## **Structural Calculations Cover Sheet**

Date:

Project Number:2019.089Project Name:4270 Ardekani

January 3<sup>rd</sup> 2020

REVISED 6/4/21

**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 Peak Ground A PGA 1 sec =	Per ASCE 7-10 Section 12 Accelerations (PGA) based on OSHPD, by Lat/Lon. 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	fc=2,500 psi; 5-	1/2 sack	mix, or alternate mix pre-approved by bldg. dept.						
Reinforcing	Grade 40 or 60;	Fy=40,00	00 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 simp	ole span b	eams, 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 ho	ld down b	oolts, F1554 Anchor Bolts, A307 other bolts						

CONSULTING STRUCTURAL ENGINEERING SERVICES, INC. 6311 - 17th Avenue NE, Seattle WA 98115 (206) 527-1288 email john@cses-engineering.com Structural Engineering Consulting and Design

page f-28 added 7/6/21



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

PASSED R1



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)	5013 @ 12' 4 1/2"	10725 (3.00")	Passed (47%)		1.0 D + 1.0 S (All Spans)
Shear (lbs)	4607 @ 1' 3"	13409	Passed (34%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	16086 @ 5' 10"	30360	Passed (53%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.195 @ 6' 2"	0.245	Passed (L/753)		1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.307 @ 6' 2"	0.613	Passed (L/479)		1.0 D + 1.0 S (All Spans)

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

Deflection criterla: LL (L/600) and TL (L/240).

• Top Edge Bracing (Lu): Top compression edge must be braced at 12' 6" o/c based on loads applied, unless detailed otherwise.

• Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' 6" o/c based on loads applied, 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.

	Bearing Length			Loads to Supports (lbs)			
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Trimmer - SPF	3.00"	3.00"	1.50"	1782	3075	4857	None
2 - Trimmer - SPF	3.00"	3.00*	1.50"	1817	3195	5012	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	30.0	Default Load
2 - Uniform (PSF)	0 to 3'	4'	16.0	30.0	
3 - Point (lb)	3'	N/A	775	1350	

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



## Roof, R2 6' Header 1 piece(s) 6 x 10 Hem-Fir No. 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)	2734 @ 1 1/2"	6683 (3.00")	Passed (41%)		1.0 D + 1.0 S (All Spans)
Shear (lbs)	1858 @ 1' 1/2"	5608	Passed (33%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-ibs)	4108 @ 3' 3"	5352	Passed (77%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.043 @ 3' 3"	0.208	Passed (L/999+)		1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.067 @ 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 based on loads applied, unless detailed otherwise.

• Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 6' 6" o/c based on loads applied, unless detailed otherwise.

Applicable calculations are based on NDS.

	Bearing Length			Loadst	o Supports	NOT REPORT	
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Trimmer • SPF	3.00"	3.00"	1.50"	979	1755	2734	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	979	1755	2734	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	30.0	Default Load

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



## Roof, R3 6' Header @ Girder Truss 1 piece(s) 6 x 12 Hem-Fir No. 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 (Pattorn)
Member Reaction (lbs)	3227 @ 1 1/2"	6683 (3.00")	Passed (48%)		
Shear (lbs)	2208 @ 1' 2 1/2"	6789	Passed (33%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-Ibs)	5635 @ 3' 3"	7842	Passed (72%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.029 @ 3' 2 1/16"	0.208	Passed (L/999+)		1.0  D + 1.0  S (All Spans)
Total Load Defl. (in)	0.046 @ 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 esign Methodology : ASD

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

Top Edge Bracing (Lu): Top compression edge must be braced at 6' 6" o/c based on loads applied, unless detailed otherwise.

Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 6' 6" o/c based on loads applied, unless detailed otherwise.

Applicable calculations are based on NDS.

	Bearing Length			Loads to Supports (lbs)			States and the second
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Trimmer - SPF	3.00"	3.00"	1.50"	1163	2064	3227	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	785	1356	2141	None

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 6"	N/A	16.0		Contraction of the second second second
1 - Uniform (PSF)	0 to 3' 3"	18'	16.0	30.0	Default Load
2 - Uniform (PSF)	3' 3" to 6' 6"	4'	16.0	30.0	Sciuli Looo
3 - Point (Ib)	3' 3"	N/A	700	1275	

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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		Weyerhaeuser

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





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

Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
6837 @ 1 1/2"	9844 (3.00")	Passed (69%)		1.0 D + 1.0 S (All Spans)
5501 @ 1' 5"	16342	Passed (34%)	1.15	1.0 D + 1.0 S (All Spans)
23936 @ 7' 3"	46854	Passed (51%)	1.15	1.0 D + 1.0 S (All Spans)
0.256 @ 7' 3"	0.285	Passed (L/669)		1.0 D + 1.0 S (All Spans)
0.402 @ 7' 3"	0.712	Passed (L/425)		1.0 D + 1.0 S (All Spans)
	Actual @ Location       6837 @ 1 1/2"       5501 @ 1' 5"       23936 @ 7' 3"       0.256 @ 7' 3"       0.402 @ 7' 3"	Actual @ Location     Allowed       6837 @ 1 1/2"     9844 (3.00")       5501 @ 1' 5"     16342       23936 @ 7' 3"     46854       0.256 @ 7' 3"     0.285       0.402 @ 7' 3"     0.712	Actual @ Location     Allowed     Result       6837 @ 1 1/2"     9844 (3.00")     Passed (69%)       5501 @ 1' 5"     16342     Passed (34%)       23936 @ 7' 3"     46854     Passed (51%)       0.256 @ 7' 3"     0.285     Passed (L/669)       0.402 @ 7' 3"     0.712     Passed (L/425)	Actual @ Location     Allowed     Result     LDF       6837 @ 1 1/2"     9844 (3.00")     Passed (69%)        5501 @ 1 5"     16342     Passed (34%)     1.15       23936 @ 7' 3"     46854     Passed (51%)     1.15       0.256 @ 7' 3"     0.285     Passed (L/669)        0.402 @ 7' 3"     0.712     Passed (L/425)

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

Deflection criteria: LL (L/600) and TL (L/240).

Top Edge Bracing (Lu): Top compression edge must be braced at 14' 6" o/c based on loads applied, unless detailed otherwise.

Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 14' 6" o/c based on loads applied, unless detailed otherwise.

Sale and the second second	Bearing Length			Loads	to Supports		
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Trimmer - SPF	3.00"	3.00"	2.08"	2487	4350	6837	None
2 - Trimmer - SPF	3.00"	3.00"	2.08"	2487	4350	6837	None

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 14' 6"	N/A	23.0		
1 - Uniform (PSF)	0 to 14' 6"	20'	16.0	30.0	Default Load

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





Roof, R5 9' Header



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)	4427 @ 1 1/2"	10725 (3.00")	Passed (41%)		1.0 D + 1.0 S (All Spans)
Shear (lbs)	3495 @ 1'	10057	Passed (35%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	9968 @ 4' 9"	17078	Passed (58%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.164 @ 4' 9"	0.308	Passed (L/675)		1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.255 @ 4' 9"	0.463	Passed (L/435)		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 9' 6" o/c based on loads applied, unless detailed otherwise.

Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 9' 6" o/c based on loads applied, 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		
	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Trimmer - SPF	3.00"	3.00"	1.50"	1577	2850	4427	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	1577	2850	4427	None

			Dead	Snow	1	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(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	30.0	Default Load	

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



Roof, R6 sistered cantilever joist 1 piece(s) 4 x 8 Hem-Fir No. 2 @ 24" OC

# ROOF OVERHANG Overall Length: 6' 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)	384 @ 4' 5 1/4"	4961 (3.50")	Passed (8%)		1.0 D + 1.0 S (All Spans)
Shear (Ibs)	220 @ 5' 2 1/4"	2918	Passed (8%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-Ibs)	-402 @ 4' 5 1/4"	3734	Passed (11%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.014 @ 6' 7"	0.200	Passed (2L/999+)		1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.021 @ 6' 7"	0.215	Passed (2L/999+)		1.0 D + 1.0 S (All Spans)
TJ-Pro™ Rating	N/A	N/A	N/A		N/A

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

Overhang deflection criteria: LL (2L/0.2") and TL (2L/240).

· Allowed moment does not reflect the adjustment for the beam stability factor.

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.

Supports	1	Bearing Length			to Supports	and States and	8.78	
	Total	Available	Required	Dead	Snow	Total	Accessories	
1 - Stud wall - SPF	3.50"	2.25"	1.50"	-33	-62	-95	1 1/4" Rim Board	
2 - Stud wall - SPF	3.50"	3.50"	1.50"	134	251	385	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.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 6" o/c	
Bottom Edge (Lu)	6' 6" o/c	
Maximum alloughle headen inter-	als based as see field band	

Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	4' 6" to 6' 7"	24"	16.0	30.0	Default Load
2 - Point (PLF)	6' 6"	24"	16.0	30.0	

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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	



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



## Roof, Floor: Drop Beam

## 1 piece(s) 7" x 16" 2.0E Parallam® PSL





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)	8954 @ 4"	16363 (5.50")	Passed (55%)		1.0 D + 1.0 S (All Spans)		
Shear (Ibs)	7490 @ 1' 9 1/2"	24901	Passed (30%)	1.15	1.0 D + 1.0 S (All Spans)		
Moment (Ft-Ibs)	46120 @ 10' 11 1/2"	80396	Passed (57%)	1.15	1.0 D + 1.0 S (All Spans)		
Live Load Defl. (in)	0.519 @ 10' 11 1/2"	0.708	Passed (L/491)		1.0 D + 1.0 S (All Spans)		
Total Load Defl. (in)	0.832 @ 10' 11 1/2"	1.063	Passed (L/307)		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).

Allowed moment does not reflect the adjustment for the beam stability factor.

· Member should be side-loaded from both sides of the member or braced to prevent rotation.

Supports		Bearing Length			to Supports			
	Total	Available	Required	Dead	Snow	Total	Accessories	
1 - Stud wall - SPF	5.50"	5.50"	3.01"	3365	5589	8954	Blocking	
2 - Stud wall - SPF	5.50"	5.50"	3.01"	3365	5589	8954	Blocking	

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	21' 11" o/c	
Bottom Edge (Lu)	21' 11" o/c	
Maria allocation in the	all have done of the state of	

Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 21' 11"	N/A	35.1		
1 - Uniform (PSF)	0 to 21' 11" (Front)	17'	15.0	30.0	

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



John S. Apolis, P.E.		CSES, I	nc.	Job	number:	2019.089
Project: 4270 Ardekani					Date:	9-Dec-19
Architect:				Page	e number:	R8
Post Design (Con	bined Ax	ial and	Moment	t Loadin	g)	
2015 INT. Building C	Code (IBC)				8/	2015 NDS
Beam Description:		Exterior P	ost @ Sout	h		
			0	Enter '1' fo	or wind load:	1
			Enter	'l' for repetit	tive member:	
				Enter '1	' for wet use:	
Geometry and loads:						
Height	8	ft		w(d)	140.0	plf
Р	6086	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	Х	5.5
				ь		d
Nember properties:	27.7	:- ^2	Variab	les:	4.10	
Section Modulus (d):	27.7	in^2	RD(d)		4.18	
Section Modulus (b): Section Area:	30.3	in^2	c (b)		4.18	
Member stresses	Provided				Dequined	
FcF(d)	1268	nsi	>	fe	201	nsi
FcE(b)	1268	psi		fe	201	psi
FbE	32313	psi	>	fb(d)	485	psi
FbE	32313	psi >	*1	fb(b)	0	psi
Bending and Axial Compres	sion Check:					
NDS 2010 EQ 3.9-3			0.63	<	1.0	

John S. Apolis, P.E.		CSES, Inc.		Job n	umber:	2019.089
Project:	4270 Arde	kani			Date:	9-Dec-19
Architect:				Page n	umber:	R9
Post Design (Com	bined Ax	ial and Mo	ment	Loading)		
2015 TAT Building (	ode (TBC)	ADDA DOARDA ITAN		(Louding)		2015 NDS
Ream Description:	(10°C)	Poete @ Stair	Openin	a Exterior		2010 1100
beam bescription.		i osis @ Stall	openin	Enter 'l' for w	ind load.	1
			Enter	'l' for repetitive	member:	1
			2.1.1	Enter '1' for	wet use:	
Geometry and loads:						
Height	20	ft		w(d)	52.0	plf
Р	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
Colorted Member	1 OF DOI			5.5		5.5
Selected Wiember:	1.6E PSL			5.5 X		3.3
Mambaumanautian			Variah	b		d
Section Modulus (d):	27.7	in^2	Rh(d)	ies:	6.61	
Section Modulus (d).	27.7	in^3	Rb(b)		6.61	
Section Area:	20.3	in^2	RU(U)		0.01	
Section Area.	50.5	111 2	C		0.0	
Member stresses:	Provided			Re	quired	
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 Compres	sion Check:				1000000000	
NDS 2010 EQ 3.9-3		0.6		<	1.0	

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



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		

• 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<sup>™</sup> Rating include: None.

Supports	Bearing Length			Loads	to Supports (	Contraction of the		
	Total	Available	Required	Dead	Floor Live	Total	Accessories	
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



ForteWEB Software Operator	Job Notes	
Brett Johnson CSES	2014.089	
(253) 579-2158 Brett.ajohnson@yahoo.com	4270	

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



## Upper, U2 Upper Floor Joists Typical 1 piece(s) 16" TJI® 110 @ 16" OC





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-Ibs)	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<sup>™</sup> Rating include: None.

States and states and states	E	Bearing Length			to Supports (	Markey Constraints	
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
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

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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) 529-2158	2019.089	
Brett.ajohnson@yahoo.com	4270	

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## Upper, U3 Upper Floor Joists Cantilever 1 piece(s) 1 3/4" x 16" 2.0E Microllam® LVL @ 16" OC



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		

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<sup>™</sup> Rating include: None.

	No. 17	Bearing Length			to Supports		
Supports	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

· 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

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



(B) SUSTAINABLE FORESTRY INITIATIVE

ForteWEB Software Operator Job Notes Brett Johnson 2019.089 CSES (253) 579-2158 Brett.ajohnson@yahoo.com 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 Page 1 / 1

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

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





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)

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.

and a strange	Bearing Length			Loads	to Supports (		
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
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

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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	2019. OBA	
Brett.ajohnson@yahoo.com	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 Page 1 / 1

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



## Upper, U5 6' Header 1 piece(s) 6 x 10 Hem-Fir No. 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)	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)

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 (		
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
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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(8) SUSTAINABLE FORESTRY INITIATIVE

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

ForteWEB Software Operator	Job Notes	
Brett Johnson CSES (253) 579-2158	2019.089	
Brett.ajohnson@yahoo.com	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 Page 1 / 1



## Upper, U6 Typical Header 2 piece(s) 2 x 8 Hem-Fir No. 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)

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.

	Bearing Length			Loads	to Supports (	Per la constanció	
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
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



(B) SUSTAINABLE FORESTRY INITIATIVE

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

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

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Upper, U7 West Floor Beam 1 piece(s) 5 1/2" x 13 1/2" 24F-V4 DF Glulam





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)	

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.

	1	Bearing Length			to Supports (		100	
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories	
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

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



SUSTAINABLE FORESTRY INITIATIVE

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

12/9/2019 5:53:26 AM UTC ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2 File Name: 4270 Ardekani Page 1 / 1

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



## Upper, U8 East Floor Beam 1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam



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.

		Bearing Leng	th	Loads	to Supports (	(lbs)	No. C. States	
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories	
1 - Stud wall - SPF	5.50"	5.50"	2.03"	1184	3550	4734	Blocking	
2 - Hanger on 12" SPF beam	5.50"	Hanger <sup>1</sup>	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-T	ie					
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	2019.089	
Brett.ajohnson@yahoo.com	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 Page 1 / 2

John S. Apolis, P.E.		CSES, Inc.			Job num	ber:	20	019.089
Project:	4270 Arde	kani			Ι	Date:	8	-Dec-19
Architect:				P	age num	ber:		U9
Post Design (Con	hined Ax	ial and M	omen	t Load	ling)			
2015 TNT Building	Tode (TRC)							2015 NDS
Ream Description:		Intonion Doct						2015 1105
Dealli Description.		Interior Post		Enton	111 for mind	lead		
			Enter	·'l' for re	1 IOF WIND	mbor		
			Lincer	Fnt	ter 'l' for w	of use		
				LI	101 101 101	t use.		
Geometry and loads:								
Height	8	ft			w(d)	0.0	plf	
P	12000	lbs			w(b)	0	plf	
Le(d)	8	ft		I	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
Colostad Mamban	LIE#2			5 5				5.5
Selected Member:	ΠΓ#2			5.5	X			5.5
Mambaumantian			*7	Ь				d
Section Modulus (d):	27.7	in^3	Rb(d)	nes:		4 18		
Section Modulus (b):	27.7	in^3	Rb(b)			4.18		
Section Area:	30.3	in^2	C (0)			0.8		
Section Area.	50.5	111 2				0.0		
Member stresses:	Provided				Requi	red		
FcE(d)	1268	psi >			fc	397	psi	
FcE(b)	1268	psi >			fc	397	psi	
FbE	32313	psi >		t	fb(d)	0	psi	
FbE	32313	psi >		i	fb(b)	0	psi	
Randing and Avial Commun	seion Charles							
NDS 2010 FO 3 9-3	SIOII CHECK:	0.2	0	<		1.0		
100 2010 20 3.9-3		0.2	V			1.0		



## Upper, U10 Case 1 Cantilever Lower Roof Beam 1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam

U10



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)	8259 @ 12' 8 1/4"	12856 (5.50")	Passed (64%)		1.0 D + 1.0 S (All Spans)
Shear (lbs)	3996 @ 11' 5 1/2"	13409	Passed (30%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-Ibs)	9704 @ 5' 9 1/16"	30360	Passed (32%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-Ibs)	-9024 @ 12' 8 1/4"	23403	Passed (39%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.121 @ 6' 3 9/16"	0.412	Passed (L/999+)		1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.172 @ 6' 2 5/16"	0.618	Passed (L/861)		1.0 D + 1.0 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 17" 11" o/c based on loads applied, unless detailed otherwise.

Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 17' 11" o/c based on loads applied, unless detailed otherwise.

Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 10' 10 1/8".

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.

	1	Bearing Leng	th	Loads t	to Supports	(lbs)	and the states
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Stud wall - SPF	5.50"	5.50"	1.63"	1297	2502	3799	Blocking
2 - Stud wall - SPF	5.50"	5.50"	3.53"	3004	5255	8259	Blocking

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

			Dead	Snow	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(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	30.0	Default Load

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Weverhaeuser

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	



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



## 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)

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 t	o Supports		
	Total	Available	Required	Dead	Snow	Total	Accessories
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	

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



(3) SUSTAINABLE FORESTRY INITIATIVE

12/9/2019 7:26:26 PM UTC ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2 File Name: 4270 Ardekani Page 1 / 1

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

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



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-Ibs)	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

PASSED

1112

• 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.

	I	Bearing Length			to Supports		
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
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

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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	2014.084			
(253) 579-2158 Brett.ajohnson@yahoo.com	4270			

12/9/2019 7:34:54 PM UTC ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2 File Name: 4270 Ardekani Page 1 / 1





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)

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.

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

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



(8) SUSTAINABLE FORESTRY INITIATIVE

ForteWEB Software Operator	Job Notes				
Brett Johnson CSES (553) 570-2158	2019.089				
Brett.ajohnson@yahoo.com	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 Page 1 / 1

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

John S. Apolis, P.E.		J	ob numb	per:	2019.089				
Project:	4270 Arde	kani			Da	ate:	9-Dec-19		
Architect:				Pa	ge numb	ber:	U14		
Post Design (Combined Axial and Moment Loading)									
2015 INT. Building Code (IBC) 2015 NDS									
Beam Description:		Exterior Post	a South	h					
1			0	Enter '1	' for wind l	oad:	1		
			Enter	'l' for repo	etitive mem	ber:			
				Ente	r 'l' for <u>wet</u>	use:			
Geometry and loads:									
Height	8	ft		W	(d) 1	40.0 p	olf		
P	11000	lbs		W	(b)	0 p	olf		
		0				0.4			
Le(d)	8	ft		Le	:(b)	8 1	t		
Material Properties:									
Fb1	850	psi	Fb(d)'		9	77.5 p	osi		
Fb2	850	psi	Fb(b)'		9	77.5 p	osi		
Fc	1300	psi	Fc'			944 I	osi		
E	1.3	x10^6psi	E'			1.3 >	(10^6psi		
Emin	0.47	x10^6psi	Emin'			0.47 >	(10^6psi		
Selected Member:	HF#2			5.5	х		5.5		
				ь			] d		
Member properties:			Variab	les:					
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	с			0.8			
Member stresses:	Provided				Require	ed			
FcE(d)	1268	psi >			fc	364 p	osi		
FcE(b)	1268	psi >			fc	364 p	osi		
FbE	32313	psi >		fb	(d)	485 p	osi		
FbE	32313	psi >		fb	(b)	0 1	osi		
Bending and Axial Compre	ssion Check:								
NDS 2010 EQ 3.9-3		0.84	4	<		1.0			

John S. Apolis, P.E. Project:	4270 Arde	CSES, Inc. kani		Job r	Date:	<b>2019.089</b> 9-Dec-19
Post Design (Con	bined Ax	ial and Mo	ment	Loading	)	
2015 INT. Building C	Code (IBC)					2015 NDS
Beam Description:		Exterior Post (	a) South	n East		
				Enter '1' for	wind load:	1
			Enter	'1' for repetitive	e member:	
				Enter '1' fo	or wet use:	
Geometry and loads:	10	۵		nu(d)	10.0	alf
Height	7500	π lbc		w(a)	10.0	plf
P	7500	105		w(0)	0	рп
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
Emin	1.3	x10^6psi	E'		1.3	x10°6psi
Emm	0.47	xio opsi	Cum		0.47	xio opsi
Selected Member:	HF#2			5.5 x		5.5
				b		d
Member properties:			Variab	les:		
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	с		0.8	
Member stresses:	Provided			R	equired	
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
Rending and Avial Commun	scion Charles					
NDS 2010 EQ 3.9-3	SION CHECK.	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

PASSED



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)	8526 @ 4"	12856 (5.50")	Passed (66%)		1.0 D + 1.0 S (All Spans)
Shear (Ibs)	6930 @ 1' 7"	15085	Passed (46%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-Ibs)	33273 @ 8' 5 1/2"	38424	Passed (87%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.487 @ 8' 5 1/2"	0.542	Passed (L/400)		1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.779 @ 8' 5 1/2"	0.813	Passed (L/250)		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 16' 11" o/c based on loads applied, unless detailed otherwise.

· Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 16' 11" o/c based on loads applied, 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.

	Bearing Length			Loads to Supports (lbs)					
Supports	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	Accessories
1 - Beam - SPF	5.50"	5.50"	3.65"	3198	677	5329	552/-552	9756/- 552	None
2 - Beam - SPF	5.50"	5.50"	3.65"	3198	677	5329	1131/-1131	10335/- 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	-	30.0		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

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Weyerhaeuser

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



## 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



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)	9218 @ 16' 7 1/2"	14025 (6.00")	Passed (66%)	-	1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	6930 @ 1' 7 1/2"	15085	Passed (46%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	33273 @ 8' 6"	38424	Passed (87%)	1.15	1.0 D + 1.0 S (All Spans)
Neg Moment (Ft-Ibs)	-391 @ 15' 3"	41209	Passed (1%)	1.60	0.6 D + 0.7 E (All Spans)
Live Load Defl. (in)	0.487 @ 8' 6"	0.542	Passed (L/400)		1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.779 @ 8' 6"	0.813	Passed (L/250)		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 based on loads applied, unless detailed otherwise.

Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 17' o/c based on loads applied, 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.

	Bearing Length			Loads to Supports (lbs)					Service Contraction
Supports	Total	Available	Required	Dead	Floor Live	Snow	Selsmic	Total	Accessories
1 - Beam - SPF	6.00"	6.00"	3.67"	3213	680	5355	1392/-1392	10640/- 1392	None
2 - Beam - SPF	6.00"	6.00"	3.94"	3213	680	5355	2816/-2816	12064/- 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		30.0		Default Load
2 - Uniform (PSF)	0 to 17' (Front)	2'	12.0	40.0	•	•	
3 - Point (lb)	4' 3" (Front)	N/A	25	-	-	-4208	2.5 x UPLIFT See Page L2
4 - Point (lb)	8' 3" (Front)	N/A		-	3	4208	2.5 x UPLIFT See Page L2
5 - Point (lb)	15' 3" (Front)	N/A		-		-4208	2.5 x UPLIFT See Page L2

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Weyerhaeuser

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



## 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



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)	8526 @ 4"	12856 (5.50")	Passed (66%)		1.0 D + 1.0 S (All Spans)
Shear (lbs)	6930 @ 1' 7"	15085	Passed (46%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-Ibs)	33273 @ 8' 5 1/2"	38424	Passed (87%)	1.15	1.0 D + 1.0 S (All Spans)
Neg Moment (Ft-Ibs)	-1263 @ 8' 6"	41209	Passed (3%)	1.60	0.6 D - 0.7 E (All Spans)
Live Load Defl. (in)	0.535 @ 8' 5 1/2"	0.542	Passed (L/365)		1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.827 @ 8' 5 1/2"	0.813	Passed (L/236)		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 based on loads applied, unless detailed otherwise.

Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 16' 11" o/c based on loads applied, 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.

	Bearing Length			Loads to Supports (lbs)					
Supports	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	Accessories
1 - Beam - SPF	5.50"	5.50"	3.65"	3198	677	5329	1531/-1531	10735/- 1531	None
2 - Beam - SPF	5.50"	5.50"	3.65"	3198	677	5329	1546/-1546	10750/- 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		30.0	-	Default Load
2 - Uniform (PSF)	0 to 16' 11" (Front)	2'	12.0	40.0	-	-	
3 - Point (Ib)	8' 6" (Front)	N/A	•			3077	UPLIFT See Page L4 (TOP)

## Member Notes

1546 lb < 1705 lb CS16 Strap

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Weyerhaeuser

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





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





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)	9765 @ 4 1/2"	14025 (6.00")	Passed (70%)		1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (Ibs)	6893 @ 1' 8"	15644	Passed (44%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-Ibs)	46485 @ 8' 6"	57493	Passed (81%)	1.60	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Neg Moment (Ft-Ibs)	-14377 @ 8' 6"	44318	Passed (32%)	1.60	0.6 D - 0.7 E (All Spans)
Live Load Defl. (in)	0.645 @ 8' 6"	0.542	Failed (L/302)		1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.907 @ 8' 6"	0.813	Failed (L/215)		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).

Deflection criteria: LL (L/360) and TL (L/240).
Top Edge Bracing (Lu): Top compression edge must be braced at 17' o/c based on loads applied, unless detailed otherwise.
Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 17' o/c based on loads applied, 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.

and the second second second	Bearing Length			Loads to Supports (lbs)					State State	
Supports	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	Accessories	
1 - Beam - SPF	6.00"	6.00"	4.18"	3219	680	5355	3847/-3847	13101/- 3847	None	
2 - Beam - SPF	6.00"	6.00"	4.18"	3219	680	5355	3847/-3847	13101/- 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	-	30.0		Default Load
2 - Uniform (PSF)	0 to 17' (Front)	2'	12.0	40.0	-		
3 - Point (lb)	8' 6" (Front)	N/A		-	-	7693	2.5x UPLIFT See Page L4 (TOP)

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Weyerhaeuser

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







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)

· 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.

	1	Bearing Leng	Loads	to Supports (	Contraction of the		
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
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

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

ForteWEB Software Operator	Job Notes	
Brett Johnson CSES (252) 570-2158	2019.089	
Brett.ajohnson@yahoo.com	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



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)

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.

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

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



(B) SUSTAINABLE FORESTRY INITIATIVE

ForteWEB Software Operator	Job Notes	
Brett Johnson CSES (253) 579-2158	2014.089	
Brett.ajohnson@yahoo.com	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

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



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





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)	3153 @ 3' 2 3/4"	3973 (5.25")	Passed (79%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	2195 @ 3'	3117	Passed (70%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-Ibs)	-6836 @ 3' 2 3/4"	14864	Passed (46%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.202 @ 0	0.200	Passed (2L/382)		1.0 D + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.285 @ 0	0.323	Passed (2L/272)		1.0 D + 0.75 L + 0.75 S (Alt Spans)
TJ-Pro <sup>™</sup> Rating	44	40	Passed		

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 based on loads applied, unless detailed otherwise.

Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 8' o/c based on loads applied, 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 nalled down.

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

		Bearing Leng	th		Loads to Supp	and the second second		
Supports	Total	Available	Required	Dead	Floor Live	Snow	Total	Accessories
1 - Stud wall - SPF	5.50"	5.50"	3.50"	1089	1626	1127	3842	Blocking
2 - Stud wall - SPF	5.50"	5.50"	1.75"	86	642/-112	-137	728/- 249	Blocking

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

			Dead	Floor Live	Snow	1882.02
Vertical Loads	Location (Side)	Spacing	(0.90)	(1.00)	(1.15)	Comments
1 - Uniform (PSF)	0 to 26' 11"	16"	12.0	40.0	-	Default Load
2 - Point (lb)	0	N/A	528	-	990	Roof
3 - Point (lb)	0	N/A	216	720	-	Floor

Web stiffeners required at location 0 due to loads.

#### Weyerhaeuser Notes

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LEDGER DESIGN: 11.5' × (40 PS+ + 12 PS+) = 600 PIF 600 PIF < (2 × 670 16)/ 16/12 = 1005 PIF V Z1= 670 16 31/2"HEMFER TO CONCRETE

 
 ForteWEB Software Operator
 Job Notes

 Brett Johnson CSES (253) 579-2158 Brett.ajohnson@yahoo.com
 Image: Comparison of the second secon



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



## Main, M2 Cantilever Floor Beams Case 1 1 piece(s) 5 1/4" x 16" 2.0E Parallam® PSL



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)	7202 @ 3' 2 3/4"	12272 (5.50")	Passed (59%)		1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	4387 @ 1' 8"	18676	Passed (23%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-Ibs)	-14153 @ 3' 2 3/4"	60297	Passed (23%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.186 @ 0	0.215	Passed (2L/418)		1.0 D + 0.525 E + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.230 @ 0	0.323	Passed (2L/338)	-	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

67016×2=134016 134016>120316

(2) 5/8 ANCHOR BOITS

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 based on loads applied, unless detailed otherwise.

Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 27' 5" o/c based on loads applied, unless detailed otherwise.

-208 lbs uplift at support located at 27' 1". Strapping or other restraint may be required.

	Bearing Length Loads to Supports (lbs)						Bearing Length Loads to Supports (lbs)			Loads to Supports (lbs)						
Supports	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	Accessories	14411555/10						
1 - Stud wall - SPF	5.50"	5.50"	3.23"	2430	2886	1994	2117/-2117	9427/- 2117	Blocking	1111035.5/10						
2 - Stud wall - SPF	5.50"	5.50"	1.50"	297	654/-258	-238	252/-252	1203/- 748	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 L5
3 - Point (lb)	0 (Front)	N/A	979	-	1756		Roof
4 - Point (lb)	0 (Front)	N/A	589	1820		-	Floor

#### Member Notes

2117 lb - (.25 x DL=4134 lb) = 1084 lb Uplift 1084 lb Uplift < 1420 lb (2) H8 Ties

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Weverhaeuser

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



748 16 < 3565 16 120316 553511

## FORTEWEE

MEMBER REPORT

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

An excessive uplift of support located at 3' 2 3/4" failed this product.

OK



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)	8446 @ 3' 2 3/4"	12272 (5.50")	Passed (69%)		1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	6462 @ 1' 8"	25984	Passed (25%)	1.60	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Moment (Ft-Ibs)	-20854 @ 3' 2 3/4"	83891	Passed (25%)	1.60	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.259 @ 0	0.215	Failed (2L/300)		1.0 D + 0.525 E + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.284 @ 0	0.323	Passed (2L/272)		1.0 D + 0.525 E + 0.75 L + 0.75 S (Alt

Floor Type : Drop Beam Use : Residential Code : IBC 2015 Aethodology : ASD

\_<del>EAILED<sup>2K</sup></del> M3

 Top Edge Bracing (Lu): Top compression edge must be braced at 27' 5" o/c based on loads applied, unless detailed otherwise. Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 27' 5" o/c based on loads applied, unless detailed otherwise.

-356 lbs uplift at support located at 27' 1". Strapping or other restraint may be required.

	Bearing Length				Loads to				
Supports	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	Accessories
1 - Stud wall - SPF	5.50"	5.50"	3.79"	2007	2886	1994	5294/-5294	12181/- 5294	Blocking
2 - Stud wall - SPF	5.50"	5.50"	1.50"	347	654/-258	-238	631/-631	1632/- 1127	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	-	1756		Roof	-
4 - Point (lb)	0 (Front)	N/A	215	1820			Floor	-

#### Member Notes

Shear and Moment OK by calculation for over strength factor

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

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



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)	11445 @ 4"	19663 (5.50")	Passed (58%)		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-Ibs)	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)

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

Top Edge Bracing (Lu): Top compression edge must be braced at 9' 11" o/c based on loads applied, unless detailed otherwise.

Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 9' 11" o/c based on loads applied, 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.

	Bearing Length			Loads to Supports (lbs)				State State State	
Supports	Total	Available	Required	Dead	Floor Live	Snow	Total	Accessories	
1 - Trimmer - SPF	5.50"	5.50"	3.20"	4739	6024	2917	13680	None	
2 - Trimmer - SPF	5.50"	5.50"	1.50"	2230	3029	227	5486	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 (Ib)	1'	N/A	2932	3500	3144	
3 - Uniform (PLF)	0 to 9' 11"	N/A	225.0			

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

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



## Main, M5 West Cantilever Floor Beam 1 piece(s) 7" x 16" 2.0E Parallam® PSL



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)	System : Floor
Member Reaction (lbs)	10503 @ 3' 2 3/4"	16363 (5.50")	Passed (64%)		1.0 D + 0.75 L + 0.75 S (All Spans)	Member Type : Flush Bear
Shear (Ibs)	8228 @ 1' 8"	24901	Passed (33%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)	Building Use : Residential
Moment (Ft-Ibs)	-26558 @ 3' 2 3/4"	80396	Passed (33%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)	Design Methodology : ASD
Live Load Defl. (in)	0.157 @ 0	0.200	Passed (2L/494)		1.0 D + 0.75 L + 0.75 S (Alt Spans)	besign neurodology . Hob
Total Load Defl. (in)	0.236 @ 0	0.323	Passed (2L/328)		1.0 D + 0.75 L + 0.75 S (Alt Spans)	

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 based on loads applied, unless detailed otherwise.

Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 21' 10" o/c based on loads applied, unless detailed otherwise.

-1000 lbs uplift at support located at 21' 7". Strapping or other restraint may be required.

Member should be side-loaded from both sides of the member or braced to prevent rotation.

