Structural Calculations Cover Sheet

Project Number: 2019.089   **Date:**   **January 3rd 2020**
Project Name: 4270 Ardekani

Structural Design For: Structural design for a new residence.
Construction Type: Conventional wood framed construction.

CODES

2015 International Building Code (IBC)
2015 NDS
ASCE 7-10

LOADS

Floor Live Load	40 psf
Dead Loads	As required
Roof snow Load	25 psf
Deck Load	60 psf
Wind	110 mph, Exposure C, Per ASCE 7-10 Section 28, Kzt = 1.0
Seismic	Per ASCE 7-10 Section 12

Peak Ground Accelerations (PGA) based on OSHPD, by Lat/Lon.
PGA 1 sec = .538   PGA .2 sec = 1.401   %V = .144 * DL

Material Design Values

Soils	Minimum 2,000 psf allowed bearing (subject to field verification)
	Per Geotech report by GEO Group Northwest, Inc. dated Nov. 4th 2019
Concrete	f'c=2,500 psi; 5-1/2 sack mix, or alternate mix pre-approved by bldg. dept.
Reinforcing	Grade 40 or 60; Fy=40,000 psi minimum
Sawn Lumber	Joists, Rafters: Hem-Fir #2 and better

Beams: 4x_: DF-L #2
            6x_: DF-L #2
            Posts: DF-L #2

Studs & Plates: Hem-Fir Standard

Glu-Lam Beams	24F-V4 for simple span beams, 24F-V8 for cantilevered beams
Parallam Beams	2.0E PSL, Fb=2,900 psi, Fv=290 psi, E=2.0*10^6 psi (minimum)
Microllam Beams	1.9E LVL, Fb=2,600 psi, Fv=285 psi, E=1.9*10^6 psi (minimum)
Anchor Bolts	ASTM A325 hold down bolts, F1554 Anchor Bolts, A307 other bolts

Roof, R1 12' Header
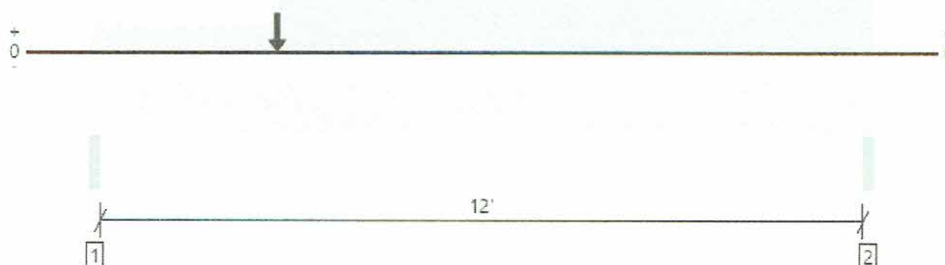**1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam**

Overall Length: 12' 6"

12'

1   2

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)	4498 @ 12' 4 1/2"	10725 (3.00")	Passed (42%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	4177 @ 1' 3"	13409	Passed (31%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	14494 @ 5' 9 11/16"	30360	Passed (48%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.165 @ 6' 1 7/8"	0.408	Passed (L/891)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.276 @ 6' 1 7/8"	0.613	Passed (L/532)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 12' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' 6" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 12' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - SPF	3.00"	3.00"	1.50"	1782	2620	4402	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	1817	2680	4497	None

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 12' 6"	N/A	16.0	--	
1 - Uniform (PSF)	3' to 12' 6"	16'	16.0	25.0	Default Load
2 - Uniform (PSF)	0 to 3'	4'	16.0	25.0	
3 - Point (lb)	3'	N/A	775	1200	

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Roof, R2 6' Header
1 piece(s) 6 x 10 Hem-Fir No. 2
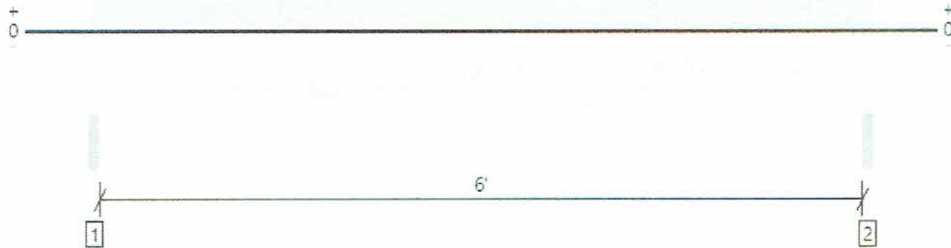
Overall Length: 6' 6"

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)	2442 @ 1 1/2"	6683 (3.00")	Passed (37%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1659 @ 1' 1/2"	5608	Passed (30%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3668 @ 3' 3"	5352	Passed (69%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.036 @ 3' 3"	0.208	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.060 @ 3' 3"	0.313	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 6' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 6' 6" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

	Bearing Length			Loads to Supports (lbs)			
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Trimmer - SPF	3.00"	3.00"	1.50"	979	1463	2442	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	979	1463	2442	None

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 6"	N/A	13.2	--	
1 - Uniform (PSF)	0 to 6' 6"	18'	16.0	25.0	Default Load

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

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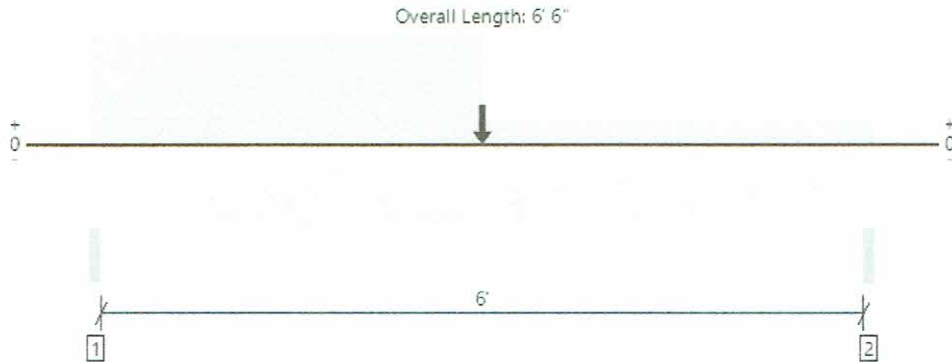| ForteWEB Software Operator	Job Notes
Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com	*2014.084* *4270*

Roof, R3 6' Header @ Girder Truss
1 piece(s) 6 x 10 Hem-Fir No. 2

Overall Length: 6' 6"

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)	2893 @ 1 1/2"	6683 (3.00")	Passed (43%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2111 @ 1' 1/2"	5608	Passed (38%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	5079 @ 3' 3"	5352	Passed (95%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.044 @ 3' 2 1/16"	0.208	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.074 @ 3' 2 1/16"	0.313	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 6' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 6' 6" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - SPF	3.00"	3.00"	1.50"	1154	1739	2893	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	776	1148	1924	None

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 6"	N/A	13.2	--	
1 - Uniform (PSF)	0 to 3' 3"	18'	16.0	25.0	Default Load
2 - Uniform (PSF)	3' 3" to 6' 6"	4'	16.0	25.0	
3 - Point (lb)	3' 3"	N/A	700	1100	

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File Name: 4270 Ardekani

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Roof, R4 14' Roof Beam
1 piece(s) 5 1/4" x 11 7/8" 2.0E Parallam® PSL

Overall Length: 14' 6"
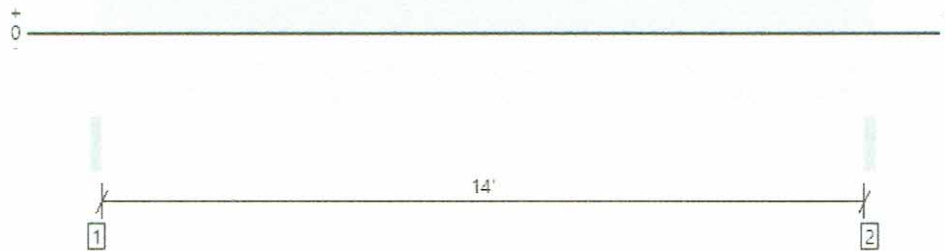
All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	6086 @ 1 1/2"	9844 (3.00")	Passed (62%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	5046 @ 1' 2 7/8"	13861	Passed (36%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	21309 @ 7' 3"	34332	Passed (62%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.340 @ 7' 3"	0.475	Passed (L/503)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.571 @ 7' 3"	0.712	Passed (L/300)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 14' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 14' 6" o/c unless detailed otherwise.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - SPF	3.00"	3.00"	1.85"	2461	3625	6086	None
2 - Trimmer - SPF	3.00"	3.00"	1.85"	2461	3625	6086	None

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 14' 6"	N/A	19.5	--	
1 - Uniform (PSF)	0 to 14' 6"	20'	16.0	25.0	Default Load

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Brett Johnson
CSES
(253) 579-2158
Brett.ajohnson@yahoo.com	*2019.089*
4270

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File Name: 4270 Ardekani

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Overall Length: 9' 6"

9'

| 1 | | 2 |

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

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
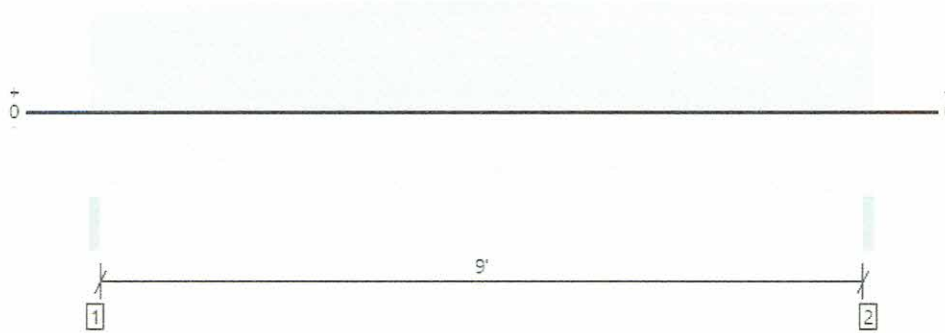
Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3952 @ 1 1/2"	10725 (3.00")	Passed (37%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3120 @ 1'	10057	Passed (31%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	8899 @ 4' 9"	17078	Passed (52%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.137 @ 4' 9"	0.308	Passed (L/811)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.228 @ 4' 9"	0.463	Passed (L/487)	--	1.0 D + 1.0 S (All Spans)

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 9' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 9' 6" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 9' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - SPF	3.00"	3.00"	1.50"	1577	2375	3952	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	1577	2375	3952	None

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 9' 6"	N/A	12.0	--	
1 - Uniform (PSF)	0 to 9' 6"	20'	16.0	25.0	Default Load

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

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ForteWEB Software Operator	Job Notes
Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com	2014-084 4270

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Post Design (Combined Axial and Moment Loading)

2015 *INT.* **Building Code (IBC)**   **2015 NDS**

Beam Description: Exterior Post @ South

Enter '1' for **wind load**:	1
Enter '1' for **repetitive member**:	
Enter '1' for **wet use**:	

Geometry and loads:

Height	8 ft		$w(d)$	140.0 plf
P	6086 lbs		$w(b)$	0 plf
Le(d)	8 ft		Le(b)	8 ft

Material Properties:

F_{b1}	850 psi	$F_{b(d)}'$	977.5 psi
F_{b2}	850 psi	$F_{b(b)}'$	977.5 psi
F_c	1300 psi	F_c'	944 psi
E	1.3 x10^6 psi	E'	1.3 x10^6 psi
E_{min}	0.47 x10^6 psi	E_{min}'	0.47 x10^6 psi

Selected Member: HF#2   5.5   x   5.5

                                   b   d

Member properties: **Variables:**

Section Modulus (d):	27.7 in^3	$R_b(d)$	4.18
Section Modulus (b):	27.7 in^3	$R_b(b)$	4.18
Section Area:	30.3 in^2	c	0.8

Member stresses: Provided   Required

$F_{cE}(d)$	1268 psi	>	f_c	201 psi
$F_{cE}(b)$	1268 psi	>	f_c	201 psi
F_{bE}	32313 psi	>	$f_b(d)$	485 psi
F_{bE}	32313 psi	>	$f_b(b)$	0 psi

Bending and Axial Compression Check:

NDS 2010 EQ 3.9-3   0.63   <   1.0

Post Design (Combined Axial and Moment Loading)

2015 *INT.* Building Code (IBC)	**2015 NDS**

Beam Description: Posts @ Stair Opening Exterior

Enter '1' for **wind load**: 1
Enter '1' for **repetitive member**:
Enter '1' for **wet use**:

Geometry and loads:

Height	20 ft		$w(d)$	52.0 plf
P	3000 lbs		$w(b)$	0 plf
Le(d)	20 ft		Le(b)	20 ft

Material Properties:

Fb1	2400 psi	Fb(d)'	2760 psi
Fb2	2400 psi	Fb(b)'	2760 psi
Fc	2500 psi	Fc'	383 psi
E	1.8 x10^6psi	E'	1.8 x10^6psi
Emin	0.91488 x10^6psi	Emin'	0.91488 x10^6psi

Selected Member: 1.8E PSL   5.5   x   5.5

			b		d

Member properties: **Variables:**

Section Modulus (d):	27.7 in^3	Rb(d)	6.61
Section Modulus (b):	27.7 in^3	Rb(b)	6.61
Section Area:	30.3 in^2	c	0.8

Member stresses: Provided   Required

FcE(d)	395 psi	>	fc	99 psi
FcE(b)	395 psi	>	fc	99 psi
FbE	25159 psi	>	fb(d)	1125 psi
FbE	25159 psi	>	fb(b)	0 psi

Bending and Axial Compression Check:

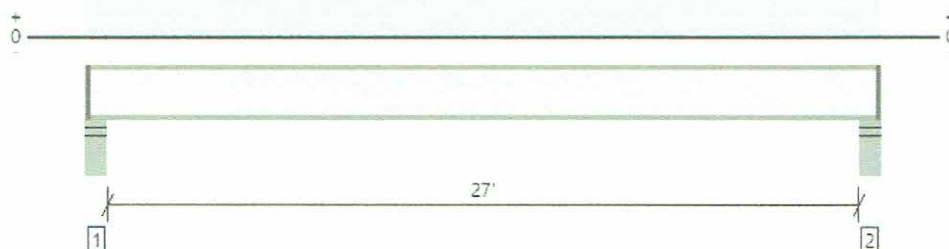| NDS 2010 EQ 3.9-3	0.61	<	1.0

Upper, U1 Upper Floor Joists Long
1 piece(s) 16" TJI® 560 @ 16" OC

Overall Length: 27' 11"

27'

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)	961 @ 4 1/2"	1725 (3.50")	Passed (56%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	936 @ 5 1/2"	2710	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	6396 @ 13' 11 1/2"	12925	Passed (49%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.522 @ 13' 11 1/2"	0.679	Passed (L/625)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.678 @ 13' 11 1/2"	1.358	Passed (L/481)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	32	Any	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 8' 3" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 27' 9" o/c unless detailed otherwise.
- 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 - SPF	5.50"	4.25"	1.75"	223	744	967	1 1/4" Rim Board
2 - Stud wall - SPF	5.50"	4.25"	1.75"	223	744	967	1 1/4" Rim Board

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

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 27' 11"	16"	12.0	40.0	Default Load

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

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ForteWEB Software Operator	Job Notes
Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com	2014.0B9 4270

Upper, U2 Upper Floor Joists Typical
1 piece(s) 16" TJI® 110 @ 16" OC
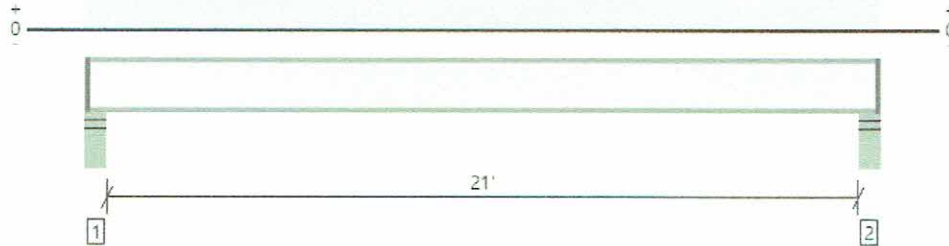
Overall Length: 21' 11"

21'

1   2

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)	753 @ 4 1/2"	1375 (3.50")	Passed (55%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	728 @ 5 1/2"	2145	Passed (34%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3883 @ 10' 11 1/2"	4280	Passed (91%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.405 @ 10' 11 1/2"	0.529	Passed (L/628)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.526 @ 10' 11 1/2"	1.058	Passed (L/483)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	38	Any	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 3' 3" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 21' 9" o/c unless detailed otherwise.
- 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 - SPF	5.50"	4.25"	1.75"	175	584	759	1 1/4" Rim Board
2 - Stud wall - SPF	5.50"	4.25"	1.75"	175	584	759	1 1/4" Rim Board

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

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 21' 11"	16"	12.0	40.0	Default Load

SUSTAINABLE FORESTRY INITIATIVE

Weyerhaeuser

ForteWEB Software Operator	Job Notes
Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com	2019.089 4270

Upper, U3 Upper Floor Joists Cantilever

1 piece(s) 1 3/4" x 16" 2.0E Microllam® LVL @ 16" OC

Overall Length: 20' 11"
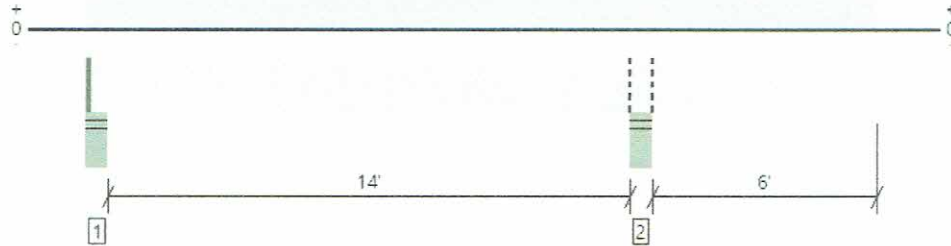
All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1022 @ 14' 8 1/4"	4091 (5.50")	Passed (25%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	482 @ 13' 1 1/2"	5320	Passed (9%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1624 @ 7' 2 5/8"	16179	Passed (10%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.059 @ 20' 11"	0.311	Passed (2L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.060 @ 20' 11"	0.623	Passed (2L/999+)	--	1.0 D + 1.0 L (Alt Spans)
TJ-Pro™ Rating	66	Any	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 20' 10" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 20' 10" o/c unless detailed otherwise.
- A 4% increase in the moment capacity has been added to account for repetitive member usage.
- 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)			
	Total	Available	Required	Dead	Floor Live	Total	Accessories
1 - Stud wall - SPF	5.50"	4.25"	1.50"	99	402/-67	501/-67	1 1/4" Rim Board
2 - Stud wall - SPF	5.50"	5.50"	1.50"	236	786	1022	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 20' 11"	16"	12.0	40.0	Default Load

Weyerhaeuser Notes

SUSTAINABLE FORESTRY INITIATIVE

Weyerhaeuser

ForteWEB Software Operator	Job Notes
Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com	2019.089 4270

12/10/2019 5:05:02 AM UTC

ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2

File Name: 4270 Ardekani

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Upper, U4 12' Header
1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam
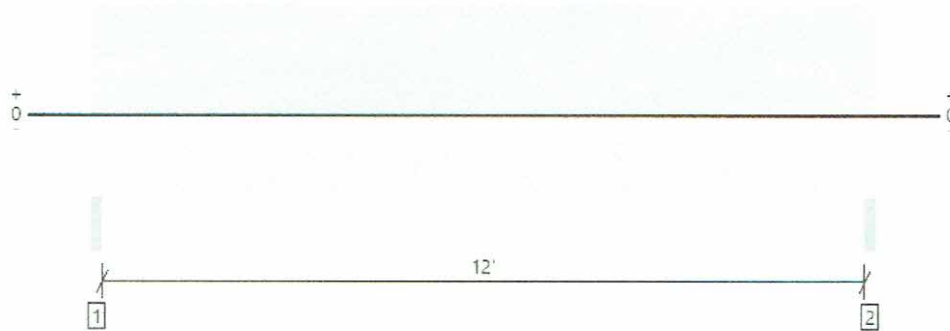
Overall Length: 12' 6"

12'

1   2

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)	4650 @ 1 1/2"	10725 (3.00")	Passed (43%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	3720 @ 1' 3"	11660	Passed (32%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	13957 @ 6' 3"	26400	Passed (53%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.199 @ 6' 3"	0.408	Passed (L/739)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.264 @ 6' 3"	0.613	Passed (L/556)	--	1.0 D + 1.0 L (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

• Deflection criteria: LL (L/360) and TL (L/240).
• Top Edge Bracing (Lu): Top compression edge must be braced at 12' 6" o/c unless detailed otherwise.
• Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' 6" o/c unless detailed otherwise.
• Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 12' 3".
• The effects of positive or negative camber have not been accounted for when calculating deflection.
• The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
• Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Trimmer - SPF	3.00"	3.00"	1.50"	1150	3500	4650	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	1150	3500	4650	None

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 12' 6"	N/A	16.0	--	
1 - Uniform (PSF)	0 to 12' 6"	14'	12.0	40.0	Default Load

SUSTAINABLE FORESTRY INITIATIVE

Weyerhaeuser

ForteWEB Software Operator	Job Notes
Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com	2014.084 4270

12/10/2019 6:42:05 AM UTC
ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2
File Name: 4270 Ardekani
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Upper, U5 6' Header
1 piece(s) 6 x 10 Hem-Fir No. 2
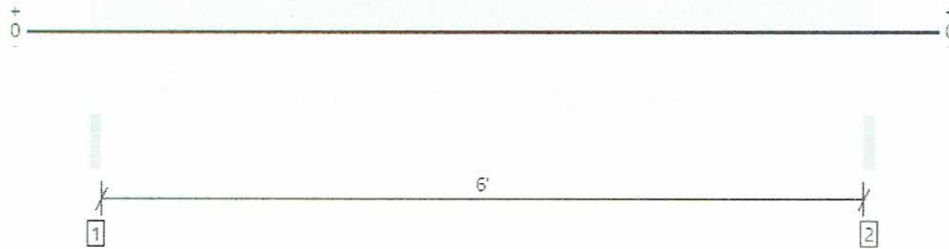
Overall Length: 6' 6"

