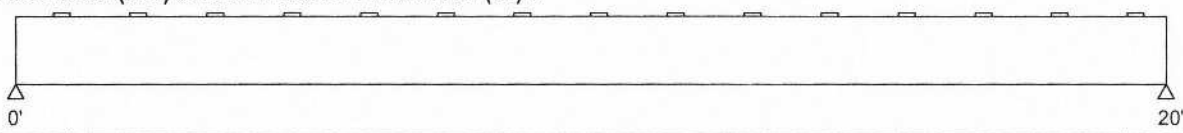
Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnitude Start	Magnitude End	Location [ft] Start	Location [ft] End	Pat-tern
Load1	Dead	Full UDL	221.0				No
Load2	Snow	Full UDL	350.0				No
Load3	Dead	Full UDL	33.0				No

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



Dead	2846		2846
Live	3500		3500
Total	6346		6346
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:

FACTORS: F	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fb'+ 3100	1.15	-	1.00	1.000	0.98	-	1.00	1.00	-	-	2
Fv' 285	1.15	-	1.00	-	-	-	-	1.00	-	1.00	2
Fcp' 750	-	-	1.00	-	-	-	-	1.00	-	-	-
E' 2.1 million		-	1.00	-	-	-	-	1.00	-	-	2

Bending(+): LC# 2 = D+S, M = 31731 lbs-ft
Shear : LC# 2 = D+S, V = 6346, V design = 5606 lbs
Deflection: LC# 2 = D+S EI= 336le06 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. 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.

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COMPANY	PROJECT
May 7, 2015 15:50	RB3

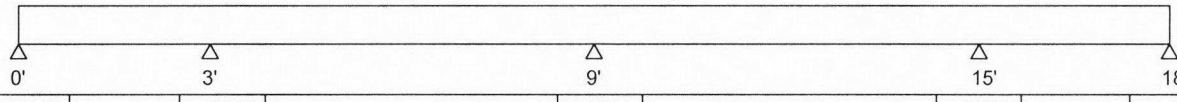
Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnitude Start	Magnitude End	Location [ft] Start	Location [ft] End	Pat-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	178		1200		1511		1200		178
Live	333		1544		1868		1544		333
Total	511		2744		3379		2744		511
Bearing:									
LC number	7		13		8		15		12
Length	1.00		1.00		1.17		1.00		1.00
Cb	1.00		1.43		1.32		1.43		1.00

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

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

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

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

ADDITIONAL 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	-	-
E'	1.6 million		1.00	1.00	-	-	-	-	1.00	1.00	-	4

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Bending(+): LC# 7 = D+S (pattern: SsSs), M =    997 lbs-ft
Bending(-): LC# 8 = D+S (pattern: sSSs), M =   1804 lbs-ft
Shear     : LC# 8 = D+S (pattern: sSSs), V =   1690, V design =   1373 lbs
Deflection: LC# 4 = D+S (pattern: sSss)   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)
  (Load Pattern: s=S/2,  X=L+S or L+C,  _=no pattern load in this span)
```

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.

WoodWorks® SOFTWARE FOR WOOD DESIGN

COMPANY	PROJECT
May 7, 2015 15:59	RB4

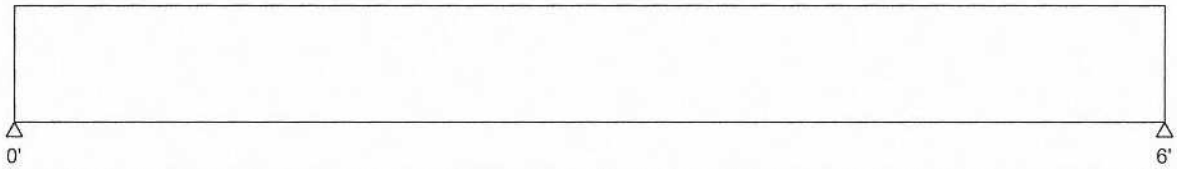
Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnitude Start	Magnitude End	Location [ft] Start	Location [ft] End	Pat-tern
Load1	Dead	Full UDL	297.0				No
Load2	Snow	Full UDL	363.0				No

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



Dead	909		909
Live	1089		1089
Total	1998		1998
Bearing:			
LC number	2		2
Length	1.00		1.00

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

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

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

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

ADDITIONAL DATA:

FACTORS:	F	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fb'+	900	1.15	1.00	1.00	0.991	1.300	1.00	1.00	1.00	1.00	-	2
Fv'	180	1.15	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fcp'	625	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.6 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

Bending(+): LC# 2 = D+S, M = 2997 lbs-ft
Shear : LC# 2 = D+S, V = 1998, V design = 1596 lbs
Deflection: LC# 2 = D+S 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. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

WoodWorks® SOFTWARE FOR WOOD DESIGN

COMPANY	PROJECT
May 7, 2015 15:48	RB5

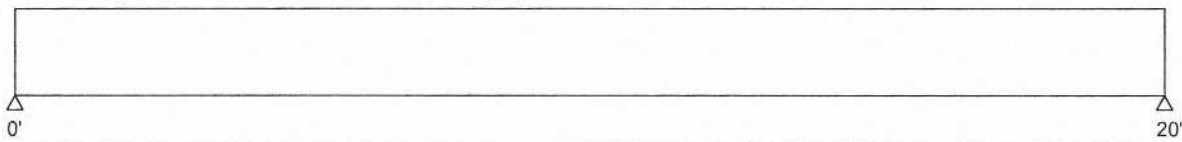
Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnitude Start	Magnitude End	Location [ft] Start	Location [ft] End	Pat-tern
Load1	Dead	Full UDL	306.0				No
Load2	Snow	Full UDL	475.0				No
Load3	Dead	Full UDL	90.0				No

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



Dead	4188		4188
Live	4750		4750
Total	8938		8938
Bearing:			
LC number	2		2
Length	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:

FACTORS:	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

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Bending(+): LC# 2 = D+S, M =  44690 lbs-ft
Shear     : LC# 2 = D+S, V =   8938, V design =   7597 lbs
Deflection: LC# 2 = D+S   EI=   4811e06 lb-in2
Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.
  (D=dead  L=live  S=snow  W=wind  I=impact  C=construction  CLd=concentrated)
  (All LC's are listed in the Analysis output)
```

DESIGN NOTES:

1. Please verify that the default deflection limits are appropriate for your application.
2. Glulam design values are for materials conforming to AITC 117-2001 and manufactured in accordance with ANSI/AITC A190.1-1992
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).

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COMPANY	PROJECT
May 7, 2015 16:16	RB7

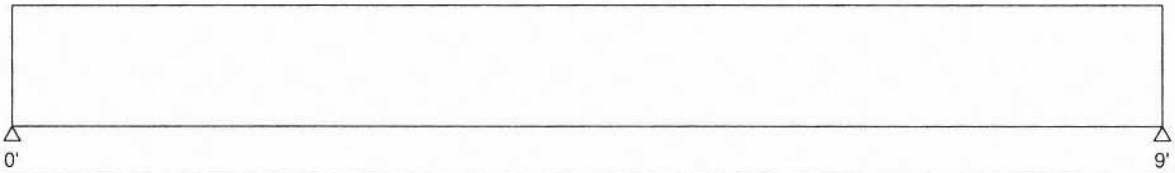
Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnitude Start	Magnitude End	Location [ft] Start	Location [ft] End	Pat-tern
Load1	Dead	Full UDL	242.0				No
Load2	Snow	Full UDL	300.0				No

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



Dead	1131		1131
Live	1350		1350
Total	2481		2481
Bearing:			
LC number	2		2
Length	1.13		1.13

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	0.30 = L/360	0.22
Total Defl'n	0.15 = L/717	0.45 = L/240	0.33

ADDITIONAL 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

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Bending(+): LC# 2 = D+S, M =    5582 lbs-ft
Shear     : LC# 2 = D+S, V =    2481, V design =    1964 lbs
Deflection: LC# 2 = D+S   EI=     664e06 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. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

WoodWorks® SOFTWARE FOR WOOD DESIGN

COMPANY	PROJECT
May 28, 2015 11:07	RB8

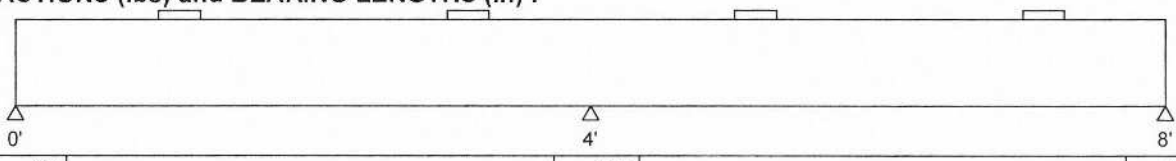
Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnitude Start	Magnitude End	Location [ft] Start	Location [ft] End	Pat-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 (lbs) and BEARING LENGTHS (in) :



	0'		4'		8'
Dead	29		618		342
Live					
Total	29		618		342
Bearing:					
LC number	1		1		1
Length	1.00		1.00		1.00

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

Self Weight of 6.03 plf automatically included in loads;
Lateral support: top= 24.00 bottom= at supports; [in] Load combinations: ICC-IBC;

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

Criterion	Analysis Value	Design Value	Analysis/Design
Shear	fv = 18	Fv' = 162	fv/Fv' = 0.11
Bending(+)	fb = 101	Fb' = 1051	fb/Fb' = 0.10
Bending(-)	fb = 97	Fb' = 1051	fb/Fb' = 0.09
Live Defl'n	negligible		
Total Defl'n	0.01 = <L/999	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	-	-
E'	1.6 million		1.00	1.00	-	-	-	-	1.00	1.00	-	1

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

DESIGN NOTES:

1. Please verify that the default deflection limits are appropriate for your application.
2. Continuous or Cantilevered Beams: NDS Clause 4.2.5.5 requires that normal grading provisions be extended to the middle 2/3 of 2 span beams and to the full length of cantilevers and other spans.
3. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

FROELICH CONSULTING ENGINEERS
client: Pahlisch Homes
project: Keystone
job number: 15-B158
date: 5/28/2015
by: BL

Columns & Footings

Column C1	Location: Garage Main Door Height: 9'-0" Loads:		(2) 2x6 DF
	RB1 DL =	2017 lbs	Ok on Typ FTG
	SL =	2800 lbs	
		4817 lbs	
Column C2	Location: Beam above Dining Height: 9'-0" Loads:		(2) 2x6 DF
	RB2 DL =	2749 lbs	24"x24"x10" Conc FTG
	SL =	3500 lbs	w/ (3) #4 bars EW
		6249 lbs	
Column C3	Location: Front Living Height: 9'-0" Loads:		4x6 DF #4
	RB3 DL =	1511 lbs	24"x24"x10" Conc FTG
	SL =	1868 lbs	w/ (3) #4 bars EW
		3379 lbs	
	Wind OOP= 13.2 psf (6ft)= 81 plf		
Column C4	Location: Garage BEAM Height: 9'-0" Loads:		6X6 df #2
	RB6 DL =	3778 lbs	36X36"x10" Conc FTG
	SL =	5369 lbs	w/ (4) #4 bars EW
		9147 lbs	
Column C5	Location: Garage Floor Height: 9'-0" Loads:		6x6 DF #2
	RB6 DL =	3778 lbs	36x36x10" Conc FTG
	SL =	5369 lbs	w/ (4) #4 bars EW
	FB3 DL=	4393 lbs	
	LL=	3120 lbs	
		16660 lbs	
Column C6	Location: Garage Right of opening Height: 5'-0" Loads:		6x6 DF #2
	FB3 DL=	2920 lbs	24"x24"x10" Conc FTG
	LL=	2080 lbs	w/ (3) #4 bars EW
		5000 lbs	

WoodWorks® SOFTWARE FOR WOOD DESIGN

COMPANY	PROJECT
May 11, 2015 15:32	C3

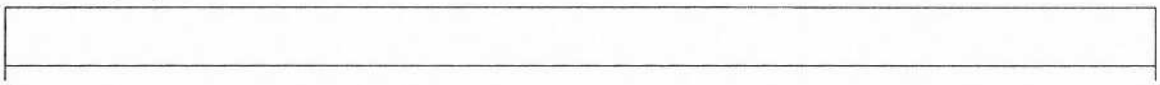
Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnitude Start	Magnitude End	Location [ft] Start	Location [ft] End	Pat-tern
Load1	Dead	Axial	1511	(Eccentricity = 0.25 in)			
Load2	Snow	Axial	1868	(Eccentricity = 0.25 in)			
Load3	Wind	Full UDL	81.0				No

MAXIMUM REACTIONS (lbs):



Dead		
Live	364	364
Total	364	364

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 (axial + eccentric & side 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

Bending(+): LC# 4 = .6D+W, M = 820 lbs-ft
Shear : LC# 4 = .6D+W, V = 364, V design = 364 lbs
Deflection: LC# 4 = .6D+W EI= 78e06 lb-in2
Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.
Axial : LC# 2 = D+S, P = 3420 lbs
Eq.15.4-1 : Crit.LC#= 3 fb= 418 Fb'= 1872
FcE= 1247 Pxe/S=fc(6xe/d)= 41
(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.

General Footing

Description : C5 FTG

Code References

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

General Information

Material Properties

f'c : Concrete 28 day strength	=	2.50 ksi
fy : Rebar Yield	=	60.0 ksi
Ec : Concrete Elastic Modulus	=	2,850.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.50 : 1
Min. Sliding Safety Factor	=	1.50 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	2.0 ksf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

Increases based on footing Depth

Footing base depth below soil surface	=	0.0 ft
Allowable pressure increase per foot of depth	=	0.0 ksf
when footing base is below	=	0.0 ft

Increases based on footing plan dimension

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

Dimensions

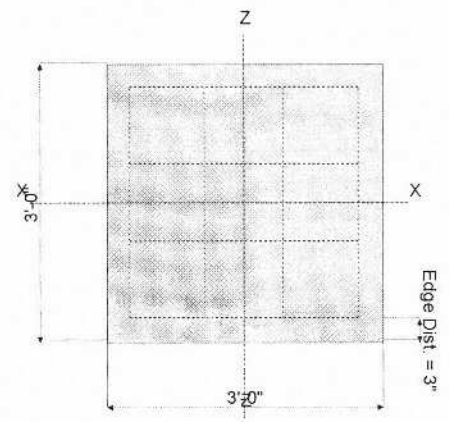
Width parallel to X-X Axis	=	3.0 ft
Length parallel to Z-Z Axis	=	3.0 ft
Footing Thicknes	=	10.0 in

Pedestal dimensions...

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

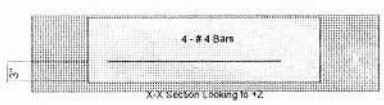
Rebar Centerline to Edge of Concrete..

