



Structural Calculations

1547-1626 5PLEX

Project Address

Prepared For:
Work Order:
Date:

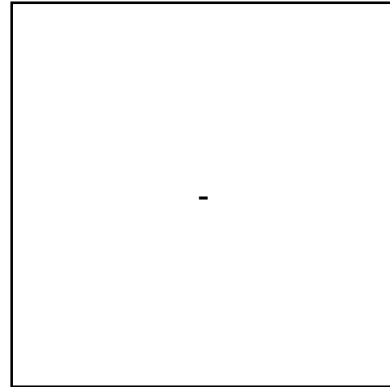
Project Abstract:
New wood framed SFD

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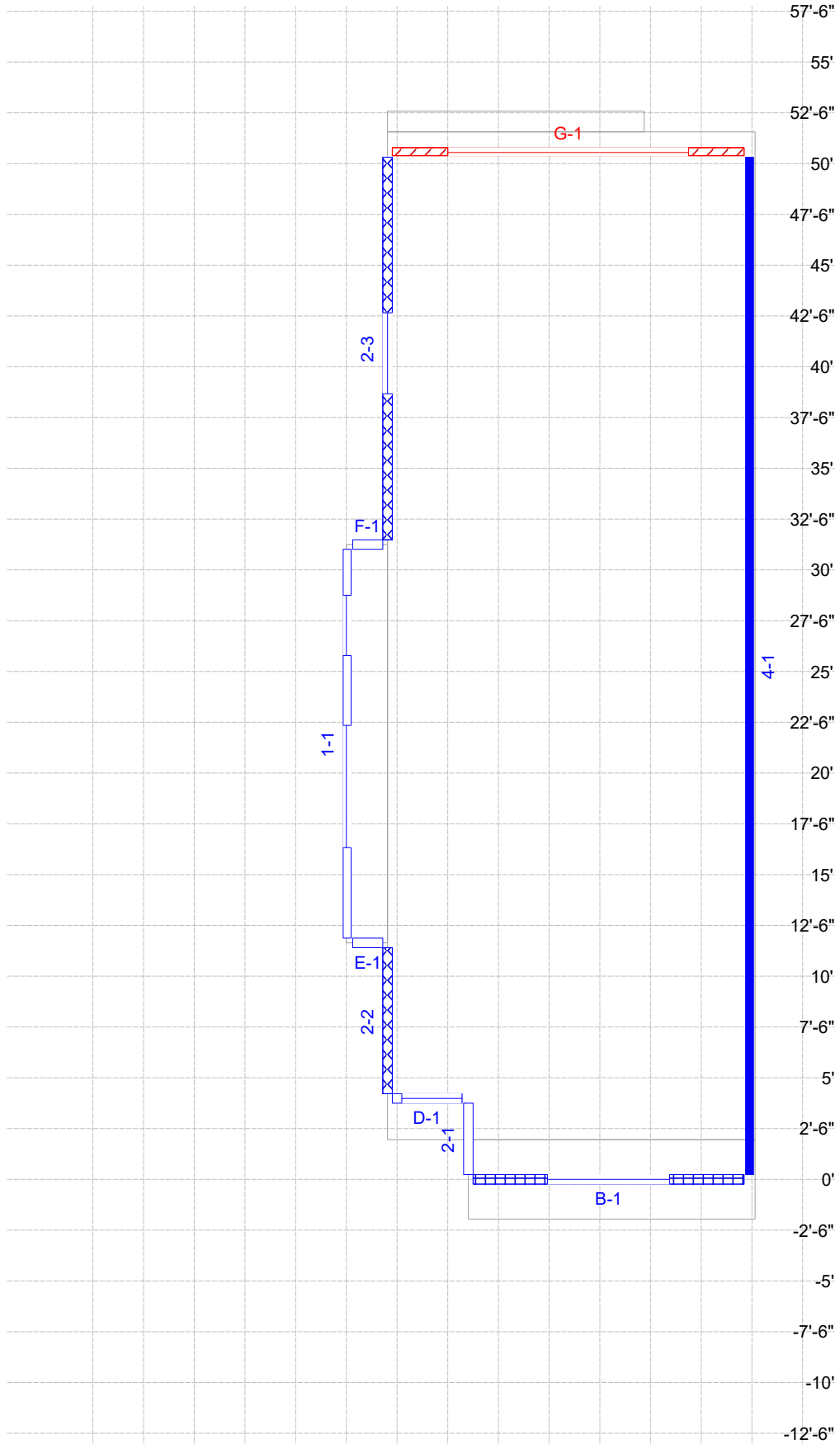


