

# STRUCTURAL CALCULATIONS

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## BLOOM RESIDENCE DECK COVER

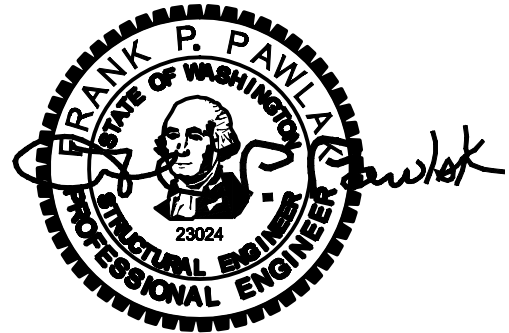
Mercer Island, Washington

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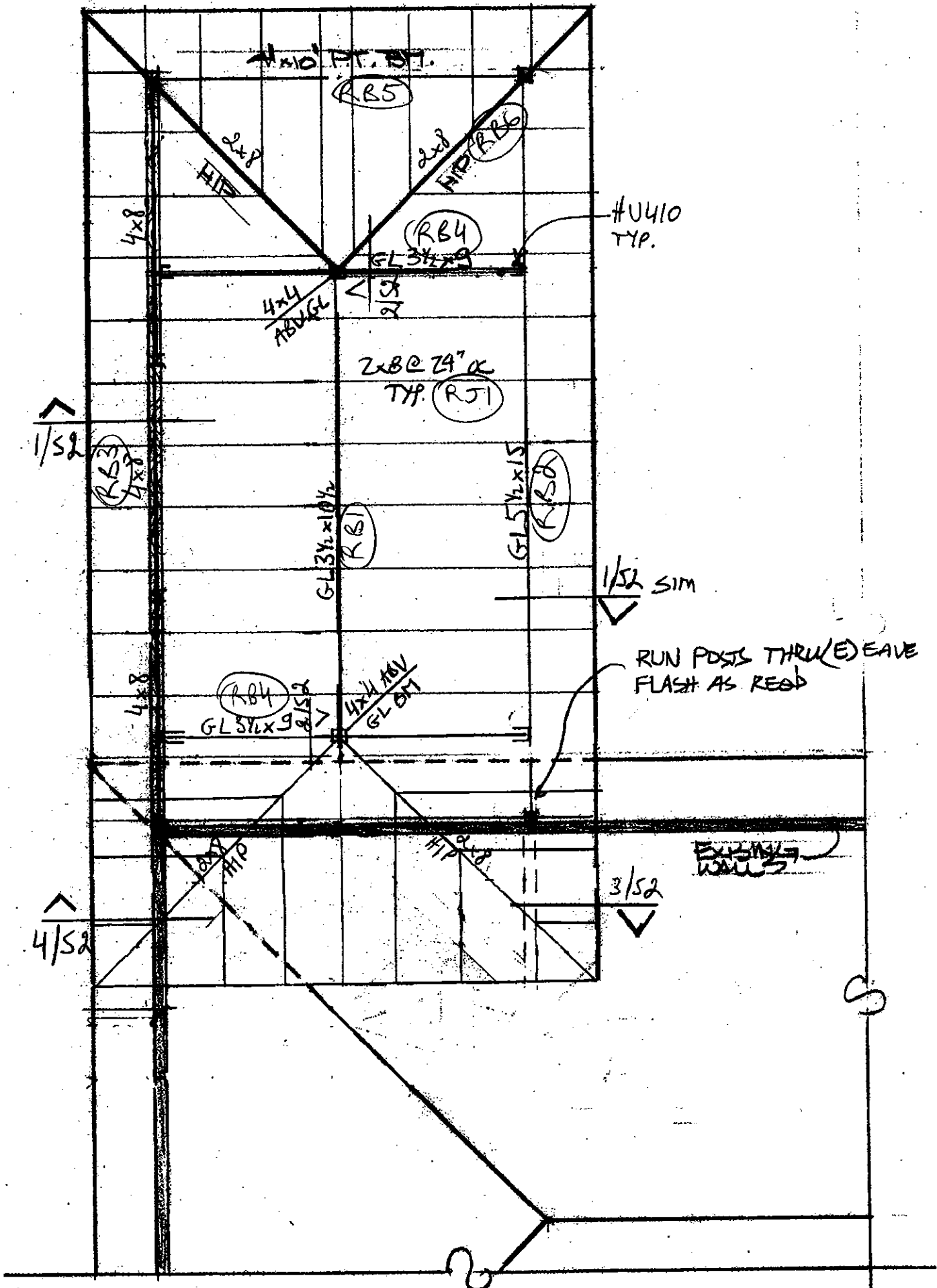
PROJECT NO.: 14-204

DATE: December 2, 2014

12/2/2014



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4x10 P.T. BT.