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)	2409 @ 1 1/2"	6683 (3.00")	Passed (36%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1637 @ 1' 1/2"	4877	Passed (34%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3619 @ 3' 3"	4654	Passed (78%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.044 @ 3' 3"	0.208	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.059 @ 3' 3"	0.313	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 6' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 6' 6" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Trimmer - SPF	3.00"	3.00"	1.50"	589	1820	2409	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	589	1820	2409	None

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 6' 6"	N/A	13.2	--	
1 - Uniform (PSF)	0 to 6' 6"	14'	12.0	40.0	Default Load

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

SUSTAINABLE FORESTRY INITIATIVE

Weyerhaeuser

ForteWEB Software Operator	Job Notes
Brett Johnson
CSES
(253) 579-2158
Brett.ajohnson@yahoo.com | *2019.089*

4270 |

12/10/2019 5:54:10 AM UTC
ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2
File Name: 4270 Ardekani
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Overall Length: 3' 6"

3'

1   2
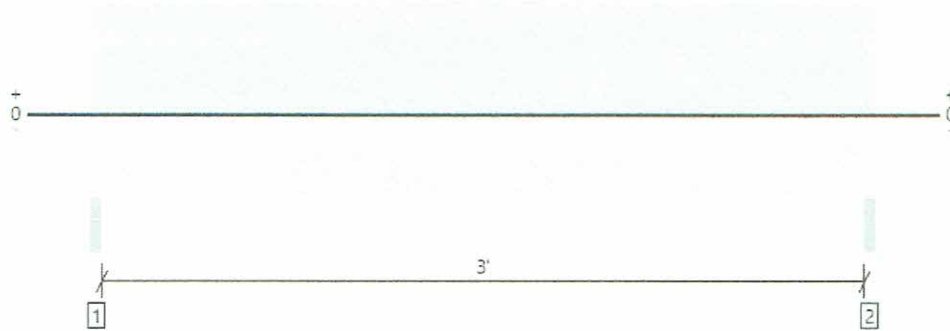
All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1284 @ 1 1/2"	3645 (3.00")	Passed (35%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	657 @ 10 1/4"	2175	Passed (30%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	968 @ 1' 9"	2234	Passed (43%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.011 @ 1' 9"	0.108	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.015 @ 1' 9"	0.162	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 3' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 3' 6" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Trimmer - SPF	3.00"	3.00"	1.50"	304	980	1284	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	304	980	1284	None

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 3' 6"	N/A	5.5	--	
1 - Uniform (PSF)	0 to 3' 6"	14'	12.0	40.0	Default Load

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

| ForteWEB Software Operator	Job Notes
Brett Johnson
CSES
(253) 579-2158
Brett.ajohnson@yahoo.com | *2019.089*

4270 |

12/9/2019 6:55:08 PM UTC

ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2

File Name: 4270 Ardekani

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Upper, U7 West Floor Beam
1 piece(s) 5 1/2" x 13 1/2" 24F-V4 DF Glulam
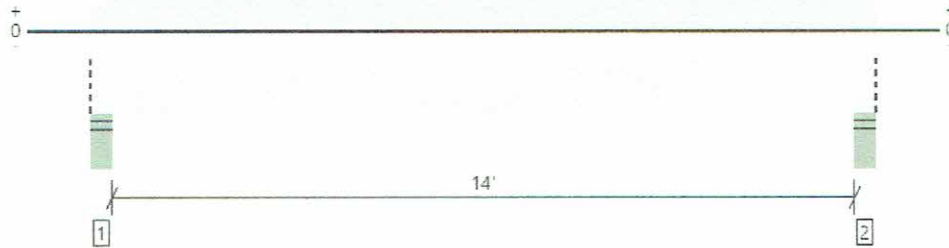
Overall Length: 14' 11"

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)	6340 @ 4"	12856 (5.50")	Passed (49%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4994 @ 1' 7"	13118	Passed (38%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	21577 @ 7' 5 1/2"	33413	Passed (65%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.293 @ 7' 5 1/2"	0.475	Passed (L/585)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.389 @ 7' 5 1/2"	0.712	Passed (L/440)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 14' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 14' 11" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 14' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - SPF	5.50"	5.50"	2.71"	1567	4773	6340	Blocking
2 - Stud wall - SPF	5.50"	5.50"	2.71"	1567	4773	6340	Blocking

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 14' 11"	N/A	18.0	--	
1 - Uniform (PSF)	0 to 14' 11" (Front)	16'	12.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser

SUSTAINABLE FORESTRY INITIATIVE

ForteWEB Software Operator	Job Notes
Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com	2019.089 4270

Upper, U8 East Floor Beam
1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam
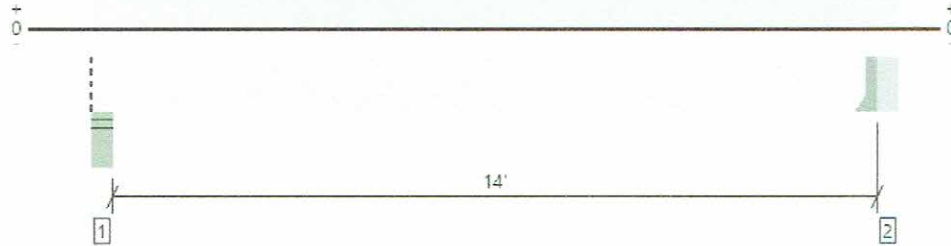
Overall Length: 14' 11"

14'

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)	4520 @ 14' 5 1/2"	5363 (1.50")	Passed (84%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	3880 @ 13' 5 1/2"	11660	Passed (33%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	15962 @ 7' 4 3/4"	26400	Passed (60%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.302 @ 7' 4 3/4"	0.471	Passed (L/562)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.402 @ 7' 4 3/4"	0.706	Passed (L/422)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 14' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 14' 6" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 14' 1 1/2".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - SPF	5.50"	5.50"	2.03"	1184	3550	4734	Blocking
2 - Hanger on 12" SPF beam	5.50"	Hanger¹	1.50"	1196	3610	4806	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						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	OHU612-SDS3	4.00"	N/A	16-SDS25300	8-SDS25300	

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 14' 5 1/2"	N/A	16.0	--	
1 - Uniform (PSF)	0 to 14' 11" (Front)	12'	12.0	40.0	Default Load

Member Notes
4806lb < 5185 lb HUCQ612-SDS Hanger

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

ForteWEB Software Operator	Job Notes
Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com	2019.089 4270

12/9/2019 6:01:10 AM UTC

ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2

File Name: 4270 Ardekani

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Post Design (Combined Axial and Moment Loading)

2015 *INT.* Building Code (*I*BC)   **2015 NDS**

Beam Description: Interior Post

Enter '1' for **wind load**:
Enter '1' for **repetitive member**:
Enter '1' for **wet use**:

Geometry and loads:

Height	8 ft		w(d)	0.0 plf
P	12000 lbs		w(b)	0 plf
Le(d)	8 ft		Le(b)	8 ft

Material Properties:

Fb1	850 psi	Fb(d)'		850 psi
Fb2	850 psi	Fb(b)'		850 psi
Fc	1300 psi	Fc'		887 psi
E	1.3 x10^6psi	E'		1.3 x10^6psi
Emin	0.47 x10^6psi	Emin'		0.47 x10^6psi

Selected Member: HF#2   5.5   x   5.5

                                                                    b   d

Member properties:		Variables:	
Section Modulus (d):	27.7 in^3	Rb(d)	4.18
Section Modulus (b):	27.7 in^3	Rb(b)	4.18
Section Area:	30.3 in^2	c	0.8

Member stresses:	Provided		Required	
FcE(d)	1268 psi	>	fc	397 psi
FcE(b)	1268 psi	>	fc	397 psi
FbE	32313 psi	>	fb(d)	0 psi
FbE	32313 psi	>	fb(b)	0 psi

Bending and Axial Compression Check:

NDS 2010 EQ 3.9-3   0.20   <   1.0

Upper, U10 Case 1 Cantilever Lower Roof Beam
1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam
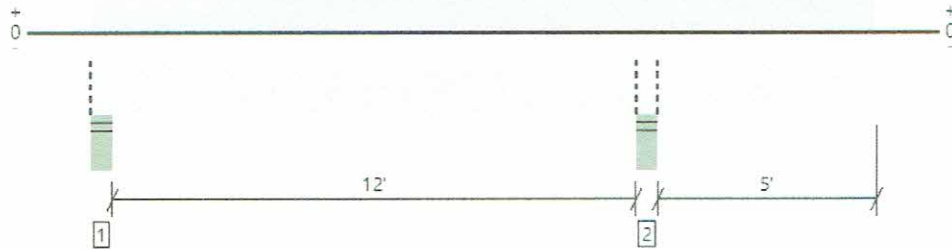
Overall Length: 17' 11"

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)	7383 @ 12' 8 1/4"	12856 (5.50")	Passed (57%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3572 @ 11' 5 1/2"	13409	Passed (27%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	8598 @ 5' 8 13/16"	30360	Passed (28%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-8067 @ 12' 8 1/4"	23403	Passed (34%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.101 @ 6' 3 9/16"	0.412	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.152 @ 6' 2 3/16"	0.618	Passed (L/976)	--	1.0 D + 1.0 S (Alt Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 17' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 17' 11" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 10' 9 9/16".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 7' 5 5/16".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - SPF	5.50"	5.50"	1.50"	1297	2085	3382	Blocking
2 - Stud wall - SPF	5.50"	5.50"	3.16"	3004	4380	7384	Blocking

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 17' 11"	N/A	16.0	--	
1 - Uniform (PSF)	0 to 17' 11" (Front)	14'	16.0	25.0	Default Load

Weyerhaeuser

SUSTAINABLE FORESTRY INITIATIVE

ForteWEB Software Operator	Job Notes	
Brett Johnson
CSES
(253) 579-2158
Brett.ajohnson@yahoo.com	2019.089
4270	

12/9/2019 7:26:36 PM UTC

ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2

File Name: 4270 Ardekani

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Upper, U11 Case 2 Cantilever Lower Roof Beam
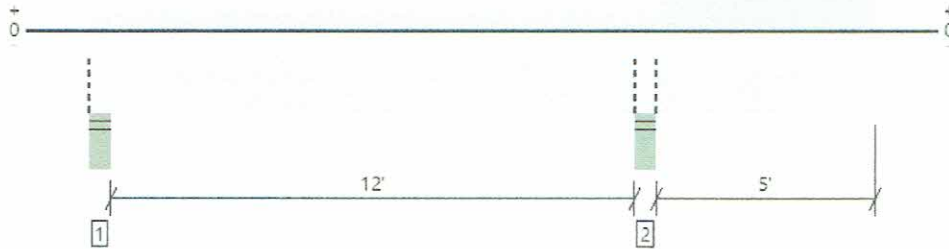
1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam

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)	4804 @ 12' 8 1/4"	12856 (5.50")	Passed (37%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2640 @ 13' 11"	13409	Passed (20%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	1079 @ 4' 5 1/4"	23760	Passed (5%)	0.90	1.0 D (All Spans)
Neg Moment (Ft-lbs)	-8998 @ 12' 8 1/4"	23403	Passed (38%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.197 @ 17' 11"	0.349	Passed (2L/638)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.246 @ 17' 11"	0.523	Passed (2L/510)	--	1.0 D + 1.0 S (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 17' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 17' 11" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 8' 2 9/16".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 16' 7 1/4".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - SPF	5.50"	5.50"	1.50"	568	-463	568/-463	Blocking
2 - Stud wall - SPF	5.50"	5.50"	2.06"	2276	2528	4804	Blocking

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 17' 11"	N/A	16.0	--	
1 - Uniform (PSF)	0 to 13' (Front)	14'	8.0	-	Default Load
2 - Uniform (PSF)	13' to 17' 11" (Front)	14'	16.0	30.0	

SUSTAINABLE FORESTRY INITIATIVE

Weyerhaeuser

| ForteWEB Software Operator	Job Notes
Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com	2019.089 4270

Upper, U12 North lower roof beam
1 piece(s) 3 1/2" x 16" 24F-V4 DF Glulam

Overall Length: 21' 7"
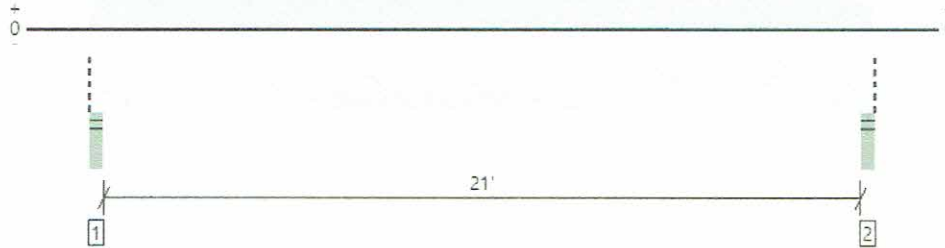
All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3622 @ 2"	5206 (3.50")	Passed (70%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3076 @ 1' 7 1/2"	11377	Passed (27%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	18944 @ 10' 9 1/2"	34347	Passed (55%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.448 @ 10' 9 1/2"	0.708	Passed (L/569)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.716 @ 10' 9 1/2"	1.063	Passed (L/356)	--	1.0 D + 1.0 S (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 21' 7" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 21' 7" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 21' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - SPF	3.50"	3.50"	2.43"	1356	2266	3622	Blocking
2 - Stud wall - SPF	3.50"	3.50"	2.43"	1356	2266	3622	Blocking

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 21' 7"	N/A	13.6	--	
1 - Uniform (PSF)	0 to 21' 7" (Front)	7'	16.0	30.0	Default Load

Weyerhaeuser Notes

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

ForteWEB Software Operator	Job Notes
Brett Johnson	2019.084
CSES	
(253) 579-2158	4270
Brett.ajohnson@yahoo.com	

Upper, U13 South 14' Header
1 piece(s) 5 1/4" x 11 7/8" 2.0E Parallam® PSL
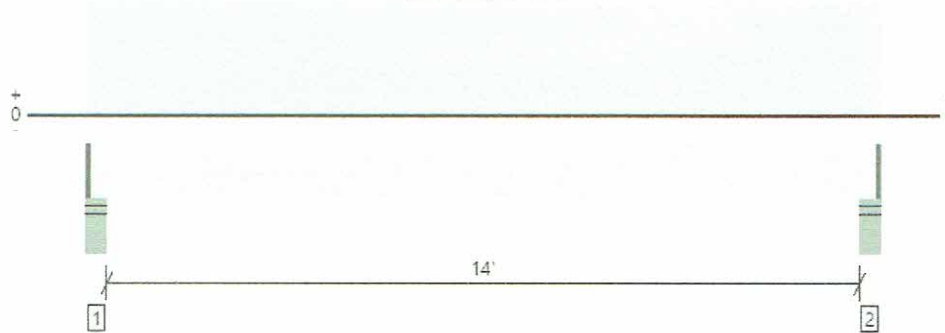
Overall Length: 14' 11"

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)	4173 @ 4"	9483 (4.25")	Passed (44%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	3411 @ 1' 5 3/8"	12053	Passed (28%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	14405 @ 7' 5 1/2"	29854	Passed (48%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.245 @ 7' 5 1/2"	0.356	Passed (L/698)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.386 @ 7' 5 1/2"	0.712	Passed (L/443)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 14' 9" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 14' 9" o/c unless detailed otherwise.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - SPF	5.50"	4.25"	1.87"	1546	2685	4231	1 1/4" Rim Board
2 - Stud wall - SPF	5.50"	4.25"	1.87"	1546	2685	4231	1 1/4" Rim Board

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 14' 9 3/4"	N/A	19.5	--	
1 - Uniform (PSF)	0 to 14' 11" (Front)	9'	12.0	40.0	Default Load
2 - Uniform (PLF)	0 to 14' 11" (Front)	N/A	80.0	-	

Member Notes

4231 lb < 5185 lb HUCQ612-SDS Hanger

Weyerhaeuser Notes

SUSTAINABLE FORESTRY INITIATIVE

Weyerhaeuser

ForteWEB Software Operator	Job Notes
Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com	2019.089 4270

12/9/2019 9:03:57 PM UTC

ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2

File Name: 4270 Ardekani

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Post Design (Combined Axial and Moment Loading)

2015 *INT.* Building Code (*I*BC)   **2015 NDS**

Beam Description: Exterior Post @ South

Enter '1' for **wind load**:	1
Enter '1' for **repetitive member**:	
Enter '1' for **wet use**:	

Geometry and loads:

Height	8 ft		w(d)	140.0 plf
P	11000 lbs		w(b)	0 plf
Le(d)	8 ft		Le(b)	8 ft

Material Properties:

Fb1	850 psi	Fb(d)'	977.5 psi
Fb2	850 psi	Fb(b)'	977.5 psi
Fc	1300 psi	Fc'	944 psi
E	1.3 x10^6psi	E'	1.3 x10^6psi
Emin	0.47 x10^6psi	Emin'	0.47 x10^6psi

Selected Member: HF#2   5.5   x   5.5

b d

Member properties: **Variables:**

Section Modulus (d):	27.7 in^3	Rb(d)	4.18
Section Modulus (b):	27.7 in^3	Rb(b)	4.18
Section Area:	30.3 in^2	c	0.8

Member stresses: Provided   Required

FcE(d)	1268 psi	>	fc	364 psi
FcE(b)	1268 psi	>	fc	364 psi
FbE	32313 psi	>	fb(d)	485 psi
FbE	32313 psi	>	fb(b)	0 psi

Bending and Axial Compression Check:

NDS 2010 EQ 3.9-3   0.84   <   1.0

Post Design (Combined Axial and Moment Loading)

2015 _INT_ Building Code (IBC)		**2015 NDS**

Beam Description: Exterior Post @ South East

Enter '1' for **wind load**:	1
Enter '1' for **repetitive member**:	
Enter '1' for **wet use**:	

Geometry and loads:

Height	10 ft		$w(d)$	10.0 plf	
P	7500 lbs		$w(b)$	0 plf	
$Le(d)$	10 ft		$Le(b)$	10 ft	

Material Properties:

$Fb1$	850 psi	$Fb(d)'$		977.5 psi	
$Fb2$	850 psi	$Fb(b)'$		977.5 psi	
Fc	1300 psi	Fc'		692 psi	
E	1.3 x10^6psi	E'		1.3 x10^6psi	
$Emin$	0.47 x10^6psi	$Emin'$		0.47 x10^6psi	

Selected Member: HF#2   5.5   x   5.5

                                                     b   d

Member properties: **Variables:**

Section Modulus (d):	27.7 in^3	$Rb(d)$		4.67
Section Modulus (b):	27.7 in^3	$Rb(b)$		4.67
Section Area:	30.3 in^2	c		0.8

Member stresses: Provided   Required

$FcE(d)$	812 psi	>	fc	248 psi	
$FcE(b)$	812 psi	>	fc	248 psi	
FbE	25850 psi	>	$fb(d)$	54 psi	
FbE	25850 psi	>	$fb(b)$	0 psi	

Bending and Axial Compression Check:

NDS 2010 EQ 3.9-3	0.21	<	1.0

Upper, U16 N Wall - Upper Floor Shear Wall Beam Case 1
1 piece(s) 5 1/2" x 13 1/2" 24F-V4 DF Glulam
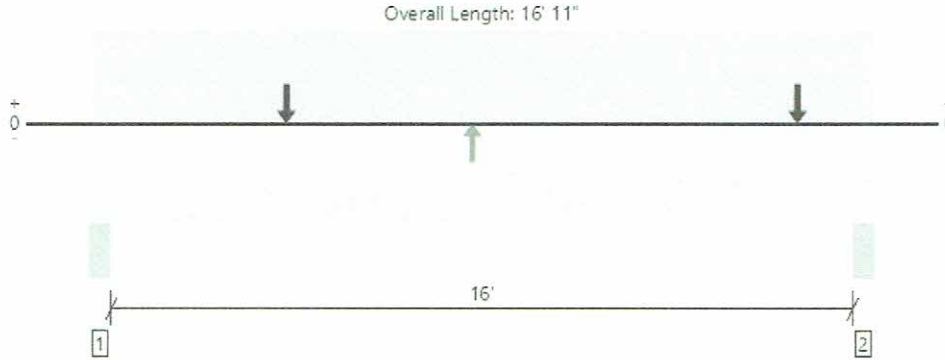
Overall Length: 16' 11"

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)	7638 @ 4"	12856 (5.50")	Passed (59%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	6208 @ 1' 7"	15085	Passed (41%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	29808 @ 8' 5 1/2"	38424	Passed (78%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.406 @ 8' 5 1/2"	0.542	Passed (L/481)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.698 @ 8' 5 1/2"	0.813	Passed (L/279)	--	1.0 D + 1.0 S (All Spans)

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 16' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 16' 11" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 16' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	
1 - Beam - SPF	5.50"	5.50"	3.27"	3198	677	4441	552/-552	8868/-552	None
2 - Beam - SPF	5.50"	5.50"	3.27"	3198	677	4441	1131/-1131	9447/-1131	None

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 16' 11"	N/A	18.0	--	--	--	
1 - Uniform (PSF)	0 to 16' 11" (Front)	21'	16.0	-	25.0	-	Default Load
2 - Uniform (PSF)	0 to 16' 11" (Front)	2'	12.0	40.0	-	-	
3 - Point (lb)	4' 3" (Front)	N/A	-	-	-	1683	UPLIFT See Page L2
4 - Point (lb)	8' 3" (Front)	N/A	-	-	-	-1683	UPLIFT See Page L2
5 - Point (lb)	15' 3" (Front)	N/A	-	-	-	1683	UPLIFT See Page L2