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**INSERT
SITE INFO**

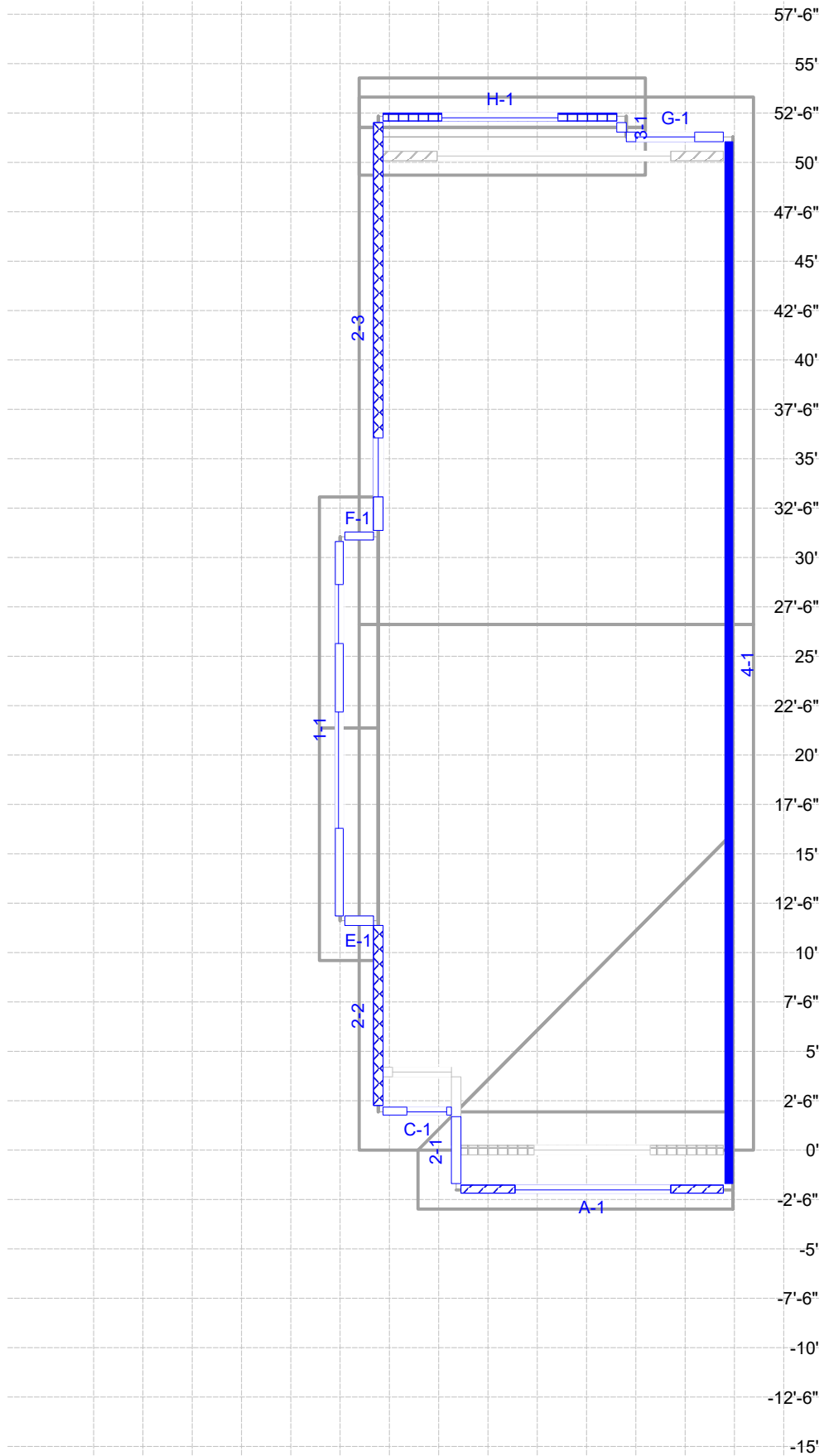
WoodWorks® Shearwalls

Level 1 of 2



WoodWorks® Shearwalls

Level 2 of 2



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Project Information

COMPANY AND PROJECT INFORMATION

Company	Project
PLIRIS 327 W 3RD AVE. SPOKANE, WA 99201 833.4PLIRIS	

DESIGN SETTINGS

Design Code		Wind Standard		Seismic Standard	
IBC 2021/AWC SDPWS 2021		ASCE 7-16 Directional (All heights)		ASCE 7-16	
Load Combinations			Building Code Capacity Modification		
For Design and MWFRS Deflection		For Deflection (Wind:Serviceability)		Wind	Seismic
0.7 Seismic + 0.6 Dead		1.0 Seismic + 0.9 Dead		1.00	1.00
0.6 Basic wind + 0.6 Dead		1.0 MRI wind + 1.0 Dead			
Duration Factor	Service Conditions and Load Duration			Max Shearwall Offset [ft]	
	Temperature Range	Moisture Content		Plan (within story)	Elevation (between stories)
-	-	Fabrication	Service	4.00	0.83
		15% (<=19%)	10% (<=19%)		
Maximum Height-to-width Ratio					
Wood panels		Fiberboard	Lumber	Gypsum	
Blocked	Unblocked		Wind	Blocked	Unblocked
3.5	2.0	-	-	2.0	1.5
Ignore shear resistance contribution of...			Forces based on...		
Wall segments		Seismic		Hold-downs	Applied loads
Side with invalid aspect ratio		Don't ignore		Drag struts	Applied loads
Shearwall relative rigidity: Deflection-based stiffness of wall segments					
Non-identical materials and construction on the shearline: Allowed, except for material type					