(RB5)

2x8  
HIP

2x8  
HIP (RB6)

4x8

(RB4)

#U410  
TYP.

4x4  
ABWG

GL 3 1/2 x 9

2x8 @ 24\"/>

(RJ1)

1/52

(RB3)

GL 3 1/2 x 10 1/2

(RB1)

GL 5 1/2 x 15

(RB5)

1/52 SIM

RUN POSTS THRU (E) EAVE  
FLASH AS REQD

4x8

(RB4)

4x4 ABW  
GL BT

EXPOSED  
WALLS

4/52

2x8  
HIP

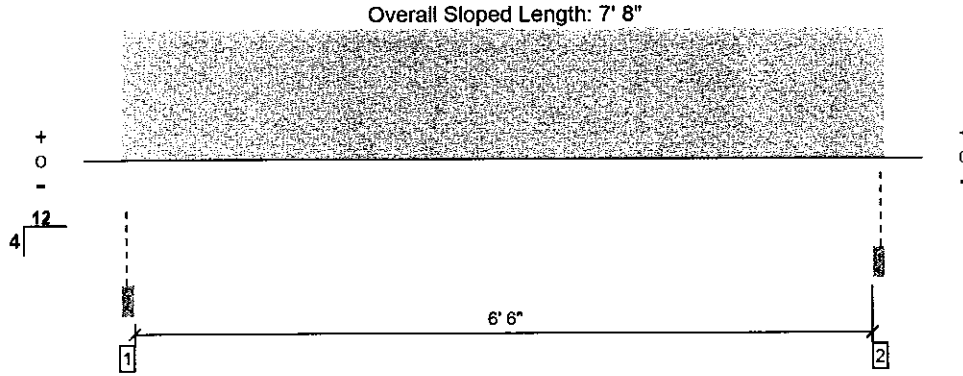
2x8  
HIP

3/52

S

2

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)	415 @ 2 1/2"	2126 (3.50")	Passed (20%)	--	1.0 D + 0.75 W + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	314 @ 10 3/8"	1740	Passed (18%)	1.60	1.0 D + 0.75 W + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	651 @ 3' 6 1/2"	2055	Passed (32%)	1.60	1.0 D + 0.75 W + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.068 @ 3' 6 1/2"	0.234	Passed (L/999+)	--	1.0 D + 0.75 W + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.093 @ 3' 6 1/2"	0.351	Passed (L/903)	--	1.0 D + 0.75 W + 0.75 L + 0.75 S (All Spans)

System : Roof  
 Member Type : Joist  
 Building Use : Residential  
 Building Code : IBC  
 Design Methodology : ASD  
 Member Pitch: 4/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Bracing (Lu): All compression edges (top and bottom) must be braced at 7' 5 5/8" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS 2005 methodology.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Total	
1 - Beveled Plate - HF	3.50"	3.50"	1.50"	112	177	227	516	Blocking
2 - Beveled Plate - HF	3.50"	3.50"	1.50"	112	177	227	516	Blocking

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

Loads	Location	Spacing	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
1 - Uniform (PSF)	0 to 7' 1"	24"	15.0	25.0	32.0	Roof

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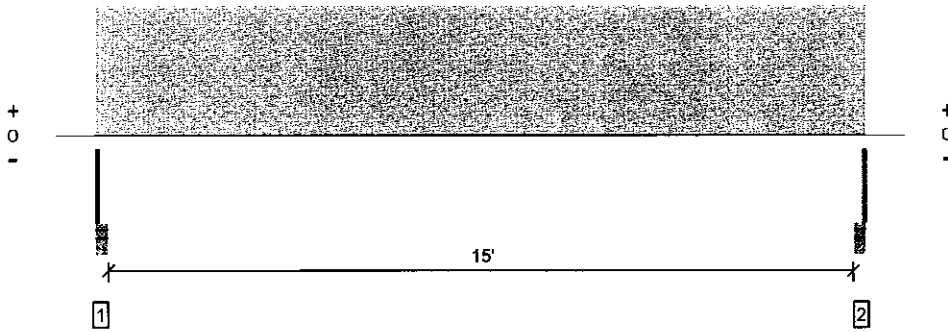
The product application, input design loads, dimensions and support information have been provided by Forte Software Operator



Forte Software Operator	Job Notes
Asrade Mengstu Fossatti Pawlak Structural Engineers (206) 456-3071 amengstu@fossatti.com	

2

Overall Length: 15' 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)	2242 @ 2"	3189 (2.25")	Passed (70%)	--	1.0 D + 0.75 W + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1652 @ 1' 2"	7466	Passed (22%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	7251 @ 7' 8 1/4"	14792	Passed (49%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.410 @ 7' 9 1/2"	0.508	Passed (L/446)	--	1.0 D + 0.75 W + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.584 @ 7' 9 1/2"	0.762	Passed (L/313)	--	1.0 D + 0.75 W + 0.75 L + 0.75 S (All Spans)

