BTL
ENGINEERING

19011 Wood-Sno Road NE, Suite 100
Woodinville, WA 98072-4436
Phone: (425) 814-8448
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Structural Calculations

For

Dann Residence

3008 70th Avenue SE, Mercer Island, WA 98040

March 13, 2024

Prepared by

Brian Lampe
Mariam Soliman

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STRUCTURAL CALCULATIONS SHEET INDEX

Project Name
Project Address

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Criteria

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19011 Wood-Sno Road NE, Suite 100
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Phone: 425-814-8448
Fax: 425-821-2120

Project: Dann Residence
Project Number: 3008 70th Avenue SE, Mercer Island, WA 98040

Code:	IBC 2018			
	Risk Category	II		
Earthquake:	Site Class	D		
		I_e = 1.00		R = 6.5
		S_S = 1.405		Ω_0 = 3.0
		S_1 = 0.489		C_d = 4.0
		ρ = 1.00		
Wind:	Basic Design Wind Speed, *V*	110		
	Exposure	B		
	Topographic Factor	K_{ZT} = 1.60		
Soil Bearing:	1500-psf Allowable Soil Bearing Pressure			
Concrete:	2500-psi Concrete Strength			
	Higher strength may be used, but special inspection and testing reports not req'd			
Nails:	Sheathing	8d common (2½" x 0.131")		
	Framing	12d box (3¼" x 0.131")		

Roof Framing:

Snow Load	Ground Snow, Pg		25 psf
		Exposure factor, Ce	1.0
		Thermal Factor, Ct	1.2
	Flat Roof Snow, Pf (0.7 Ce Ct I Pg)		21 psf
	Use Snow Load		**25 psf**
	Attic (where accessible)		10 psf
Dead Load	Roofing - Composition Shingles		4.0 psf
	Sheathing - 7/16 OSB		2.2 psf
	Framing - Trusses @ 24"oc		2.5 psf
	Insulation - Batt.		1.0 psf
	Ceiling - 5/8 GWB		2.8 psf
	Misc.		2.5 psf
		Total	**15 psf**
Deflection	L/360 Live Load, L/240 Total Load		

Floor Framing:

Live Load	Residential		40 psf
	Decks		60 psf
Dead Load	Finish Floor - Carpet/Vinyl		5.0 psf
	Sheathing - 3/4 Plywood/Edge Gold		2.5 psf
	Framing - I-Joists @ 16"oc		2.7 psf
	Ceiling - 5/8 GWB		2.8 psf
	Misc.		2.0 psf
		Total	**15 psf**
Deflection	L/480 Live Load, L/240 Total Load		

Wall Framing:

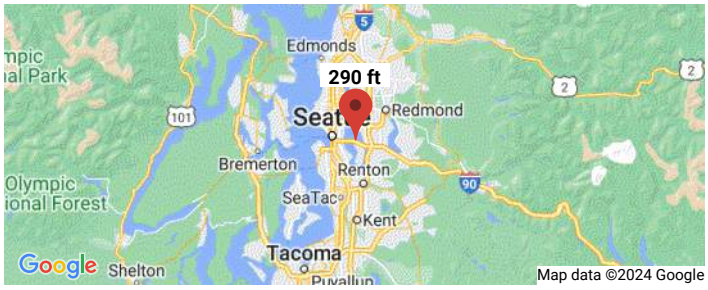
Dead Load	Exterior 2x Stud Walls		10 psf
	Interior 2x Stud Walls		8 psf

This is a beta release of the new ATC Hazards by Location website. Please contact us with feedback.

The ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

Hazards by Location

Search Information



Address:	3008 70th Ave SE, Mercer Island, WA 98040, USA
Coordinates:	47.5834996, -122.2449016
Elevation:	290 ft
Timestamp:	2024-01-26T15:18:30.091Z
Hazard Type:	Seismic
Reference Document:	ASCE7-16
Risk Category:	II
Site Class:	D-default

Basic Parameters

Name	Value	Description
S_S	1.405	MCE_R ground motion (period=0.2s)
S_1	0.489	MCE_R ground motion (period=1.0s)
S_{MS}	1.685	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	1.124	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA

* See Section 11.4.8

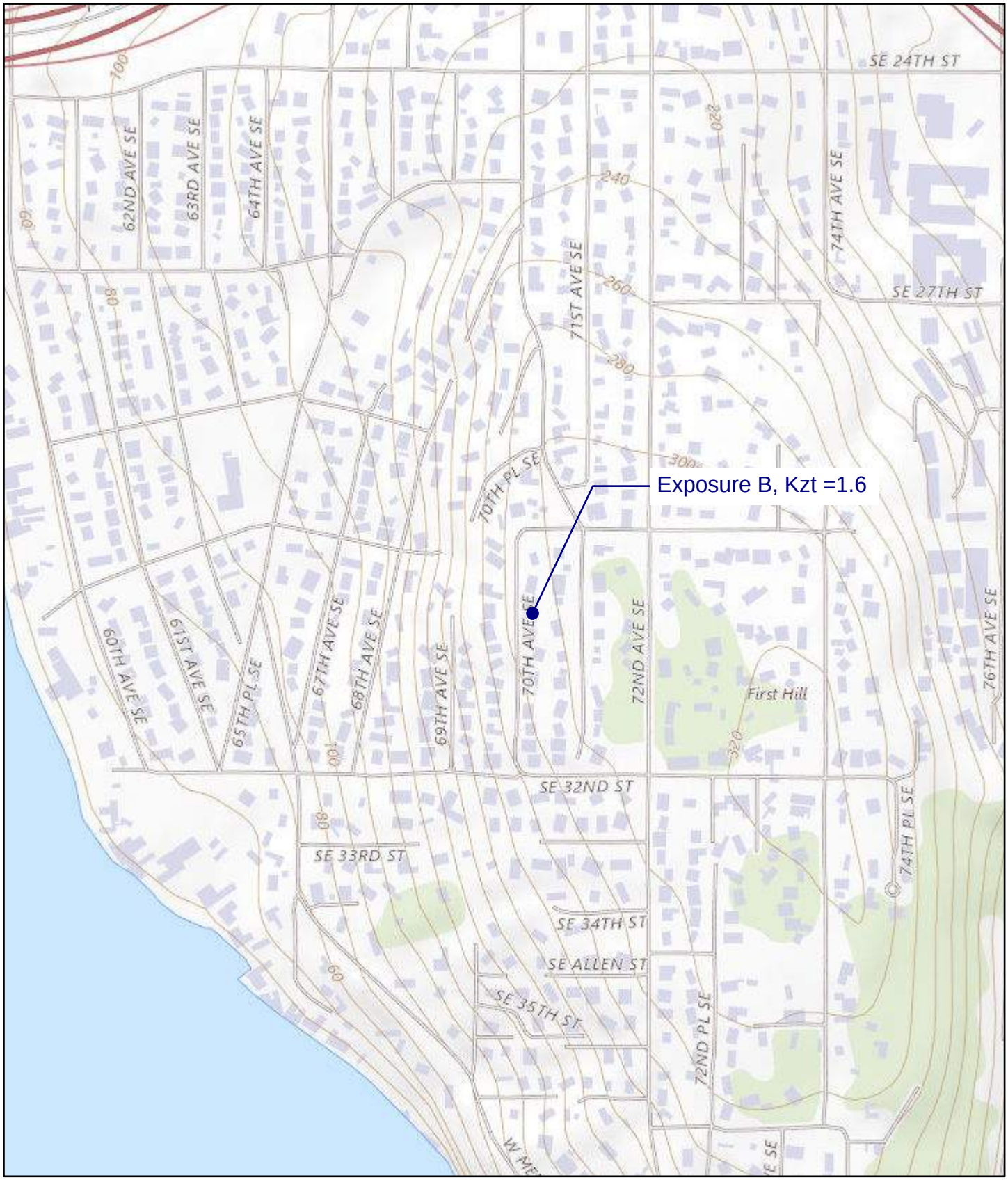
Additional Information

Name	Value	Description
SDC	* null	Seismic design category
F_a	1.2	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s
CR_S	0.902	Coefficient of risk (0.2s)
CR_1	0.896	Coefficient of risk (1.0s)
PGA	0.601	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.721	Site modified peak ground acceleration
T_L	6	Long-period transition period (s)
SsRT	1.405	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.557	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	3.305	Factored deterministic acceleration value (0.2s)
S1RT	0.489	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.545	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.342	Factored deterministic acceleration value (1.0s)
PGAd	1.138	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

7KH 1DWLRQDO 0DS $GYDQFHG 9



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PL

NP

86*6 7KH 1DWLRQDO 0DS, 1DWLRQDO %RXQGDULHV 3URJUDP *HRJUDSKLF 1DPHV ,QIRUPDWLRQ 6\VWHP 'DWDVHW 1DWLRQDO /DQG &RYHU 'DWDEDVH 1DWL 1DWLRQDO 7UDQVSRUWDWLRQ 'DWDVHW° 86*6 *ORE %XUHDX 7,*(5 /LQH GDWD° 86)6 5RDG 'DWD° 1DWX

86*6
86*6

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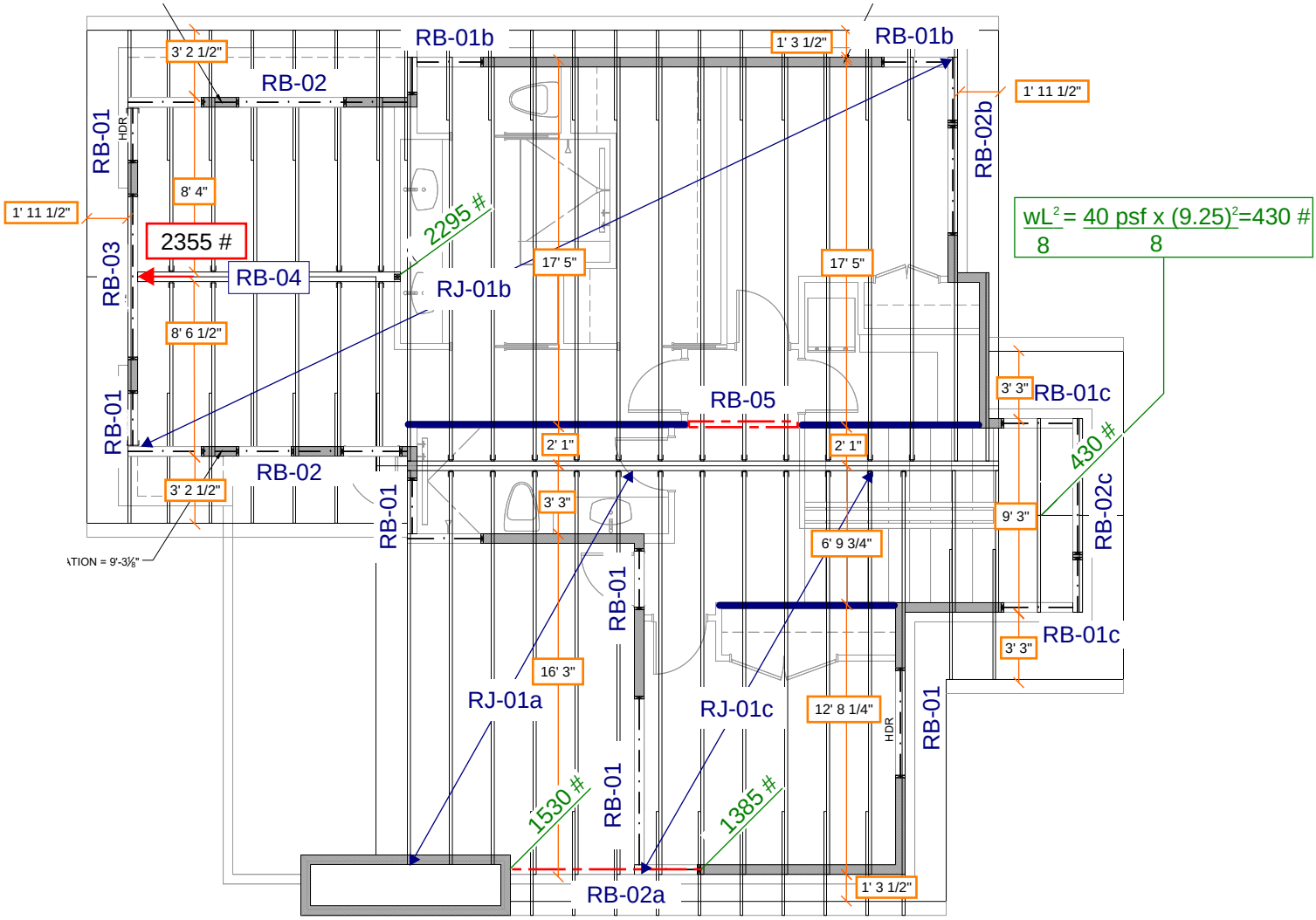
Gravity

Roof Framing



Roof Framing Key Plan

R1.1

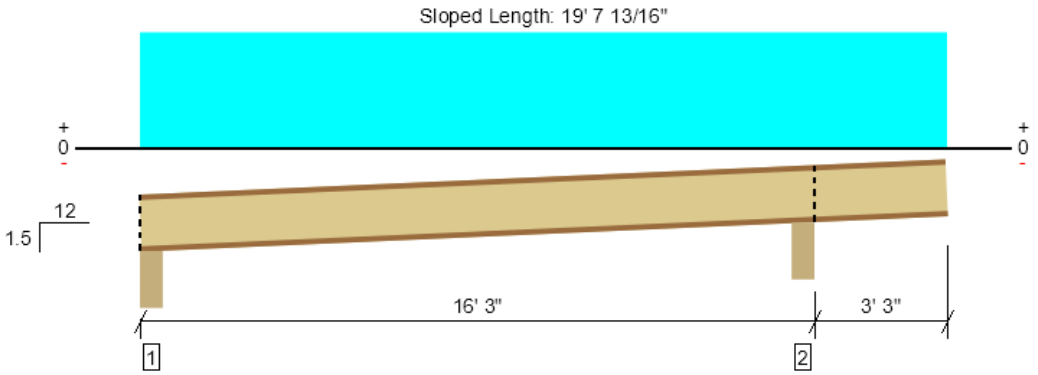
FORTEWEB

MEMBER REPORT

PASSED

Roof/Upper Wall, RJ-01a

1 piece(s) 9 1/2" TJI® 210 @ 24" OC



Drawing is Conceptual. 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)	636 @ 4 1/2"	1679 (3.50")	Passed (38%)	1.15	1.0 D + 1.0 S (Alt Spans)
Shear (lbs)	610 @ 15' 9 1/2"	1530	Passed (40%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2291 @ 7' 11 3/16"	3450	Passed (66%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	0.381 @ 8' 1 9/16"	0.788	Passed (L/497)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.598 @ 8' 1 1/4"	1.051	Passed (L/317)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 19' 9"
System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 1.5/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Beveled Plate - HF	5.50"	5.50"	1.75"	236	400	636	Blocking
2 - Beveled Plate - HF	5.50"	5.50"	3.50"	353	584	937	Blocking

• 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)	4' 3" o/c	
Bottom Edge (Lu)	8' 8" o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.
•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 19' 6"	24"	15.0	25.0	Roof

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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
Mariam Soliman BTL Engineering PS (425) 814-8448 mariam.soliman@btleng.net	

Weyerhaeuser

3/13/2024 12:11:59 AM UTC
ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0
File Name: Dann Residence
R2.1

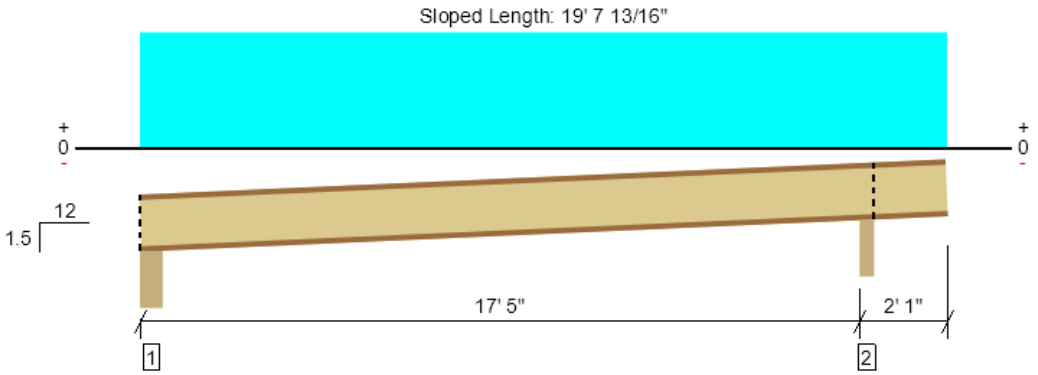
FORTEWEB

MEMBER REPORT

PASSED

Roof/Upper Wall, RJ-01b

1 piece(s) 9 1/2" TJI® 210 @ 24" OC



Drawing is Conceptual. 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)	714 @ 4 1/2"	1679 (3.50")	Passed (42%)	1.15	1.0 D + 1.0 S (Alt Spans)
Shear (lbs)	677 @ 5 1/2"	1530	Passed (44%)	1.15	1.0 D + 1.0 S (Alt Spans)
Moment (Ft-lbs)	2911 @ 8' 10 3/4"	3450	Passed (84%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	0.569 @ 8' 11 3/8"	0.866	Passed (L/365)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.909 @ 8' 11 5/16"	1.155	Passed (L/229)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 19' 9"
System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 1.5/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Upward deflection on right cantilever exceeds overhang deflection criteria.
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Beveled Plate - HF	5.50"	5.50"	1.75"	268	446	714	Blocking
2 - Beveled Plate - HF	3.50"	3.50"	3.50"	322	532	854	Blocking

• 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)	3' 8" o/c	
Bottom Edge (Lu)	8' 8" o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.
•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 19' 6"	24"	15.0	25.0	Roof

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ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Dann Residence

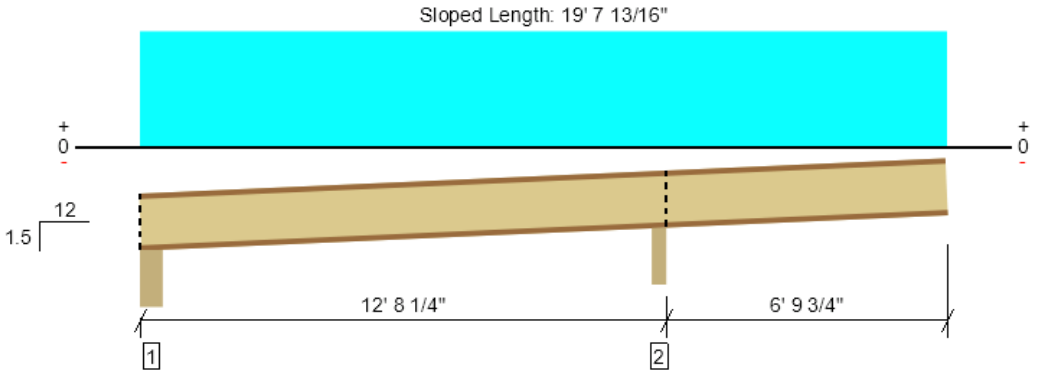
R2.2

FORTEWEB

MEMBER REPORT

Roof/Upper Wall, RJ-01c

1 piece(s) 9 1/2" TJI® 210 @ 24" OC



Drawing is Conceptual. 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)	1206 @ 12' 6 1/2"	2486 (3.50")	Passed (49%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	606 @ 12' 4 3/4"	1530	Passed (40%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-1942 @ 12' 6 1/2"	2588	Passed (75%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.365 @ 19' 6"	0.701	Passed (2L/462)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.511 @ 19' 6"	0.935	Passed (2L/330)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 19' 9"
System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 1.5/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Right cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- Moment capacity over cantilever support 2 has been reduced by 25% to lessen the effects of buckling.
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Beveled Plate - HF	5.50"	5.50"	1.75"	135	273	408	Blocking
2 - Beveled Plate - HF	3.50"	3.50"	3.50"	454	752	1206	Blocking

• 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' 11" o/c	
Bottom Edge (Lu)	4' 7" o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.
•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 19' 6"	24"	15.0	25.0	Roof

Member Notes

(converted from: Floor Joist)

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ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0
File Name: Dann Residence
R2.3

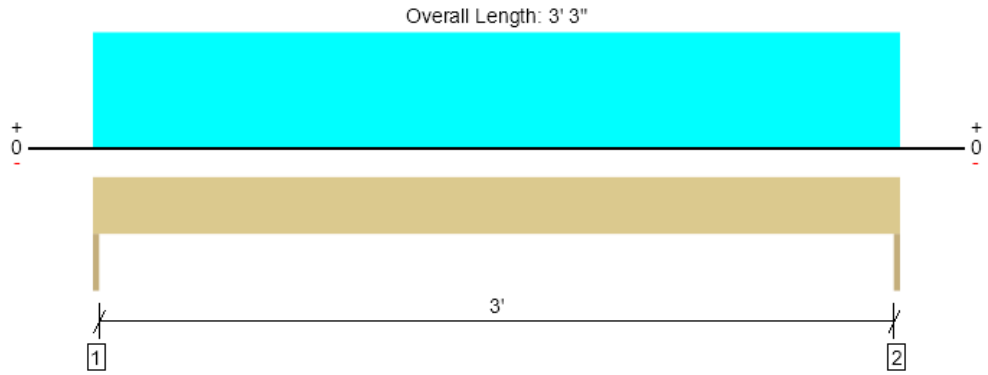
FORTEWEB

MEMBER REPORT

PASSED

Roof/Upper Wall, RB-01

1 piece(s) 3 1/2" x 9" 24F-V4 DF Glulam



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Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	205 @ 0	3413 (1.50")	Passed (6%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	94 @ 10 1/2"	6400	Passed (1%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	166 @ 1' 7 1/2"	10868	Passed (2%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.000 @ 1' 7 1/2"	0.108	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.001 @ 1' 7 1/2"	0.162	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 3' 3"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 3' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - HF	1.50"	1.50"	1.50"	85	120	205	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	85	120	205	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 3" o/c	
Bottom Edge (Lu)	3' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 3"	N/A	7.7	--	
1 - Uniform (PSF)	0 to 3' 3"	2' 11 1/2"	15.0	25.0	Roof

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ForteWEB Software Operator	Job Notes
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File Name: Dann Residence

R2.4

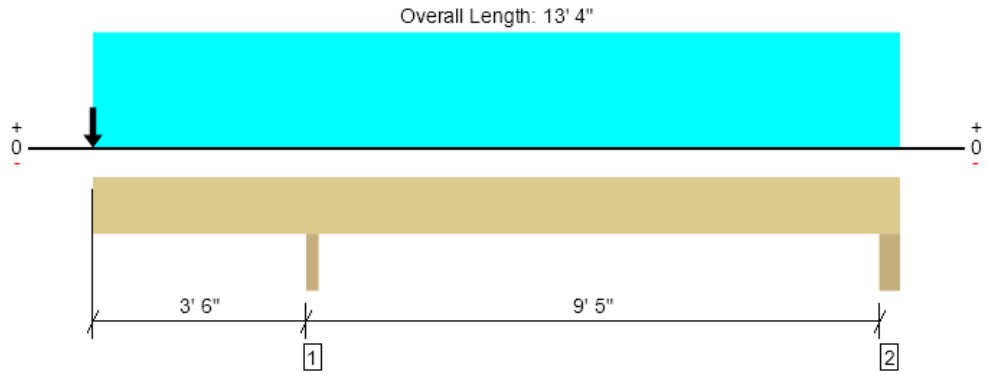
FORTEWEB

MEMBER REPORT

PASSED

Roof/Upper Wall, RB-02

1 piece(s) 5 1/2" x 9" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	3102 @ 3' 7 1/2"	10725 (3.00")	Passed (29%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1493 @ 4' 6"	10057	Passed (15%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	2548 @ 9'	17078	Passed (15%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-2793 @ 3' 7 1/2"	13164	Passed (21%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.038 @ 0	0.242	Passed (2L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.061 @ 8' 7 11/16"	0.471	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 13' 4"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 8' 1".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 5' 6 5/16".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - HF	3.00"	3.00"	1.50"	1242	1860	3102	None
2 - Trimmer - HF	5.00"	5.00"	1.50"	503	849	1352	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	13' 4" o/c	
Bottom Edge (Lu)	13' 4" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 13' 4"	N/A	12.0	--	
1 - Uniform (PSF)	0 to 13' 4"	7' 6"	15.0	25.0	Roof
2 - Point (lb)	0	N/A	85	120	Linked from: RB-01, Support 1

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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
Mariam Soliman BTL Engineering PS (425) 814-8448 mariam.soliman@btleng.net	

Weyerhaeuser

3/13/2024 12:11:59 AM UTC

ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Dann Residence

R2.5

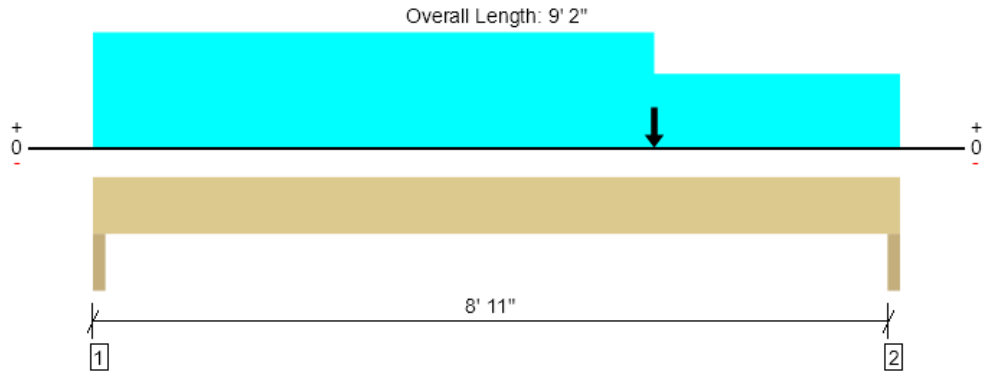
FORTEWEB

MEMBER REPORT

PASSED

Roof/Upper Wall, RB-02a

1 piece(s) 5 1/2" x 7 1/2" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	1519 @ 1 1/2"	10725 (3.00")	Passed (14%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1232 @ 10 1/2"	8381	Passed (15%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	3331 @ 4' 7 9/16"	11859	Passed (28%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.083 @ 4' 6 15/16"	0.297	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.137 @ 4' 6 15/16"	0.446	Passed (L/784)	--	1.0 D + 1.0 S (All Spans)

Member Length : 9' 2"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 8' 11".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - HF	3.00"	3.00"	1.50"	592	927	1519	None
2 - Trimmer - HF	3.00"	3.00"	1.50"	526	849	1375	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	9' 2" o/c	
Bottom Edge (Lu)	9' 2" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 9' 2"	N/A	10.0	--	
1 - Uniform (PLF)	0 to 6' 4 1/2"	N/A	118.0	200.0	Linked from: RJ-01a, Support 1
2 - Uniform (PLF)	6' 4 1/2" to 9' 2"	N/A	67.5	136.5	Linked from: RJ-01c, Support 1
3 - Point (lb)	6' 4 1/2"	N/A	85	120	Linked from: RB-01, Support 1

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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
Mariam Soliman BTL Engineering PS (425) 814-8448 mariam.soliman@btleng.net	

Weyerhaeuser

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ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Dann Residence

R2.6

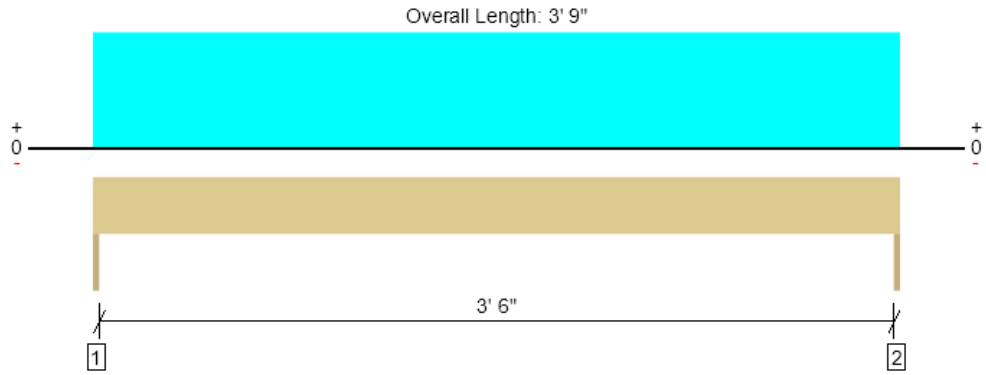
FORTEWEB

MEMBER REPORT

PASSED

Roof/Upper Wall, RB-01b

1 piece(s) 3 1/2" x 9" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	917 @ 0	3413 (1.50")	Passed (27%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	489 @ 10 1/2"	6400	Passed (8%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	860 @ 1' 10 1/2"	10868	Passed (8%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.003 @ 1' 10 1/2"	0.125	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.006 @ 1' 10 1/2"	0.188	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 3' 9"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 3' 9".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - HF	1.50"	1.50"	1.50"	353	564	917	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	353	564	917	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 9" o/c	
Bottom Edge (Lu)	3' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 9"	N/A	7.7	--	
1 - Uniform (PSF)	0 to 3' 9"	12' 1/2"	15.0	25.0	Roof

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ForteWEB Software Operator	Job Notes
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File Name: Dann Residence

R2.7

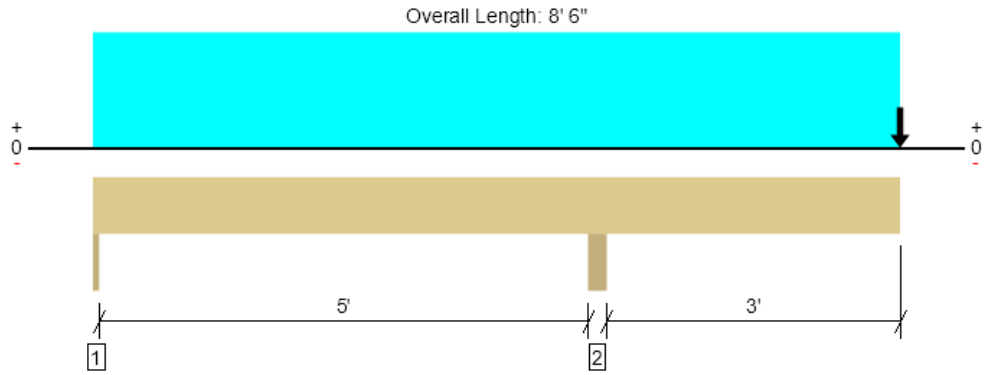
FORTEWEB

MEMBER REPORT

PASSED

Roof/Upper Wall, RB-02b

1 piece(s) 5 1/2" x 9" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	2354 @ 5' 3 3/4"	16088 (4.50")	Passed (15%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1210 @ 6' 3"	10057	Passed (12%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	0 @ N/A	N/A	Passed (N/A)	--	N/A
Neg Moment (Ft-lbs)	-3585 @ 5' 3 3/4"	13164	Passed (27%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.053 @ 8' 6"	0.213	Passed (2L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.086 @ 8' 6"	0.319	Passed (2L/888)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 8' 6"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Right cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 8' 6".
- -427 lbs uplift at support located at 0". 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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - HF	1.50"	1.50"	1.50"	-116	-311	0/-427	None
2 - Trimmer - HF	4.50"	4.50"	1.50"	948	1405	2353	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' 6" o/c	
Bottom Edge (Lu)	8' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 8' 6"	N/A	12.0	--	
1 - Uniform (PSF)	0 to 8' 6"	2' 11 1/2"	15.0	25.0	Roof
2 - Point (lb)	8' 6"	N/A	353	564	Linked from: RB-01b, Support 2