Member Notes

1131 lb < 1705 lb CS16 Strap

Weyerhaeuser Notes

ForteWEB Software Operator	Job Notes
Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com	2019.089 4270

12/10/2019 5:11:52 AM UTC
ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2
File Name: 4270 Ardekani
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Upper, U17 N Wall - Upper Floor Shear Wall Beam Case 2
1 piece(s) 5 1/2" x 13 1/2" 24F-V4 DF Glulam
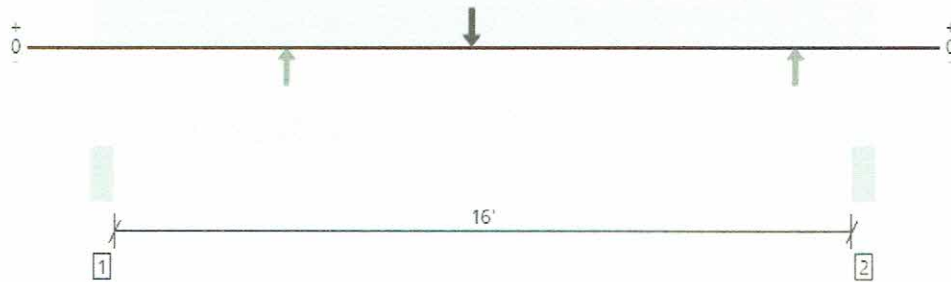
Overall Length: 17'

16'

1   2

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)	8549 @ 16' 7 1/2"	14025 (6.00")	Passed (61%)	--	1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	6208 @ 1' 7 1/2"	15085	Passed (41%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	29808 @ 8' 6"	38424	Passed (78%)	1.15	1.0 D + 1.0 S (All Spans)
Neg Moment (Ft-lbs)	-391 @ 15' 3"	41209	Passed (1%)	1.60	0.6 D + 0.7 E (All Spans)
Live Load Defl. (in)	0.406 @ 8' 6"	0.542	Passed (L/481)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.698 @ 8' 6"	0.813	Passed (L/279)	--	1.0 D + 1.0 S (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 17' o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 17' o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 16' 3".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 1' 6 3/8".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	
1 - Beam - SPF	6.00"	6.00"	3.34"	3213	680	4463	1392/-1392	9748/-1392	None
2 - Beam - SPF	6.00"	6.00"	3.66"	3213	680	4463	2816/-2816	11172/-2816	None

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 17'	N/A	18.0	--	--	--	
1 - Uniform (PSF)	0 to 17' (Front)	21'	16.0	-	25.0	-	Default Load
2 - Uniform (PSF)	0 to 17' (Front)	2'	12.0	40.0	-	-	
3 - Point (lb)	4' 3" (Front)	N/A	-	-	-	-4208	2.5 x UPLIFT See Page L2
4 - Point (lb)	8' 3" (Front)	N/A	-	-	-	4208	2.5 x UPLIFT See Page L2
5 - Point (lb)	15' 3" (Front)	N/A	-	-	-	-4208	2.5 x UPLIFT See Page L2

ForteWEB Software Operator	Job Notes
Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com	2019.089 4270

Upper, U18 SE Wall - Upper Floor Shear Wall Beam Case 1
1 piece(s) 5 1/2" x 13 1/2" 24F-V4 DF Glulam

Overall Length: 16' 11"

16'

1   2
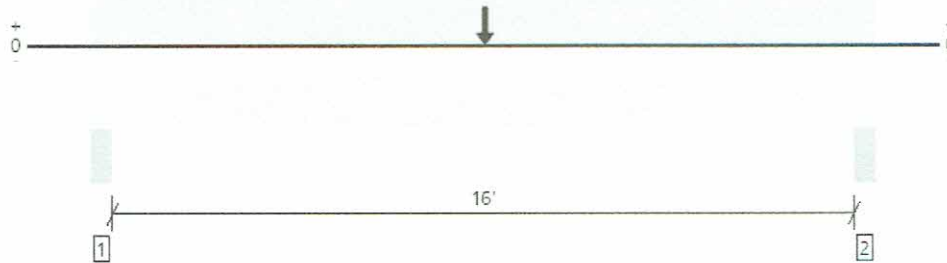
All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	7847 @ 16' 7"	12856 (5.50")	Passed (61%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	6208 @ 1' 7"	15085	Passed (41%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	29808 @ 8' 5 1/2"	38424	Passed (78%)	1.15	1.0 D + 1.0 S (All Spans)
Neg Moment (Ft-lbs)	-1263 @ 8' 6"	41209	Passed (3%)	1.60	0.6 D - 0.7 E (All Spans)
Live Load Defl. (in)	0.474 @ 8' 5 9/16"	0.542	Passed (L/412)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.766 @ 8' 5 1/2"	0.813	Passed (L/255)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 16' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 16' 11" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 16' 3".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 2' 8 7/8".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	
1 - Beam - SPF	5.50"	5.50"	3.35"	3198	677	4441	1531/-1531	9847/-1531	None
2 - Beam - SPF	5.50"	5.50"	3.36"	3198	677	4441	1546/-1546	9862/-1546	None

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 16' 11"	N/A	18.0	--	--	--	
1 - Uniform (PSF)	0 to 16' 11" (Front)	21'	16.0	-	25.0	-	Default Load
2 - Uniform (PSF)	0 to 16' 11" (Front)	2'	12.0	40.0	-	-	
3 - Point (lb)	8' 6" (Front)	N/A	-	-	-	3077	UPLIFT See Page L4 (TOP)

Member Notes

1546 lb < 1705 lb CS16 Strap

Weyerhaeuser Notes

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

Upper, U19 SE Wall - Upper Floor Shear Wall Beam Case 2
1 piece(s) 5 1/2" x 14" 24F-V4 DF Glulam
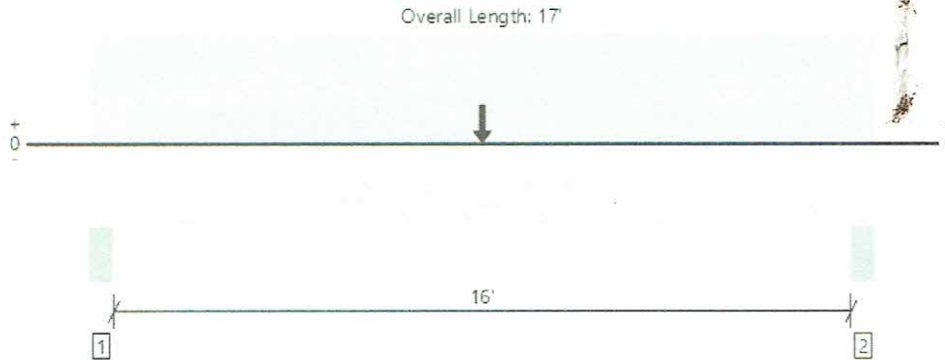
Overall Length: 17'

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)	9095 @ 4 1/2"	14025 (6.00")	Passed (65%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	6175 @ 1' 8"	15644	Passed (39%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	43886 @ 8' 6"	57493	Passed (76%)	1.60	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Neg Moment (Ft-lbs)	-14377 @ 8' 6"	44318	Passed (32%)	1.60	0.6 D - 0.7 E (All Spans)
Live Load Defl. (in)	0.590 @ 8' 6"	0.542	Failed (L/330)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.853 @ 8' 6"	0.813	Failed (L/229)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 17' o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 17' o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 16' 3".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 16' 3".
- -761 lbs uplift at support located at 4 1/2". Strapping or other restraint may be required.
- -761 lbs uplift at support located at 16' 7 1/2". Strapping or other restraint may be required.
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

SHEAR & MOMENT OK BY CALCULATION

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	
1 - Beam - SPF	6.00"	6.00"	3.89"	3219	680	4463	3847/-3847	12209/-3847	None
2 - Beam - SPF	6.00"	6.00"	3.89"	3219	680	4463	3847/-3847	12209/-3847	None

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 17'	N/A	18.7	--	--	--	
1 - Uniform (PSF)	0 to 17' (Front)	21'	16.0	-	25.0	-	Default Load
2 - Uniform (PSF)	0 to 17' (Front)	2'	12.0	40.0	-	-	
3 - Point (lb)	8' 6" (Front)	N/A	-	-	-	7693	UPLIFT See Page L4 (TOP)

UPLIFT × 2.5

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

ForteWEB Software Operator	Job Notes	
Brett Johnson
CSES
(253) 579-2158
Brett.ajohnson@yahoo.com	*2019.084*
4270	12/10/2019 5:13:16 AM UTC
ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2
File Name: 4270 Ardekani
Page 1 / 2

Upper, U20 Stair Opening Beam
2 piece(s) 1 3/4" x 16" 2.0E Microllam® LVL

Overall Length: 10' 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)	3985 @ 4"	6322 (4.25")	Passed (63%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2729 @ 1' 9 1/2"	10640	Passed (26%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	9775 @ 5' 5 1/2"	31114	Passed (31%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.073 @ 5' 5 1/2"	0.256	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.097 @ 5' 5 1/2"	0.512	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 10' 9" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 10' 9" o/c unless detailed otherwise.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - SPF	5.50"	4.25"	2.68"	1004	3057	4061	1 1/4" Rim Board
2 - Stud wall - SPF	5.50"	4.25"	2.68"	1004	3057	4061	1 1/4" Rim Board

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 10' 9 3/4"	N/A	16.3	--	
1 - Uniform (PSF)	0 to 10' 11" (Front)	14'	12.0	40.0	Default Load

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

SUSTAINABLE FORESTRY INITIATIVE

Weyerhaeuser

ForteWEB Software Operator	Job Notes
Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com	2019.089 4270

12/10/2019 5:17:20 AM UTC
ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2
File Name: 4270 Ardekani
Page 1 / 1

Upper, U21 North 6' Header
2 piece(s) 2 x 8 Hem-Fir No. 2

Overall Length: 6' 3"
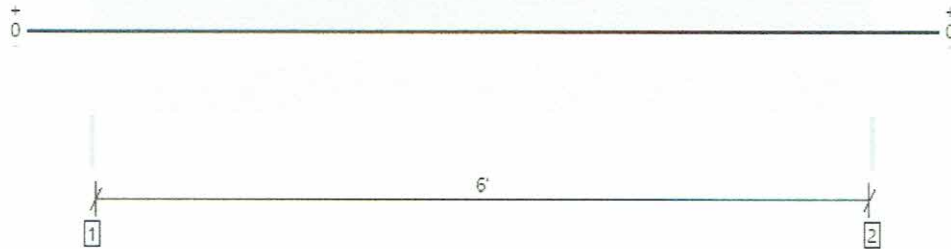
All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1317 @ 0	1823 (1.50")	Passed (72%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1010 @ 8 3/4"	2175	Passed (46%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2058 @ 3' 1 1/2"	2234	Passed (92%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.089 @ 3' 1 1/2"	0.208	Passed (L/845)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.117 @ 3' 1 1/2"	0.313	Passed (L/642)	--	1.0 D + 1.0 L (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 6' 3" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 6' 3" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	317	1000	1317	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	317	1000	1317	None

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 6' 3"	N/A	5.5	--	
1 - Uniform (PSF)	0 to 6' 3"	8'	12.0	40.0	Default Load

Weyerhaeuser Notes

SUSTAINABLE FORESTRY INITIATIVE

Weyerhaeuser

ForteWEB Software Operator	Job Notes
Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com	2014.084 4270

12/10/2019 5:55:25 AM UTC
ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2
File Name: 4270 Ardekani
Page 1 / 1

Main, M1 Long Cantilever Floor Joists
1 piece(s) 16" TJI® 560 @ 16" OC

Overall Length: 26' 11"
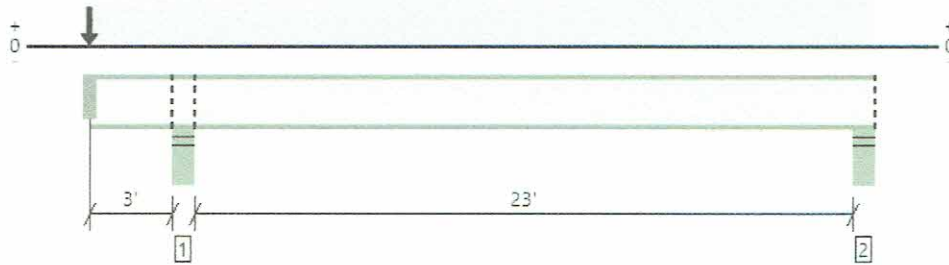
All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2714 @ 3' 2 3/4"	3455 (5.25")	Passed (79%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2071 @ 3'	3117	Passed (66%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	-6436 @ 3' 2 3/4"	14864	Passed (43%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.184 @ 0	0.200	Passed (2L/422)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.266 @ 0	0.323	Passed (2L/292)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
TJ-Pro™ Rating	44	40	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/0.2") and TL (2L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 11' 3" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 8' 3" o/c unless detailed otherwise.
- 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 - SPF	5.50"	5.50"	3.50"	1089	1626	939	3654	Blocking
2 - Stud wall - SPF	5.50"	5.50"	1.75"	86	642/-112	-114	728/-226	Blocking

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

Vertical Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 26' 11"	16"	12.0	40.0	-	Default Load
2 - Point (lb)	0	N/A	528	-	825	Roof
3 - Point (lb)	0	N/A	216	720	-	Floor

- Web stiffeners required at location 0 due to loads.

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

SUSTAINABLE FORESTRY INITIATIVE

Weyerhaeuser

ForteWEB Software Operator	Job Notes	
Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com	*2019.089* *4270*	

12/10/2019 6:09:41 AM UTC
ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2
File Name: 4270 Ardekani
Page 1 / 1

Main, M2 Cantilever Floor Beams Case 1
1 piece(s) 5 1/4" x 16" 2.0E Parallam® PSL
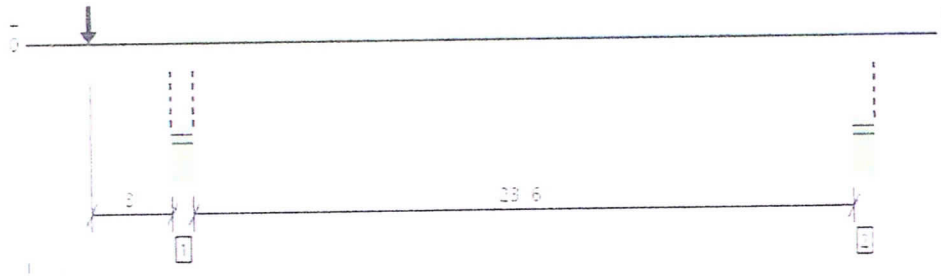
Overall Length: 27' 5"

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)	6952 @ 3' 2 3/4"	12272 (5.50")	Passed (57%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	4167 @ 1' 8"	18676	Passed (22%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	-13443 @ 3' 2 3/4"	60297	Passed (22%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.175 @ 0	0.215	Passed (2L/444)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.219 @ 0	0.323	Passed (2L/354)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (Alt Spans)

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 27' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 27' 5" o/c unless detailed otherwise.

UPLIFT :   708 lb < 3565 lb

1203 lb < 5635 lb

HHUS 5.5/10

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	
1 - Stud wall - SPF	5.50"	5.50"	3.12"	2430	2886	1661	2117/-2117	9094/-2117	Blocking
2 - Stud wall - SPF	5.50"	5.50"	1.50"	297	654/-256	-198	252/-252	1203/-708	Blocking

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 27' 5"	N/A	26.3	--	--	--	
1 - Uniform (PSF)	0 to 27' 5" (Front)	1' 4"	12.0	40.0	-	-	Default Load
2 - Point (lb)	0 (Front)	N/A				1865	Uplift See Page LS
3 - Point (lb)	0 (Front)	N/A	979		1463	-	Roof
4 - Point (lb)	0 (Front)	N/A	589	1820	-	-	Floor

Member Notes

2117 lb - (.25 x D) +4124 (S) = 1084 lb Uplift.
1084 lb Uplift < 1420 lb (2) H8 Ties

Weyerhaeuser Notes

ForteWEB Software Operator	Job Notes	
Brett Johnson
CSES
(253) 579-2158
Brett.ajohnson@yahoo.com | *2019-084*

4270 | |

12/10/2019 7:07:20 AM UTC
ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2
File Name: 4270 Ardekani
Page 1 / 2

Main, M3 Cantilever Floor Beams Case 2
1 piece(s) 5 1/4" x 16" 2.0E Parallam® PSL

~~An excessive uplift of -2502 lbs at support located at 3' 2 3/4" failed this product~~ OK
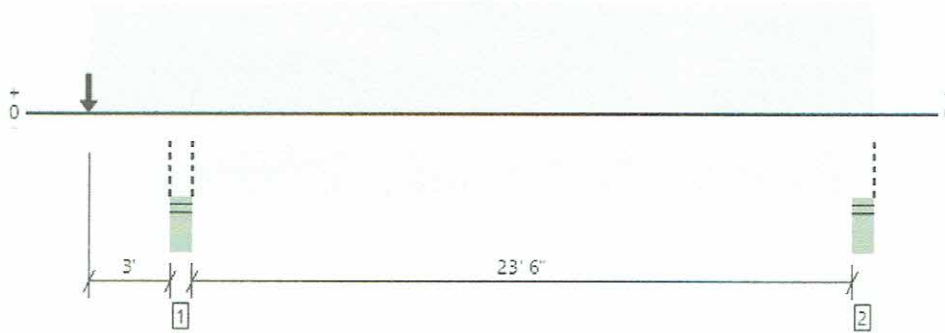
Overall Length: 27' 5"

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)	8197 @ 3' 2 3/4"	12272 (5.50")	Passed (67%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	6242 @ 1' 8"	25984	Passed (24%)	1.60	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	-20144 @ 3' 2 3/4"	83891	Passed (24%)	1.60	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.248 @ 0	0.215	Failed (2L/312)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.273 @ 0	0.323	Passed (2L/284)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (Alt Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

• Deflection criteria: LL (L/360) and TL (L/240).
• Overhang deflection criteria: LL (2L/360) and TL (2L/240).
• Top Edge Bracing (Lu): Top compression edge must be braced at 27' 5" o/c unless detailed otherwise.
• Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 27' 5" o/c unless detailed otherwise.
• -326 lbs uplift at support located at 27' 1". Strapping or other restraint may be required.

SHEAR/MOMENT OK BY CALCULATION

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	
1 - Stud wall - SPF	5.50"	5.50"	3.67"	2007	2886	1661	5294/-5294	11848/-5294	Blocking
2 - Stud wall - SPF	5.50"	5.50"	1.50"	347	654/-258	-198	631/-631	1632/-1087	Blocking

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 27' 5"	N/A	26.3	--	--	--	
1 - Uniform (PSF)	0 to 27' 5" (Front)	1' 4"	12.0	40.0	-	-	Default Load
2 - Point (lb)	0 (Front)	N/A	-	-	-	4663	2.5 x Uplift See Page L5
3 - Point (lb)	0 (Front)	N/A	979	-	1463	-	Roof
4 - Point (lb)	0 (Front)	N/A	216	1820	-	-	Floor

Member Notes

Shear and Moment OK by calculation for over strength factor

Weyerhaeuser Notes

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

| ForteWEB Software Operator	Job Notes
Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com	2019.089 4270

Main, M4 9' Header @ South
1 piece(s) 5 1/2" x 10 1/2" 24F-V4 DF Glulam

Overall Length: 9' 11"
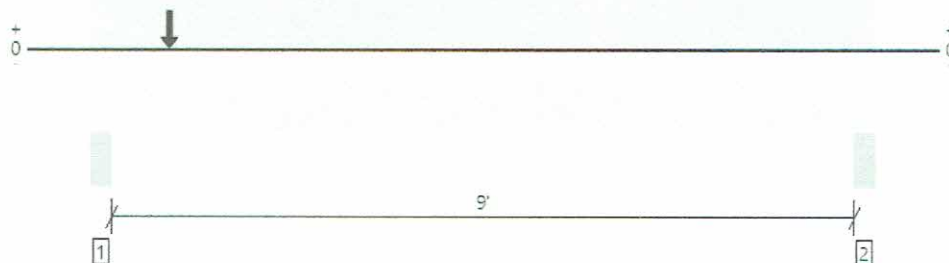
All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	11081 @ 4"	19663 (5.50")	Passed (56%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	7024 @ 1' 4"	10203	Passed (69%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	12598 @ 4' 5 3/4"	20213	Passed (62%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.119 @ 4' 10 3/16"	0.308	Passed (L/932)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.208 @ 4' 10 1/8"	0.463	Passed (L/533)	--	1.0 D + 1.0 L (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 9' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 9' 11" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 9' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Trimmer - SPF	5.50"	5.50"	3.10"	4739	6024	2431	13194	None
2 - Trimmer - SPF	5.50"	5.50"	1.50"	2230	3029	189	5448	None

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 9' 11"	N/A	14.0	--	--	
1 - Uniform (PSF)	0 to 9' 11"	14'	12.0	40.0	-	Default Load
2 - Point (lb)	1'	N/A	2932	3500	2620	
3 - Uniform (PLF)	0 to 9' 11"	N/A	225.0	-	-	

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

SUSTAINABLE FORESTRY INITIATIVE
Weyerhaeuser

MEMBER REPORT

~~FAILED~~ OK *(handwritten)*

M5 *(handwritten)*

Main, M5 West Cantilever Floor Beam
1 piece(s) 5 1/4" x 16" 2.0E Parallam® PSL

~~An excessive uplift of -1008 lbs at support located at 21' 7" failed this product.~~ *OK BY DETAILING (handwritten)*

Overall Length: 21' 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)	9906 @ 3' 2 3/4"	12272 (5.50")	Passed (81%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	7801 @ 1' 8"	18676	Passed (42%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	-25180 @ 3' 2 3/4"	60297	Passed (42%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.192 @ 0	0.200	Passed (2L/404)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.301 @ 0	0.323	Passed (2L/258)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/0.2") and TL (2L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 21' 10" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 21' 10" o/c unless detailed otherwise.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Stud wall - SPF	5.50"	5.50"	4.44"	4013	4623	3234	11870	Blocking
2 - Stud wall - SPF	5.50"	4.25"	1.50"	-177	380/-623	-484	380/-1284	1 1/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 21' 9 3/4"	N/A	26.3	--	--	
1 - Uniform (PSF)	0 to 21' 11" (Front)	1'	12.0	40.0	-	Default Load
2 - Point (lb)	0 (Front)	N/A	3000	3500	2750	

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

SUSTAINABLE FORESTRY INITIATIVE
Weyerhaeuser

ForteWEB Software Operator	Job Notes
Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com	*2019.089* *4270 (handwritten)*

M6

Main, M6 Cantilever Floor Beams Case 3
1 piece(s) 7" x 16" 2.0E Parallam® PSL
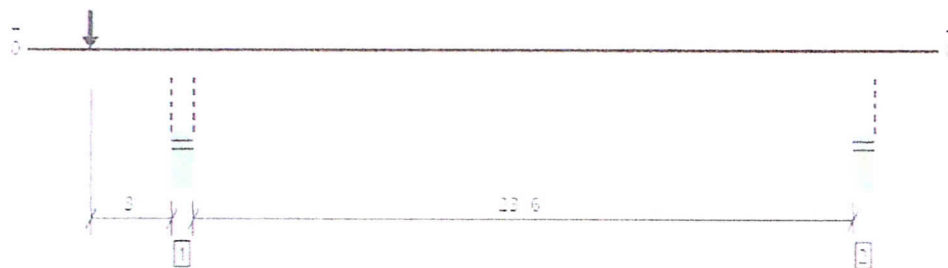
Overall Length: 27' 5"

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)	11073 @ 3' 2 3/4"	16363 (5.50")	Passed (68%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	7692 @ 1' 8"	24901	Passed (31%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	24823 @ 3' 2 3/4"	80396	Passed (31%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.210 @ 0	0.215	Passed (2L/368)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.290 @ 0	0.323	Passed (2L/268)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (Alt Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 27' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 27' 5" o/c unless detailed otherwise.
- -415 lbs uplift at support located at 27' 1". Strapping or other restraint may be required.
- Member should be side-loaded from both sides of the member or braced to prevent rotation.