System : Roof  
 Member Type : Flush Beam  
 Building Use : Residential  
 Building Code : IBC  
 Design Methodology : ASD  
 Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Bracing (Lu): All compression edges (top and bottom) must be braced at 15' 4 1/2" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 15' 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 2005 methodology.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Total	
1 - Stud wall - HF	3.50"	2.25"	1.58"	676	1266	861	2803	1 1/4" Rim Board
2 - Stud wall - HF	3.50"	2.25"	1.58"	676	1266	861	2803	1 1/4" Rim Board

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

Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
1 - Uniform (PSF)	0 to 15' 7"	6' 6"	12.0	25.0	17.0	Roof

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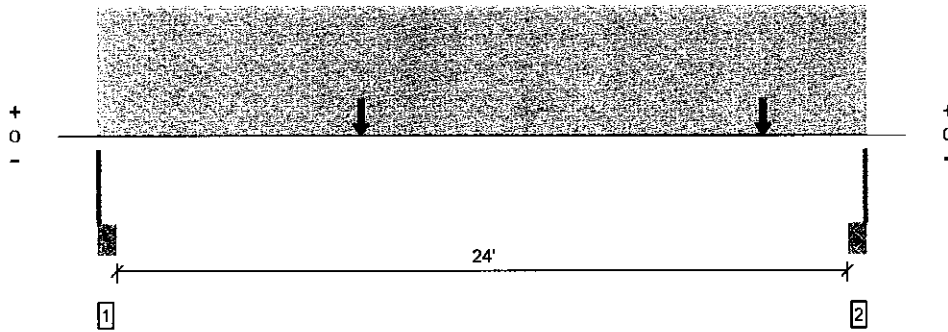
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The product application, input design loads, dimensions and support information have been provided by Forte Software Operator



Forte Software Operator	Job Notes
Asrade Mengstu Fossatti Pawlak Structural Engineers (206) 456-3071 amengstu@fossatti.com	

Overall Length: 24' 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)	5436 @ 24' 7"	15194 (4.25")	Passed (36%)	--	1.0 D + 0.75 W + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	4661 @ 23' 2 1/2"	16761	Passed (28%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	27105 @ 10' 5 3/8"	45406	Passed (60%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.750 @ 12' 4 5/16"	0.808	Passed (L/388)	--	1.0 D + 0.75 W + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	1.138 @ 12' 4 1/4"	1.212	Passed (L/256)	--	1.0 D + 0.75 W + 0.75 L + 0.75 S (All Spans)

System : Roof  
 Member Type : Flush Beam  
 Building Use : Residential  
 Building Code : IBC  
 Design Methodology : ASD  
 Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Bracing (Lu): All compression edges (top and bottom) must be braced at 24' 8 1/2" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.
- Critical positive moment adjusted by a volume factor of 0.96 that was calculated using length L = 24' 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 2005 methodology.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Total	
1 - Column - DF	5.50"	4.25"	1.50"	1576	2633	1453	5662	1 1/4" Rim Board
2 - Column - DF	5.50"	4.25"	1.52"	1864	3162	1633	6659	1 1/4" Rim Board

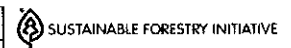
• Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
1 - Uniform (PSF)	0 to 24' 11"	5' 3"	12.0	25.0	17.0	Roof
2 - Point (lb)	8' 6"	N/A	687	1262	431	
3 - Point (lb)	21' 6"	N/A	687	1262	431	

**Weyerhaeuser Notes**

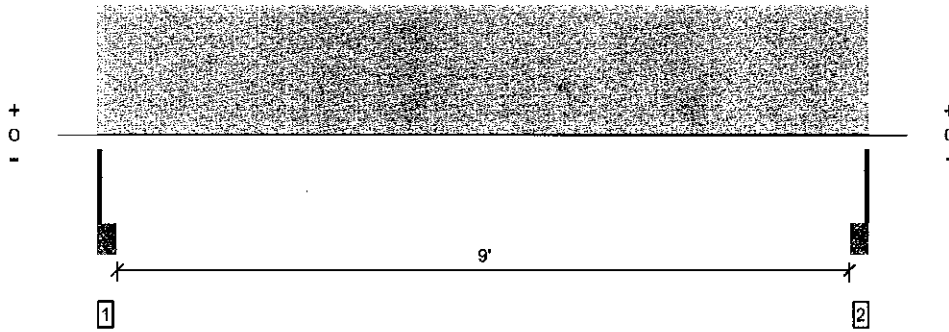
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Asrade Mengstu Fossatti Pawlak Structural Engineers (206) 456-3071 amengstu@fossatti.com	