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Weyerhaeuser

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File Name: Dann Residence

R2.8

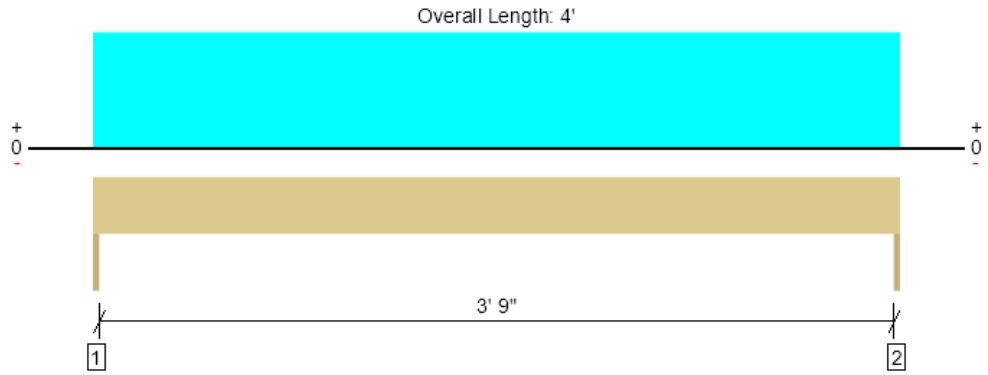
FORTEWEB

MEMBER REPORT

PASSED

Roof/Upper Wall, RB-01c

1 piece(s) 3 1/2" x 9" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	645 @ 0	3413 (1.50")	Passed (19%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	363 @ 10 1/2"	6400	Passed (6%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	645 @ 2'	10868	Passed (6%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.003 @ 2'	0.133	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.005 @ 2'	0.200	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 4'
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 4'.
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - HF	1.50"	1.50"	1.50"	252	394	646	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	252	394	646	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' o/c	
Bottom Edge (Lu)	4' o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 4'	N/A	7.7	--	
1 - Uniform (PSF)	0 to 4'	7' 10 1/2"	15.0	25.0	Roof

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File Name: Dann Residence

R2.9

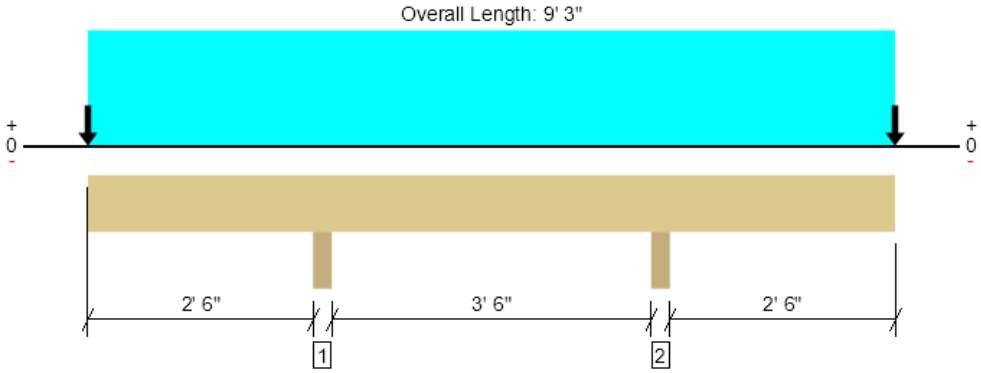
FORTEWEB

MEMBER REPORT

PASSED

Roof/Upper Wall, RB-02c

1 piece(s) 5 1/2" x 9" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	1420 @ 2' 8 1/4"	16088 (4.50")	Passed (9%)	--	1.0 D + 1.0 S (Adj Spans)
Shear (lbs)	874 @ 1' 9"	10057	Passed (9%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	0 @ N/A	N/A	Passed (N/A)	--	N/A
Neg Moment (Ft-lbs)	-2207 @ 2' 8 1/4"	13164	Passed (17%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.028 @ 0	0.200	Passed (2L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.046 @ 0	0.269	Passed (2L/999+)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 9' 3"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (0.2") and TL (2L/240).
- Left cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- Right cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 9' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - HF	4.50"	4.50"	1.50"	513	907	1420	None
2 - Trimmer - HF	4.50"	4.50"	1.50"	513	907	1420	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	9' 3" o/c	
Bottom Edge (Lu)	9' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 9' 3"	N/A	12.0	--	
1 - Uniform (PSF)	0 to 9' 3"	2' 11 1/2"	15.0	25.0	Roof
2 - Point (lb)	9' 3"	N/A	252	394	Linked from: RB-01c, Support 2
3 - Point (lb)	0	N/A	252	394	Linked from: RB-01c, Support 2

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ForteWEB Software Operator	Job Notes
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Weyerhaeuser

3/13/2024 12:11:59 AM UTC

ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Dann Residence

R2.10

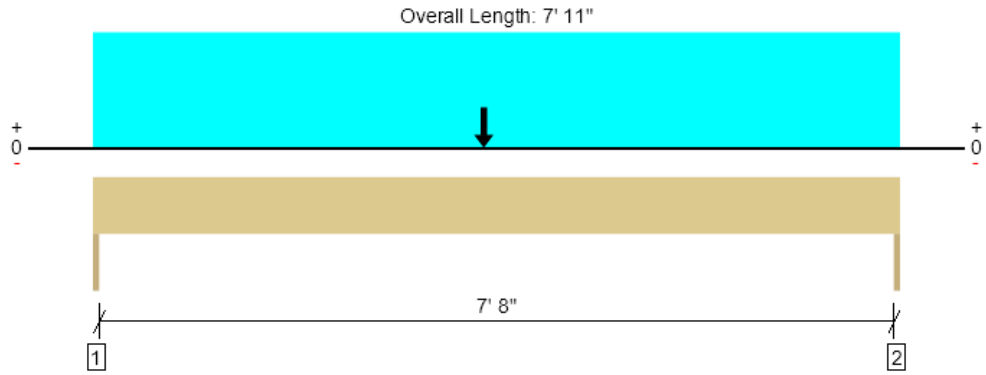
FORTEWEB

MEMBER REPORT

PASSED

Roof/Upper Wall, RB-03

1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	1746 @ 0	5363 (1.50")	Passed (33%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1594 @ 1' 1 1/2"	13409	Passed (12%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	5704 @ 3' 10"	30360	Passed (19%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.022 @ 3' 11 1/4"	0.264	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.038 @ 3' 11 1/4"	0.396	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 7' 11"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 7' 11".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - HF	1.50"	1.50"	1.50"	729	1017	1746	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	699	973	1672	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	7' 11" o/c	
Bottom Edge (Lu)	7' 11" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 7' 11"	N/A	16.0	--	
1 - Uniform (PSF)	0 to 7' 11"	2' 11 1/2"	15.0	25.0	Roof
2 - Point (lb)	3' 10"	N/A	949	1404	Linked from: RB-04, Support 1

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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
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Weyerhaeuser

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ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Dann Residence

R2.11

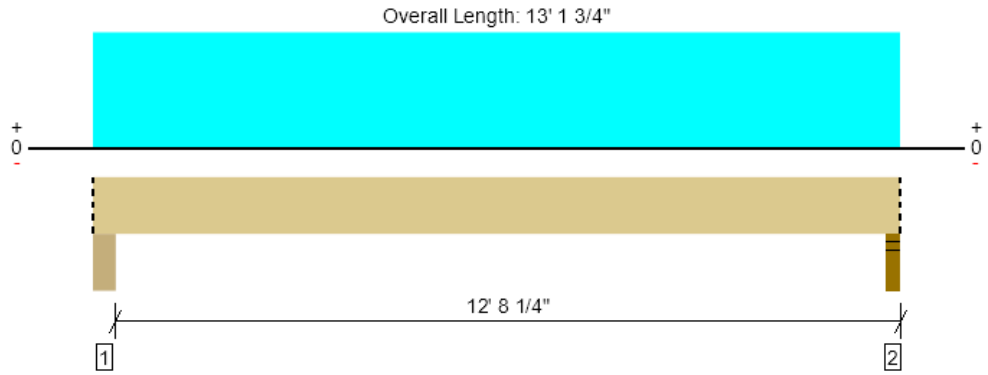
FORTEWEB

MEMBER REPORT

PASSED

Roof/Upper Wall, RB-04

1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	2294 @ 12' 11 3/4"	7796 (3.50")	Passed (29%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1838 @ 1' 5 1/2"	13409	Passed (14%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	7067 @ 6' 7 7/8"	30360	Passed (23%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.085 @ 6' 7 7/8"	0.632	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.143 @ 6' 7 7/8"	0.843	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 13' 1 3/4"
System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 12' 7 3/4".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Beam - GLB	5.50"	5.50"	1.50"	949	1404	2353	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.50"	925	1369	2294	Blocking

• 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)	13' 2" o/c	
Bottom Edge (Lu)	13' 2" o/c	

•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 13' 1 3/4"	N/A	16.0	--	
1 - Uniform (PSF)	0 to 13' 1 3/4" (Front)	8' 5 1/4"	15.0	25.0	Roof

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

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Weyerhaeuser

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ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Dann Residence

R2.12

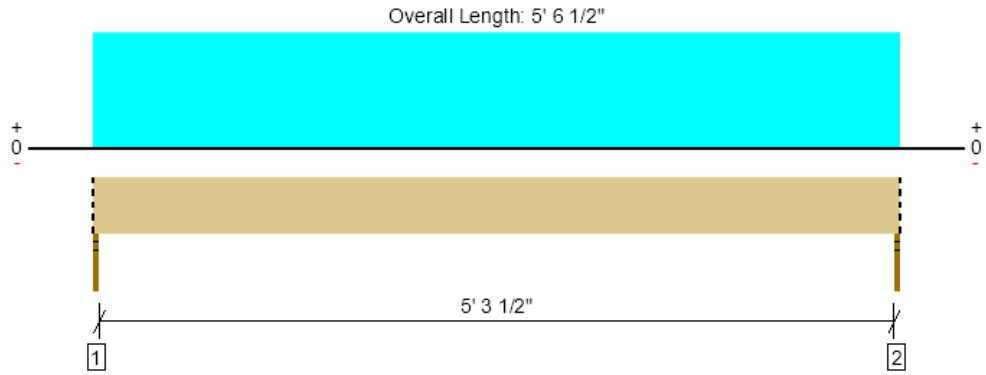
FORTEWEB

MEMBER REPORT

PASSED

Roof/Upper Wall, RB-05

1 piece(s) 3 1/2" x 7 1/2" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	1201 @ 0	2126 (1.50")	Passed (56%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	876 @ 9"	5333	Passed (16%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	1664 @ 2' 9 1/4"	7547	Passed (22%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.025 @ 2' 9 1/4"	0.277	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.042 @ 2' 9 1/4"	0.369	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 5' 6 1/2"
System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 5' 6 1/2".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	1.50"	1.50"	1.50"	464	737	1201	Blocking
2 - Stud wall - HF	1.50"	1.50"	1.50"	464	737	1201	Blocking

• 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)	5' 7" o/c	
Bottom Edge (Lu)	5' 7" o/c	

•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 5' 6 1/2"	N/A	6.4	--	
1 - Uniform (PLF)	0 to 5' 6 1/2" (Front)	N/A	161.0	266.0	Linked from: RJ-01b, Support 2

Member Notes

(converted from: Roof Flush Beam)

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File Name: Dann Residence

R2.13

BTL
ENGINEERING

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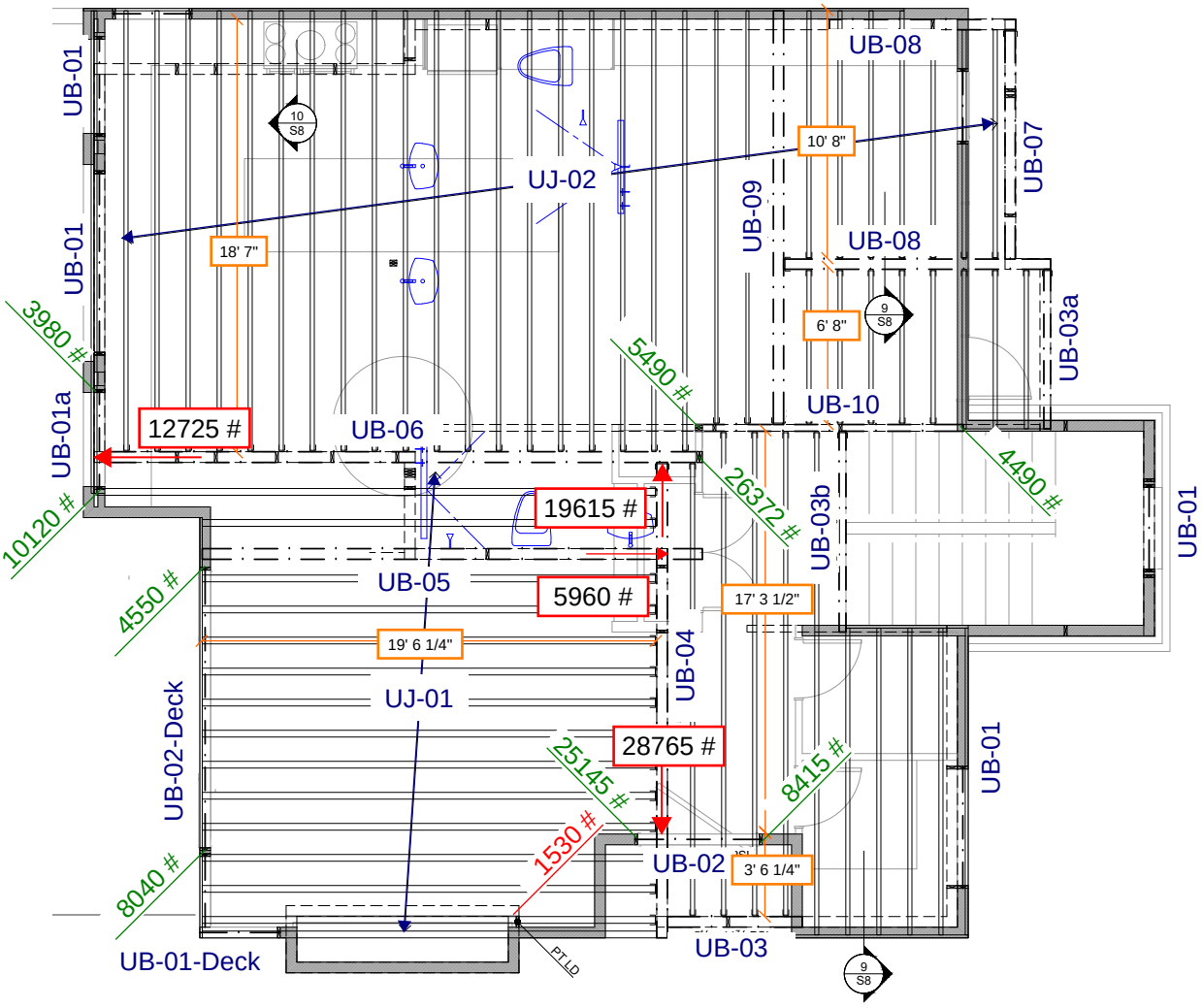
Gravity

Upper Floor Framing



Upper Floor Framing Key Plan

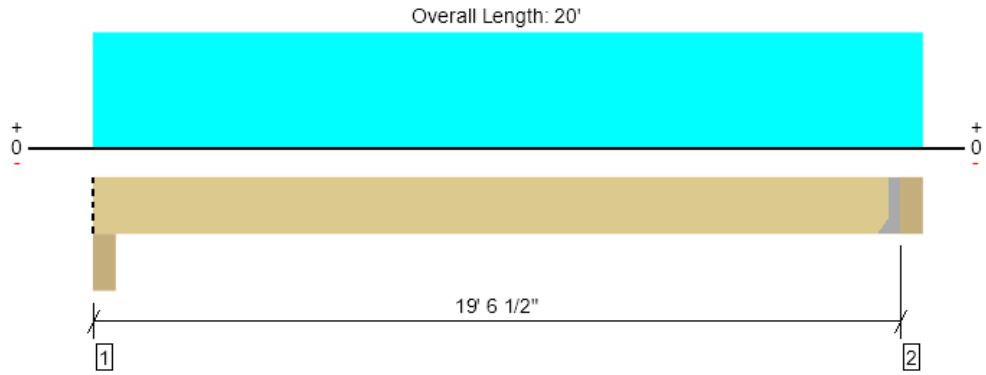
FORTEWEB

MEMBER REPORT

PASSED

Upper Floor/ Main Wall, UJ-01

1 piece(s) 3 1/2" x 9 1/2" 2.2E Parallam® PSL @ 16" OC



Drawing is Conceptual. 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)	958 @ 19' 6 1/2"	3281 (1.50")	Passed (29%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	879 @ 18' 9"	6428	Passed (14%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	4592 @ 9' 11 1/2"	13579	Passed (34%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.406 @ 9' 11 1/2"	0.639	Passed (L/566)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.508 @ 9' 11 1/2"	0.958	Passed (L/453)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	51	40	Passed	--	--

Member Length : 19' 6 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 4% increase in the moment capacity has been added to account for repetitive member usage.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Beam - GLB	5.50"	5.50"	1.50"	199	797	996	Blocking
2 - Hanger on 9 1/2" HF beam	5.50"	Hanger[1]	1.50"	201	803	1004	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.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	19' 7" o/c	
Bottom Edge (Lu)	19' 7" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	LUS410	2.00"	N/A	8-10dx1.5	6-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 20'	16"	15.0	60.0	Deck

Member Notes
(converted from: Roof Joist)

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File Name: Dann Residence

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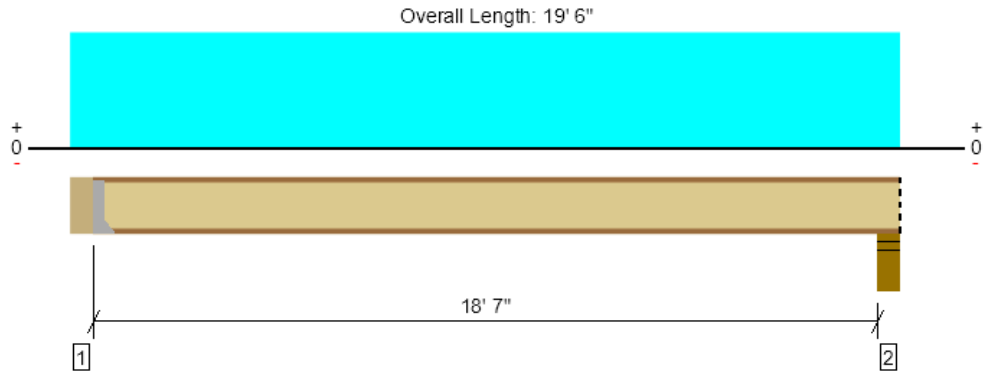
MEMBER REPORT

PASSED

Upper Floor/ Main Wall, UJ-02
1 piece(s) 11 7/8" TJI® 210 @ 16" OC



Drawing is Conceptual. 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)	684 @ 5 1/2"	1005 (1.75")	Passed (68%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	684 @ 5 1/2"	1655	Passed (41%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3194 @ 9' 9 1/2"	3795	Passed (84%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.418 @ 9' 9 1/2"	0.622	Passed (L/536)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.575 @ 9' 9 1/2"	0.933	Passed (L/390)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	40	40	Passed	--	--

Member Length : 19' 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 11 7/8" GLB beam	5.50"	Hanger[1]	1.75" / - [2]	196	522	718	See note [1]
2 - Stud wall - HF	5.50"	5.50"	1.75"	194	518	712	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.
- [2] Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' o/c	
Bottom Edge (Lu)	19' 1" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	IUS2.06/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 19' 6"	16"	15.0	40.0	Upper floor

Member Notes
(converted from: Roof Joist)

ForteWEB Software Operator	Job Notes
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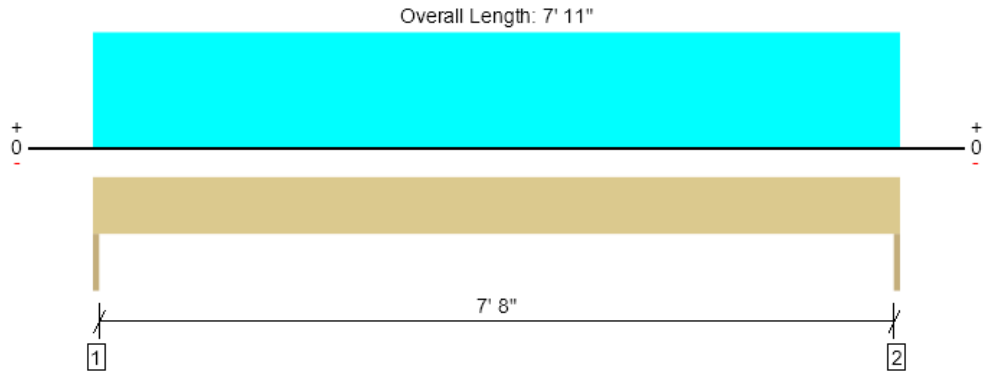
File Name: Dann Residence

Upper Floor/ Main Wall, UB-01
1 piece(s) 4 x 8 DF No.2



Drawing is Conceptual. 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)	915 @ 0	3281 (1.50")	Passed (28%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	747 @ 8 3/4"	3502	Passed (21%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	1812 @ 3' 11 1/2"	3438	Passed (53%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.038 @ 3' 11 1/2"	0.264	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.115 @ 3' 11 1/2"	0.313	Passed (L/827)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 7' 11"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (5/16").
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Trimmer - HF	1.50"	1.50"	1.50"	617	106	293	1016	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	617	106	293	1016	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	7' 11" o/c	
Bottom Edge (Lu)	7' 11" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 7' 11"	N/A	6.4	--	--	
1 - Uniform (PSF)	0 to 7' 11"	8"	15.0	40.0	-	Upper Floor
2 - Uniform (PLF)	0 to 7' 11"	N/A	95.0	-	-	Wall
3 - Uniform (PSF)	0 to 7' 11"	2' 11 1/2"	15.0	-	25.0	Roof

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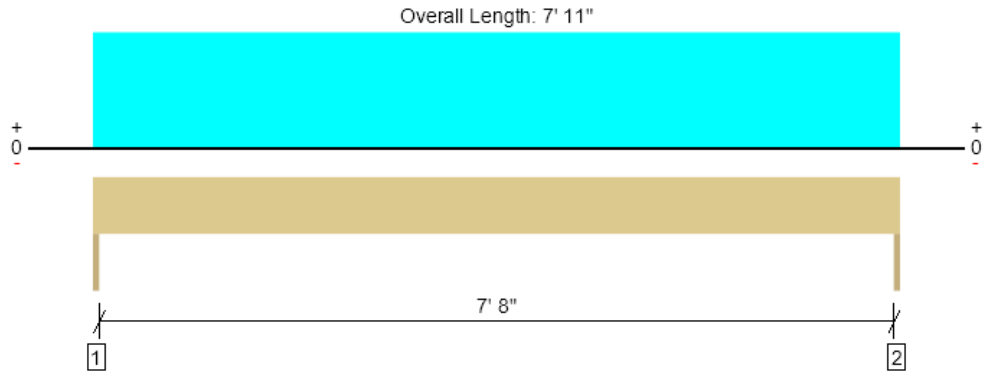
Weyerhaeuser

FORTEWEB

MEMBER REPORT

PASSED

Upper Floor/ Main Wall, UB-01-Deck
1 piece(s) 4 x 8 DF No.2



Drawing is Conceptual. 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)	223 @ 0	3281 (1.50")	Passed (7%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	182 @ 8 3/4"	3045	Passed (6%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	442 @ 3' 11 1/2"	2989	Passed (15%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.020 @ 3' 11 1/2"	0.264	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.028 @ 3' 11 1/2"	0.313	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 7' 11"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (5/16").
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Trimmer - HF	1.50"	1.50"	1.50"	65	158	223	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	65	158	223	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	7' 11" o/c	
Bottom Edge (Lu)	7' 11" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 7' 11"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 7' 11"	8"	15.0	60.0	Deck

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Weyerhaeuser

3/13/2024 12:12:28 AM UTC
ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0
File Name: Dann Residence

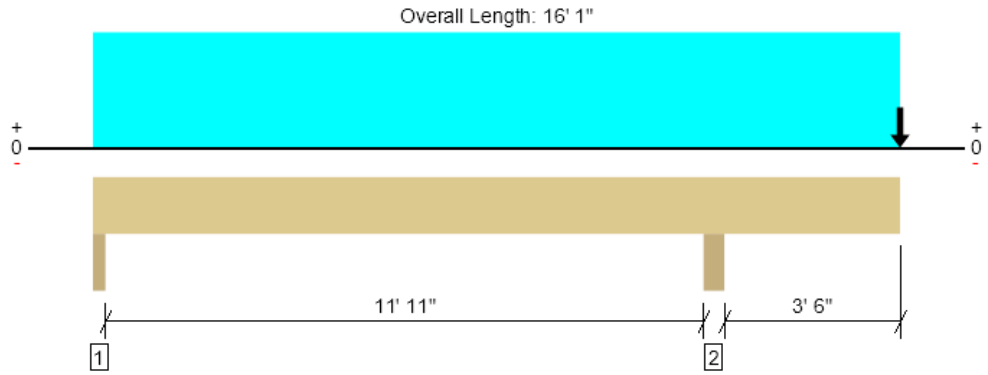
FORTEWEB

MEMBER REPORT

PASSED

Upper Floor/ Main Wall, UB-02-Deck

1 piece(s) 5 1/2" x 10 1/2" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	8037 @ 12' 4 1/2"	17875 (5.00")	Passed (45%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4243 @ 11' 3 1/2"	10203	Passed (42%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	13316 @ 6' 1 1/4"	20213	Passed (66%)	1.00	1.0 D + 1.0 L (Alt Spans)
Neg Moment (Ft-lbs)	-5951 @ 12' 4 1/2"	15580	Passed (38%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.310 @ 6' 3"	0.408	Passed (L/474)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.373 @ 6' 2 7/16"	0.613	Passed (L/394)	--	1.0 D + 1.0 L (Alt Spans)

Member Length : 16' 1"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Upward deflection on right cantilever exceeds overhang deflection criteria.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 11' 11 1/2".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 5' 1/8".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Trimmer - HF	3.00"	3.00"	1.50"	892	3656/-376	4548/-376	None
2 - Trimmer - HF	5.00"	5.00"	2.25"	1751	6287	8038	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	16' 1" o/c	
Bottom Edge (Lu)	16' 1" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 16' 1"	N/A	14.0	--	
1 - Uniform (PSF)	0 to 16' 1"	9' 9"	15.0	60.0	Deck
2 - Point (lb)	16' 1"	N/A	65	158	Linked from: UB-01-Deck, Support 1

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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
Mariam Soliman BTL Engineering PS (425) 814-8448 mariam.soliman@btleng.net	

Weyerhaeuser

3/13/2024 12:12:28 AM UTC

ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Dann Residence

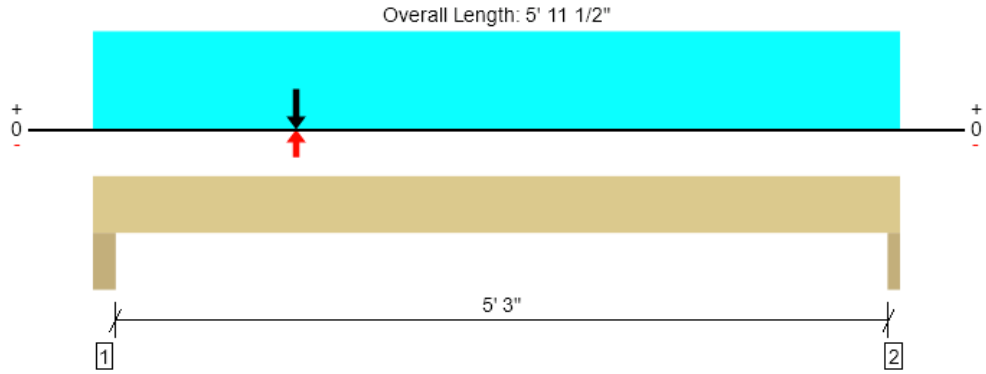
FORTEWEB

MEMBER REPORT

PASSED

Upper Floor/ Main Wall, UB-02

1 piece(s) 5 1/4" x 11 7/8" 2.2E Parallam® PSL



Drawing is Conceptual. 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) [Group]
Member Reaction (lbs)	17249 @ 4"	18047 (5.50")	Passed (96%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans) [1]
Shear (lbs)	16312 @ 1' 5 3/8"	19285	Passed (85%)	1.60	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans) [1]
Moment (Ft-lbs)	19432 @ 1' 6"	47766	Passed (41%)	1.60	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans) [1]
Live Load Defl. (in)	0.030 @ 2' 10 9/16"	0.183	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans) [1]
Total Load Defl. (in)	0.051 @ 2' 10 3/16"	0.275	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans) [1]

Member Length : 5' 11 1/2"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	
1 - Trimmer - DF	5.50"	5.50"	5.26"	4729	6150	1859	12407/-12407	25145/-12407	None
2 - Trimmer - HF	3.00"	3.00"	1.82"	1634	2940	500	3340/-3340	8414/-3340	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' o/c	
Bottom Edge (Lu)	6' o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 5' 11 1/2"	N/A	19.5	--	--	--	
1 - Uniform (PSF)	0 to 5' 11 1/2"	10' 5 5/8"	15.0	60.0	-	-	Upper Floor
2 - Point (lb)	1' 6"	N/A	5312	5348	2359	15747/-15747	Linked from: UB-04, Support 1

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ForteWEB Software Operator	Job Notes
Mariam Soliman BTL Engineering PS (425) 814-8448 mariam.soliman@btleng.net	

Weyerhaeuser

3/13/2024 2:00:12 PM UTC

ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Dann Residence

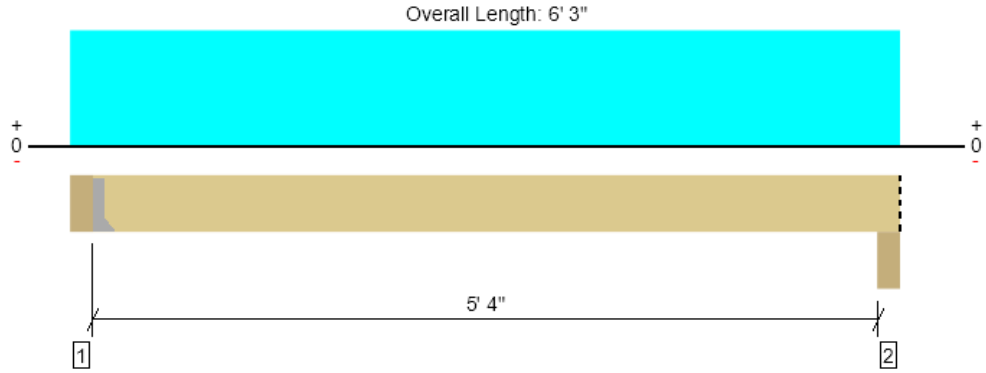
FORTEWEB

MEMBER REPORT

PASSED

Upper Floor/ Main Wall, UB-03

1 piece(s) 5 1/4" x 11 7/8" 2.2E Parallam® PSL



Drawing is Conceptual. 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)	1612 @ 5 1/2"	4922 (1.50")	Passed (33%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1028 @ 1' 5 3/8"	13861	Passed (7%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2200 @ 3' 2 1/4"	34332	Passed (6%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.005 @ 3' 2 1/4"	0.136	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.011 @ 3' 2 1/4"	0.273	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 5' 9 1/2"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Hanger on 11 7/8" GLB beam	5.50"	Hanger[1]	1.50"	997	223	877	2097	See note [1]
2 - Beam - GLB	5.50"	5.50"	1.50"	967	214	842	2023	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.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 10" o/c	
Bottom Edge (Lu)	5' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	U610	2.00"	N/A	14-10d	6-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	5 1/2" to 6' 3"	N/A	19.5	--	--	
1 - Uniform (PSF)	0 to 6' 3" (Front)	1' 9"	15.0	40.0	-	Upper Floor
2 - Uniform (PLF)	0 to 6' 3" (Front)	N/A	105.0	-	-	Wall
3 - Uniform (PSF)	0 to 6' 3" (Front)	11'	15.0	-	25.0	Roof