UPLIFT : 1092 lb < 3565 lb

1122 lb < 5635 lb

HHUS7.25/10

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	
1 - Stud wall - SPF	5.50"	5.50"	3.72"	4134	4794	2975	2117/-2117	14020/-2117	Blocking
2 - Stud wall - SPF	5.50"	5.50"	1.50"	216	654/-485	-355	252/-252	1122/-1092	Blocking

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 27' 5"	N/A	35.1	--	--	--	
1 - Uniform (PSF)	0 to 27' 5" (Front)	1' 4"	12.0	40.0			Default Load
2 - Point (lb)	0 (Front)	N/A	-	-	-	1865	Uplift See Page L5
3 - Point (lb)	0 (Front)	N/A	1800	-	2620		Roof
4 - Point (lb)	0 (Front)	N/A	1150	3500			Floor

Member Notes

2117 lb - (.25 x DL=4134 lb) = 1084 lb Uplift
1084 lb Uplift < 1420 lb (2) HB Ties

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

MEMBER REPORT

~~FAILED~~ *OK*
M7

Main, M7 Cantilever Floor Beams Case 4
1 piece(s) 7" x 16" 2.0E Parallam® PSL

~~An excessive uplift of -1238 lbs at support located at 3' 2 3/4" failed this product.~~ *OK*
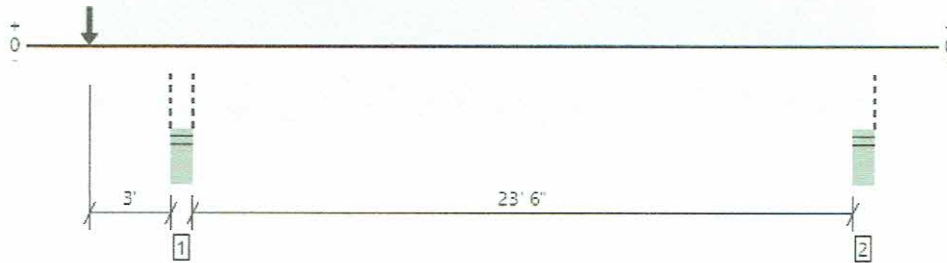
Overall Length: 27' 5"

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)	12720 @ 3' 2 3/4"	16363 (5.50")	Passed (78%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	7674 @ 1' 8"	24901	Passed (31%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	-24765 @ 3' 2 3/4"	80396	Passed (31%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.265 @ 0	0.215	Failed (2L/292)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.344 @ 0	0.323	Failed (2L/226)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (Alt Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 27' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 27' 5" o/c unless detailed otherwise.
- -743 lbs uplift at support located at 27' 1". Strapping or other restraint may be required.
- Member should be side-loaded from both sides of the member or braced to prevent rotation.

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	
1 - Stud wall - SPF	5.50"	5.50"	4.28"	4114	4794	2975	5294/-5294	17177/-5294	Blocking
2 - Stud wall - SPF	5.50"	5.50"	1.50"	218	654/-485	-355	631/-631	1503/-1471	Blocking

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 27' 5"	N/A	35.1	--	--	--	
1 - Uniform (PSF)	0 to 27' 5" (Front)	1' 4"	12.0	40.0	-	-	Default Load
2 - Point (lb)	0 (Front)	N/A	-	-	-	4663	2.5 x Uplift See Page L5
3 - Point (lb)	0 (Front)	N/A	1782	-	2620	-	Roof
4 - Point (lb)	0 (Front)	N/A	1150	3500	-	-	Floor

Member Notes

Shear and Moment OK by calculation for over strength factor

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator.
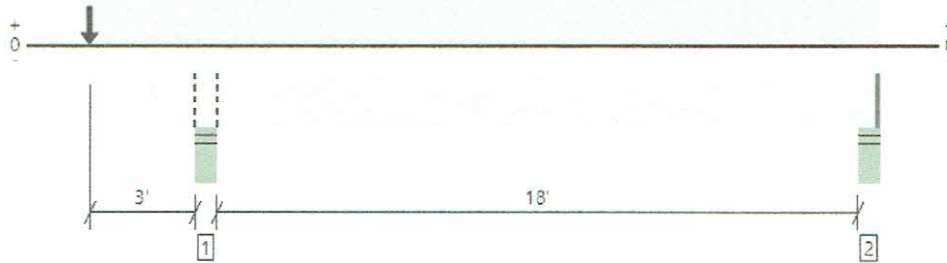
Main, M8 16' Garage Door Header Case 1
1 piece(s) 5 1/2" x 18" 24F-V4 DF Glulam
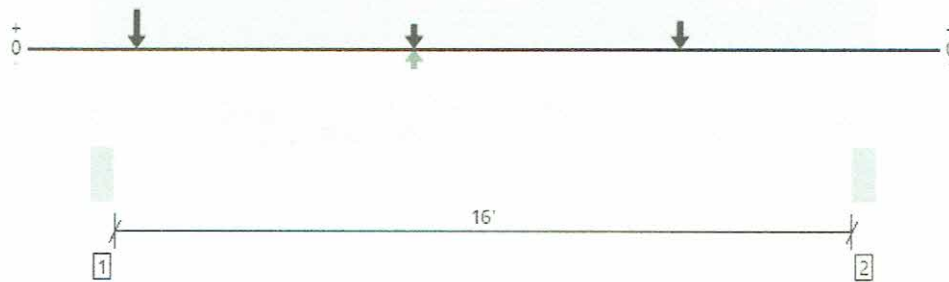
Overall Length: 17'

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)	19179 @ 4 1/2"	21450 (6.00")	Passed (89%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	10674 @ 2'	17490	Passed (61%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	47640 @ 7' 4 5/16"	58109	Passed (82%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.308 @ 8' 5 9/16"	0.542	Passed (L/634)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.471 @ 8' 5 1/2"	0.813	Passed (L/414)	--	1.0 D + 1.0 L (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 17' o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 17' o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 0.98 that was calculated using length L = 16' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	
1 - Trimmer - SPF	6.00"	6.00"	5.36"	7012	11222	4101	1286/-1286	23621/-1286	None
2 - Trimmer - SPF	6.00"	6.00"	3.12"	3727	7412	1860	831/-831	13830/-831	None

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 17'	N/A	24.1	--	--	--	
1 - Uniform (PSF)	0 to 17'	15'	12.0	40.0	-	-	Default Load
2 - Point (lb)	1'	N/A	4134	4794	2975	2117	
3 - Point (lb)	7'	N/A	1568	1820	1493	-2117	
4 - Point (lb)	12' 9"	N/A	1568	1820	1493	2117	

SUSTAINABLE FORESTRY INITIATIVE
Weyerhaeuser

ForteWEB Software Operator	Job Notes
Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com	2014.084 4270

Main, M9 16' Garage Door Header Case 2
1 piece(s) 5 1/2" x 18" 24F-V4 DF Glulam
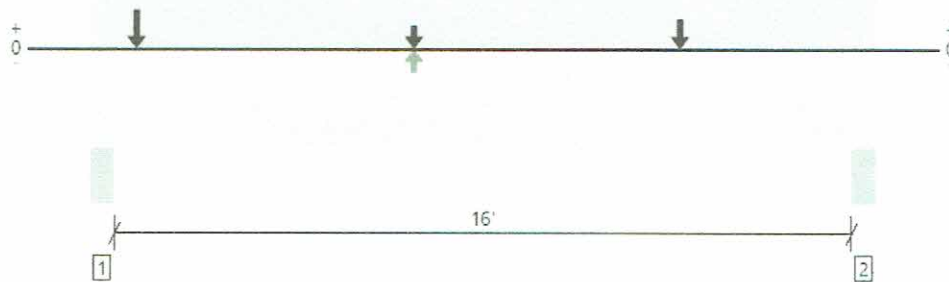
Overall Length: 17'

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)	20193 @ 4 1/2"	21450 (6.00")	Passed (94%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	10674 @ 2'	17490	Passed (61%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	47640 @ 7' 4 5/16"	58109	Passed (82%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.313 @ 8' 2 9/16"	0.542	Passed (L/623)	--	1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.476 @ 8' 3 7/16"	0.813	Passed (L/410)	--	1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 17' o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 17' o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 0.98 that was calculated using length L = 16' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	
1 - Trimmer - SPF	6.00"	6.00"	5.65"	7012	11222	4101	3217/-3217	25552/-3217	None
2 - Trimmer - SPF	6.00"	6.00"	3.29"	3727	7412	1860	2076/-2076	15075/-2076	None

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 17'	N/A	24.1	--	--	--	
1 - Uniform (PSF)	0 to 17'	15'	12.0	40.0	-	-	Default Load
2 - Point (lb)	1'	N/A	4134	4794	2975	5293	
3 - Point (lb)	7'	N/A	1568	1820	1493	-5293	
4 - Point (lb)	12' 9"	N/A	1568	1820	1493	5293	

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SUSTAINABLE FORESTRY INITIATIVE

Weyerhaeuser

ForteWEB Software Operator	Job Notes
Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com	2019.084 4270

Post Design (Combined Axial and Moment Loading)

2015 Seattle Building Code (SBC)   **2015 NDS**

Beam Description: Garage Door Posts

Enter '1' for **wind load**:	1
Enter '1' for **repetitive member**:	
Enter '1' for **wet use**:	

Geometry and loads:

Height	7 ft		w(d)	141.0 plf
P	24000 lbs		w(b)	0 plf
Le(d)	7 ft		Le(b)	7 ft

Material Properties:

Fb1	1000 psi	Fb(d)'	1150 psi
Fb2	1000 psi	Fb(b)'	1150 psi
Fc	1500 psi	Fc'	1321 psi
E	1.7 x10^6psi	E'	1.7 x10^6psi
Emin	0.62 x10^6psi	Emin'	0.62 x10^6psi

Selected Member: DF#1   5.5   x   5.5

                                                    b   d

Member properties:		Variables:	
Section Modulus (d):	27.7 in^3	Rb(d)	3.91
Section Modulus (b):	27.7 in^3	Rb(b)	3.91
Section Area:	30.3 in^2	c	0.8

Member stresses: Provided			Required	
FcE(d)	2185 psi	>	fc	793 psi
FcE(b)	2185 psi	>	fc	793 psi
FbE	48714 psi	>	fb(d)	374 psi
FbE	48714 psi	>	fb(b)	0 psi

Bending and Axial Compression Check:

NDS 2010 EQ 3.9-3	0.87	<	1.0

Main, M11 Flush Stair Beam
2 piece(s) 1 3/4" x 16" 2.0E Microllam® LVL

Overall Length: 10' 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)	3985 @ 4"	6322 (4.25")	Passed (63%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2729 @ 1' 9 1/2"	10640	Passed (26%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	9775 @ 5' 5 1/2"	31114	Passed (31%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.073 @ 5' 5 1/2"	0.256	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.097 @ 5' 5 1/2"	0.512	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 10' 9" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 10' 9" o/c unless detailed otherwise.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - SPF	5.50"	4.25"	2.68"	1004	3057	4061	1 1/4" Rim Board
2 - Stud wall - SPF	5.50"	4.25"	2.68"	1004	3057	4061	1 1/4" Rim Board

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 10' 9 3/4"	N/A	16.3	--	
1 - Uniform (PSF)	0 to 10' 11" (Front)	14'	12.0	40.0	Default Load

Weyerhaeuser Notes

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

SUSTAINABLE FORESTRY INITIATIVE

Weyerhaeuser

ForteWEB Software Operator	Job Notes
Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com	2019.089 4270

Post Design (Combined Axial and Moment Loading)

2015 Seattle Building Code (SBC)   **2015 NDS**

Beam Description: Interior Post

Enter '1' for **wind load**:
Enter '1' for **repetitive member**:
Enter '1' for **wet use**:

Geometry and loads:

Height	8 ft		$w(d)$	plf
P	25000 lbs		$w(b)$	0 plf
$L_e(d)$	8 ft		$L_e(b)$	8 ft

Material Properties:

Fb1	850 psi	Fb(d)'	850 psi
Fb2	850 psi	Fb(b)'	850 psi
Fc	1300 psi	Fc'	887 psi
E	1.3 x10^6psi	E'	1.3 x10^6psi
Emin	0.47 x10^6psi	Emin'	0.47 x10^6psi

Selected Member: HF#2   5.5   x   5.5

		b	d

Member properties: **Variables:**

Member properties		Variables	
Section Modulus (d):	27.7 in^3	Rb(d)	4.18
Section Modulus (b):	27.7 in^3	Rb(b)	4.18
Section Area:	30.3 in^2	c	0.8

Member stresses: Provided   Required

Member stresses	Provided		Required	
FcE(d)	1268 psi	>	fc	826 psi
FcE(b)	1268 psi	>	fc	826 psi
FbE	32313 psi	>	fb(d)	0 psi
FbE	32313 psi	>	fb(b)	0 psi

Bending and Axial Compression Check:

NDS 2010 EQ 3.9-3   0.87   <   1.0

M13 (handwritten)

Main, M13 Deck Joists
1 piece(s) 2 x 12 Hem-Fir No. 2 @ 12" OC

Overall Length: 15' 11"
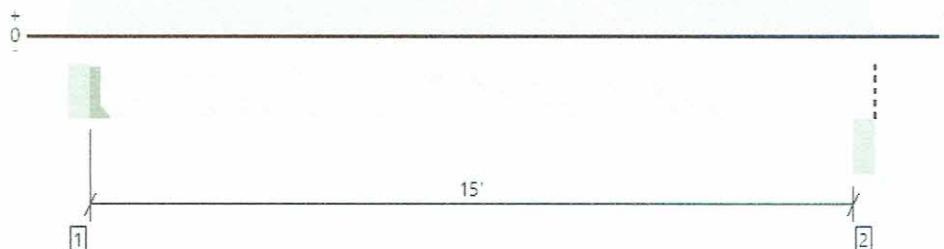
15'

1   2

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)	543 @ 5 1/2"	911 (1.50")	Passed (60%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	476 @ 1' 4 3/4"	1688	Passed (28%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2048 @ 8'	2577	Passed (79%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.302 @ 8'	0.377	Passed (L/599)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.362 @ 8'	0.754	Passed (L/499)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	N/A	N/A	--	--	--

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 4' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 15' 6" o/c unless detailed otherwise.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

576# < 1135# (handwritten)
LU5210 (handwritten)

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 11 1/4" SPF beam	5.50"	Hanger¹	1.50"	96	480	576	See note ¹
2 - Beam - SPF	5.50"	5.50"	1.50"	95	475	570	Blocking

- 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

Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 15' 11"	12"	12.0	60.0	Default Load

Weyerhaeuser Notes

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

ForteWEB Software Operator	Job Notes
Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com	2019.084 (handwritten) 4270 (handwritten)

12/16/2019 7:16:24 PM UTC
ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2
File Name: 4270 Ardekani

BEAM DESIGN (Uniform Load, Simple Span)

2015 *INT.* **Building Code (IBC)** **2015 NDS**

Beam Description: Deck beam

Enter '1' for incised PT lumber:	1	Enter '1' for **snow load**:
		Enter '1' for **repetitive member**:
		Enter '1' for **wet use**:
Enter '1' for f**ully supported**:	1	Enter '1' for **reduced live load**:

Geometry and Loads:

Span:	21 ft		Tributary Width:	8 ft	
DL unit load:	12 psf		LL unit load:	60 psf	
Add'l unif. DL:	0 lb/ft		Add'l unif. LL:	0 lb/ft	
Kll * At:	336 ft^2		Reduced LL:	60 psf	
DL uniform load:	96 lb/ft		Max DL reaction:	1,008 lbs	
LL uniform load:	480 lb/ft		Max LL reaction:	5,040 lbs	
Total load:	576 lb/ft		Max Total reaction:	6,048 lbs	

Material Properties:

E	1.8 x 10^6 psi		E'	1.8 x 10^6 psi
Fb	2400 psi		Fb'	1831 psi
Fv	265 psi		Fv'	212 psi
Fc perp	650 psi		Fc perp'	520 psi

(Allowable design values include modification factors per NDS 2012)

Deflection analysis:

For total load:		Allowed deflection criteria, span/	**360**		
For LL only:		Allowed deflection criteria, span/	**480**		
Max. allowed total defl:	0.700	in	Max LL defl:	0.525	in
Total defl. * I:	1400.3		Required I:	2,000	in^4
LL defl. * I:	1166.9		Required I:	2,223	in^4
Actual deflections:	TOTAL:	0.524 inches	LL:	0.437	inches

Force analysis:

		Max Shear:	6048 lbs	
Max. moment:	31752 ft-lb	Shear @ d =	5184 lbs < *5185 lb*	

HUCQ612-SDS

Selected Member:	**GLB**	**5.500**	**x**	**18**

Member properties:	Provided:	Required:
Moment of inertia:	2,673.0 in^4	2,222.6 in^4
Section Modulus:	297.0 in^3	208.1 in^3
Section Area:	99.0 in^2	36.7 in^2
Bearing Area:		11.6 in^2
Minimum bearing dimensions:	5.5 x	2.1 inches

MEMBER REPORT

Main, M15 Cantilever Deck Beams
1 piece(s) 5 1/2" x 18" 24F-V4 DF Glulam

An excessive uplift of -2101 lbs at support located at 15' 9 1/2" failed this product. OK
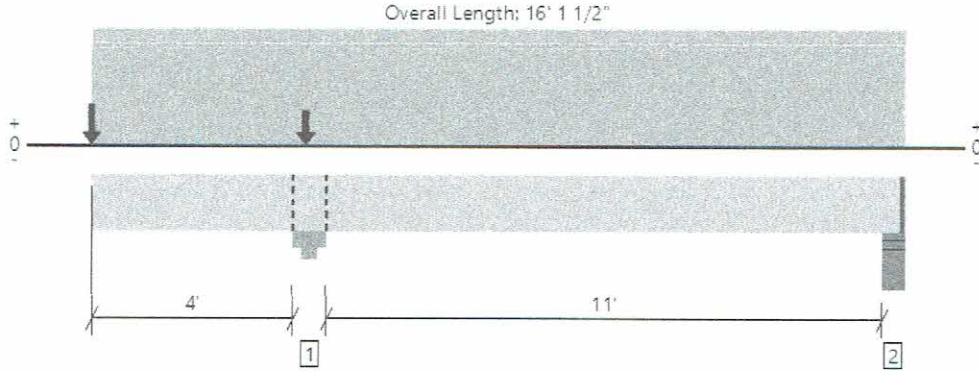
Overall Length: 16' 1 1/2"

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)	20884 @ 4' 4"	28600 (8.00")	Passed (73%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	8736 @ 2' 6"	17490	Passed (50%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	10860 @ 10' 10 1/8"	59400	Passed (18%)	1.00	1.0 D + 1.0 L (Alt Spans)
Neg Moment (Ft-lbs)	-36574 @ 4' 4"	44921	Passed (81%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.230 @ 0	0.289	Passed (2L/452)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.279 @ 0	0.433	Passed (2L/374)	--	1.0 D + 1.0 L (Alt Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 16' o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 16' o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 9' 10 11/16".
- Critical negative moment adjusted by a volume factor of 0.98 that was calculated using length L = 15' 9 1/2".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

OK BY CALCULATION

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Column Cap - steel	8.00"	8.00"	5.84"	6103	14781	3500	24384	Blocking
2 - Stud wall - SPF	5.50"	4.25"	1.97"	320	4365/-2421	-	4685/-2421	1 1/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 16' 1/4"	N/A	24.1	--	--	
1 - Uniform (PSF)	0 to 16' 1 1/2" (Front)	12'	12.0	60.0	-	Default Load
2 - Point (lb)	0 (Front)	N/A	1476	5040	-	
3 - Point (lb)	4' 3" (Front)	N/A	2240	-	3500	