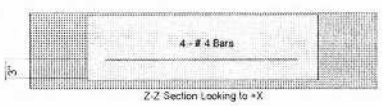
at Bottom of footing	=	3.0 in



Reinforcing

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





Bandwidth Distribution Check (ACI 15.4.4.2)

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

Applied Loads

		D	Lr	L	S	W	E	H
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

General Footing

Lic. # : KW-06005580

Description : C5 FTG

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 Allowable Load	DF PL Perp to Grain, $Pc^{\perp}$ (lbs)	HF PL Perp to Grain, $Pc^{\perp}$ (lbs)
4-Inch Wall	(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
	(2) - 2x4 DF#2	3650	6563	4253
	(3) - 2x4 DF#2	5600	9844	6379
	(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
6-Inch Wall	(1) - 2x6 DF	4100	5156	3341
	(2) - 2x6 DF	8300	10313	6683
	(3) - 2x6 DF	12750	15469	10024
	(4) - 2x6 DF	15900	20625	13365
	(1) - 2x6 DF#2	5750	5156	3341
	(2) - 2x6 DF#2	11500	10313	6683
	(3) - 2x6 DF#2	17750	15469	10024
	(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
Post	6x6 DF #2**	12800	18906	12251
	6x6 DF #1**	17700	18906	12251
	PT 4x4 HF #2**	2850	7656	4961
	PT 4x4 HF #1**	3250	7656	4961
	PT 6x6 HF #2**	9000	18906	12251
	PT 6x6 HF #1**	12450	18906	12251

** Indicates column is unbraced

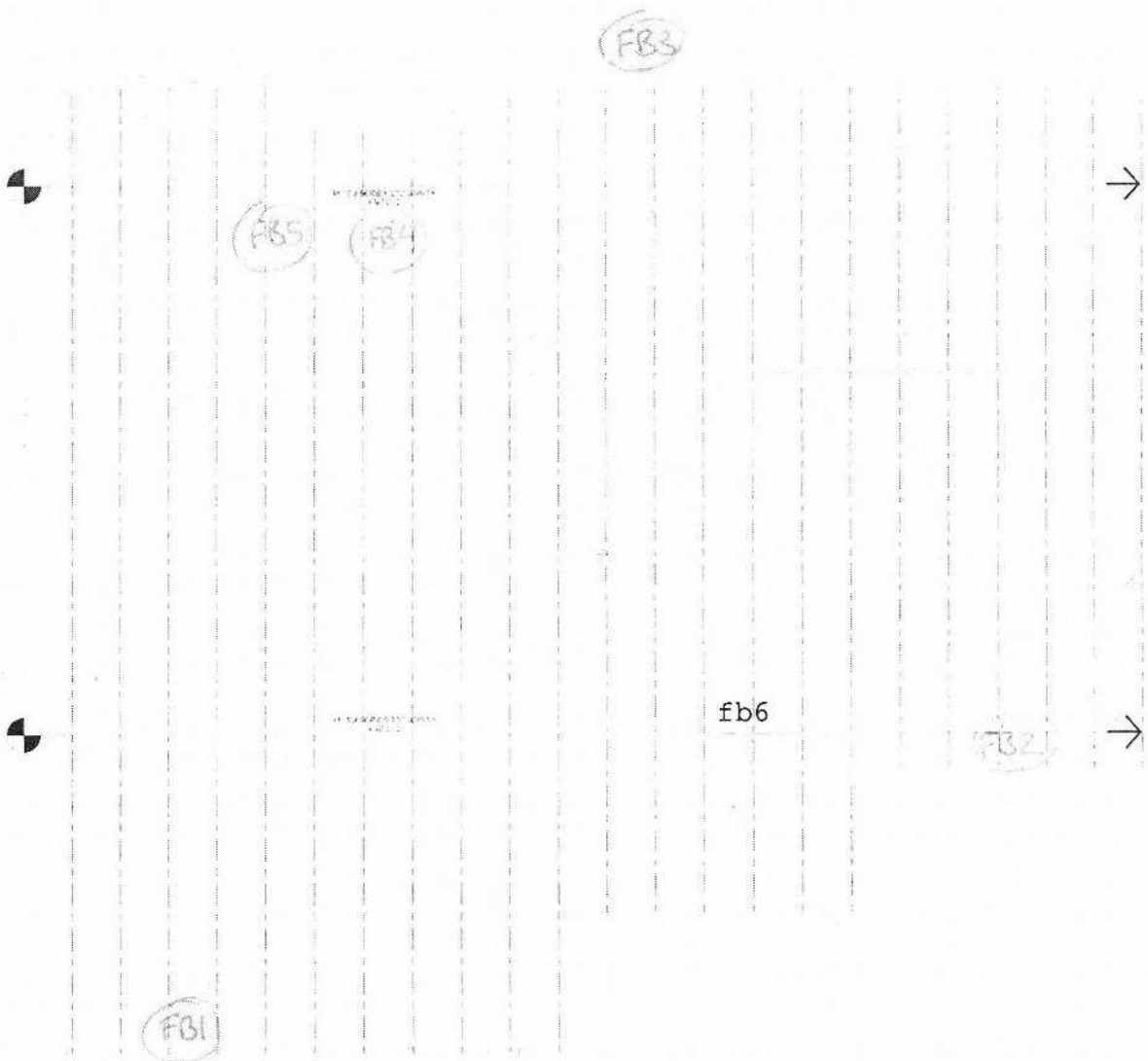
The following assumptions have been made:
1.) Column Ht= 9'-0"
2.) Fully braced weak axis
- If uniform only braced on once axis
3.) Evenly distributed Live Load(40 psf) and Dead Load (17 psf)
4.) An Eccentricity of 0.25" is used.
5.) DF $Fc^{\perp}$ = 625 psi & HF $Fc^{\perp}$ = 405 psi
6.) The perpendicular to grain allowable loads do not include the NDS Bearing Area Factor (Cb) per NDS 3.10.4
7.) Shaded values are limited to the plate perpendicular to grain alloawable bearing loads

FROELICH CONSULTING ENGINEERS

client: Arcon
project: Alta Mira
job number: 15-T070
date: 5/28/2015
by: AT

Floor Beams

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



MAIN LEVEL FLOOR FRAMING PLAN

WoodWorks® SOFTWARE FOR WOOD DESIGN

COMPANY	PROJECT
May 8, 2015 15:34	FB1

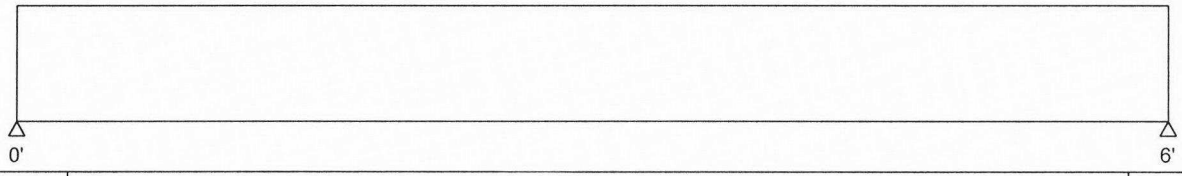
Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnitude Start	Magnitude End	Location [ft] Start	Location [ft] End	Pat-tern
Load1	Dead	Full UDL	140.0				No
Load2	Live	Full UDL	280.0				No

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



Dead	438		438
Live	840		840
Total	1278		1278
Bearing:			
LC number	2		2
Length	1.00		1.00

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

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

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

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

ADDITIONAL DATA:

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

Bending(+): LC# 2 = D+L, M = 1917 lbs-ft
Shear : LC# 2 = D+L, V = 1278, V design = 1021 lbs
Deflection: LC# 2 = D+L 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. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

WoodWorks® SOFTWARE FOR WOOD DESIGN

COMPANY	PROJECT
May 8, 2015 15:44	FB2

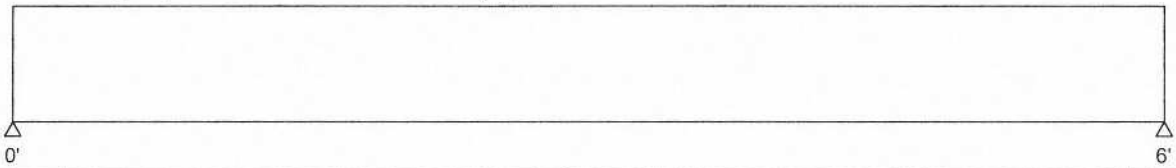
Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnitude Start	Magnitude End	Location [ft] Start	Location [ft] End	Pat-tern
Load1	Dead	Full UDL	170.0				No
Load2	Live	Full UDL	340.0				No

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



Dead	528		528
Live	1020		1020
Total	1548		1548
Bearing:			
LC number	2		2
Length	1.00		1.00

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

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

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

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

ADDITIONAL DATA:

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

Bending(+): LC# 2 = D+L, M = 2322 lbs-ft
Shear : LC# 2 = D+L, V = 1548, V design = 1236 lbs
Deflection: LC# 2 = D+L 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. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

WoodWorks® SOFTWARE FOR WOOD DESIGN

COMPANY	PROJECT
May 28, 2015 11:27	FB3

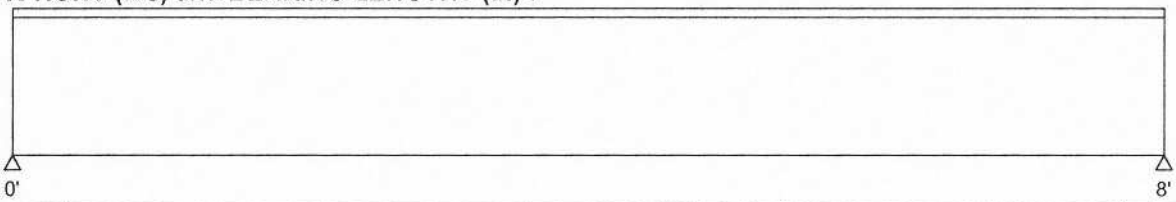
Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnitude Start	Magnitude End	Location [ft] Start	Location [ft] End	Pat-tern
Load1	Dead	Full UDL	715.0				No
Load2	Live	Full UDL	520.0				No

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



Dead	2920		2920
Live	2080		2080
Total	5000		5000
Bearing:			
LC number	2		2
Length	1.45		1.45

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:

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	-	-
E'	1.6 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

Bending(+): LC# 2 = D+L, M = 10000 lbs-ft
Shear : LC# 2 = D+L, V = 5000, V design = 3802 lbs
Deflection: LC# 2 = D+L EI= 1115e06 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. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

WoodWorks® SOFTWARE FOR WOOD DESIGN

COMPANY	PROJECT
May 12, 2015 15:46	FB4

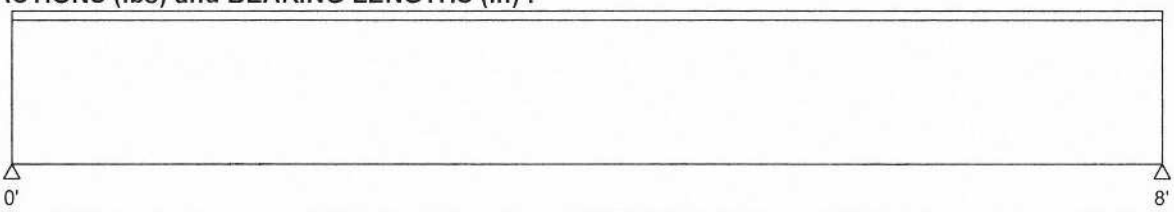
Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnitude Start	Magnitude End	Location [ft] Start	Location [ft] End	Pat-tern
Load1	Dead	Full UDL	100.0				No
Load2	Live	Full UDL	200.0				No

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



Dead	438		438
Live	800		800
Total	1238		1238
Bearing:			
LC number	2		2
Length	1.00		1.00

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	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

Bending(+): LC# 2 = D+L, M = 2477 lbs-ft
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).

WoodWorks® SOFTWARE FOR WOOD DESIGN

COMPANY	PROJECT
May 12, 2015 15:57	FB5

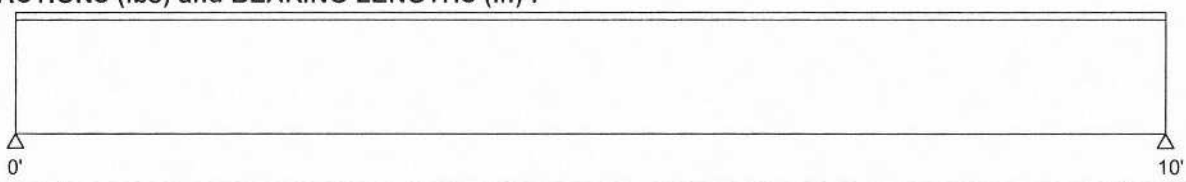
Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnitude Start	Magnitude End	Location [ft] Start	Location [ft] End	Pat-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) :



Dead	467		467
Live	800		800
Total	1267		1267
Bearing:			
LC number	2		2
Length	1.00		1.00

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	0.33 = L/360	0.16
Total Defl'n	0.10 = <L/999	0.50 = L/240	0.20

ADDITIONAL DATA:

FACTORS:	F	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cn	LC#
Fb'+	2400	1.00	1.00	1.00	1.000	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

Bending(+): LC# 2 = D+L, M = 4715 lbs-ft
Shear : LC# 2 = D+L, V = 1267, V design = 1139 lbs
Deflection: LC# 2 = D+L EI= 879e06 lb-in2
Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.
(D=dead L=live S=snow W=wind I=impact C=construction CLd=concentrated)
(All LC's are listed in the Analysis output)

DESIGN NOTES:

1. Please verify that the default deflection limits are appropriate for your application.
2. Glulam design values are for materials conforming to AITC 117-2001 and manufactured in accordance with ANSI/AITC A190.1-1992
3. GLULAM: bxd = actual breadth x actual depth.
4. Glulam Beams shall be laterally supported according to the provisions of NDS Clause 3.3.3.
5. GLULAM: bearing length based on smaller of Fcp(tension), Fcp(comp'n).

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
	May 27, 2015 14:16	FB6

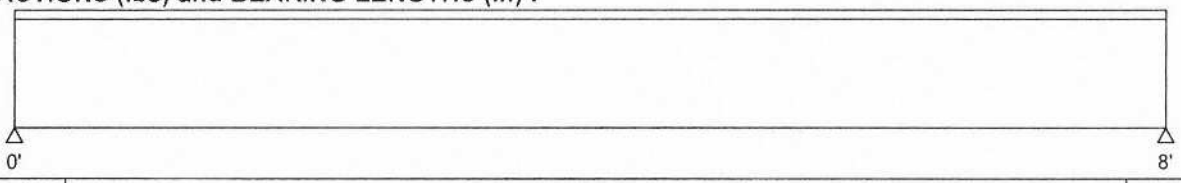
Design Check Calculation Sheet

Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnitude Start	Magnitude End	Location [ft] Start	Location [ft] End	Pat-tern
Load1	Dead	Full UDL	240.0				No
Load2	Live	Full UDL	480.0				No

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



Dead	989		989
Live	1920		1920
Total	2909		2909
Bearing:			
LC number	2		2
Length	1.28		1.28

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
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

Bending(+): LC# 2 = D+L, M = 5818 lbs-ft
Shear : LC# 2 = D+L, V = 2909, V design = 2364 lbs
Deflection: LC# 2 = D+L EI= 383e06 lb-in2
Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.
(D=dead L=live S=snow W=wind I=impact C=construction CLd=concentrated)
(All LC's are listed in the Analysis output)

DESIGN NOTES:

1. Please verify that the default deflection limits are appropriate for your application.
2. 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

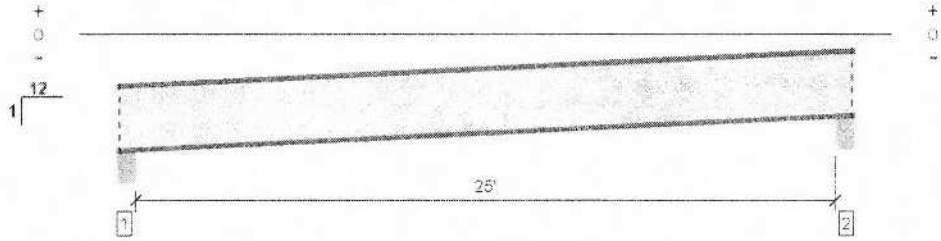
ROOF JOISTS

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

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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
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

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Refer to current Weyerhaeuser literature for installation details. (www.woodbywy.com) Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards.