Overall Length: 9' 11"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1087 @ 4"	6024 (4.25")	Passed (18%)	--	1.0 D + 0.75 W + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	746 @ 1' 3/4"	2918	Passed (26%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2047 @ 4' 11 1/2"	3247	Passed (63%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.180 @ 4' 11 1/2"	0.308	Passed (L/618)	--	1.0 D + 0.75 W + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.255 @ 4' 11 1/2"	0.463	Passed (L/435)	--	1.0 D + 0.75 W + 0.75 L + 0.75 S (All Spans)

System : Roof  
 Member Type : Flush Beam  
 Building Use : Residential  
 Building Code : IBC  
 Design Methodology : ASD  
 Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Bracing (Lu): All compression edges (top and bottom) must be braced at 9' 8 1/2" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.
- Applicable calculations are based on NDS 2005 methodology.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Total	
1 - Column - DF	5.50"	4.25"	1.50"	329	620	421	1370	1 1/4" Rim Board
2 - Column - DF	5.50"	4.25"	1.50"	329	620	421	1370	1 1/4" Rim Board

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

Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
1 - Uniform (PSF)	0 to 9' 11"	5'	12.0	25.0	17.0	Roof

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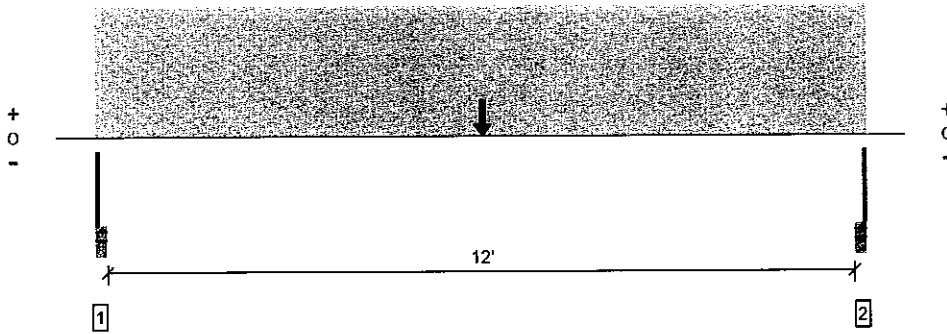
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Forte Software Operator	Job Notes
Asrade Mengstu Fossatti Pawlak Structural Engineers (206) 456-3071 amengstu@fossatti.com	

5

Overall Length: 12' 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)	1944 @ 2"	3189 (2.25")	Passed (61%)	--	1.0 D + 0.75 W + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1788 @ 1' 1/2"	6400	Passed (28%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	8867 @ 6' 2 1/4"	10868	Passed (82%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.375 @ 6' 3 1/2"	0.408	Passed (L/392)	--	1.0 D + 0.75 W + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.566 @ 6' 3 1/2"	0.613	Passed (L/260)	--	1.0 D + 0.75 W + 0.75 L + 0.75 S (All Spans)

System : Roof  
 Member Type : Flush Beam  
 Building Use : Residential  
 Building Code : IBC  
 Design Methodology : ASD  
 Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Bracing (Lu): All compression edges (top and bottom) must be braced at 12' 4 1/2" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.
- 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 2005 methodology.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Total	
1 - Stud wall - HF	3.50"	2.25"	1.50"	687	1262	431	2380	1 1/4" Rim Board
2 - Stud wall - HF	3.50"	2.25"	1.50"	687	1262	431	2380	1 1/4" Rim Board

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

Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
1 - Uniform (PSF)	0 to 12' 7"	4'	12.0	25.0	-	Roof
2 - Point (lb)	6' 3 1/2"	N/A	676	1266	861	

**Weyerhaeuser Notes**

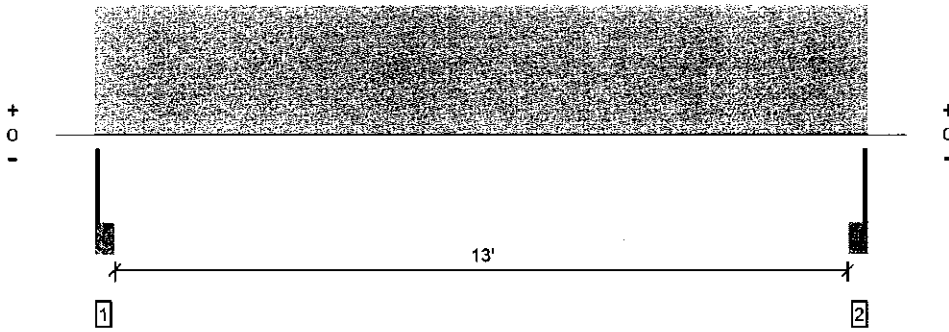
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The product application, input design loads, dimensions and support information have been provided by Forte Software Operator