Deflection Equation: 3-term from SDPWS 4.3-1					
Drift limit for wind design: 1 / 500 story height					
FTAO strap: Continuous at top of highest opening and bottom of lowest					
Dead load in chord force for overturning design					
Tension end		Compression end		When completely counteracts overturning	
Wall length / 2		Wall length / 2		Wall length / 2	

SITE INFORMATION

Wind			Seismic		
ASCE 7-16 Directional (All heights)			ASCE 7-16 12.8 Equivalent Lateral Force Procedure		
Design Wind Speed	105 mph		Risk Category	Category II - All others	
Serviceability Wind Speed	85 mph		Structure Type	Regular	
Exposure	Exposure B		Building System	Bearing Wall	
Enclosure	Enclosed		Design Category	D	
Min Wind Loads: Walls	16 psf		Site Class	D	
Roofs	8 psf		Spectral Response Acceleration		
Topographic Information [ft]			S1: 0.370g	Ss: 0.840g	
Shape	Height	Length	Fundamental Period	E-W	N-S
-	-	-	T Used	0.206s	0.206s
Site Location: -			Approximate Ta	0.206s	0.206s
Elev: 384ft			Maximum T	0.289s	0.289s
Rigid building - Static analysis			Response Factor R	6.50	6.50
Case 2	E-W loads	N-S loads	Fa: 1.16	Fv: 1.93	
Eccentricity (%)	15	15			
Loaded at	75%				

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Structural Data

STORY INFORMATION

	Story Elev [ft]	Floor/Ceiling Depth [in]	Wall Height [ft]	Hold-down Length subject to shrinkage [in]	Bolt length [in]
Ceiling	21.12	0.0			
Level 2	13.02	1'-1.0	8.10	16.75	17.5
Level 1	2.83	10.0	9.10	13.75	14.5
Foundation	2.00				