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

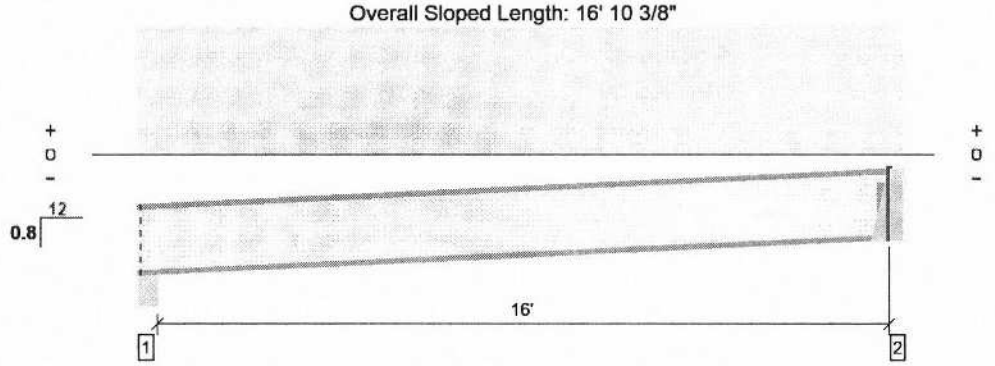
SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
Todd Nagele Froelich Engineers (503) 624-7005 tnagele@froelich-engineers.com	

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

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

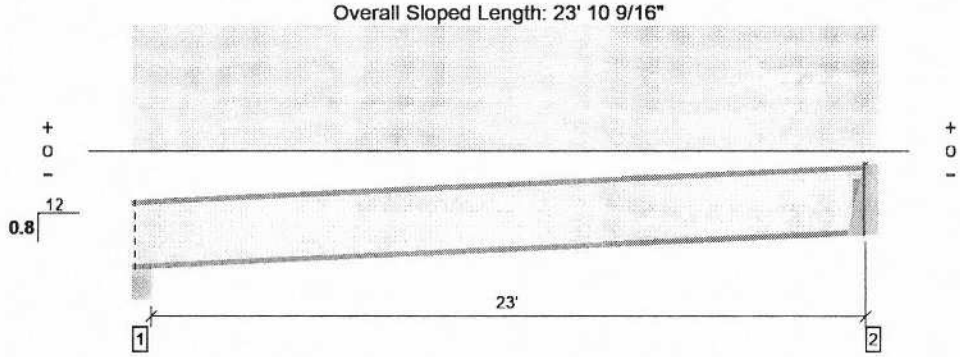
The purpose of this report is for product comparison only. Load and support information necessary for professional design review is not displayed here. Please print an individual Member Report for submittal purposes.

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

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

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

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

- Deflection criteria: LL (L/360) and TL (L/240).
- Bracing (Lu): All compression edges (top and bottom) must be braced at 3' 11 3/16" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Beveled Plate - DF	5.50"	5.50"	1.75"	366	397	763	Blocking
2 - Hanger on 14" LVL beam	3.50"	Hanger[1]	1.75"	364	394	758	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Connector: Simpson 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

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

Member Notes

Joist over Master
(RJ3)

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Refer to current Weyerhaeuser literature for installation details. (www.woodbywy.com) Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards.

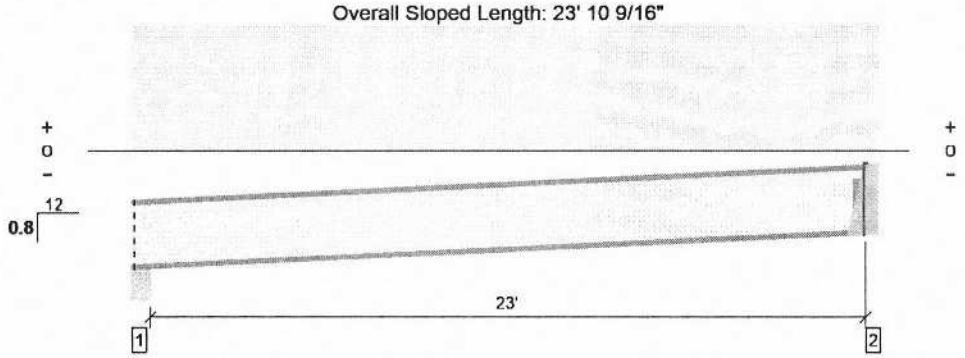
The product application, input design loads, dimensions and support information have been provided by Forte Software Operator

SUSTAINABLE FORESTRY INITIATIVE

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

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

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

- Deflection criteria: LL (L/360) and TL (L/240).
- Bracing (Lu): All compression edges (top and bottom) must be braced at 3' 6 5/8" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Beveled Plate - DF	5.50"	5.50"	1.75"	549	596	1145	Blocking
2 - Hanger on 14" LVL beam	3.50"	Hanger[1]	1.75"	546	592	1138	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

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

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

Member Notes

Joist over Master
(RJ3)

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

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

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

WoodWorks® SOFTWARE FOR WOOD DESIGN

COMPANY	PROJECT
May 8, 2015 14:33	FJ1

Design Check Calculation Sheet

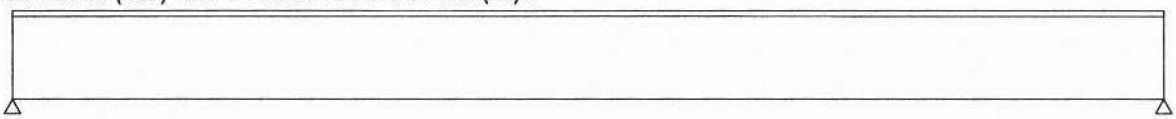
Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnitude Start	Magnitude End	Location [ft] Start	Location [ft] End	Pat-tern
Load1	Dead	Full Area	55.00 (16.0)*				No
Load2	Live	Point	1500		6.50		No

*Tributary Width (in)

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



Dead	537		537
Live	750		750
Total	1287		1287
Bearing:			
LC number	2		2
Length	1.00		1.00

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	1.00	2
Fcp'	625	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.7 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

Bending(+): LC# 2 = D+L, M = 6622 lbs-ft
Shear : LC# 2 = D+L, V = 1287, V design = 1210 lbs
Deflection: LC# 2 = D+L EI= 706e06 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. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

WoodWorks® SOFTWARE FOR WOOD DESIGN

COMPANY	PROJECT
May 8, 2015 14:58	FJ1_LSL

Design Check Calculation Sheet

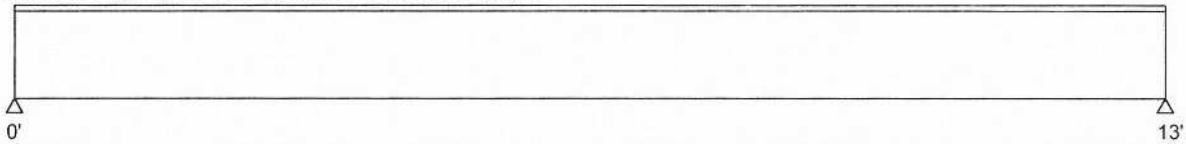
Sizer 2004a

LOADS (lbs, psf, or plf) :

Load	Type	Distribution	Magnitude Start	Magnitude End	Location [ft] Start	Location [ft] End	Pat-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) :



Dead	519		519
Live	750		750
Total	1269		1269
Bearing:			
LC number	2		2
Length	1.00		1.00

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

Self Weight of 6.49 plf automatically included in loads;
Lateral support: top= full, bottom= at supports; Load combinations: ICC-IBC;

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

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

ADDITIONAL DATA:

FACTORS:	F	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fb'+	2360	1.00	-	1.00	1.000	1.00	-	1.00	1.00	-	-	2
Fv'	410	1.00	-	1.00	-	-	-	-	1.00	-	1.00	2
Fcp'	875	-	-	1.00	-	-	-	-	1.00	-	-	-
E'	1.5 million		-	1.00	-	-	-	-	1.00	-	-	2

Bending(+): LC# 2 = D+L, M = 6561 lbs-ft
Shear : LC# 2 = D+L, V = 1269, V design = 1190 lbs
Deflection: LC# 2 = D+L EI= 379e06 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:

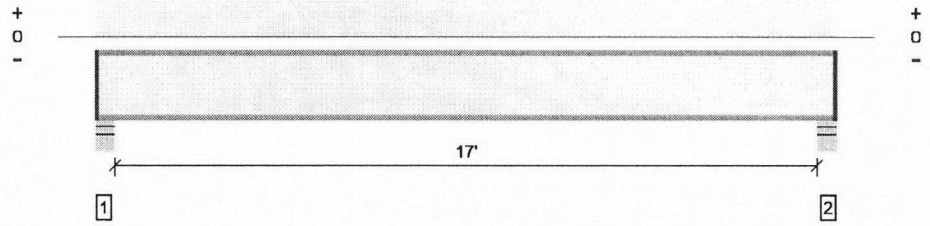
1. Please verify that the default deflection limits are appropriate for your application.
2. SCL-BEAMS (Structural Composite Lumber): the attached SCL selection is for preliminary design only. For final member design contact your local SCL manufacturer.
3. Size factors vary from one manufacturer to another 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.

FORTE

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)
TJ-Pro™ Rating	45	45	Passed	--	--

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

- Deflection criteria: LL (L/480) and TL (L/240).
- Bracing (Lu): All compression edges (top and bottom) must be braced at 4' 9 5/16" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
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.

Loads	Location	Spacing	Dead (0.90)	Floor Live (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

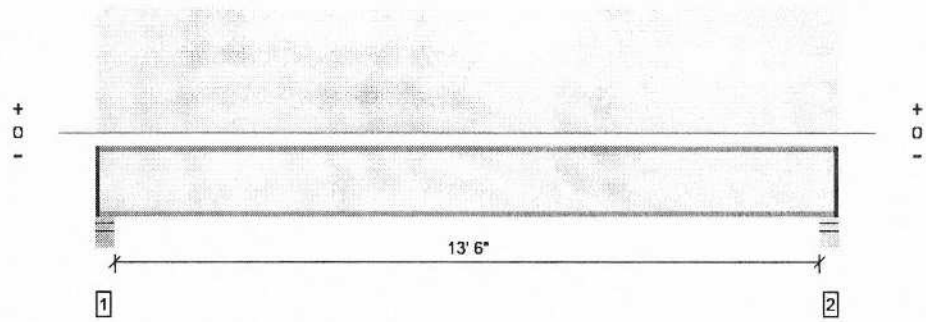
Forte Software Operator	Job Notes
Allan Tompkins Froelich Engineers (541) 550-5375 atompkins@froelich-engineers.com	

5/8/2015 3:04:08 PM
Forte v4.6, Design Engine: V6.1.1.5

FORTE MEMBER REPORT *Main Floor, Living*

1 piece(s) 11 7/8" TJI® 110 @ 16" OC

Overall Length: 14' 5"



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

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

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

- Deflection criteria: LL (L/480) and TL (L/240).
- Bracing (Lu): All compression edges (top and bottom) must be braced at 3' 7 3/16" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
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.

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

Weyerhaeuser Notes

SUSTAINABLE FORESTRY INITIATIVE

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Forte Software Operator	Job Notes
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FROELICH
ENGINEERS

6969 SW Hampton St.
Portland, Oregon 97223
503-624-7005

745 NW Mt. Washington Dr. #205
Bend, Oregon 97701
541-383-1828

CLIENT:

PROJECT:

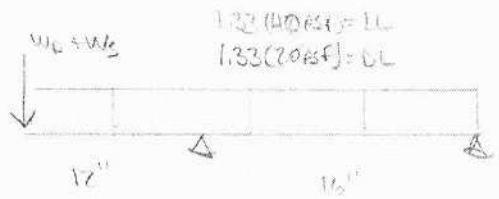
NUMBER:

DATE:

BY:

Cant. JOIST @ West Wall -

1'-0" Cant & 16" Back span



W_D = 9ft (8psf) + 1ft (22psf) = 94plf

W_S = 1ft (25psf) = 25plf

USE 2 - 11 7/8 TJI 360 @ 16" o.c.

- 1752.37 / 11.89

RETAINING WALLS - Cantilevered

Schedule for 4'-0" - 10'-0"

Max DL => Roof = 12ft (17psf) = 204 plf
Wall = 9ft (8psf) = 72 plf
Floor = 6.5ft (55psf) = 357.5plf

DL = 633 plf

LL = 560 plf

SL = 12ft (25psf) = 300 plf
LL = 6.5ft (40psf) = 260 plf

Min DL => Roof = 2ft (17psf) = 34 plf
Wall = 9ft (8psf) = 72 plf
Floor = 2ft (20psf) = 40 plf
Snow = 2ft (25psf) = 50 plf
LL = 2ft (40psf) = 80 plf

DL = 146 plf

LL = 130 plf

Wind = 12.5psf

Seismic = 10 pcf

<SEE ATTACHED CALCS>

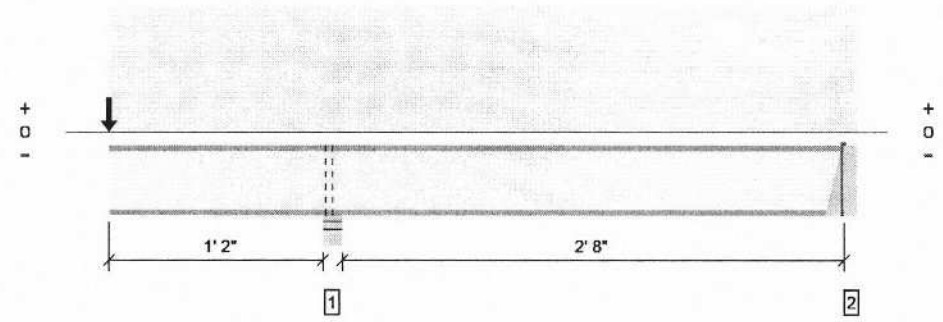
- GOVERNING CALCULATIONS SHOWN

COMBINATIONS OF WIND, SEISMIC, MIN & MAX AXIAL LOADS HAVE BEEN CHECKED

FORTE MEMBER REPORT *Main Floor, Cant Joist*

1 piece(s) 11 7/8" TJI® 360 @ 16" OC

Overall Length: 4' 7"



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

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

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

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (0.2").
- Bracing (Lu): All compression edges (top and bottom) must be braced at 4' 3 1/2" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None

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

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

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

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

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SUSTAINABLE FORESTRY INITIATIVE

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

5/28/2015 2:42:50 PM
Forte v4.6, Design Engine: V6.1.1.5
Joist.4te

spyker addition
Retaining Wall
Froelich Engineers

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

Dsgnr: AT

Page: ____
Date: MAY 13,2015

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

Cantilevered Retaining Wall Design

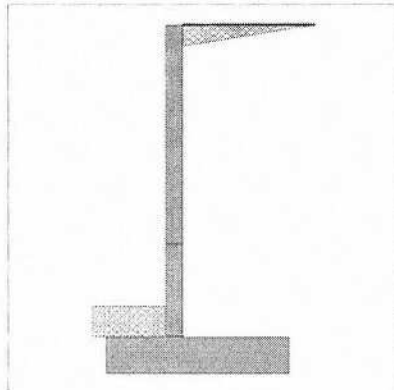
Code: IBC 2009

Criteria

Retained Height	=	10.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	12.00 in
Water height over heel	=	0.0 ft

Soil Data

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



Thumbnail

Surcharge Loads

Surcharge Over Heel	=	95.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	55.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	637.0 lbs
Axial Live Load	=	560.0 lbs
Axial Load Eccentricity	=	0.0 in

Earth Pressure Seismic Load

Multiplier Used	=	1.000
(Multiplier used on soil density)		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	14.50 ft
...Height to Bottom	=	10.00 ft
The above lateral load has been increased by a factor of		1.00
Wind on Exposed Stem	=	0.0 psf
Uniform Seismic Force	=	10.000
Total Seismic Force	=	111.667

Adjacent Footing Load

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

Stem Weight Seismic Load

F_p / W_p Weight Multiplier = 0.112 g

Added seismic base force 80.0 lbs

spyker addition
Retaining Wall
Froelich Engineers

Title : Alta Mira
Job # : 15-T070 Dsgnr: AT Date: MAY 13,2015
Description....