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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
Mariam Soliman BTL Engineering PS (425) 814-8448 mariam.soliman@btleng.net	

Weyerhaeuser

3/13/2024 12:12:28 AM UTC

ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Dann Residence

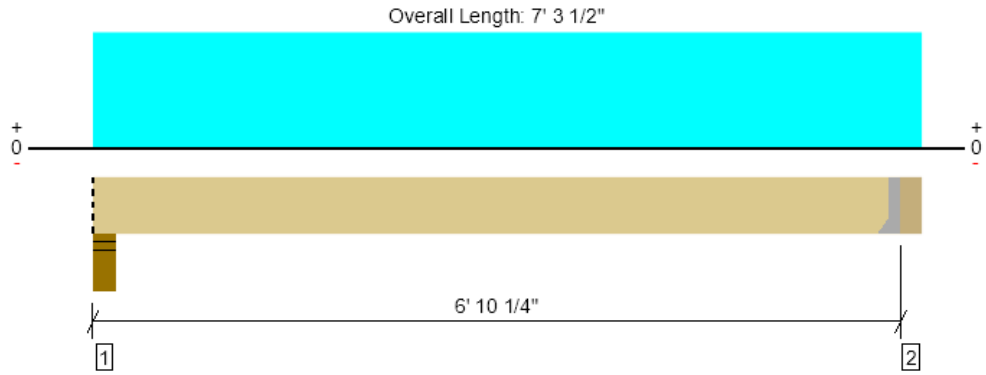
FORTEWEB

MEMBER REPORT

PASSED

Upper Floor/ Main Wall, UB-03a

1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



Drawing is Conceptual. 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)	593 @ 6' 10 1/4"	4725 (1.50")	Passed (13%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	385 @ 5' 10 3/8"	8590	Passed (4%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	902 @ 3' 7 1/8"	15953	Passed (6%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.003 @ 3' 7 1/8"	0.163	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.013 @ 3' 7 1/8"	0.326	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 6' 10 1/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Stud wall - HF	5.50"	5.50"	1.50"	514	96	90	700	Blocking
2 - Hanger on 11 7/8" GLB beam	5.25"	Hanger[1]	1.50"	523	99	92	714	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.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 10" o/c	
Bottom Edge (Lu)	6' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	LUS410	2.00"	N/A	8-10dx1.5	6-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 10 1/4"	N/A	13.0	--	--	
1 - Uniform (PSF)	0 to 7' 3 1/2" (Front)	8"	15.0	40.0	-	Upper Floor
2 - Uniform (PLF)	0 to 7' 3 1/2" (Front)	N/A	105.0	-	-	Wall
3 - Uniform (PSF)	0 to 7' 3 1/2" (Front)	1'	15.0	-	25.0	Roof

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Mariam Soliman BTL Engineering PS (425) 814-8448 mariam.soliman@btleng.net	

Weyerhaeuser

3/13/2024 12:12:28 AM UTC

ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Dann Residence

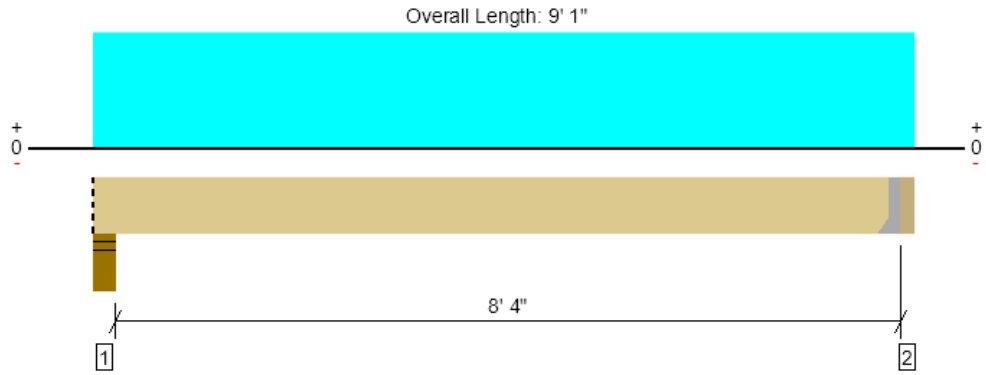
FORTEWEB

MEMBER REPORT

PASSED

Upper Floor/ Main Wall, UB-03b

1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



Drawing is Conceptual. 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)	210 @ 8' 9 1/2"	4725 (1.50")	Passed (4%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	161 @ 7' 9 5/8"	8590	Passed (2%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	444 @ 4' 6 3/4"	15953	Passed (3%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.005 @ 4' 6 3/4"	0.211	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.009 @ 4' 6 3/4"	0.423	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 8' 9 1/2"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - HF	5.50"	5.50"	1.50"	105	122	227	Blocking
2 - Hanger on 11 7/8" LSL beam	3.50"	Hanger[1]	1.50"	100	121	221	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.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' 10" o/c	
Bottom Edge (Lu)	8' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	LUS410	2.00"	N/A	8-10dx1.5	6-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 8' 9 1/2"	N/A	13.0	--	
1 - Uniform (PSF)	0 to 9' 1" (Front)	8"	15.0	40.0	Upper Floor

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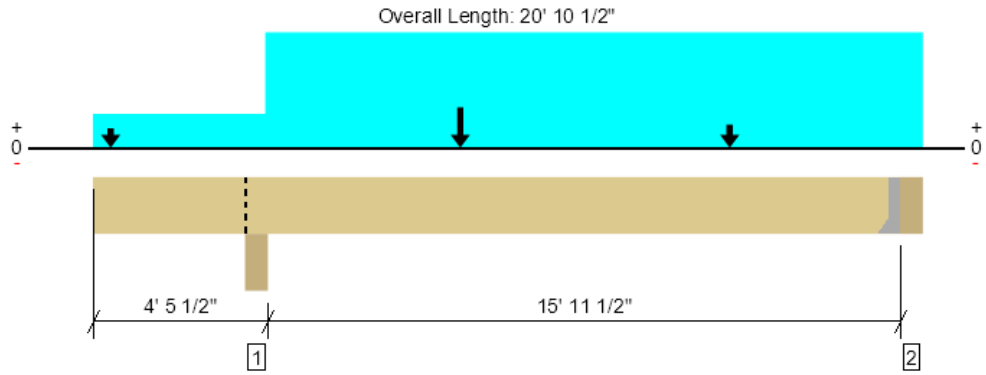
ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Dann Residence

Upper Floor/ Main Wall, UB-04

1 piece(s) 5 1/2" x 19 1/2" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	19360 @ 4' 2 3/4"	18906 (5.50")	Passed (102%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	15084 @ 6' 1"	30316	Passed (50%)	1.60	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Pos Moment (Ft-lbs)	68702 @ 9' 6"	108572	Passed (63%)	1.60	1.0 D + 0.525 E + 0.75 L + 0.75 S (Alt Spans)
Neg Moment (Ft-lbs)	-52506 @ 9' 6"	81557	Passed (64%)	1.60	0.6 D - 0.7 E (All Spans)
Live Load Defl. (in)	0.157 @ 12' 4 1/2"	0.405	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.263 @ 12' 7 5/8"	0.809	Passed (L/737)	--	1.0 D + 1.0 L (Alt Spans)

Member Length : 20' 5"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 0.97 that was calculated using length L = 15' 9 1/4".
- Critical negative moment adjusted by a volume/size factor of 0.95 that was calculated using length L = 20' 5".
- An excessive uplift of -7835 lbs detected at support located at 4' 2 3/4".
- An excessive uplift of -2625 lbs detected at support located at 20' 5".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	
1 - Beam - DF	5.50"	5.50"	5.63"	5312	5348	2359	15747/-15747	28766/-15747	Blocking
2 - Hanger on 19 1/2" GLB beam	5.50"	Hanger[1]	3.85"	4495	5400	2116	7603/-7603	19614/-7603	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.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	20' 5" o/c	
Bottom Edge (Lu)	20' 5" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	HGUS5.50/14	4.00"	N/A	66-16d	22-16d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

ForteWEB Software Operator	Job Notes
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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 20' 5"	N/A	26.1	--	--	--	
1 - Uniform (PSF)	0 to 4' 5 1/2" (Front)	1' 1 1/4"	15.0	60.0	-	-	Deck
2 - Uniform (PSF)	4' 5 1/2" to 20' 10 1/2" (Front)	9' 9"	15.0	60.0	-	-	Deck
3 - Uniform (PLF)	0 to 20' 10 1/2" (Front)	N/A	105.0	-	-	-	Wall
4 - Uniform (PSF)	0 to 20' 10 1/2" (Front)	2'	15.0	-	25.0	-	Roof
5 - Point (lb)	16' 2 1/2" (Front)	N/A	2985	538	2438	-	Linked from: UB-05, Support 2
6 - Point (lb)	5 1/2" (Front)	N/A	997	223	877	-	Linked from: UB-03, Support 1
7 - Point (lb)	9' 6" (Top)	N/A	-	-	-	23350	

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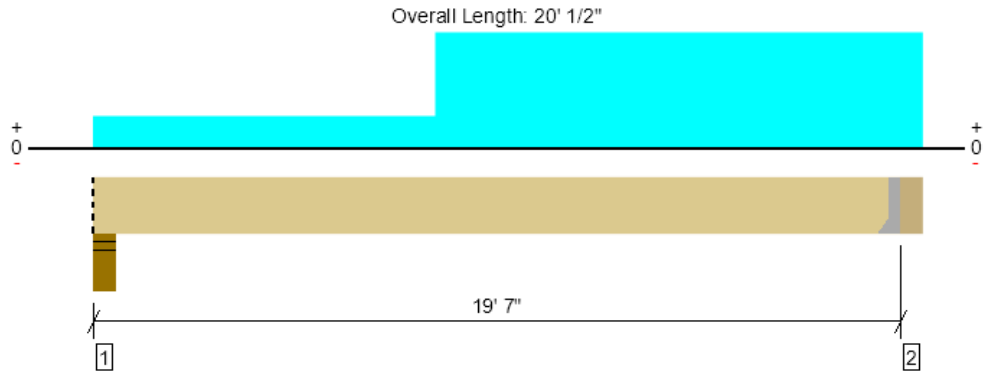
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Upper Floor/ Main Wall, UB-05

1 piece(s) 5 1/2" x 19 1/2" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	5152 @ 19' 7"	5363 (1.50")	Passed (96%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	4145 @ 17' 11 1/2"	21790	Passed (19%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	21419 @ 11' 3 1/4"	76495	Passed (28%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.092 @ 10' 6 1/4"	0.642	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.223 @ 10' 4 1/16"	0.962	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 19' 7"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 0.95 that was calculated using length L = 19' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Stud wall - HF	5.50"	5.50"	1.50"	2068	531	932	3531	Blocking
2 - Hanger on 19 1/2" HF beam	5.50"	Hanger[1]	1.50"	2985	538	2438	5961	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.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	19' 7" o/c	
Bottom Edge (Lu)	19' 7" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	HGUS5.50/14	4.00"	N/A	66-10d	22-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 19' 7"	N/A	26.1	--	--	
1 - Uniform (PSF)	0 to 20' 1/2" (Front)	1' 4"	15.0	40.0	-	Upper Floor
2 - Uniform (PLF)	0 to 20' 1/2" (Front)	N/A	105.0	-	-	Wall
3 - Uniform (PLF)	8' 6" to 20' 1/2" (Front)	N/A	176.5	-	292.0	Linked from: RJ-01a, Support 2

ForteWEB Software Operator	Job Notes
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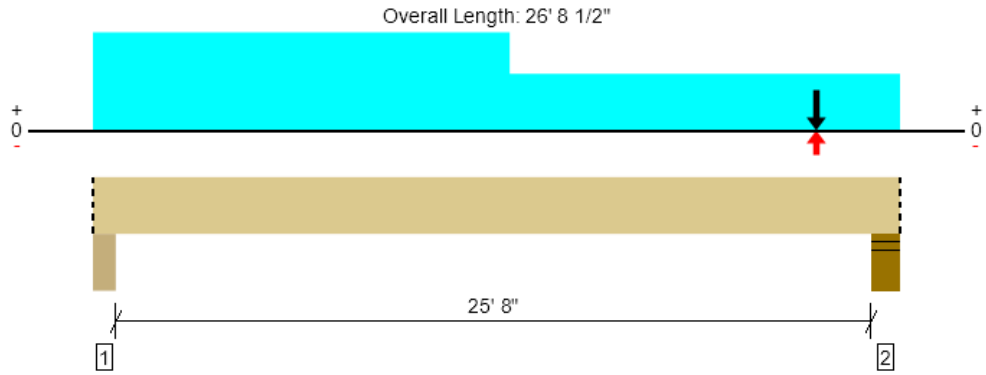
Upper Floor/ Main Wall, UB-06

1 piece(s) 5 1/2" x 19 1/2" 24F-V4 DF Glulam



Drawing is Conceptual. 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) [Group]
Member Reaction (lbs)	19961 @ 26' 3"	24063 (7.00")	Passed (83%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans) [1]
Shear (lbs)	15679 @ 24' 6"	18948	Passed (83%)	1.00	1.0 D + 1.0 L (All Spans) [1]
Pos Moment (Ft-lbs)	64965 @ 13' 8 15/16"	64569	Passed (101%)	1.00	1.0 D + 1.0 L (All Spans) [1]
Neg Moment (Ft-lbs)	-1923 @ 23' 11 1/4"	85979	Passed (2%)	1.60	0.6 D - 0.7 E (All Spans) [1]
Live Load Defl. (in)	0.764 @ 13' 7 5/8"	0.864	Passed (L/407)	--	1.0 D + 1.0 L (All Spans) [1]
Total Load Defl. (in)	1.323 @ 13' 6 3/8"	1.296	Passed (L/235)	--	1.0 D + 1.0 L (All Spans) [1]

Member Length : 26' 8 1/2"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 0.93 that was calculated using length L = 25' 11".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 3' 6".
- -671 lbs uplift at support located at 26' 3". 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.

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	
1 - Beam - DF	5.50"	5.50"	3.06"	4505	5422	2120	678/-678	12725/-678	Blocking
2 - Stud wall - DF	7.00"	7.00"	5.81"	6960	9905	2582	6925/-6925	26372/-6925	Blocking

• 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" o/c	
Bottom Edge (Lu)	26' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

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 26' 8 1/2"	N/A	26.1	--	--	--	
1 - Uniform (PSF)	0 to 26' 8 1/2" (Front)	9' 3 1/2"	15.0	40.0	-	-	Upper Floor
2 - Uniform (PLF)	0 to 13' 9 1/2" (Front)	N/A	95.0	-	-	-	Wall
3 - Uniform (PSF)	0 to 13' 9 1/2" (Front)	7' 6"	12.0	-	25.0	-	Roof
4 - Point (lb)	23' 11 1/4" (Front)	N/A	4495	5400	2116	7603/-7603	Linked from: UB-04, Support 2

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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
Mariam Soliman BTL Engineering PS (425) 814-8448 mariam.soliman@btleng.net	

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3/13/2024 1:57:37 PM UTC

ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Dann Residence

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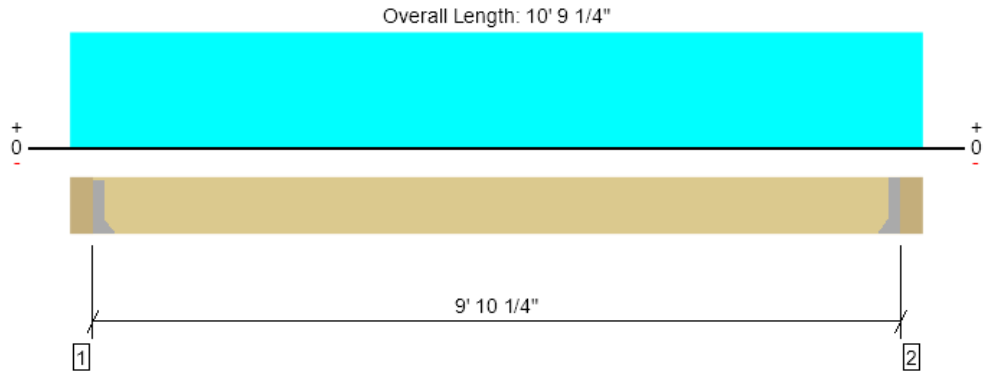
MEMBER REPORT

PASSED

Upper Floor/ Main Wall, UB-07

1 piece(s) 5 1/4" x 11 7/8" 2.2E Parallam® PSL



Drawing is Conceptual. 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)	1204 @ 5 1/2"	4922 (1.50")	Passed (24%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	962 @ 1' 5 3/8"	13861	Passed (7%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	2966 @ 5' 4 5/8"	34332	Passed (9%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.011 @ 5' 4 5/8"	0.246	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.037 @ 5' 4 5/8"	0.493	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 9' 10 1/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Hanger on 11 7/8" HF beam	5.50"	Hanger[1]	1.50"	900	144	398	1442	See note [1]
2 - Hanger on 11 7/8" HF beam	5.50"	Hanger[1]	1.50"	900	144	398	1442	See note [1]

- 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.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	9' 10" o/c	
Bottom Edge (Lu)	9' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	U610	2.00"	N/A	14-10dx1.5	6-10d	
2 - Face Mount Hanger	U610	2.00"	N/A	14-10dx1.5	6-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	5 1/2" to 10' 3 3/4"	N/A	19.5	--	--	
1 - Uniform (PSF)	0 to 10' 9 1/4" (Front)	8"	15.0	40.0	-	Upper Floor
2 - Uniform (PLF)	0 to 10' 9 1/4" (Front)	N/A	95.0	-	-	Wall
3 - Uniform (PSF)	0 to 10' 9 1/4" (Front)	2' 11 1/2"	15.0	-	25.0	Roof

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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
Mariam Soliman BTL Engineering PS (425) 814-8448 mariam.soliman@btleng.net	

Weyerhaeuser

3/13/2024 12:12:28 AM UTC

ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Dann Residence

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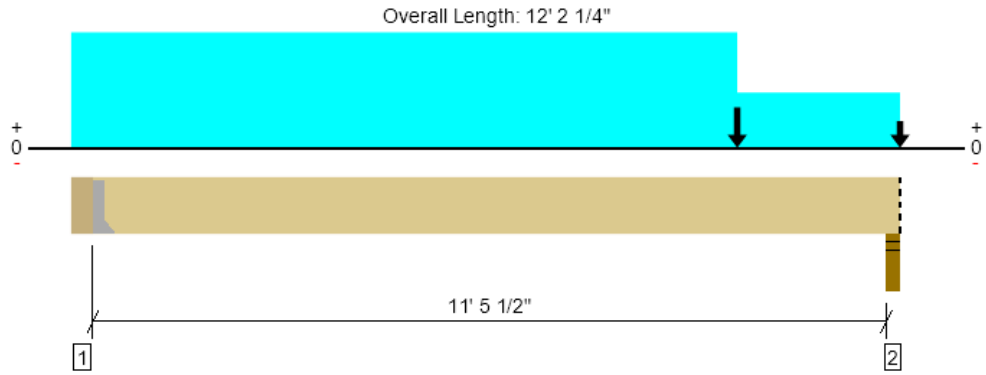
MEMBER REPORT

PASSED

Upper Floor/ Main Wall, UB-08

1 piece(s) 5 1/4" x 11 7/8" 2.2E Parallam® PSL



Drawing is Conceptual. 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)	3005 @ 5 1/4"	4922 (1.50")	Passed (61%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2843 @ 10' 10 7/8"	12053	Passed (24%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	9099 @ 6' 5 15/16"	29854	Passed (30%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.091 @ 6' 2 1/8"	0.290	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.153 @ 6' 3 7/16"	0.579	Passed (L/910)	--	1.0 D + 1.0 L (All Spans)

Member Length : 11' 9"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Hanger on 11 7/8" SPF beam	5.25"	Hanger[1]	1.50"	1104	2109	98	3311	See note [1]
2 - Stud wall - SPF	3.50"	3.50"	1.68"	2169	1506	597	4272	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.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	11' 9" o/c	
Bottom Edge (Lu)	11' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HHUS5.50/10	3.00"	N/A	30-10d	10-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	5 1/4" to 12' 2 1/4"	N/A	19.5	--	--	
1 - Uniform (PSF)	0 to 9' 8 3/4" (Front)	8' 8"	15.0	40.0	-	Upper Floor
2 - Uniform (PLF)	9' 8 3/4" to 12' 2 1/4" (Front)	N/A	95.0	-	-	Wall
3 - Uniform (PSF)	9' 8 3/4" to 12' 2 1/4" (Front)	3' 4"	15.0	-	25.0	Roof
4 - Point (lb)	9' 8 3/4" (Front)	N/A	900	144	398	Linked from: UB-07, Support 1
5 - Point (lb)	12' 2 1/4" (Front)	N/A	523	99	92	Linked from: UB-03a, Support 2

ForteWEB Software Operator	Job Notes
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ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Dann Residence

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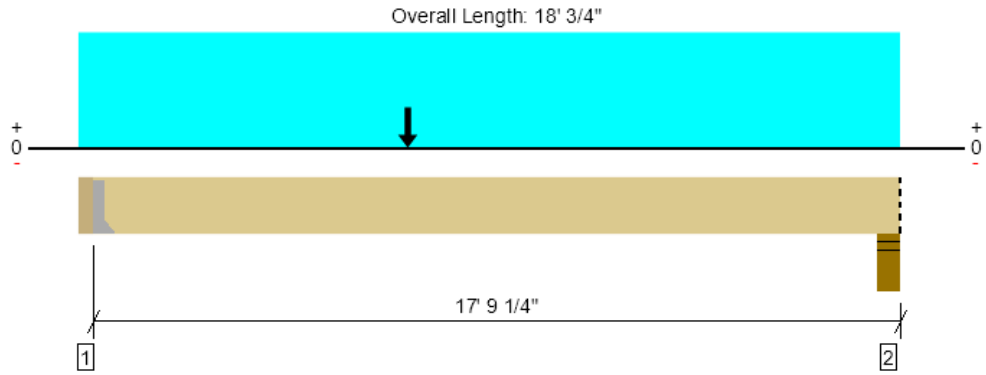
MEMBER REPORT

PASSED

Upper Floor/ Main Wall, UB-09

1 piece(s) 5 1/4" x 11 7/8" 2.2E Parallam® PSL



Drawing is Conceptual. 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)	2767 @ 3 1/2"	4922 (1.50")	Passed (56%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2675 @ 1' 3 3/8"	12053	Passed (22%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	16696 @ 7' 1 1/4"	29854	Passed (56%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.319 @ 8' 7 1/8"	0.436	Passed (L/656)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.502 @ 8' 7 1/4"	0.872	Passed (L/417)	--	1.0 D + 1.0 L (All Spans)

Member Length : 17' 9 1/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Hanger on 11 7/8" LSL beam	3.50"	Hanger[1]	1.50"	1023	1766	60	2849	See note [1]
2 - Stud wall - SPF	5.50"	5.50"	1.50"	789	1307	38	2134	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.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	17' 9" o/c	
Bottom Edge (Lu)	17' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HU612	2.50"	N/A	22-10d	8-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	3 1/2" to 18' 3/4"	N/A	19.5	--	--	
1 - Uniform (PSF)	0 to 18' 3/4" (Front)	1' 4"	15.0	40.0	-	Upper Floor
2 - Point (lb)	7' 1 1/4" (Front)	N/A	1104	2109	98	Linked from: UB-08, Support 1

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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
Mariam Soliman BTL Engineering PS (425) 814-8448 mariam.soliman@btleng.net	

Weyerhaeuser

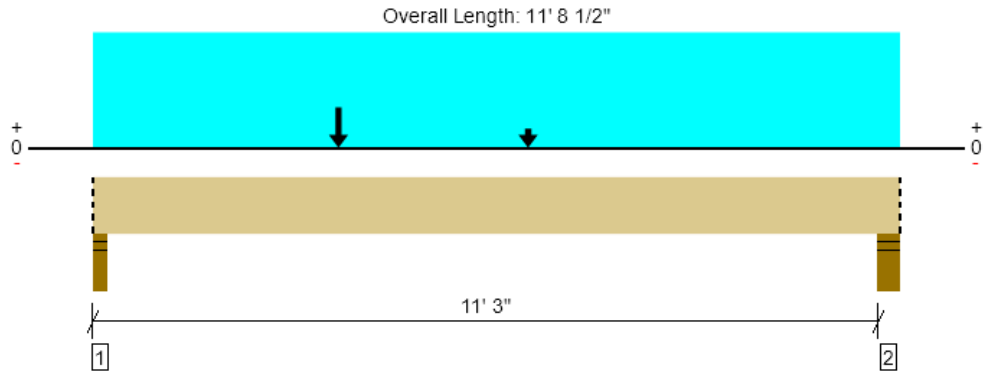
3/13/2024 12:12:28 AM UTC

ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Dann Residence

Upper Floor/ Main Wall, UB-10

1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



Drawing is Conceptual. 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)	4717 @ 2"	4961 (3.50")	Passed (95%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	4059 @ 1' 3 3/8"	9878	Passed (41%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	13006 @ 4' 6 5/16"	18346	Passed (71%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.209 @ 5' 6 13/16"	0.280	Passed (L/642)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.427 @ 5' 7 3/16"	0.560	Passed (L/315)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 11' 8 1/2"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Stud wall - HF	3.50"	3.50"	3.33"	2397	1516	1577	5490	Blocking
2 - Stud wall - HF	5.50"	5.50"	2.74"	2051	839	1598	4488	Blocking

• 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)	11' 9" o/c	
Bottom Edge (Lu)	11' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 11' 8 1/2"	N/A	13.0	--	--	
1 - Uniform (PSF)	0 to 11' 8 1/2" (Front)	1'	15.0	40.0	-	Upper Floor
2 - Uniform (PLF)	0 to 11' 8 1/2" (Front)	N/A	95.0	-	-	Wall
3 - Uniform (PLF)	0 to 11' 8 1/2" (Front)	N/A	161.0	-	266.0	Linked from: RJ-01b, Support 2
4 - Point (lb)	3' 6 3/4" (Front)	N/A	1023	1766	60	Linked from: UB-09, Support 1
5 - Point (lb)	6' 3 3/4" (Front)	N/A	100	121	-	Linked from: UB-03b, Support 2

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ForteWEB Software Operator	Job Notes
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Weyerhaeuser

3/13/2024 12:12:28 AM UTC

ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Dann Residence

BTL
ENGINEERING

19011 Wood-Sno Road NE, Suite 100
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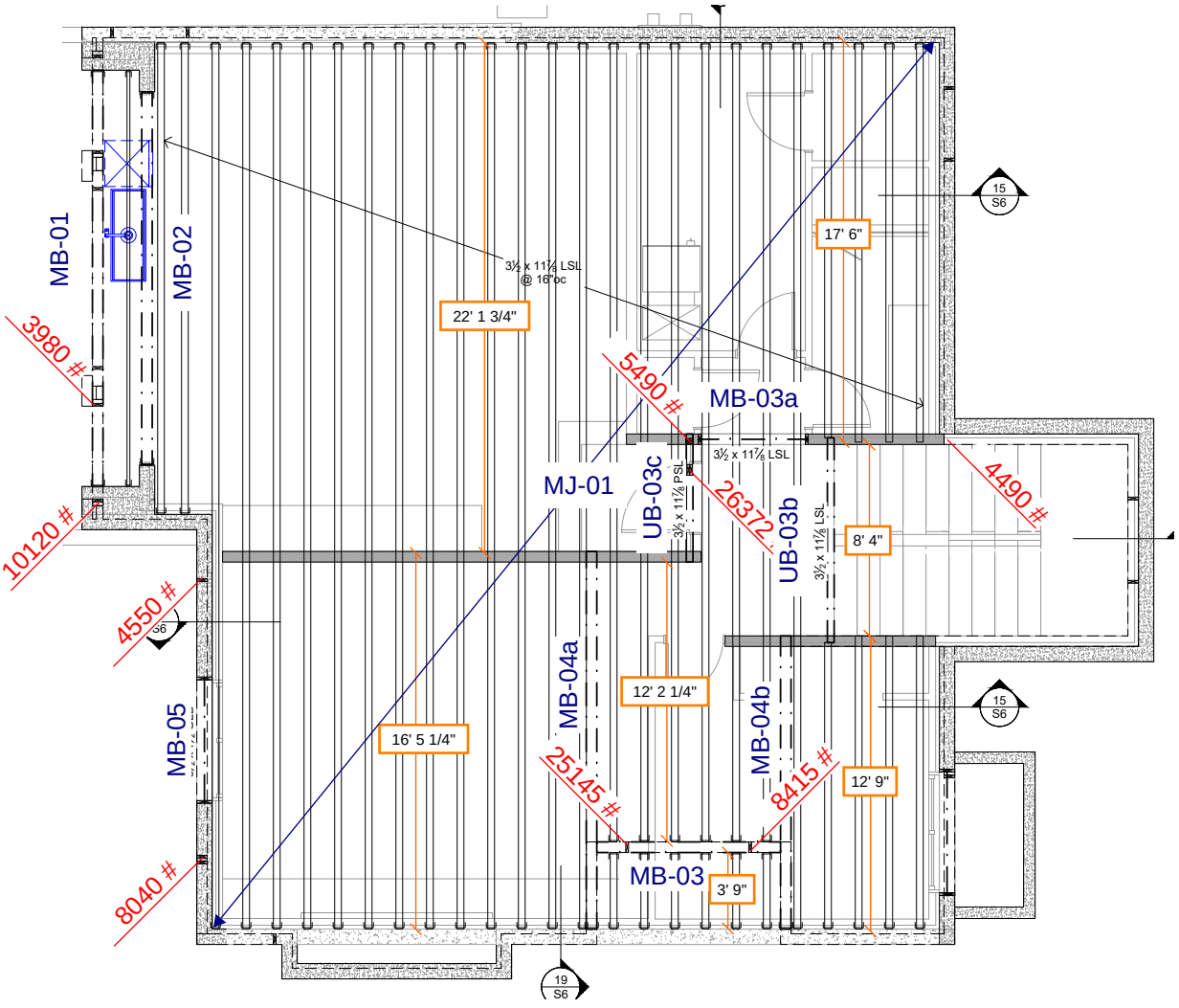
Gravity

Main Floor Framing



Main Floor Framing Key Plan

MF1.1

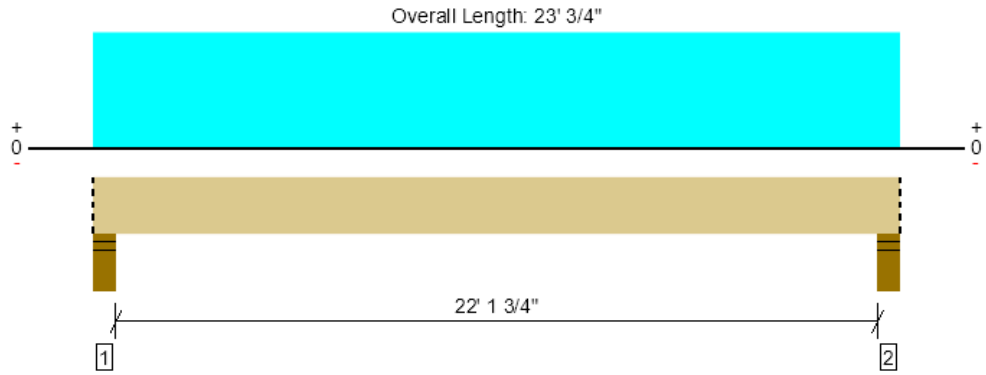
FORTEWEB

MEMBER REPORT

PASSED

Main Floor/Lower Wall, MJ-01

1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL @ 16" OC



Drawing is Conceptual. 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)	615 @ 4 1/2"	7796 (5.50")	Passed (8%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	538 @ 1' 5 3/8"	9878	Passed (5%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3319 @ 11' 6 3/8"	19080	Passed (17%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.225 @ 11' 6 3/8"	0.744	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.360 @ 11' 6 3/8"	1.116	Passed (L/744)	--	1.0 D + 1.0 S (All Spans)
TJ-Pro™ Rating	46	40	Passed	--	--