Weyerhaeuser Notes

Weyerhaeuser

SUSTAINABLE FORESTRY INITIATIVE

ForteWEB Software Operator	Job Notes
Brett Johnson
CSES
(253) 579-2158
Brett.ajohnson@yahoo.com	2019.089

Post Design (Combined Axial and Moment Loading)

2015 INT. Building Code (IBC)   **2015 NDS**

Beam Description: Deck posts

Enter '1' for **wind load**:   1
Enter '1' for **repetitive member**:
Enter '1' for **wet use**:

Geometry and loads:

Height	8 ft		w(d)	10.0 plf
P	25500 lbs	< 30250 lb	w(b)	0 plf
		PB66		
Le(d)	8 ft		Le(b)	8 ft

Material Properties:

Fb1	850 psi	Fb(d)'	977.5 psi
Fb2	850 psi	Fb(b)'	977.5 psi
Fc	1300 psi	Fc'	944 psi
E	1.3 x10^6psi	E'	1.3 x10^6psi
Emin	0.47 x10^6psi	Emin'	0.47 x10^6psi

Selected Member: HF#2   5.5   x   5.5

                b   d

Member properties: **Variables:**

Section Modulus (d):	27.7 in^3	Rb(d)	4.18
Section Modulus (b):	27.7 in^3	Rb(b)	4.18
Section Area:	30.3 in^2	c	0.8

Member stresses: Provided   Required

FcE(d)	1268 psi	>	fc	843 psi
FcE(b)	1268 psi	>	fc	843 psi
FbE	32313 psi	>	fb(d)	35 psi
FbE	32313 psi	>	fb(b)	0 psi

Bending and Axial Compression Check:

NDS 2010 EQ 3.9-3   0.90   <   1.0

BEAM DESIGN (Uniform Load, Simple Span)

2015 *INT* Building Code (*I*BC)   **2015 NDS**

Beam Description: Deck Header Below

Enter '1' for incised PT lumber:		Enter '1' for **snow load**:	
		Enter '1' for **repetitive member**:	
		Enter '1' for **wet use**:	
Enter '1' for f**ully supported**:	1	Enter '1' for **reduced live load**:	

Geometry and Loads:

Span:	16 ft	Tributary Width:	8 ft	
DL unit load:	12 psf	LL unit load:	60 psf	
Add'l unif. DL:	24 lb/ft	Add'l unif. LL:	40 lb/ft	
Kll * At:	256 ft^2	Reduced LL:	60 psf	
DL uniform load:	120 lb/ft	Max DL reaction:	960 lbs	
LL uniform load:	520 lb/ft	Max LL reaction:	4,160 lbs	
Total load:	640 lb/ft	Max Total reaction:	5,120 lbs	

Material Properties:

E	1.8 x 10^6 psi	E'	1.8 x 10^6 psi	
Fb	2400 psi	Fb'	2400 psi	
Fv	265 psi	Fv'	265 psi	
Fc perp	650 psi	Fc perp'	650 psi	

(Allowable design values include modification factors per NDS 2012)

Deflection analysis:

For total load:		Allowed deflection criteria, span/	**360**		
For LL only:		Allowed deflection criteria, span/	**480**		
Max. allowed total defl:	0.533	in	Max LL defl:	0.400	in
Total defl. * I:	524.3		Required I:	983	in^4
LL defl. * I:	426.0		Required I:	1,065	in^4
Actual deflections:	TOTAL:	0.465 inches	LL:	0.378	inches

Force analysis:

			Max Shear:	5120 lbs
Max. moment:	20480 ft-lb		Shear @ d =	4400 lbs

Selected Member:	**GLB**	**5.500**	**x**	**13.5**

Member properties:	Provided:		Required:	
Moment of inertia:	1,127.7 in^4		1,065.0 in^4	
Section Modulus:	167.1 in^3		102.4 in^3	
Section Area:	74.3 in^2		24.9 in^2	
Bearing Area:			7.9 in^2	
Minimum bearing dimensions:	5.5	x	1.4 inches	

Post Design (Combined Axial and Moment Loading)

2015 *INT* Building Code (*I*BC)   **2015 NDS**

Beam Description: Deck Header Posts

Enter '1' for **wind load**:   1

Enter '1' for **repetitive member**:

Enter '1' for **wet use**:

Geometry and loads:

Height	8 ft		w(d)	100.0 plf
P	15000 lbs		w(b)	0 plf
Le(d)	8 ft		Le(b)	8 ft

Material Properties:

Fb1	850 psi	Fb(d)'	977.5 psi
Fb2	850 psi	Fb(b)'	977.5 psi
Fc	1300 psi	Fc'	944 psi
E	1.3 x10^6psi	E'	1.3 x10^6psi
Emin	0.47 x10^6psi	Emin'	0.47 x10^6psi

Selected Member: HF#2   5.5   x   5.5

                                          b   d

Member properties:		Variables:	
Section Modulus (d):	27.7 in^3	Rb(d)	4.18
Section Modulus (b):	27.7 in^3	Rb(b)	4.18
Section Area:	30.3 in^2	c	0.8

Member stresses: Provided   Required

FcE(d)	1268 psi	>	fc	496 psi
FcE(b)	1268 psi	>	fc	496 psi
FbE	32313 psi	>	fb(d)	346 psi
FbE	32313 psi	>	fb(b)	0 psi

Bending and Axial Compression Check:

NDS 2010 EQ 3.9-3   0.86   <   1.0

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

Project Name/Number : 4270
Title   F2   :
Dsgnr:
Description....

Page : 1
Date: 20 FEB 2020

This Wall in File: i:\work\cses engineering\jobs\walkey\4270.rpx

RetainPro (c) 1987-2019, Build 11.19.11.12
License : KW-06061297
License To : CSES, Inc

Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Criteria

Retained Height	=	10.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	6.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	50.0 psf/ft
	=	
Passive Pressure	=	350.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in

Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	100.0
Used for Sliding & Overturning		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W)
		(Service Level)
Wind on Exposed Stem (Service Level)	=	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	=	480.0 lbs
Axial Live Load	=	640.0 lbs
Axial Load Eccentricity	=	0.0 in

Earth Pressure Seismic Load

Method : Uniform		
Multiplier Used	=	8.000
(Multiplier used on soil density)		

| Uniform Seismic Force | = | 88.000 |
| Total Seismic Force | = | 968.000 |

Design Summary

Wall Stability Ratios

| Overturning | = | 1.29 Ratio < 1.5! |
| Slab Resists All Sliding ! | | |

| Total Bearing Load | = | 5,389 lbs |
| ...resultant ecc. | = | 11.09 in |

Soil Pressure @ Toe	=	1,696 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	2,000 psf

Soil Pressure Less Than Allowable

| ACI Factored @ Toe | = | 2,374 psf |
| ACI Factored @ Heel | = | 0 psf |

Footing Shear @ Toe	=	37.1 psi OK
Footing Shear @ Heel	=	22.6 psi OK
Allowable	=	75.0 psi

Sliding Calcs

| Lateral Sliding Force | = | 3,702.6 lbs |

Vertical component of active lateral soil pressure IS
considered in the calculation of soil bearing pressures.

Load Factors

Building Code	IBC 2018,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Stem Construction

Bottom

Stem OK

Design Height Above Ftg	ft =	0.00
Wall Material Above "Ht"	=	Concrete
Design Method	=	LRFD
Thickness	=	8.00
Rebar Size	=	# 5
Rebar Spacing	=	5.00
Rebar Placed at	=	Edge

Design Data

| fb/FB + fa/Fa | = | 0.997 |

Total Force @ Section

| Service Level | lbs = | |
| Strength Level | lbs = | 4,880.0 |

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	17,733.3
Moment.....Allowable	=	17,776.5

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	65.7
Shear.....Allowable	psi =	75.0
Anet (Masonry)	in2 =	
Rebar Depth 'd'	in =	6.19

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Wall Weight	psf =	100.0
Short Term Factor	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	Medium Weight
Masonry Design Method	=	ASD

Concrete Data

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

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

Project Name/Number : 4270

Title   F2   :
Dsgnr:
Description....

Page : 2
Date: 20 FEB 2020

This Wall in File: i:\work\cses engineering\jobs\walkey\4270.rpx

RetainPro (c) 1987-2019, Build 11.19.11.12	Cantilevered Retaining Wall	Code: IBC 2018,ACI 318-14,TMS 402-16
License : KW-06061297 License To : CSES, Inc		

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.6715 in2/ft	
(4/3) * As :	0.8953 in2/ft	Min Stem T&S Reinf Area 2.016 in2
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :
	============	One layer of : Two layers of :
Required Area :	0.6715 in2/ft	#4@ 12.50 in #4@ 25.00 in
Provided Area :	0.744 in2/ft	#5@ 19.38 in #5@ 38.75 in
Maximum Area :	0.8382 in2/ft	#6@ 27.50 in #6@ 55.00 in

Footing Data

Toe Width	=	4.00 ft	
Heel Width	=	1.17	
Total Footing Width	=	5.17	
Footing Thickness	=	12.00 in	
Key Width	=	0.00 in	
Key Depth	=	0.00 in	
Key Distance from Toe	=	0.00 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	0 psf
Mu' : Upward	=	166,873	0 ft-#
Mu' : Downward	=	39,840	1,146 ft-#
Mu: Design	=	5,828	1,146 ft-#
Actual 1-Way Shear	=	37.09	22.59 psi
Allow 1-Way Shear	=	75.00	40.00 psi
Toe Reinforcing	=	# 5 @ 4.50 in	
Heel Reinforcing	=	None Spec'd	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs

**If torsion exceeds allowable, provide
supplemental design for footing torsion.**

Other Acceptable Sizes & Spacings
    Toe: #4@ 7.05 in, #5@ 10.93 in, #6@ 15.52 in, #7@ 21.17 in, #8@ 27.87 in, #9@ 35
    Heel: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
    Key: No key defined

Min footing T&S reinf Area	1.34	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft
If one layer of horizontal bars:	If two layers of horizontal bars:	
#4@ 9.26 in	#4@ 18.52 in	
#5@ 14.35 in	#5@ 28.70 in	
#6@ 20.37 in	#6@ 40.74 in	

Use menu item Settings > Printing & Title Block
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Project Name/Number : 4270
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Description....

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RetainPro (c) 1987-2019, Build 11.19.11.12 License : KW-06061297 License To : CSES, Inc	**Cantilevered Retaining Wall** Code: IBC 2018,ACI 318-14,TMS 402-16

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....				.....RESISTING.....		
	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	3,025.0	3.67	11,091.7	Soil Over HL (ab. water tbl)	625.4	4.92	3,075.1
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		4.92	3,075.1
Hydrostatic Force				Watre Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =	1,120.0	4.33	2,080.0
Added Lateral Load =				* Axial Live Load on Stem =	640.0	4.33	2,773.3
Load @ Stem Above Soil =				Soil Over Toe =	250.0	2.00	500.0
Seismic Earth Load =	677.6	5.50	3,726.8	Surcharge Over Toe =	400.0	2.00	800.0
=				Stem Weight(s) =	1,050.0	4.33	4,550.0
				Earth @ Stem Transitions =			
Total =	3,702.6	O.T.M. =	14,818.5	Footing Weight =	775.1	2.58	2,002.3
				Key Weight =			
Resisting/Overturning Ratio = **1.29**				Vert. Component =	1,168.9	5.17	6,039.7
Vertical Loads used for Soil Pressure = 5,389.4 lbs				Total = 4,749.4 lbs R.M. = 19,047.1			

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

If seismic is included, the OTM and sliding ratios
may be 1.1 per section 1807.2.3 of IBC.

Vertical component of active lateral soil pressure IS considered in the
calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the
calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.096	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,

because the wall would then tend to rotate into the retained soil.

Use menu item Settings > Printing & Title Block
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Project Name/Number : 4270
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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Criteria

Retained Height	=	10.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	6.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	50.0 psf/ft
	=	
Passive Pressure	=	350.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in

Surcharge Loads

Surcharge Over Heel	=	50.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	100.0
Used for Sliding & Overturning		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W)
		(Service Level)
Wind on Exposed Stem (Service Level)	=	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	=	200.0 lbs
Axial Live Load	=	400.0 lbs
Axial Load Eccentricity	=	0.0 in

Earth Pressure Seismic Load

Method : Uniform		
Multiplier Used	=	8.000
(Multiplier used on soil density)		
Uniform Seismic Force	=	88.000
Total Seismic Force	=	968.000

Design Summary

Wall Stability Ratios

Overturning	=	1.19 Ratio < 1.5!
Slab Resists All Sliding !		

Total Bearing Load	=	4,972 lbs
...resultant ecc.	=	17.06 in
Soil Pressure @ Toe	=	1,970 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	2,000 psf

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	2,759 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	36.6 psi OK
Footing Shear @ Heel	=	22.9 psi OK
Allowable	=	75.0 psi

Sliding Calcs

Lateral Sliding Force	=	3,922.6 lbs

Vertical component of active lateral soil pressure IS
considered in the calculation of soil bearing pressures.

Load Factors

Building Code	IBC 2018,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Stem Construction

Bottom

		Stem OK
Design Height Above Ftg ft =		0.00
Wall Material Above "Ht"	=	Concrete
Design Method	=	LRFD
Thickness	=	8.00
Rebar Size	=	# 5
Rebar Spacing	=	4.50
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.996

Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	5,200.0

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	19,333.3
Moment.....Allowable		19,388.8

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	70.0
Shear.....Allowable	psi =	75.0
Anet (Masonry)	in2 =	
Rebar Depth 'd'	in =	6.19

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Wall Weight	psf =	100.0
Short Term Factor	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	Medium Weight
Masonry Design Method	=	ASD

Concrete Data

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

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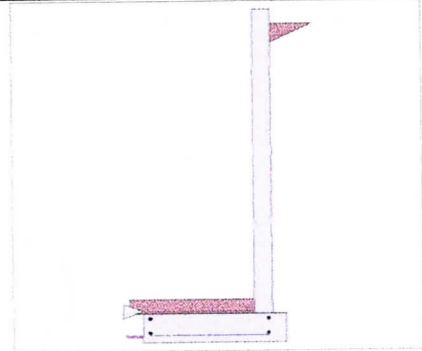| RetainPro (c) 1987-2019, Build 11.19.11.12 License : KW-06061297 License To : CSES, Inc	Cantilevered Retaining Wall	Code: IBC 2018,ACI 318-14,TMS 402-16

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.7321 in2/ft	
(4/3) * As :	0.9761 in2/ft	Min Stem T&S Reinf Area 2.016 in2
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :
	=============	One layer of : Two layers of :
Required Area :	0.7321 in2/ft	#4@ 12.50 in #4@ 25.00 in
Provided Area :	0.8267 in2/ft	#5@ 19.38 in #5@ 38.75 in
Maximum Area :	0.8382 in2/ft	#6@ 27.50 in #6@ 55.00 in

Footing Data

Toe Width	=	4.25 ft
Heel Width	=	1.17
Total Footing Width	=	5.42
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 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	=	2,759	0 psf
Mu' : Upward	=	189,342	0 ft-#
Mu' : Downward	=	44,976	1,156 ft-#
Mu: Design	=	5,130	1,156 ft-#
Actual 1-Way Shear	=	36.57	22.92 psi
Allow 1-Way Shear	=	75.00	40.00 psi
Toe Reinforcing	=	# 5 @ 4.50 in	
Heel Reinforcing	=	None Spec'd	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs

**If torsion exceeds allowable, provide
supplemental design for footing torsion.**

Other Acceptable Sizes & Spacings

Toe: #4@ 7.05 in, #5@ 10.93 in, #6@ 15.52 in, #7@ 21.17 in, #8@ 27.87 in, #9@ 35
Heel: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Key: No key defined

Min footing T&S reinf Area	1.40	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars: If two layers of horizontal bars:
#4@ 9.26 in   #4@ 18.52 in
#5@ 14.35 in   #5@ 28.70 in
#6@ 20.37 in   #6@ 40.74 in

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING.....		
		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		3,025.0	3.67	11,091.7
HL Act Pres (be water tbl)				
Hydrostatic Force				
Buoyant Force	=			
Surcharge over Heel	=	220.0	5.50	1,210.0
Surcharge Over Toe	=			
Adjacent Footing Load	=			
Added Lateral Load	=			
Load @ Stem Above Soil	=			
Seismic Earth Load	=	677.6	5.50	3,726.8
	=			
Total	=	3,922.6	O.T.M. =	16,028.5

Resisting/Overturning Ratio   =   1.19 > 1.1
Vertical Loads used for Soil Pressure =   4,972.5 lbs

If seismic is included, the OTM and sliding ratios
may be 1.1 per section 1807.2.3 of IBC.

Vertical component of active lateral soil pressure IS considered in the
calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the
calculation of Overturning Resistance.

Item		.....RESISTING.....		
		Force lbs	Distance ft	Moment ft-#
Soil Over HL (ab. water tbl)		625.4	5.17	3,231.4
Soil Over HL (bel. water tbl)			5.17	3,231.4
Watre Table				
Sloped Soil Over Heel	=			
Surcharge Over Heel	=	25.0	5.17	129.3
Adjacent Footing Load	=			
Axial Dead Load on Stem	=	600.0	4.58	916.7
* Axial Live Load on Stem	=	400.0	4.58	1,833.3
Soil Over Toe	=	265.6	2.13	564.5
Surcharge Over Toe	=	425.0	2.13	903.1
Stem Weight(s)	=	1,050.0	4.58	4,812.5
Earth @ Stem Transitions	=			
Footing Weight	=	812.6	2.71	2,200.8
Key Weight	=			
Vert. Component	=	1,168.9	5.42	6,331.9
	Total =	4,572.5 lbs	R.M.=	19,090.1

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.106	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe.
because the wall would then tend to rotate into the retained soil.

Use menu item Settings > Printing & Title Block
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Project Name/Number : 4270
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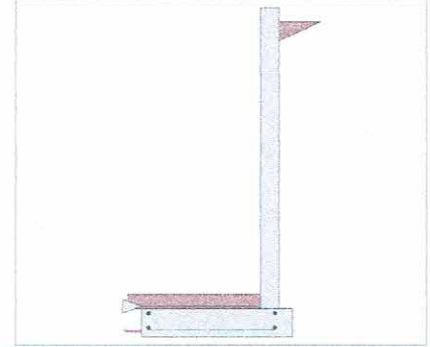
Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Criteria

Retained Height	=	10.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	6.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	50.0 psf/ft
	=	
Passive Pressure	=	350.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in

Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	100.0
Used for Sliding & Overturning		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Service Level)	=	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	=	600.0 lbs
Axial Live Load	=	1,000.0 lbs
Axial Load Eccentricity	=	0.0 in

Earth Pressure Seismic Load

Method : Uniform		
Multiplier Used	=	8.000
(Multiplier used on soil density)		
Uniform Seismic Force	=	88.000
Total Seismic Force	=	968.000

Design Summary

Wall Stability Ratios

Overturning	=	1.24 Ratio < 1.5!
Slab Resists All Sliding !		
Total Bearing Load	=	5,791 lbs
...resultant ecc.	=	9.71 in
Soil Pressure @ Toe	=	1,868 psf OK
Soil Pressure @ Heel	=	12 psf OK
Allowable	=	2,000 psf

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	2,615 psf
ACI Factored @ Heel	=	17 psf
Footing Shear @ Toe	=	40.9 psi OK
Footing Shear @ Heel	=	22.6 psi OK
Allowable	=	75.0 psi

Sliding Calcs

Lateral Sliding Force	=	3,702.6 lbs

Vertical component of active lateral soil pressure IS
considered in the calculation of soil bearing pressures.

Load Factors

Building Code	IBC 2018,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Stem Construction

Bottom

Stem OK

Design Height Above Ftg ft =		0.00
Wall Material Above "Ht"	=	Concrete
Design Method	=	LRFD
Thickness	=	8.00
Rebar Size	=	# 5
Rebar Spacing	=	5.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.997

Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	4,880.0

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	17,733.3
Moment.....Allowable	=	17,776.5

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	65.7
Shear.....Allowable	psi =	75.0
Anet (Masonry)	in2 =	
Rebar Depth 'd'	in =	6.19

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Wall Weight	psf =	100.0
Short Term Factor	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	Medium Weight
Masonry Design Method	=	ASD

Concrete Data

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

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing
As (based on applied moment) :	0.6715 in2/ft
(4/3) * As :	0.8953 in2/ft
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in2/ft
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft
	=============
Required Area :	0.6715 in2/ft
Provided Area :	0.744 in2/ft
Maximum Area :	0.8382 in2/ft

Horizontal Reinforcing

Min Stem T&S Reinf Area 2.016 in2
Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft
Horizontal Reinforcing Options :

One layer of :	Two layers of :
#4@ 12.50 in	#4@ 25.00 in
#5@ 19.38 in	#5@ 38.75 in
#6@ 27.50 in	#6@ 55.00 in

Footing Data

Toe Width	=	3.75 ft
Heel Width	=	1.17
Total Footing Width	=	4.92
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 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	=	2,615	17 psf
Mu' : Upward	=	164,935	0 ft-#
Mu' : Downward	=	35,016	1,146 ft-#
Mu: Design	=	6,336	1,146 ft-#
Actual 1-Way Shear	=	40.90	22.59 psi
Allow 1-Way Shear	=	75.00	40.00 psi
Toe Reinforcing	= #5 @ 5.00 in		
Heel Reinforcing	= None Spec'd		
Key Reinforcing	= None Spec'd		
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs

If torsion exceeds allowable, provide
supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 7.05 in, #5@ 10.93 in, #6@ 15.52 in, #7@ 21.17 in, #8@ 27.87 in, #9@ 35
Heel: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Key: No key defined

Min footing T&S reinf Area	1.27	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars:
#4@ 9.26 in
#5@ 14.35 in
#6@ 20.37 in

If two layers of horizontal bars:
#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	3,025.0	3.67	11,091.7	Soil Over HL (ab. water tbl)	625.4	4.67	2,918.7
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		4.67	2,918.7
Hydrostatic Force				Watre Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =	1,600.0	4.08	2,450.0
Added Lateral Load =				* Axial Live Load on Stem =	1,000.0	4.08	4,083.3
Load @ Stem Above Soil =				Soil Over Toe =	234.4	1.88	439.5
Seismic Earth Load =	677.6	5.50	3,726.8	Surcharge Over Toe =	375.0	1.88	703.1
=				Stem Weight(s) =	1,050.0	4.08	4,287.5
				Earth @ Stem Transitions =			
Total =	3,702.6	O.T.M. =	14,818.5	Footing Weight =	737.6	2.46	1,813.3
				Key Weight =			
Resisting/Overturning Ratio =		1.24 > 1.1		Vert. Component =	1,168.9	4.92	5,747.4
Vertical Loads used for Soil Pressure =	5,791.2	lbs		Total =	4,791.2 lbs	R.M.=	18,359.5

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

If seismic is included, the OTM and sliding ratios
may be 1.1 per section 1807.2.3 of IBC.