Page: _____

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

Cantilevered Retaining Wall Design

Code: IBC 2009

Design Summary

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	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	2,667 psf
ACI Factored @ Heel	=	834 psf
Footing Shear @ Toe	=	21.6 psi OK
Footing Shear @ Heel	=	16.8 psi OK
Allowable	=	75.0 psi

Sliding Calcs (Vertical Component NOT Used)

Lateral Sliding Force	=	2,216.1 lbs
less 100% Passive Force	= -	458.3 lbs
less 100% Friction Force	= -	3,650.8 lbs
Added Force Req'd	=	0.0 lbs OK
....for 1.5 : 1 Stability	=	0.0 lbs OK

Load Factors

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

Footing Dimensions & Strengths

Toe Width	=	2.25 ft
Heel Width	=	4.75
Total Footing Width	=	7.00
Footing Thickness	=	14.00 in
Key Width	=	12.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	2.00 ft

f'c = 2,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Stem Construction

		Top Stem	2nd
Design Height Above Ftg	ft =	Stem OK 3.00	Stem OK 0.00
Wall Material Above "Ht"	=	Concrete	Concrete
Thickness	=	8.00	8.00
Rebar Size	=	# 5	# 5
Rebar Spacing	=	16.00	8.00
Rebar Placed at	=	Edge	Edge
Design Data			
fb/FB + fa/Fa	=	**0.700**	**0.942**
Total Force @ Section	lbs =	1,593.6	2,978.5
Moment....Actual	ft-# =	4,279.0	11,112.7
Moment.....Allowable	ft-# =	6,114.9	11,799.2
Shear.....Actual	psi =	20.8	38.8
Shear.....Allowable	psi =	67.1	75.0
Wall Weight	psf =	100.0	100.0
Rebar Depth 'd'	in =	6.19	6.19
LAP SPLICE IF ABOVE	in =	18.31	22.04
LAP SPLICE IF BELOW	in =	18.31	
HOOK EMBED INTO FTG	in =		9.28

Lap splice above base reduced by stress ratio
Hook embedment reduced by stress ratio

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Short Term Factor	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	Medium Weight
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,000.0	2,500.0
Fy	psi =	60,000.0	60,000.0

Footing Design Results

		Toe	Heel
Factored Pressure	=	2,667	834 psf
Mu' : Upward	=	6,253	9,926 ft-#
Mu' : Downward	=	1,233	16,148 ft-#
Mu: Design	=	5,021	6,222 ft-#
Actual 1-Way Shear	=	21.58	16.81 psi
Allow 1-Way Shear	=	75.00	75.00 psi

Toe Reinforcing = # 5 @ 16.50 in
Heel Reinforcing = # 5 @ 15.00 in
Key Reinforcing = None Spec'd

Other Acceptable Sizes & Spacings

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

spyker addition
Retaining Wall
Froelich Engineers

Title : **Alta Mira**
Job # : **15-T070** Dsgnr: **AT** Date: **MAY 13,2015**
Description....

Page: _____

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

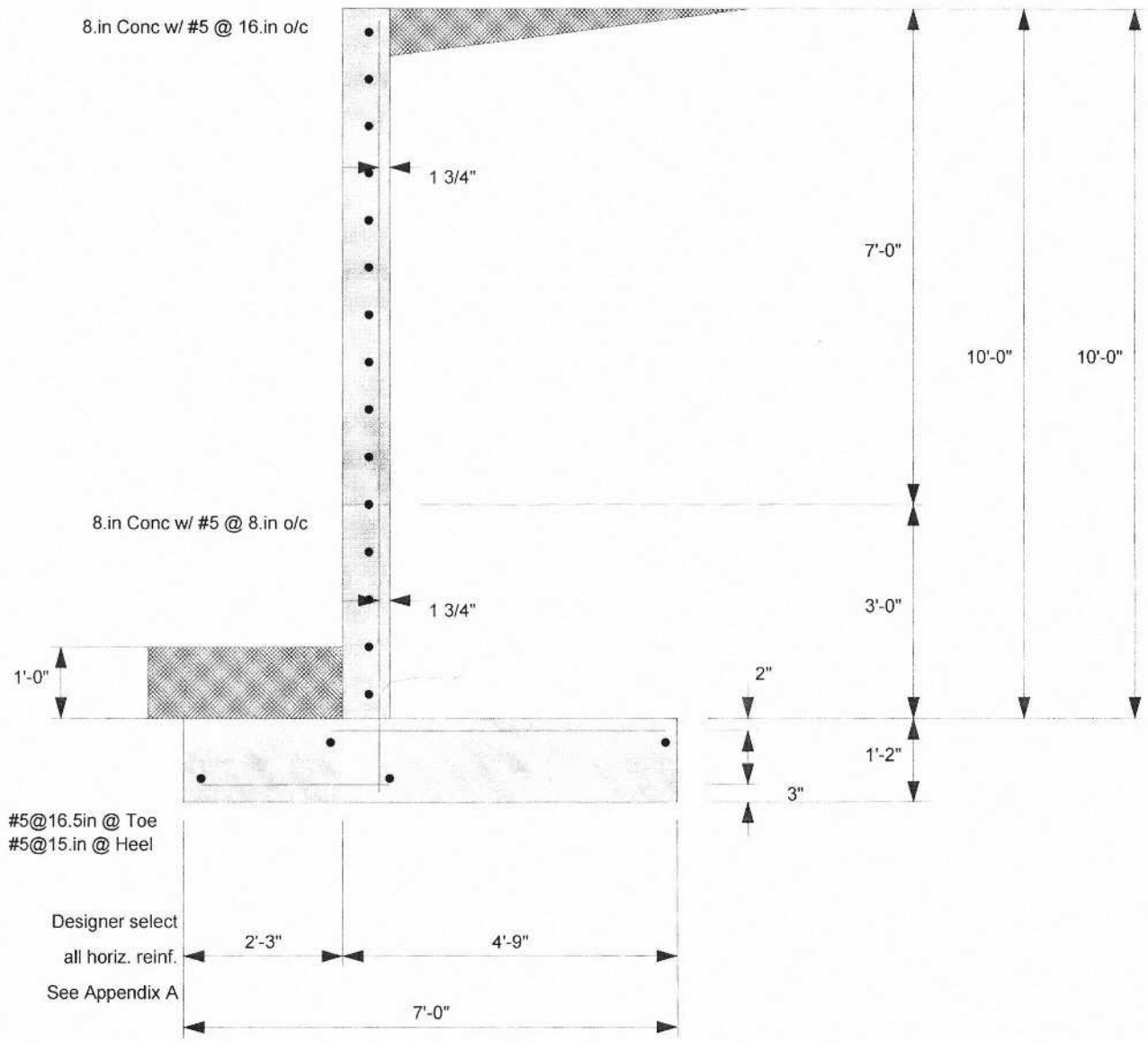
Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	1,870.4	3.72	6,962.1	Soil Over Heel	= 4,491.7	4.96	22,271.2
Surcharge over Heel	=	289.3	5.58	1,615.4	Sloped Soil Over Heel	=		
Toe Active Pressure	=	-70.4	0.72	-50.9	Surcharge Over Heel	= 387.9	4.96	1,923.4
Surcharge Over Toe	=	-32.5	1.08	-35.2	Adjacent Footing Load	=		
Adjacent Footing Load	=				Axial Dead Load on Stem	= 637.0	2.58	1,645.6
Added Lateral Load	=				* Axial Live Load on Stem	= 560.0	2.58	1,446.7
Load @ Stem Above Soil	=				Soil Over Toe	= 247.5	1.13	278.4
Seismic Earth Load	=	79.3	6.70	531.2	Surcharge Over Toe	= 123.8	1.13	139.2
Seismic Stem Self Wt	=	112.0	6.17	690.7	Stem Weight(s)	= 1,000.0	2.58	2,583.3
					Earth @ Stem Transitions	=		
Total	=	2,216.1	**O.T.M.** =	9,515.9	Footing Weight	= 1,225.0	3.50	4,287.5
Resisting/Overturning Ratio			=	**3.48**	Key Weight	=	2.50	
Vertical Loads used for Soil Pressure		= 8,672.8 lbs			Vert. Component	=		
					Total	= 8,112.8 lbs	**R.M.=**	33,128.7

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

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

DESIGNER NOTES:


8.in Conc w/ #5 @ 16.in o/c
1 3/4"
7'-0"
10'-0"
10'-0"
8.in Conc w/ #5 @ 8.in o/c
1 3/4"
3'-0"
1'-0"
2"
1'-2"
3"
#5@16.5in @ Toe
#5@15.in @ Heel
Designer select
all horiz. reinf.
See Appendix A
2'-3"
4'-9"
7'-0"

spyker addition
Retaining Wall
Froelich Engineers

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

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

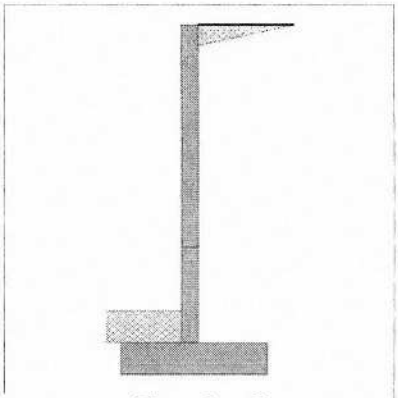
Code: IBC 2009

Criteria

Retained Height	=	10.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	12.00 in
Water height over heel	=	0.0 ft

Soil Data

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



Thumbnail

Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	55.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	146.0 lbs
Axial Live Load	=	560.0 lbs
Axial Load Eccentricity	=	0.0 in

Earth Pressure Seismic Load

Multiplier Used	=	1.000
(Multiplier used on soil density)		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	14.50 ft
...Height to Bottom	=	10.00 ft
The above lateral load has been increased by a factor of		1.00
Wind on Exposed Stem	=	0.0 psf
Uniform Seismic Force	=	10.000
Total Seismic Force	=	110.000

Adjacent Footing Load

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

Stem Weight Seismic Load

F_p / W_p Weight Multiplier = 0.112 g

Added seismic base force 80.0 lbs

spyker addition
Retaining Wall
Froelich Engineers

Title : **Alta Mira**
Job # : **15-T070** Dsgnr: **AT** Page: ____
Description.... 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

Design Summary

Wall Stability Ratios

Overturning	=	2.32 OK
Sliding	=	1.45 Ratio < 1.5!
Total Bearing Load	=	5,744 lbs
...resultant ecc.	=	9.03 in
Soil Pressure @ Toe	=	1,902 psf OK
Soil Pressure @ Heel	=	187 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	2,700 psf
ACI Factored @ Heel	=	265 psf
Footing Shear @ Toe	=	28.5 psi OK
Footing Shear @ Heel	=	20.7 psi OK
Allowable	=	75.0 psi

Sliding Calcs (Vertical Component NOT Used)

Lateral Sliding Force	=	1,883.1 lbs
less 100% Passive Force	= -	393.8 lbs
less 100% Friction Force	= -	2,332.8 lbs
Added Force Req'd	=	0.0 lbs OK
....for 1.5 : 1 Stability	=	98.1 lbs NG

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

Stem Construction

		Top Stem	2nd
		Stem OK	Stem OK
Design Height Above Ftg	ft =	3.00	0.00
Wall Material Above "Ht"	=	Concrete	Concrete
Thickness	=	8.00	8.00
Rebar Size	=	# 5	# 5
Rebar Spacing	=	18.00	9.00
Rebar Placed at	=	Edge	Edge
Design Data			
fb/FB + fa/Fa	=	**0.597**	**0.853**
Total Force @ Section	lbs =	1,303.4	2,564.0
Moment....Actual	ft-# =	3,263.4	9,040.0
Moment.....Allowable	ft-# =	5,470.9	10,601.6
Shear.....Actual	psi =	16.9	33.2
Shear.....Allowable	psi =	67.1	75.0
Wall Weight	psf =	100.0	100.0
Rebar Depth 'd'	in =	6.19	6.19
LAP SPLICE IF ABOVE	in =	15.61	19.95
LAP SPLICE IF BELOW	in =	15.61	
HOOK EMBED INTO FTG	in =		8.25

Lap splice above base reduced by stress ratio
Hook embedment reduced by stress ratio

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Short Term Factor	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	Medium Weight
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,000.0	2,500.0
Fy	psi =	60,000.0	60,000.0

Footing Dimensions & Strengths

Toe Width	=	2.25 ft
Heel Width	=	3.25
Total Footing Width	=	5.50
Footing Thickness	=	12.00 in
Key Width	=	12.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	2.00 ft

f'c = 2,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	2,700	265 psf
Mu' : Upward	=	5,994	2,156 ft-#
Mu' : Downward	=	1,144	5,839 ft-#
Mu: Design	=	4,850	3,683 ft-#
Actual 1-Way Shear	=	28.49	20.69 psi
Allow 1-Way Shear	=	75.00	75.00 psi

Toe Reinforcing = # 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: #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

spyker addition
Retaining Wall
Froelich Engineers

Title : **Alta Mira**
Job # : **15-T070** Dsgnr: **AT** Page: _____
Description.... Date: **MAY 13,2015**