Member Length : 23' 3/4"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 4% increase in the moment capacity has been added to account for repetitive member usage.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	5.50"	5.50"	1.50"	231	384	615	Blocking
2 - Stud wall - HF	5.50"	5.50"	1.50"	231	384	615	Blocking

• 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)	23' 1" o/c	
Bottom Edge (Lu)	23' 1" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 23' 3/4"	16"	15.0	25.0	Roof

Member Notes

(converted from: Roof Joist)

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ForteWEB Software Operator	Job Notes
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Weyerhaeuser

3/13/2024 12:12:49 AM UTC

ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Dann Residence

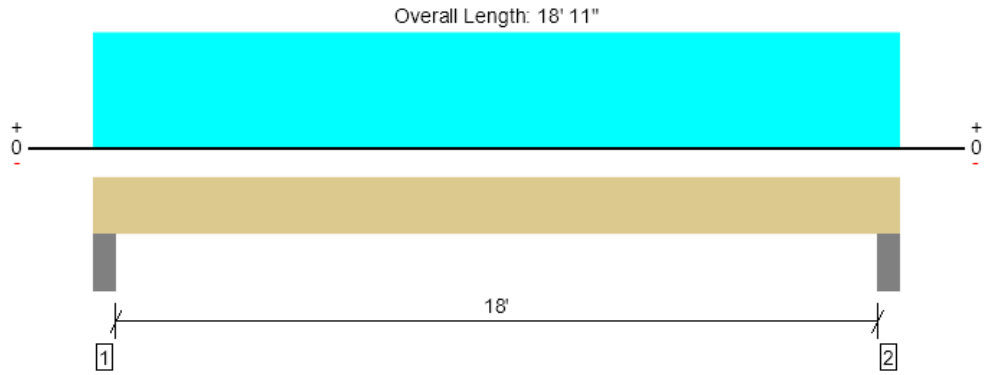
FORTEWEB

MEMBER REPORT

PASSED

Main Floor/Lower Wall, MB-02

1 piece(s) 5 1/4" x 11 7/8" 2.2E Parallam® PSL



Drawing is Conceptual. 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)	531 @ 4"	18047 (5.50")	Passed (3%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	450 @ 1' 5 3/8"	12053	Passed (4%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2338 @ 9' 5 1/2"	29854	Passed (8%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.043 @ 9' 5 1/2"	0.456	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.091 @ 9' 5 1/2"	0.913	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 18' 11"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Pocket - concrete	5.50"	5.50"	1.50"	279	252	531	None
2 - Pocket - concrete	5.50"	5.50"	1.50"	279	252	531	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	18' 11" o/c	
Bottom Edge (Lu)	18' 11" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 18' 11"	N/A	19.5	--	
1 - Uniform (PSF)	0 to 18' 11" (Front)	8"	15.0	40.0	Main Floor

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ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Dann Residence

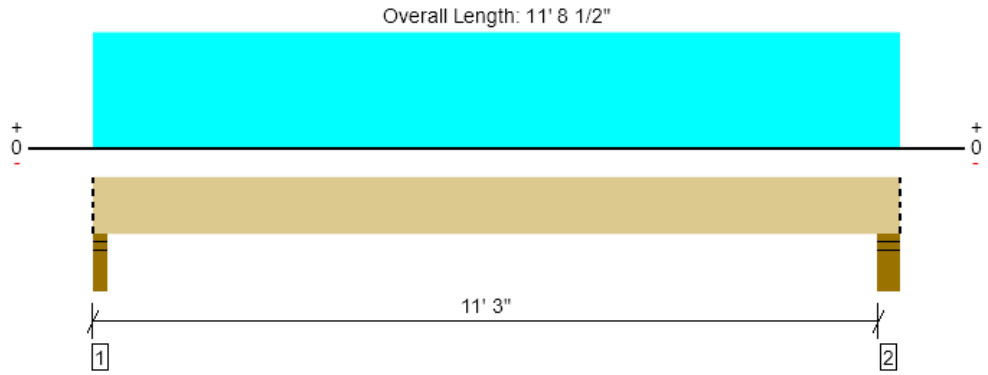
FORTEWEB

MEMBER REPORT

PASSED

Main Floor/Lower Wall, MB-03a

1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



Drawing is Conceptual. 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)	4175 @ 2"	4961 (3.50")	Passed (84%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	3248 @ 1' 3 3/8"	8590	Passed (38%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	11360 @ 5' 9 1/4"	15953	Passed (71%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.271 @ 5' 9 1/4"	0.280	Passed (L/496)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.380 @ 5' 9 1/4"	0.560	Passed (L/354)	--	1.0 D + 1.0 L (All Spans)

Member Length : 11' 8 1/2"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - HF	3.50"	3.50"	2.95"	1193	2982	4175	Blocking
2 - Stud wall - HF	5.50"	5.50"	3.03"	1228	3068	4296	Blocking

• 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)	11' 9" o/c	
Bottom Edge (Lu)	11' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 11' 8 1/2"	N/A	13.0	--	
1 - Uniform (PSF)	0 to 11' 8 1/2" (Front)	12' 11"	15.0	40.0	Main Floor

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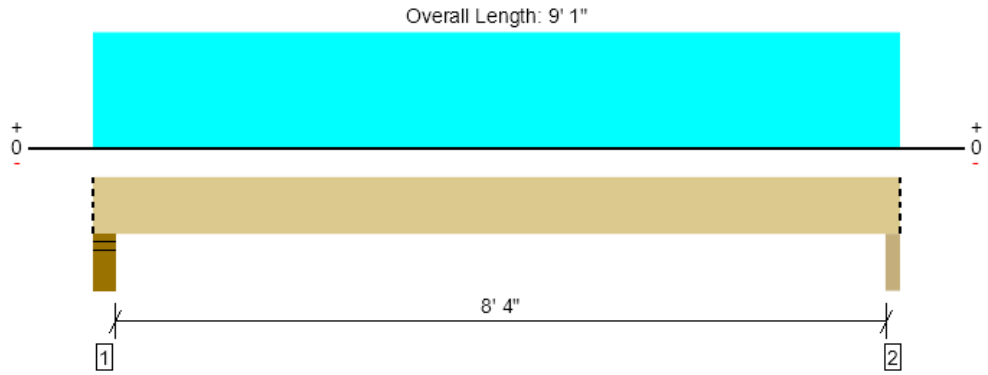
File Name: Dann Residence

Main Floor/Lower Wall, MB-03b

1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



Drawing is Conceptual. 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)	230 @ 4"	7796 (5.50")	Passed (3%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	158 @ 1' 5 3/8"	8590	Passed (2%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	457 @ 4' 7 1/2"	15953	Passed (3%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.005 @ 4' 7 1/2"	0.215	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.010 @ 4' 7 1/2"	0.429	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 9' 1"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - HF	5.50"	5.50"	1.50"	106	123	229	Blocking
2 - Beam - LSL	3.50"	3.50"	1.50"	103	119	222	Blocking

• 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)	9' 1" o/c	
Bottom Edge (Lu)	9' 1" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 9' 1"	N/A	13.0	--	
1 - Uniform (PSF)	0 to 9' 1" (Front)	8"	15.0	40.0	Upper Floor

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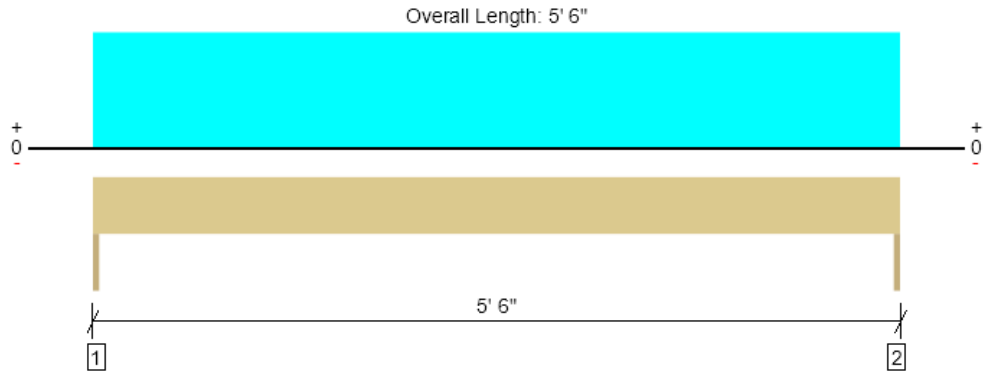
FORTEWEB

MEMBER REPORT

PASSED

Main Floor/Lower Wall, MB-05

1 piece(s) 3 1/2" x 7 1/2" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	2404 @ 0	3413 (1.50")	Passed (70%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1749 @ 9"	4638	Passed (38%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	3306 @ 2' 9"	6563	Passed (50%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.057 @ 2' 9"	0.183	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.081 @ 2' 9"	0.275	Passed (L/812)	--	1.0 D + 1.0 L (All Spans)

Member Length : 5' 6"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 5' 6".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	722	1682	2404	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	722	1682	2404	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 6" o/c	
Bottom Edge (Lu)	5' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 5' 6"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 5' 6"	9' 9"	15.0	60.0	Upper Floor-Deck
2 - Uniform (PLF)	0 to 5' 6"	N/A	100.0	-	Wall
3 - Uniform (PSF)	0 to 5' 6"	8"	15.0	40.0	Main Floor

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3/13/2024 12:12:49 AM UTC

ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Dann Residence

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Lateral
Forces

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Dann Residence — Revision Date: 1/29/2024

3008 70th Avenue SE, Mercer Island, WA 98040

Criteria

Code:	2018 IBC		
	Allowable Stress Design (ASD)		
Seismic Design:	**ASCE 7-16: 12.8 Equivalent Lateral Force Procedure**		
Wind Design:	**ASCE 7-16: Ch. 28 Envelope Procedure, Low Rise**		
Risk Category:	II - Other Structures		*Table 1.5-1*
Snow Importance Factor	I_S = 1.00		*Table 1.5-2*
Ice Importance Factor - Thickness	I_i = 1.00		*Table 1.5-2*
Ice Importance Factor - Wind	I_w = 1.00		*Table 1.5-2*
Seismic Importance Factor	I_e = 1.00		*Table 1.5-2*
Spectral Response, Short Period	S_S = 1.405		(Mapped)
Spectral Response, 1-s Period	S_1 = 0.489		(Mapped)
Site Class assumed, no Geotechnical Report			
Site Class:	D		*Table 20.3-1*
Site Coefficient	F_a = 1.20		*Table 11.4-1*
Site Coefficient	F_v = 1.81		*Table 11.4-2*

Structural Systems:

Light framed walls with shear panels

All other structural systems	T_L = 6		*(Figs. 22-14 thru 22-17)*
Response Modification Coefficient	R = 6.5		*Table 12.2-1*
Overstrength Factor	Ω_0 = 3		*Table 12.2-1*
Deflection Amplification Factor	C_d = 4		*Table 12.2-1*
Basic Wind Speed:	110 mph		
Exposure to Wind:	Exposure B		*Section 26.7.3*
Topographical Factor	K_{ZT} = 1.60		

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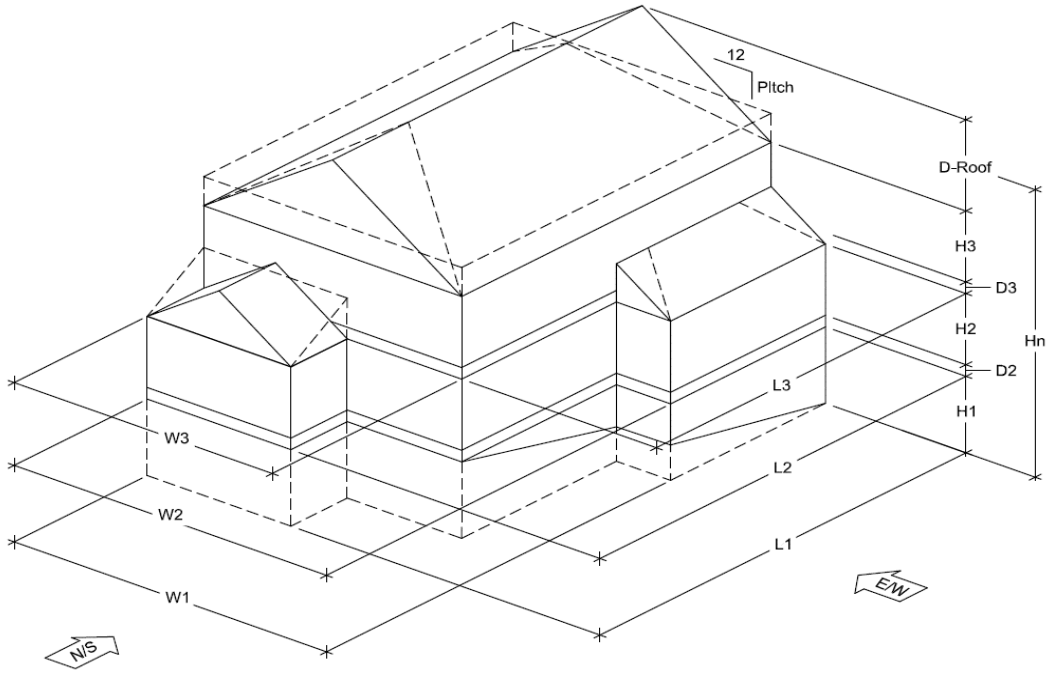

Roof		
Geometry		
Mean Roof Height	Hn =	31.36 ft
Roof Depth	D-Roof =	2.95 ft
Overhang Length		24 in
Pitch		2:12
Floor 2		
Geometry		
Width	W3 =	46.8 ft
Length	L3 =	39.92 ft
Plate Height	H3 =	9.5 ft
Floor Depth	D3 =	13 in
Floor 1		
Geometry		
Width	W2 =	46.67 ft
Length	L2 =	39.92 ft
Plate Height	H2 =	10 ft
Floor Depth	D2 =	11 in
Basement		
Geometry		
Width	W1 =	46.67 ft
Length	L1 =	39.9 ft
Plate Height	H1 =	8 ft

Seismic Weight - Roof				
Roof Area 1	1675 SF	15 psf		25,125#
Roof Area 2				
Roof Area 3				
Exterior Wall 1	196.08 LF	4.75 ft	10 psf	9,314#
Exterior Wall 2				
Exterior Wall 3				
Interior Wall	112 LF	4.75 ft	8 psf	4,256#
			Total	38,695#

Seismic Weight - Floor 2				
Roof Area 1				
Floor Area 1	1109.5 SF	15 psf		16,643#
Floor Area 2				
Floor Area 3				
Exterior Wall 1	196.08 LF	4.75 ft	10 psf	9,314#
Exterior Wall 2	183 LF	5 ft	10 psf	9,150#
Exterior Wall 3				
Interior Wall1	112 LF	4.75 ft	8 psf	4,256#
Interior Wall2	32.17 LF	5 ft	8 psf	1,287#
			Total	40,649#

Seismic Weight - Floor 1				
Roof Area 1				
Floor Area 1	1377.3 SF	15 psf		20,659#
Floor Area 2				
Floor Area 3				
Exterior Wall 1	183 LF	5 ft	10 psf	9,150#
Exterior Wall 2	173.14 LF	4.2 ft	10 psf	7,272#
Exterior Wall 3				
Interior Wall1	32.17 LF	5 ft	8 psf	1,287#
Interior Wall2	78.5 LF	4.2 ft	8 psf	2,638#
			Total	41,005#

N/S Projected Area - Roof	
Sloped Roof Area	93 SF
Gable/Parapet Area	
Wall Area	222.3 SF
E/W Projected Area - Roof	
Sloped Roof Area	
Gable/Parapet Area	60 SF
Wall Area	189.62 SF

N/S Projected Area - Floor 2	
Sloped Roof Area	
Gable/Parapet Area	
Wall Area	506.59 SF
E/W Projected Area - Floor 2	
Sloped Roof Area	
Gable/Parapet Area	
Wall Area	432.67 SF

N/S Projected Area - Floor 1	
Sloped Roof Area	
Gable/Parapet Area	
Wall Area	471.17 SF
E/W Projected Area - Floor 1	
Sloped Roof Area	
Gable/Parapet Area	
Wall Area	402.94 SF

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Redundancy, ρ 1.0 *(Section 12.3.4)*

Design Base Shear

$S_{MS} = F_a S_S$ *(Eq. 11.4-1)* $= 1.686$

$S_{M1} = F_v S_1$ *(Eq. 11.4-2)* $= 0.886$

$S_{DS} = \frac{2}{3} S_{MS}$ *(Eq. 11.4-3)* $= 1.124$

$S_{D1} = \frac{2}{3} S_{M1}$ *(Eq. 11.4-4)* $= 0.590$

Seismic Design Category:

Short Period -- D

1-Second Period -- D

Structure Period and Weight:

$C_t = 0.020$ *Table 12.8-2*

$x = 0.75$

Building Height (Mean Roof), $h_n = 31$ ft

Approximate Fundamental Period, $T_a = C_t (h_n)^x$ *(Eq. 12.8-7)*

$T = T_a = 0.27$

$T_L = 6$ *(Figs. 22-14 thru 22-17)*

Calculated design base shear:

$V = C_s W$ (Eq. 12.8-1)

$$C_s = \frac{S_{DS}}{\left(\frac{R}{I_e}\right)}$$ (Eq. 12.8-2)

$C_s = 0.173$

The total design base shear need not exceed:

(Eq. 12.8-3) (Eq. 12.8-4)

for $T \leq T_L$ $C_s = \frac{S_{D1}}{T\left(\frac{R}{I_e}\right)}$ $C_s = 0.343$

for $T > T_L$ $C_s = \frac{S_{D1} T_L}{T^2\left(\frac{R}{I_e}\right)}$ $C_s = 7.758$

$C_s = 0.343$ $T \leq TL$

$C_s = 0.514$ *1.5 times Cs in accordance with 11.4.8*

The total design base shear shall not be less than:

$C_s = 0.044 S_{DS} I_e \geq 0.01$ (Eq. 12.8-5)

$C_s = 0.049$

nor where $S_1 \geq 0.6g$*:*

$C_s = 0.5 S_1/(R/I_e)$ (Eq. 12.8-6)

$C_s = 0.000$

$C_s = 0.173$

$V = 0.173 W$

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$\rho_S = \lambda K_{ZT} \rho_{S30}$ (28.5-1)
λ = 1.01 (Fig. 28.5.1)
K_{ZT} = 1.60 (Section 26.8)

Exposure = B
Mean Roof Ht hn (ft) = 31 ft
a (roof) = 4.0 ft
a (upper/main floor) = 4.0 ft
Basic Wind Speed = 110 mph
Roof Angle = 10

North/South Loading *28.5.4 Minimum Design Loads*

	Zone	Area	p_{S30} (psf)	$p_{S30\ design}$ (psf)	ρ (psf)	Force (#)	ASD Force (#)	Force (#)	ASD Force (#)
Roof	A_{wall}	38	21.6	21.6	34.9	1324	794	607	364
	Agable	0	21.6	21.6	34.9	0	0	0	0
	B	24	-9.0	0.0	0.0	0	0	188	113
	Cwall	184	14.4	14.4	23.3	4291	2574	2950	1770
	Cgable	0	14.4	14.4	23.3	0	0	0	0
	D	69	-5.2	0.0	0.0	0	0	556	333
	Total Area =	315			Total Load =	5614	3369	4301	2580
					Design:	***5614***	***3369***		
	Zone	Area	p_{S30} (psf)	$p_{S30\ design}$ (psf)	ρ (psf)	Force (#)	ASD Force (#)	Force (#)	ASD Force (#)
Floor 2	Awall	87	21.6	21.6	34.9	3020	1812	1384	831
	Agable	0	21.6	21.6	34.9	0	0	0	0
	B	0	-9.0	0.0	0.0	0	0	0	0
	Cwall	420	14.4	14.4	23.3	9776	5865	6721	4033
	Cgable	0	14.4	14.4	23.3	0	0	0	0
	D	0	-5.2	0.0	0.0	0	0	0	0
	Total Area =	507			Total Load =	12795	7677	8106	4863
					Design :	***12795***	***7677***		

East/West Loading *28.5.4 Minimum Design Loads*

	Zone	Area	p_{S30} (psf)	$p_{S30\ design}$ (psf)	ρ (psf)	Force (#)	ASD Force (#)	Force (#)	ASD Force (#)
Roof	Awall	38	21.6	21.6	34.9	1324	794	607	364
	Agable	12	21.6	21.6	34.9	411	247	188	113
	B	0	-9.0	0.0	0.0	0	0	0	0
	Cwall	152	14.4	14.4	23.3	3530	2118	2427	1456
	Cgable	48	14.4	14.4	23.3	1122	673	772	463
	D	0	-5.2	0.0	0.0	0	0	0	0
	Total Area =	250			Total Load =	6387	3832	3994	2396
					Design :	***6387***	***3832***		
	Zone	Area	p_{S30} (psf)	$p_{S30\ design}$ (psf)	ρ (psf)	Force (#)	ASD Force (#)	Force (#)	ASD Force (#)
Floor 2	Awall	82	21.6	21.6	34.9	2868	1721	1315	789
	Agable	0	21.6	21.6	34.9	0	0	0	0
	B	0	-9.0	0.0	0.0	0	0	0	0
	Cwall	351	14.4	14.4	23.3	8156	4894	5608	3365
	Cgable	0	14.4	14.4	23.3	0	0	0	0
	D	0	-5.2	0.0	0.0	0	0	0	0
	Total Area =	433			Total Load =	11025	6615	6923	4154
					Design :	***11025***	***6615***		
	Zone	Area	p_{S30} (psf)	$p_{S30\ design}$ (psf)	ρ (psf)	Force (#)	ASD Force (#)	Force (#)	ASD Force (#)
Floor 1	Awall	81	21.6	21.6	34.9	2839	1703	1301	781
	Agable	0	21.6	21.6	34.9	0	0	0	0
	B	0	-9.0	0.0	0.0	0	0	0	0
	Cwall	322	14.4	14.4	23.3	7484	4490	5146	3087
	Cgable	0	14.4	14.4	23.3	0	0	0	0
	D	0	-5.2	0.0	0.0	0	0	0	0
	Total Area =	403			Total Load =	10323	6194	6447	3868
					Design :	***10323***	***6194***		

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Vertical Distribution of Lateral Forces

Base Shear:

V = 20.81 kips

Shear Walls:

$F_x = C_{vx} V$ *(Eq. 12.8-11)*

$C_{vx} = \frac{w_x h_x^k}{\sum_{i=1}^{n} w_i h_i^k}$ *(Eq. 12.8-12)*

Diaphragms:

$$F_{px} = \left(\sum_{i=x}^{n} F_i \Big/ \sum_{i=x}^{n} w_i\right)(w_{px}) \ldots [Eq.12.10-1]$$

$F_{px} = 0.2 S_{DS} I_e w_{px} \ldots [Eq.12.10-2]$ (min)

$F_{px} = 0.4 S_{DS} I_e w_{px} \ldots [Eq.12.10-3]$ (max)

	Strength Design Seismic Forces (E)							
Floor Level (from base)	Height, h_x (ft)	Story Weight, w_x (Kips)	$w_x h_x$ (ft-Kips)	Lateral Force, F_x (Kips)	Story Shear, ΣF_x (Kips)	Story Moment (ft-Kips)	Portion of Weight at *i*, Σw_i (Kips)	Diaphragm Force, Fpx (Kips)
Roof	22.1	38.69	854	8.98	8.98	99	39	8.98
Floor 2	11.1	40.65	451	4.74	13.72	251	79	9.14
Floor 1	-	41.01	-	7.09	20.81	-	120	9.22
Totals	W =	120.35	Kips					
	$\Sigma w_x h_x$ =	1304	ft-Kips					

	Strength Design Wind Forces (W)			
Floor Level (from base)	Lateral Force N/S, H_x (Kips)	Story Shear N/S, ΣHx (Kips)	Lateral Force E/W, H_x (Kips)	Story Shear E/W, ΣH_x (Kips)
Roof	5.61	5.61	6.39	6.39
Floor 2	12.80	18.41	11.02	17.41
Floor 1	-	-	10.32	27.73

	Diaphragm (ASD)		
	Seismic, [0.7E] (kips)	Wind N/S [0.6W] (kips)	Wind E/W [0.6W] (kips)
Roof	6.29	3.37	3.83
Floor 2	6.40	7.68	6.61
Floor 1	6.45	-	6.19

	Shear Walls (ASD)		
	Seismic, [0.7E] (kips)	Wind N/S [0.6W] (kips)	Wind E/W [0.6W] (kips)
Floor 2	6.29	3.37	3.83
Floor 1	3.32	7.68	6.61
Basement	4.96	-	6.19

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Lateral

Shear Walls/Diaphragms

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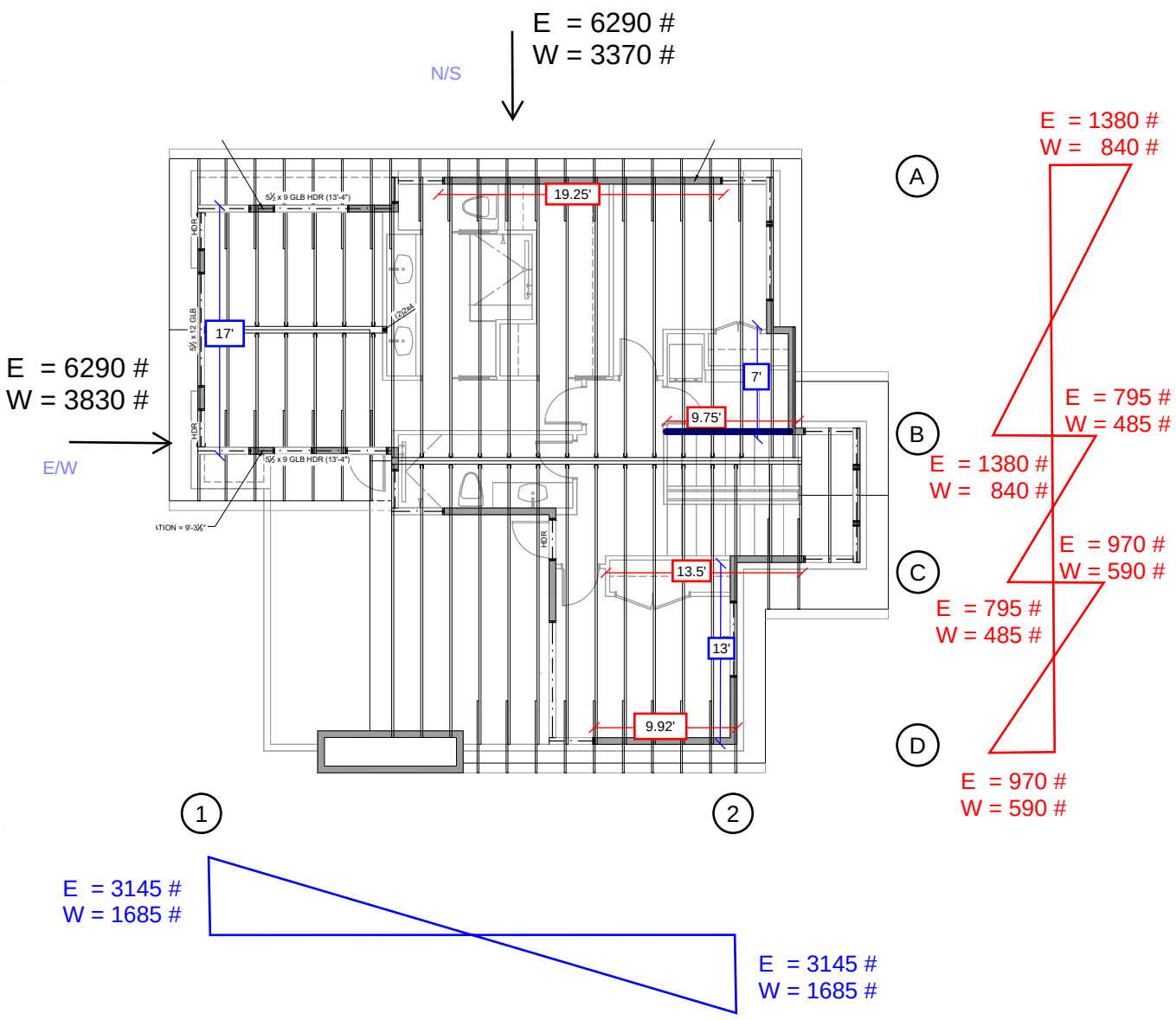
Roof Diaphragm



1 (E) 3145 #/17' =185 plf
(W) 1685 #/17' =100 plf

2 (E) (30%)3145 #/7' =135 plf
(W) (30%)1685 #/7' = 72 plf

A (E) 1380 #/19.25' =72 plf
(W) 840 #/19.25'= 44 plf

B (E) 1380 #/9.75' =142 plf
(W) 840 #/9.75' = 86 plf

C (E) 970 #/11' =88plf
(W) 590 #/11' =54 plf

D (E) 970 #/9.92' = 98 plf
(W) 590 #/9.92' = 59 plf

UNBLOCKED

Project: Dann Residence Designed By: MS Date: _____

Project Number: _____ Client: _____ Scale: _____ Page: L2.1

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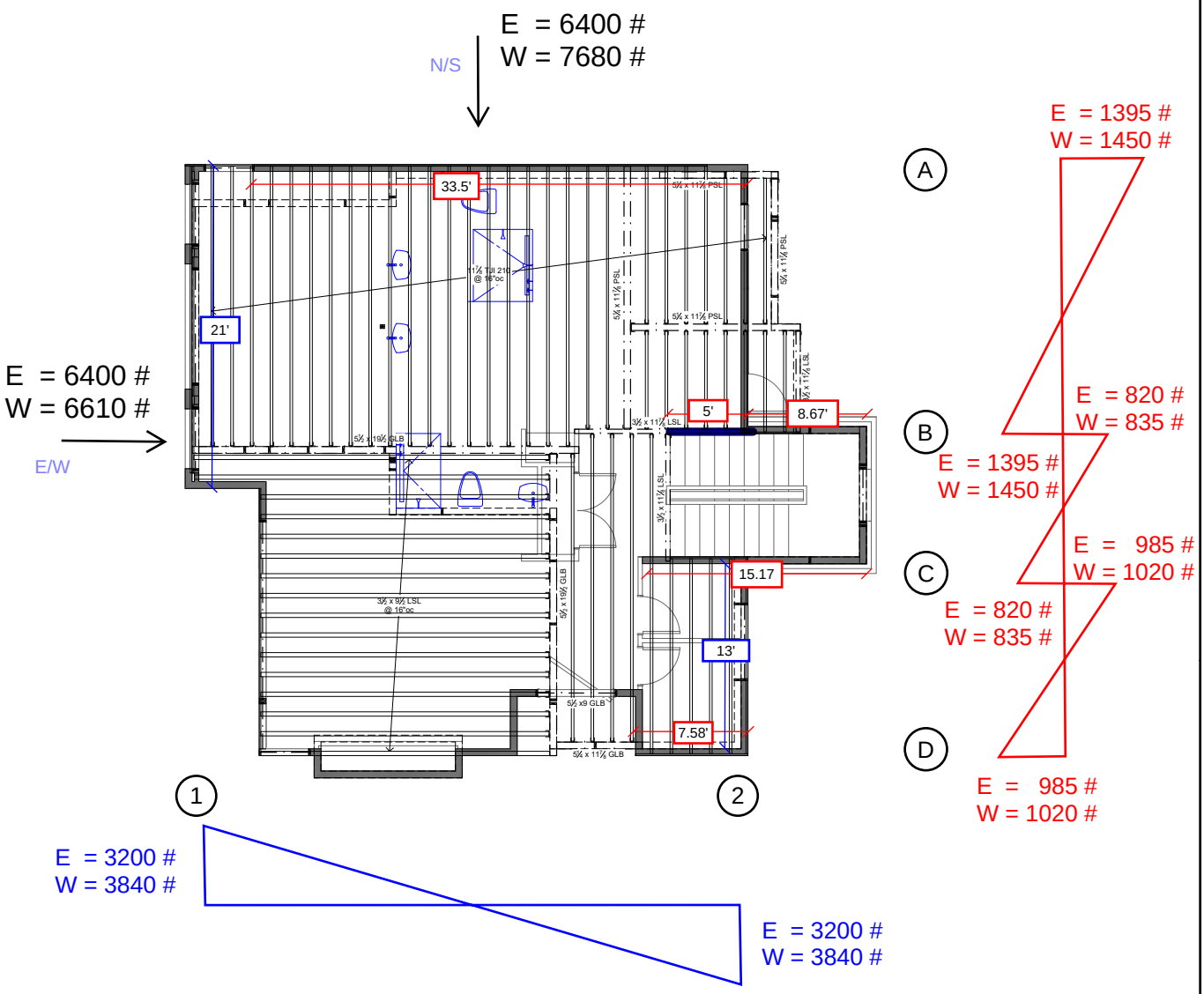
Upper Floor Diaphragm