		Bearing Length			Loads to Supp			
Supports	Total	Available	Required	Dead	Floor Live	Snow	Total	Accessories
1 - Stud wall - SPF	5.50"	5.50"	3.53"	4125	4623	3881	12629	Blocking
2 - Stud wall - SPF	5.50"	4.25"	1.50"	-97	380/-623	-581	380/- 1301	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.

		and and the second	Dead	Floor Live	Snow	12.35
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.00)	(1.15)	Comments
0 - Self Weight (PLF)	0 to 21' 9 3/4"	N/A	35.1			
1 - Uniform (PSF)	0 to 21' 11" (Front)	1'	12.0	40.0		Default Load
2 - Point (Ib)	0 (Front)	N/A	3000	3500	3300	

# SKEWED HANGER Q BACKSPAN : <u>HHUS7.25/10</u>

0.85×563516 = 478718 478916 > 130116 2745 16 7 1301 1b

1340 16 > 1301 16 (2) 5/8 "ANCHAR BALTS

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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		Weyerhaeuser

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## Main, M6 Cantilever Floor Beams Case 3 1 piece(s) 7" x 16" 2.0E Parallam® PSL





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)	11400 @ 2' 11 3/4"	16363 (5.50")	Passed (70%)		1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	8062 @ 1' 5"	24901	Passed (32%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-Ibs)	-24038 @ 2' 11 3/4"	80396	Passed (30%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.191 @ 0	0.200	Passed (2L/374)		1.0 D + 0.525 E + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.256 @ 0	0.298	Passed (2L/280)		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/0.2") and TL (2L/240).

Top Edge Bracing (Lu): Top compression edge must be braced at 27' 2" o/c based on loads applied, unless detailed otherwise.

Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 27' 2" o/c based on loads applied, unless detailed otherwise.

-382 lbs uplift at support located at 26' 10". Strapping or other restraint may be required.

Member should be side-loaded from both sides of the member or braced to prevent rotation.

Bearing Length			Loads to Supports (lbs)						
Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	Accessories	
5.50"	5.50"	3.83"	4089	4742	3537	2098/-2098	14466/- 2098	Blocking	
5.50"	5.50"	1.50"	248	654/-447	-393	233/-233	1135/- 1073	Blocking	UPLIFT
Contraction of the local division of the loc	Total           5.50"           5.50"	Bearing Leng           Total         Available           5.50"         5.50"           5.50"         5.50"	Bearing Length           Total         Available         Required           5.50"         5.50"         3.83"           5.50"         5.50"         1.50"	Bearing Length         Required         Dead           Total         Available         Required         Dead           5.50"         5.50"         3.83"         4089           5.50"         5.50"         1.50"         248	Bearing Length         Loads to           Total         Available         Required         Dead         Floor Live           5.50"         5.50"         3.83"         4089         4742           5.50"         5.50"         1.50"         248         654/-447	Bearing Length         Loads to Supports           Total         Available         Required         Dead         Floor Live         Snow           5.50"         5.50"         3.83"         4089         4742         3537           5.50"         5.50"         1.50"         248         654/-447         -393	Bearing Length         Loads to Supports (lbs)           Total         Available         Required         Dead         Floor Live         Snow         Seismic           5.50"         5.50"         3.83"         4089         4742         3537         2098/-2098           5.50"         5.50"         1.50"         248         654/-447         -393         233/-233	Bearing Length         Loads to Supports (lbs)           Total         Available         Required         Dead         Floor Live         Snow         Seismic         Total           5.50"         5.50"         3.83"         4089         4742         3537         2098/-2098         14466/- 2098           5.50"         5.50"         1.50"         248         654/-447         -393         233/-233         1135/- 1073	Bearing Length         Loads to Supports (lbs)           Total         Available         Required         Dead         Floor Live         Snow         Seismic         Total         Accessories           5.50"         5.50"         3.83"         4089         4742         3537         2098/-2098         14466/- 2098         Blocking           5.50"         5.50"         1.50"         248         654/-447         -393         233/-233         1135/- 1073         Blocking

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Seismic (1.60)	Comments	HHUS 7.25/10
0 - Self Weight (PLF)	0 to 27' 2"	N/A	35.1					
1 - Uniform (PSF)	0 to 27' 2" (Front)	1' 4"	12.0	40.0			Default Load	1741 1 > 1126 4
2 - Point (lb)	0 (Front)	N/A		-		1865	Uplift See Page L5	1370 16 - 11 55 18
3 - Point (lb)	0 (Front)	N/A	1800	-	3144	-	Roof	(2) 5/2" ANCHORS
4 - Point (lb)	0 (Front)	N/A	1150	3500			Floor	(0)/B meter

#### Member Notes

2117 lb - (.25 x DL=4134 lb) = 1084 lb Uplift 1084 lb Uplift < 1420 lb (2) H8 Ties

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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		



DOWN: 1073 16 2 3565 16

## -ORTE WEE

#### MEMBER REPORT

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

OK An excessive uplift of -1230 lb 11 3/4" failed this product.



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)	System : Floor	
Member Reaction (lbs)	13032 @ 2' 11 3/4"	16363 (5.50")	Passed (80%)		1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)	Member Type : Drop Bean Building Use : Residential	
Shear (lbs)	8044 @ 1' 5"	24901	Passed (32%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)	Building Code : IBC 2015	
Moment (Ft-Ibs)	-23984 @ 2' 11 3/4"	80396	Passed (30%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)	Design Methodology : ASC	
Live Load Defl. (in)	0.238 @ 0	0.200	Failed (21./300)		1.0 D + 0.525 E + 0.75 L + 0.75 S (Alt Spans)		
Total Load Defl. (in)	0.302 @ 0	0.298	Passed (2L/236)		1.0 D + 0.525 E + 0.75 L + 0.75 S (Alt Spans)		
<ul> <li>Deflection criteria: LL (L/360) a</li> <li>Overhang deflection criteria: LL</li> </ul>	and TL (L/240). L (2L/0.2") and TL (2L/240).	SHE	AR/MOM	ENT	OK BY CALCUL,	ATION	

FAILED M7

Top Edge Bracing (Lu): Top compression edge must be braced at 27' 2" o/c based on loads applied, unless detailed otherwise.

Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 27' 2" o/c based on loads applied, unless detailed otherwise.

· -685 lbs uplift at support located at 26' 10". Strapping or other restraint may be required.

Member should be side-loaded from both sides of the member or braced to prevent rotation.

Supports	14 M	Bearing Length			Loads to	the second production			
	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	Accessories
1 - Stud wall - SPF	5.50"	5.50"	4.38"	4069	4742	3537	5245/-5245	17593/- 5245	Blocking
2 - Stud wall - SPF	5.50"	5.50"	1.50"	250	654/-447	-393	582/-582	1486/- 1422	Blocking

arry 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' 2"	N/A	35.1				
1 - Uniform (PSF)	0 to 27' 2" (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		3144	-	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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Weverhaeuser

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		1		
(253) 579-2158				
Brett.ajohnson@yahoo.com				



## Main, M8 16' Garage Door Header Case 1 1 piece(s) 5 1/2" x 18" 24F-V4 DF Glulam

PASSED





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)	System : Wall	
Member Reaction (lbs)	19741 @ 4 1/2"	21450 (6.00")	") Passed (92%) 1.0 D + 0.525 E + 0.7 Spans)		1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)	Member Type : Header Building Use : Residential	
Shear (lbs)	10674 @ 2'	17490	Passed (61%)	1.00	1.0 D + 1.0 L (All Spans)	Building Code : IBC 2015	
Pos Moment (Ft-Ibs)	47640 @ 7' 4 5/16"	58109	Passed (82%)	1.00	1.0 D + 1.0 L (All Spans)	Design Methodology : ASI	
Live Load Defl. (in)	0.312 @ 8' 4 1/8"	0.542	Passed (L/625)		1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)		
Total Load Defl. (in)	0.475 @ 8' 4 1/2"	0.813	Passed (L/411)	-	1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)		

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

Top Edge Bracing (Lu): Top compression edge must be braced at 17' o/c based on loads applied, unless detailed otherwise.

Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 17' o/c based on loads applied, 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.

	Bearing Length				Loads to				
Supports	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	Accessories
1 - Trimmer - SPF	6.00"	6.00"	5.52"	7012	11222	4850	1286/-1286	24370/- 1286	None
2 - Trimmer - SPF	6.00"	6.00"	3.14"	3727	7412	2005	831/-831	13975/- 831	None

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Selsmic (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 (Ib)	1'	N/A	4134	4794	3570	2117	
3 - Point (lb)	7'	N/A	1568	1820	1792	-2117	
4 - Point (lb)	12' 9"	N/A	1568	1820	1493	2117	

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

Job Notes	
	Job Notes



5/12/2020 10:01:25 PM UTC ForteWEB v2.4, Engine: V8.0.1.5, Data: V7.3.2.0 File Name: 4270 Ardekani Page 1 / 1

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



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)	20755 @ 4 1/2"	21450 (6.00")	Passed (97%)		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-Ibs)	47640 @ 7' 4 5/16"	58109	Passed (82%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.322 @ 8' 2 7/16"	0.542	Passed (L/606)		1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.485 @ 8' 3 3/8"	0.813	Passed (L/402)		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 based on loads applied, unless detailed otherwise.

Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 17' o/c based on loads applied, 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)					State of the second state of the
	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	Accessories
1 - Trimmer - SPF	6.00"	6.00"	5.81"	7012	11222	4850	3217/-3217	26301/- 3217	None
2 - Trimmer - SPF	6.00"	6.00"	3.32"	3727	7412	2005	2076/-2076	15220/- 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 (Ib)	1'	N/A	4134	4794	3570	5293	2.5x UPLIET
3 - Point (lb)	7'	N/A	1568	1820	1792	-5293	2.5x UPLIFT
4 - Point (lb)	12' 9"	N/A	1568	1820	1493	5293	2.5x UPLIFT

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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	



John S. Apolis, P.E. Project: 42 Architect:	CSES, 270 Ardekani	Inc.	Job	Date:	<b>2019.089</b> 10-Dec-19
Post Design (Combi	ined Axial and	Momen	t Loadin	g)	WIIU
2015 Seattle Building Cod	e (SBC)			8/	2015 NDS
Beam Description:	Garage D	oor Posts			2015 1105
	0		Enter 'l' fo	r wind load:	1
		Ente	r 'l' for repetiti	ive member:	1
			Enter '1'	for wet use:	
Geometry and loads:					
Height	7 ft		w(d)	141.0	plf
Р	24000 lbs		w(b)	0	plf
Le(d)	7 ft		Le(b)	7	ft
Material Properties:					
Fb1	1000 psi	Fb(d)'		1150	osi
Fb2	1000 psi	Fb(b)'		1150	osi
Fc	1500 psi	Fc'		1321	osi
E	1.7 x10^6psi	E'		1.7 >	(10^6psi
Emin	0.62 x10^6psi	Emin'		0.62 >	(10^6psi
Selected Member: DF	5#1		5.5	X	5.5
			b		d
Member properties:		Variab	oles:		
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 m <sup>2</sup>	с		0.8	
Member stresses: Prov	vided		1	Required	
FcE(d)	2185 psi	>	fc	793 p	si
FcE(b)	2185 psi	>	fc	793 p	si
FbE	48714 psi	>	fb(d)	374 p	si
FbE	48714 psi	>	fb(b)	0 p	si
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





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.

	E	learing Leng	th	Loads	to Supports (		
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
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



(B) SUSTAINABLE FORESTRY INITIATIVE

ForteWEB Software Operator	Job Notes	
Brett Johnson CSES	2019.089	
Brett.ajohnson@yahoo.com	4270	

12/12/2019 9:44:19 PM UTC ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2 File Name: 4270 Ardekani Page 1 / 1

John S. Apolis, P.E.	CSES,	Inc.		Job nu	mber:	2019.089
Project: 42	70 Ardekani				Date:	12-Dec-19
Architect:				Page nu	mber:	M12
Post Design (Combi	ned Avial and	Mome	nt Lo	ading)		
2015 Soottle Puilding Cod	(SDC)			aung)		2015 NDS
2015 Seattle Building Cou	e (SDC)	Deet				2015 NDS
Beam Description:	Interior	Post				
		E	En	repetitive n	nd load:	
		E	ner i ior	Enter '1' for	wat use:	
				Linter 1 101	wet use.	
Geometry and loads:						
Height	8 ft			w(d)		plf
Р	25000 lbs			w(b)	0	plf
						* 302014
Le(d)	8 ft			Le(b)	8	ft
Material Properties:						
Fbl	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	Em	n'		0.47	x10^6psi
C.L. d. I.M. I. I.	C#2		5.5			5.5
Selected Member: H	C#2		5.5	X		5.5
			b			d
Member properties:	07.7	Vai	iables:		4.10	
Section Modulus (d):	27.7 in^3	Rb(	d)		4.18	
Section Modulus (b):	27.7 in 3	KD(	0)		4.18	
Section Area:	30.3 in 2	С			0.8	
Member stresses: Pro	vided			Reg	uired	
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	1 Check:					
NDS 2010 EQ 3.9-3		0.87	<		1.0	



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





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)	System : Floor
Member Reaction (lbs)	543 @ 5 1/2"	911 (1.50")	Passed (60%)		1.0 D + 1.0 L (All Spans)	Member Type : Joist
Shear (lbs)	476 @ 1' 4 3/4"	1688	Passed (28%)	1.00	1.0 D + 1.0 L (All Spans)	Building Use : Residential
Moment (Ft-Ibs)	2048 @ 8'	2577	Passed (79%)	1.00	1.0 D + 1.0 L (All Spans)	Design Methodology : ASE
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.

Bearing Length Loads to Supports (lbs) Supports Total Available Required Floor Live Accessories Dead Total 1 - Hanger on 11 1/4" SPF beam 5.50' Hanger<sup>1</sup> 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



SUSTAINABLE FORESTRY INITIATIVE

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 Page 1 / 1

ForteWEB Software Operator	Job Notes				
Brett Johnson CSES (253) 579-2158	2014.084				
Brett.ajohnson@yahoo.com	4220				

576#< 1135# LUS210

John S. Apolis, P.E.		CSES, Inc.	Job	number:	2019	.089	
Project:	4270			Date:	19-De	ec-19	
Architect:			Page	number:	M	14	
BEAM DESIGN (	Uniform	Load, Sim	ple Span)				
2015 INT. Building Co	de (IBC)				201	5 NDS	
<b>Beam Description:</b>	1	Deck beam					
Enter '1' for incised	PT lumber:	1	Enter '1' for	snow load:			
			Enter 1' for repetiti	for wet use:			
Enter '1' for fully	supported:	1	Enter '1' for reduce	ed live load:			
Geometry and Loads:							
Span:	21 1	ft	Tributary Width:	8	ft		
DL unit load:	12 J	psf	LL unit load:	60	psf		
Add'l unif. DL:	0 1	lb/ft	Add'l unif. LL:	0	lb/ft		
Kll * At:	336 1	ft^2	Reduced LL:	60	psf		
DL uniform load	96 1	lb/ft	Max DL reaction:	1.008	lbe		
LL uniform load:	480 1	b/ft	Max LL reaction:	5,040	lbs		
Total load:	576 1	b/ft	Max Total reaction:	6,048	lbs		
Material Properties							
F	18	( 10^6 psi	E.	1.8	v 10^6 pci		
Fb	2400 r	osi	Fb'	1831	nsi		
Fv	265 r	osi	Fv'	212	psi		
Fc perp	650 p	osi	Fc perp'	520	psi		
(Allo	wable design	values include me	odification factors per	NDS 2012)			
Deflection analysis:							
For total load:		Allowed def	lection criteria, span/	360			
For LL only:		Allowed def	lection criteria, span/	480			
Max. allowed total defl:	0.700 i	n	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	1211	(O(1) - SNS)
Force analysis:			May Shear	6048	lbc	nu	CQ6/2 303
Max. moment:	31752 f	t-lb	Shear $\emptyset$ d =	5184	lbs C D	185 1	4
main moment.	517521		Shear (a) d	5104	103	105 4	
Selected Member:		GLB	5.500	Х		18	
						]	
Member	properties:	Provided:		Required:			
Mome	nt of inertia:	2,673.0	in^4	2.222.6	in^4		
Sectio	on Modulus:	297.0	in^3	208.1	in^3		
S	ection Area:	99.0	in^2	36.7	in^2		
B	earing Area:			11.6	in^2		
Minimum bearing	dimensions:	5.5	х	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



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-Ibs)	10860 @ 10' 10 1/8"	59400	Passed (18%)	1.00	1.0 D + 1.0 L (Alt Spans)
Neg Moment (Ft-Ibs)	-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)
<ul> <li>Deflection criteria: LL (L/360) a</li> </ul>	and TL (L/240).		OK F	SY C	AICHIATTON
<ul> <li>Overhand deflection criteria: III</li> </ul>	(21/360) and TL (21/240)				/ CCVIC/6/ FVIV

Overhang deflection criteria: LL (2L/360) and TL (2L/240).

Top Edge Bracing (Lu): Top compression edge must be braced at 16' o/c based on loads applied, unless detailed otherwise.

· Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 16' o/c based on loads applied, 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.