Vertical component of active lateral soil pressure IS considered in the
calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the
calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.111	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,
because the wall would then tend to rotate into the retained soil.

Use menu item Settings > Printing & Title Block
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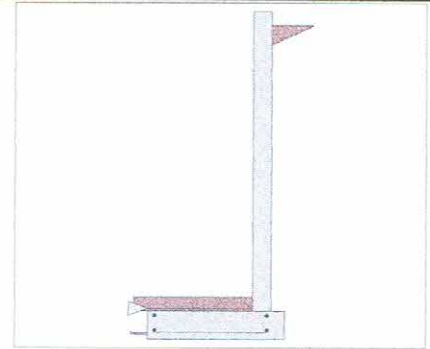
Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Criteria

Retained Height	=	8.00 ft
Wall height above soil	=	2.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	6.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	50.0 psf/ft
	=	
Passive Pressure	=	350.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in

Surcharge Loads

Surcharge Over Heel	=	100.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	100.0
Used for Sliding & Overturning		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	1.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Earth (H) (Service Level)
Wind on Exposed Stem = (Service Level)		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	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Earth Pressure Seismic Load

Method : Uniform

Multiplier Used	=	8.000
(Multiplier used on soil density)		
Uniform Seismic Force	=	72.000
Total Seismic Force	=	648.000

Design Summary

Wall Stability Ratios

Overturning	=	1.31 Ratio < 1.5!
Slab Resists All Sliding !		
Total Bearing Load	=	3,652 lbs
...resultant ecc.	=	15.45 in
Soil Pressure @ Toe	=	1,829 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	2,561 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	26.9 psi OK
Footing Shear @ Heel	=	16.9 psi OK
Allowable	=	75.0 psi

Sliding Calcs

Lateral Sliding Force	=	2,838.6 lbs

Stem Construction

Bottom

		Stem OK
Design Height Above Ftg ft =		0.00
Wall Material Above "Ht"	=	Concrete
Design Method	=	LRFD
Thickness	=	8.00
Rebar Size	=	# 5
Rebar Spacing	=	8.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.946
Total Force @ Section		
Service Level	lbs =	
Strength Level	lbs =	3,648.0
Moment....Actual		
Service Level	ft-# =	
Strength Level	ft-# =	11,178.7
Moment.....Allowable	=	11,799.2
Shear.....Actual		
Service Level	psi =	
Strength Level	psi =	49.1
Shear.....Allowable	psi =	75.0
Anet (Masonry)	in2 =	
Rebar Depth 'd'	in =	6.19

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Wall Weight	psf =	100.0
Short Term Factor	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	Medium Weight
Masonry Design Method	=	ASD

Concrete Data

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

Vertical component of active lateral soil pressure IS
considered in the calculation of soil bearing pressures.

Load Factors

Building Code	IBC 2018,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.4233 in2/ft	
(4/3) * As :	0.5644 in2/ft	Min Stem T&S Reinf Area 2.016 in2
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :
	============	One layer of : Two layers of :
Required Area :	0.4233 in2/ft	#4@ 12.50 in #4@ 25.00 in
Provided Area :	0.465 in2/ft	#5@ 19.38 in #5@ 38.75 in
Maximum Area :	0.8382 in2/ft	#6@ 27.50 in #6@ 55.00 in

Footing Data

Toe Width	=	3.50 ft
Heel Width	=	1.17
Total Footing Width	=	4.67
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 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	=	2,561	0 psf
Mu' : Upward	=	118,300	0 ft-#
Mu' : Downward	=	30,503	819 ft-#
Mu: Design	=	2,730	819 ft-#
Actual 1-Way Shear	=	26.86	16.85 psi
Allow 1-Way Shear	=	75.00	40.00 psi
Toe Reinforcing	= # 5 @ 6.00 in		
Heel Reinforcing	= None Spec'd		
Key Reinforcing	= None Spec'd		
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs

**If torsion exceeds allowable, provide
supplemental design for footing torsion.**

Other Acceptable Sizes & Spacings

Toe: #4@ 9.05 in, #5@ 14.03 in, #6@ 19.92 in, #7@ 27.16 in, #8@ 35.77 in, #9@ 45
Heel: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Key: No key defined

Min footing T&S reinf Area	1.21	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars: If two layers of horizontal bars:
    #4@ 9.26 in   #4@ 18.52 in
    #5@ 14.35 in   #5@ 28.70 in
    #6@ 20.37 in   #6@ 40.74 in

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....				.....RESISTING.....		
	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	2,025.0	3.00	6,075.0	Soil Over HL (ab. water tbl)	500.3	4.42	2,209.9
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		4.42	2,209.9
Hydrostatic Force				Watre Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =	360.0	4.50	1,620.0	Surcharge Over Heel =	50.0	4.42	221.0
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe	218.8	1.75	382.8
Seismic Earth Load =	453.6	4.50	2,041.2	Surcharge Over Toe =	350.0	1.75	612.5
=				Stem Weight(s) =	1,050.0	3.83	4,025.0
				Earth @ Stem Transitions =			
Total =	2,838.6	O.T.M. =	9,736.2	Footing Weight =	700.1	2.33	1,633.6
				Key Weight =			
				Vert. Component =	782.5	4.67	3,651.8
				Total =	3,651.6 lbs	R.M.=	12,736.6

Resisting/Overturning Ratio   =   1.31
   Vertical Loads used for Soil Pressure =   3,651.6 lbs

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

If seismic is included, the OTM and sliding ratios
may be 1.1 per section 1807.2.3 of IBC.

Vertical component of active lateral soil pressure IS considered in the
calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the
calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.114	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,
because the wall would then tend to rotate into the retained soil.

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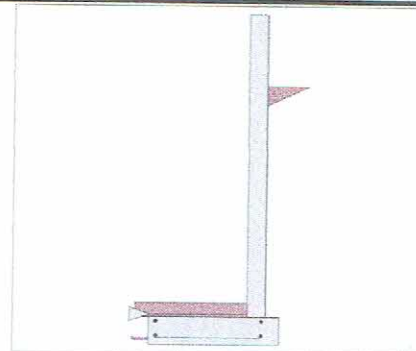License To : CSES, Inc

Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Criteria

Retained Height	=	12.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	18.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	50.0 psf/ft
	=	
Passive Pressure	=	350.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.350
Soil height to ignore for passive pressure	=	0.00 in

Surcharge Loads

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

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	1.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Earth (H)
		(Service Level)
Wind on Exposed Stem (Service Level)	=	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	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Design Summary

Wall Stability Ratios

Overturning	=	2.62 OK
Sliding	=	1.21 Ratio < 1.5!
Total Bearing Load	=	11,305 lbs
...resultant ecc.	=	1.89 in
Soil Pressure @ Toe	=	1,554 psf OK
Soil Pressure @ Heel	=	1,185 psf OK
Allowable	=	2,000 psf

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	2,176 psf
ACI Factored @ Heel	=	1,659 psf
Footing Shear @ Toe	=	10.2 psi OK
Footing Shear @ Heel	=	69.4 psi OK
Allowable	=	75.0 psi

Sliding Calcs

Lateral Sliding Force	=	4,444.4 lbs
less 100% Passive Force	= -	1,404.9 lbs
less 100% Friction Force	= -	3,956.7 lbs
Added Force Req'd	=	0.0 lbs OK
....for 1.5 Stability	=	1,305.1 lbs NG

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	IBC 2018,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Stem Construction

Bottom

Stem OK

Design Height Above Ftg ft =		0.00
Wall Material Above "Ht"	=	Concrete
Design Method	=	LRFD
Thickness	=	10.00
Rebar Size	=	# 5
Rebar Spacing	=	4.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.775

Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	5,760.0

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	23,040.0
Moment.....Allowable	=	29,672.1

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	58.6
Shear.....Allowable	psi =	75.0
Anet (Masonry)	in2 =	
Rebar Depth 'd'	in =	8.19

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Wall Weight	psf =	125.0
Short Term Factor	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	Medium Weight
Masonry Design Method	=	ASD

Concrete Data

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

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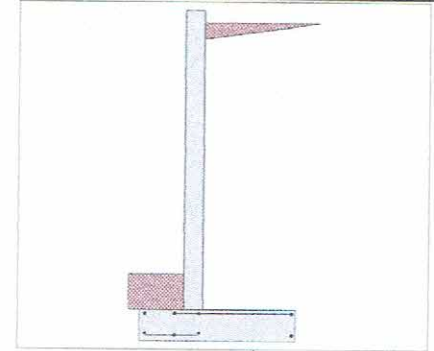License To : CSES, Inc

Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	
As (based on applied moment) :	0.6507 in2/ft	
(4/3) * As :	0.8676 in2/ft	Horizontal Reinforcing
200bd/fy : 200(12)(8.1875)/60000 :	0.3275 in2/ft	Min Stem T&S Reinf Area 3.000 in2
0.0018bh : 0.0018(12)(10) :	0.216 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.240 in2/ft
	============	Horizontal Reinforcing Options :

		One layer of :	Two layers of :
Required Area :	0.6507 in2/ft	#4@ 10.00 in	#4@ 20.00 in
Provided Area :	0.93 in2/ft	#5@ 15.50 in	#5@ 31.00 in
Maximum Area :	1.1092 in2/ft	#6@ 22.00 in	#6@ 44.00 in

Footing Data

Toe Width	=	2.00 ft
Heel Width	=	5.00
Total Footing Width	=	7.00
Footing Thickness	=	16.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 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	=	2,176	1,659 psf
Mu' : Upward	=	51,041	0 ft-#
Mu' : Downward	=	11,160	29,158 ft-#
Mu: Design	=	2,905	29,158 ft-#
Actual 1-Way Shear	=	10.23	69.43 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	# 5 @ 4.00 in	
Heel Reinforcing	=	# 5 @ 4.00 in	
Key Reinforcing	=	# 4 @ 9.00 in	
Footing Torsion, Tu	=	36,616.50 ft-lbs	
Footing Allow. Torsion, phi Tu	=	8,640.00 ft-lbs	

If torsion exceeds allowable, provide
supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 6.93 in, #5@ 10.75 in, #6@ 15.27 in, #7@ 20.82 in, #8@ 27.42 in, #9@ 34
Heel: #4@ 6.93 in, #5@ 10.75 in, #6@ 15.27 in, #7@ 20.82 in, #8@ 27.42 in, #9@ 34
Key: No key defined

Min footing T&S reinf Area	2.42	in2
Min footing T&S reinf Area per foot	0.35	in2 /ft

If one layer of horizontal bars: If two layers of horizontal bars:
   #4@ 6.94 in   #4@ 13.89 in
   #5@ 10.76 in   #5@ 21.53 in
   #6@ 15.28 in   #6@ 30.56 in

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Summary of Overturning & Resisting Forces & Moments

Item	Force lbs	Distance ft	Moment ft-#		Item	Force lbs	Distance ft	Moment ft-#
	.....OVERTURNING.....					.....RESISTING.....		
HL Act Pres (ab water tbl)	4,444.4	4.44	19,753.1		Soil Over HL (ab. water tbl)	6,250.0	4.92	30,729.2
HL Act Pres (be water tbl)					Soil Over HL (bel. water tbl)		4.92	30,729.2
Hydrostatic Force					Watre Table			
Buoyant Force	=				Sloped Soil Over Heel	=		
Surcharge over Heel	=				Surcharge Over Heel	=		
Surcharge Over Toe	=				Adjacent Footing Load	=		
Adjacent Footing Load	=				Axial Dead Load on Stem	=		
Added Lateral Load	=				* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=				Soil Over Toe	375.0	1.00	375.0
	=				Surcharge Over Toe	=		
					Stem Weight(s)	= 1,562.5	2.42	3,776.0
					Earth @ Stem Transitions	=		
Total	= 4,444.4	O.T.M. =	19,753.1		Footing Weight	= 1,400.0	3.50	4,900.0
					Key Weight	=		
Resisting/Overturning Ratio		=	**2.62**		Vert. Component	= 1,717.4	7.00	12,021.6
Vertical Loads used for Soil Pressure =	11,304.9 lbs				Total =	11,304.9 lbs	R.M.=	51,801.8

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

Vertical component of active lateral soil pressure IS considered in the
calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the
calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.077	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe.
because the wall would then tend to rotate into the retained soil.

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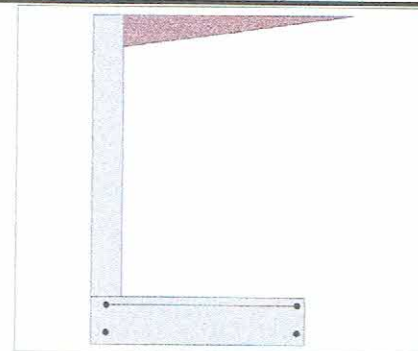
Cantilevered Retaining Wall

Code: IBC 2018, ACI 318-14, TMS 402-16

Criteria

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

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	50.0 psf/ft
	=	
Passive Pressure	=	350.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in

Surcharge Loads

Surcharge Over Heel	=	100.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	1.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Earth (H)
		(Service Level)
Wind on Exposed Stem (Service Level)	=	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	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Earth Pressure Seismic Load

Method : Uniform

Multiplier Used	=	8.000
(Multiplier used on soil density)		

Uniform Seismic Force	=	56.000
Total Seismic Force	=	392.000

Design Summary

Wall Stability Ratios

Overturning	=	2.73 OK
Sliding	=	1.16 Ratio < 1.5!
Total Bearing Load	=	5,174 lbs
...resultant ecc.	=	6.78 in
Soil Pressure @ Toe	=	1,739 psf OK
Soil Pressure @ Heel	=	275 psf OK
Allowable	=	2,000 psf

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	2,434 psf
ACI Factored @ Heel	=	386 psf
Footing Shear @ Toe	=	0.0 psi OK
Footing Shear @ Heel	=	50.2 psi OK
Allowable	=	75.0 psi

Sliding Calcs

Lateral Sliding Force	=	1,779.4 lbs
less 100% Passive Force	= -	0.0 lbs
less 100% Friction Force	= -	2,069.5 lbs
Added Force Req'd	=	0.0 lbs OK
....for 1.5 Stability	=	599.6 lbs NG

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	IBC 2018, ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Stem Construction

		Bottom
		Stem OK
Design Height Above Ftg ft =		0.00
Wall Material Above "Ht"	=	Concrete
Design Method	=	LRFD
Thickness	=	8.00
Rebar Size	=	# 4
Rebar Spacing	=	9.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.707

Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	2,160.0

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	5,040.0
Moment.....Allowable	=	7,122.4

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	28.8
Shear.....Allowable	psi =	75.0
Anet (Masonry)	in2 =	
Rebar Depth 'd'	in =	6.25

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Wall Weight	psf =	100.0
Short Term Factor	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	Medium Weight
Masonry Design Method	=	ASD

Concrete Data

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

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.1888 in2/ft	
(4/3) * As :	0.2518 in2/ft	Min Stem T&S Reinf Area 1.152 in2
200bd/fy : 200(12)(6.25)/60000 :	0.25 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :

		One layer of :	Two layers of :
	============		
Required Area :	0.25 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.2667 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	0.8467 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Footing Data

Toe Width	=	0.00 ft	
Heel Width	=	4.67	
Total Footing Width	=	4.67	
Footing Thickness	=	12.00 in	
Key Width	=	0.00 in	
Key Depth	=	0.00 in	
Key Distance from Toe	=	0.00 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	=	2,434	386 psf
Mu' : Upward	=	0	0 ft-#
Mu' : Downward	=	0	12,951 ft-#
Mu: Design	=	0	12,951 ft-#
Actual 1-Way Shear	=	0.00	50.16 psi
Allow 1-Way Shear	=	0.00	75.00 psi
Toe Reinforcing	= # 4 @ 9.00 in		
Heel Reinforcing	= # 4 @ 9.00 in		
Key Reinforcing	= None Spec'd		
Footing Torsion, Tu	=	36,616.50	ft-lbs
Footing Allow. Torsion, phi Tu	=	8,640.00	ft-lbs

**If torsion exceeds allowable, provide
supplemental design for footing torsion.**

Other Acceptable Sizes & Spacings

   Toe: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
   Heel: #4@ 9.25 in, #5@ 14.34 in, #6@ 20.36 in, #7@ 27.77 in, #8@ 36.56 in, #9@ 46
   Key: No key defined

Min footing T&S reinf Area	1.21	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 9.26 in	#4@ 18.52 in
#5@ 14.35 in	#5@ 28.70 in
#6@ 20.37 in	#6@ 40.74 in

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

Project Name/Number : 4270
Title   F4   :
Dsgnr:
Description....

Page : 3
Date: 23 DEC 2019

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....				.....RESISTING.....		
	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	1,225.0	2.33	2,858.3	Soil Over HL (ab. water tbl)	3,000.3	2.67	8,001.2
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.67	8,001.2
Hydrostatic Force				Watre Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =	280.0	3.50	980.0	Surcharge Over Heel =	400.0	2.67	1,066.8
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =			
Seismic Earth Load =	274.4	3.50	960.4	Surcharge Over Toe =			
=				Stem Weight(s) =	600.0	0.33	200.0
				Earth @ Stem Transitions =			
Total =	1,779.4	O.T.M. =	4,798.7	Footing Weight =	700.1	2.33	1,633.6
				Key Weight =			
Resisting/Overturning Ratio		=	**2.73**	Vert. Component =	473.4	4.67	2,209.1
Vertical Loads used for Soil Pressure =		5,173.7 lbs		Total =	5,173.7 lbs	R.M.=	13,110.7

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

If seismic is included, the OTM and sliding ratios
may be 1.1 per section 1807.2.3 of IBC.

Vertical component of active lateral soil pressure IS considered in the
calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the
calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.062	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,

because the wall would then tend to rotate into the retained soil.

Project Name/Number : 4270
Title   F4   :
Dsgnr:
Description....

Page : 1
Date: 23 DEC 2019

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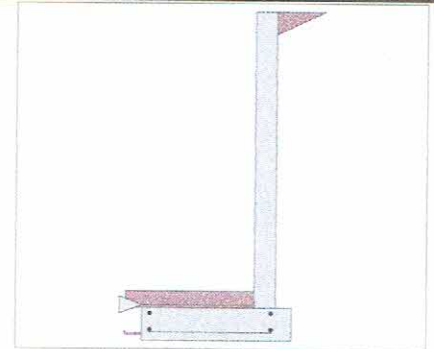License To : CSES, Inc

Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Criteria

Retained Height	=	9.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	6.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	50.0 psf/ft
	=	
Passive Pressure	=	350.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	125.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in

Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	100.0
Used for Sliding & Overturning		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	1.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Earth (H)
		(Service Level)
Wind on Exposed Stem (Service Level)	=	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	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Design Summary

Wall Stability Ratios

Overturning	=	1.57	OK
Slab Resists All Sliding !			

Total Bearing Load	=	3,698 lbs
...resultant ecc.	=	7.18 in
Soil Pressure @ Toe	=	1,036 psf OK
Soil Pressure @ Heel	=	135 psf OK
Allowable	=	2,000 psf

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	1,450 psf
ACI Factored @ Heel	=	189 psf
Footing Shear @ Toe	=	17.3 psi OK
Footing Shear @ Heel	=	19.3 psi OK
Allowable	=	75.0 psi

Sliding Calcs

Lateral Sliding Force	=	2,500.0 lbs

Stem Construction

Bottom

Stem OK

Design Height Above Ftg	ft =		0.00
Wall Material Above "Ht"		=	Concrete
Design Method		=	LRFD
Thickness		=	8.00
Rebar Size		=	# 4
Rebar Spacing		=	6.00
Rebar Placed at		=	Edge

Design Data

fb/FB + fa/Fa	=	0.934

Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	3,240.0

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	9,720.0
Moment.....Allowable	=	10,400.4

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	43.2
Shear.....Allowable	psi =	75.0
Anet (Masonry)	in2 =	
Rebar Depth 'd'	in =	6.25

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Wall Weight	psf =	100.0
Short Term Factor	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	Medium Weight
Masonry Design Method	=	ASD

Concrete Data

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

Vertical component of active lateral soil pressure IS
considered in the calculation of soil bearing pressures.

Load Factors

Building Code	IBC 2018,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Use menu item Settings > Printing & Title Block
to set these five lines of information
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Project Name/Number : 4270
Title   F4   :
Dsgnr:
Description....