(1) (E) 3200 #/21' =152 plf
(W) 3840 #/21' =182 plf

(2) (E) 3200 #/13' =246 plf
(W) 3840 #/13' =295 plf

BLOCKED

(A) (E) 1395 #/33.5' =42 plf
(W) 1450 #/33.5'=43 plf

(B) (E) 1395 #/13.67' =102 plf
(W) 1450 #/13.67' =106 plf

UNBLOCKED

(C) (E) 985 #/15.17' =65 plf
(W) 1020 #/15.17' =67 plf

(D) (E) 985 #/7.58' =130 plf
(W) 1020 #/7.58' =134 plf

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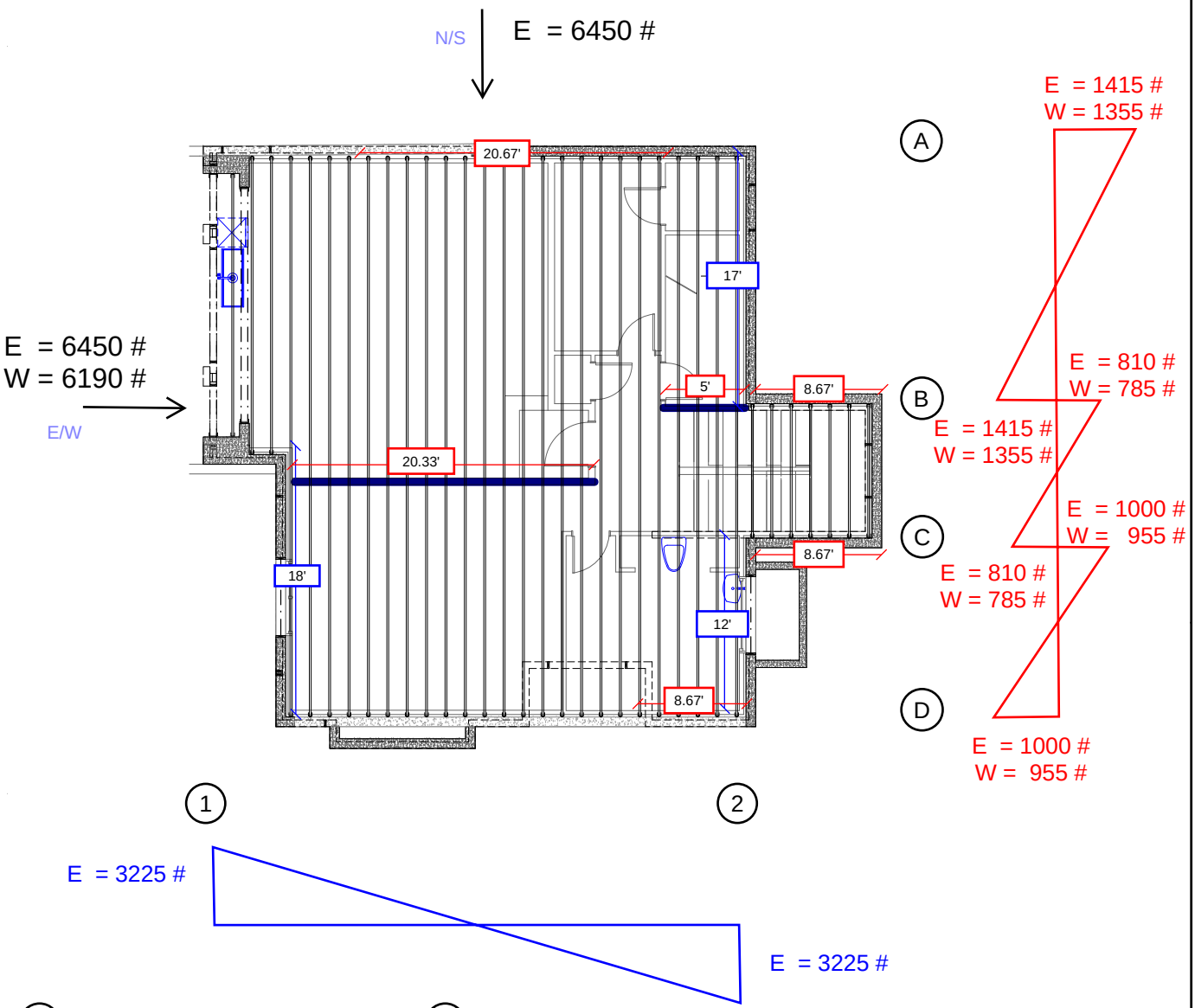
Main Floor Diaphragm



1 (E) 3225 #/18' =180 plf

2 (E) (50%)3225 #/12' =134 plf

A (E) 1415 #/20.67'=68 plf
(W) 1355 #/20.67'=66 plf

B (E) 1415 #/13.67' =104 plf
(W) 1355 #/13.67' = 99 plf

C (E) 1000 #/8.67' =115 plf
(W) 955 #/8.67' =110 plf

D (E) 1000 #/8.67' =115 plf
(W) 955 #/8.67' =110 plf

UNBLOCKED

Project: Dann Residence Designed By: MS Date: _____

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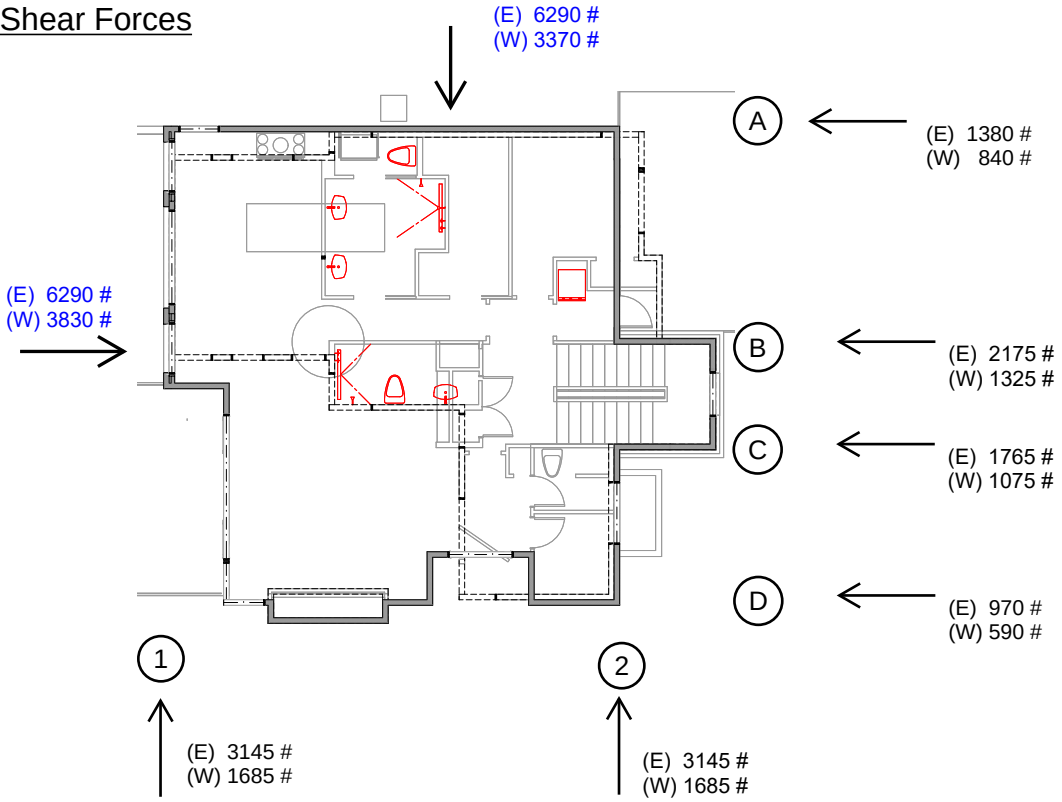
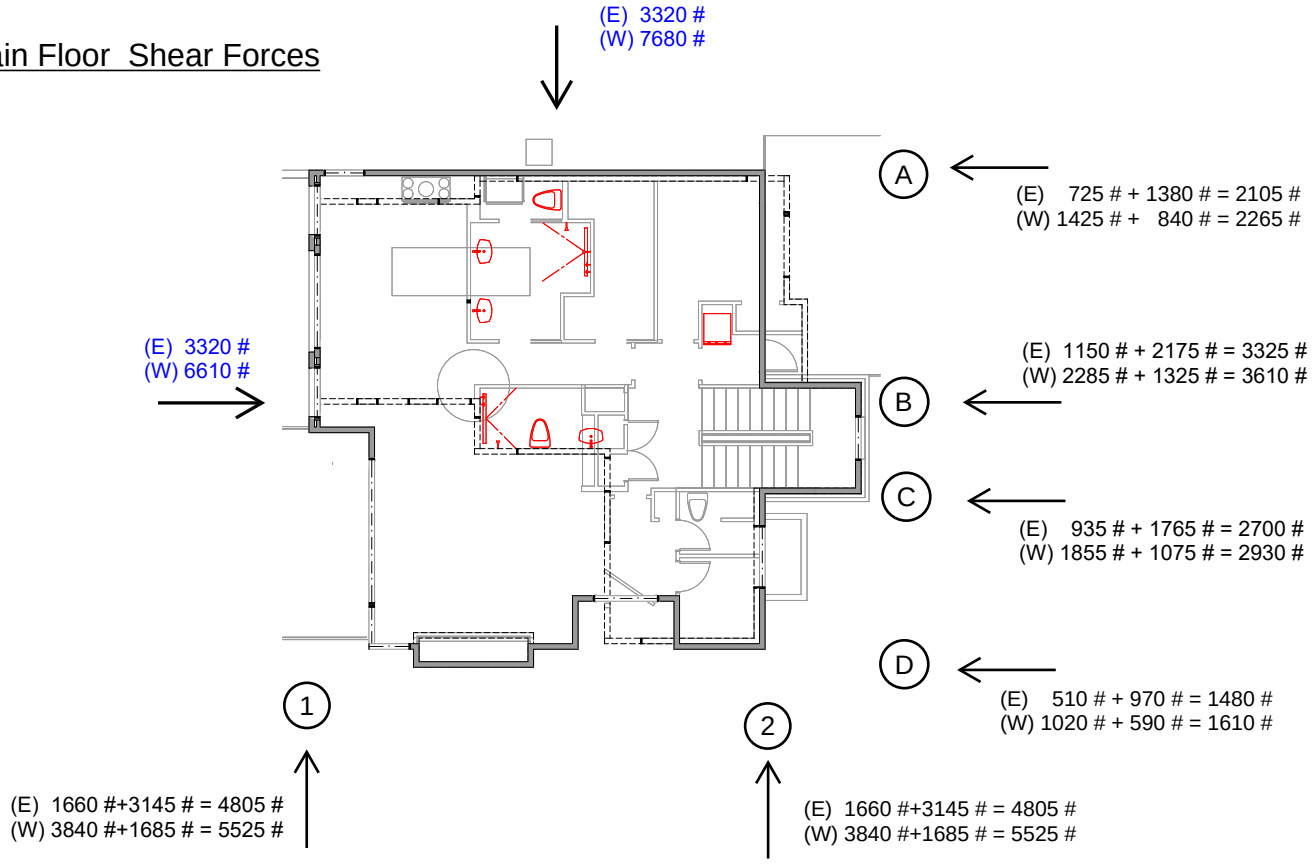
Upper Floor Shear Forces



Main Floor Shear Forces



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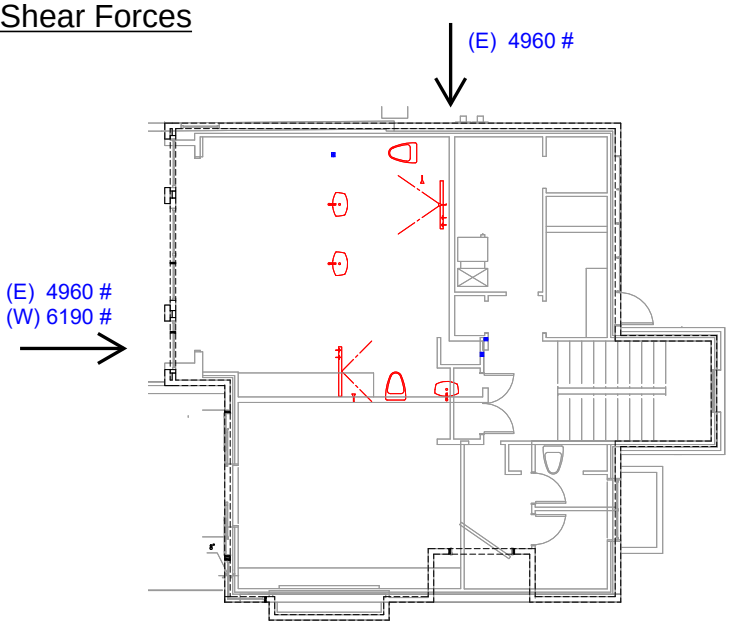
Lower Floor Shear Forces



(E) 1080 # + 2105 # = 3185 #
(W) 1355 # + 2265 # = 3620 #

(E) 1720 # + 3325 # = 5045 #
(W) 2140 # + 3610 # = 5750 #

(E) 1400 # + 2700 # = 4100 #
(W) 1740 # + 2930 # = 4670 #

(E) 760 # + 1480 # = 2240 #
(W) 955 # + 1610 # = 2565 #

(E) 2480 # + 4805 # = 7285 #
(W) 5525 #

(E) 2480 # + 4805 # = 7285 #
(W) 5525 #

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Project Number: _____ Client: _____ Scale: _____ Page: L2.5

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Shear Wall Line (1)

E=
W=

3rd Floor: 9.5' PLT

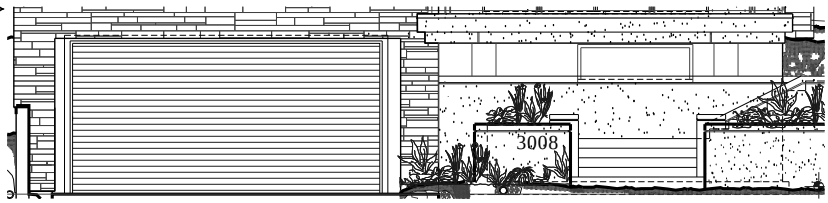
E=
W=

2nd Floor: 10 ' PLT

*See following page for Moment Frame Design

E= 7285 #
W= 5525 #

1st Floor: 8 ' PLT



5'

E = 7285 # /[8"* (5'* 12"/1)]= 15.2 psi
W = 5525 # /[8"* (5'* 12"/1)]= 11.5 psi

V_c= 2*sqrt(f_c') = 2*sqrt(2500 psi) =100 psi
Concrete Wall Ok

NO UPLIFT

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Project Number: Client: Scale: Page: L2.6

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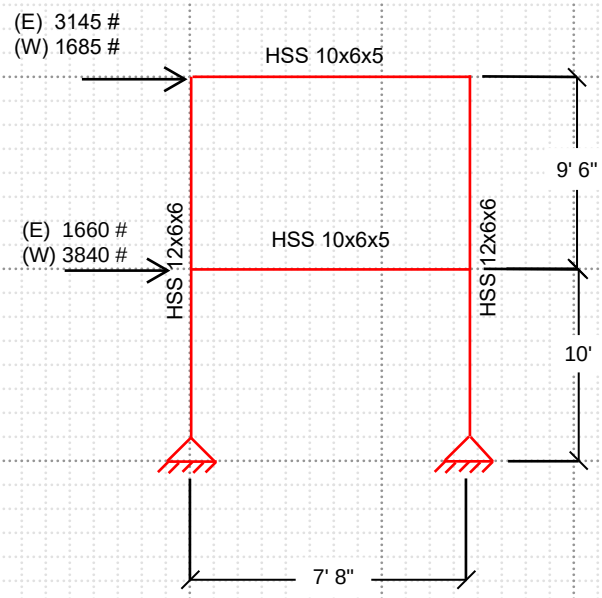
Shear Wall Line (1) Steel Moment Frame



(E)

R=3.5

$V = \frac{3.15k}{0.7} * \frac{0.321}{0.173} = 8.35K$

R=6.5

R=3.5

$V = \frac{1.66k}{0.7} * \frac{0.321}{0.173} = 4.4K$

R=6.5

(W)

R=3.5

$V = \frac{1.68k}{0.7} * \frac{0.321}{0.173} = 4.45K$

R=6.5

R=3.5

$V = \frac{3.84k}{0.7} * \frac{0.321}{0.173} = 10.17K$

R=6.5

DEFLECTION WILL GOVERN THE DESIGN:

$C_d * \Delta \leq 0.025 * h_x = 0.025 * (19.5') * (12"/1') = 5.85" \approx 6"$
$\Delta \leq 6"/C_d = 6"/3 = 2"$

$C_d * \Delta \leq 0.025 * h_x = 0.025 * (10') * (12"/1') = 3"$
$\Delta \leq 3"/C_d = 3"/3 = 1"$

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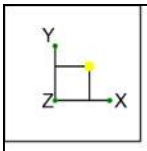

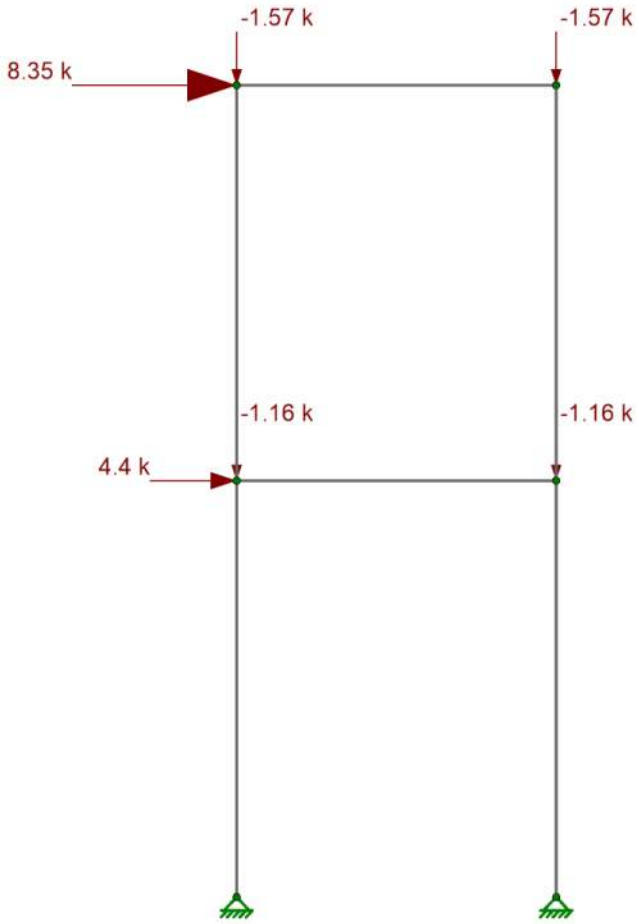

Loads: LC 2, Unfactored

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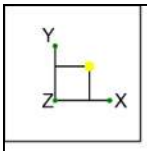
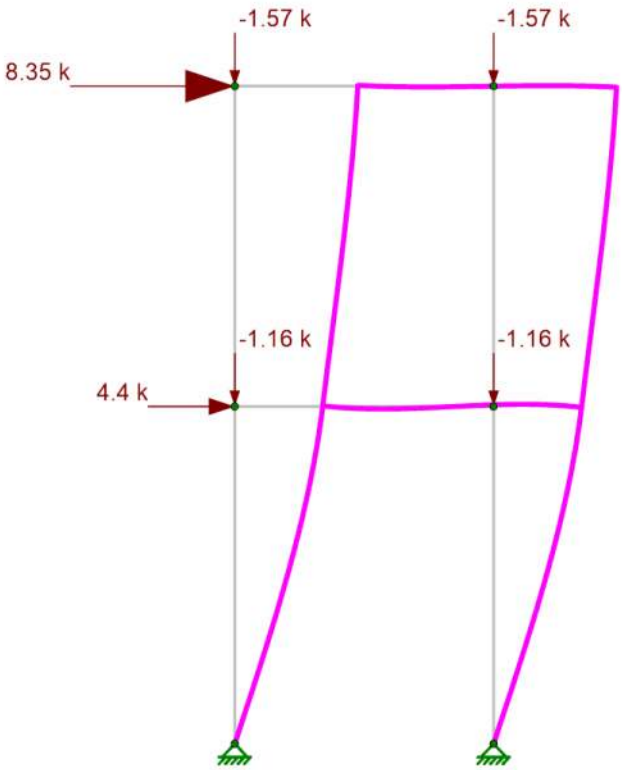
Mariam Soliman		Mar 12, 2024
		Dann Moment Frame MS SW1.r3d





Loads: LC 3, IBC 16-12 (b) (a)
Results for LC 3, IBC 16-12 (b) (a)

BTL Engineering	Dann Residence Moment Frame	SK-2
Mariam Soliman		Mar 12, 2024
		Dann Moment Frame MS SW1.r3d

Node Coordinates

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
1	N1	0	0	0	
2	N2	0	10	0	
3	N3	7.67	10	0	
4	N4	7.67	0	0	
5	N5	0	19.5	0	
6	N6	7.67	19.5	0	

Node Boundary Conditions

	Node Label	X [k/in]	Y [k/in]	Z [k/in]
1	N1	Reaction	Reaction	Reaction
2	N4	Reaction	Reaction	Reaction

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in²]	Iyy [in⁴]	Izz [in⁴]	J [in⁴]
1	beam	HSS10X5X6	Beam	Tube	A992	Typical	9.67	40.6	120	100
2	column	HSS12X6X6	Column	Tube	A992	Typical	11.8	72.9	215	178
3	floor beam	HSS10X4X6	Beam	Tube	A992	Typical	8.97	24.3	104	66.5

Member Primary Data

	Label	I Node	J Node	Section/Shape	Type	Design List	Material	Design Rule
1	M1	N2	N3	beam	Beam	Tube	A992	Typical
2	M2	N1	N5	column	Column	Tube	A992	Typical
3	M3	N4	N6	column	Column	Tube	A992	Typical
4	M4	N5	N6	beam	Beam	Tube	A992	Typical

Hot Rolled Steel Design Parameters

	Label	Shape	Length [ft]	Lcomp top [ft]	Channel Conn.	a [ft]	Function
1	M1	beam	7.67	Lbyy	N/A	N/A	Lateral
2	M2	column	19.5	Lbyy	N/A	N/A	Lateral
3	M3	column	19.5	Lbyy	N/A	N/A	Lateral
4	M4	beam	7.67	Lbyy	N/A	N/A	Lateral

Envelope Node Reactions

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N1	max	4.221	8	21.709	4	0	12	0	12	0	12	0	12
2		min	-4.706	3	-17.295	7	0	3	0	3	0	3	0	3
3	N4	max	4.705	4	21.712	3	0	12	0	12	0	12	0	12
4		min	-4.221	7	-17.292	8	0	3	0	3	0	3	0	3
5	N3	max	NC		NC		NC		LOCKED		NC		NC	
6		min	NC		NC		NC		LOCKED		NC		NC	
7	Totals:	max	8.925	8	7.016	6	0	12						
8		min	-8.925	7	3.282	7	0	3						

Envelope Node Displacements

	Node Label		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
1	N1	max	0	3	0	7	0	12	0	12	0	12	1.026e-2	4
2		min	0	8	0	4	0	3	0	3	0	3	-1.026e-2	3
3	N2	max	0.978	3	0.008	7	0	12	0	12	0	12	3.766e-3	4
4		min	-0.978	4	-0.009	4	0	3	0	3	0	3	-3.773e-3	3
5	N3	max	0.977	3	0.008	8	0	12	0	12	0	12	3.769e-3	4
6		min	-0.977	4	-0.009	3	0	3	0	3	0	3	-3.761e-3	3
7	N4	max	0	7	0	8	0	12	0	12	0	12	1.025e-2	4
8		min	0	4	0	3	0	3	0	3	0	3	-1.026e-2	3
9	N5	max	1.367	3	0.01	7	0	12	0	12	0	12	1.716e-3	8
10		min	-1.367	4	-0.012	4	0	3	0	3	0	3	-1.731e-3	3
11	N6	max	1.366	3	0.01	8	0	12	0	12	0	12	1.727e-3	4
12		min	-1.366	4	-0.012	3	0	3	0	3	0	3	-1.713e-3	7

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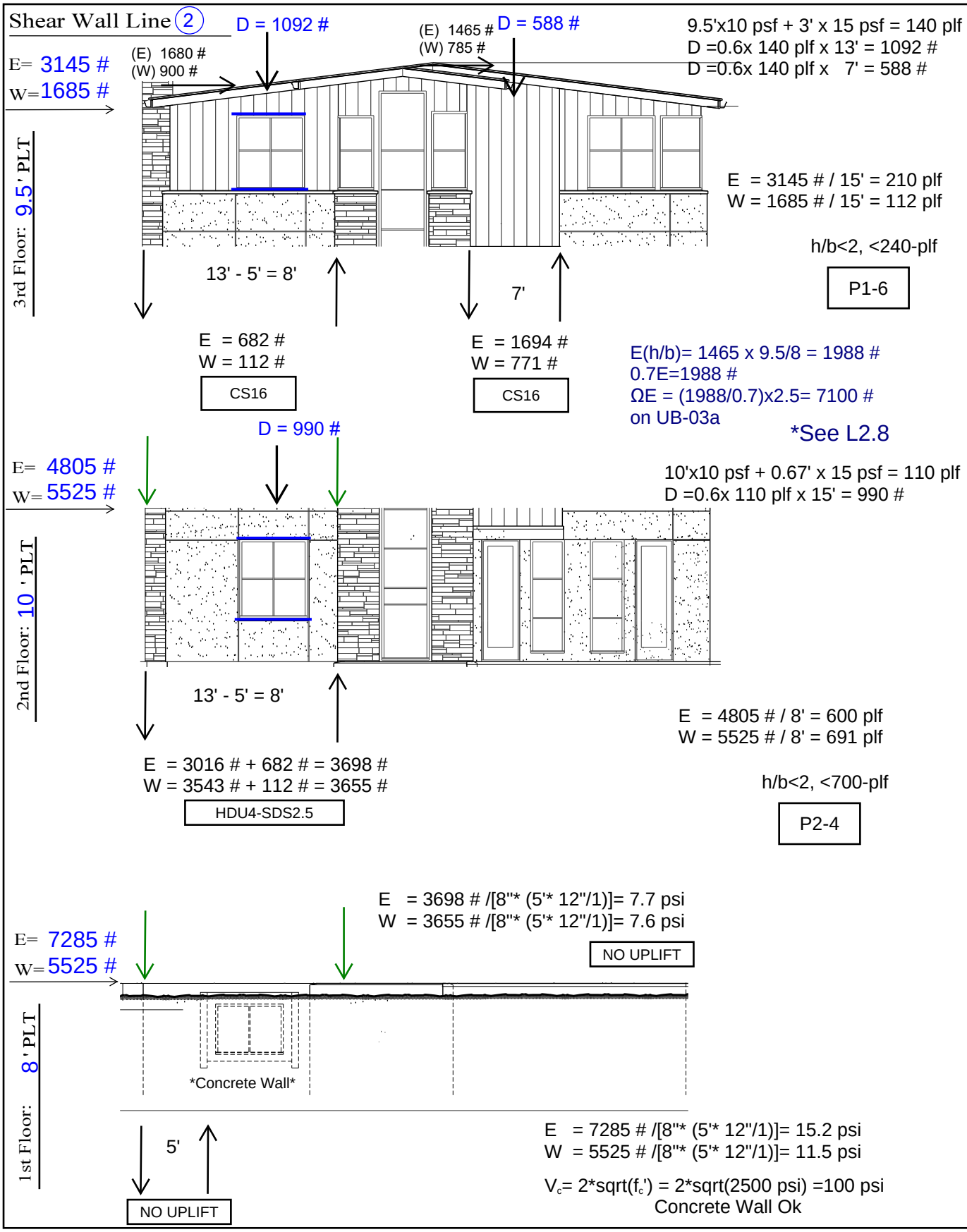
Shear Wall Line 2



Project: Dann Residence Designed By: MS Date:

Project Number: Client: Scale: Page: L2.12

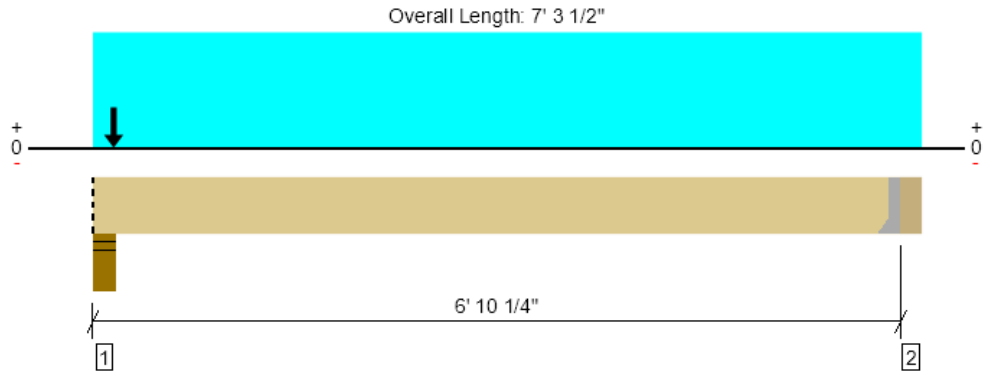
FORTEWEB

MEMBER REPORT

PASSED

Upper Floor/ Main Wall, UB-03a-Overstrength

1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



Drawing is Conceptual. 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)	5484 @ 4"	7796 (5.50")	Passed (70%)	--	1.0 D + 0.7 E (All Spans)
Shear (lbs)	385 @ 5' 10 3/8"	8590	Passed (4%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	902 @ 3' 7 1/8"	15953	Passed (6%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.003 @ 3' 7 1/8"	0.163	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.013 @ 3' 7 1/8"	0.326	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 6' 10 1/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- An excessive uplift of -4662 lbs detected at support located at 4".