	Bearing Length			Loads to Supports (lbs)				
Supports	Total	Available	Required	Dead	Floor Live	Snow	Total	Accessories
1 - Column Cap - steel	8.00"	8.00"	5.84"	6103	14781	4200	25084	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		4200	

#### Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

Weverhaeuser

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		



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

FATTED MIS

John S. Apolis, P.E. Project	CSES	S, Inc.	Job n	umber:	2019.089				
Architect.	4270 Aluckam		Daga	Date:	19-Dec-19				
Dest Desire (C		1.2.5	Pagen	lumber:	M16				
Post Design (Com	Post Design (Combined Axial and Moment Loading)								
2015 INT. Building C	ode (IBC)				2015 NDS				
Beam Description:	Deck p	oosts							
			Enter '1' for v	vind load:	1				
		Ente	r '1' for <u>repetitive</u>	member:					
			Enter '1' fo	r wet use:					
Competer and loader									
Height	8 ft	0.11	w(d)	10.0 -	16				
P	25500 lbs < 3	30250 16	w(d)	10.0 p	lf				
1	25500 103	DRGG	w(0)	υp	DIT				
Le(d)	8 ft	PDOO	Le(b)	8 f	t				
Material Properties:									
Fb1	850 psi	Fb(d)'		977.5 p	si				
Fb2	850 psi	Fb(b)'		977.5 p	si				
Fc	1300 psi	Fc'		944 p	si				
E	1.3 x10^6ps	i E'		1.3 x	10^6psi				
Emin	0.47 x10^6ps	i Emin'		0.47 x	10^6psi				
Salaatad Mamban I	112#2		<i></i>						
Selected Member: 1	16#2		5.5 X		5.5				
Member properties:		Variah	b		d				
Section Modulus (d):	27.7 in^3	Rb(d)	nes.	4 18					
Section Modulus (b):	27.7 in^3	Rb(b)		4.18					
Section Area:	30.3 in^2	с		0.8					
Member stresses: P	rovided		Re	quired					
FcE(d)	1268 psi	>	fc	843 ps	si				
FcE(b)	1268 psi	>	fc	843 ps	si				
FbE	32313 psi	>	fb(d)	35 ps	si				
FDE	32313 psi	>	fb(b)	0 ps	si				
Bending and Axial Compressi	on Check:								
NDS 2010 EQ 3.9-3		0.90	<	1.0					

John S. Apolis, P.E.		CS	SES, Inc.	Job	number	2019.089			
Project:	4270				Date	19-Dec-19			
Architect:				Page	number	M17			
BEAM DESIGN (	BEAM DESIGN (Uniform Load, Simple Span)								
2015 TNT Building Co	2015 TWT Building Code (TBC) 2015 NDS								
Beam Description:	ar (200)	Dar	k Handar Palor			2013 1105			
beam bescription.		Det	In meader below	V					
Enter '1' for incised	PT lumber:			Enter '1' fo	r snow load				
			Ente	er '1' for repetit	ive member:				
				Enter '1'	for wet use:				
Enter '1' for fully	supported:		1 En	ter '1' for reduc	ed live load:				
Geometry and Loads:									
Span:	16	ft	Т	ributary Width:	8	ft			
DL unit load:	12	psf		LL unit load:	60	psf			
Add'I 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	115/17	М	N DI resotion	060	11			
LL uniform load:	520	lb/ft	M	ax LL reaction:	4 160	IDS			
Total load:	640	lb/ft	Max	Total reaction:	5 120	lbs			
			1.144	rotar reaction.	0,120	103			
Material Properties:									
E	1.8	x 10 <sup>4</sup>	^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			
(Allo	wable design	n valu	es include modifica	ation factors per	NDS 2012)				
Deflection analysis									
For total load:			Allowed deflection	n oritorio cnon/	260				
For LL only:			Allowed deflection	n criteria, span/	100				
Max. allowed total defl:	0.533	in	Anowed deficetion	Max II 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			
		111 - 212		U					
Selected Member:			GLB	5.500	Х	13.5			
Lunari									
Member	properties		Provided.		Deguined				
Mome	nt of inertia:		$1.127.7 \text{ in}^{4}$		1 065 0	in^/			
Sectio	on Modulus:		$167.1 \text{ in}^3$		102.4	in^3			
Sector	ection Area:		74.3 in^2		24.9	in^2			
Be	earing Area:				7.9	in^2			
Minimum bearing	dimensions:		5.5	x	1.4	inches			

John S. Apolis, P.E. Project: Architect: Post Design (Com 2015 INT. Building Co Beam Description:	<b>2</b>	019.089 9-Dec-19 M18 2015 NDS						
		Deen meader	1 0505	Ent	er 'l' for wi	nd load:		1
			Enter	r'l' for	renetitive i	nember		1
			Linter		Enter '1' for	wet use:		
						net use.		
Geometry and loads:								
Height	8	ft			w(d)	100.0	plf	
Р	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	x10^6	ópsi
Emin	0.47	x10^6psi	Emin'			0.47	x10^6	5psi
	10							]
Selected Member: I	HF#2			5.5	Х			5.5
				b				d
Member properties:	27.7		Variab	oles:				
Section Modulus (d):	27.7	in^3	Rb(a)			4.18		
Section Area:	20.3	in^2	RD(D)			4.18		
Section Area.	50.5	111 2	C			0.8		
Member stresses: P	rovided				Reg	uired		
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 Avial Compressi	on Cheeke							
NDS 2010 EO 3 9-3	on Check:	0.8	6	<		10		
		0.0				1.0		

John S. Apolis, P	.E.	CSES, Inc.		Job number:	2019 089
Project:	4270			Dotor	20,1,000
Architect				Date:	22-Apr-21
DEAM DECK				Page number:	MIG
BEAM DESIG	N (Unif	orm Load+	Concent	rated Load)	
2018 International E	Building C	ode (IBC)			2018 NDS
Beam Description	1:	NEWDER	REAM		
Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	
Geometry and Loads:					
Span:	14.5 ft	Tributary Width:	7.25 ft	D Location.	145.0
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DI :	14.5 m
Add'l uniform LL:		LL unit load:	60 psf	Concentrated LL	
Add'l uniform SL:		SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	
DL Reaction 1.	788 lbs	DI Pagation 2	700 11		
LL Reaction 1	3154 lbs	LL Reaction 2:	788 IDS	Note: Design automa	tically uses
SL Reaction 1:	0 lbs	SI Reaction 2:	0 lbs	ASD load combinatio	ons
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs		
Total Reaction 1:	3942 lbs	Total Reaction 2:	3942 lbs		
Material Properties:					
E	1.8 msi	E'	1.8 msi		
Fb	2400 psi	Fb'	2400 psi		
Fv	265 psi	Fv'	265 psi		
Fc perp	650 psi	Fc perp'	650 psi		
Emin	0.95 msi	Emin'	0.95 msi		
Deflection analysis:					
For total I	oad: Allowed	d deflection criteria	span/	240	
For LL o	only: Allowed	deflection criteria	, span/	480	
Max. allowed total defl:	0.73 in		Max LL defl:	0.36 in	
Total defl. * I:	300.46 in^4		Required I:	414 42 in^4	
LL defl. * I:	240.37 in^4		Required I:	663.08 in^4	
Actual deflections:	TOTAL:	0.38 in	-	0.3 in	
Force analysis:					
Max. moment:	14290	ft-lb	May Shaar		
	1.270		wiax Silear.	3942 165	3
Selected Member:	(1)	GLB	55		10
	(-)		5.5	λ	12
Member	properties	Provided			
Momen	t of inertia	792 in/4		Required:	
Section	n Modulus:	132 in^3		003.08 m^4	
Se	ction Area:	66. in^2		/1.45 m^3	
Be	aring Area:			6.06 in/2	
Minimum bearing d	imensions:	5.5 in	х	1.1 in	

John S. Apolis, P	.E.	CSES, Inc.		Job number:	2019 080
Project:	4270	0		Doto:	2015.009
Architect:				Date:	22-Apr-21
DEAM DECIC				Page number:	M20
BEAM DESIG	N (Unif	orm Load+	Concent	rated Load)	
2018 International E	Building C	ode (IBC)	22		2018 NDS
Beam Description	1:	NEW DECP	1 Ja1573		
Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:	1	P.T. Lumber:		Wet Use:	
Geometry and Loads:					
Span:	6 ft	Tributary Width:	1.33 ft	P Location	0.0
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DL:	0 11
Add'l uniform LL:		LL unit load:	60 psf	Concentrated LL:	
Add'I uniform SL:	-	SL unit load:		Concentrated SL:	
Add Tuniform WL:		WL unit load:		Concentrated WL:	
DL Reaction 1:	60 lbs	DL Reaction 2:	60 lbs	Net D	
LL Reaction 1:	239 lbs	LL Reaction 2:	239 lbs	ASD load combineti	tically uses
SL Reaction 1:	0 lbs	SL Reaction 2:	0 lbs	ASI) load combinatio	ons
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs		
Total Reaction 1:	299 lbs	Total Reaction 2:	299 lbs		
Material Properties:					
E	1.3 msi	E'	1.3 msi		
Fb	850 psi	Fb'	1173 nsi		
Fv	150 psi	Fv'	150 psi		
Fc perp	405 psi	Fc perp'	405 psi		
Emin	0.47 msi	E.min'	0.47 msi		
Deflection analysis:					
For total I	oad: Allowed	deflection criteria	span/	240	
For LL c	only: Allowed	deflection criteria.	span/	480	
Max. allowed total defl:	0.3 in		Max LL defl:	0.15 in	
Total defl. * I:	2.24 in^4		Required I:	7.46 in^4	
LL defl. * I:	1.79 in^4		Required I:	11.93 in^4	
Actual deflections:	TOTAL:	0.05 in		0.04 in	
Force analysis:					
Max. moment:	449 1	t-lb	Max Shear	200 16	
			inter oncer.	299 105	5
Selected Member:	(1)	HF #2	15	v	7.25
	(-)		1.5	λ	1.25
Mamha	Noncett	<b>B</b>			
Momer	t of inertia:	Provided:		Required:	
Section	Modulue:	47.03 In 4		11.93 in^4	
Seu	ction Area:	10.88 :		4.59 in^3	
Bea	aring Area:	10.00 11 2		2.99 in^2	
Minimum bearing d	imensions:	1.5 in	x	0.74 in^2	
5		1.2 111	Λ	0.49 in	

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

FI

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0.0 psf

100.0

480.0 lbs

640.0 lbs

0.0 in

RetainPro (c) 1987-2019, Bu License : KW-06061297 License To : CSES, Inc	ild 11	.19.11.12
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

=

=

=

=

Used To Resist Sliding & Overturning

Earth Pressure Seismic Load

Used for Sliding & Overturning Axial Load Applied to Stem

## Cantilevered Retaining Wall

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

## 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

#### Uniform Seismic Force = 88.000 **Total Seismic Force** = 968.000

Adjacent Footing	Load		
Adjacent Footing Load	=	0.0 lbs	
Footing Width	=	0.00 ft	
Eccentricity	=	0.00 in	
Wall to Ftg CL Dist	=	0.00 ft	

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

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

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

## **Design Summary**

Surcharge Loads

Surcharge Over Heel

Surcharge Over Toe

Axial Load Eccentricity =

Axial Dead Load

Axial Live Load

Wall Stability Ratios Overturning	=	1.29 Ratio < 1.5!
Slab Resis	ts All	Sliding !
Total Bearing Loadresultant ecc.	=	5,389 lbs 11.09 in
Soil Pressure @ Toe Soil Pressure @ Heel Allowable Soil Pressure Less ACI Factored @ Toe ACI Factored @ Heel	= = Thai = =	1,696 psf OK 0 psf OK 2,000 psf n Allowable 2,374 psf 0 psf
Footing Shear @ Toe Footing Shear @ Heel Allowable Sliding Calcs Lateral Sliding Force		37.1 psi OK 22.6 psi OK 75.0 psi 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

St	em Construction		Bottom	
1000	Design Height Above Et		Stem OK	
	Wall Material Above "Ht		Concrete	
.5!	Design Method	-	LRED	
	Thickness	-	8 00	
	Rebar Size	=	# 5	
	Rebar Spacing	=	5.00	
	Rebar Placed at	=	Edge	
	Design Data		2030	
	fb/FB + fa/Fa	=	0.997	
	Total Force @ Section			
	Service Level	lbs =		
	Strength Level	lbs =	4.880.0	
	MomentActual			
	Service Level	ft-#=		
	Strength Level	ft-# =	17,733.3	
	MomentAllowable	=	17,776.5	
	ShearActual			
	Service Level	psi=		
	Strength Level	psi=	65 7	
	Shear Allowable	osi =	75.0	
	Anet (Masonry)	in2 =	10.0	
	Rebar Depth 'd'	in =	6 19	
	Masonry Data		0.10	
	fm	psi=		
	Fs	psi=		
	Solid Grouting	=		
	Modular Ratio 'n'	=		
	Wall Weight	psf=	100.0	
	Short Term Factor	=		
	Equiv. Solid Thick.	=		
	Masonry Block Type	=	Medium Weig	ht
	Masonry Design Method	=	ASD	
	Concrete Data			
	fc	psi =	2,500.0	
	Fy	psi=	60,000.0	



FZ

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RetainPro (c) 1987-2019, Build 11.19.11 License : KW-06061297 License To : CSES, Inc	12 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) :	0.6715 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 Opt	tions :	
		One layer of : Two lay	vers of :	
Required Area :	0.6715 in2/ft	#4@ 12.50 in #4@ 2	5.00 in	
Provided Area :	0.744 in2/ft	#5@ 19.38 in #5@ 3	8.75 in	
Maximum Area :	0.8382 in2/ft	#6@ 27.50 in #6@ 5	5.00 in	
Footing Data	Footing Des	ign Results		
Toe Width = Heel Width =	4.00 ft 1.17 Factored Pressure	<u>Toe</u> <u>Heel</u> = 2,374 0	) psf	
Total Footing Width =	5.17 Mu': Upward	= 166,873 0	) ft-#	
Footing Thickness =	12.00 in Mu' : Downward	= 39,840 1,146	6 ft-#	
Key Width = Key Depth = Key Distance from Toe =	0.00 in Actual 1-Way Shea 0.00 in Allow 1-Way Shea 0.00 ft Toe Beinforming	$ = 5,828  1,146 \\ ar = 37.09  22.59 \\ r = 75.00  40.00 \\ = #5 @ 4.50 in $	n <del></del> psi psi	
fc = 2,500 psi Fy = 6 Footing Concrete Density = 1 Min. As % = 0 Cover @ Top 2.00 @ Btm	0,000 psi         Heel Reinforcing           50.00 pcf         Key Reinforcing           0,0018         Footing Torsion, Tu          =         3.00 in	= None Spec'd = None Spec'd = 0.0	0 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(fc)\*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 lay	ers of horizontal bars:
#4@ 9.26 in	#4@ 1	8.52 in
#5@ 14.35 in	#5@ 2	8.70 in
#6@ 20.37 in	#6@ 4	0.74 in

3

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## Cantilevered Retaining Wall

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

		OV	ERTURNI	NG		R	SISTING	
Item		lbs	ft	Moment ft-#		Force	Distance	Moment ft-#
HL Act Pres (ab water tb	1)	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 tb) Hydrostatic Force	)				Soil Over HL (bel. water tbl) Watre Table		4.92	3,075.1
Buoyant Force	=				Sloped Soil Over Hee =			
Surcharge over Heel	=				Surcharge Over Heel =			
Surcharge Over Toe	=				Adjacent Footing Load =			
Adjacent Footing Load	=				Avial Dead I had on Stem =	1 120 0	1 33	2 080 0
Added Lateral Load	=				* Axial Live Load on Stem =	640.0	4 33	2,080.0
oad @ 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
Total	-	3 702 6	OTM	14.040.5	Earth @ Stem Transitions =			
1 O CUI	-	5,702.0	U.1.IVI. =	14,818.5	Footing Weight =	775.1	2.58	2.002.3
Posisting/Overturning	Detia				Key Weight =			
Vertical Loads used for	Ratio	Pressure =	= 5.390	1.29	Vert. Component =	1,168.9	5.17	6,039.7
	our r	icosule -	0,00	5.4 IDS	Total =	4 740 A IL	D	10.047.4

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 to set these five lines of information for your program.

Seismic, E

1.000

Fy

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License To : CSES, Inc				Cantilevered Retai	ining	Wall	Code: IBC 2018,	ACI 318-14,TMS 402-10
Criteria			S	oil Data				
Retained Height Wall height above soil	=	10.00 ft 0.50 ft	Alle	w Soil Bearing = uivalent Fluid Pressure Met ive Heel Pressure =	2,000 hod 50	0.0 psf 0.0 psf/ft		
Height of Sail aver Tas	-	0.00						
Height of Soll over Toe	=	6.00 in	Pa	=	0.50	0.0		
Water height over heel	=	0.0 ft	Sai	Dopoitu Heal	350	0.0 pst/ft		
			Soi	Density, Toe =	125.	00 pcf 00 pcf		
			Foo	ting  Soil Friction =	0.4	00		
			Soi	height to ignore pr passive pressure =	12.0	0 in	C-	
Surcharge Loads			La	teral Load Applied to	o Ste	m II	Adjacent Ecoting	Load
Surcharge Over Heel	-	50.0.psf					Adjacent Pooling	LOad
Used To Resist Sliding Surcharge Over Toe	80	verturning	Lat	eral Load = leight to Top =	0.0	#/ft ft	Adjacent Footing Load Footing Width	= 0.0 lbs = 0.00 ft
Used for Sliding & Ove	rturn	ing	H	eight to Bottom =	0.00	ft	Eccentricity	= 0.00 in
Axial Load Applie	d to	Stom -	Loa	id Type = W	ind (W	)	Wall to Ftg CL Dist	= 0.00 ft
	4 10	oteni		(S	ervice	Level)	Base Above/Rolow Seil	Line Load
Axial Lead Load	=	200.0 lbs	Wi	nd on Exposed Stem =	0.0	psf	at Back of Wall	= 0.0 ft
Axial Load Eccentricity	=	400.0 lbs 0.0 in	(S	ervice Level)			Poisson's Ratio	= 0.300
Earth Pressure Se	eisn	nic Load						
Method : Uniform			Uni	form Seismic Force =	38.000			
Multiplier Used (Multiplier used on soil of	= lensi	8.000 ty)	Tota	al Seismic Force = 96	58.000			
Design Summary			S	tem Construction	-	Bottom Stem OK		
Wall Stability Ratios				Design Height Above Fi Wall Material Above "H	g ft =	= 0.00		
Overturning	=	1.19 Ratio	< 1.5!	Design Method		LRFD		
Slab Resis	ts Al	Sliding !		Thickness	=	8.00		
Total Bearing Load	-	1 072 lbc		Rebar Size	=	# 5		
resultant ecc.	=	17.06 in		Rebar Spacing	=	4.50		
0.10		10 2020 D 10		Design Data	-	Edge		
Soil Pressure @ Hool	=	1,970 psf Ol	Ķ	fb/FB + fa/Fa	=	0.996	1	
Allowable	2	2 000 pst 01	×	Total Force @ Section				
Soil Pressure Less	Tha	in Allowable		Service Level	lbs =	0		
ACI Factored @ Toe	=	2,759 psf		Strength Level	lbs =	5,200.0		
ACI Factored @ Heel	=	0 psf		MomentActual				
Footing Shear @ Toe	=	36.6 psi Ok	<	Service Level	ft-# =			
Footing Shear @ Heel	=	22.9 psi Ok	<	Strength Level	ft-# =	19,333.3		
Allowable	=	75.0 psi		MomentAllowable	=	19,388.8		
Lateral Sliding Force		2 000 0 1		SnearActual				
Lateral Silding Force	=	3,922.6 lbs		Strength Lovel	psi=			
				Shoar Allowable	psi=	70.0		
				Anet (Masonny)	psi=	75.0		
				Rebar Depth 'd'	in2 =	6 10		
				Masonry Data	111-	0.19		
				fm	psi =			
ertical component of active	late	ral soil prossure 19		FS Solid Crouting	psi =			
insidered in the calculation	of s	oil bearing pressure is	res.	Modular Ratio 'n'	=			
				Wall Weight	psf=	100.0		
oad Factors				Short Term Factor	=	100.0		
Dead Load	IB	C 2018,ACI		Equiv. Solid Thick.	=			
Live Load		1.200		Masonry Block Type	=	Medium W	eight	
Earth, H		1.600		Masonry Design Method	=	ASD	255	
Wind, W		1.000		Concrete Data				
Solomia E		1.000		IC	psi =	2,500.0		