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

Cantilevered Retaining Wall Design

Code: IBC 2009

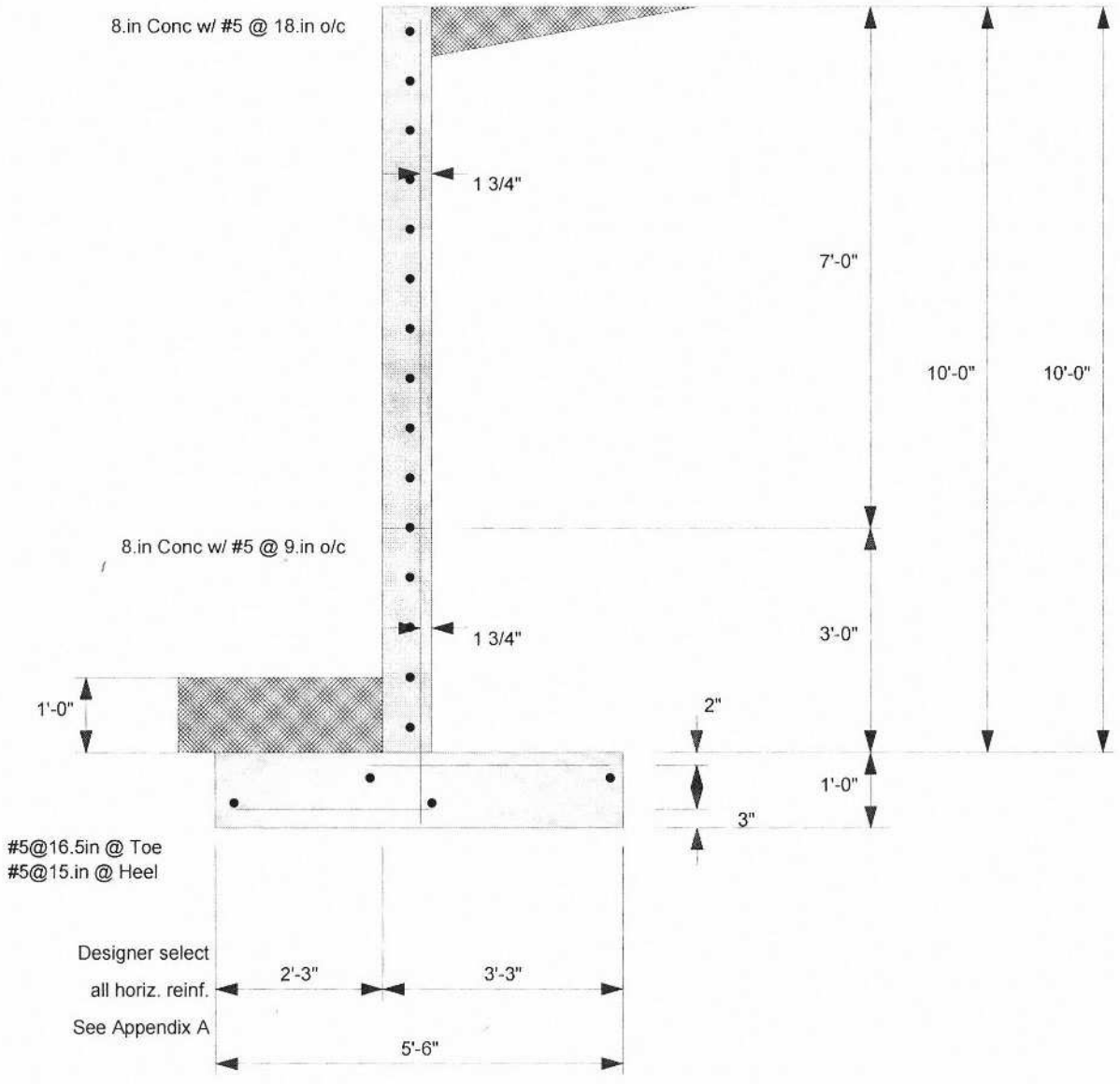
Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	1,815.0	3.67	6,655.0	Soil Over Heel	= 2,841.7	4.21	11,958.7
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	377.2
Added Lateral Load	=				* Axial Live Load on Stem	= 560.0	2.58	1,446.7
Load @ Stem Above Soil	=				Soil Over Toe	= 247.5	1.13	278.4
Seismic Earth Load	=	78.1	6.60	515.5	Surcharge Over Toe	= 123.8	1.13	139.2
Seismic Stem Self Wt	=	112.0	6.00	672.0	Stem Weight(s)	= 1,000.0	2.58	2,583.3
					Earth @ Stem Transitions	=		
Total	=	1,883.1	**O.T.M.** =	7,580.5	Footing Weight	= 825.0	2.75	2,268.8
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.**=	17,605.6

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

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

DESIGNER NOTES:


8.in Conc w/ #5 @ 18.in o/c
1 3/4"
7'-0"
10'-0"
10'-0"
8.in Conc w/ #5 @ 9.in o/c
1 3/4"
3'-0"
1'-0"
2"
1'-0"
3"
#5@16.5in @ Toe
#5@15.in @ Heel
Designer select
all horiz. reinf.
See Appendix A
2'-3"
3'-3"
5'-6"

spyker addition
Retaining Wall
Froelich Engineers

Title : **Alta Mira**
Job # : **15-T070** Dsgnr: **AT** Page: _____
Description.... 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

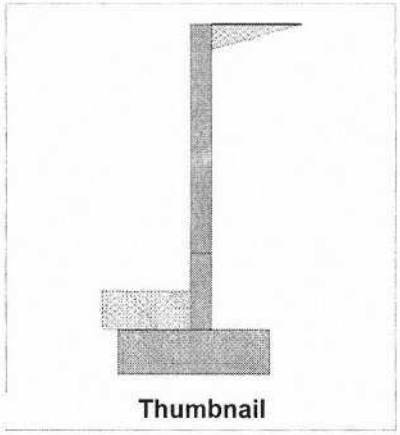
Code: IBC 2009

Criteria

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

Soil Data

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



Thumbnail

Surcharge Loads

Surcharge Over Heel = 95.0 psf
Used To Resist Sliding & Overturning
Surcharge Over Toe = 55.0 psf
Used for Sliding & Overturning

Axial Load Applied to Stem

Axial Dead Load	=	146.0 lbs
Axial Live Load	=	130.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Design Summary

Wall Stability Ratios

Overturning	=	2.13 OK
Sliding	=	1.54 OK
Total Bearing Load	=	4,066 lbs
...resultant ecc.	=	9.23 in
Soil Pressure @ Toe	=	1,688 psf OK
Soil Pressure @ Heel	=	24 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	2,374 psf
ACI Factored @ Heel	=	34 psf
Footing Shear @ Toe	=	16.7 psi OK
Footing Shear @ Heel	=	15.2 psi OK
Allowable	=	75.0 psi

Sliding Calcs (Vertical Component NOT Used)

Lateral Sliding Force	=	1,451.3 lbs
less 100% Passive Force	= -	458.3 lbs
less 100% Friction Force	= -	1,771.2 lbs
Added Force Req'd	=	0.0 lbs OK
....for 1.5 : 1 Stability	=	0.0 lbs OK

Load Factors

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

Stem Construction

		Top Stem	2nd
		Stem OK	Stem OK
Design Height Above Ftg	ft =	2.00	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			
fb/FB + fa/Fa	=	**0.679**	**0.909**
Total Force @ Section	lbs =	1,169.0	1,875.9
Moment....Actual	ft-# =	2,938.2	5,979.1
Moment.....Allowable	ft-# =	4,330.1	6,578.7
Shear.....Actual	psi =	16.0	25.7
Shear.....Allowable	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 FTG	in =		9.50

Lap splice above base reduced by stress ratio
Hook embedment reduced by stress ratio

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Short Term Factor	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	Medium Weight
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,000.0	2,500.0
Fy	psi =	60,000.0	60,000.0

spyker addition
Retaining Wall
Froelich Engineers

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

Dsgnr: AT

Page: ____
Date: MAY 13,2015

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

Cantilevered Retaining Wall Design

Code: IBC 2009

Footing Dimensions & Strengths

Toe Width	=	2.25 ft
Heel Width	=	2.50
Total Footing Width	=	4.75
Footing Thickness	=	14.00 in
Key Width	=	12.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	2.00 ft

f'c = 2,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	2,374	34 psf
Mu' : Upward	=	5,074	563 ft-#
Mu' : Downward	=	1,233	2,738 ft-#
Mu: Design	=	3,841	2,175 ft-#
Actual 1-Way Shear	=	16.66	15.19 psi
Allow 1-Way Shear	=	75.00	75.00 psi

Toe Reinforcing = # 5 @ 16.50 in
Heel Reinforcing = # 5 @ 15.00 in
Key Reinforcing = None Spec'd

Other Acceptable Sizes & Spacings

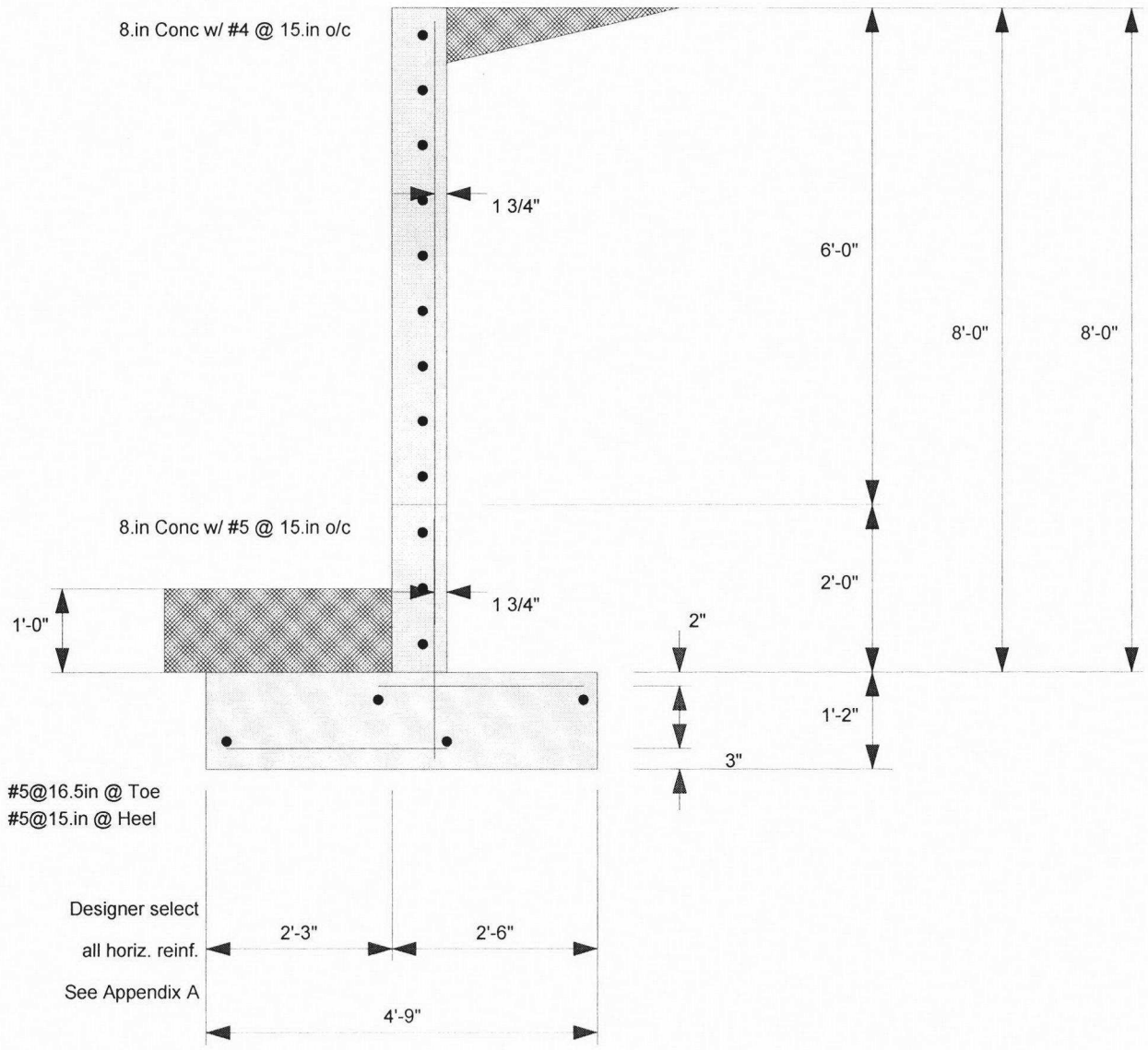
Toe: #4@ 10.75 in, #5@ 16.50 in, #6@ 23.50 in, #7@ 31.75 in, #8@ 42.00 in, #9@ 4
Heel: Not req'd, Mu < S * Fr
Key: Not req'd, Mu < S * Fr

Summary of Overturning & Resisting Forces & Moments

		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#			.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Item									
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 Stem	=	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 Soil	=				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 Transitions	=			
Total	=	1,451.3	**O.T.M.** =	5,495.9	Footing Weight	=	831.3	2.38	1,974.2
Resisting/Overturning Ratio			=	**2.13**	Key Weight	=		2.50	
Vertical Loads used for Soil Pressure =		4,066.0 lbs			Vert. Component	=			
					Total =		3,936.0 lbs	**R.M.**=	11,687.8

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

DESIGNER NOTES:


8.in Conc w/ #4 @ 15.in o/c
1 3/4"
6'-0"
8'-0"
8'-0"
8.in Conc w/ #5 @ 15.in o/c
2'-0"
1'-0"
1 3/4"
2"
1'-2"
3"
#5@16.5in @ Toe
#5@15.in @ Heel
Designer select
all horiz. reinf.
See Appendix A
2'-3"
2'-6"
4'-9"

spyker addition
Retaining Wall
Froelich Engineers

Title : **Alta Mira**
Job # : **15-T070** Dsgnr: **AT** Date: **MAY 13,2015**
Description....

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

Cantilevered Retaining Wall Design

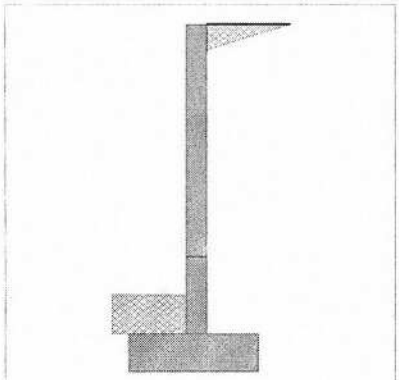
Code: IBC 2009

Criteria

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

Soil Data

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



Thumbnail

Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	55.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	146.0 lbs
Axial Live Load	=	130.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Design Summary

Wall Stability Ratios

Overturning	=	1.88 OK
Sliding	=	1.56 OK
Total Bearing Load	=	3,358 lbs
...resultant ecc.	=	9.86 in
Soil Pressure @ Toe	=	1,900 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	2,675 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	18.4 psi OK
Footing Shear @ Heel	=	15.9 psi OK
Allowable	=	75.0 psi

Sliding Calcs (Vertical Component NOT Used)

Lateral Sliding Force	=	1,181.3 lbs
less 100% Passive Force	= -	393.8 lbs
less 100% Friction Force	= -	1,452.6 lbs
Added Force Req'd	=	0.0 lbs OK
....for 1.5 : 1 Stability	=	0.0 lbs OK

Load Factors

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

Stem Construction

		Top Stem	2nd
		Stem OK	Stem OK
Design Height Above Ftg	ft =	2.00	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			
fb/FB + fa/Fa	=	**0.506**	**0.707**
Total Force @ Section	lbs =	920.3	1,544.3
Moment....Actual	ft-# =	2,192.1	4,652.6
Moment.....Allowable	ft-# =	4,330.1	6,578.7
Shear.....Actual	psi =	12.7	21.3
Shear.....Allowable	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 =	12.00	16.55
LAP SPLICE IF BELOW	in =	12.00	
HOOK EMBED INTO FTG	in =		7.31

Lap splice above base reduced by stress ratio
Hook embedment reduced by stress ratio

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Short Term Factor	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	Medium Weight
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,000.0	2,500.0
Fy	psi =	60,000.0	60,000.0

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Registration #: RP-1110505 RP9.27

Cantilevered Retaining Wall Design

Code: IBC 2009

Footing Dimensions & Strengths

Toe Width	=	1.75 ft
Heel Width	=	2.25
Total Footing Width	=	4.00
Footing Thickness	=	12.00 in
Key Width	=	12.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	2.00 ft

f'c = 2,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	2,675	0 psf
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 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