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	
1 - Stud wall - HF	5.50"	5.50"	3.87"	514	96	90	7100/-7100	7800/-7100	Blocking
2 - Hanger on 11 7/8" GLB beam	5.25"	Hanger[1]	1.50"	523	99	92	-	714	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.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 10" o/c	
Bottom Edge (Lu)	6' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	LUS410	2.00"	N/A	8-10dx1.5	6-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

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 6' 10 1/4"	N/A	13.0	--	--	--	
1 - Uniform (PSF)	0 to 7' 3 1/2" (Front)	8"	15.0	40.0	-	-	Upper Floor
2 - Uniform (PLF)	0 to 7' 3 1/2" (Front)	N/A	105.0	-	-	-	Wall
3 - Uniform (PSF)	0 to 7' 3 1/2" (Front)	1'	15.0	-	25.0	-	Roof
4 - Point (lb)	2 1/4" (Front)	N/A	-	-	-	7100	PT Load Seismic Ω E=7100 #

ForteWEB Software Operator	Job Notes
Mariam Soliman BTL Engineering PS (425) 814-8448 mariam.soliman@btleng.net	

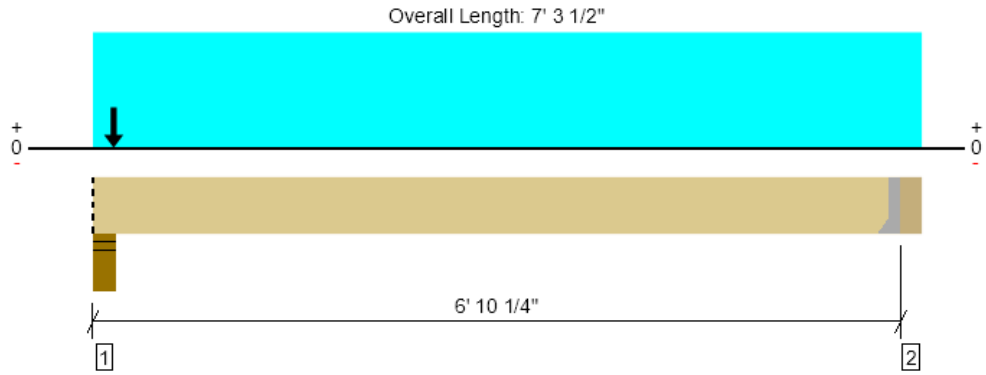
Weyerhaeuser

3/12/2024 7:30:06 PM UTC

ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Dann Residence

Upper Floor/ Main Wall, UB-03a-Connections
1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



Drawing is Conceptual. 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)	2502 @ 4"	7796 (5.50")	Passed (32%)	--	1.0 D + 0.7 E (All Spans)
Shear (lbs)	385 @ 5' 10 3/8"	8590	Passed (4%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	902 @ 3' 7 1/8"	15953	Passed (6%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.003 @ 3' 7 1/8"	0.163	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.013 @ 3' 7 1/8"	0.326	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 6' 10 1/4"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- An excessive uplift of -1680 lbs detected at support located at 4".

0.6D-0.7E
= (0.6*514#)-(0.7*2480)
= -1228#--> resolved by straps

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	
1 - Stud wall - HF	5.50"	5.50"	1.76"	514	96	90	2840/-2840	3540/-2840	Blocking
2 - Hanger on 11 7/8" GLB beam	5.25"	Hanger[1]	1.50"	523	99	92	-	714	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.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 10" o/c	
Bottom Edge (Lu)	6' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	LUS410	2.00"	N/A	8-10dx1.5	6-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

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 6' 10 1/4"	N/A	13.0	--	--	--	
1 - Uniform (PSF)	0 to 7' 3 1/2" (Front)	8"	15.0	40.0	-	-	Upper Floor
2 - Uniform (PLF)	0 to 7' 3 1/2" (Front)	N/A	105.0	-	-	-	Wall
3 - Uniform (PSF)	0 to 7' 3 1/2" (Front)	1'	15.0	-	25.0	-	Roof
4 - Point (lb)	2 1/4" (Front)	N/A	-	-	-	2840	PT Load Seismic Ω E=7100 #/2.5

ForteWEB Software Operator	Job Notes
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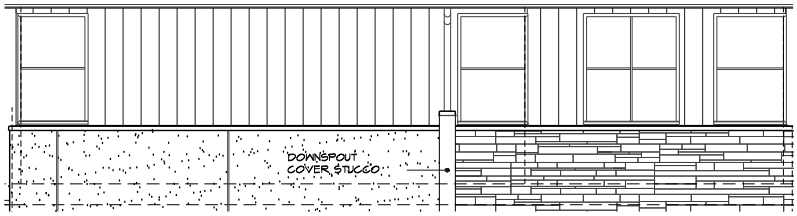
Shear Wall Line (A)

E= 1380 #
W= 840 #

3rd Floor: 9.5' PLT

9.5'x10 psf + 10' x 15 psf = 245 plf
D =0.6x 245 plf x 19.25' = 2830 #

D = 2830 #



19.25'

E = -734 #
W = -1001 #

NO UPLIFT

E = 1380 # / 19.25' = 72 plf
W = 840 # / 19.25' = 44 plf

h/b<2, <240-plf

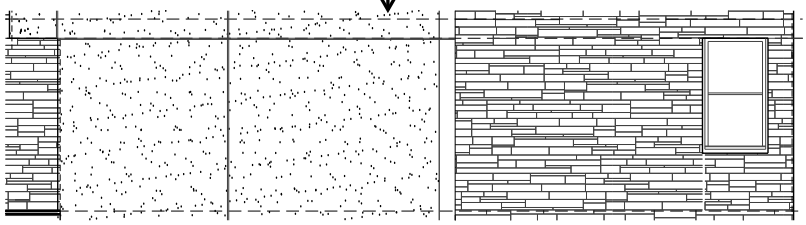
P1-6

D = 4688 #

E= 2105 #
W=2265 #

2nd Floor: 10 ' PLT

10'x10 psf + 9' x 15 psf = 235 plf
D =0.6x 235 plf x 33.25' = 4688 #



33.25'

E = -1742 #
W = -1670 #

NO UPLIFT

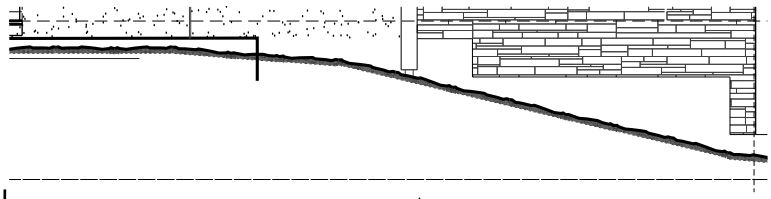
E = 2105 # / 33.25' = 63 plf
W = 2265 # / 33.25' = 68 plf

h/b<2, <240-plf

P1-6

E= 3185 #
W= 3620 #

1st Floor: 8 ' PLT



20.67'

E = 3185 # /[8"* (20.67'* 12"/1)]= 1.6 psi
W = 3620 # /[8"* (20.67'* 12"/1)]= 1.8 psi

V_c= 2*sqrt(f_c') = 2*sqrt(2500 psi) =100 psi
Concrete Wall Ok

NO UPLIFT

Project: Dann Residence Designed By: MS Date:

Project Number: Client: Scale: Page: L2.15

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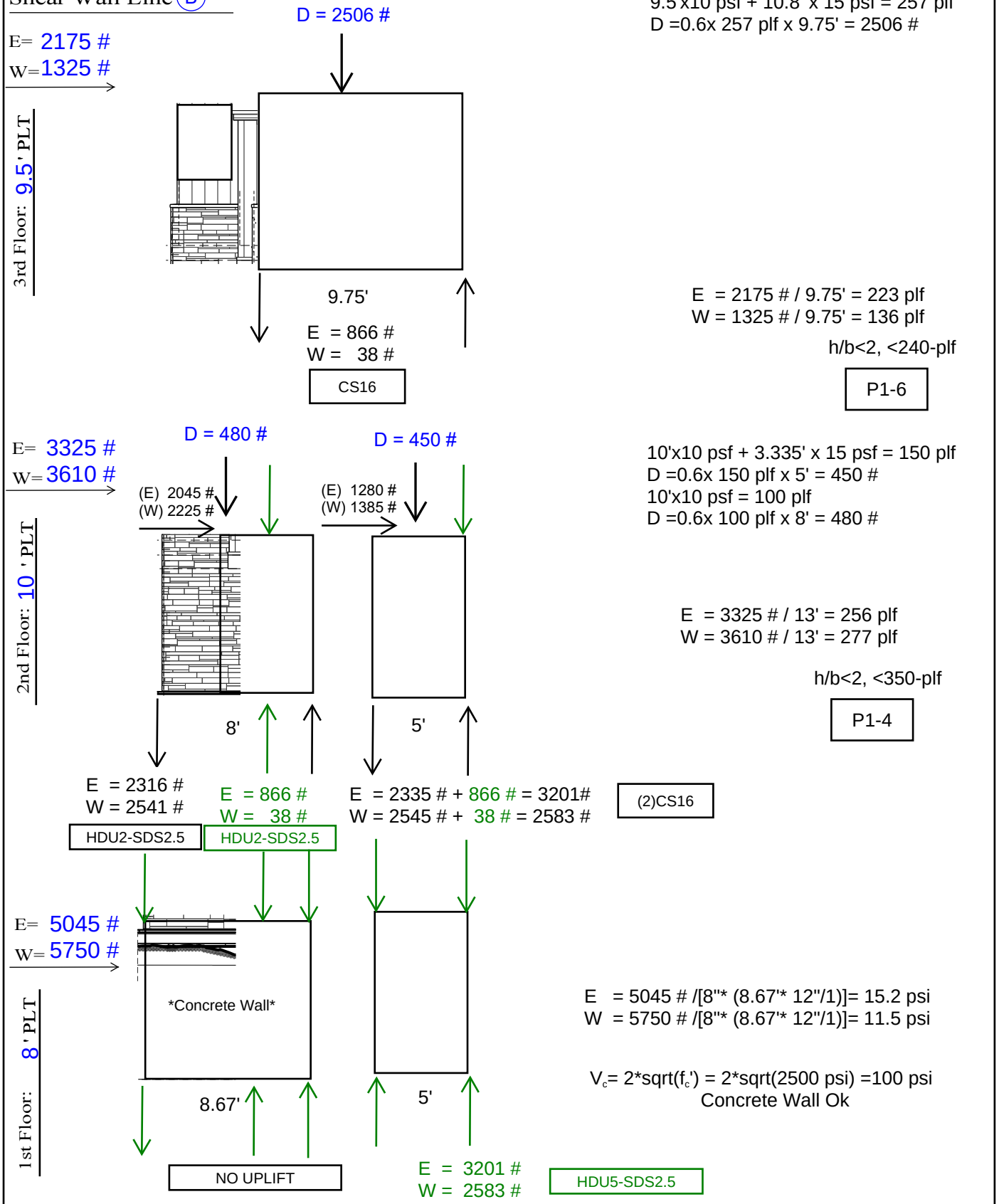
Shear Wall Line (B)



Project: Dann Residence Designed By: MS Date: _____

Project Number: _____ Client: _____ Scale: _____ Page: L2.16

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Shear Wall Line (C)

E= 1765 #
W=1075 #

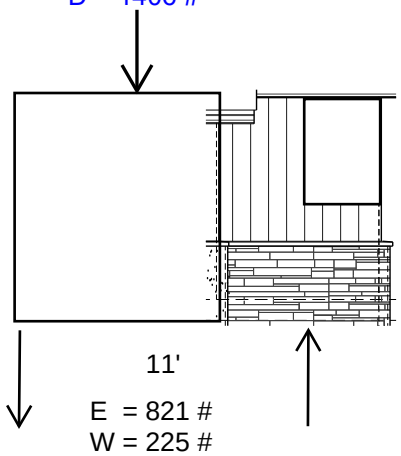
3rd Floor: 9.5' PLT

E = 1765 # /11' = 161 plf
W = 1075 # /11' = 98 plf

h/b<2, <240-plf

P1-6

9.5'x10 psf + 7.875' x 15 psf = 213 plf
D =0.6x 213 plf x 11' = 1406 #



E = 821 #
W = 225 #

CS16

10'x10 psf + 6' x 15 psf = 190 plf
D =0.6x 190 plf x15.17' = 1730 #

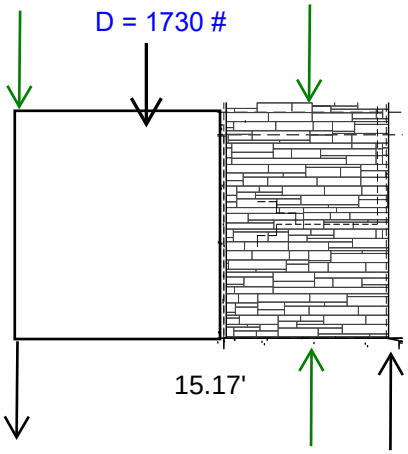
E= 2700 #
W=2930 #

2nd Floor: 10 ' PLT

E = 2700 # / 15.17' = 178 plf
W = 2930 # / 15.17' = 193 plf

h/b<2, <240-plf

P1-6



E = 915 # + 821 # = 1736 #
W = 1066 # + 225 # = 1291 #

HDU2-SDS2.5

E = 821 #
W = 225 # #

HDU2-SDS2.5

E = 915 #
W = 1066 #

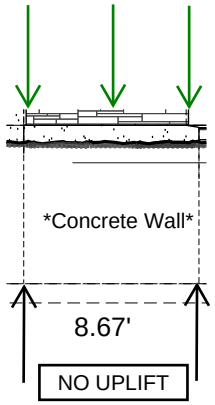
HDU2-SDS2.5

E= 4100 #
W=4670 #

1st Floor: 8 ' PLT

E = 4100 # /[8"* (8.67'* 12"/1)]= 5 psi
W = 4670 # /[8"* (8.67'* 12"/1)]= 5.6 psi

V_c= 2*sqrt(f_c') = 2*sqrt(2500 psi) =100 psi
Concrete Wall Ok



NO UPLIFT

Project: Dann Residence Designed By: MS Date:

Project Number: Client: Scale: Page: L2.17

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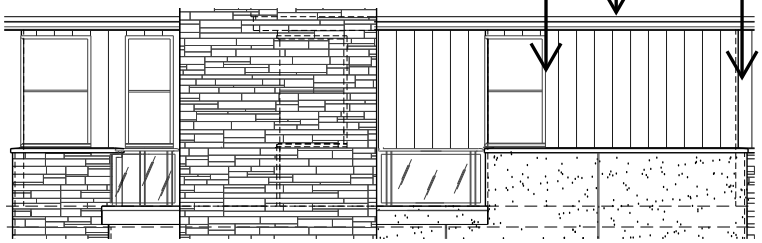
Shear Wall Line (D)

9.5'x10 psf + 7.67' x 15 psf = 210 plf
D =0.6x 210 plf x 9.92' = 1250 #

E= 970 #
W=590 #

D = 1250 #
Adj BM = 1385 #
Adj Wall = 400 #

3rd Floor: 9.5' PLT



9.92'

E = 970 # / 9.92' = 98 plf
W = 590 # / 9.92' = 59 plf

h/b<2, <240-plf

P1-6

E = -1085 #
W = -1445 #

E = -100 #
W = -460 #

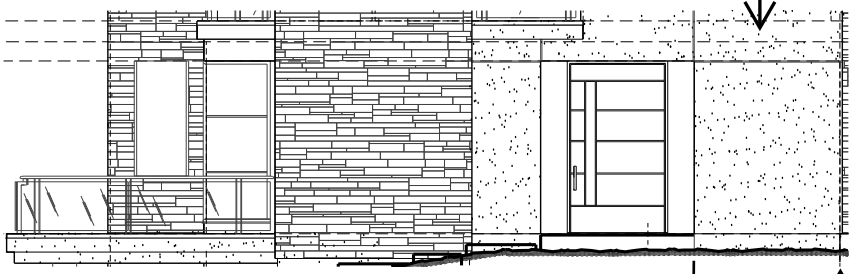
NO UPLIFT

E= 1480 #
W= 1610 #

10'x10 psf + 6' x 15 psf = 190 plf
D =0.6x 190 plf x7.67' = 875 #

D = 875 #

2nd Floor: 10 ' PLT



7.67'

E = 1480 # / 7.67' = 193 plf
W = 1610 # / 7.67' = 210 plf

h/b<2, <240-plf

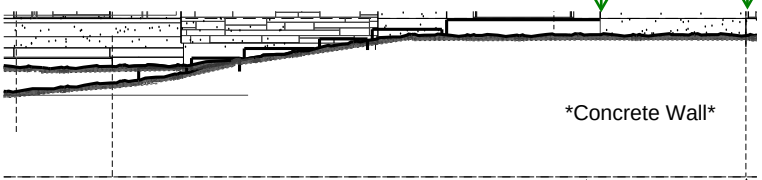
P1-6

E = 1492 #
W = 1662 #

HDU2-SDS2.5

E= 2240 #
W= 2565 #

1st Floor: 8 ' PLT



Concrete Wall

8.67'

E = 2240 # /[8"* (7.67'* 12"/1)]= 3.1 psi
W = 2565 # /[8"* (7.67'* 12"/1)]= 3.5psi

V_c= 2*sqrt(f_c') = 2*sqrt(2500 psi) =100 psi
Concrete Wall Ok

NO UPLIFT

Project: Dann Residence Designed By: MS Date:

Project Number: Client: Scale: Page: L2.18

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Lateral

Shear Wall/Diaphragm Capacities

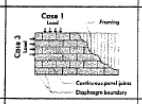
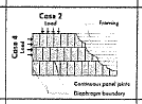
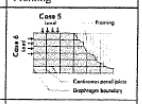
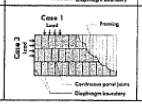
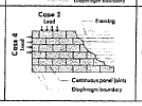
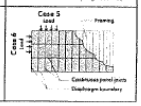
2018 IBC/SDPWS 2015 – Diaphragms (8d Nailing)

Table 4.2C Nominal Unit Shear Capacities for Wood-Frame Diaphragms

Unblocked Wood Structural Panel Diaphragms[1,2,3,4,5]

Sheathing Grade	Common Nail Size	Minimum Fastener Penetration in Framing (in.)	Minimum Nominal Panel Thickness (in.)	Minimum Nominal Width of Nailed Face at Supported Edges and Boundaries (in.)	A SEISMIC: 6 in. Nail Spacing at diaphragm boundaries and supported panel edges — Case 1: v_s (plf)	Case 1: G_a (kips/in.) OSB	Case 1: G_a (kips/in.) PLY	Cases 2,3,4,5,6: v_s (plf)	Cases 2,3,4,5,6: G_a (kips/in.) OSB	Cases 2,3,4,5,6: G_a (kips/in.) PLY	B WIND: 6 in. Nail Spacing at diaphragm boundaries and supported panel edges — Case 1: v_w (plf)	Cases 2,3,4,5,6: v_w (plf)
Structural I	6d	1-1/4	5/16	2	330	9.0	7.0	250	6.0	4.5	460	350
				3	370	7.0	6.0	280	4.5	4.0	520	390
	8d	1-3/8	3/8	2	480	8.5	7.0	360	6.0	4.5	670	505
				3	530	7.5	6.0	400	5.0	4.0	740	560
	10d	1-1/2	15/32	2	570	14	10	430	9.5	7.0	800	600
				3	640	12	9.0	480	8.0	6.0	895	670
Sheathing and Single-Floor	6d	1-1/4	5/16	2	300	9.0	6.5	220	6.0	4.0	420	310
				3	340	7.0	5.5	250	5.0	3.5	475	350
			3/8	2	330	7.5	5.5	250	5.0	4.0	460	350
				3	370	6.0	4.5	280	4.0	3.0	520	390
	8d	1-3/8	3/8	2	430	9.0	6.5	320	6.0	4.5	600	450
				3	480	7.5	5.5	360	5.0	3.5	670	505
			7/16	2	460	8.5	6.0	340	5.5	4.0	645	475
				3	510	7.0	5.5	380	4.5	3.5	715	530
			15/32	2	480	7.5	5.5	360	5.0	4.0	670	505
				3	530	6.5	5.0	400	4.0	3.5	740	560
	10d	1-1/2	15/32	2	510	15	9.0	380	10	6.0	715	530
				3	580	12	8.0	430	8.0	5.5	810	600
			19/32	2	570	13	8.5	430	8.5	5.5	800	600
				3	640	10	7.5	480	7.0	5.0	895	670

1. Nominal unit shear capacities shall be adjusted in accordance with 4.2.3 to determine ASD allowable unit shear capacity and LRFD factored unit resistance. For general construction requirements see 4.2.6. For specific requirements, see 4.2.7.1 for wood structural panel diaphragms. See Appendix A for common nail dimensions.
2. For species and grades of framing other than Douglas-Fir-Larch or Southern Pine, reduced nominal unit shear capacities shall be determined by multiplying the tabulated nominal unit shear capacity by the Specific Gravity Adjustment Factor = [1-(0.5-G)], where G = Specific Gravity of the framing lumber from the *NDS* (Table 12.3.3A). The Specific Gravity Adjustment Factor shall not be greater than 1.
3. Apparent shear stiffness values, G_a, are based on nail slip in framing with moisture content less than or equal to 19% at time of fabrication and panel stiffness values for diaphragms constructed with either OSB or 3-ply plywood panels. When 4-ply or 5-ply plywood panels or composite panels are used, G_a values shall be permitted to be multiplied by 1.2.
4. Where moisture content of the framing is greater than 19% at time of fabrication, G_a values shall be multiplied by 0.5.
5. Diaphragm resistance depends on the direction of continuous panel joints with respect to the loading direction and direction of framing members, and is independent of the panel orientation.

	Cases 1&3: Continuous Panel Joints Perpendicular to Framing	Cases 2&4: Continuous Panel Joints Parallel to Framing	Cases 5&6: Continuous Panel Joints Perpendicular and Parallel to Framing
Long Panel Direction Perpendicular to Supports			
Long Panel Direction Parallel to Supports[a]			

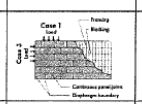
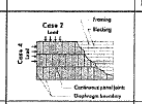
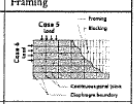
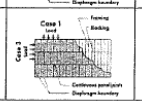
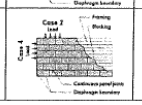
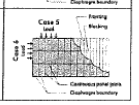
(a) Panel span rating for out-of-plane loads may be lower than the span rating with the long panel direction perpendicular to supports (See Section 3.2.2 and Section 3.2.3)

Table 4.2A Nominal Unit Shear Capacities for Wood-Frame Diaphragms

Blocked Wood Structural Panel Diaphragms[1,2,3,4,5]

Sheathing Grade	Common Nail Size	Minimum Fastener Penetration in Framing Member or Blocking (in.)	Minimum Nominal Panel Thickness (in.)	Minimum Nominal Width of Nailed Face at Adjoining Panel Edges and Boundaries (in.)	A SEISMIC: Nail Spacing (in.) at diaphragm boundaries (all cases), at continuous panel edges parallel to load (Cases 3 & 4), and at all panel edges (Cases 5 & 6): 6 — Nail Spacing (in.) at other panel edges (Cases 1, 2, 3, & 4): 6 — v_s (plf)	6: G_a (kips/in.) OSB	6: G_a (kips/in.) PLY	4: v_s (plf)	4: G_a (kips/in.) OSB	4: G_a (kips/in.) PLY	2-1/2: v_s (plf)	2-1/2: G_a (kips/in.) OSB	2-1/2: G_a (kips/in.) PLY	B WIND: Nail Spacing (in.) at diaphragm boundaries (all cases), at continuous panel edges parallel to load (Cases 3 & 4), and at all panel edges (Cases 5 & 6): 6 — Nail Spacing (in.) at other panel edges (Cases 1, 2, 3, & 4): 6 — v_w (plf)	6: v_w (plf)	4: v_w (plf)	2: v_w (plf)
Structural I	6d	1-1/4	5/16	2	370	15	12	500	9.5	7.5	750	12	10	840	20	15	520	700	1050	1175
				3	420	12	9.5	560	7.0	6.0	840	9.5	8.5	950	17	13	590	785	1175	1330
	8d	1-3/8	3/8	2	540	14	11	720	9.0	7.5	1060	13	10	1200	21	15	755	1010	1485	1680
				3	600	12	10	800	7.5	6.5	1200	10	9.0	1350	18	13	840	1120	1680	1890
	10d	1-1/2	15/32	2	640	24	17	850	15	12	1280	20	15	1460	31	21	895	1190	1790	2045
				3	720	20	15	960	12	9.5	1440	16	13	1640	26	18	1010	1345	2015	2295
Sheathing and Single-Floor	6d	1-1/4	5/16	2	340	15	10	450	9.0	7.0	670	13	9.5	760	21	13	475	630	940	1065
				3	380	12	9.0	500	7.0	6.0	760	10	8.0	850	17	12	530	700	1065	1295
			3/8	2	370	13	9.5	500	7.0	6.0	750	10	8.0	840	18	12	520	700	1050	1175
				3	420	10	8.0	560	5.5	5.0	840	8.5	7.0	950	14	10	590	785	1175	1330
	8d	1-3/8	3/8	2	480	15	11	640	9.5	7.5	960	13	9.5	1090	21	13	670	895	1345	1525
				3	540	12	9.5	720	7.5	6.0	1080	11	8.5	1220	18	12	755	1010	1510	1710
			7/16	2	510	14	10	680	8.5	7.0	1010	12	9.5	1150	20	13	715	950	1415	1610
				3	570	11	9.0	760	7.0	6.0	1140	10	8.0	1290	17	12	800	1065	1595	1805
			15/32	2	540	13	9.5	720	7.5	6.5	1060	11	8.5	1200	19	13	755	1010	1485	1680
				3	600	10	8.5	800	6.0	5.5	1200	9.0	7.5	1350	15	11	840	1120	1680	1890
	10d	1-1/2	15/32	2	580	25	15	770	15	11	1150	21	14	1310	33	18	810	1080	1610	1835
				3	660	21	14	860	12	9.5	1300	17	12	1470	28	16	910	1205	1820	2060
			19/32	2	640	21	14	850	13	9.5	1280	18	12	1460	28	17	895	1190	1790	2045
				3	720	17	12	960	10	8.0	1440	14	11	1640	24	15	1010	1345	2015	2295

1. Nominal unit shear capacities shall be adjusted in accordance with 4.2.3 to determine ASD allowable unit shear capacity and LRFD factored unit resistance. For general construction requirements see 4.2.6. For specific requirements, see 4.2.7.1 for wood structural panel diaphragms. See Appendix A for common nail dimensions.
2. For species and grades of framing other than Douglas-Fir-Larch or Southern Pine, reduced nominal unit shear capacities shall be determined by multiplying the tabulated nominal unit shear capacity by the Specific Gravity Adjustment Factor = [1-(0.5-G)], where G = Specific Gravity of the framing lumber from the *NDS* (Table 12.3.3A). The Specific Gravity Adjustment Factor shall not be greater than 1.
3. Apparent shear stiffness values, G_a, are based on nail slip in framing with moisture content less than or equal to 19% at time of fabrication and panel stiffness values for diaphragms constructed with either OSB or 3-ply plywood panels. When 4-ply or 5-ply plywood panels or composite panels are used, G_a values shall be permitted to be multiplied by 1.2.
4. Where moisture content of the framing is greater than 19% at time of fabrication, G_a values shall be multiplied by 0.5.
5. Diaphragm resistance depends on the direction of continuous panel joints with respect to the loading direction and direction of framing members, and is independent of the panel orientation.

	Cases 1&3: Continuous Panel Joints Perpendicular to Framing	Cases 2&4: Continuous Panel Joints Parallel to Framing	Cases 5&6: Continuous Panel Joints Perpendicular and Parallel to Framing
Long Panel Direction Perpendicular to Supports			
Long Panel Direction Parallel to Supports[a]			

(a) Panel span rating for out-of-plane loads may be lower than the span rating with the long panel direction perpendicular to supports (See Section 3.2.2 and Section 3.2.3)

1. Reduction Factor = 2
2. G = 0.42 (SPF or Hem Fir)… Adjustment Factor = [1-(0.5-0.42)] = 0.92 or 0.5 (I-Joists or Douglas Fir)… Adjustment Factor = 1.0

Diaphragm	Sheathing Thickness	Nail Spacing Edge/Intermediate	Blocked	Framing	Seismic Capacity (Case 1/Other)	Wind Capacity (Case 1/Other)
Roof – Unblocked	7/16"	6"/12" oc	N	2x (SPF/HF)	212-plf/156-plf	297-plf/219-plf
Roof – Blocked	7/16"	4"/12" oc	Y	2x (SPF/HF)	313-plf	437-plf
Floor – Unblocked	3/4"	6"/12" oc	N	2x (DF) or 3x (HF)	240-plf/180-plf	335-plf/252-plf
Floor – Blocked	3/4"	4"/12" oc,	Y	2x (DF) or 3x (HF)	360-plf	505-plf

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7/16"OSB; 0.131"ϕ Nails; SPF or HF Studs @ 16"oc

Table 4.3A Nominal Unit Shear Capacities for Wood-Frame Shear Walls[1,3,6,7]

Wood-based Panels[4]

Sheathing Material	Minimum Nominal Panel Thickness (in.)	Minimum Fastener Penetration in Framing Member or Blocking (in.)	Fastener Type & Size	A SEISMIC										B WIND			
				Panel Edge Fastener Spacing (in.)										Panel Edge Fastener Spacing (in.)			
				6			4			3			2				
				v_s (plf)	G_a (kips/in.)		v_s (plf)	G_a (kips/in.)		v_s (plf)	G_a (kips/in.)		v_s (plf)	G_a (kips/in.)		6 v_w (plf)	4 v_w (plf)	3 v_w (plf)	2 v_w (plf)
					OSB	PLY		OSB	PLY		OSB	PLY		OSB	PLY				
Wood Structural Panels - Structural I[4,5]	5/16	1-1/4	Nail (common or galvanized box) 6d	400	13	10	600	18	13	780	23	16	1020	35	22	580	840	1090	1430
	3/8[2]	1-3/8	8d	460	19	14	720	24	17	920	30	20	1220	43	24	645	1010	1290	1710
	7/16[2]			510	16	13	790	21	16	1010	27	19	1340	40	24	715	1105	1415	1875
	15/32			560	14	11	860	18	14	1100	24	17	1460	37	23	765	1205	1540	2045
	15/32	1-1/2	10d	680	22	16	1020	29	20	1330	36	22	1740	51	28	950	1430	1860	2435
Wood Structural Panels – Sheathing[4,5]	5/16	1-1/4	6d	360	13	9.5	540	18	12	700	24	14	900	37	18	505	755	980	1260
	3/8			400	11	8.5	600	15	11	780	20	13	1020	32	17	560	840	1090	1430
	3/8[2]	1-3/8	8d	440	17	12	640	25	15	820	31	17	1060	45	20	615	895	1150	1485
	7/16[2]			480	15	11	700	22	14	900	28	17	1170	42	21	670	980	1260	1640
	15/32			520	13	10	760	19	13	980	25	15	1280	39	20	730	1065	1370	1790
	15/32	1-1/2	10d	620	22	14	920	30	17	1200	37	19	1540	52	23	870	1290	1680	2155
	19/32			680	19	13	1020	26	16	1330	33	18	1740	48	22	950	1430	1860	2435
Plywood Siding	5/16	1-1/4	Nail (galvanized casing) 6d	280		13	420		16	550		17	720		21	390	590	770	1010
	3/8	1-3/8	8d	320		16	480		18	620		20	820		22	450	670	870	1150
Particleboard Sheathing - (M-S "Exterior Glue" and M-2 "Exterior Glue")	3/8		Nail (common or galvanized box) 6d	240		15	360		17	460		19	600		22	335	505	645	840
	3/8		8d	260		18	380		20	480		21	630		23	365	530	670	880
	1/2			280		18	420		20	540		22	700		24	390	590	755	980
	1/2		10d	370		21	550		23	720		24	920		25	520	770	1010	1290
	5/8			400		21	610		23	790		24	1040		26	560	855	1105	1455
Structural Fiberboard Sheathing	1/2		Nail (galvanized roofing) 11 ga. galv. roofing nail (0.120" x 1-1/2" long x 7/16" head)				340		4.0	460		5.0	520		5.5		475	645	730
	25/32		11 ga. galv. roofing nail (0.120" x 1-3/4" long x 3/8" head)				340		4.0	460		5.0	520		5.5		475	645	730

1. Nominal unit shear capacities shall be adjusted in accordance with 4.3.3 to determine ASD allowable unit shear capacity and LRFD factored unit resistance. For general construction requirements see 4.3.6. For specific requirements, see 4.3.7.1 for wood structural panel shear walls, 4.3.7.2 for particleboard shear walls, and 4.3.7.3 for fiberboard shear walls. See Appendix A for common and box nail dimensions.
2. Shears are permitted to be increased to values shown for 15/32 inch (nominal) sheathing with same nailing provided (a) studs are spaced a maximum of 16 inches on center, or (b) panels are applied with long dimension across studs.
3. For species and grades of framing other than Douglas-Fir-Larch or Southern Pine, reduced nominal unit shear capacities shall be determined by multiplying the tabulated nominal unit shear capacity by the Specific Gravity Adjustment Factor = [1-(0.5-G)], where G = Specific Gravity of the framing lumber from the NDS (Table 12.3.3A). The Specific Gravity Adjustment Factor shall not be greater than 1.
4. Apparent shear stiffness values G_a are based on nail slip in framing with moisture content less than or equal to 19% at time of fabrication and panel stiffness values for shear walls constructed with either OSB or 3-ply plywood panels. When 4-ply or 5-ply plywood panels or composite panels are used, G_a values shall be permitted to be multiplied by 1.2.
5. Where moisture content of the framing is greater than 19% at time of fabrication, G_a values shall be multiplied by 0.5.
6. Where panels are applied on both faces of a shear wall and nail spacing is less than 6" on center on either side, panel joints shall be offset to fall on different framing members as shown below. Alternatively, the width of the nailed face of framing members shall be 3" nominal or greater at adjoining panel edges and nails at all panel edges shall be staggered.
7. Galvanized nails shall be hot-dipped or tumbled.