psi = psi = 60,000.0

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Concrete Stem Reba	r Area Details		and the second	
Bottom Stem As (based on applied mom (4/3) * As : 200bd/fy : 200(12)(6.1875)/	Verti ent) : 0.732 0.976 60000 : 0.247	cal Reinforcing 21 in2/ft 31 in2/ft 75 in2/ft	Horizontal Reinford Min Stem T&S Rei Min Stem T&S Rei	cing inf Area 2.016 in2
0.0018bh : 0.0018(12)(8) : 0.1728		3 in2/ft Horizontal Reinforcing (		cing Options :
Required Area : Provided Area : Maximum Area :	0.732 0.826 0.838	21 in2/ft 57 in2/ft 52 in2/ft	#4@ 12.50 in #5@ 19.38 in #6@ 27.50 in	#4@ 25.00 in #5@ 38.75 in #6@ 55.00 in
Footing Data		Footing Desi	gn Results	
Toe Width Heel Width Total Footing Width Footing Thickness Key Width Key Depth Key Distance from Toe fc = 2,500 psi Footing Concrete Density	= 4.25  ft $= 1.17$ $= 5.42$ $= 12.00  in$ $= 0.00  in$ $= 0.00  ft$ $y = 60,000  psi$ $= 150.00  pcf$	Factored Pressure Mu': Upward Mu': Downward Mu: Design Actual 1-Way Shear Allow 1-Way Shear Toe Reinforcing Heel Reinforcing Key Reinforcing	Toe = 2,759 = 189,342 = 44,976 = 5,130 = 36.57 = 75.00 = #5@4.50 in = None Spec'd	Heel 0 psf 0 ft-# 1,156 ft-# 1,156 ft-# 22.92 psi 40.00 psi
Min. As % Cover @ Top 2.00	= 0.0018 @ Btm.= 3.00 in	Footing Torsion, Tu Footing Torsion, Tu Footing Allow. Torsio If torsion exceed supplemental do	= None Spec'd = on, phi Tu = ds allowable, prov esign for footing t	0.00 ft-lbs 0.00 ft-lbs ride orsion.

## 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(fc)\*Sm Key: No key defined

Min footing T&S reinf Area Min footing T&S reinf Area per foot	1.40 in2 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				



Momont

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# Cantilevered Retaining Wall

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

.....RESISTING .....

Distanc

		OVERTURNING						
Item		Force lbs	Distance ft	Moment ft-#				
HL Act Pres (ab water to HL Act Pres (be water to Hydrostatic Force	ol) ol)	3,025.0	3.67	11,091.7				
Buoyant Force	=							
Surcharge over Heel	=	220.0	5.50	1,210.0				
Surcharge Over Toe	=			.,				
Adjacent Footing Load	=							
Added Lateral Load	=							
Load @ Stem Above So	il =							
Seismic Earth Load	=	677.6	5.50	3 726 8				
	=			0,120.0				
Total	=	3,922.6	O.T.M. =	16,028.5				
Pooloting/Outerturnin								

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

		lbs	ft	ft-#
Soil Over HL (ab. wa	ter tbl)	625.4	5.17	3,231.4
Soil Over HL (bel. wa Watre Table	iter tbl)		5.17	3,231.4
Sloped Soil Over Hee	=			
Surcharge Over Heel	=	25.0	5.17	129.3
Adjacent Footing Load	d =			
Axial Dead Load on S	tem =	600.0	4.58	916.7
* Axial Live Load on Ste	em =	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 Transit	ions =			
Footing Weight	=	812.6	2.71	2,200.8
Key Weight	=	-		
Vert. Component	=	1,168.9	5.42	6,331.9
T	otal =	4.572.5 lbs	R.M.=	19,090,1

Force

\* 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)	0.106	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 to set these five lines of information for your program.

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License To : CSES, Inc			Cantilevered Reta	ining	y vvali	Code: IBC 2018,/	ACI 318-14,TMS 402-
Criteria			Soil Data				
Retained Height	=	10.00 ft	Allow Soil Bearing =	2,00	0.0 psf		Barre
Wall height above soil	=	0.50 ft	Equivalent Fluid Pressure Me	thod			
Slope Behind Wall	=	0.00	Active Heel Pressure =	5	0.0 psf/ft		
Height of Soil over Toe	=	6.00 in	=				
Water height over heel	=	0.0 ft	Passive Pressure =	35	0.0 psf/ft		
		0.0 10	Soil Density, Heel =	125	.00 pcf		
			Soil Density, Toe =	125	.00 pcf		
			Footing  Soil Friction =	0.4	100		
			Soil height to ignore				
			for passive pressure =	12.0	00 in		
Surcharge Loads			Lateral Load Applied t	o Ste	m I	Adjacent Footing	Load
Surcharge Over Heel	=	0.0 psf	Lotorol Longi			Adjacent i ooting	LUau
Used To Resist Sliding	80	verturning	Lateral Load =	0.0	) #/ft	Adjacent Footing Load	= 0.0 lbs
Surcharge Over Toe	=	100.0	Height to Bottom =	0.00		Eccentricity	= 0.00 ft
Used for Sliding & Ove	rturni	ng		lind 04	0	Wall to Etg CL Dist	= 0.00 ft
Axial Load Applied	d to	Stem				Footing Type	Line Load
Axial Dead Load	=	600.0 lbs	Wind on Expected Other	CI VICE	Level)	Base Above/Below Soil	E COU
Axial Live Load	=	1,000.0 lbs	(Service Level)	0.0	pst	at Back of Wall	= 0.0 ft
Axial Load Eccentricity	=	0.0 in	, and serving			Poisson's Ratio	= 0.300
Earth Pressure Se	eism	ic Load					
Method : Uniform			Uniform Seismic Force =	88 000			
Multiplier Used	=	8.000	Total Seismic Force = 9	68.000			
(Multiplier used on soil d	ensit	y)		00.000			
Design Summary			Stem Construction		Bottom		
			Design Height Above F	tc ft :	Stem OK		
Wall Stability Ratios	-		Wall Material Above "H	t" :	= Concrete		
Slab Resid	+c All	1.24 Ratio < 1	1.5! Design Method		= LRFD		
0100 110313	IS AII	Silulity !	Thickness	1	= 8.00		
Total Bearing Load	=	5 791 lbs	Rebar Size	-	= # 5		
resultant ecc.	=	9.71 in	Rebar Spacing	-	= 5.00		
Call Dana o T		121222	Design Data		Edge		
Soil Pressure @ Loe	=	1,868 psf OK	fb/FB + fa/Fa	-	= 0.997		
Allowable	-	12 pst OK	Total Force @ Section		0.007		
Soil Pressure Less	Tha	n Allowable	Service Level	lbs =	=		
ACI Factored @ Toe	=	2.615 psf	Strength Level	lbs =	4,880.0		
ACI Factored @ Heel	=	17 psf	MomentActual		.,		
Footing Shear @ Toe	=	40.9 psi OK	Service Level	ft-#=			
Footing Shear @ Heel	=	22.6 psi OK	Strength Level	ft-# =	= 17,733.3		
Allowable	=	75.0 psi	MomentAllowable	=	17,776.5		
liding Calcs			ShearActual				
Lateral Sliding Force	=	3,702.6 lbs	Service Level	psi=			
			Strength Level	psi=	65.7		
			ShearAllowable	psi=	75.0		
			Anet (Masonry)	in2 =			
			Rebar Depth 'd'	in =	6.19		
			Masonry Data				
			fm	psi =			
tical component of active	later	al soil pressure IS	Solid Grouting	psi =			
sidered in the calculation	ofso	bil bearing pressures	5. Modular Ratio 'n'	=			
			Wall Weight	osf=	100.0		
Dad Factors			Short Term Factor	=	100.0		
Dead Load	IB	C 2018,ACI	Equiv. Solid Thick.	=			
Live Load		1.200	Masonry Block Type	=	Medium We	eight	
Earth, H		1.600	Masonry Design Method	=	ASD	5 <u>7</u> 2	
Wind, W		1.000	Concrete Data		the new sectors		
Seismic, E		1.000	TC	psi=	2,500.0		
			r y	DSI =	60 000 0		

psi = 60,000.0

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Concrete Stem Rebar Area De	etails		
Bottom Stem As (based on applied moment) :	Vertical Reinforcing 0.6715 in2/ft	Horizontal Reinforcin	g
(4/3) * As : 200bd/fy : 200(12)(6.1875)/60000 : 0.0018bh : 0.0018(12)(8) :	0.8953 in2/ft 0.2475 in2/ft 0.1728 in2/ft	Min Stem T&S Reinf Min Stem T&S Reinf Horizontal Reinforcin	Area 2.016 in2 Area per ft of stem Height : 0.192 in2/ft a Options :
Required Area : Provided Area : Maximum Area :	0.6715 in2/ft 0.744 in2/ft 0.8382 in2/ft	One layer of : Tw #4@ 12.50 in # #5@ 19.38 in # #6@ 27.50 in #	4@ 25.00 in 5@ 38.75 in 6@ 55.00 in
Footing Data	Footing D	esign Results	
Toe Width=3.Heel Width=1.Total Footing Width=4.Footing Thickness=12.0Key Width=Key Depth=0.0Key Distance from Toe=0.1Key Distance from Toe=fc=2,500 psiFyFooting Concrete Density=150.0Min. As %=0.007Cover @ Top2.00@ Btm.=	75 ft       17       Factored Press         92       Mu': Upward         90 in       Mu': Design         00 in       Actual 1-Way S         00 in       Allow 1-Way Sh         00 ft       Toe Reinforcing         00 psi       Heel Reinforcing         00 pcf       Key Reinforcing         08       Footing Torsion,         3.00 in       Footing Allow, T	$\begin{array}{rcl} & & & & \\ \hline & & & \\ &$	Heel 17 psf 0 ft-# 1,146 ft-# 1,146 ft-# 22.59 psi 40.00 psi 0.00 ft-lbs 0.00 ft-lbs
	If torsion ex supplement Other Acceptat Toe: #4@ 7.0 Heel: Not req Key: No key	ceeds allowable, provid al design for footing tors ble Sizes & Spacings 05 in, #5@ 10.93 in, #6@ 'd: Mu < phi*5*lambda*sqr defined	e sion. 15.52 in, #7@ 21.17 in, #8@ 27.87 in, #9@ 35 t(fc)*Sm

Min footing T&S reinf Area Min footing T&S reinf Area per foot 1.27 in2 0.26 in2 /ft If one layer of horizontal bars: If two layers of horizontal bars: #4@ 9.26 in #5@ 14.35 in #4@ 18.52 in #5@ 28.70 in #6@ 40.74 in

#5@	14.35	In
#6@	20.37	in



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## Cantilevered Retaining Wall

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

		OV	ERTURNING			RE	SISTING	
Item		lbs	Distance ft	ft-#		Force	Distance	Moment ft-#
HL Act Pres (ab water th	ol)	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 the Hydrostatic Force	ol)				Soil Over HL (bel. water tbl) Watre Table		4.67	2,918.7
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	1 083 3
oad @ Stem Above So	il =				Soil Over Toe =	234.4	4.00	4,003.5
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
Total	_	3 702 6	OTM	14 040 5	Earth @ Stem Transitions =	-		1,207.0
1 Otal	_	3,702.0	0.1.11. =	14,818.5	Footing Weight =	737.6	2.46	1.813.3
Resisting/Overturnin	a Dat				Key Weight =			10.000
Vertical Loads used f	or Soi	Pressure =	= 5701.2	1.24 > [.]	Vert. Component =	1,168.9	4.92	5,747.4
	0, 00	i i i cosule -	5,751.2	105	Total =	1 701 2 lb	D	10.050.5

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 to set these five lines of information for your program.

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

Critoria	-	lan and a second se		11.0			2010, 100 2010,	1010	10 14, 11/10 402-
oriteria			S	oil Data					
Retained Height	=	8.00 ft	All	w Soil Bearing	= 2,00	0.0 psf			
Wall height above soil	=	2.50 ft	Eq	uvalent Fluid Pressure Me	ethod	0.0			
Slope Behind Wall	=	0.00	AU	ive neer Pressure	- 5	0.0 pst/ft		1	
Height of Soil over Toe	=	6.00 in		=	=				
Water height over heel	=	0.0 ft	Pa	ssive Pressure =	= 35	0.0 psf/ft			
			Soi	I Density, Heel =	= 125	.00 pcf			
			So	Density, Toe =	= 125	.00 pcf			
			FOO	sting  Soil Friction =	= 0.4	00			
			Sol	or passive pressure =	12.0	00 in			
Surcharge Loads			1.	toral Local Analtast	4. 04			•	
Surcharge Over Hool		100.0.11		iteral Load Applied	to Ste	m	Adjacent Footing	Load	
Used To Resist Sliding	80	verturning	Lat	eral Load =	0.0	#/ft	Adjacent Footing Load	=	0.0 lbs
Surcharge Over Toe	=	100.0		leight to Bottom =	1.00	ft ft	Footing Width	=	0.00 ft
Used for Sliding & Ove	rturn	ing	Loa	d Type = F	Earth (H		Wall to Ftg CL Dist	=	0.00 ft
Axial Load Applied	d to	Stem	200		Service	l evel)	Footing Type		Line Load
Axial Dead Load	=	0.0 lbs	Wi	nd on Exposed Stem	0.0	Dof	Base Above/Below Soil	-	0.0.#
Axial Live Load	=	0.0 lbs	(S	ervice Level)	0.0	hai	at Back of Wall		0.0 1
Earth Dream C	-	0.0 in					FUISSON'S RATIO	=	0.300
Earth Pressure Se	eism	nic Load							
Method : Uniform			Uni	form Seismic Force =	72.000				
(Multiplier Used on soil d	= Iensit	8.000	Tota	al Seismic Force = 6	648.000				
Design Summany			C	tom Construction		5.4			
boolgn ouninary			3	terri construction	-	Stem OF	(		
Wall Stability Ratios				Design Height Above I	Ftg ft =	= 0.00	5		
Overturning	=	1.31 Ratio <	1.5!	Vvali Material Above "}	Ht" =	<ul> <li>Concrete</li> </ul>			
Slab Resis	ts All	Sliding !		Thickness		= 8.00			
Total Bearing Load	_	0.050 "		Rebar Size	-	= # 5			
resultant ecc.	=	15.45 in		Rebar Spacing	=	8.00			
Call Danses O T				Design Data	-	Edge			
Soil Pressure @ Leel	=	1,829 psf OK		fb/FB + fa/Fa	=	= 0.946	3		
Allowable	=	2.000 psf 0K		Total Force @ Sectio	n				
Soil Pressure Less	Tha	n Allowable		Service Level	lbs =				
ACI Factored @ Toe	=	2,561 psf		Strength Level	lbs =	3,648.0			
Footing Shoot @ Teel	=	0 pst		MomentActual	64-				
Footing Shear @ Toe	=	26.9 psi OK		Strength Level	ft_# =	11 178 7			
Allowable	-	75.0 psi OK		Moment Allowable	=	11 700 2			
Sliding Calcs		10.0 001		ShearActual		11,700.2			
Lateral Sliding Force	=	2,838.6 lbs		Service Level	psi=				
				Strength Level	psi=	49 1			
				Shear Allowable	psi=	75.0			
				Anet (Masonry)	in2 =				
				Rebar Depth 'd'	in =	6.19			
				fm	neir				
				Fs	psi =				
ertical component of active	later	ral soil pressure IS		Solid Grouting	=				
insidered in the calculation	ofs	oil bearing pressure	es.	Modular Ratio 'n'	=				
oad Factors	_		_	Wall Weight	psf=	100.0			
Building Code	IB	C 2018,ACI		Short Term Factor	=				
Dead Load		1.200		Masonry Block Type	=	Medium M	eicht		
LIVE Load		1.600		Masonry Design Method	d =	ASD	vigitt		
Carth, F		1.600		Consulta Data	735				

Concrete Data

psi = 2,500.0

psi = 60,000.0

fc Fy

1.000

1.000

Wind, W

Seismic, E

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Concrete Stem Reb	ar Area Deta	nils		
Bottom Stem As (based on applied mon (4/3) * As : 200bd/fy : 200(12)(6.1875) 0.0018bh : 0.0018(12)(8) :	nent) : //60000 :	Vertical Reinforcing 0.4233 in2/ft 0.5644 in2/ft 0.2475 in2/ft 0.1728 in2/ft	Horizontal Reinf Min Stem T&S F Min Stem T&S F Horizontal Reinf	orcing Reinf Area 2.016 in2 Reinf Area per ft of stem Height : 0.192 in2/ft orcing Options :
Required Area : Provided Area : Maximum Area : Footing Data		0.4233 in2/ft 0.465 in2/ft 0.8382 in2/ft Footin	One layer of : #4@ 12.50 in #5@ 19.38 in #6@ 27.50 in g Design Results	Two layers of : #4@ 25.00 in #5@ 38.75 in #6@ 55.00 in
Toe Width Heel Width Total Footing Width Footing Thickness Key Width Key Depth Key Distance from Toe fc = 2,500 psi F Footing Concrete Density Min. As % Cover @ Top 2.00	= 3.50 = 1.17 = 4.67 = 12.00 = 0.00 = 0.00 = 0.00 = 0.00 = 150.00 = 0.0018 @ Btm.= 3.0	ft Factored P Mu': Upwa in Mu': Down in Actual 1-Wa in Actual 1-Wa ft Toe Reinfor posi Heel Reinfor posi Heel Reinfor Footing Tors 0 in Footing Allo	Toe           ressure         =         2,561           rd         =         118,300           ward         =         30,503           o         =         2,730           ay Shear         =         26,86           y Shear         =         75.00           rcing         =         None Spec'           cing         =         None Spec'           sion, Tu         =           w. Torsion, phi Tu         =	Heel 0 psf 0 ft.# 819 ft.# 819 ft.# 16.85 psi 40.00 psi in d d 0.00 ft-lbs 0.00 ft-lbs
		lf torsio supplen	n exceeds allowable, pro- nental design for footing	ovide g 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(fc)\*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 lay	ers of horizontal bars:
#4@ 9.26 in	#4@ 1	8.52 in
#5@ 14.35 in	#5@ 2	8.70 in
#6@ 20.37 in	#6@ 4	0.74 in

Soil Over HL (ab. water tbl)

Soil Over HL (bel. water tbl)

Sloped Soil Over Heel

Surcharge Over Heel

Surcharge Over Toe

Adjacent Footing Load

Axial Dead Load on Stem = \* Axial Live Load on Stem =

Watre Table

Soil Over Toe

Stem Weight(s)



Moment

ft-#

2.209.9

2.209.9

221.0

382.8

612.5

4.025.0

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RetainFi0 (C) 1907-2019, E	•u
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LICENSE . NVV-00001237	
License To : CSES, Inc.	