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Date: 23 DEC 2019

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Concrete Stem Rebar Area Details

Bottom Stem
As (based on applied moment) :
(4/3) * As :
200bd/fy : 200(12)(6.25)/60000 :
0.0018bh : 0.0018(12)(8) :

Vertical Reinforcing	
0.3642 in2/ft	
0.4856 in2/ft	
0.25 in2/ft	
0.1728 in2/ft	
============	
Required Area :	0.3642 in2/ft
Provided Area :	0.4 in2/ft
Maximum Area :	0.8467 in2/ft

Horizontal Reinforcing

Min Stem T&S Reinf Area 1.728 in2
Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft
Horizontal Reinforcing Options :

	One layer of :	Two layers of :
	#4@ 12.50 in	#4@ 25.00 in
	#5@ 19.38 in	#5@ 38.75 in
	#6@ 27.50 in	#6@ 55.00 in

Footing Data

Toe Width	=	3.50 ft
Heel Width	=	1.17
Total Footing Width	=	4.67
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 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	=	1,450	189 psf
Mu' : Upward	=	83,393	0 ft-#
Mu' : Downward	=	30,503	965 ft-#
Mu: Design	=	2,477	965 ft-#
Actual 1-Way Shear	=	17.32	19.26 psi
Allow 1-Way Shear	=	75.00	40.00 psi
Toe Reinforcing	=	# 4 @ 6.00 in	
Heel Reinforcing	=	None Spec'd	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=	36,616.50 ft-lbs	
Footing Allow. Torsion, phi Tu	=	8,640.00 ft-lbs	

**If torsion exceeds allowable, provide
supplemental design for footing torsion.**

Other Acceptable Sizes & Spacings

   Toe: #4@ 9.25 in, #5@ 14.34 in, #6@ 20.36 in, #7@ 27.77 in, #8@ 36.56 in, #9@ 46
   Heel: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
   Key: No key defined

Min footing T&S reinf Area	1.21	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars:
   #4@ 9.26 in
   #5@ 14.35 in
   #6@ 20.37 in

If two layers of horizontal bars:
   #4@ 18.52 in
   #5@ 28.70 in
   #6@ 40.74 in

This Wall in File: i:\work\cses engineering\jobs\walkey\4270.rpx

Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Summary of Overturning & Resisting Forces & Moments

Item	OVERTURNING Force lbs	Distance ft	Moment ft-#		Force lbs	RESISTING Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	2,500.0	3.33	8,333.3	Soil Over HL (ab. water tbl)	562.9	4.42	2,486.1
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		4.42	2,486.1
Hydrostatic Force				Watre Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =	218.8	1.75	382.8
=				Surcharge Over Toe =	350.0	1.75	612.5
				Stem Weight(s) =	900.0	3.83	3,450.0
				Earth @ Stem Transitions =			
Total =	2,500.0	O.T.M. =	8,333.3	Footing Weight =	700.1	2.33	1,633.6
				Key Weight =			
Resisting/Overturning Ratio	=	**1.57**		Vert. Component =	966.0	4.67	4,508.4
Vertical Loads used for Soil Pressure =	3,697.7	lbs		Total =	3,697.7 lbs	R.M.=	13,073.4

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

Vertical component of active lateral soil pressure IS considered in the
calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the
calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.055	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,
because the wall would then tend to rotate into the retained soil.

SLAB DESIGN (Uniform Load, Simple Span)

2015 *INT.* Building Code (*I*BC)   **ACI 318**

Beam Description:

Material Properties:

Fy:	60000 psi		f'c:	2500 psi
Es:	29000000 psi		Ec:	2850000 psi
$\beta 1$:	0.85	φv: 0.75	φm: 0.9	

Geometry and Loads:

Span:	12 ft	Tributary Width:	1 ft
DL unit load:	100 psf	LL unit load:	50 psf
Add'l unif. DL:	lb/ft	Add'l unif. LL:	lb/ft
Point DL:	lbs	Point LL:	lbs
Point Location:	2 ft		
Depth:	8 in	Width:	12 in
d:	5 in		

Force analysis:

Mu:	43200 in-lbs	Vu:	1200 lbs

Reinforcement:

Center Bars   (1)   #4

As:	0.20	In^2
ρ:	0.002	

Design:

a:	0.46 in		c:	0.54 in
tensile strain:	0.025	>	0.005 **OK**	
φMn:	50,565 in-lbs	>	43,200 **OK**	
φVc:	4500 lbs			
φVn:	4500 lbs	>	1200 **OK**	

Shear Reinforcement Required for: **-5.3 ft**   from supports.

Deflections:

Ig:	512 In^4	Mcr:	48000 In-lbs
Icr:	36 In^4	Ie:	512 In^4
LL Deflection:	0.0160 in	L/	9007 **OK**
DL Deflection:	0.0320 in	$\lambda \Delta$:	2.00
TL Deflection:	0.0799 in	L/	1801 **OK, > L/360**

CONCRETE BEAM DESIGN (Uniform Load, Simple Span)

2015 _INT._ Building Code (_I_BC)   ACI 318

Beam Description: GRADE BEAM

Material Properties:

Fy:	60000 psi		f'c:	2500 psi
Es:	29000000 psi		Ec:	2850000 psi
β1:	0.85	φv: 0.75		φm: 0.9

Geometry and Loads:

Span:	12 ft	Tributary Width:		12 ft
DL unit load:	100 psf	LL unit load:		50 psf
Add'l unif. DL:	lb/ft	Add'l unif. LL:		lb/ft
Point DL:	0 lbs	Point LL:		lbs
Point Location:	0 ft			
Depth:	18 in	Width:		18 in
$\underline{d:}$	15 in			

Force analysis:

Mu:	518400 in-lbs	Vu:	14400 lbs

Reinforcement:

Top Rebar:	(4)	#5	Bottom Rebar:	(4)		#5
As':	1.23 In^2		As:	1.23	In^2	
ρ':	0.004		ρ:	0.004		
Ties:	(1)	#3	@ 4.5 in o.c.	OK		

Design:

a:	1.92 in		c:	2.26 in
tensile strain:	0.017	>	0.005	**OK**
φMn:	930,237 in-lbs	>	518,400	**OK**
φVc:	20250 lbs	φVs:	16567 lbs	
φVn:	36817 lbs	>	14400	**OK**

Shear Reinforcement Required for: **1.8 ft**   from supports.

Deflections:

Ig:	8748 In^4	Mcr:	364500 In-lbs
Icr:	1894 In^4	Ie:	4277 In^4
LL Deflection:	0.0230 in	L/	6270 **OK**
DL Deflection:	0.0459 in	λΔ:	1.68
TL Deflection:	0.1002 in	L/	1437 **OK. > L/360**

PILE REINFORCEMENT DESIGN

$14'' \emptyset$ PILES $\qquad A_g = \pi \, 7_{in}^2 = 154 \, in^2 \qquad d = 14'' - 3'' = 11''$

$(4) \times 0.2 \, in^2 = 0.8 \, in^2 \quad X$

$0.01 \times 154 \, in^2 = 1.54 \, in^2$

$0.08 \times 154 \, in^2 = 12.3 \, in^2$

$(4) \times 0.31 \, in^2 = 1.24 \, in^2 \quad X$

$(6) \times 0.31 \, in^2 = 1.86 \, in^2 \quad \checkmark$

(6) #5 VERTICAL BARS w/

$d/2 = 11''/2 = 5.5''$

#3 TIES @ 5" O.C.

Project No. 2019.089   Date 1/3/19

Project Name 4270

Comments _____

Revision _____   Page F24

CALCULATING DEAD LOAD

SLAB: $100 \text{ psf} \times 2300 \text{ FT}^2 = 230000 \text{ lb}$

GRADE BEAMS: $(1.5' \times 1.5' \times 150 \text{ pcf}) \times 166' = 56025 \text{ lb}$

RET. WALLS: $1863 \text{ lb/FT} \times 159' = 296217 \text{ lb}$

WOOD WALLS: $(20' \times 236') \times 12 \text{ psf} = 56640 \text{ lb}$

WOOD FLOORS: $(2300 \text{ FT}^2 \times 2 \text{ FLOORS} \times 12 \text{ psf}) = 47664 \text{ lb}$

ROOF: $(2300 \text{ FT}^2 \times 12 \text{ psf}) = 27600 \text{ lb}$

$\longrightarrow$ TOTAL $= 714146 \text{ lb} = P$

CALCULATING SLIDING FORCES

$F_s = 3703 \text{ lb/FT} \times 24' + 3923 \text{ lb/FT} \times 22' + 3703 \text{ lb/FT} \times 28'$

$= 278862 \text{ lb}$

$P \times 0.35 = 249951 \text{ lb}$ $\leftarrow$ DEAD LOAD RESISTING SLIDING

$F_s - 249951 \text{ lb} = 28411 \text{ lb}$

CALCULATING PASSIVE FORCE

$V_p = 350 \text{ pcf} \times 2.5' \times 2.5'/2 - 350 \text{ pcf} \times 1' \times 1'/2 = 918 \text{ plf}$

$F_p = 918 \text{ plf} \times 82' = 75276 \text{ lb} > 28411 \text{ lb}$ ✓

Melissa Lookups: Personator Result

Name & Address Verified

AS01,AS16,DA00,DA10,GS05,NE05,NS02,VR01

Name at Address	Millad Llc Name & Address Match (VR01)
Address	4270 E Mercer Way Mercer IslandWA98040-3824 Address Verified (AS01)
Property Information	Owner: Millad V Llc
MAK (Melissa Address Key)	6766954241
Lat. & Long.	47.570628 -122.208266 Geocoded to Rooftop Level (GS05)
Address Type	Residential
Postal Carrier Route	C006 (DPC: 70-5)
U.S. Representative	Adam Smith (D) (09)
Census Entities	County 53033 King County Subdivision 92931 Seattle East CCD Tract 0245.00 Block 1001 City, Place or Town 5345005 Mercer Island Unified School District 04980 Mercer Island School District
State Upper District	041
State Lower District	041
Delivery Post Office	Mercer Island 3040 78Th Ave Se Mercer Island WA 98040 206-232-8834

View Google Map and Picture (3 credits)   Hide Markers   Download (Print) Map

Address Location

PROJECT LOCATION
$K_{zt} = 1.0$
Exposure "C"

OSHPD
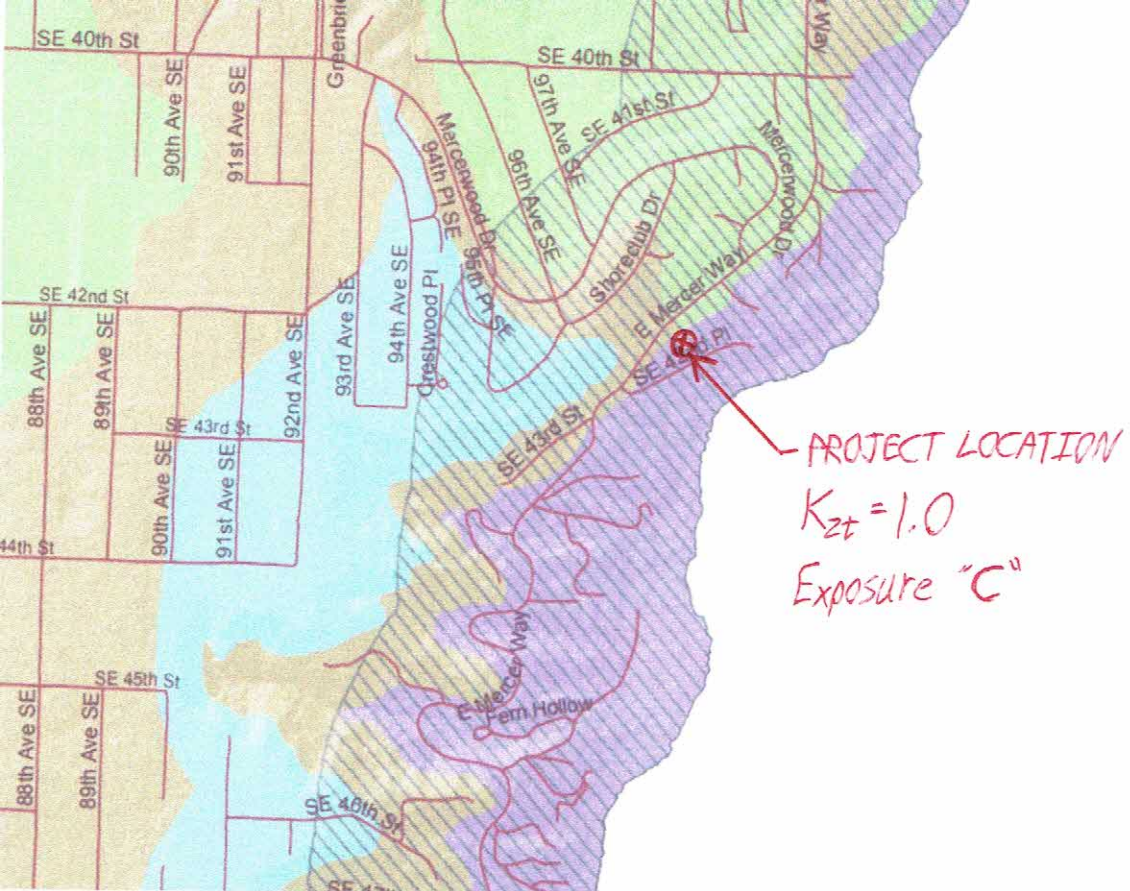
4270 E Mercer Way, Mercer Island, WA 98040, USA

Latitude, Longitude: 47.5706712, -122.20809150000002

Date	11/20/2019, 12:06:11 PM
Design Code Reference Document	ASCE7-10
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.401	MCE_R ground motion. (for 0.2 second period)
S_1	0.538	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.401	Site-modified spectral acceleration value
S_{M1}	0.807	Site-modified spectral acceleration value
S_{DS}	0.934	Numeric seismic design value at 0.2 second SA
S_{D1}	0.538	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	D	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	1.5	Site amplification factor at 1.0 second
PGA	0.578	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.578	Site modified peak ground acceleration
T_L	6	Long-period transition period in seconds
SsRT	1.401	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.463	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	3.273	Factored deterministic acceleration value. (0.2 second)
S1RT	0.538	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.576	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	1.308	Factored deterministic acceleration value. (1.0 second)
PGAd	1.268	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.958	Mapped value of the risk coefficient at short periods
C_{R1}	0.933	Mapped value of the risk coefficient at a period of 1 s

MCER Response Spectrum

Period, T (sec)
— Sa(g)
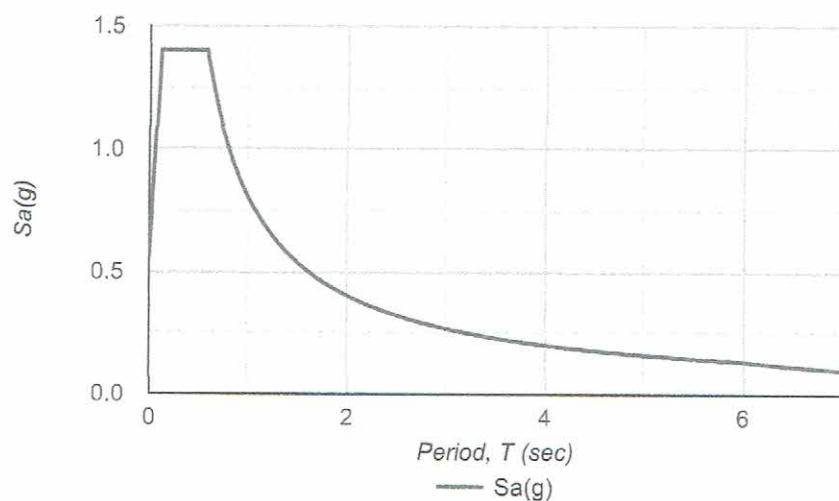
Design Response Spectrum

Period, T (sec)
— Sa(g)

DISCLAIMER

Lateral Loads Design per ASCE 7-10, Wind: Section 27 Seismic: Section 12

(Directional Procedure Part 1)   2015 Seattle Building Code (SBC)

WIND LOADS   **110**   mph Basic Wind Speed   2015 NDS

$Ps = lambda * Kzt * Ps(30) * 0.6$ Exposure : C   Roof Slope: **0.00** : 12 =   0.0

Least Horizontal Dimension, feet: **27**   Mean Roof Ht, feet: **32**   (degrees)

Risk Category: II $Kzt =$ **1.00**

Directionality Factor: $Kd =$ 0.85   Gust-Effect Factor: $G =$ 0.85

Enclosure Classification: Enclosed $Gcpi =$ 0.18   -0.18

Horizontal wind pressure on walls at specified heights of structure.

Significant Heights of structure (ft)	EQ 27.3-1 Velocity Pressure (psf):	EQ 27.4-1 Design Pressures (psf):
1 10	22.4	**17.6**
2 20	23.7	**18.5**
3 30	25.8	**19.9**

Horizontal and vertical wind pressure on roof of structure.

Horizontal roof pressure: **0.0** psf

Vertical/uplift pressure: **12.0** psf

Vertical/uplift pressure on overhangs: **13.3** psf

(Equivalent Lateral Force Procedure, Section 12.8)

SEISMIC LOADS   Ie   1.0 $R =$ 6.5   ASCE 7-10, Table 12.2.1

Seismic Parameters   Group I   Site Class: **D**

per ASCE 7-10)   PGA (.2 sec)   1.401 $Fa =$ 1.00   ASCE 7-10 Table 11.4-1

          PGA (1 sec)   0.538 $Fv =$ 1.50   ASCE 7-10 Table 11.4-2

Seismic Design Categories per ASCE 7-10 Tables 11.6-1, 11.6-2

      Based on Sds: **D**   Based on Sd1:   **D**

PGA's based on peak ground accelerations per latest USGS Hazards Program (based on lat/lon).

      $Ss =$ 1.4010 $Sms = Fa * Ss =$ 1.40   Equation 11.4-1

      $S1 =$ 0.5380 $Sm1 = Fv * S1 =$ 0.81   Equation 11.4-2

Equations 11.4-3, 11.4-4 $Sds = 2/3 * Sms =$ 0.93 $Sd1 = 2/3 * Sm1 =$ 0.54

Equation 12.14-11 Cs (or %V) = $(Sds / (R/I)) =$ 0.144   **Building period < 0.5 s per IBC eq 12.8-7**

Base Shear = %V * W * 0.7 =   **6.84**   **psf**, uniformly distributed over floor area

(0.7 reduction factor per ASCE 7-10, Section 2.4.1, Eq 5 (seismic vertical distribution per IBC eqs 12.8-11 & 12)

Base = top of foundation	Roof or Floor DL (psf)	Wall DL (psf) dist. over floor area	Story Height Above Base (ft)	Lateral Load (psf)
Roof	16	8	30	3.57
Second floor	12	10	20	2.18
First floor	12	10	10	1.09
				0.00
Total Seismic DL:	**68**		Sum	6.84

SHEAR WALL DESIGN - NORTH WALL - UPPER FLOOR   L = 4.5' + 4'

$P_W = [(5.5' \times 5') \times 19.9 \text{ psf}] = 548 \text{ lb}$

$P_E = [(52' \times 7') \times 3.57 \text{ psf}] = 1300 \text{ lb}$ ⟵ CONTROLS

$V = 1300 \text{ lb} / 8.5' = 153 \text{ plf} < 230 \text{ plf}$ SW1

UPLIFT $= 153 \text{ plf} \times 11' = 1683 \text{ lb} < 1705 \text{ lb}$ CS16
$< 3900 \text{ lb}$ MSTC48B3

MAIN FLOOR - L = 3' + 3'

$P_W = [(4.5' \times 11') \times 18.5 \text{ psf}] + 548 \text{ lb} = 1464 \text{ lb}$

$P_E = [(8' \times 28') \times 2.18 \text{ psf}] + 1300 \text{ lb} = 1789 \text{ lb}$ ⟵ CONTROLS

$V = 1789 \text{ lb} / 6' = 299 \text{ plf}$

$V^* = 299 \text{ plf} / 1.25 - 0.125 \times {}^{10.5'}\!/_{3'} = 368 \text{ plf} < 550 \text{ plf}$ SW3

UPLIFT $= 1683 \text{ lb} + [(368 \text{ plf} \times 10.5')] = 5547 \text{ lb} < 5820 \text{ lb}$ HDU8
3864 lb $< 6435 \text{ lb}$ SB⅞×24

$\underline{\text{SHEAR WALL DESIGN} - \text{EAST WALL} - \text{UPPER FLOOR}} \qquad L = 28'$

$P_W = [(5.5' \times 11') \times 19.9 \text{ psf}] = 1204 \text{ lb}$

$P_E = (11' \times 34' \times 3.57 \text{ psf}) = 1336 \text{ lb} \quad \Leftarrow \text{CONTROLS}$

$V = 1336 \text{ lb} / 28' = 48 \text{ plf} < 230 \text{ plf} \qquad \underline{SW1}$

$\text{UPLIFT} = 48 \text{ plf} \times 10.5' = 504 \text{ lb} < 1705 \text{ lb} \qquad \underline{CS16}$

$\underline{\text{MAIN FLOOR}} - L = 28'$

$P_W = [(11' \times 18') \times 18.5 \text{ psf}] + 1204 \text{ lb} + (2518 \text{ lb} \times {}^{14'}/{}_{36'}) = 5847 \text{ lb} \quad \Leftarrow \text{CONTROLS}$

$P_E = [(18' \times 70') \times 2.18 \text{ psf}] + 1336 \text{ lb} + (3006 \text{ lb} \times {}^{14'}/{}_{36'}) = 5252 \text{ lb}$

$V = 5847 \text{ lb} / 28' = 204 \text{ plf} < 230 \text{ plf} \qquad \underline{SW1}$

$\text{UPLIFT} = (209 \text{ plf} \times 10.5') + 504 \text{ lb} = 2699 \text{ lb} < 4340 \text{ lb} \quad \underline{HDU5}$
$< 3410 \text{ lb} \quad \underline{(2) CS16}$

$\underline{\text{LOWER FLOOR}} - L = 11'$

$P_W = (5847 \text{ lb} \times {}^{16'}/{}_{28'}) + [(11' \times 5') \times 17.6 \text{ psf}] = 4310 \text{ lb} \quad \Leftarrow \text{CONTROLS}$

$P_E = (5252 \text{ lb} \times {}^{16'}/{}_{28'}) + [(11' \times 32') \times 1.09 \text{ psf}] = 3385 \text{ lb}$

$V = 4310 \text{ lb} / 11' = 392 \text{ plf} < 550 \text{ plf} \qquad \underline{SW3}$