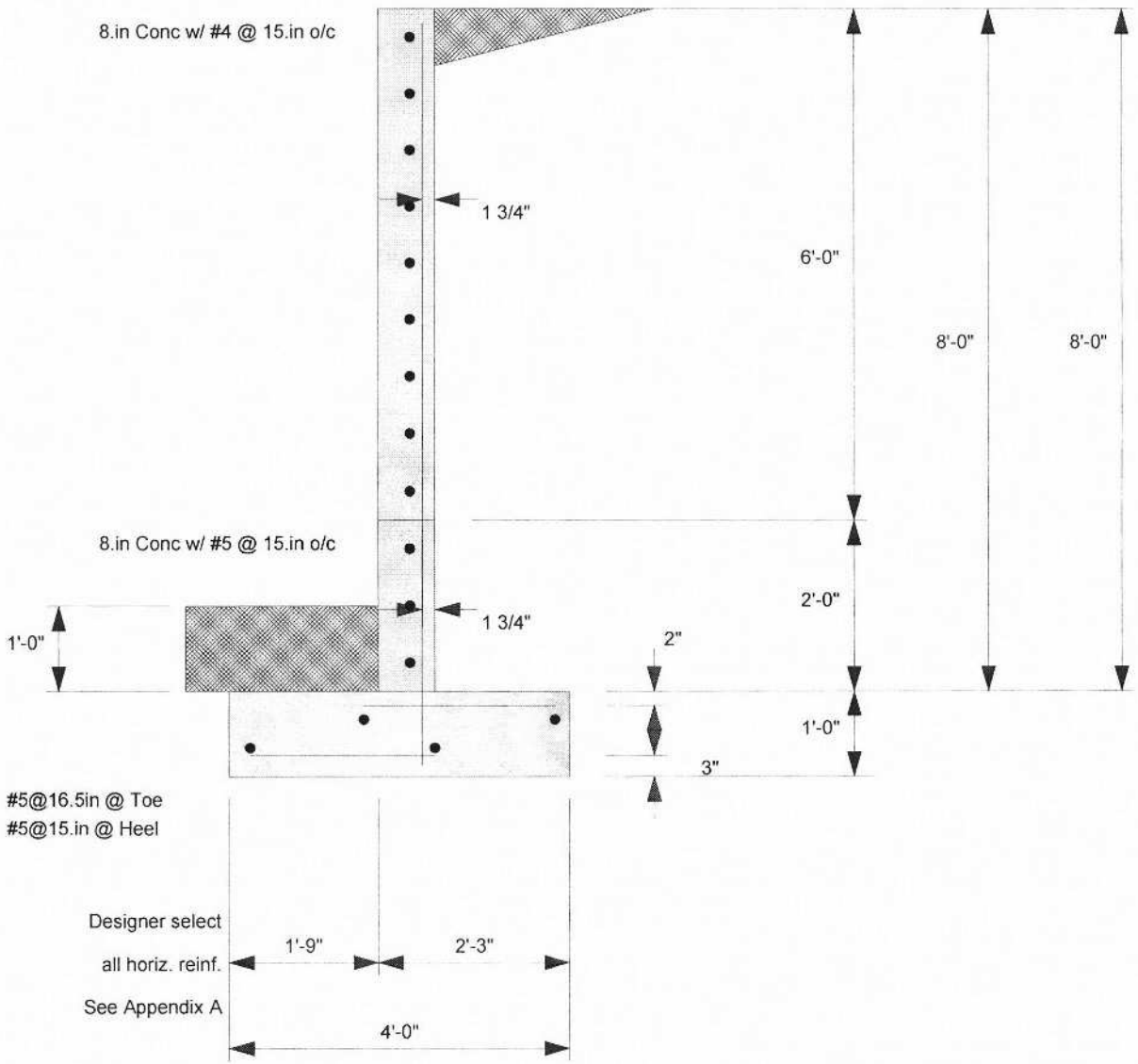
Toe: #4@ 13.25 in, #5@ 20.50 in, #6@ 29.00 in, #7@ 39.25 in, #8@ 48.25 in, #9@ 4
Heel: Not req'd, Mu < S * Fr
Key: Not req'd, Mu < S * Fr

Summary of Overturning & Resisting Forces & Moments

		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#			.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Item									
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 Soil	=				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	=			
Total	=	1,181.3	**O.T.M.** =	4,207.8	Footing Weight	=	600.0	2.00	1,200.0
Resisting/Overturning Ratio			=	**1.88**	Key Weight	=		2.50	
Vertical Loads used for Soil Pressure	=	3,358.1 lbs			Vert. Component	=			
					Total =		3,228.1 lbs	**R.M.**=	7,893.8

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

DESIGNER NOTES:


8.in Conc w/ #4 @ 15.in o/c
1 3/4"
6'-0"
8'-0"
8'-0"
8.in Conc w/ #5 @ 15.in o/c
2'-0"
1 3/4"
1'-0"
2"
1'-0"
3"
#5@16.5in @ Toe
#5@15.in @ Heel
Designer select
all horiz. reinf.
See Appendix A
1'-9"
2'-3"
4'-0"

spyker addition
Retaining Wall
Froelich Engineers

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

Dsgnr: AT

Page: ____
Date: MAY 13,2015

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

Cantilevered Retaining Wall Design

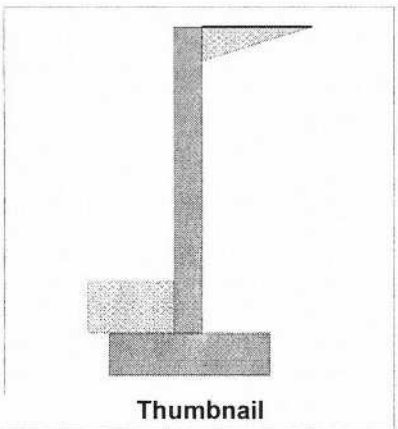
Code: IBC 2009

Criteria

Retained Height	=	6.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	12.00 in
Water height over heel	=	0.0 ft

Soil Data

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



Thumbnail

Surcharge Loads

Surcharge Over Heel	=	95.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	55.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	637.0 lbs
Axial Live Load	=	560.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Design Summary

Wall Stability Ratios

Overturning	=	2.48 OK
Sliding	=	2.05 OK
Total Bearing Load	=	3,709 lbs
...resultant ecc.	=	5.91 in
Soil Pressure @ Toe	=	1,768 psf OK
Soil Pressure @ Heel	=	210 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	2,529 psf
ACI Factored @ Heel	=	300 psf
Footing Shear @ Toe	=	22.2 psi OK
Footing Shear @ Heel	=	8.5 psi OK
Allowable	=	75.0 psi

Sliding Calcs (Vertical Component NOT Used)

Lateral Sliding Force	=	855.8 lbs
less 100% Passive Force	= -	333.3 lbs
less 100% Friction Force	= -	1,416.9 lbs
Added Force Req'd	=	0.0 lbs OK
....for 1.5 : 1 Stability	=	0.0 lbs OK

Load Factors

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

Stem Construction

		Top Stem	2nd
		Stem OK	Stem OK
Design Height Above Ftg	ft =	2.00	0.00
Wall Material Above "Ht"	=	Concrete	Concrete
Thickness	=	8.00	8.00
Rebar Size	=	# 4	# 4
Rebar Spacing	=	16.00	16.00
Rebar Placed at	=	Edge	Edge
Design Data			
fb/FB + fa/Fa	=	**0.321**	**0.739**
Total Force @ Section	lbs =	606.1	1,121.0
Moment....Actual	ft-# =	1,307.7	3,030.7
Moment.....Allowable	ft-# =	4,069.4	4,099.3
Shear.....Actual	psi =	8.5	15.4
Shear.....Allowable	psi =	67.1	75.0
Wall Weight	psf =	100.0	100.0
Rebar Depth 'd'	in =	6.25	6.25
LAP SPLICE IF ABOVE	in =	12.00	13.84
LAP SPLICE IF BELOW	in =	12.00	
HOOK EMBED INTO FTG	in =		6.16

Lap splice above base reduced by stress ratio
Hook embedment reduced by stress ratio

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Short Term Factor	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	Medium Weight
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,000.0	2,500.0
Fy	psi =	60,000.0	60,000.0

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

Cantilevered Retaining Wall Design

Code: IBC 2009

Footing Dimensions & Strengths

Toe Width	=	1.50 ft
Heel Width	=	2.25
Total Footing Width	=	3.75
Footing Thickness	=	10.00 in
Key Width	=	12.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	2.00 ft

f'c = 2,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	2,529	300 psf
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 psi
Allow 1-Way Shear	=	75.00	75.00 psi

Toe Reinforcing = # 4 @ 17.25 in
Heel Reinforcing = # 4 @ 18.00 in
Key Reinforcing = None Spec'd

Other Acceptable Sizes & Spacings

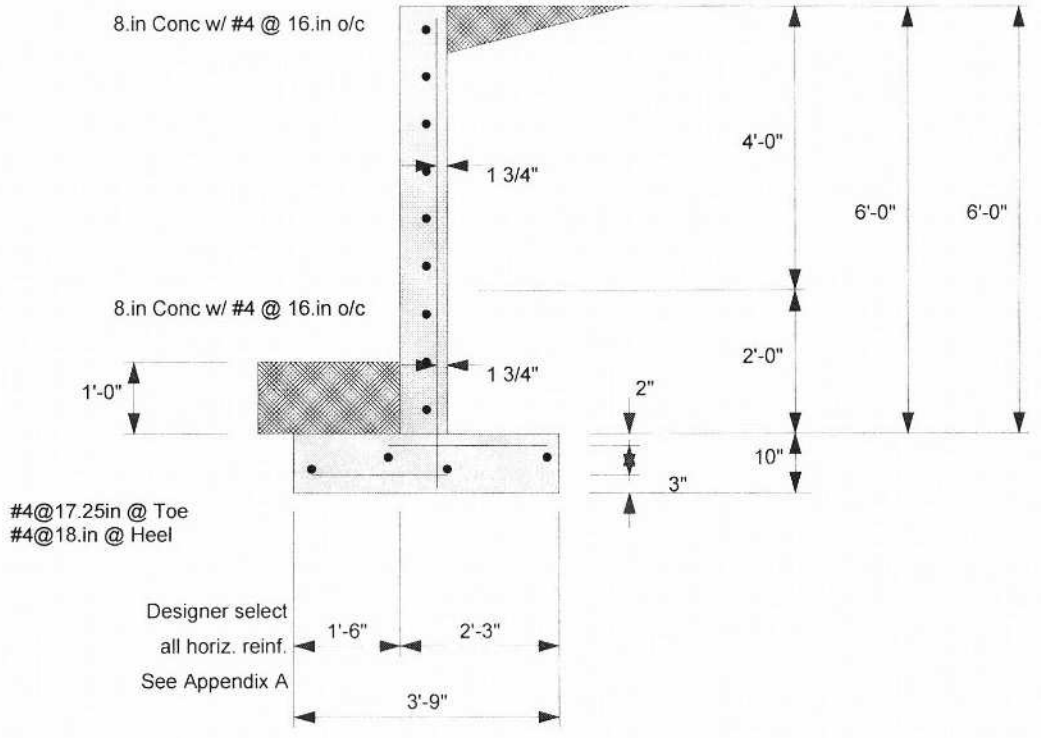
Toe: #4@ 17.25 in, #5@ 26.50 in, #6@ 37.75 in, #7@ 48.25 in, #8@ 48.25 in, #9@ 4
Heel: Not req'd, Mu < S * Fr
Key: Not req'd, Mu < S * Fr

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	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 Stem	= 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 Soil	=				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 Transitions	=		
Total	=	855.8	**O.T.M.** =	2,767.7	Footing Weight	= 468.8	1.88	878.9
Resisting/Overturning Ratio			=	**2.48**	Key Weight	=	2.50	
Vertical Loads used for Soil Pressure =		3,708.7 lbs			Vert. Component	=		
					Total =	3,148.7 lbs	**R.M.**=	6,868.8

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

DESIGNER NOTES:


8.in Conc w/ #4 @ 16.in o/c
1 3/4"
4'-0"
6'-0"
6'-0"
8.in Conc w/ #4 @ 16.in o/c
1 3/4"
2'-0"
1'-0"
2"
10"
3"
#4@17.25in @ Toe
#4@18.in @ Heel
Designer select
all horiz. reinf.
See Appendix A
1'-6"
2'-3"
3'-9"

spyker addition
Retaining Wall
Froelich Engineers

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

Dsgnr: AT

Page: ____
Date: MAY 13,2015

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

Cantilevered Retaining Wall Design

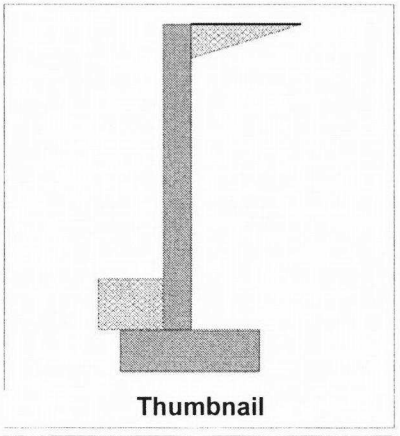
Code: IBC 2009

Criteria

Retained Height	=	6.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	12.00 in
Water height over heel	=	0.0 ft

Soil Data

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



Thumbnail

Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	55.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	146.0 lbs
Axial Live Load	=	130.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Design Summary

Wall Stability Ratios

Overturning	=	1.99 OK
Sliding	=	2.06 OK
Total Bearing Load	=	2,492 lbs
...resultant ecc.	=	8.34 in
Soil Pressure @ Toe	=	1,787 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	2,521 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	11.0 psi OK
Footing Shear @ Heel	=	13.0 psi OK
Allowable	=	75.0 psi

Sliding Calcs (Vertical Component NOT Used)

Lateral Sliding Force	=	678.8 lbs
less 100% Passive Force	= -	333.3 lbs
less 100% Friction Force	= -	1,063.0 lbs
Added Force Req'd	=	0.0 lbs OK
....for 1.5 : 1 Stability	=	0.0 lbs OK

Load Factors

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

Stem Construction

		Top Stem	2nd
		Stem OK	Stem OK
Design Height Above Ftg	ft =	2.00	0.00
Wall Material Above "Ht"	=	Concrete	Concrete
Thickness	=	8.00	8.00
Rebar Size	=	# 4	# 4
Rebar Spacing	=	18.00	18.00
Rebar Placed at	=	Edge	Edge
Design Data			
fb/FB + fa/Fa	=	**0.269**	**0.625**
Total Force @ Section	lbs =	440.3	872.3
Moment....Actual	ft-# =	976.1	2,284.6
Moment.....Allowable	ft-# =	3,632.0	3,655.6
Shear.....Actual	psi =	6.3	12.1
Shear.....Allowable	psi =	67.1	75.0
Wall Weight	psf =	100.0	100.0
Rebar Depth 'd'	in =	6.25	6.25
LAP SPLICE IF ABOVE	in =	12.00	12.00
LAP SPLICE IF BELOW	in =	12.00	
HOOK EMBED INTO FTG	in =		6.00

Lap splice above base reduced by stress ratio
Hook embedment reduced by stress ratio

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Short Term Factor	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	Medium Weight
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,000.0	2,500.0
Fy	psi =	60,000.0	60,000.0

spyker addition
Retaining Wall
Froelich Engineers

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

Dsgnr: AT

Page: ____
Date: MAY 13,2015

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

Cantilevered Retaining Wall Design

Code: IBC 2009

Footing Dimensions & Strengths

Toe Width	=	1.00 ft
Heel Width	=	2.25
Total Footing Width	=	3.25
Footing Thickness	=	10.00 in
Key Width	=	12.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	2.00 ft

f'c = 2,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design 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