## Cantilevered Retaining Wall

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

Distance

ft

4.42

4.42

4.42

1.75

1.75

3.83

.....RESISTING .....

		0\	ERTURNING	
Item		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water the HL Act Pres (be water the Hydrostatic Force	ol) ol)	2,025.0	3.00	6,075.0
Buoyant Force	=			
Surcharge over Heel	=	360.0	4.50	1,620.0
Adjacent Footing Load	=			
Added Lateral Load	=			
Load @ Stem Above So	il =			
Seismic Earth Load	=	453.6	4.50	2,041.2
	=			
Total	=	2,838.6	O.T.M. =	9,736.2

Vertical Loads used for Soil Pressure = 3,651.6 lbs

Earth @ Stem Transi	tions =				
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
<ul> <li>* Axial live load NOT in resistance, but is incl</li> </ul>	uded for s	total display soil pressure	ed, calo	or used for culation.	overturning

Force

lbs

=

=

=

=

=

=

500.3

50.0

218.8

350.0

1,050.0

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.

RetainPro (c) 1987-2019, Build	11.19.11.12	Captilovarad Batai	ain a I	Mall		
License To : CSES, Inc		Cantilevered Retail	ning	vvall	Code: IBC 2018,A	CI 318-14,TMS 402-16
Criteria		Soil Data			<b>—</b>	
Retained Height Wall height above soil Slope Behind Wall Height of Soil over Toe Water height over heel	= 12.00 ft = 0.50 ft = 0.00 = 18.00 in = 0.0 ft	Allow Soil Bearing = Equivalent Fluid Pressure Meth Active Heel Pressure = Passive Pressure = Soil Density, Heel = Soil Density, Toe = Footing  Soil Friction = Soil height to ignore for passive pressure =	2,000.1 iod 350.1 125.0 125.0 0.351 0.00	0 psf 0 psf/ft 0 psf/ft 0 pcf 0 pcf 0		
Surcharge Loads		Lateral Load Applied to	Sten	n 🔳 🗍	Adjacent Footing I	boo
Surcharge Over Heel Used To Resist Sliding & Surcharge Over Toe Used for Sliding & Overt	= 0.0 psf & Overturning = 0.0 urning	Lateral Load = Height to Top = Height to Bottom = Load Type = Ea	0.0 # 1.00 ft 0.00 ft arth (H)	t/ft t Ft	Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist	= 0.0 lbs = 0.00 ft = 0.00 ft Line Load
Axial Dead Load Axial Live Load Axial Load Eccentricity	= 0.0 lbs = 0.0 lbs = 0.0 in	(Se Wind on Exposed Stem = (Service Level)	o.0 p	evel) E sf F	Base Above/Below Soil at Back of Wall Poisson's Ratio	= 0.0 ft = 0.300
Design Summary		Stem Construction		Bottom		
Wall Stability Ratios Overturning Sliding Total Bearing Load	= 2.62 OK = 1.21 Ratio < = 11,305 lbs	Design Height Above Ft Wall Material Above "Ht Design Method Thickness Rebar Size Rebar Spacing	€ ft = " = = = =	0.00 Concrete LRFD 10.00 # 5 4.00		
Soil Pressure @ Toe Soil Pressure @ Heel Allowable	= 1,554 psf OK = 1,185 psf OK = 2,000 psf	Rebar Placed at Design Data fb/FB + fa/Fa Total Force @ Section Service Level	= =	Edge 0.775		
ACI Factored @ Toe ACI Factored @ Heel	= 2,176 psf = 1,659 psf	Strength Level MomentActual Service Level	lbs =	5,760.0		
Footing Shear @ Heel Allowable	= 10.2 psi OK = 69.4 psi OK = 75.0 psi	Strength Level MomentAllowable	ft-# = =	23,040.0 29,672.1		
Sliding Calcs Lateral Sliding Force less 100% Passive Force less 100% Friction Force	= 4,444.4 \bs = - 1,404.9 \bs = - 3,956.7 \bs	ShearActual Service Level Strength Level ShearAllowable	psi = psi = psi =	58.6 75.0		
Added Force Req'd for 1.5 Stability	= 0.0 lbs OK = 1,305.1 lbs NG	Anet (Masonry) Rebar Depth 'd' Masonry Data	in2 = in =	8.19		
Vertical component of active considered in the calculation	lateral soil pressure IS of soil bearing pressure	Fs Solid Grouting es. Modular Ratio 'n'	psi = psi = = =	105.0		
Load Factors Building Code Dead Load Live Load	IBC 2018,ACI 1.200 1.600	Short Term Factor Equiv. Solid Thick. Masonry Block Type	psr = = =	Medium We	sight	
Earth, H Wind, W Seismic, E	1.600 1.000 1.000	fc Fy	= psi = psi =	2,500.0 60,000.0		



RetainPro (c) 1987-2019, Build 11.19.11.12 License : KW-06061297 License To : CSES, Inc	2 Cantilevered	Retaining Wall	Code: IBC 2018,ACI 318-14,TMS 402-16
Concrete Stem Rebar Area	Details		
Bottom Stem As (based on applied moment) :	Vertical Reinforcing 0.6507 in2/ft	Horizontal Reinforcing	
(4/3) * As : 200bd/fy : 200(12)(8.1875)/60000 :	0.8676 in2/ft 0.3275 in2/ft	Min Stem T&S Reinf Area Min Stem T&S Reinf Area	a 3.000 in2 a per ft of stem Height : 0.240 in2/ft
0.0018bh : 0.0018(12)(10) :	0.216 in2/ft	Horizontal Reinforcing Op	ptions :
Required Area : Provided Area : Maximum Area :	0.6507 in2/ft 0.93 in2/ft 1.1092 in2/ft	#4@ 10.00 in #4@ 2 #5@ 15.50 in #5@ 3 #6@ 22.00 in #6@ 4	20.00 in 31.00 in 44.00 in
Footing Data	Footing Des	sign Results	
Toe Width=Heel Width=Total Footing Width=Footing Thickness=Key Width=CKey DepthKey Distance from Toe=fc=2,500 psiFyFooting Concrete Density=Min. As %=Cover @ Top2.00@ Btm.=	2.00 ft5.00Factored Pressure7.00Mu' : Upward6.00 inMu' : Downward0.00 inActual 1-Way Sheat0.00 inActual 1-Way Sheat0.00 ftToe Reinforcing000 psiHeel Reinforcing0.00 pcfKey Reinforcing018Footing Allow. Torsion, To	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	I 9 psf 0 ft-# 8 ft-# 8 ft-# 3 psi 0 psi 50 ft-lbs 00 ft-lbs
	If torsion exce supplemental	eds allowable, provide design for footing torsion.	
	Other Acceptable Toe: #4@ 6.93 Heel: #4@ 6.93	e Sizes & Spacings in, #5@ 10.75 in, #6@ 15.2 in, #5@ 10.75 in, #6@ 15.2	7 in, #7@ 20.82 in, #8@ 27.42 in, #9@ 34 7 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

OVERTURNING							RESISTING			
Item		lbs	Distance	e M	oment ft-#			Force Ibs	Distance ft	Moment ft-#
HL Act Pres (ab water tb	1)	4,444.4	4.44		9,753.1	Soil Over HL (ab. wa	ter tbl)	6,250.0	4.92	30,729.2
HL Act Pres (be water tb Hydrostatic Force	)					Soil Over HL (bel. wa Watre Table	ter tbl)		4.92	30,729.2
Buoyant Force	=					Sloped Soil Over Hee	=			
Surcharge over Heel	=					Surcharge Over Heel	=			
Surcharge Over Toe	=					Adjacent Footing Load	d =			
Adjacent Footing Load	=					Axial Dead Load on S	tem =			
Added Lateral Load	=					* Axial Live Load on Ste	em =			
oad @ Stem Above Soi	=					Soil Over Toe	=	375.0	1.00	375.0
	=					Surcharge Over Toe	=		1.00	0.0.0
						Stem Weight(s)	=	1.562.5	2 42	3 776 0
						Earth @ Stem Transit	ions =	.,		0,170.0
lotal	=	4,444.4	O.T.M.	= 1	9,753.1	Footing Weight	=	1,400.0	3.50	4,900.0
	Matter 199					Key Weight	=			.,
Resisting/Overturning	g Rati	0	=	2.62		Vert. Component	=	1,717.4	7.00	12,021,6
ventical Loads used to	or 501	Pressure =	= 11,30	04.9 lb	S	т	otal -	11 304 0 1	DM-	54 004 0

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.

Seismic, E

1.000

Fy

psi = 60,000.0

License : KW-06061297 License To : CSES. Inc				Cantilevered Retai	ning	Wall	Code: IBC 2018,A	CI 318-14,TMS 402-1
Criteria			S	oil Data				
Retained Height Wall height above soil Slope Behind Wall	= = =	6.00 ft 0.00 ft 0.00	All Eq	ow Soil Bearing = uivalent Fluid Pressure Meth tive Heel Pressure =	2,000 nod 50	0.0 psf 0.0 psf/ft		
Height of Soil over Toe Water height over heel	=	0.00 in 0.0 ft	Pa So So Fo	ssive Pressure = il Density, Heel = il Density, Toe = oting  Soil Friction =	350 125.0 125.0 0.40	0.0 psf/ft 00 pcf 00 pcf 00		
			So	il height to ignore or passive pressure =	12.0	0 in	•	•
Surcharge Loads			L	ateral Load Applied to	Ster	m	Adjacent Footing	Load
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Ove	g & Ov = erturnir	100.0 psf rerturning 0.0 ng	La 1 1	teral Load = Height to Top = Height to Bottom =	0.0 1.00 0.00	#/ft ft ft	Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist	= 0.0 lbs = 0.00 ft = 0.00 in = 0.00 ft
Axial Load Applie	d to s	Stem		(Se	ervice	Level)	Footing Type	Line Load
Axial Dead Load Axial Live Load	=	0.0 lbs 0.0 lbs	W (S	ind on Exposed Stem = Service Level)	0.0	psf	at Back of Wall	= 0.0 ft
Axial Load Eccentricity	= aiem	0.0 in	-				Poisson's Ratio	= 0.300
Method : Uniform	213111	ic Loau		· · · · · · · · · · · · · · · · · · ·				
Multiplier Used (Multiplier used on soil of	= density	8.000 /)	To	al Seismic Force = 5	6.000 2.000			
Design Summary			S	tem Construction	-	Bottom		
Wall Stability Ratios Overturning Sliding	= =	2.73 OK 1.16 Rati	0 < 1.5	Design Height Above Ft Wall Material Above "Ht Design Method Thickness	ç ft = " = =	= 0.00 = Concrete = LRFD = 8.00		
Total Bearing Loadresultant ecc.	=	5,174 lbs 6.78 in		Rebar Size Rebar Spacing Rebar Placed at	=	# 4 9.00 Edge		
Soil Pressure @ Toe Soil Pressure @ Heel Allowable	= =	1,739 psf 275 psf 2,000 psf	OK OK	fb/FB + fa/Fa Total Force @ Section	=	0.707		
ACI Factored @ Toe ACI Factored @ Heel	s I nar = =	2,434 psf 386 psf		Strength Level	lbs =	2,160.0		
Footing Shear @ Foe Footing Shear @ Heel Allowable	= =	0.0 psi 50.2 psi 75.0 psi	OK OK	Strength Level MomentAllowable	ft-# =	5,040.0 7,122.4		
Sliding Calcs Lateral Sliding Force less 100% Passive Force	= .	1,779.4 lbs 0.0 lbs		ShearActual Service Level Strength Level	psi=	28.8		
less 100% Friction Force Added Force Req'd	e = - =	2,069.5 lbs 0.0 lbs (	OK	ShearAllowable Anet (Masonry)	psi = in2 =	75.0		
ror 1.5 Stability	=	599.6 lbs	NG	Rebar Depth 'd' Masonry Data fm Fs	in = psi =	6.25		
Vertical component of activ considered in the calculatio	e later n of so	al soil pressure bil bearing pres	sures.	Solid Grouting Modular Ratio 'n' Wall Weight	=	100.0		
Load Factors Building Code Dead Load	IB	C 2018,ACI 1.200		Short Term Factor Equiv. Solid Thick.	=	Modium 14	laicht	
Live Load Earth, H		1.600		Masonry Design Method Concrete Data	=	ASD	reight	
Wind, W		1.000		fc	psi=	2,500.0		

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Concrete Stem Reba	r Area Details				
Bottom Stem As (based on applied mom	Vertica ent) : 0.1888	al Reinforcing	Horizontal Reinf	forcing	
(4/3) * As : 200bd/fy : 200(12)(6.25)/60 0.0018bh : 0.0018(12)(8) :	0.2518 000 : 0.25 in 0.1728	in2/ft 2/ft in2/ft	Min Stem T&S F Min Stem T&S F Horizontal Reinf	Reinf Area 1.15 Reinf Area per f forcing Options	2 in2 t of stem Height : 0.192 in2/ft :
Required Area : Provided Area : Maximum Area :	 0.25 in 0.2667 0.8467	2/ft : in2/ft : in2/ft :	One layer of : #4@ 12.50 in #5@ 19.38 in #6@ 27.50 in	Two layers o #4@ 25.00 #5@ 38.75 #6@ 55.00	if : in in
Footing Data		Footing Desig	gn Results		
Toe Width Heel Width Total Footing Width Footing Thickness Key Width Key Depth Key Distance from Toe fc = 2,500 psi F Footing Concrete Density Min. As % Cover @ Top 2.00	= 0.00 ft = 4.67 = 12.00 in = 0.00 in = 0.00 in = 0.00 ft y = 60,000 psi = 150.00 pcf = 0.0018 @ Btm.= 3.00 in	Factored Pressure Mu': Upward Mu: Downward Mu: Design Actual 1-Way Shear Allow 1-Way Shear Toe Reinforcing Heel Reinforcing Key Reinforcing Footing Torsion, Tu Footing Allow. Torsio	Toe = 2,434 = 0 = 0 = 0.00 = 0.00 = 4 @ 9.00 = # 4 @ 9.00 = None Spec = n, phi Tu =	Heel 386 psf 0 ft-# 12,951 ft-# 12,951 ft-# 50.16 psi 75.00 psi in in 'd 36,616.50 ft-II 8,640.00 ft-II	bs
		If torsion exceed supplemental de Other Acceptable S Toe: Not req'd: M Heel: #4@ 9.25 in, Key: No key defin Min footing T&S re	Is allowable, pr ssign for footing lizes & Spacin u < phi*5*lambd , #5@ 14.34 in, s led inf Area	rovide g torsion. gs a*sqrt(fc)*Sm #6@ 20.36 in, # 1.21 in	#7@ 27.77 in, #8@ 36.56 in, #9@ 46 2

Min footing T&S reinf Area per foot If one layer of horizontal bars: #4@ 9.26 in #5@ 14.35 in #6@ 20.37 in

0.26 in2 /tt If two layers of horizontal bars: #4@ 18.52 in #5@ 28.70 in #6@ 40.74 in

Moment

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

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Summary of Overturning & Resisting Forces & Moments

.....RESISTING .....

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

Distance

		OV	ERTURNING	
Item		Force lbs	Distance	Moment ft-#
HL Act Pres (ab water tbl) HL Act Pres (be water tbl) Hydrostatic Force	)	1,225.0	2.33	2,858.3
Buoyant Force	=			
Surcharge over Heel	=	280.0	3.50	980.0
Surcharge Over Toe	=			
Adjacent Footing Load	=			
Added Lateral Load	=			
Load @ Stem Above Soil	=			
Seismic Earth Load	=	274.4	3.50	960.4
	=			
Total	=	1,779.4	O.T.M. =	4,798.7
Resisting/Overturning	Rati	io	=	2.73

Resisting/Overturning Ratio Vertical Loads used for Soil Pressure =

5,173.7 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) 0.062 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.