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Overall Length: 13' 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)	1298 @ 4"	6024 (4.25")	Passed (22%)	--	1.0 D + 0.75 W + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	789 @ 1' 2 3/4"	3723	Passed (21%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3022 @ 6' 11 1/2"	4879	Passed (62%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.322 @ 6' 11 1/2"	0.442	Passed (L/495)	--	1.0 D + 0.75 W + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.438 @ 6' 11 1/2"	0.663	Passed (L/363)	--	1.0 D + 0.75 W + 0.75 L + 0.75 S (All Spans)

System : Roof  
 Member Type : Flush Beam  
 Building Use : Residential  
 Building Code : IBC  
 Design Methodology : ASD  
 Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Bracing (Lu): All compression edges (top and bottom) must be braced at 13' 8 1/2" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.
- Applicable calculations are based on NDS 2005 methodology.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Total	
1 - Column - DF	5.50"	4.25"	1.50"	348	609	682	1639	1 1/4" Rim Board
2 - Column - DF	5.50"	4.25"	1.50"	348	609	682	1639	1 1/4" Rim Board

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

Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
1 - Uniform (PSF)	0 to 13' 11"	3' 6"	12.0	25.0	28.0	Roof

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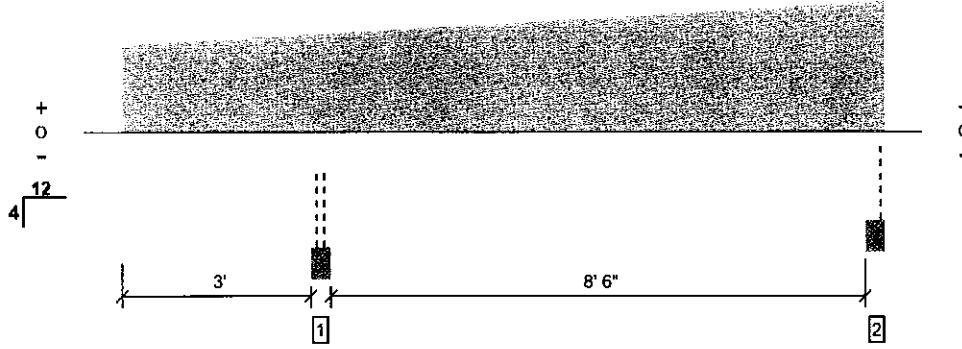
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Forte Software Operator	Job Notes
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Overall Sloped Length: 13' 3 1/2"



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

Design Results	Actual @ Location	Allowed	Result	LDf	Load: Combination (Pattern)
Member Reaction (lbs)	745 @ 3' 2 3/4"	3522 (5.50")	Passed (21%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	406 @ 4' 3/8"	1251	Passed (32%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	858 @ 8' 7/8"	1284	Passed (67%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.142 @ 7' 9 1/4"	0.311	Passed (L/790)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.208 @ 7' 9 11/16"	0.467	Passed (L/538)	--	1.0 D + 1.0 S (All Spans)

System : Roof  
 Member Type : Flush Beam  
 Building Use : Residential  
 Building Code : IBC  
 Design Methodology : ASD  
 Member Pitch: 4/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Bracing (Lu): All compression edges (top and bottom) must be braced at 9' 2 1/4" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.
- Applicable calculations are based on NDS 2005 methodology.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Column - DF	5.50"	5.50"	1.50"	266	479	745	Blocking
2 - Column - DF	5.50"	5.50"	1.50"	162	312	474	Blocking

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

Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
1 - Tapered (PSF)	0 to 12' 5"	2' to 3'	12.0	25.0	Roof

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# Bloom Residence Deck Cover

## Seismic Analysis

$$\text{Roof DL} = 12 \text{ pcf} \times (17' \times 34') + 8 \text{ pcf} \times 19\frac{1}{2}' \times 34' = 8296 \#$$

From attached calcs, seismic base shear = 1.1k

## Wind Analysis

$$V = 110 \text{ mph}, \text{ Exp 'B'}, K_{z,t} = 1.6$$

→ Wind E/W direction:

$$* \text{Roof} = (10.25\frac{1}{2}' \times 24') \times 16.9 \text{ pcf} = 2079 \#$$

$$* \text{Floor} = 10.25\frac{1}{2}' \times 24' \times 16.9 \text{ pcf} = 2079 \#$$

$$\text{Total} = 4158 \#$$

→ Wind N/S direction:

$$* \text{Roof} = 13.1 \text{ pcf} \times (17' \times 2.8\frac{1}{2}') = 312 \#$$

\* N/S direction, seismic governs. West SW takes entire lateral force = 1.1k

$$\text{wall length} = 24' - 2 \times 5' = 14' \rightarrow 1100/14 = 79 \text{ pcf} \rightarrow \text{SW6 OK} \\ (\text{HF\#2 w/ 8d@6"oc})$$

$$OT = \frac{1100}{1000} \times 12.5' \left[ (5.25 \times 12 + 8 \times 10) \times 24 \frac{2}{2000} \right]^{0.42} = 11.6 \text{ k}\cdot\text{ft} - 41.2 = 29.6 \text{ k}\cdot\text{ft}$$

No overturning

\* E/W direction: Use chimney wall @ North, (E) bldg @ South.

wind governs = 2.1 k @ roof, wall is 25 min.