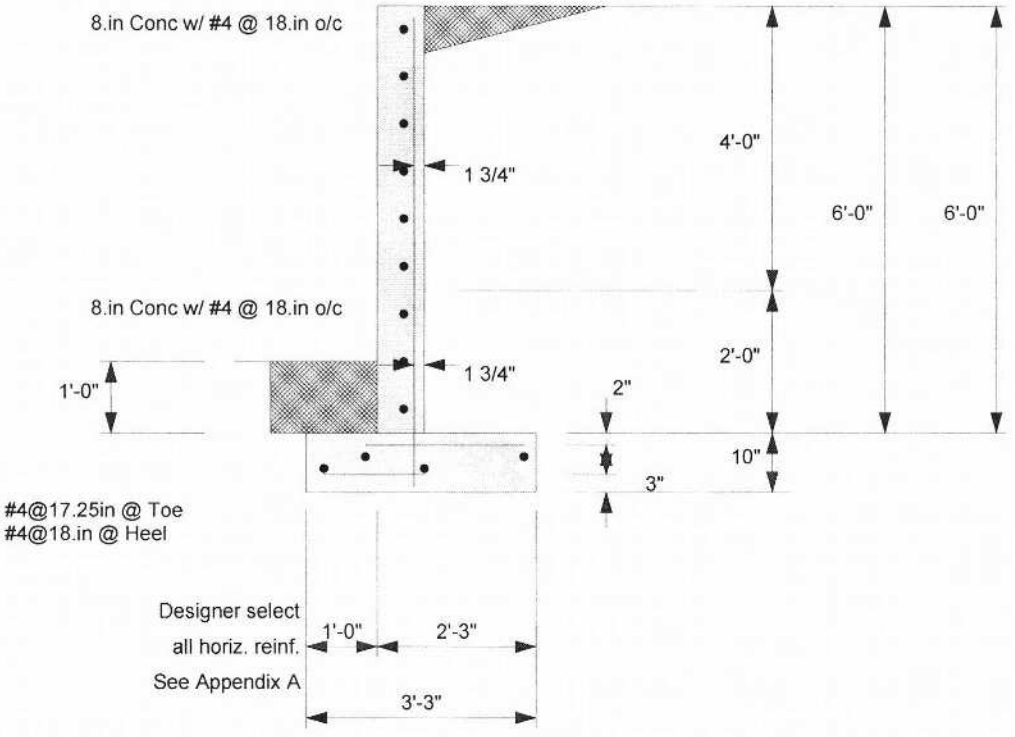
Other Acceptable Sizes & Spacings
Toe: Not req'd, Mu < S * Fr
Heel: Not req'd, Mu < S * Fr
Key: Not req'd, Mu < S * Fr

Summary of Overturning & Resisting Forces & Moments

		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#			.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Item									
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 Stem	=	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 Soil	=				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 Transitions	=			
Total	=	678.8	**O.T.M.** =	2,162.8	Footing Weight	=	406.3	1.63	660.2
Resisting/Overturning Ratio			=	**1.99**	Key Weight	=		2.50	
Vertical Loads used for Soil Pressure =		2,492.3 lbs			Vert. Component	=			
						Total =	2,362.3 lbs	**R.M.=**	4,306.3

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

DESIGNER NOTES:


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

spyker addition
Retaining Wall
Froelich Engineers

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

Dsgnr: AT

Page: ____
Date: MAY 13,2015

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

Cantilevered Retaining Wall Design

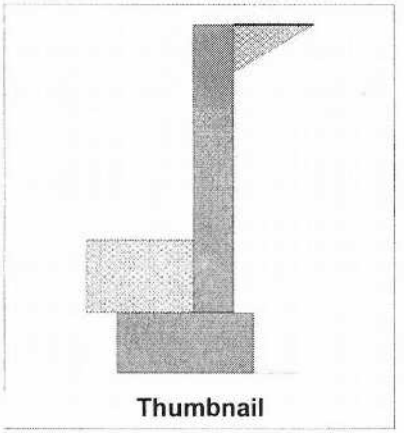
Code: IBC 2009

Criteria

Retained Height	=	4.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	12.00 in
Water height over heel	=	0.0 ft

Soil Data

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



Thumbnail

Surcharge Loads

Surcharge Over Heel	=	95.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	55.0 psf
Used for Sliding & Overturning		

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Axial Load Applied to Stem

Axial Dead Load	=	637.0 lbs
Axial Live Load	=	560.0 lbs
Axial Load Eccentricity	=	0.0 in

Design Summary

Wall Stability Ratios

Overturning	=	1.71 OK
Sliding	=	2.42 OK
Total Bearing Load	=	2,263 lbs
...resultant ecc.	=	3.37 in
Soil Pressure @ Toe	=	1,758 psf OK
Soil Pressure @ Heel	=	253 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	2,548 psf
ACI Factored @ Heel	=	367 psf
Footing Shear @ Toe	=	16.0 psi OK
Footing Shear @ Heel	=	1.5 psi OK
Allowable	=	75.0 psi

Sliding Calcs (Vertical Component NOT Used)

Lateral Sliding Force	=	454.0 lbs
less 100% Passive Force	= -	333.3 lbs
less 100% Friction Force	= -	766.3 lbs
Added Force Req'd	=	0.0 lbs OK
....for 1.5 : 1 Stability	=	0.0 lbs OK

Load Factors

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

Stem Construction

		Top Stem	2nd
		Stem OK	Stem OK
Design Height Above Ftg	ft =	2.00	0.00
Wall Material Above "Ht"	=	Concrete	Concrete
Thickness	=	8.00	8.00
Rebar Size	=	# 4	# 4
Rebar Spacing	=	18.00	18.00
Rebar Placed at	=	Edge	Edge
Design Data			
fb/FB + fa/Fa	=	**0.168**	**0.383**
Total Force @ Section	lbs =	235.2	558.1
Moment....Actual	ft-# =	611.0	1,400.2
Moment.....Allowable	ft-# =	3,632.0	3,655.6
Shear.....Actual	psi =	3.6	7.9
Shear.....Allowable	psi =	67.1	75.0
Wall Weight	psf =	100.0	100.0
Rebar Depth 'd'	in =	6.25	6.25
LAP SPLICE IF ABOVE	in =	12.00	12.00
LAP SPLICE IF BELOW	in =	12.00	
HOOK EMBED INTO FTG	in =		6.00

Lap splice above base reduced by stress ratio
Hook embedment reduced by stress ratio

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Short Term Factor	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	Medium Weight
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,000.0	2,500.0
Fy	psi =	60,000.0	60,000.0

Cantilevered Retaining Wall Design

Code: IBC 2009

Footing Dimensions & Strengths

Toe Width	=	1.25 ft
Heel Width	=	1.00
Total Footing Width	=	2.25
Footing Thickness	=	10.00 in
Key Width	=	12.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	2.00 ft

f'c = 2,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design 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 Sizes & Spacings

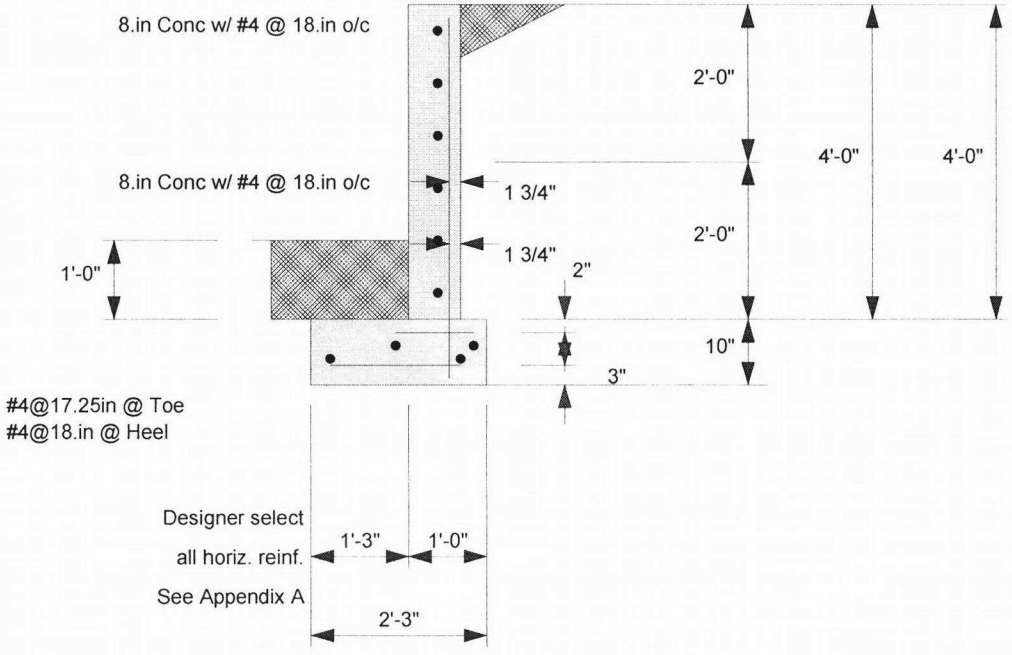
Toe: Not req'd, Mu < S * Fr
Heel: Not req'd, Mu < S * Fr
Key: Not req'd, Mu < S * Fr

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	350.4	1.61	564.6	Soil Over Heel	= 146.7	2.08	305.6
Surcharge over Heel	=	125.2	2.42	302.6	Sloped Soil Over Heel	=		
Toe Active Pressure	=	-50.4	0.61	-30.8	Surcharge Over Heel	= 31.7	2.08	66.0
Surcharge Over Toe	=	-27.5	0.92	-25.2	Adjacent Footing Load	=		
Adjacent Footing Load	=				Axial Dead Load on 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	886.7
Load @ Stem Above Soil	=				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 Transitions	=		
Total	=	454.0	**O.T.M.** =	1,434.6	Footing Weight	= 281.3	1.13	316.4
Resisting/Overturning Ratio			=	**1.71**	Key Weight	=	2.50	
Vertical Loads used for Soil Pressure	=	2,262.8 lbs			Vert. Component	=		
					Total =	1,702.8 lbs	**R.M.**=	2,458.8

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

DESIGNER NOTES:


8.in Conc w/ #4 @ 18.in o/c
8.in Conc w/ #4 @ 18.in o/c
1 3/4"
1 3/4"
2"
3"
2'-0"
2'-0"
4'-0"
4'-0"
10"
1'-0"
#4@17.25in @ Toe
#4@18.in @ Heel
Designer select
all horiz. reinf.
See Appendix A
1'-3"
1'-0"
2'-3"

spyker addition
Retaining Wall
Froelich Engineers

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

Dsgnr: AT

Page: ____
Date: MAY 13,2015

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

Cantilevered Retaining Wall Design

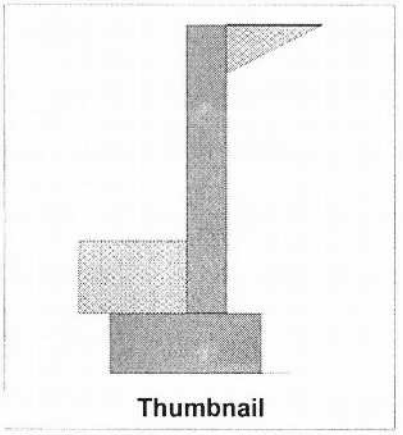
Code: IBC 2009

Criteria

Retained Height	=	4.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	12.00 in
Water height over heel	=	0.0 ft

Soil Data

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



Thumbnail

Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	55.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	146.0 lbs
Axial Live Load	=	130.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Design Summary

Wall Stability Ratios

Overturning	=	1.72 OK
Sliding	=	2.82 OK
Total Bearing Load	=	1,451 lbs
...resultant ecc.	=	6.53 in
Soil Pressure @ Toe	=	1,371 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,943 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	10.7 psi OK
Footing Shear @ Heel	=	4.9 psi OK
Allowable	=	75.0 psi

Sliding Calcs (Vertical Component NOT Used)

Lateral Sliding Force	=	328.8 lbs
less 100% Passive Force	= -	333.3 lbs
less 100% Friction Force	= -	594.6 lbs
Added Force Req'd	=	0.0 lbs OK
....for 1.5 : 1 Stability	=	0.0 lbs OK

Load Factors

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

Stem Construction

		Top Stem	2nd
		Stem OK	Stem OK
Design Height Above Ftg	ft =	2.00	0.00
Wall Material Above "Ht"	=	Concrete	Concrete
Thickness	=	8.00	8.00
Rebar Size	=	# 4	# 4
Rebar Spacing	=	18.00	18.00
Rebar Placed at	=	Edge	Edge
Design Data			
fb/FB + fa/Fa	=	**0.145**	**0.292**
Total Force @ Section	lbs =	152.3	392.3
Moment....Actual	ft-# =	528.1	1,068.6
Moment.....Allowable	ft-# =	3,632.0	3,655.6
Shear.....Actual	psi =	2.5	5.7
Shear.....Allowable	psi =	67.1	75.0
Wall Weight	psf =	100.0	100.0
Rebar Depth 'd'	in =	6.25	6.25
LAP SPLICE IF ABOVE	in =	12.00	12.00
LAP SPLICE IF BELOW	in =	12.00	
HOOK EMBED INTO FTG	in =		6.00

Lap splice above base reduced by stress ratio
Hook embedment reduced by stress ratio

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Short Term Factor	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	Medium Weight
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,000.0	2,500.0
Fy	psi =	60,000.0	60,000.0

spyker addition
Retaining Wall
Froelich Engineers

Title : Alta Mira
Job # : 15-T070 Dsgnr: AT Date: MAY 13,2015
Description....

Page: ____

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

Cantilevered Retaining Wall Design

Code: IBC 2009

Footing Dimensions & Strengths

Toe Width	=	1.25 ft
Heel Width	=	1.25
Total Footing Width	=	2.50
Footing Thickness	=	10.00 in
Key Width	=	12.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	2.00 ft

f'c = 2,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design 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

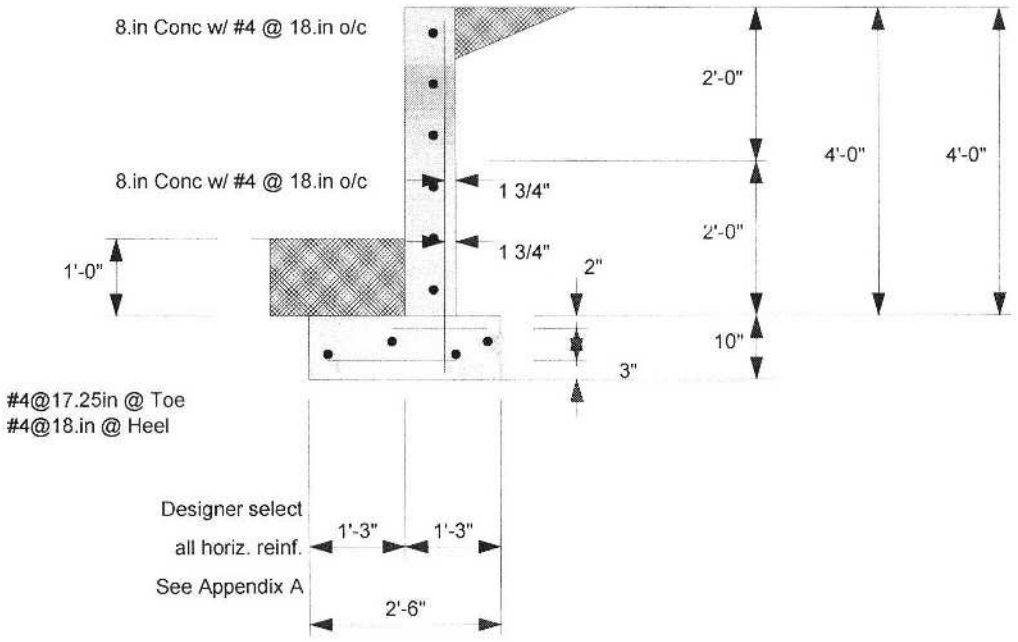
Other Acceptable Sizes & Spacings
Toe: Not req'd, Mu < S * Fr
Heel: Not req'd, Mu < S * Fr
Key: Not req'd, Mu < S * Fr

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	350.4	1.61	564.6	Soil Over Heel	= 256.7	2.21	566.8
Surcharge over Heel	=				Sloped Soil Over Heel	=		
Toe Active Pressure	=	-50.4	0.61	-30.8	Surcharge Over Heel	=		
Surcharge Over Toe	=	-27.5	0.92	-25.2	Adjacent Footing Load	=		
Adjacent Footing Load	=				Axial Dead Load on Stem	= 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 Soil	=				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 Transitions	=		
Total	=	328.8	**O.T.M.** =	1,132.0	Footing Weight	= 312.5	1.25	390.6
Resisting/Overturning Ratio		= **1.72**			Key Weight	=	2.50	
Vertical Loads used for Soil Pressure =		1,451.4 lbs			Vert. Component	=		
					Total =	1,321.4 lbs	**R.M.**=	1,950.8

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

DESIGNER NOTES:


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

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

House 2nd Floor:

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

FROELICH CONSULTING ENGINEERS, INC.