_		lbs	ft	ft-#
Soil Over HL (ab. water tbl)		3,000.3	2.67	8,001.2
Soil Over HL (bel. wate Watre Table	er tbl)		2.67	8,001.2
Sloped Soil Over Heel	=			
Surcharge Over Heel	=	400.0	2.67	1,066.8
Adjacent Footing Load	=			
Axial Dead Load on Ste	em =			
* Axial Live Load on Ster	m =			
Soil Over Toe	=			
Surcharge Over Toe	=			
Stem Weight(s)	=	600.0	0.33	200.0
Earth @ Stem Transitio	ns=			
Footing Weight	=	700.1	2.33	1,633.6
Key Weight	=			
Vert. Component	=	473.4	4.67	2,209.1
То	tal =	5,173,7 I	bs R.M.=	13,110,7

Force

License : KW-06061297 License To : CSES, Inc	ia 11.1	19.11.12		Cantilevered Retain	ning	Wall	Code: IBC 2018,A	CI 318-14,TMS 402-16
Criteria				Soil Data				
Retained Height Wall height above soil Slope Behind Wall	=	9.00 ft 0.00 ft 0.00		Allow Soil Bearing = Equivalent Fluid Pressure Meth Active Heel Pressure =	2,000 od 50	0.0 psf 0.0 psf/ft		
Water height over heel	-	6.00 m 0.0 ft	F	Passive Pressure = Soil Density, Heel = Soil Density, Toe = Footing  Soil Friction = Soil height to ignore for passive pressure =	350 125.0 125.0 0.40 12.00	0.0 psf/ft 00 pcf 00 pcf 00 00 in		
Surcharge Loads				Lateral Load Applied to	Ster	n 📕	Adjacent Footing	Load
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Over Axial Load Applied Axial Dead Load	= & Ov turnin to \$	0.0 psf erturning 100.0 ng Stem 0.0 lbs	- - - -	Lateral Load = Height to Top = Height to Bottom = Load Type = Ear (Se Wind on Exposed Stem	0.0 1.00 0.00 th (H) rvice I	#/ft ft ft Level)	Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist Footing Type Base Above/Below Soil	= 0.0 lbs = 0.00 ft = 0.00 in = 0.00 ft Line Load = 0.0 ft
Axial Live Load Axial Load Eccentricity	=	0.0 lbs 0.0 in		(Service Level)	0.0	psi	at Back of Wall Poisson's Ratio	= 0.300
Design Summary			[	Stem Construction	-	Bottom		
Wall Stability Ratios Overturning Slab Resist	= ts All	1.57 OK Sliding !		Design Height Above Ft Wall Material Above "Ht Design Method Thickness	ft =	Stem OK 0.00 Concrete LRFD 8.00		
Total Bearing Loadresultant ecc.	=	3,698 lbs 7.18 in		Rebar Size Rebar Spacing Rebar Placed at	=	# 4 6.00 Edge		
Soil Pressure @ Toe Soil Pressure @ Heel Allowable Soil Pressure Less	= = Thar	1,036 psf 0 135 psf 0 2,000 psf Allowable	OK	Design Data fb/FB + fa/Fa Total Force @ Section Service Level	= lbs =	0.934		
ACI Factored @ Toe ACI Factored @ Heel	=	1,450 psf 189 psf		Strength Level MomentActual	lbs =	3,240.0		
Footing Shear @ Toe Footing Shear @ Heel Allowable	=	17.3 psi C 19.3 psi C 75.0 psi	OK OK	Service Level Strength Level MomentAllowable	ft-# = ft-# = =	9,720.0 10,400.4		
Lateral Sliding Force	=	2,500.0 lbs		Service Level Strength Level ShearAllowable Anet (Masonry) Rebar Depth 'd'	psi = psi = psi = in2 = in =	43.2 75.0 6.25		
Vertical component of active considered in the calculation	e later	ral soil pressure oil bearing press	IS	fm Fs Solid Grouting Modular Ratio 'n' Wall Weight	psi = psi = = psf =	100.0		
Building Code Dead Load Live Load Earth, H	IB	C 2018,ACI 1.200 1.600 1.600		Short Term Factor Equiv. Solid Thick. Masonry Block Type Masonry Design Method	=	Medium W ASD	/eight	
Wind, W Seismic, E		1.000		fc Fy	psi = psi =	2,500.0 60,000.0		



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Concrete Stem Rebar Area Deta	ails					
Bottom Stem As (based on applied moment) :	Vertical Reinforcing 0.3642 in2/ft	Horizontal Reinforcing				
(4/3) * As :	0.4856 in2/ft	Min Stem T&S Reinf Area 1 728 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 in 2/6				
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options				
	===========	One laver of Two	lavers of :			
Required Area :	0.3642 in2/ft	#4@ 12.50 in #4	@ 25.00 in			
Provided Area :	0.4 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	Footing De	sign Results				
Toe Width= $3.50$ Heel Width= $1.17$ Total Footing Width= $4.67$ Footing Thickness= $12.00$ Key Width= $0.00$ Key Depth= $0.00$ Key Distance from Toe= $0.00$ fc= $2,500$ psiFyFooting Concrete Density= $150.00$ Min. As %= $0.0018$ Cover @ Top $2.00$ @ Btm.=State $3.00$	ft Factored Pressum Mu': Upward in Mu': Downward Mu: Design in Actual 1-Way Shea ft Toe Reinforcing psi Heel Reinforcing pcf Key Reinforcing Footing Torsion, T 00 in Footing Allow. Tor If torsion exce supplemental Other Acceptable Toe: #4@ 9.25 Heel: Not req'd: Key: No key de	$\begin{array}{rcrcr} & & & & & & & \\ \hline & & & & & \\ e & & & & & \\ & & & & & \\ & & & &$	teel 189 psf 0 ft-# 965 ft-# 926 psi 0.00 psi 16.50 ft-lbs 10.00 ft-lbs 10.36 in, #7@ 27.77 in, #8@ 36.56 in, #9@ 46 fc)*Sm			

Min footing T&S reinf Area per If one layer of horizontal bars:

#4@ 9.26 in #5@ 14.35 in #6@ 20.37 in

0.26 in2 /ft
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

		OV	ERTURNIN	G		R	RESISTING		
Item		lbs	Distance ft	ft-#		Force	Distance ft	Moment ft-#	
HL Act Pres (ab water tb HL Act Pres (be water tb Hydrostatic Force	l) l)	2,500.0	3.33	8,333.3	Soil Over HL (ab. water tb) Soil Over HL (bel. water tb) Watre Table	l) 562.9 I)	4.42 4.42	2,486.1 2,486.1	
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 =				
oad @ Stem Above Soi	=				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	
Total	-	0.500.0			Earth @ Stem Transitions =			0,100.0	
Total	=	2,500.0	0.T.M. =	8,333.3	Footing Weight =	700.1	2.33	1.633.6	
Decisting (O	-			Ing 1 August 17	Key Weight =				
Vertical Loads used for	g Rati	O Brocouro	=	1.57	Vert. Component =	966.0	4.67	4,508.4	
Vertical Loads used in	01 301	- Fiessule -	- 3,097.	I IDS	* Axial live load NOT includer	3,697.7 II	s R.M.=	13,073.4	

resistance, but is included for soil pressure calculation. overturning

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.
John S. Apolis, P.E.	CSE	S, Inc.	Job number: 2019.0					
Project:	4270		Date:	19-Dec-19				
Owner:		Pa	age number:	F22				
SLAB DESIGN (Uniform Load, Simple Span)								
2015 INT. Building C	ode (ZBC)			ACI 318				
<b>Beam Description:</b>								
Material Properties								
Fy:	60000 psi	Paul	2500					
Es:	29000000 psi	TC:	2500 psi					
β1:	0.85	ov: 0.75	2850000 psi om: 0.9					
		P salest cost.	ţını dış					
Geometry and Loads:	10.0							
Span:	12 ft	Tributary Width:	1 ft					
Add'I unif DI :	100 pst	LL unit load:	50 psf					
Point DL:	lb/π	Add'I unif. LL:	16/1	ft				
Point Location:	2 ft	Point LL:	Ibs					
	2 11							
Depth:	8 in	Width:	12 in					
<u>d:</u>	5 in							
Transfer I. I.								
Force analysis:	42200 in the							
iviu.	43200 m-10s	Vu:	1200 lbs					
Reinforcement:								
Center Bars	(1) #	4						
As:	0.20 In^2							
ρ:	0.002							
Design:								
a:	0.46 in	0	0.54 in					
tensile strain:	0.025	>	0.04 m					
φMn:	50,565 in-lbs	>	43.200 OK					
φVc:	4500 lbs		10,200 011					
φVn:	4500 lbs	>	1200 <b>OK</b>					
Shear Reinforcem	nent Required for: <u>-5.3</u>	from supports.						
Deflections:								
Ig:	512 In^4	Mcr:	48000 In-II	05				
Icr:	36 In^4	Ie:	512 In^4					
LL Deflection	0.0160 in		0007					
DL Deflection:	0.0320 in	L/	2 00					
TL Deflection:	0.0799 in	λΔ. I /	1801 OK	>1/360				
	citizz m	L	TOUT OK.	- 11300				

John S. Apolis, P.E.		CSES	Inc.	Ic	h number	. 21	10 080
Project:	4270		,	50	Doto		17.009
Owner:				D	Date	. 24	2-Apr-21
CONCRETE DE A	MDDOLO			Pag	ge number		F23
CONCRETE BLA	IN DESIG	in (Un	iform Load	l, Simp	ole Span)		
2018 Seattle Building Co	de (SBC)						ACI 318
Beam Description:		Grade E	Beam				
Material Properties:							
Fy:	60000	) psi		fc:	2500	) psi	
ES:	2900000	) psi		Ec:	2850000	) psi	
pr:	0.85	1	φv: 0.75		φm	: 0.9	
Geometry and Loads:							
Span:	14	Ĥ	Tributar	Width	10	0	
DL unit load:	100	) psf	IIIouai	width:	12	π.	
Add'l unif. DL:		lb/tt	Addil	unif II.	50	15/A	
Point DL:	0	lbs	FIGUIT	oint LL.		ID/It	
Point Location:	0	ft		onne DD.		103	
Donth	10						
Deptil:	18	in		Width:	18	in	
<u>u.</u>	15	111					
Force analysis:							
Mu:	705600	in-lbs		Vu:	16800	lbs	
Deinfer							
Ten Bakan	(1)		_				
Top Reber:	(4)	#5	Bottor	n Rebar:	(4)		#5
A5.	1.25	In 2		As:	1.23	In^2	
Ties	(1)	#2	07	ρ:	0.004		
1103.	(1)	#5	@ 7.5 in	0.C.	OK		
Design:							
a:	1.92	in		c:	2.26	in	
tensile strain:	0.017		>		0.005	OK	
φMn:	930,237	in-lbs	>		705,600	OK	
φVc:	20250	lbs		oVs:	9940	lbs	
φVn:	30190	lbs	>		16800	OK	
Shear Reinforceme	ent Required for:	2.8 ft	from support	s.			
Deflections:							
Ig:	8748	In^4		Mer	364500	In lhe	
Icr:	1894	In^4		Ie:	2839	In-ibs	
LL Deflect							
DI Deflection:	0.0641	in		L/	2621	<u>OK</u>	
TL Deflection:	0.1282	in		λΔ:	1.68		
L Denecuon:	0.2796	m		L/	601	OK,	> L/360

CALCULATING DEAD LOAD SLAB: 100 PSF × 2300 FT = 230000 16 GRADE BEAMS : (1.5'×1.5' × 150 PCF) × 166' = 56025 16 RET. WALLS : 1863 16/FT × 159 = 296217 16 WOOD WALLS : (20'x 236') × 12 PSF = 5664016 WOOD FLOORS: (2300 FT = 2 FLOORS × 12 PSF) = 4766416 ROOF = (2300 FT \* 12 PSF) = 27600 16 ---> TOTAL = 71414616 = P CALCULATING SLIDING FORCES F= 3703 16/FT × 24 + 3923 16/FT × 22 + 3703 16/FT × 28 = 278862 16 P×0.35 = 249951 16 < DEAD LOAD RESISTING SLIDING Fz - 24995/16 = 2891116 CALCULATING PASSIVE FORCE Vp = 350 pcf × 2.5 × 2.5/2 - 350 pcf × 1 × 1/2 = 918 AIF Fp = 918 pif x 82 = 75276 16 > 28911 16 V Project No. 2019.089 Date 3/20/20 CONSULTING STRUCTURAL ENGINEERING SERVICES Project Name 4220 Residential and Commercial Structural Design 6311 17th Avenue NE, Seattle, WA 98115 Comments \_\_\_\_\_ Phone: (206)527-1288 Email: john@cses-engineering.com Revision \_\_\_\_\_ Page \_F 25

PILE DESIGN 4'R PILES CAP = 20" WHU SLAB GARAGE NOTON WALC -> W = 2,220 pl4 + 1,950 pl6 + (100 ps+ + 40 ps+) x6 Sail +  $0.5' \times 10.9' \times 130 \text{ pcf} = 5,692 \text{ plf} \frac{20^{14}}{5.74\%} 3.5' \text{ o-l.}$ (EAST WALL SIMILAR) NORTH HOUSEWALLS = CU = 5,682p4 +1,740p4-2220p4- 5,212p4 201/52144 = 3.75'0.0 OVER TURNING SUPPORTS - 6,509 pt - 6514EE 3'0.C. WEST WALL- W= 5,692 pt - 2,220 pt + 440 pt = 3,912 pt 3912 - 5'al. GREBEAMS W= 1.5x1.5x150pf + 12 × 140psf \$ 2000 ptf 100.0 GARGE OPENING W= 2,603p4 + 15×1.5×150pG+ 6×140pS+= 3,783\* 38 - 5.25 0. C. DETAIL (FS) B SIMILAR W=11,305#-ft REFEIS 11-3- 1.75 PILES@ 1.75'or. SEWALLS QJ=7,175 pl++ 1.5×1.5 × 150 ps++ G <140 ps+= 3,353 p+ 20/33 - 6 0.0 Project No. 2019.089 Date 5/26/21 CONSULTING STRUCTURAL ENGINEERING SERVICES Project Name 4270 ARDEKANI Residential and Commercial Structural Design 6311 17th Avenue NE, Seattle, WA 98115 Comments \_\_\_\_ Revision \_\_\_\_\_ Page \_\_\_\_\_\_ F26-,4 Phone: (206)527-1288 Email: john@cses-engineering.com

John S. Apolis, P.E Project: Architect:	2. 4270 A	CSES, Inc. rdekani	Job number: Date: Page number:	2019.089 20-Nov-20 F27				
Pile Supported F	Pile Supported Retaining Wall							
2015 International Bu	ilding Coo	le (IBC)			]			
Seismic Condition: Overturn	ing Factor o	f Safety = 1.2, Sliding Fa	ctor of Safety	= 1.1				
Design Information:	SHOR	T RETAINING	WALL	-				
Concrete Weight:	150 pcf	Pile Capacity:	6000 lbs	Soil Weight:	130 pcf			
Friction Coefficient:	0.35	Passive Pressure:	350 pcf	Ignore Soil Height:	12 in			
<u>Wall Information:</u> Wall Height: Triangular Loads:	4.0 ft	Wall Thickness:	6 in					
Uniform Loads:		Slah surcharge:	0 pcf	Seismic Pressure:	0 pcf			
		ondo surcharge.	0 psr	Seismic Pressure:	40 psf			
Footing Information:								
Length from face:	12 in	Thickness:	12 in					
Heel Length:	18 in	Soil Over Toe:	12 in					
Forces and Moments: Wall weight:	300 lbs/ft	(sum moments about be Wall location:	ottom of heel	corner)	6200 lh :-			
Footing Weight:	280 lbs/ft	Footing location:	30 in	Footing moment:	8400 lb in			
Axial Load:	0 lbs/ft	Load location:	0 in	Avial moment:	0.1b in			
Soil Behind Wall:	1005 lbs/ft	Load location:	9 in	Soil moment:	010-III 9045 lb in			
Uniform load:	200 lbs/ft	Uniform location:	30 in	Uniform moment:	6000 lb-in			
Triangular Load:	625 lbs/ft	Triangular location:	20 in	Triangular moment:	12500 lb-in			
				Q				
Pile 2 Load:	1408 lbs/ft	Pile 2 Location:	30 in	Pile 2 moment:	42245 lb-in			
Pile I Load:	177 lbs/ft	Pile 1 Location:	6 in	Pile 1 moment:	0 lb-in			
Pile Specification: Min. pile 2 spacing: Pile 2 spacing:	51 in 48 in	Min. pile 1 spacing: Pile 1 spacing:	407 in					
Pile 2 moment:	45000 lb-in	Pile 1 moment	6000 lb in					
Design Pile 2 Loading: Overturning Moment:	5633 lbs 42245 lb-in	Design Pile 1 Loading: Resisting Moment:	1061 lbs 51000 lb-in	Safety Factor:	<u>1.21</u>			
Shung Demand:	825 Ibs/ft	Sliding Resistance:	1080 lbs/ft	Safety Factor:	1.31			



## Melissa Lookups: Personator Result

and the second	a series and an end of the series of the product to manufacture that the series of the series of the series of the
Name & Add AS01,AS16,DA00,DA10	dress Verified
Name at Address	Millad Llc Name & Address Match (VR01)
Address	4270 E Mercer Way Mercer IslandWA <u>98040-3824</u> 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