1. Reduction Factor = 2
2. 16"oc studs – use values for 15/32
3. G = 0.42 (SPF or Hem Fir)… Adjustment Factor = [1-(0.5-0.42)] = 0.92

Wall Type	Blocked	Sheathing (1) or (2) Sides	Nail Spacing Edge/Intermediate	Framing	Sill Plate	Seismic Capacity $h/b_s = 2$	Seismic Capacity $h/b_s = 3.5$	Wind Capacity $h/b_s = 2$	Wind Capacity $h/b_s = 3.5$
P1-6	Y	1	6"/12" oc	2x	2x	240-plf	194-plf	335-plf	272-plf
P1-4	Y	1	4"/12" oc	2x	2x	350-plf	284-plf	490-plf	398-plf
P1-3	Y	1	3"/12" oc	2-2x	2x	450-plf	366-plf	630-plf	512-plf
P1-2	Y	1	2"12" oc	2-2x	2x	590-plf	478-plf	820-plf	669-plf
P2-4	Y	2	4"/12" oc, ea.side	2-2x	3x	700-plf	568-plf	980-plf	796-plf
P2-3	Y	2	3"/12" oc, ea. side	2-2x	3x	900-plf	733-plf	1260-plf	1024-plf
P2-2	Y	2	2"/12" oc, ea. side	2-2x	3x	1180-plf	957-plf	1640-plf	1338-plf

2018 IBC/NDS 2015 – Shear Wall Framing Clips

Model No.	Type of Connection	Fasteners (in.)	Direction of Load	DF/SP Allowable Loads			SPF/HF Allowable Loads		
				Floor (100)	Roof (125)	(160)	Floor (100)	Roof (125)	(160)
A34	1	(8) 0.131 x 1½	F_1	395	465	465	340	400	400
			F_2[6]	395	430	430	340	370	370
SS A34	1	(8) #9 x 1½ SD	F_1	640	640	640	550	550	550
			F_2	495	495	495	425	425	425
			Uplift	240	240	240	170	170	170
	2	(9) 0.131 x 1½	A_1	295	350	350	255	300	300
			E	295	360	385	255	310	330
			C_1	185	185	185	160	160	160
	3	(12) 0.131 x 1½	A_2	295	325	325	255	280	280
SS A35			C_2	295	330	330	255	285	285
			D	225	225	225	195	195	195
	4	(12) 0.131 x 1½	F_1	590	650	650	510	560	560
			F_2[6]	590	670	670	510	575	575
	5	(12) PH612I	F_1	420	420	420	360	360	360
LTP4	6	(12) 0.131 x 1½	G	580	625	625	500	540	540
			H	580	525	525	500	450	450
LTP5	7	(12) 0.131 x 1½	G	580	565	565	500	485	485
			H	545	490	490	470	420	420

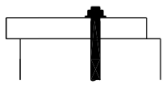
1. Allowable loads are for one angle. When angles are installed on each side of the joist, the minimum joist thickness is 3".
2. Some illustrations show connections that could cause cross-grain tension or bending of the wood during loading if not reinforced sufficiently. In this case, mechanical reinforcement should be considered.
3. LTP4 can be installed over 3/8" wood structural panel sheathing with 0.131" x 1 1/2" nails and achieve 0.72 of the listed load, or over 1/2" sheathing and achieve 0.64 of the listed load. 0.131" x 2 1/2" nails will achieve 100% load.
4. LTP4 satisfies the IRC continuously sheathed portal frame (CS-PF) framing anchor requirements when installed over raised wood floor framing per Figure R602.10.6.4.
5. The LTP5 may be installed over wood structural panel sheathing up to 1/2" thick using 0.131" x 1 1/2" nails with no reduction in load.
6. Connectors are required on both sides to achieve F_2 loads in both directions.
7. Fasteners: Nail dimensions in the table are diameter by length. SD screws are Simpson Strong-Tie® Strong-Drive® screws. PH612I is a pan-head #6 x 1/2" screw available from Simpson Strong-Tie. For additional information, see Fastener Types and Sizes Specified for Simpson Strong-Tie Connectors.

Wall Type	Capacity	A35 Capacity	A35 Spacing	LTP4 Capacity	LTP4 Spacing
P1-6U	144-plf (E)	560#	44" oc	540#	44" oc
P1-6	240-plf (E)	560#	27" oc	540#	27" oc
P1-4	350-plf (E)	560#	18" oc	540#	18" oc
P1-3	450-plf (E)	560#	14" oc	540#	14" oc
P1-2	820-plf (W)	560#	7½" oc	540#	7½" oc
P2-4	700-plf (E)	560#	9" oc	540#	LTP5 18" oc + A35 18" oc
P2-3	900-plf (E)	560#	7" oc	540#	LTP5 14" oc + A35 14" oc
P2-2	1640-plf (W)	560#	2 rows 8" oc	540#	LTP5 8" oc + A35 8" oc

2018 IBC/NDS 2018 – Shear Wall Bolts

Table 12E **BOLTS: Reference Lateral Design Values, Z, for Single Shear (two member) Connections[1,2,3,4]**

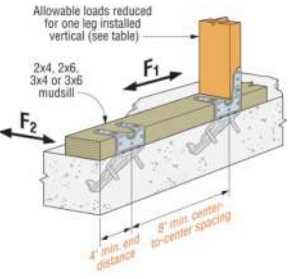
for sawn lumber or SCL to concrete



Embedment Depth in Concrete t_m in.	Thickness Side Member t_s in.	Bolt Diameter D in.	G=0.43 Hem-Fir $Z_{\parallel}$ lbs.	G=0.43 Hem-Fir $Z_{\perp}$ lbs.	G=0.42 Spruce-Pine-Fir $Z_{\parallel}$ lbs.	G=0.42 Spruce-Pine-Fir $Z_{\perp}$ lbs.	G=0.37 Redwood (open grain) $Z_{\parallel}$ lbs.	G=0.37 Redwood (open grain) $Z_{\perp}$ lbs.	G=0.36 Eastern Softwoods Spruce-Pine-Fir(S) Western Cedars Western Woods $Z_{\parallel}$ lbs.	G=0.36 Eastern Softwoods Spruce-Pine-Fir(S) Western Cedars Western Woods $Z_{\perp}$ lbs.	G=0.35 Northern Species $Z_{\parallel}$ lbs.	G=0.35 Northern Species $Z_{\perp}$ lbs.
6.0 and greater	1-1/2	1/2	590	340	590	340	550	310	540	290	530	290
		5/8	860	420	850	410	810	350	800	330	780	320
		3/4	1200	460	1190	450	1130	370	1120	360	1100	350
		7/8	1580	500	1540	490	1360	410	1330	390	1280	370
		1	1800	540	1760	530	1560	440	1520	420	1460	410
	1-3/4	1/2	640	360	630	350	580	320	580	310	560	310
		5/8	910	490	900	480	840	400	830	380	810	370
		3/4	1230	540	1220	530	1160	430	1140	420	1120	410
		7/8	1630	580	1610	570	1540	470	1520	460	1490	430
		1	2090	630	2060	610	1820	510	1770	490	1710	470
	2-1/2	1/2	730	410	730	400	700	360	690	340	680	340
		5/8	1070	540	1060	530	980	480	960	470	940	460
		3/4	1400	710	1380	700	1290	620	1270	600	1240	580
		7/8	1790	830	1770	810	1660	680	1640	660	1600	610
		1	2230	900	2210	880	2080	730	2060	700	2030	680
	3-1/2	1/2	730	470	730	470	700	430	690	410	690	400
		5/8	1140	620	1140	610	1090	550	1080	530	1070	520
		3/4	1650	780	1640	770	1540	680	1510	670	1470	660
		7/8	2100	960	2070	950	1910	870	1880	850	1840	820
		1	2550	1190	2520	1180	2340	1020	2310	980	2260	950

1. Tabulated lateral design values, Z, for bolted connections shall be multiplied by all applicable adjustment factors (see Table 11.3.1).
2. Tabulated lateral design values, Z, are for "full-body diameter" bolts (see Appendix Table L1) with bolt bending yield strength, F_{yb}, of 45,000 psi.
3. Tabulated lateral design values, Z, are based on dowel bearing strength, F_e, of 7,500 psi for concrete with minimum f'_c=2,500 psi.
4. Six inch anchor embedment assumed.

Model No.	Sill Size	Fasteners (in.) Sides	Fasteners (in.) Top	Allowable Loads Uncracked Wind and SDC A&B[5,6] Uplift	Uncracked Wind and SDC A&B[5,6] F_1	Uncracked Wind and SDC A&B[5,6] F_2	Uncracked SDC C–F[6] Uplift	Uncracked SDC C–F[6] F_1	Uncracked SDC C–F[6] F_2	Cracked Wind and SDC A&B[5,6] Uplift	Cracked Wind and SDC A&B[5,6] F_1	Cracked Wind and SDC A&B[5,6] F_2	Cracked SDC C–F[6] Uplift	Cracked SDC C–F[6] F_1	Cracked SDC C–F[6] F_2
Standard Installation – Attached to DF/SP Sill Plate															
MASA or MASAP	2x4, x6, x8, x10	(3) 0.148 x 1½	(6) 0.148 x 1½	920	1,475	1,095	745	1,235	1,045	750	1,475	875	660	1,235	765
	3x4, 3x6	(5) 0.148 x 1½	(4) 0.148 x 1½	630	1,165	725	550	1,020	725	475	1,165	725	415	1,020	640
One-Leg-Up Installation – Attached to DF/SP Sill Plate															
MASA or MASAP	2x4, x6, x8, x10	(6) 0.148 x 1½	(3) 0.148 x 1½	755	965	995	660	845	995	570	965	930	500	845	810
	3x4, 3x6	(7) 0.148 x 1½	(2) 0.148 x 1½	—	760	—	—	685	—	—	760	—	—	685	—
Two-Legs-Up Installation – Attached to DF/SP Sill Plate and Rimboard															
MASA or MASAP	2x4, x6, x8, x10	(9) 0.148 x 1½	—	810	1,105	865	740	965	755	620	1,105	630	560	965	550
Double 2x Installation – Attached to DF/SP Sill Plate															
MASA or MASAP	Double 2x4, Double 2x6	(5) 0.148 x 1½	(2) 0.148 x 1½	840	1,030	785	735	900	785	635	1,030	785	555	900	785
Standard Installation – Attached to Hem Fir Sill Plate															
MASA or MASAP	2x4, x6, x8, x10	(3) 0.148 x 1½	(6) 0.148 x 1½	790	1,250	940	640	1,060	900	650	1,250	755	570	1,060	660
	3x4, 3x6	(5) 0.148 x 1½	(4) 0.148 x 1½	535	1,005	625	475	875	625	410	1,005	625	355	875	550
One-Leg-Up Installation – Attached to Hem Fir Sill Plate and HF/SPF Stud															
MASA or MASAP	2x4, x6, x8, x10	(6) 0.148 x 1½	(3) 0.148 x 1½	650	830	855	565	725	855	490	830	795	430	725	695
	3x4, 3x6	(7) 0.148 x 1½	(2) 0.148 x 1½	—	670	—	—	590	—	—	670	—	—	590	—
Two-Legs-Up Installation – Hem Fir Sill Plate and HF/SPF Rimboard															
MASA or MASAP	2x4, x6, x8, x10	(9) 0.148 x 1½	—	700	950	745	635	830	650	545	950	540	480	830	475
Double 2x Installation – Attached to Hem Fir Sill Plate															
MASA or MASAP	Double 2x4, Double 2x6	(5) 0.148 x 1½	(2) 0.148 x 1½	720	890	675	630	775	675	545	890	675	555	775	675



Wall Type	Capacity	Sill Plate	Single 5/8"ϕ Bolt Capacity	5/8"ϕ Anchor Bolt Spacing	MASAP Anchor Capacity	MASAP Anchor Spacing
P1-6U	144-plf (E)	2x	1376#	60" oc	1060#	60" oc
P1-6	240-plf (E)	2x	1376#	60" oc	1060#	52" oc
P1-4	350-plf (E)	2x	1376#	46" oc	1060#	36" oc
P1-3	450-plf (E)	2x	1376#	36" oc	1060#	28" oc
P1-2	820-plf (W)	2x	1376#	20" oc	1250#	18" oc
P2-4	700-plf (E)	3x	1712#	28" oc	875#	15" oc
P2-3	900-plf (E)	3x	1712#	22" oc	875#	11" oc
P2-2	1640-plf (W)	3x	1712#	12" oc	1005#	7" oc

SHEAR WALL SCHEDULE

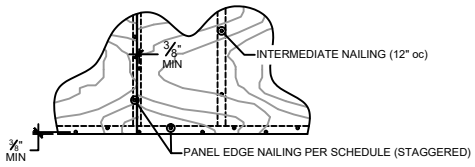
(IN ACCORDANCE w/ ANSI/AF&PA SDPWS-2015 SECTION 4.3)
Updated 1/20/2021

WALL TYPE	SHEATHING	PANEL EDGE NAILING ②	MINIMUM WIDTH OF NAILED FACE OF FRAMING @ ADJOINING PANEL EDGES ③		MUDSILL PLATE	FACE NAILING ④	FRAMING CLIPS ⑤	ANCHORAGE TO CONCRETE ⑥		SEISMIC CAPACITY - h/b = 2 h/b = 3.5	WIND CAPACITY - h/b = 2 h/b = 3.5
			SINGLE MEMBER	BUILT-UP MEMBER				ANCHOR BOLTS	MUDSILL ANCHORS		
P1-6	1 SIDE	6" oc	2x	2x	2x	6" oc	A35 @ 27" oc or LTP4 @ 27" oc	⅝"Ø @ 60" oc	MASAP @ 52" oc	240-plf 194-plf	240-plf 194-plf
P1-4	1 SIDE	4" oc	2x	2x	2x	4" oc	A35 @ 18" oc or LTP4 @ 18" oc	⅝"Ø @ 46" oc	MASAP @ 36" oc	350-plf 284-plf	350-plf 284-plf
P1-3	1 SIDE	3" oc	3x	(2)2x	2x	3" oc	A35 @ 14" oc or LTP4 @ 14" oc	⅝"Ø @ 36" oc	MASAP @ 28" oc	450-plf 366-plf	450-plf 366-plf
P1-2	1 SIDE	2" oc	3x	(2)2x	2x	2" oc	A35 @ 7½" oc or LTP4 @ 7½" oc	⅝"Ø @ 20" oc	MASAP @ 18" oc	590-plf 478-plf	820-plf 669-plf
P2-4	2 SIDES	4"oc	3x	(2)2x	3x	(2) Rows, 4" oc	A35 @ 18" oc and LTP4 @ 18" oc	⅝"Ø @ 28" oc	MASAP @ 15" oc	700-plf 568-plf	700-plf 568-plf
P2-3	2 SIDES	3" oc	3x	(2)2x	3x	(2) Rows, 3" oc	A35 @ 14" oc and LTP4 @ 14" oc	⅝"Ø @ 22" oc	MASAP @ 11" oc	900-plf 733-plf	900-plf 733-plf
P2-2	2 SIDES	2" oc	3x	(2)2x	3x	(2) Rows, 2" oc	A35 @ 8" oc and LTP4 @ 8" oc	⅝"Ø @ 12" oc	MASAP @ 7" oc	1180-plf 957-plf	1640-plf 1338-plf

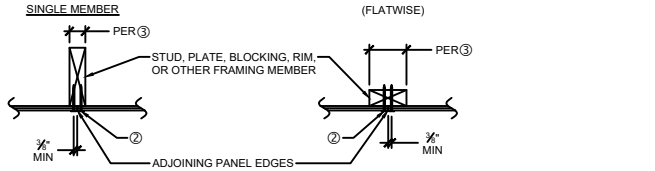
SHEAR WALL SCHEDULE NOTES

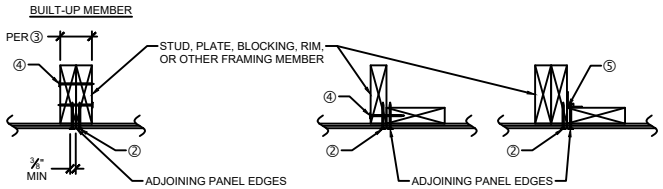
(SECTION 4.3.7.1.1)
7/16" OSB or 15/32" PLYWOOD SHEATHING OR SIDING EXCEPT GROUP 5 SPECIES. MINIMUM PANEL SPAN RATING OF (24/0). PANELS SHALL NOT BE LESS THAN 4'x8', EXCEPT AT BOUNDARIES AND CHANGES IN FRAMING. ALL EDGES OF ALL PANELS SHALL BE SUPPORTED BY AND FASTENED TO FRAMING MEMBERS OR BLOCKING.

② (SECTION 4.3.7.1.2. & SECTION 4.3.7.1.3)
PANEL EDGE NAILING APPLIES TO ALL SHEATHING PANEL EDGES. NAIL SHEATHING TO INTERMEDIATE FRAMING MEMBERS WITH SHEATHING NAILS @ 12"oc. MAXIMUM STUD SPACING SHALL BE 16"oc. SHEATHING NAILS SHALL BE 0.131"Ø x 2½". PLYWOOD EDGE NAILING SHALL BE STAGGERED. NAILS SHALL BE LOCATED AT LEAST ⅜" FROM THE PANEL EDGES.



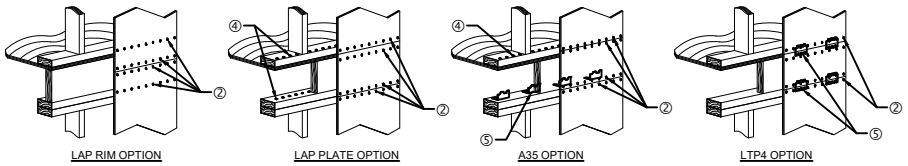
③ (SECTION 4.3.7.1.4)
THE MINIMUM NOMINAL WIDTH OF THE NAILED FACE OF FRAMING AND BLOCKING AT ADJOINING PANEL EDGES SHALL BE AS INDICATED IN THE SCHEDULE.





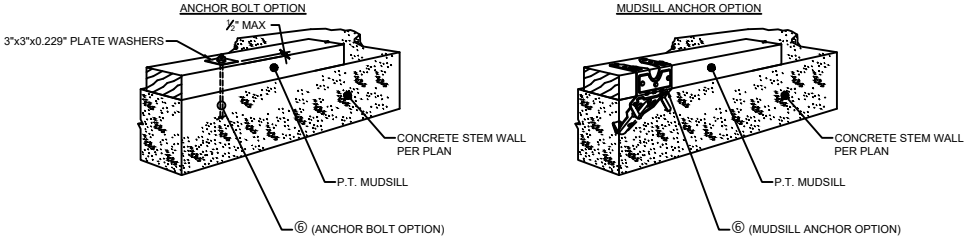
④ FACE NAILING APPLIES TO CONDITIONS WHERE FRAMING NAILS CAN BE STRAIGHT DRIVEN THRU FIRST MEMBER AND PENETRATE MAIN MEMBER MINIMUM OF 1½". FRAMING NAILS SHALL BE 0.131"Ø x 3¼". 0.131"Ø x 3" NAILS MAY BE USED WHEN STITCHING TOGETHER (2)2x MEMBERS WITH NO SPACERS.

⑤ AT ADJOINING PANEL EDGES WHERE SHEATHING CANNOT LAP ON SINGLE MEMBER AND FACE NAILING CANNOT BE ACCOMPLISHED, FRAMING CLIPS SHALL BE USED TO FASTEN BUILT-UP MEMBERS. USE 0.131"Ø x 2½" NAILS AT LTP4 CLIP WHEN INSTALLED OVER ½" SHEATHING.



LAP RIM OPTION | LAP PLATE OPTION | A35 OPTION | LTP4 OPTION

⑥ (SECTION 4.3.6.4.3)
ANCHOR BOLTS EMBEDMENT SHALL BE 7", U.O.N. ALL ANCHORS SHALL HAVE 3" x 3" x 0.229" PLATE WASHERS. PLATE WASHER SHALL EXTEND TO WITHIN ½" OF THE EDGE OF THE BOTTOM PLATE ON THE SIDE WITH SHEATHING. IF SHEATHING IS ON BOTH SIDES OF THE WALL, STAGGER THE ANCHOR BOLTS, AS REQUIRED, SO THAT HALF OF THE PLATE WASHERS ARE WITHIN ½" OF THE EDGE OF THE BOTTOM PLATE ON EACH SIDE. HOLE IN PLATE WASHERS MAY BE DIAGONALLY SLOTTED.



BTL
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Miscellaneous

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Stud Wall Design

Based on 2018 NDS Combined axial and bending formula:

$[f_c/F_c']^2 + f_b/F_b'[1-(f_c/F_{cE})] < 1$ in which: $F_{cE} = 0.822(Emin')/(\ell_e/d)^2$

Wall: Exterior Walls	Wall Height:		9	ft
	Desired Stud Spacing:		24	in oc
No Fire Rating ▼	Design Axial Dead Load:		683	plf
2x6 ▼	Design Axial Live Load:		960	plf
SPF Stud ▼	Design Axial Snow Load:		538	plf
	Design Lateral Pressure (0.6W):		15	psf
	Deflection Criteria:	L/	240	

STUD CHECK					
	ℓ_e/d	<	50		OK
D+0.6W (C_D = 1.60)					
$[f_c/F_c']^2 + f_b/F_b'[1-(f_c/F_{cE})]$ =	0.53	<	1		OK
$f_c/F_{cE2} + (f_b/F_{bE})^2$ =	0.00	<	1		OK
D+0.75L+0.75(0.6W)+0.75S (C_D = 1.60)					
$[f_c/F_c']^2 + f_b/F_b'[1-(f_c/F_{cE})]$ =	0.92	<	1		OK
$f_c/F_{cE2} + (f_b/F_{bE})^2$ =	0.00	<	1		OK
D+0.75L+0.75S (C_D = 1.15)					
f_c/F_c' =	0.72	<	1		OK
D+L (C_D = 1.0)					
f_c/F_c' =	0.71	<	1		OK
Deflection (No Increase for Load Duration):					
Defl: L/ 240 = 0.45	0.18	<	0.45		OK
SPF Stud 2x6 @ 24 oc					OK

PLATE CRUSHING CHECK[1]					
Checks Crushing for Stud Spacing[2]					
No Stress Increase for Load Duration					
Hem Fir Plates:	$f_c/F_{c\perp}'$ =	0.87	<	1	OK
Douglas Fir Plates:	$f_c/F_{c\perp}'$ =	0.56	<	1	OK

[1] Plate must also be checked for bending.

[2] Check on crushing only applies to stud spacing. Joists above must also be checked for crushing effect on plate. Also, no stress increase is allowed due to load duration.

Date: 1/27/2021

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Stud Wall Design

Based on 2018 NDS Combined axial and bending formula:

$[f_c/F_c']^2 + f_b/F_b'[1-(f_c/F_{cE})] < 1$ in which: $F_{cE} = 0.822(Emin')/(\ell_e/d)^2$

Wall: Exterior Walls

No Fire Rating

(2)2x6

SPF Stud

Wall Height:	19.25	ft
Desired Stud Spacing:	16	in oc
Design Axial Dead Load:	323	plf
Design Axial Live Load:	0	plf
Design Axial Snow Load:	538	plf
Design Lateral Pressure (0.6W):	15	psf
Deflection Criteria: L/	180	

STUD CHECK	ℓ_e/d	<	50	OK
D+0.6W (C_D = 1.60)				
$[f_c/F_c']^2 + f_b/F_b'[1-(f_c/F_{cE})]$ =	0.70	<	1	OK
$f_c/F_{cE2} + (f_b/F_{bE})^2$ =	0.00	<	1	OK
D+0.75L+0.75(0.6W)+0.75S (C_D = 1.60)				
$[f_c/F_c']^2 + f_b/F_b'[1-(f_c/F_{cE})]$ =	0.71	<	1	OK
$f_c/F_{cE2} + (f_b/F_{bE})^2$ =	0.00	<	1	OK
D+0.75L+0.75S (C_D = 1.15)				
f_c/F_c' =	0.30	<	1	OK
D+L (C_D = 1.0)				
f_c/F_c' =	0.14	<	1	OK
Deflection (No Increase for Load Duration):				
Defl: L/ 180 = 1.28	1.24	<	1.28	OK
SPF Stud (2)2x6 @ 16 oc				OK

PLATE CRUSHING CHECK[1]				
Checks Crushing for Stud Spacing[2]				
No Stress Increase for Load Duration				
Hem Fir Plates:	$f_c/F_{c\perp}'$ = 0.13	<	1	OK
Douglas Fir Plates:	$f_c/F_{c\perp}'$ = 0.08	<	1	OK

[1] Plate must also be checked for bending.

[2] Check on crushing only applies to stud spacing. Joists above must also be checked for crushing effect on plate. Also, no stress increase is allowed due to load duration.

Date: 1/27/2021

Page: M1.2

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Stud Wall Design

Based on 2018 NDS Combined axial and bending formula:

$[f_c/F_c']^2 + f_b/F_b'[1-(f_c/F_{cE})] < 1$ in which: $F_{cE} = 0.822(Emin')/(\ell_e/d)^2$

Wall: Interior Walls	Wall Height:		9	ft
	Desired Stud Spacing:		24	in oc
No Fire Rating	Design Axial Dead Load:		203	plf
2x4	Design Axial Live Load:		540	plf
SPF Stud	Design Axial Snow Load:		0	plf
	Design Lateral Pressure (0.6W):		5	psf
	Deflection Criteria:	L/	180	

STUD CHECK					
	ℓ_e/d	<	50		OK
D+0.6W (C_D = 1.60)					
$[f_c/F_c']^2 + f_b/F_b'[1-(f_c/F_{cE})]$ =	0.41	<	1		OK
$f_c/F_{cE2} + (f_b/F_{bE})^2$ =	0.00	<	1		OK
D+0.75L+0.75(0.6W)+0.75S (C_D = 1.60)					
$[f_c/F_c']^2 + f_b/F_b'[1-(f_c/F_{cE})]$ =	0.99	<	1		OK
$f_c/F_{cE2} + (f_b/F_{bE})^2$ =	0.00	<	1		OK
D+0.75L+0.75S (C_D = 1.15)					
f_c/F_c' =	0.69	<	1		OK
D+L (C_D = 1.0)					
f_c/F_c' =	0.86	<	1		OK
Deflection (No Increase for Load Duration):					
Defl: L/ 180 = 0.60	0.23	<	0.60		OK
SPF Stud 2x4 @ 24 oc					OK

PLATE CRUSHING CHECK[1]					
Checks Crushing for Stud Spacing[2]					
No Stress Increase for Load Duration					
Hem Fir Plates:	$f_c/F_{c\perp}'$ =	0.46	<	1	OK
Douglas Fir Plates:	$f_c/F_{c\perp}'$ =	0.30	<	1	OK

[1] Plate must also be checked for bending.

[2] Check on crushing only applies to stud spacing. Joists above must also be checked for crushing effect on plate. Also, no stress increase is allowed due to load duration.

Date: 1/27/2021

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Stud Wall Design

Based on 2018 NDS Combined axial and bending formula:

$[f_c/F_c']^2 + f_b/F_b'[1-(f_c/F_{cE})] < 1$ in which: $F_{cE} = 0.822(Emin')/(\ell_e/d)^2$

Wall: Interior Walls	Wall Height:		9	ft
	Desired Stud Spacing:		16	in oc
No Fire Rating	Design Axial Dead Load:		338	plf
2x4	Design Axial Live Load:		900	plf
SPF Stud	Design Axial Snow Load:		0	plf
	Design Lateral Pressure (0.6W):		5	psf
	Deflection Criteria:	L/	180	

STUD CHECK					
	ℓ_e/d	<	50		OK
D+0.6W (C_D = 1.60)					
$[f_c/F_c']^2 + f_b/F_b'[1-(f_c/F_{cE})]$ =	0.31	<	1		OK
$f_c/F_{cE2} + (f_b/F_{bE})^2$ =	0.00	<	1		OK
D+0.75L+0.75(0.6W)+0.75S (C_D = 1.60)					
$[f_c/F_c']^2 + f_b/F_b'[1-(f_c/F_{cE})]$ =	0.99	<	1		OK
$f_c/F_{cE2} + (f_b/F_{bE})^2$ =	0.00	<	1		OK
D+0.75L+0.75S (C_D = 1.15)					
f_c/F_c' =	0.76	<	1		OK
D+L (C_D = 1.0)					
f_c/F_c' =	0.95	<	1		OK
Deflection (No Increase for Load Duration):					
Defl: L/ 180 = 0.60	0.15	<	0.60		OK
SPF Stud 2x4 @ 16 oc					OK

PLATE CRUSHING CHECK[1]					
Checks Crushing for Stud Spacing[2]					
No Stress Increase for Load Duration					
Hem Fir Plates:	$f_c/F_{c\perp}'$ =	0.51	<	1	OK
Douglas Fir Plates:	$f_c/F_{c\perp}'$ =	0.33	<	1	OK

[1] Plate must also be checked for bending.

[2] Check on crushing only applies to stud spacing. Joists above must also be checked for crushing effect on plate. Also, no stress increase is allowed due to load duration.