$1050 \# / 25 = 420 \text{ plf} \rightarrow 1\frac{1}{2} \text{ ply w/ \#2 framing, } 8d @ 3" \text{ o.c. nailing}$   
(SW-3)

$$O.T. = \frac{1050}{1000} \times 10.5' - (3' \times 12 + 8' \times 10) \times 5 \frac{1}{2000} \times 0.42 = 11.03 - 1.5 = 9.5 \text{ k-ft}$$

$$T = C = 9.5 / 5 = 1.9 \text{ k} \rightarrow \text{MSTC40/HOU2}$$



**FOSSATTI PAWLAK**  
STRUCTURAL ENGINEERS

LATERAL CALC.

SUBJECT

BLOOM RESIDENCE DECK COVER

PROJECT

CLIENT

AM

DESIGN

14-204

PROJECT NO.

11/7/14

DATE

10

SHEET NO.

**Fossatti Pawlak Structural Engineers**

1735 Westlake Ave N, Suite 205  
Seattle, WA 98109  
(206) 456-3071

JOB TITLE Bloom Residence Deck Cover

JOB NO. 14-204

SHEET NO. \_\_\_\_\_

CALCULATED BY AM

DATE 11/7/14

CHECKED BY FPP

DATE \_\_\_\_\_

www.struware.com

**Code Search**

**Code:** International Building Code 2012

**Occupancy:**

Occupancy Group = R Residential

**Risk Category & Importance Factors:**

Risk Category = II  
Wind factor = 1.00 use 0.60 NOTE: Output will be nominal wind pressures  
Snow factor = 1.00  
Seismic factor = 1.00

**Type of Construction:**

Fire Rating:  
Roof = 0.0 hr  
Floor = 0.0 hr

**Building Geometry:**

Roof angle (θ) 4.00 / 12 18.4 deg  
Building length (L) 24.0 ft  
Least width (B) 13.0 ft  
Mean Roof Ht (h) 16.0 ft  
Parapet ht above grd 0.0 ft  
Minimum parapet ht 0.0 ft

**Live Loads:**

**Roof** 0 to 200 sf: 20 psf  
200 to 600 sf: 24 - 0.02Area, but not less than 12 psf  
over 600 sf: 12 psf

**Floor:**

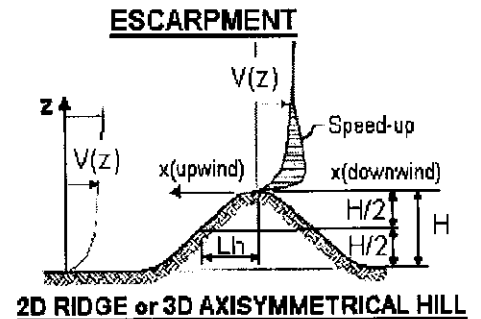
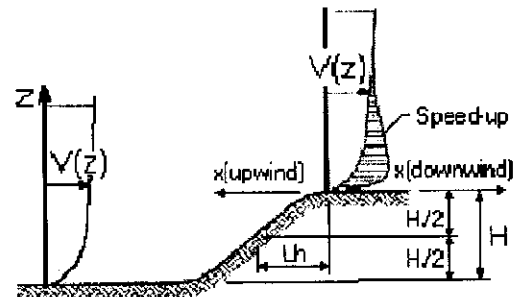
Typical Floor 50 psf  
Partitions 15 psf  
Corridors above first floor 80 psf  
Lobbies & first floor corridors 100 psf  
Balconies (exterior) - same as occup: 50 psf

**Wind Loads :** ASCE 7- 10

Ultimate Wind Speed	110 mph
Nominal Wind Speed	85.2 mph
Risk Category	II
Exposure Category	B
Enclosure Classif.	Enclosed Building
Internal pressure	+/-0.18
Directionality (Kd)	0.85
Kh case 1	0.701
Kh case 2	0.585
Type of roof	Hip

Topographic Factor (Kzt)