## OSHPD

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

Latitude, Longitude: 47.5706712, -122.2080915000002





MCER Response Spectrum





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John S. Apolis, P.E.		CSES, Inc.		Jo	b number:	2019.089	
Project:	4270 Ardekan	ni			Date:	20-Nov-19	
Architect:				Pag	e number:	L1	
Lateral Loads Des	ign per ASC	E 7-10, W	Vind: Se	ection 27	Seismic:	Section 1	2
(Directional Procedu	re Part 1)				2015 Se	attle Building	Code (SBC)
WIND LOADS	110	mph Basic W	vind Speed	l			2015 NDS
Ps = lambda * Kzt * Ps	s(30) * 0.6	Exposure :	С	Roof Slope:	0.00	:12 =	0.0
Least Horizontal Dim	nension, feet:	27	Mean	Roof Ht, feet:	32		(degrees)
Risk Category:	II		K	Zzt =	1.00		(
Directionality Factor:	Kd =	0.85	Gust-Eff	ect Factor:	G =	0.85	
Enclosure Classificatio	on:		Enclosed		Gcpi =	0.18	-0.18
]	Horizontal wind p	pressure on wa	alls at spec	ified heights	of structure.		
Significant Heights of	structure (ft)	EQ 27.3-1 \	/elocity Pr	essure (psf):	EQ 27.4-	1 Design Pres	sures (psf):
1	10		22.4			17.6	
2	20		23.7			18.5	
3	30		25.8			19.9	
	Horizontal ar	nd vertical wir	nd pressure	e on roof of st	ructure.		
Horizont	al roof pressure:	0.0	psf				
Vertical	/uplift pressure:	12.0	psf				
Vertical/uplift pressur	e on overhangs:	13.3	psf				
(Equivalent Lateral F	orce Procedu	re, Section	12.8)				
SEISMIC LOADS	Ie	1.0	R =	6.5	ASCE 7-10	, Table 12.2.1	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	В	ased 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	4-1
S1 =	0.5380		Sm1	= Fv * S1 =	0.81	Equation 11.4	4-2
Equations 11.4-3, 11.4-4	Sds = 2	/3 * Sms =	0.93	Sd1 = 2/2	3 * Sm1 =	0.54	
Equation 12.14-11	Cs(or%V) = (Sd	(R/I) =	0.144	Building per	riod < 0.5 s	per IBC eq 1	2.8-7

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)

	Roof or Floor	Wall DL (psf)	Story Height	La	teral
Base = top of foundation	DL (psf)	dist. over floor	area Above Base (ft)	Load	d (psf)
Roof	16	8	30		3.57
Second floor	12	10	20		2.18
First floor	12	10	10		1.09
	1.5.52				0.00
Total Seismic DL:	68		S	Sum	6.84

L = 4.5 + 4'SHEAR WALL DESIGN - NORTH WALL- UPPER FLOOR P. = [(5.5 × 5) × 19.9 psf] = 548 16 P\_= = [(52' × 7') × 3.57 ps+] = 1300 16 = CONTROLS V = 1300 16/8.5' = 153 pit < 230 pit SWI UPLIFT = 153 PIX × 11' = 1683 16 < 1705 16 <516 < 3900 16 MSTC48 B3 MAIN FLOOR - L= 3'+3' Rw = [(4.5 × 11) × 18.5 ps+] + 54816 = 146416 PE = (8 × 28) × 2.18 pst + 1300 16 = 1789 16 = CONTROLS V= 1789 46/6 = 299 11+ V\* = 249 AIT / 1.25-0.125 × 10.5'3' = 368 AIT < 550 AIT SW3 UPLIFT = 1683 16 + [(368 MF × 10.5)] = 5547 16 < 5820 16 HOUR 4643516 SB7/8×24 3864 14 Project No. 2019,089 Date 11/20/19 CONSULTING STRUCTURAL ENGINEERING SERVICES Project Name 4270 Residential and Commercial Structural Design Comments \_\_\_\_\_

6311 17th Avenue NE, Seattle, WA 98115 Phone: (206)527-1288 Email: john@cses-engineering.com

Revision \_\_\_\_\_ Page \_\_\_\_ Revision \_\_\_\_\_\_ Page \_\_\_\_ Revision \_\_\_\_\_ Page \_\_\_\_ Page \_\_\_\_ Revision \_\_\_\_\_ Page \_\_\_\_ Revision \_\_\_\_\_ Page \_\_\_\_ Page \_Revision \_\_\_\_ Page \_\_\_\_ Page \_\_\_\_\_ Page \_\_\_\_\_ Page \_\_\_\_ Page \_\_\_\_ Page \_\_\_\_ Page \_\_\_\_ Page \_\_\_\_\_ Page \_\_\_\_\_ Page \_\_\_\_\_ Page \_\_Revision \_\_\_\_ Page \_\_\_\_ Page \_\_\_\_\_ Page \_\_\_\_\_ Page \_\_\_\_\_ Page \_\_\_\_\_ Page \_\_Revision \_\_\_\_ Page \_\_\_\_ Page \_\_\_\_\_ Page \_\_\_\_\_ Page \_\_\_\_\_ Page \_\_\_\_\_ Page \_\_Revision \_\_\_\_ Page \_\_\_\_ Page \_\_\_\_\_ Page \_\_\_\_\_\_ Page \_\_\_\_\_ Page \_\_\_\_\_ Page \_\_Revision \_\_\_\_ Page \_\_\_\_ Page \_\_\_\_ Page \_\_\_\_\_\_ Page \_\_\_\_\_ Page \_\_\_\_\_ Page \_Rev

SHEAR WALL DESIGN - EAST WALL - UPPER FLOOR L=28' P, = [(5.5 × 11') × 19.9 ps+] = 1204 16 PE = (11 × 34 × 3.57 NSF) = 1336 16 = CONTROLS V=133616/28=48117 < 230 117 SW1 UPLIFT = 48 NF × 10.5 = 504 16 < 1705 16 CS16 MAIN FLOOR - L= 28 PW = [(11 × 18) × 18,5 pst ] + 1204 16 + (2518 16 × 14/36') = 5847.16 € CONTROCS  $P_{E} = \left[ (18' \times 70') \times 2.18 \text{ psf} \right] + 1336 \text{ b} t(3006 \text{ lb} \times \frac{14'}{36'}) = 5352 \text{ lb}$ V=5847 16/28=209 117 = 230 117 SWI UPLIFT = (209 DIF × 10.5) + 504 16 = 2699 16 < 4340 16 HDU5 < 34/0 16 (2)(3/6 LOWER FLOOR - L= 11 PW=(5847 16 × 16/28) + (11 × 5) × 17.6 PSF] = 4310 16 = CONTROLS PE = (5252 16 × 6/28') + (11 × 32) × 1.09 1587 = 3385 16 V=4310 16/11 = 392 11+ < 550 11+ SW3 UPLIFT = 2699 16 + 392 11+ × 10 = 6617 16 < 8030 16 HOWII < 8030 16 5B/×30 Project No. 2019.089 Date 11/20/19 CONSULTING STRUCTURAL ENGINEERING SERVICES Project Name 4220 Residential and Commercial Structural Design 6311 17th Avenue NE, Seattle, WA 98115 Comments \_\_\_\_\_ Phone: (206)527-1288 Email: john@cses-engineering.com Revision \_\_\_\_\_ Page \_\_\_\_\_

SHEAR WALL DESTIGN - SOUTH EAST WALL - UPPER FLOOR L= 11.5'  $P_{W} = [11.5' \times 5.5' \times [9.9] P_{SF}] = 1258 IL$   $P_{F} = [11.5' \times 82' \times 3.57] P_{SF}] = 3367 IB = CONTROLS$ V = 3367 16 / 11.5 = 293 PIF = 350 PIF SW2 UPLIFT = 293 NF × 10-5' = 3077 48 < 3900 18 MSTC48B3 < 3410 16 (2) 516 SOUTH MID WALL - UPPER FLOOR L=7 P. = [5.5' × 5.5' × 19.9 pg] = 602 16 PE = [4'×67'×3.57 PSF] = 957 B = CONTROLS V = 9576/7'= 132 plf < 230 ME SWI VPLIFT = 137 PIF × 10.5' = 1436 18 = 1705 18 516 MAIN FLOOR - L = 8.5 + 3.5 = 12 PERFORATED SHEAR WALL PW = 602 10 + [(19/27) × 1258 16] + [13'×11' × 18.5 PS+] = 41.33 18 = CONTROLS P= = 957 13 + [(19/27) × 3367 13] + [4'×82' × 2.18 157] = 4042 16 V = 4/33 16/12' = 345 NIF < 550 NIF SW3 UPLIFT = 1436 16 + (345 MIF × 10.5') = 5059 16 UPLIFT\* = 5059 16 + (345 PIF × 7.5') = 7647 16 < 8030 16 HOU 11 UNIFORM UPLIFT < 8030 16 5B1×30 Project No. 2019.089 Date 5/11/2020 CONSULTING STRUCTURAL ENGINEERING SERVICES Project Name 4270 Residential and Commercial Structural Design Comments \_\_\_\_\_ 6311 17th Avenue NE, Seattle, WA 98115 Revision \_\_\_\_\_ Page \_\_\_\_4 Phone: (206)527-1288 Email: john@cses-engineering.com

SHEAR WALL DESTIN - SOUTH WEST WALL - UPPER FLOOR L= 5.75 + 4.25  $P_{W} = \left[ (a' \times 5.5') \times 14.9 \text{ psf} \right] = 2.14 \text{ lb}$ PE = (5 × 42) × 3.57 pst = 750 16 - CONTROLS V = 750 16/10 = 75 NF < 230 NF 5WL UPLIFT = 75117 × 10.5 = 788 16 < 1705 16 (516) MAIN FLOOR - L = 5.75 + 4.25 PW = 219 16 + ( 2 × 11 ) × 18.5 ps+7 = 626 16 PF = 750 16 + [(3'×42)×2.18 ps+] = 1025 16 = CONTROLS V = 102516/10' = 102.5 pif < 230 pit 5WT UPLIFT = 788 16 + (102.5 MF × 10.5) = 1865 16 = 3909 16 MSTC48B3 DIAPHRAGM CHECK: 1025 16/100 plf = 10.25 <16 PROVIDE 16' PRAG STRUT Project No. 2019.089 Date 11/20/19 CONSULTING STRUCTURAL ENGINEERING SERVICES Project Name 4270 Residential and Commercial Structural Design 6311 17th Avenue NE, Seattle, WA 98115 Comments \_\_\_\_\_ Revision \_\_\_\_\_ Page \_\_\_\_\_\_ Phone: (206)527-1288 Email: john@cses-engineering.com

SHEAR WALL DESIGN - EAST MID WALL - UPPER FLOOR L= 5.5' +4' P. = [(23 × 5.5') × 19.9 ps+] = 2518 16 P== (11' × 34) + (13' × 36') 7 × 3.57 pst = 3006 16 - CONTROLS V = 3006 16/9.5 = 317 NF < 350 NF SW2 11PLIFT = 317 NF × 10.5 = 3323 16 < 3410 16 (2) CS16 WEST STAIR WALL - UPPER FLOOR L=8 Py = [(30 × 5.5) × 19.9 pst] = 3284 16 P\_ = [(12 × 35')+(18 × 33')] × 3.57 154 = 3620 16 < CONTROLS V = 3620 16/8 = 453 pH < 550 PH SW3 UPLIFT = 453 NF × 10.5 = 4757 16 < 6475 16 CMST14 WEST WALL - UPPER FLOOR L= 9 Pw = (18 × 5.5') × 19.9 psf = 1971 16 PE = [ (18 × 33 ) × 3.57 PSF ] = 2121 13 = CONTROLS V = 2121 16/9 = 236 NIF < 350 NH 5W2 UPLIFT = 236 NH × 10.5 = 2478 16 < 3410 16 (2) (5/6 Project No. 2019.089 Date 12/17/19 CONSULTING STRUCTURAL ENGINEERING SERVICES Project Name 4270 Residential and Commercial Structural Design Comments \_\_\_\_\_ 6311 17th Avenue NE, Seattle, WA 98115 Revision \_\_\_\_\_ Page \_\_\_\_\_6 Phone: (206)527-1288 Email: john@cses-engineering.com

SHEAR WALL DESIGN - EAST STAIR WALL - MAIN FLOOR L= 13 P. 1 = [(23 × 11) × 18.5 pst] + [2518 16 × (20/36')] = 6220 16 € ONTROLS P==[(23'×58')×2.18ps+]+[300616×(22'36')]=474616 V = 6220 16/13 = 474 plf < 550 plf SW3 UPLIFT = 479 pif × 10.5' = 5030 16 < 6475 16 CMST14 < 5820 16 HOULE 643516 SB7/8×24 LOWER FLOOR L= 15.5 +8 PW = 23 × 5 × 17.6 PSF + 6220 16 = 8244 16 = GNTPOLS P== 23 × 32 × 1.04 pst + 4746 16 = 5549 16 V = 8244 16/23.5 = 351 PIF < 550 PIF SW3 UPLIFT = 35/ 117 × 10.5 = 3686 16: < 4340 16 HOUS WEST STAIR WALL - MAIN FLOOR L=8 P. = [(8×11)×18.5ps+]+ 328416 = 491216 € CONTROLS P= = 3620 16 + [(8 × 35') × 2.18 ps+] = 423/16 V = 4912 16/8 = 614 11F < 710 11F 5W3X UPLIFT = 475716 + (614 PIF × 11) = 151116 < 1444516 140414 W/6×6 POSTS < 17080 16 PAB8 Project No. 2019.089 Date 12/17/19 CONSULTING STRUCTURAL ENGINEERING SERVICES Project Name 4270 Residential and Commercial Structural Design 6311 17th Avenue NE, Seattle, WA 98115 Comments \_\_\_\_\_ Revision \_\_\_\_\_ Page \_\_\_\_\_ Page \_\_\_\_\_ Z Phone: (206)527-1288 Email: john@cses-engineering.com

SHEAR WALL DESIGN - WEST STAIR WALL-LOWER FLOOR L=10' PW = (8×5)×17.6 PSF] + 4912 16 = 561616 = CONTROLS PE = 423/16 + [(8 × 28') × 1.04 PSF] = 4476 16 V=5616 16/10 = 562 NF < 710 NF SW3X UPLIFT = 562 pH × 11' = 6182 16 < 8030 14 HOUII < 8030 16 581×30 WEST ELEVATOR WALL-MAIN FLOOR L=6 Pw = (18 × 11) × 18,5 pst ] = 3664 16 E CONTRAIS PE = [(18 × 28) × 2.18 pst] = 1099 16 V = 3664 16 6' = 611 PIF < 710 PIF SW3X UPLIFT = 6/1 NF × 11 = 6721 16 < 9215 16 CMST 12 LOWER FLOOR L=6' Pw = 366416 + [(18'x 5') × 17.6 pst] = 524816 = CONTROLS PE = 1099 16 + (18'×28')× 1.09 15+] = 1649 16 V= 5248 16 6 = 881 PIF < 910 PIF SW5 UPLIFT = 6721 16 + 88/ PIF × 10 = 15531 16 < 16735.16 HO19 < 21620 1/2 PAB9 Project No. 2019, 089 Date 12/17/19 CONSULTING STRUCTURAL ENGINEERING SERVICES Project Name 4270 Residential and Commercial Structural Design 6311 17th Avenue NE, Seattle, WA 98115 Comments \_\_\_\_\_ Revision \_\_\_\_\_ Page \_\_\_\_\_ Phone: (206)527-1288 Email: john@cses-engineering.com

SHEAR WALL DESIGN - WEST WALL-MAIN FLOOR L=9' Pw = 197/ 16 + [(15'×11')×18.5 ps+] = 5024 16 ← CONTROLS PE = 212/16 + [(15 × 28') × 2.18 PSF] = 303716 V = 5024 16/9' = 559 PIF < 710 PIF SW3X V = 5007 60 1 VPLIFT = 2478 16 + 559 PLF ×11' = 8627 16 < 9260. 16 HDU14 <11405 16 PAB8 dc = 8" NORTH WEST WALL - UPDER FLOOR L= 19' Pw=(14'× 5.5') × 19.9 pst = 1533 16 P== [(14 × 82') × 3.57 ps+] = 4099 16 = CONTROLS V = 4099 16/19 = 216 NIF < 230 NIF SWI UPLIFT = 216 NIF × 11 = 2376 16 < 3410 16 @CS16 MAIN FLOOR L=19 Pw=[(14'×11') × 18.5 ps+] + 153316 = 438216 PE=[(14 \* 82) × 2.18 PS+] + 409916 = 660216 = CANTROLS V = 6602 16/19' = 348 017 < 350 017 SW2 < 500 NI (2) 1/4 × 6" SDS UPLIFT = 2376 16 + 348 14 × 11 = 6204 16 < 8030 16 HOWN 3828 16 < 434016 803016 5B1×30 HDULS Project No. 2019.089 Date 12/17/19 CONSULTING STRUCTURAL ENGINEERI VG SERVICES Project Name 4270 Residential and Commercial Structural Design 6311 17th Avenue NE, Seattle, WA 98115 Comments \_\_\_\_ Phone: (206)527-1288 Email: john@cses-engineering.com 19 \_ Page \_ Revision

POST FOOTING DESIGN 4 × 11 = 44 FT2 , 44 FT2 × 2.18 DSF = 96 15 SEISMIC LOAD 6 × 2 = 12 FT2, 12 FT2 × 18.5 PSF = 222 16 WIND LOAD CONTROLS MAX POINT LOAD = 3622 16 - SEE PAGE UIZ MAX MOMENT = 22216 × 10 FT = 2220 16.FT < 2795 16 MPB662 · TRY 24"x24" E = 2220 16 FT/3622 16 = 0.61  $L/6 = 0.3\overline{3}$  L/6 < c < L/2L/2 = 1.00 $2_{MAX} = \frac{2 \times 3622.16}{3 \times 2 \times (\frac{2}{3} - 0.61)} = 3096 \text{ psf} X$ • TRY 30" × 30" 4/6 = 0.417 4/2 = 1.25, 4/6 < C < 4/2  $\frac{2_{MAX}}{3 \times 2.5' \times \left(\frac{2.5}{2} - 0.61\right)} = 1510 \text{ psf} < 2000 \text{ psf} \sqrt{2}$ · USE 30" × 30" × 12 DEEP FOOTINGS MIN. Project No. 2019.089 Date 12/19/19 CONSULTING STRUCTURAL ENGINEERING SERVICES Project Name \_\_\_\_ Residential and Commercial Structural Design Comments \_\_\_\_\_ 6311 17th Avenue NE, Seattle, WA 98115 Revision \_\_\_\_\_ Page \_\_\_\_\_ Phone: (206)527-1288 Email: john@cses-engineering.com