Date: 1/27/2021

BTL ENGINEERING

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2018 NDS

3.7-SOLID COLUMNS and 15.3-BUILT-UP COLUMNS

Solid Column	F_c =	800 psi	E_{min} =	440	ksi
Visually graded lumber (Dimensional)	C_D =	1.00	E_{min}' =	440	ksi
No Fire Rating	C_M =	1.00	l =	9.0	ft
Hem-Fir Stud	C_t =	1.00	d =	5 1/2	in
	C_F =	1.00	K_e =	1.0	
			l_e =	108.0	in
			l_e/d =	19.6	

$$F_c' = F_c^* \, C_P$$

$$F_c^* = F_c \, C_D \, C_M \, C_t \, C_F$$

F_c^* = 800 psi

C_p = 0.743

F_c' = 594 psi

$$C_p = K_f \left[\frac{1+\left(F_{cE}/F_c^*\right)}{2c} - \sqrt{\left[\frac{1+\left(F_{cE}/F_c^*\right)}{2c}\right]^2 - \frac{F_{cE}/F_c^*}{c}} \right]$$

F_{cE} = 938

$$F_{cE} = \frac{0.822 \, E_{min}'}{\left(l_e/d\right)^2}$$

c = 0.8

K_f = 1.0

	STUD	HF Plate Crushing	DF Plate Crushing
(1) 2x6	4904	3341	5156
(2) 2x6	9807	6683	10313
(3) 2x6	14711	10024	15469
(4) 2x6	19614	13365	20625
(5) 2x6	24518	16706	25781

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2018 NDS

3.7-SOLID COLUMNS and 15.3-BUILT-UP COLUMNS

Solid Column	F_c =	800 psi	E_{min} =	440	ksi
Visually graded lumber (Dimensional)	C_D =	1.00	E_{min}' =	440	ksi
No Fire Rating	C_M =	1.00	l =	9.0	ft
Hem-Fir Stud	C_t =	1.00	d =	3 1/2	in
	C_F =	1.00	K_e =	1.0	
			l_e =	108.0	in
			l_e/d =	30.9	

$$F_c' = F_c^* \, C_P$$

$$F_c^* = F_c \, C_D \, C_M \, C_t \, C_F$$

F_c^* = 800 psi

C_p = 0.416

F_c' = 333 psi

$$C_p = K_f \left[\frac{1+\left(F_{cE}/F_c^*\right)}{2c} - \sqrt{\left[\frac{1+\left(F_{cE}/F_c^*\right)}{2c}\right]^2 - \frac{F_{cE}/F_c^*}{c}} \right]$$

F_{cE} = 380

$$F_{cE} = \frac{0.822 \, E_{min}'}{\left(l_e/d\right)^2}$$

c = 0.8

K_f = 1.0

	STUD	HF Plate Crushing	DF Plate Crushing
(1) 2x4	1746	2126	3281
(2) 2x4	3492	4253	6563
(3) 2x4	5237	6379	9844
(4) 2x4	6983	8505	13125
(5) 2x4	8729	10631	16406

BTL ENGINEERING
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Phone: 425-814-8448
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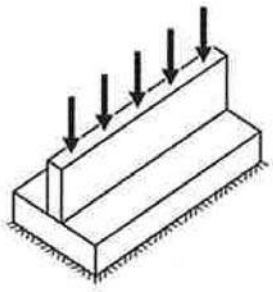
Project: Continuous Strip Footing
18" wide x 8" thick

IBC Section 13.3.2: One-way shallow foundations


Strip footing

Footing width, B = 18 in
Footing Thickness, t = 8 in
Stem Wall width, C = 8 in
Stem Wall Height = 24 in

Normalweight f'_c = 2500 psi
Uncoated f_y = 40000 psi

Longintudinal Reinforcement: (2) #4
Bar Diameter = 0.500 in
Bar Area = 0.20 in^2
A_s = 0.40 in^2
Cover: 3 in

Stem Wall Reinforcement: #4 @ 24 "oc Straight Dowels
Bar Diameter = 0.500 in
Bar Area = 0.20 in^2
A_s = 0.00 in^2
Cover: 3 in
b_w = 12 in (per ft)
d = 4.75 in

Footing + Stem Wall Weight - Weight of Displaced Soil = 240 plf

One-way shear, no shear reinforcement:

[22.5.5.1] $V_c = 2\lambda\sqrt{f'_c}\,b_w d$ = 5700 # per foot length ϕ = 0.75

[22.5.10.1] $V_u \le \phi V_c$

$$V_u = q_u b_w \left(\frac{B-C}{2} - d\right) \rightarrow q_u = \frac{\phi V_c}{b_w\left(\frac{B-C}{2} - d\right)}$$

q_u = 51300 psf
Max Uniform Load on Stem = 76950 plf [Ultimate]
48094 plf [Service]

Moment:

[22.2.1.1] $M_n = A_s f_y (d - a/2)$ = 0.000 k-ft per foot length ϕ = 0.90

$M_u \le \phi M_n$

$$M_u = \frac{q_u b_w \left(\frac{B-C}{2}\right)^2}{2} \rightarrow q_u = \frac{2\phi M_n}{b_w\left(\frac{B-C}{2}\right)^2}$$

$$a = \frac{A_s f_y}{0.85 f'_c b} = 0.00 \text{ in}$$

q_u = NO MOMENT
Max Uniform Load on Stem = 12000 plf [Ultimate]
7500 plf [Service]

Development of Reinforcement:

[25.4.2.3] $l_d = \left(\frac{3}{40}\frac{f_y}{\lambda\sqrt{f'_c}}\frac{\psi_t\psi_e\psi_s}{\left(\frac{c_b+K_{tr}}{d_b}\right)}\right) d_b$ = N/A

OK

Allowable Soil Bearing Pressure	**1500 psf**	**2000 psf**	**2500 psf**	**3000 psf**	**3500 psf**	**4000 psf**
Max Uniform Load, Soil	2010 plf	2760 plf	3510 plf	4260 plf	5010 plf	5760 plf
Max Uniform Load, Shear	48094 plf	48094 plf	48094 plf	48094 plf	48094 plf	48094 plf
Max Uniform Load, Moment	7500 plf	7500 plf	7500 plf	7500 plf	7500 plf	7500 plf
Max Uniform Load (Service)	**2010 plf**	**2760 plf**	**3510 plf**	**4260 plf**	**5010 plf**	**5760 plf**
Max Uniform Load (Ultimate)	**3216 plf**	**4416 plf**	**5616 plf**	**6816 plf**	**8016 plf**	**9216 plf**
Max Point Load (Service)	**16080 #**	**22080 #**	**28080 #**	**34080 #**	**40080 #**	**46080 #**
Max Point Load (Ultimate)	**25728 #**	**35328 #**	**44928 #**	**54528 #**	**64128 #**	**73728 #**

Date: 3/19/2018

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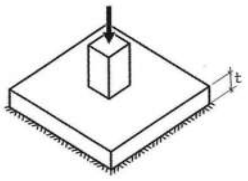
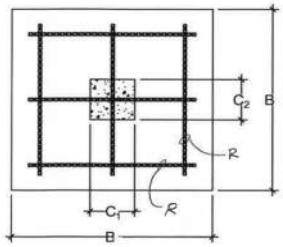
Project: Typical Footing
Footing: 18" x 18" x 8" thick



Isolated footing



Footing B = 1.50 ft
t = 8 in
Reinforcement R = (2) #4
A_{s1} = 0.40 in²
d = 4.25 in Cover: 3 in
Column C_1 = 3.50 in C_2 = 3.50 in
Materials f'_c = 2500 psi Normalweight λ = 1.00
f_y = 40000 psi Uncoated ψ_e = 1.00

Net Footing Weight
P_{FTG} = 0.06 k

Soil Pressure:

$$P_{ASD} = q_a B^2 - P_{FTG} =$$

One-way shear: ø = 0.75

$V_c = 2\lambda\sqrt{f'_c}Bd =$ 7.65 k
$V_u \le \emptyset V_c$ $\emptyset V_c =$ 5.74 k

$$V_u = q_u B\left(\frac{B-C_2}{2} - d\right) \rightarrow q_u = \frac{\emptyset V_c}{B\left(\frac{B-C_2}{2} - d\right)}$$

$$V_u = q_u B\left(\frac{B-C_1}{2} - d\right) \rightarrow q_u = \frac{\emptyset V_c}{B\left(\frac{B-C_1}{2} - d\right)}$$

q_u = 15300 psf or 15300 psf $P_u = q_u B^2 =$ 34425 #

Two-way shear: ø = 0.75

[22.6.5.2(a]) $v_c = 4\lambda\sqrt{f'_c} =$ 200 psi ⇦

[22.6.5.2(b)] $v_c = \left(2 + \frac{4}{\beta}\right)\lambda\sqrt{f'_c} =$ 300 psi β = 1.00

[22.6.5.2(c)] $v_c = \left(2 + \frac{\alpha_x d}{b_0}\right)\lambda\sqrt{f'_c} =$ 374 psi α_x = 40

b_0 = 2(C₁+d)+2(C₂+d) = 31

$V_u \le \phi V_c$ $\phi V_c = \phi v_c b_0 d =$ 19.76 k

$$V_u = q_u[B^2 - (C_1 + d)(C_2 + d)] \rightarrow q_u = \frac{\emptyset V_c}{[B^2 - (C_1 + d)(C_2 + d)]}$$

q_u = 10782 psf $P_u = q_u B^2 =$ 24260 #

Moment: ø = 0.90

$M_n = A_s f_y\left(d - a/2\right) =$ 5.4 k-ft
$a = A_s f_y/(0.85 f'_c B) =$ 0.42 in
$M_u \le \emptyset M_n$ $\emptyset M_n =$ 4.8 k-ft

$$M_u = \frac{q_u B\left(\frac{B-C_2}{2}\right)^2}{2} \rightarrow q_u = \frac{2\emptyset M_n}{B((B-C_2)/2)^2}$$

$$M_u = \frac{q_u B\left(\frac{B-C_1}{2}\right)^2}{2} \rightarrow q_u = \frac{2\emptyset M_n}{B((B-C_1)/2)^2}$$

q_u = 17712 psf or 17712 psf $P_u = q_u B^2 =$ 39853 #

Development of Reinforcement:

$$l_d = \left(\frac{3}{40}\frac{f_y}{\lambda\sqrt{f'_c}}\frac{\psi_t\psi_e\psi_s}{\left(\frac{c_b + K_{tr}}{d_b}\right)}\right)d_b =$$ 4 in ...4 in available **OK**
Adjusted

Soil Bearing Pressure	**1500 psf**	**2000 psf**	**2500 psf**	**3000 psf**	**3500 psf**	**4000 psf**
Max Load (lbs), Soil	3315	4440	5565	6690	7815	8940
Max Load (lbs), One-Way Shear	21516	21516	21516	21516	21516	21516
Max Load (lbs), Two-Way Shear	15162	15162	15162	15162	15162	15162
Max Load (lbs), Moment	24908	24908	24908	24908	24908	24908
Max Load (ASD)	**3315**	**4440**	**5565**	**6690**	**7815**	**8940**
Max Load (Factored)	**5304**	**7104**	**8904**	**10704**	**12504**	**14304**

Date: 1/23/2023

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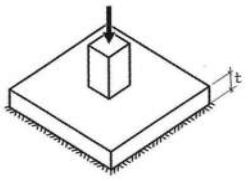
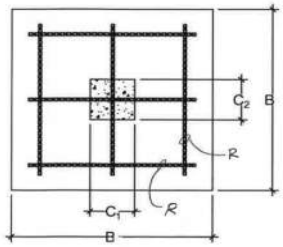
Project: Typical Footing
Footing: 24" x 24" x 8" thick



Isolated footing



Footing B = 2.00 ft
t = 8 in
Reinforcement R = (2) #4
A_{s1} = 0.40 in²
d = 4.25 in Cover: 3 in
Column C_1 = 3.50 in C_2 = 3.50 in
Materials f'_c = 2500 psi Normalweight λ = 1.00
f_y = 40000 psi Uncoated ψ_e = 1.00
Net Footing Weight
P_{FTG} = 0.11 k
Soil Pressure:
$P_{ASD} = q_a B^2 - P_{FTG} =$

One-way shear: ø = 0.75
$V_c = 2\lambda\sqrt{f'_c}Bd =$ 10.20 k
$V_u \le \emptyset V_c$ $\emptyset V_c =$ 7.65 k
$V_u = q_u B\left(\frac{B-C_2}{2} - d\right) \rightarrow q_u = \frac{\emptyset V_c}{B\left(\frac{B-C_2}{2} - d\right)}$ $V_u = q_u B\left(\frac{B-C_1}{2} - d\right) \rightarrow q_u = \frac{\emptyset V_c}{B\left(\frac{B-C_1}{2} - d\right)}$
q_u = 7650 psf or 7650 psf $P_u = q_u B^2 =$ 30600 #

Two-way shear: ø = 0.75
[22.6.5.2(a]) $v_c = 4\lambda\sqrt{f'_c} =$ 200 psi ⇦
[22.6.5.2(b]) $v_c = \left(2 + \frac{4}{\beta}\right)\lambda\sqrt{f'_c} =$ 300 psi β = 1.00
α_x = 40
[22.6.5.2(c]) $v_c = \left(2 + \frac{\alpha_x d}{b_0}\right)\lambda\sqrt{f'_c} =$ 374 psi b_0 = 2(C₁+d)+2(C₂+d)
31
$V_u \le \phi V_c$ $\phi V_c = \phi v_c b_0 d =$ 19.76 k
$V_u = q_u[B^2 - (C_1 + d)(C_2 + d)] \rightarrow q_u = \frac{\emptyset V_c}{[B^2 - (C_1 + d)(C_2 + d)]}$
q_u = 5516 psf $P_u = q_u B^2 =$ 22063 #

Moment: ø = 0.90
$M_n = A_s f_y\left(d - {}^{a}/_{2}\right) =$ 5.5 k-ft
$a = A_s f_y/(0.85 f'_c B) =$ 0.31 in
$M_u \le \emptyset M_n$ $\emptyset M_n =$ 4.9 k-ft
$M_u = \frac{q_u B\left(\frac{B-C_2}{2}\right)^2}{2} \rightarrow q_u = \frac{2\emptyset M_n}{B((B-C_2)/2)^2}$ $M_u = \frac{q_u B\left(\frac{B-C_1}{2}\right)^2}{2} \rightarrow q_u = \frac{2\emptyset M_n}{B((B-C_1)/2)^2}$
q_u = 6732 psf or 6732 psf $P_u = q_u B^2 =$ 26929 #

Development of Reinforcement:
$l_d = \left(\frac{3}{40}\frac{f_y}{\lambda\sqrt{f'_c}}\frac{\psi_t\psi_e\psi_s}{\left(\frac{c_b + K_{tr}}{d_b}\right)}\right)d_b =$ 7 in ...7 in available **OK**
Adjusted

Soil Bearing Pressure	**1500 psf**	**2000 psf**	**2500 psf**	**3000 psf**	**3500 psf**	**4000 psf**
Max Load (lbs), Soil	5893	7893	9893	11893	13893	15893
Max Load (lbs), One-Way Shear	19125	19125	19125	19125	19125	19125
Max Load (lbs), Two-Way Shear	13789	13789	13789	13789	13789	13789
Max Load (lbs), Moment	16830	16830	16830	16830	16830	16830
Max Load (ASD)	**5893**	**7893**	**9893**	**11893**	**12710**	**12710**
Max Load (Factored)	**9429**	**12629**	**15829**	**19029**	**20337**	**20337**

Date: 1/23/2023

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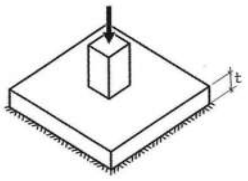
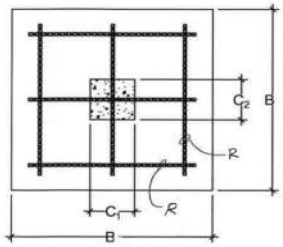
Project: Typical Footing
Footing: 30" x 30" x 8" thick



Isolated footing



Footing B = 2.50 ft
t = 8 in
Reinforcement R = (3) #4
A_{s1} = 0.60 in²
d = 4.25 in Cover: 3 in
Column C_1 = 3.50 in C_2 = 3.50 in
Materials f'_c = 2500 psi Normalweight λ = 1.00
f_y = 40000 psi Uncoated ψ_e = 1.00

Net Footing Weight
P_{FTG} = 0.17 k

Soil Pressure:

$$P_{ASD} = q_a B^2 - P_{FTG} =$$

One-way shear: ø = 0.75

$V_c = 2\lambda\sqrt{f'_c}Bd =$ 12.75 k
$V_u \le \emptyset V_c$ $\emptyset V_c =$ 9.56 k

$$V_u = q_u B\left(\frac{B-C_2}{2} - d\right) \rightarrow q_u = \frac{\emptyset V_c}{B\left(\frac{B-C_2}{2} - d\right)}$$

$$V_u = q_u B\left(\frac{B-C_1}{2} - d\right) \rightarrow q_u = \frac{\emptyset V_c}{B\left(\frac{B-C_1}{2} - d\right)}$$

q_u = 5100 psf or 5100 psf $P_u = q_u B^2$ = 31875 #

Two-way shear: ø = 0.75

[22.6.5.2(a]) $v_c = 4\lambda\sqrt{f'_c} =$ 200 psi ⇦

[22.6.5.2(b]) $v_c = \left(2 + \frac{4}{\beta}\right)\lambda\sqrt{f'_c} =$ 300 psi β = 1.00

[22.6.5.2(c]) $v_c = \left(2 + \frac{\alpha_x d}{b_0}\right)\lambda\sqrt{f'_c} =$ 374 psi α_x = 40

b_0 = 2(C₁+d)+2(C₂+d) = 31

$V_u \le \phi V_c$ $\phi V_c = \phi v_c b_0 d =$ 19.76 k

$$V_u = q_u[B^2 - (C_1 + d)(C_2 + d)] \rightarrow q_u = \frac{\emptyset V_c}{[B^2 - (C_1 + d)(C_2 + d)]}$$

q_u = 3388 psf $P_u = q_u B^2$ = 21176 #

Moment: ø = 0.90

$M_n = A_s f_y\left(d - {}^{a}/_{2}\right) =$ 8.1 k-ft
$a = A_s f_y/(0.85 f'_c B) =$ 0.38 in
$M_u \le \emptyset M_n$ $\emptyset M_n =$ 7.3 k-ft

$$M_u = \frac{q_u B\left(\frac{B-C_2}{2}\right)^2}{2} \rightarrow q_u = \frac{2\emptyset M_n}{B((B-C_2)/2)^2}$$

$$M_u = \frac{q_u B\left(\frac{B-C_1}{2}\right)^2}{2} \rightarrow q_u = \frac{2\emptyset M_n}{B((B-C_1)/2)^2}$$

q_u = 4797 psf or 4797 psf $P_u = q_u B^2$ = 29984 #

Development of Reinforcement:

$$l_d = \left(\frac{3}{40}\frac{f_y}{\lambda\sqrt{f'_c}}\frac{\psi_t\psi_e\psi_s}{\left(\frac{c_b + K_{tr}}{d_b}\right)}\right)d_b =$$ 10 in ...10 in available **OK**

Soil Bearing Pressure	**1500 psf**	**2000 psf**	**2500 psf**	**3000 psf**	**3500 psf**	**4000 psf**
Max Load (lbs), Soil	9208	12333	15458	18583	21708	24833
Max Load (lbs), One-Way Shear	19922	19922	19922	19922	19922	19922
Max Load (lbs), Two-Way Shear	13235	13235	13235	13235	13235	13235
Max Load (lbs), Moment	18740	18740	18740	18740	18740	18740
Max Load (ASD)	**9208**	**12333**	**13235**	**13235**	**13235**	**13235**
Max Load (Factored)	**14733**	**19733**	**21176**	**21176**	**21176**	**21176**

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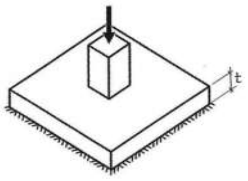
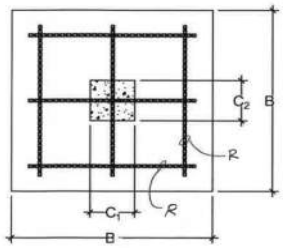
Project: Typical Footing
Footing: 36" x 36" x 12" thick



Isolated footing



Footing B = 3.00 ft
t = 12 in
Reinforcement R = (3) #4
A_{s1} = 0.60 in²
d = 8.25 in Cover: 3 in
Column C_1 = 5.50 in C_2 = 5.50 in
Materials f'_c = 2500 psi Normalweight λ = 1.00
f_y = 40000 psi Uncoated ψ_e = 1.00

Net Footing Weight
P_{FTG} = 0.36 k

Soil Pressure:

$$P_{ASD} = q_a B^2 - P_{FTG} =$$

One-way shear: ø = 0.75

$V_c = 2\lambda\sqrt{f'_c}Bd =$ 29.70 k
$V_u \le \emptyset V_c$ $\emptyset V_c =$ 22.28 k

$$V_u = q_u B\left(\frac{B-C_2}{2} - d\right) \rightarrow q_u = \frac{\emptyset V_c}{B\left(\frac{B-C_2}{2} - d\right)}$$

$$V_u = q_u B\left(\frac{B-C_1}{2} - d\right) \rightarrow q_u = \frac{\emptyset V_c}{B\left(\frac{B-C_1}{2} - d\right)}$$

q_u = 12729 psf or 12729 psf $P_u = q_u B^2 =$ 114557 #

Two-way shear: ø = 0.75

[22.6.5.2(a)] $v_c = 4\lambda\sqrt{f'_c} =$ 200 psi ⇦

[22.6.5.2(b)] $v_c = \left(2 + \frac{4}{\beta}\right)\lambda\sqrt{f'_c} =$ 300 psi β = 1.00

[22.6.5.2(c)] $v_c = \left(2 + \frac{\alpha_x d}{b_0}\right)\lambda\sqrt{f'_c} =$ 400 psi α_x = 40

b_0 = 2(C₁+d)+2(C₂+d) = 55

$V_u \le \phi V_c$ $\phi V_c = \phi v_c b_0 d =$ 68.06 k

$$V_u = q_u[B^2 - (C_1 + d)(C_2 + d)] \rightarrow q_u = \frac{\emptyset V_c}{[B^2 - (C_1 + d)(C_2 + d)]}$$

q_u = 8854 psf $P_u = q_u B^2 =$ 79687 #

Moment: ø = 0.90

$M_n = A_s f_y\left(d - a/2\right) =$ 16.2 k-ft

$a = A_s f_y/(0.85 f'_c B) =$ 0.31 in

$M_u \le \emptyset M_n$ $\emptyset M_n =$ 14.6 k-ft

$$M_u = \frac{q_u B\left(\frac{B-C_2}{2}\right)^2}{2} \rightarrow q_u = \frac{2\emptyset M_n}{B((B-C_2)/2)^2}$$

$$M_u = \frac{q_u B\left(\frac{B-C_1}{2}\right)^2}{2} \rightarrow q_u = \frac{2\emptyset M_n}{B((B-C_1)/2)^2}$$

q_u = 6013 psf or 6013 psf $P_u = q_u B^2 =$ 54121 #

Development of Reinforcement:

$$l_d = \left(\frac{3}{40}\frac{f_y}{\lambda\sqrt{f'_c}}\frac{\psi_t\psi_e\psi_s}{\left(\frac{c_b + K_{tr}}{d_b}\right)}\right)d_b =$$ 12 in ...12 in available **OK**

Soil Bearing Pressure	**1500 psf**	**2000 psf**	**2500 psf**	**3000 psf**	**3500 psf**	**4000 psf**
Max Load (lbs), Soil	13140	17640	22140	26640	31140	35640
Max Load (lbs), One-Way Shear	71598	71598	71598	71598	71598	71598
Max Load (lbs), Two-Way Shear	49805	49805	49805	49805	49805	49805
Max Load (lbs), Moment	33825	33825	33825	33825	33825	33825
Max Load (ASD)	**13140**	**17640**	**22140**	**26640**	**31140**	**33825**
Max Load (Factored)	**21024**	**28224**	**35424**	**42624**	**49824**	**54121**

BTL ENGINEERING
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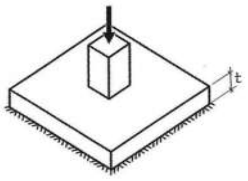
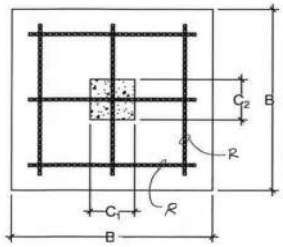
Woodinville, WA 98072-4436
Phone: 425-814-8448
Fax: 425-821-2120

Project: Typical Footing
Footing: 42" x 42" x 12" thick



Isolated footing



Footing B = 3.50 ft
t = 12 in
Reinforcement R = (4) #4
A_{s1} = 0.80 in²
d = 8.25 in Cover: 3 in
Column C_1 = 5.50 in C_2 = 5.50 in
Materials f'_c = 2500 psi Normalweight λ = 1.00
f_y = 40000 psi Uncoated ψ_e = 1.00
Net Footing Weight
P_{FTG} = 0.49 k
Soil Pressure:
$P_{ASD} = q_a B^2 - P_{FTG} =$

One-way shear: ø = 0.75
$V_c = 2\lambda\sqrt{f'_c}Bd =$ 34.65 k
$V_u \le \emptyset V_c$ $\emptyset V_c =$ 25.99 k

$V_u = q_u B\left(\frac{B-C_2}{2} - d\right) \rightarrow q_u = \frac{\emptyset V_c}{B\left(\frac{B-C_2}{2} - d\right)}$ $V_u = q_u B\left(\frac{B-C_1}{2} - d\right) \rightarrow q_u = \frac{\emptyset V_c}{B\left(\frac{B-C_1}{2} - d\right)}$

$q_u =$ 8910 psf or 8910 psf $P_u = q_u B^2 =$ 109148 #

Two-way shear: ø = 0.75
[22.6.5.2(a]) $v_c = 4\lambda\sqrt{f'_c} =$ 200 psi ⇦
[22.6.5.2(b]) $v_c = \left(2 + \frac{4}{\beta}\right)\lambda\sqrt{f'_c} =$ 300 psi β = 1.00
α_x = 40
[22.6.5.2(c]) $v_c = \left(2 + \frac{\alpha_x d}{b_0}\right)\lambda\sqrt{f'_c} =$ 400 psi b_0 = 2(C₁+d)+2(C₂+d)
55
$V_u \le \phi V_c$ $\phi V_c = \phi v_c b_0 d =$ 68.06 k

$V_u = q_u[B^2 - (C_1 + d)(C_2 + d)] \rightarrow q_u = \frac{\emptyset V_c}{[B^2 - (C_1 + d)(C_2 + d)]}$

$q_u =$ 6223 psf $P_u = q_u B^2 =$ 76233 #

Moment: ø = 0.90
$M_n = A_s f_y\left(d - a/2\right) =$ 21.5 k-ft
$a = A_s f_y/(0.85 f'_c B) =$ 0.36 in
$M_u \le \emptyset M_n$ $\emptyset M_n =$ 19.4 k-ft

$M_u = \frac{q_u B\left(\frac{B-C_2}{2}\right)^2}{2} \rightarrow q_u = \frac{2\emptyset M_n}{B((B-C_2)/2)^2}$ $M_u = \frac{q_u B\left(\frac{B-C_1}{2}\right)^2}{2} \rightarrow q_u = \frac{2\emptyset M_n}{B((B-C_1)/2)^2}$

$q_u =$ 4785 psf or 4785 psf $P_u = q_u B^2 =$ 58622 #

Development of Reinforcement:
$l_d = \left(\frac{3}{40}\frac{f_y}{\lambda\sqrt{f'_c}}\frac{\psi_t\psi_e\psi_s}{\left(\frac{c_b + K_{tr}}{d_b}\right)}\right)d_b =$ 12 in ...15 in available **OK**

Soil Bearing Pressure	**1500 psf**	**2000 psf**	**2500 psf**	**3000 psf**	**3500 psf**	**4000 psf**
Max Load (lbs), Soil	17885	24010	30135	36260	42385	48510
Max Load (lbs), One-Way Shear	68217	68217	68217	68217	68217	68217
Max Load (lbs), Two-Way Shear	47646	47646	47646	47646	47646	47646
Max Load (lbs), Moment	36639	36639	36639	36639	36639	36639
Max Load (ASD)	**17885**	**24010**	**30135**	**36260**	**36639**	**36639**
Max Load (Factored)	**28616**	**38416**	**48216**	**58016**	**58622**	**58622**

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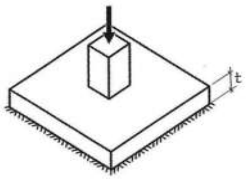
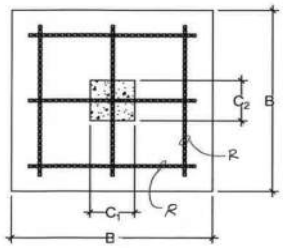
Project: Typical Footing
Footing: 48" x 48" x 12" thick



Isolated footing



Footing B = 4.00 ft
t = 12 in
Reinforcement R = (5) #4
A_{s1} = 1.00 in²
d = 8.25 in Cover: 3 in
Column C_1 = 5.50 in C_2 = 5.50 in
Materials f'_c = 2500 psi Normalweight λ = 1.00
f_y = 40000 psi Uncoated ψ_e = 1.00

Net Footing Weight
P_{FTG} = 0.64 k

Soil Pressure:

$$P_{ASD} = q_a B^2 - P_{FTG} =$$

One-way shear: ø = 0.75

$V_c = 2\lambda\sqrt{f'_c}Bd =$ 39.60 k
$V_u \le \emptyset V_c$ $\emptyset V_c =$ 29.70 k

$$V_u = q_u B\left(\frac{B-C_2}{2} - d\right) \rightarrow q_u = \frac{\emptyset V_c}{B\left(\frac{B-C_2}{2} - d\right)}$$

$$V_u = q_u B\left(\frac{B-C_1}{2} - d\right) \rightarrow q_u = \frac{\emptyset V_c}{B\left(\frac{B-C_1}{2} - d\right)}$$

q_u = 6854 psf or 6854 psf $P_u = q_u B^2 =$ 109662 #

Two-way shear: ø = 0.75

[22.6.5.2(a]) $v_c = 4\lambda\sqrt{f'_c} =$ 200 psi ⇦

[22.6.5.2(b)] $v_c = \left(2 + \frac{4}{\beta}\right)\lambda\sqrt{f'_c} =$ 300 psi β = 1.00

[22.6.5.2(c)] $v_c = \left(2 + \frac{\alpha_x d}{b_0}\right)\lambda\sqrt{f'_c} =$ 400 psi α_x = 40

b_0 = 2(C₁+d)+2(C₂+d) = 55

$V_u \le \phi V_c$ $\phi V_c = \phi v_c b_0 d =$ 68.06 k

$$V_u = q_u[B^2 - (C_1 + d)(C_2 + d)] \rightarrow q_u = \frac{\emptyset V_c}{[B^2 - (C_1 + d)(C_2 + d)]}$$

q_u = 4634 psf $P_u = q_u B^2 =$ 74147 #

Moment: ø = 0.90

$M_n = A_s f_y\left(d - {}^{a}/_{2}\right) =$ 26.8 k-ft
$a = A_s f_y/(0.85 f'_c B) =$ 0.39 in
$M_u \le \emptyset M_n$ $\emptyset M_n =$ 24.2 k-ft

$$M_u = \frac{q_u B\left(\frac{B-C_2}{2}\right)^2}{2} \rightarrow q_u = \frac{2\emptyset M_n}{B((B-C_2)/2)^2}$$

$$M_u = \frac{q_u B\left(\frac{B-C_1}{2}\right)^2}{2} \rightarrow q_u = \frac{2\emptyset M_n}{B((B-C_1)/2)^2}$$

q_u = 3853 psf or 3853 psf $P_u = q_u B^2 =$ 61640 #

Development of Reinforcement:

$$l_d = \left(\frac{3}{40}\frac{f_y}{\lambda\sqrt{f'_c}}\frac{\psi_t\psi_e\psi_s}{\left(\frac{c_b + K_{tr}}{d_b}\right)}\right)d_b =$$ 12 in ...18 in available **OK**

Soil Bearing Pressure	**1500 psf**	**2000 psf**	**2500 psf**	**3000 psf**	**3500 psf**	**4000 psf**
Max Load (lbs), Soil	23360	31360	39360	47360	55360	63360
Max Load (lbs), One-Way Shear	68538	68538	68538	68538	68538	68538
Max Load (lbs), Two-Way Shear	46342	46342	46342	46342	46342	46342
Max Load (lbs), Moment	38525	38525	38525	38525	38525	38525
Max Load (ASD)	**23360**	**31360**	**38525**	**38525**	**38525**	**38525**
Max Load (Factored)	**37376**	**50176**	**61640**	**61640**	**61640**	**61640**

Date: 1/23/2023