Topography	3D Axisym Hill
Hill Height (H)	92.0 ft
Half Hill Length (Lh)	200.0 ft
Actual H/Lh =	0.46
Use H/Lh =	0.46
Modified Lh =	200.0 ft
From top of crest: x =	50.0 ft
Bldg up/down wind?	downwind
H/Lh = 0.46	K <sub>1</sub> = 0.437
x/Lh = 0.25	K <sub>2</sub> = 0.833
z/Lh = 0.08	K <sub>3</sub> = 0.726
At Mean Roof Ht:	
Kzt = (1+K <sub>1</sub> K <sub>2</sub> K <sub>3</sub> ) <sup>2</sup> =	1.60



**Gust Effect Factor**

h =	16.0 ft
B =	13.0 ft
lz (0.6h) =	30.0 ft

Flexible structure if natural frequency < 1 Hz (T > 1 second).  
 However, if building h/B < 4 then probably rigid structure (rule of thumb).  
 h/B = 1.23 Therefore, probably rigid structure

**G = 0.85** Using rigid structure default

**Rigid Structure**

$\bar{e}$ =	0.33
$\ell$ =	320 ft
$z_{min}$ =	30 ft
c =	0.30
$g_Q, g_v$ =	3.4
$L_z$ =	310.0 ft
Q =	0.94
$I_z$ =	0.30
G =	0.89 use G = 0.85

**Flexible or Dynamically Sensitive Structure**

Natural Frequency ( $\eta_1$ ) =	0.0 Hz		
Damping ratio ( $\beta$ ) =	0		
$\beta/b$ =	0.45		
$\beta/\alpha$ =	0.25		
$V_z$ =	70.9		
$N_1$ =	0.00		
$R_n$ =	0.000		
$R_h$ =	28.282	$\eta =$	0.000
$R_B$ =	28.282	$\eta =$	0.000
$R_L$ =	28.282	$\eta =$	0.000
$g_R$ =	0.000		
R =	0.000		
G =	0.000		
			h = 16.0 ft

**Wind Loads - MWFRS all h (Enclosed/partially enclosed only)**

Kh (case 2) = 0.59 h = 16.0 ft GCpi = +/-0.18  
 Base pressure (qn) = 14.8 psf ridge ht = 17.1 ft G = 0.85  
 Roof Angle (θ) = 18.4 deg L = 24.0 ft qi = qh  
 Roof tributary area - (h/2)\*L: 192 sf B = 13.0 ft  
 (h/2)\*B: 104 sf

**Nominal Wind Surface Pressures (psf)**

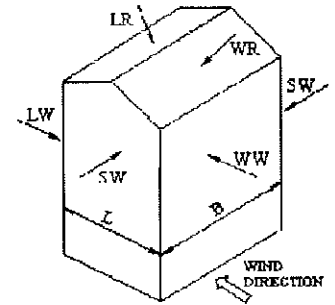
Surface	Wind Normal to Ridge				Wind Parallel to Ridge				
	B/L = 0.54		h/L = 1.23		L/B = 1.85		h/L = 0.67		
	Cp	qnGCp	w/+qiGCpi	w/-qhGCpi	Dist.*	Cp	qhGCp	w/+qiGCpi	w/-qhGCpi
Windward Wall (WW)	0.80	10.1	see table below			0.80	10.1	see table below	
Leeward Wall (LW)	-0.50	-6.3	-8.9	-3.6		-0.33	-4.2	-6.8	-1.5
Side Wall (SW)	-0.70	-8.8	-11.5	-6.1		-0.70	-8.8	-11.5	-6.1
Leeward Roof (LR)	-0.60	-7.5	-10.2	-4.9		Included in windward roof			
Windward Roof neg press.	-0.79	-10.0	-12.6	-7.3	0 to h/2*	-1.03	-13.0	-15.6	-10.3
Windward Roof pos press.	-0.18	-2.3	-4.9	0.4	h/2 to h*	-0.83	-10.5	-13.1	-7.8
					h to 2h*	-0.57	-7.1	-9.8	-4.5

\*Horizontal distance from windward edge

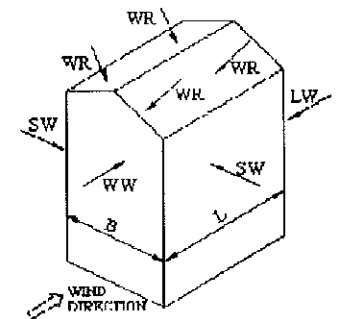
NOTE: The code requires the MWFRS be designed for minimum ultimate force of 16 psf multiplied by the wall area plus an 8 psf force applied to the vertical projection of the roof.