$\text{UPLIFT} = 2699 \text{ lb} + 392 \text{ plf} \times 10' = 6617 \text{ lb} < 8030 \text{ lb} \quad \underline{HDU11}$
$< 8030 \text{ lb} \quad \underline{SB1 \times 30}$

SHEAR WALL DESIGN - SOUTH EAST WALL - UPPER FLOOR $L = 11.5'$

$P_W = [(11.5' \times 5.5') \times 19.9 \text{ psf}] = 1258 \text{ lb}$

$P_E = [(11.5' \times 82') \times 3.57 \text{ psf}] = 3367 \text{ lb}$ ← CONTROLS

$V = 3367 \text{ lb} / 11.5' = 293 \text{ plf} < 350 \text{ plf}$ $\underline{SW2}$

UPLIFT $= 293 \text{ plf} \times 10.5' = 3077 \text{ lb} < 3400 \text{ lb}$ $\underline{MSTC48 B3}$
$< 3410 \text{ lb}$ $\underline{(2) CS16}$

SOUTH MID WALL - UPPER FLOOR - $L = 7' + 2'$

$P_W = [(5.5' \times 5.5') \times 19.9 \text{ psf}] = 602 \text{ lb}$

$P_E = [(4' \times 67') \times 3.57 \text{ psf}] = 957 \text{ lb}$ ← CONTROLS

$V = 957 \text{ lb} / 9' = 107 \text{ plf}$

$V^* = 107 \text{ plf} / 1.25 - 0.125 \times 5\frac{1}{2}' = 115 \text{ plf} < 230 \text{ plf}$ $\underline{SW1}$

UPLIFT $= 115 \text{ plf} \times 10.5' = 1208 \text{ lb} < 1705 \text{ lb}$ $\underline{CS16}$

MAIN FLOOR - $L = 8.5' + 3.5'$

$P_W = 602 \text{ lb} + [(19'/27') \times 1258 \text{ lb}] + [(13' \times 11') \times 18.5 \text{ psf}] = 4133 \text{ lb}$ ← CONTROLS

$P_E = 957 \text{ lb} + [(19'/27') \times 3367 \text{ lb}] + [(4' \times 82') \times 2.18 \text{ psf}] = 4042 \text{ lb}$

$V = 4133 \text{ lb} / 12' = 345 \text{ plf} < 350 \text{ plf}$ $\underline{SW2}$

UPLIFT $= 1208 \text{ lb} + (345 \text{ plf} \times 10.5') = 4831 \text{ lb} < 6475 \text{ lb}$ CMST14
$< 5820 \text{ lb}$ HDU8
$< 6435 \text{ lb}$ SB7/8×24

SHEAR WALL DESIGN - SOUTH WEST WALL - UPPER FLOOR   L = 5.75' + 4.25'

$P_W = [(2' \times 5.5') \times 19.9 \text{ psf}] = 219 \text{ lb}$

$P_E = [(5' \times 42') \times 3.57 \text{ psf}] = 750 \text{ lb} \leftarrow CONTROLS$

$V = 750 \text{ lb} / 10' = 75 \text{ plf} < 230 \text{ plf}$ $\underline{SW1}$

$UPLIFT = 75 \text{ plf} \times 10.5' = 788 \text{ lb} < 1705 \text{ lb}$ $\underline{CS16}$

MAIN FLOOR - L = 5.75' + 4.25'

$P_W = 219 \text{ lb} + [(2' \times 11') \times 18.5 \text{ psf}] = 626 \text{ lb}$

$P_E = 750 \text{ lb} + [(3' \times 42') \times 2.18 \text{ psf}] = 1025 \text{ lb} \leftarrow CONTROLS$

$V = 1025 \text{ lb} / 10' = 102.5 \text{ plf} < 230 \text{ plf}$ $\underline{SW1}$

$UPLIFT = 788 \text{ lb} + (102.5 \text{ plf} \times 10.5') = 1865 \text{ lb} < 3900 \text{ lb}$ $\underline{MSTC48B3}$

DIAPHRAGM CHECK: $1025 \text{ lb} / 30' = 35 \text{ plf}$ ✓

SHEAR WALL DESIGN - EAST MID WALL - UPPER FLOOR   L = 5.5' + 4'

$P_W = [(23' \times 5.5') \times 19.9 \text{ psf}] = 2518 \text{ lb}$

$P_E = [(11' \times 34') + (13' \times 36')] \times 3.57 \text{ psf} = 3006 \text{ lb}$ ← CONTROLS

$V = 3006 \text{ lb} / 9.5' = 317 \text{ plf} < 350 \text{ plf}$ SW2

UPLIFT $= 317 \text{ plf} \times 10.5' = 3323 \text{ lb} < 3410 \text{ lb}$ (2) CS16

WEST STAIR WALL - UPPER FLOOR   L = 8'

$P_W = [(30' \times 5.5') \times 19.9 \text{ psf}] = 3284 \text{ lb}$

$P_E = [(12' \times 35') + (18' \times 33')] \times 3.57 \text{ psf} = 3620 \text{ lb}$ ← CONTROLS

$V = 3620 \text{ lb} / 8' = 453 \text{ plf} < 550 \text{ plf}$ SW3

UPLIFT $= 453 \text{ plf} \times 10.5' = 4757 \text{ lb} < 6475 \text{ lb}$ CMST14

WEST WALL - UPPER FLOOR   L = 9'

$P_W = [(18' \times 5.5') \times 19.9 \text{ psf}] = 1971 \text{ lb}$

$P_E = [(18' \times 33') \times 3.57 \text{ psf}] = 2121 \text{ lb}$ ← CONTROLS

$V = 2121 \text{ lb} / 9' = 236 \text{ plf} < 350 \text{ plf}$ SW2

UPLIFT $= 236 \text{ plf} \times 10.5' = 2478 \text{ lb} < 3410 \text{ lb}$ (2) CS16

SHEAR WALL DESIGN - EAST STAIR WALL - MAIN FLOOR   L = 13'

$P_W = [(23' \times 11') \times 18.5 \text{ psf}] + [2518 \text{ lb} \times (20'/36')] = 6220 \text{ lb}$ ← CONTROLS

$P_E = [(23' \times 58') \times 2.18 \text{ psf}] + [3006 \text{ lb} \times (22'/36')] = 4746 \text{ lb}$

$V = 6220 \text{ lb} / 13' = 474 \text{ plf} < 550 \text{ plf}$ SW3

UPLIFT $= 479 \text{ plf} \times 10.5' = 5030 \text{ lb} < 6475 \text{ lb}$ CMST14
$< 5820 \text{ lb}$ HDU8
$< 6435 \text{ lb}$ SB 7/8 × 24

LOWER FLOOR   L = 15.5' + 8'

$P_W = [23' \times 5' \times 17.6 \text{ psf}] + 6220 \text{ lb} = 8244 \text{ lb}$ ← CONTROLS

$P_E = [23' \times 32' \times 1.04 \text{ psf}] + 4746 \text{ lb} = 5549 \text{ lb}$

$V = 8244 \text{ lb} / 23.5' = 351 \text{ plf} < 550 \text{ plf}$ SW3

UPLIFT $= 351 \text{ plf} \times 10.5' = 3686 \text{ lb} < 4340 \text{ lb}$ HDU5

WEST STAIR WALL - MAIN FLOOR   L = 8'

$P_W = [(8' \times 11') \times 18.5 \text{ psf}] + 3284 \text{ lb} = 4912 \text{ lb}$ ← CONTROLS

$P_E = 3620 \text{ lb} + [(8' \times 35') \times 2.18 \text{ psf}] = 4231 \text{ lb}$

$V = 4912 \text{ lb} / 8' = 614 \text{ plf} < 710 \text{ plf}$ SW3X

UPLIFT $= 4757 \text{ lb} + (614 \text{ plf} \times 11') = 11511 \text{ lb} < 14445 \text{ lb}$ HDU14
w/ 6 × 6 POSTS
$< 17080 \text{ lb}$ PAB 8
$d_e = 10.5''$

SHEAR WALL DESIGN - WEST STAIR WALL - LOWER FLOOR   L = 10'

$$P_W = [(8' \times 5') \times 17.6 \text{ psf}] + 4912 \text{ lb} = 5616 \text{ lb} \leftarrow \text{CONTROLS}$$

$$P_E = 4231 \text{ lb} + [(8' \times 28') \times 1.04 \text{ psf}] = 4476 \text{ lb}$$

$$V = 5616 \text{ lb} / 10' = 562 \text{ plf} < 710 \text{ plf} \quad \underline{SW3X}$$

$$\text{UPLIFT} = 562 \text{ plf} \times 11' = 6182 \text{ lb} < 8030 \text{ lb} \quad \underline{HDU11}$$
$$< 8030 \text{ lb} \quad \underline{SB1 \times 30}$$

WEST ELEVATOR WALL - MAIN FLOOR   L = 6'

$$P_W = [(18' \times 11') \times 18.5 \text{ psf}] = 3664 \text{ lb} \leftarrow \text{CONTROLS}$$

$$P_E = [(18' \times 28') \times 2.18 \text{ psf}] = 1099 \text{ lb}$$

$$V = 3664 \text{ lb} / 6' = 611 \text{ plf} < 710 \text{ plf} \quad \underline{SW3X}$$

$$\text{UPLIFT} = 611 \text{ plf} \times 11' = 6721 \text{ lb} < 9215 \text{ lb} \quad \underline{CMST12}$$

LOWER FLOOR   L = 6'

$$P_W = 3664 \text{ lb} + [(18' \times 5') \times 17.6 \text{ psf}] = 5248 \text{ lb} \leftarrow \text{CONTROLS}$$

$$P_E = 1099 \text{ lb} + [(18' \times 28') \times 1.09 \text{ psf}] = 1649 \text{ lb}$$

$$V = 5248 \text{ lb} / 6' = 881 \text{ plf} < 910 \text{ plf} \quad \underline{SW5}$$

$$\text{UPLIFT} = 6721 \text{ lb} + 881 \text{ plf} \times 10' = 15531 \text{ lb} < 16735 \text{ lb} \quad \underline{HD19}$$
$$< 21620 \text{ lb} \quad \underline{PAB9}$$

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SHEAR WALL DESIGN - WEST WALL: MAIN FLOOR   L = 9'

$P_W = 1971 \text{ lb} + [(15' \times 11') \times 18.5 \text{ psf}] = 5024 \text{ lb}$ ← CONTROLS

$P_E = 2121 \text{ lb} + [(15' \times 28') \times 2.18 \text{ psf}] = 3037 \text{ lb}$

$V = 5024 \text{ lb} / 9' = 559 \text{ plf} < 710 \text{ plf}$ SW3X

UPLIFT $= 2478 \text{ lb} + 559 \text{ plf} \times 11' = 8627 \text{ lb} < 9260 \text{ lb}$ HDU14
                                                     $< 11405 \text{ lb}$ PAB8
                                                                        $dc = 8"$

NORTH WEST WALL - UPPER FLOOR   L = 19'

$P_W = [(14' \times 5.5') \times 19.9 \text{ psf}] = 1533 \text{ lb}$

$P_E = [(14' \times 82') \times 3.57 \text{ psf}] = 4099 \text{ lb}$ ← CONTROLS

$V = 4099 \text{ lb} / 19' = 216 \text{ plf} < 230 \text{ plf}$ SW1

UPLIFT $= 216 \text{ plf} \times 11' = 2376 \text{ lb} < 3410 \text{ lb}$ (2) CS16

MAIN FLOOR   L = 19'

$P_W = [(14' \times 11') \times 18.5 \text{ psf}] + 1533 \text{ lb} = 4382 \text{ lb}$

$P_E = [(14' \times 82') \times 2.18 \text{ psf}] + 4099 \text{ lb} = 6602 \text{ lb}$ ← CONTROLS

$V = 6602 \text{ lb} / 19' = 348 \text{ plf} < 350 \text{ plf}$ SW2

UPLIFT $= 2376 \text{ lb} + 348 \text{ plf} \times 11' = 6204 \text{ lb} < 8030 \text{ lb}$ HDU11
                $3828 \text{ lb} < 4340 \text{ lb}$ 8030 lb SB1×30
                      HDU5

POST FOOTING DESIGN

$4' \times 11' = 44\,ft^2$, $\quad 44\,ft^2 \times 2.18\,psf = 96\,lb \quad$ SEISMIC LOAD

$6' \times 2' = 12\,ft^2$, $\quad 12\,ft^2 \times 18.5\,psf = 222\,lb \quad$ WIND LOAD CONTROLS

MAX POINT LOAD $= 3622\,lb$ — SEE PAGE U12

MAX MOMENT $= 222\,lb \times 10\,ft = 2220\,lb \cdot ft < 2795\,lb \quad$ <u>MPB66Z</u>

- TRY $24'' \times 24''$ $\qquad e = 2220\,lb \cdot ft / 3622\,lb = 0.61$

$L/6 = 0.33\overline{3}$ $\qquad L/6 < e < L/2$
$L/2 = 1.00$

$$q_{max} = \frac{2 \times 3622\,lb}{3 \times 2' \times \left(\frac{2'}{2} - 0.61\right)} = 3096\,psf \quad \times$$

- TRY $30'' \times 30''$ $\qquad L/6 = 0.417, \quad L/2 = 1.25, \quad L/6 < e < L/2$

$$q_{max} = \frac{2 \times 3622\,lb}{3 \times 2.5' \times \left(\frac{2.5}{2} - 0.61\right)} = 1510\,psf < 2000\,psf \quad \checkmark$$

- USE $30'' \times 30'' \times 12''$ DEEP FOOTINGS MIN.

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FOUNDATION PLAN
1/8" = 1'-0"

KEY PLAN
CALCULATION PAGES NOTED IN BLUE

KEY PLAN

MAIN FLOOR FRAMING
1/4" = 1'-0"

BEAM CALCULATION PAGES NOTED IN BLUE
SHEAR WALL CALC. PAGES NOTED IN GREEN

30"×30"×12" DEEP CONCRETE FOOTINGS W/ MPB66Z POST BASE FOR 6×6 POST, REINFORCE FOOTING & PLINTH PER L10 DETAIL F12

4" S.O.G.

4×8 HF #2 HEADER
24'-7"

(2) 1¾×16 LVL - FLUSH (2) CASES

5¼×16 PSL CANTILEVER 3' MAX ALIGN W/ SHEAR WALL ENDS @ SOUTH (3) CASES

(3) CASES
DTT2Z TO BEAM END

16" TJI 560 @ 16" O.C. CANTILEVER 3' MAX   M1

5¼×16 PSL CANTILEVER 3' MAX ALIGN W/ POST @ SOUTH   M5

SW3x(10') L8

16" TJI 110 @ 16" O.C. U2 TYPICAL, 21' SPAN MAX

HDU5

U2
5½×12 GLB
U8

U2

HDU11 w/ SB 1 × 30 ANCHOR

SW3 (15.5) L7

SW3 (11') L3

GLB BELOW JOISTS   U7

M12
6×6 POST
5½×12 GLB

6×6 POST, TRIM TO FIT 18" GLB, ENSURE THAT STRAPS FROM POST ABOVE ATTACH TO POST W/ MIN. END LENGTH

M11

HDU8
HDU5
5½×13½ GLB

M17
5.5×13.5 GLB

U8

U2

L7
SW3 (8')

HDU5

U2

P.T. 2×12 DF #2 @ 12" O.C. M13 W/ LUS210 HANGERS EACH END

6×6
6×6

M13
DECK w/ PT STRUCTURE

5.5×18 P.T. GLB CANTILEVER 4' MAX M15 BACKSPAN 12' MIN

M16
M16

6×6 P.T. DF #2 POST w/ PC6Z CAP & PB66 BASE M16

5.5×18 P.T. GLB W/ HUCQ 612-SDS M14 HANGERS EACH END

6×6 P.T. DF #2 POST w/ PC6Z CAP & PB66 BASE M16

M5
M1

M6 & M7
7×16 PSL CANTI 3' MAX
M3 & M3

M3 & M3

3' CANTILEVER

6×6 POST
M4
M10
M8 & M9
M10

M11
ELEV.

SW5 (6') L8

HUC616 HANGER
5½×16½ GLB HEADER M4

HU414-2 HANGER
3½×16 PSL RIM JOIST FULL LENGTH

HUC616 HANGER FROM BEAM TO RIM JOIST (3) CASES

5½×18 GLB HEADER W/ 6×6 DF #1 POST EACH END M8 & M9 ECCQ66-SDS POST CAP EACH END

6×6 P.T. DF #2 POST W PC6Z CAP & PB66 BASE M16

P.T. 2×12 DF #2 LEDGER W/ (3) ¼×3½ SDS SCREWS @ 16" O.C.

8'-0"
28'-0"
4'-0"
28'-0"
24'-0"
3'-0"

TYPICAL NOTES:
1. DENOTES "STRAP FROM SHEAR WALL ABOVE"
2. DENOTES "1¾"×16" LVL @16" O.C. CANTILEVER 6' MAX" L3
3. DENOTES "(2)H8 TIES FROM CANTILEVER BEAM TO HEADER"
4. DENOTES "DTT2Z PAIR PER DECK END DETAIL"
5. DENOTES "HDU14 PAIR TO 6×6 POSTS"

(2)2×8 HF#2 HEADER

R7

6×6)8E PSL POST FULL HEIGHT

HDU14 w/ PAB 8 TO 6×6 POST

L2 SW3 (3')

(2)2×8 HF#2 HEADER
24'-7"
HDU8 w/ SB⅞×24 ANCHOR

CS16 STRAP BEAM TO POST

6×6 w/ LCE4 POST CAP

3½×16 GLB FLUSH U12

U12
FLUSH FRAME BEAM

6×6 w/ LCE4 POST CAP

MANUFACTURED TRUSSES @ 24" O.C.

16' roof trusses @24" o/c

5½×13½ GLB, CS16 STRAP TO 6×6 POSTS

SW3 (3') L2

U16 & U17

HDU8 w/ SB⅞×24 ANCHOR TO 6×6 POST

CONNECT SHEAR WALL TO FULL HEIGHT STEM WALL FOR (12') PER THE SHEAR WALL SCHEDULE

OPEN

HDU5

SW3X(8') L7

HDU5

L7

U1

16" TJI 560 @16" O.C.

(5)

SW2 (11')

L9

(2)2×8 HF#2 HEADER

U6

HDU14 w/ PAB8 ANCHOR

L9 SW3X(4')

6×6 POST

U1

HDU14 w/ PAB3½ ANCHOR

(2)2×8 HF#2 HEADER

U6

(2)1¾×16 LVL FLUSH

16" floor joists

CMST12

L8 SW3X(6')

U20

OPEN

CMST12

"DS"(14')

U6

5½×12 GLB HEADER

6×10 HF#2

U4

U5

8' CANTILEVER

MSTC48B3 TO RIM JOIST BELOW

L5 SW1 (5.75')

L5 SW1 (4.25')

SW2 (15') AROUND OPENING L4

HDU8 w/ SB⅞×24 ANCHOR

CONNECT SHEAR WALL TO FULL HEIGHT STEM WALL FOR (15.00') PER THE SHEAR WALL SCHEDULE

L7
SW3 (13')

U21

U2

"DS"(8')

L7

6×6 POST

U30

GLB BELOW POSTS U7

(2)1¾×16 LVL

"DS"(14')
CMST14

U2

U3

(2)

(2)2×8 HEAD HEADER

(3)CS16

"DS"(14')

6×6 w/ LCE4 U14

U13

U2

U8
5½×12 GLB

ALIGN 1¾×16 LVL w/ DRAG STRUT

"DS"(8')

5.5×13.5 GLB U7

HUCQ612-SDS

6×6 POST U9

HUCQ612-SDS

5½×12 GLB U8

"DS"(8')

U18 & U19

"DS"(82')

(3)CS16

6×6 POST U14

U13

U2

SW1 (28') L3

16" TJI 110 @ 16" O.C. TYPICAL, 21' SPAN MAX

U2

(2) CS16

5½×13½ GLB, CS16 STRAP TO 6×6 POST EACH END U18 & U19

OVERFRAME

5½×12 GLB CANTILEVER 5' MAX BACKSPAN 12' MIN (2 CASES) U10 & U11

U15

6×6 POST w/ AC6 CAP

U10
U11

6×6 POST w/ AC6 CAP U15

MANUFACTURED TRUSSES @ 24" O.C.

16' roof trusses @24" o/c

EXTENT OF CONT. FLOOR DIAPHRAGM

EXTENT OF ROOF OVERFRAMING

2) OVERFRAMING, 45 MIN.

CONTINUATION OF FLOOR DIAPHRAGM

5¼×11⅞ PSL w/ HUCQ612-SDS HANGERS U13

UPPER FLOOR FRAMING
¼"=1'-0"

FLUSH FRAME BEAM

1'-0" 1'-0" 1'-0"

16" ROOF TRUSSES

TYP PORCH ROOF FRAMING
¼"=1'-0"

TYPICAL NOTES CONTINUED:
6. DENOTES "HDU14 w/ PAB8 ANCHOR TO 6×6 POST"
7. DENOTES "HDU11 w/ SB1×30 ANCHOR TO 6×6 POST"
8. DENOTES "HD19 w/ PAB7 ANCHOR TO 6×6 DF#2 POST"

UPPER FLOOR FRAMING
KEY PLAN
BEAM CALC PGS. NOTED IN BLUE
SHEAR WALL CALC. PAGES NOTED IN GREEN

ROOF FRAMING

KEY PLAN

BEAM CALC. PAGES NOTED IN BLUE
SHEAR WALL CALC. PAGES NOTED
IN GREEN

NOTE: "TSW" DENOTES:
ALIGN TRUSS W/ DESIGNATED
SHEAR WALL, NAIL & SHEATH
PER NOTE "TSW" IN THE
STRUCTURAL NOTES

NOTE: "DS"(x') DENOTES:
HORIZONTAL CMSTC'6 DRAG
STRUT (x') FT LONG PER
NOTE "DS" IN THE STR NOTES