BLOCK and ROOF INFORMATION

	Block Dimensions [ft]		Ridge	Roof Panels			
	Face	Type		Slope	Overhang [ft]		
Block 1	2 Story	E-W Ridge					
Location X,Y =	2.00	2.00		North	Side	18.4	2.00
Extent X,Y =	18.25	50.00		South	Side	18.4	2.00
Ridge Y Location, Offset	27.00	0.00		East	Gable	90.0	1.00
Ridge Elevation, Height	29.43	8.32		West	Gable	90.0	1.00
Block 2	2 Story	N-S Ridge					
Location X,Y =	6.00	-2.00		North	Joined	161.6	0.00
Extent X,Y =	14.25	4.00		South	Gable	90.0	1.00
Ridge X Location, Offset	20.25	7.13		East	Side	90.0	0.00
Ridge Elevation, Height	25.86	4.74		West	Side	18.4	2.00
Block 3	2 Story	E-W Ridge					
Location X,Y =	2.00	52.00		North	Side	14.0	2.00
Extent X,Y =	12.75	1.00		South	Side	18.4	2.00
Ridge Y Location, Offset	52.43	-0.07		East	Gable	90.0	1.00
Ridge Elevation, Height	21.26	0.14		West	Gable	90.0	1.00
Block 4	2 Story	E-W Ridge					
Location X,Y =	0.00	11.75		North	Side	18.4	2.00
Extent X,Y =	2.00	19.75		South	Side	18.4	2.00
Ridge Y Location, Offset	21.63	0.00		East	Joined	90.0	1.00
Ridge Elevation, Height	24.40	3.28		West	Gable	90.0	1.00

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SHEATHING MATERIALS by WALL GROUP

Grp	Surf	Material	Ratng	Sheathing					Gvtv lbs/in	Size	Fasteners					Apply Notes
				Thick in	GU in	Ply	Or	Size			Type	RS	Eg in	Fd in	Bk	
1	Ext	Struct Sh OSB	24/16	7/16	-	-	Vert	83500	8d	Common	N	3	12	Y	2,3	
2	Ext	Struct Sh OSB	32/16	15/32	-	-	Vert	83500	10d	Common	N	2	12	Y	2,7	
3	Int	Gyp. wallboard	24/16	1/2	-	1	Horz	40000	5d	Cooler	N	4	4	N	3	
	Ext	Struct Sh OSB	24/16	?	-	-	Vert	83500	?	Common	N	?	?	N		
4	Int	Gyp. wallboard		?	-	1	Horz	40000	?	Screw	N	?	?	N	3	
	Ext	Struct Sh OSB	24/16	7/16	-	-	Vert	83500	8d	Common	N	6	12	Y		
5	Int	Gyp. wallboard	24/16	1/2	-	1	Horz	40000	No. 6	Screw	N	8	12	Y	3	
	Ext	Struct Sh OSB	24/16	7/16	-	-	Vert	83500	8d	Common	N	6	12	N		
6	Int	Gyp. wallboard	24/16	1/2	-	1	Horz	40000	No. 6	Screw	N	8	12	N	3	
	Both	Gyp. wallboard	24/16	1/2	-	1	Horz	40000	5d	Cooler	N	7	7	N		
7	Both	Gyp. wallboard	24/16	1/2	-	1	Horz	40000	5d	Cooler	N	4	7	Y		

Legend:

Grp – Wall Design Group number, used to reference wall in other tables (created by program)

Surf – Exterior or interior surface when applied to exterior wall

Ratng – Span rating, see SDPWS Table C4.2.3C

Thick – Nominal panel thickness

GU - Gypsum underlay thickness

Ply – Number of plies (or layers) in construction of plywood sheets

Or – Orientation of longer dimension of sheathing panels or lumber planks. Dbl. = Double diagonal.

Gvtv – Shear stiffness in lb/in. of depth from SDPWS Tables C4.2.3A-B

Type – Fastener type from SDPWS Tables 4.3A-D:

Common: common wire nail; Box: galvanized box nail; Casing: casing nail; Roof: galvanized roofing nail; Cooler: cooler nail; WBoard: wallboard nail; Screw: drywall screw; Gauge: nail measured by gauge; Galv: galvanized gauge nail; GWB: Gypsum wallboard blued nail

Size - From Tables 4.3A-D and Table A1; shown in Wall Input fastener dropdown

Common nails: 6d = 0.113 x 2", 8d = 0.131 x 2.5", 10d = 0.148 x 3", 12d = 0.148 x 3.5"