**Windward Wall Pressures at "z" (psf)**

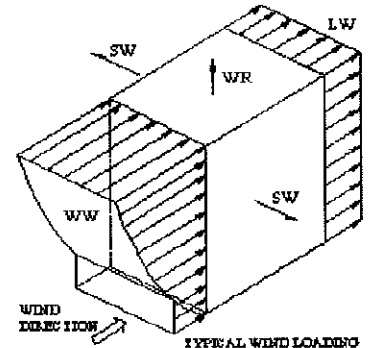
z	Kz	Kzt	Windward Wall			Combined WW + LW	
			qzGCp	w/+qiGCpi	w/-qhGCpi	Normal to Ridge	Parallel to Ridge
0 to 15'	0.57	1.73	10.7	8.0	13.3	16.9	14.8
h = 16.0 ft	0.59	1.61	10.1	7.4	12.8	16.4	14.3
ridge = 17.1 ft	0.60	1.59	10.2	7.5	12.9	16.5	14.4



WIND NORMAL TO RIDGE



WIND PARALLEL TO RIDGE



TYPICAL WIND LOADING

NOTE:

See figure in ASCE7 for the application of full and partial loading of the above wind pressures. There are 4 different loading cases.

**Parapet**

z	Kz	Kzt	qp (psf)
0.0 ft	0.57	1.86	0.0

Windward parapet: 0.0 psf (GCpn = +1.5)  
 Leeward parapet: 0.0 psf (GCpn = -1.0)

Windward roof overhangs ( add to windward roof pressure ) : 10.1 psf (upward)

**SEISMIC BASE SHEAR: ASCE 7-10**

Occupancy Category	1
Site Class	D
Lat.	47.547
Long.	-122.226
Ss	145.7 % g
S1	55.9 % g

Seismic Design Category (SDC) =	D
Fa	1.00
Fv	1.5
Sds	0.971
Sd1	0.559

$V_{min} = 0.044 \cdot S_{ds} \cdot W = 0.04$   
 $V = S_{ds} \cdot I \cdot W = 0.15$   
 $V_{max} = S_{d1} \cdot I \cdot W = 0.54$

$R = \frac{S_{ds}}{S_{d1}} = \frac{0.971}{0.559} = 1.736$   
 $T = \frac{1.46}{0.8395} = 1.736$

Where:

Sds	=	0.971
Sd1	=	0.559
I	=	1
R	=	6.5

**WOOD SW**  
 $R = 6.5$  Total W = 8.3 kips

Therefore:  
 $E = p \cdot E_h + E_v$  where

$p_y = 1.3$   
 $p_x = 1.3$

$V_{ult} = 0.194 \cdot W = 1.6$  kips  
 $V_{service} = 0.136 \cdot W = 1.1$  kips

Note: IBC Ax and r are evaluated at each floor  
 Therefore:  
 $pEx = 1.6$  kips  
 $pEy = 1.1$  kips  
 static distribution is relative to building period

**SEISMIC DISTRIBUTION: X-Direction**

level	W (kips)	h (ft)	Wh <sup>2</sup> (kip-ft)	Σ Wh <sup>2</sup> (kip-ft)	Wh <sup>2</sup> / Σ Wh <sup>2</sup>	story shear (kips)	Σ story shear (kips)	ALLOW. STRESS DESIGN
Deck	8.3	17	241	241	1.00	1.6	1.6	1.1
Σ	8.3					1.6	1.6	1.1

**SEISMIC DISTRIBUTION: Y-Direction**

level	W (kips)	h (ft)	Wh <sup>2</sup> (kip-ft)	Σ Wh <sup>2</sup> (kip-ft)	Wh <sup>2</sup> / Σ Wh <sup>2</sup>	story shear (kips)	Σ story shear (kips)	ALLOW. STRESS DESIGN
Deck	8.3	17	241	241	1.00	1.6	1.6	1.1
Σ	8.3					1.6	1.6	1.1

**Bloom Residence Deck Cover**

Fa	Ss <	Ss =	Ss >	Ss >
A	0.8	0.8	0.8	0.8
B	1	1	1	1
C	1.2	1.2	1.1	1
D	1.6	1.4	1.2	1.1
E	2.5	1.7	1.2	0.9
F	a	a	a	a
Fv	S1 <	S1 =	S1 =	S1 >
A	0.8	0.8	0.8	0.8
B	1	1	1	1
C	1.7	1.6	1.5	1.4
D	2.4	2	1.8	1.6
E	3.5	3.2	2.8	2.4
F	a	a	a	a

T exponent

0.75	0.02	default
0.75	0.03	Ecc Braced Frames
0.8	0.016	Concrete Moment Frames
0.9	0.028	Steel Moment Frames

Common Values

R	omega
Wood SW	3
bearing wall system	
Special Conc SW	5
bearing wall system	
Special CMU SW	5
bearing wall system	
Steel CMRF	3.5
building frame system	
Steel SMRF	8
building frame system	
Steel CBF	5
building frame system	
Steel SBF	6
building frame system	
Can't Coll	