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

SEISMIC FORCE CALCULATION

(Per ASCE7-10)

	Risk Category =	II		
	Importance I =	1.00		
	Soil Site Class =	D		
	Soil Shear Wave Vel. v_s =	1000	ft/s	
	Site Class B Short Period Spectral Response Acceleration S_S =	0.995	g	
	Site Class B 1 Second Spectral Response Acceleration S_1 =	0.428	g	
	Site Class Adjustment Coefficients F_a =	1.10		
	F_v =	1.58		
$S_{MS}=F_a*S_S$	S_{MS} =	1.096	g	
$S_{M1}=F_v*S_1$	S_{M1} =	0.674	g	
$S_{DS}=(2/3)S_{MS}$	S_{DS} =	0.731	g	
	Seismic Design Category =	D		
$S_{D1}=(2/3)S_{M1}$	S_{D1} =	0.449	g	
	Seismic Design Category =	D		
	R =	6.5		
	Period Parameters C_t =	0.02		
	x =	0.75		
	Height of Structure h_n =	22.00	ft	
$T_a = C_t*h_n^x$	Approximate Period T_a =	0.203	sec	
	C_u =	1.554		
$T = T_a*C_u$	Upper Limit Period T =	0.316	sec	
$C_S = S_{DS}/(R/I)$	Seismic Response Coefficient C_S =	0.112		
$C_S = S_{D1}/(T*(R/I))$	Upper Limit C_S =	0.340		
	Lower Limit C_S =	0.032		
	redundancy ρ =	1.000		
	Weight W =	98092	lbs	
$V = C_S*W*p$	Seismic Base Shear V =	11031		
Vasd=0.7*V	ASD Seismic Base Shear Vasd =	**7722**	lbs	

Vertical Distribution of Seismic Force

level x	hx	Wx	hxWx	hxWx/Σ 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

FROELICH
ENGINEERS

WIND FORCE CALCULATION - MWFRS (Front to Back)

ASCE 7-10 SECTION 27.2
DIRECTONAL ANALYTICAL

Basic Wind Speeds	**Input**		
3 Second Gust V_{3s} =	120	mph	
Wind Directionality Factor K_d =	0.85		Table 26.6-1 (page 250)
Risk Catigory =	II		Table 1.5-1 (page 2)
Wind Exposure Category =	B		

Building Parameters			
Longitudinal Dimension of Bldg L =	50	ft	
Transverse Dimension of Bldg B =	56	ft	
Mean Roof Height h =	20	ft	
Highest Roof Level h_n =	22	ft	
Approximate Fundamental Period T_a =	0.20	sec	Eq. 12.8-7 (page 90)

Output - Fundamental Frequency f = 4.9 Hz > 1 Hz Therefore Rigid

Topographic Effects	**Input**		(2 Dimensional Ridge)
Hill Height H =	0	ft	Figure 26.8-1
Length of 1/2 hill height L_h =	1000	ft	Figure 26.8-1
Dist. From Crest to Bldg. x =	0	ft	Figure 26.8-1
Height Above Local Grade z =	0	ft	Figure 26.8-1
Horizontal Attenuation Factor μ =	1.5		Figure 26.8-1
Height Attenuation Factor γ =	3		Figure 26.8-1
Shape Factor K1/(H/Lh) =	1.30		Figure 26.8-1

Output - Topographic Multipliers K_1 = 0.00
K_2 = 1.00
K_3 = 1.00
Topographic Factor K_{zt} = 1.00

Gust Effects	**Input**		
Integral Length Scale Factor ℓ =	320 ft		Table 26.9-1
Integral Length Scale			
Nominal Height of Boundary z_g =	1200		Table 26.9-1
3 sec Gust Exponent α =	7.00		Table 26.9-1
Turbulence Intensity Factor c =	0.30		Table 26.9-1
Power Law Exponent ε =	0.33		Table 26.9-1
Minimum Height z_{min} =	30 ft		Table 26.9-1
Integral Length Scale of Turbulence L_z =		310	ft

Output - Background Response Factor Q =	0.90	
Intensity of Turbulence I_z =	0.30	
Gust Effect Factor G =	0.86	

Pressure Coefficients	**Input**		
Length to Width Ratio L/B =	0.89		
Height to Length Ratio h/L =	0.36		
Roof Pitch =	1 : 12 =	3.81	deg
Velocity Pressure Exposure Coefficients K_h	(see below)	Table 27.3-1 (page 261)	
External Pressure Coefficients C_p	(see below)	Figure 27.4-1 (page 264)	

Direction	C_p
Wall Windward	0.8
Wall Leeward	-0.5
Roof Windward	0.4
Roof Leeward	-0.6

Height (ft)	K_h	q_z (psf)	Velocity
15	0.57	18.0	Pressure
20	0.62	19.6	Output q_z
25	0.67	20.8	
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	
h = 20	0.62	19.6	q_h

Design Wind Pressures p (psf) - GC_{pi} = (-) 10 psf min per 6.1.4.1

Internal Pressure Coefficient GC_{pi} = -0.18 Fig. 26.11-1 (page 258)

				Horizontal Effects		**Wall**	**Roof 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

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

Design Wind Pressures p (psf) - GC_{pi} = (+) 10 psf min per 6.1.4.1

Internal Pressure Coefficient GC_{pi} = 0.18 Fig. 26.11-1 (page 258)

				Horizontal Effects		**Wall**	**Roof 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)

FROELICH CONSULTING ENGINEERS, INC.

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

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]= 1102 lbs
Fe = (.5)(13ft/55ft) x 5802lb 686 lbs
*Windward Design

Upper North Wall Line(From West)

Fw = 10.2 psf [(4.5ft)(6.5 ft)+10SF]= 699 lbs
Fe = (.5)(13ft/55ft) x 5802lb 686 lbs
*Windward Design

Upper Back of Garage Wall Line

Fw = 13.2 psf [(4.5ft)(28 ft)+65SF]= 2521 lbs
Fe = (1/2) x 5802lb 2901 lbs

Upper South Wall Line

Fw = 13.2 psf [(4.5ft)(15 ft)+25SF]= 1221 lbs
Fe = (15/55) x 5802lb 1582 lbs

Upper East/West Wall Line

Fw = 74 plf (25 ft)= 1850 lbs
Fe = (1/2) x 5802lb 2901 lbs

Lower Back of Garage Wall Line

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

Lower South Wall Line

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

Lower East Wall Line

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

Lower West Wall Line

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

Client: Arcon
Project: Alta Mira
Proj. #: 15-T070
Date: 6/9/15
By: AT

First Floor Shear Walls and Hold Downs

Roof DL: 17 psf
Wall DL: 8 psf
Floor DL: 20 psf

L (ft)	Lt (ft)	hu (ft)	hl (ft)	hl/L	Lower Seismic	Upper Seismic	Lower Wind	Upper Wind	Ms W (lb*ft)	Mu W (lb*ft)	Ms EQ (lb*ft)	Mu EQ (lb*ft)	Rtrib (ft)	Wtrib (ft)	Ftrib (ft)	Mr (lb*ft)	Lo (in)	**Tu W (lb)**	Ts W (lb)	**Sheathing W Design (plf)**	Tu W (lb)	Ts W (lb)	Sheathing EQ Design (plf)	**Hold Downs**	**Nailing**
Lower - Back of Garage Wall Line																									
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 (ft)	Lt (ft)	hu (ft)	hl (ft)	hl/L	Lower Seismic	Upper Seismic	Lower Wind	Upper Wind	Ms W (lb*ft)	Mu W (lb*ft)	Ms EQ (lb*ft)	Mu EQ (lb*ft)	Rtrib (ft)	Wtrib (ft)	Ftrib (ft)	Mr (lb*ft)	Lo (in)	**Tu W (lb)**	Ts W (lb)	**Sheathing W Design (plf)**	Tu W (lb)	Ts W (lb)	Sheathing EQ Design (plf)	**Hold Downs**	**Nailing**
Lower -South Wall Line																									
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 (ft)	Lt (ft)	hu (ft)	hl (ft)	hl/L	Lower Seismic	Upper Seismic	Lower Wind	Upper Wind	Ms W (lb*ft)	Mu W (lb*ft)	Ms EQ (lb*ft)	Mu EQ (lb*ft)	Rtrib (ft)	Wtrib (ft)	Ftrib (ft)	Mr (lb*ft)	Lo (in)	**Tu W (lb)**	Ts W (lb)	**Sheathing W Design (plf)**	Tu W (lb)	Ts W (lb)	Sheathing EQ Design (plf)	**Hold Downs**	**Nailing**
Lower -East Wall Line																									
6.00	6.00	9	9	1.5	1210	0	4101	0	36909	36909	10890	10890	2	18	2	2354	12.000	**6911**	6911	**684**	1707	1707	202	**HDU8**	**2/12**

L (ft)	Lt (ft)	hu (ft)	hl (ft)	hl/L	Lower Seismic	Upper Seismic	Lower Wind	Upper Wind	Ms W (lb*ft)	Mu W (lb*ft)	Ms EQ (lb*ft)	Mu EQ (lb*ft)	Rtrib (ft)	Wtrib (ft)	Ftrib (ft)	Mr (lb*ft)	Lo (in)	**Tu W (lb)**	Ts W (lb)	**Sheathing W Design (plf)**	Tu W (lb)	Ts W (lb)	Sheathing EQ Design (plf)	**Hold Downs**	**Nailing**
Lower - West Wall Line																									
8.00	25.00	9	9	1.1	710	2901	2409	1850	18186	12266	19683	10400	2	18	2	4186	8.625	**1110**	1923	**170**	853	2128	144	**HTT4 w/ SSTB16**	**6/12**
17.00	25.00	9	5	0.3	710	2901	2409	1850	27061	14481	32004	12277	2	18	2	18901	0.000	**-260**	480	**170**	-390	771	144	**Not Req'd**	**6/12**

Client: Arcon
Project: Alta Mira
Proj. #: 15-T070
Date: 6/9/15
By: AT

Upper Floor Shear Walls and Hold Downs

Roof DL: 17 psf
Wall DL: 8 psf
Floor DL: 20 psf

L (ft)	Lt (ft)	hu (ft)	h/L	Wind (lb)	Seismic (lb)	Mu W (lb*ft)	Mu EQ (lb*ft)	Rtrib (ft)	Wtrib (ft)	Ftrib (ft)	Mr (lb*ft)	Lo (in)	Tu W (lb)	Sheathing W Design (plf)	Tu EQ (lb)	Sheathing EQ Design (plf)	Hold Downs	Nailing
North Wall Line																		
3.200	6.40	9.0	2.8	1102	686	4959	3087	13.5	9.0	0	926	0.000	**1260**	**172**	675	151	**HTT4**	6/12
3.200	6.40	9.0	2.8	1102	686	4959	3087	13.5	9.0	0	926	0.000	**1260**	**172**	675	151	**HTT4**	6/12
3.200	6.40	9.0	2.8	699	686	3146	3087	8.5	9.0	0	665	0.000	**775**	109	757	**151**	**HTT4**	6/12
3.200	6.40	9.0	2.8	699	686	3146	3087	8.5	9.0	0	665	0.000	**775**	109	757	**151**	**HTT4**	6/12

L (ft)	Lt (ft)	hu (ft)	h/L	Wind (lb)	Seismic (lb)	Mu W (lb*ft)	Mu EQ (lb*ft)	Rtrib (ft)	Wtrib (ft)	Ftrib (ft)	Mr (lb*ft)	Lo (in)	Tu W (lb)	Sheathing W Design (plf)	Tu EQ (lb)	Sheathing EQ Design (plf)	Hold Downs	Nailing
Back of Garage Wall Line																		
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

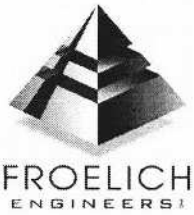
L (ft)	Lt (ft)	hu (ft)	h/L	Wind (lb)	Seismic (lb)	Mu (lb*ft)	Mu EQ (lb*ft)	Rtrib (ft)	Wtrib (ft)	Ftrib (ft)	Mr (lb*ft)	Lo (ft)	Tu W (lb)	Sheathing W Design (plf)	Tu EQ (lb)	Sheathing EQ Design (plf)	Hold Downs	Nailing
South Wall Line																		
6.000	9.00	9.0	1.5	1221	1582	7326	9492	13.5	9.0	0	3256	0.000	678	136	**1039**	**176**	**MST37**	6/12
3.000	9.00	9.0	3.0	1221	1582	3663	4746	10.5	9.0	0	676	0.000	996	136	**1357**	**264**	**MST37**	4/12

L (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 Design (plf)	Tu EQ (lb)	Sheathing EQ Design (plf)	Hold Downs	Nailing
West Wall Line																		
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 (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 Design (plf)	Tu EQ (lb)	Sheathing EQ Design (plf)	Hold Downs	Nailing
East Wall Line																		
11.200	11.20	9.0	0.8	1850	2901	16650	26109	2	9.0	0	3989	0.000	1130	165	**1975**	**259**	**MST48**	4/12

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:

f'c (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

Wall Dims/Hold down cover:

Wall Width:	72	in		
Hold Down Edge Dist:	9	in	W/S?	Controls
Embed depth (to plate):	6	in	W/S?	Controls
L1 (depth past plate):	1.5	in		
Clear Cover:	3	in		

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	

Load Cases (Bearing, lbs)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, lbs)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:	16.0	ft
Shear Wall Segment:	6.0	ft
Right Point Load Location:	5.0	ft
Left Point Load Location:	11.0	ft

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:

12	6	x cont FTG w/ (2) # 4 Bars cont.

See attached calc for bending of cont FTG

Required Footing Dim's for Bearing:

Footing Width:	24	in
Total FTG Length:	24	in
Footing Depth:	12	in

Bars (EW): 3 #4 Bars

Bars placed 3 inches Clear from bottom

* Rebar spacing is based on ACI min steel

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

Location: Garage Exterior Wall

Max Axial Load:

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

Load Cases:

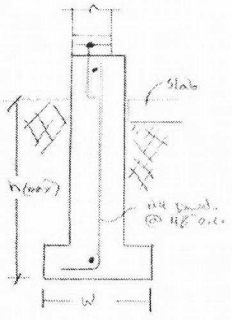
		Dead	Live (1)	Total	Wind (2)	Eq (2)
(16-8)	*D+F*	365	NA	365	NA	NA
(16-9)	*D+H+F+L =*	365	120	485	NA	NA
(16-10)	*D+H+F+(S) =*	365	225	590	NA	NA
(16-11)	*D+H+F+0.75L+0.75S =*	365	259	624	NA	NA

Note:

1) Foundation is supported both sides by soil pressure (2012 IBC 1807.1.1)
2) 7.5 " wide to meet Structrul plain concrete (2012 IBC 1905.1.8)
3) Vertical Dowels required because not supported top/bottom (ACI 318-11 22.6)

Footing Dead Load = 266 plf

Bearing Check = | **890** < **1500** | O.K.



Note:

12"x6" 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)

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

Location: Garage Exterior Wall

Max Axial Load:

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

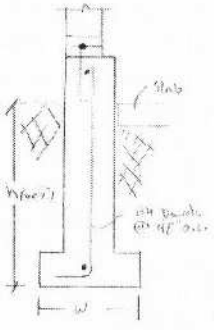
Load Cases:

		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:
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

Bearing Check = | **1023** < **1500** | O.K.



Note:

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