Box or casing nails: 6d = 0.099 x 2", 8d = 0.113 x 2.5", 10d = 0.128 x 3", 12d = 0.126 x 3.5"

Gauge, roofing and GWB nails: 13 ga = 0.92" x 1-1/8"; 11 ga = 0.120" x 1-1/8" (GWB nail for gypsum lath & plaster), 1-1/4" (gyp. L&P), 1-1/2" (wire lath & plaster, 1/2" fiberboard, 1/2" GWB), 1-3/4" (GSB, 5/8" GWB, 25/32" fiberboard, 2-ply GWB base), 2-3/8" (2-ply GWB face)

Cooler or wallboard nail: 5d = .086" x 1-5/8"; 6d = .092" x 1-7/8"; 8d = .113" x 2-3/8"; 6/8d = 6d base ply, 8d face ply for 2-ply GWB.

Drywall screws: No. 6, 1-1/4" long.

RS – Ring-shank nails (non-shearwalls only), with increased withdrawal capacity as per NDS 12.2.3.2.

Eg – Panel edge fastener spacing. For lumber sheathing, no. of nails per board at shear wall boundary. For 2-ply GWB, spacing of all nails in face ply.

Fd – Field spacing interior to panels. For lumber sheathing, no. of nails per board at interior studs. For 2-ply GWB, spacing of all nails in face ply.

Bk – Sheathing is nailed to blocking at all panel edges; Y(es) or N(o)

Apply Notes – Notes below table legend which apply to sheathing side

? – Design for unknown parameter not performed for reasons given in notes below.

Notes:

2. Framing at adjoining panel edges must be 3" nominal or wider with staggered nailing according to SDPWS 4.3.7.1 (5)

3. Shear capacity for current design has been increased to the value for 15/32" sheathing with same nailing because stud spacing is 16" max. or panel orientation is horizontal. See SDPWS Table 4.3A Note 2.

7. Capacity has been reduced by a factor of 0.92 because of the use of hold-downs on walls with 10d nailing, as per Table 4.3A Note 10.

FRAMING MATERIALS and STANDARD WALL by WALL GROUP

Wall Grp	Species	Grade	b in	d in	Spcg in	SG	E psi ⁶	Fcp	Standard Wall
1	D.Fir-L	Stud	1.50	5.50	16	0.50	1.40	625	3/12B_SEG_OSB_7/16_8D
2	D.Fir-L	Stud	1.50	5.50	16	0.50	1.40	625	2/12B_FTAO_OSB_15/32_10D
3	D.Fir-L	Stud	1.50	5.50	?	0.50	1.40	625	
4	D.Fir-L	Stud	1.50	5.50	16	0.50	1.40	625	6/12B_PERF_OSB_7/16_8D
5	D.Fir-L	Stud	1.50	5.50	16	0.50	1.40	625	
6	D.Fir-L	Stud	1.50	5.50	24	0.50	1.40	625	
7	D.Fir-L	Stud	1.50	5.50	16	0.50	1.40	625	

Legend:

Wall Grp – Wall Design Group

b – Stud breadth (thickness)

d – Stud depth (width)

Spcg – Maximum on-centre spacing of studs for design, actual spacing may be less.

SG – Specific gravity

E – Modulus of elasticity

Standard Wall - Standard wall designed as group.

Fcp - Compressive strength perpendicular to grain

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Notes:

Check manufacture requirements for stud size, grade and specific gravity (G) for all shearwall hold-downs.

The following factors are applied to F_{cp} for compressive design and deformation under wall segment end studs :

Bearing area factor C_b from NDS 3.10.4, under window openings.

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SHEARLINE, WALL and OPENING DIMENSIONS

North-south Shearlines	Type	Wall Group	Location X [ft]	Extent [ft]		Length [ft]	FHS [ft]	Aspect Ratio	Height [ft]	Studs	
				Start	End					S	N
Line 1											
Level 2											
Line 1		3	0.00	11.75	31.50	19.75	0.00	-	8.10	-	-
Wall 1-1	Prf	3	0.00	11.75	31.50	19.75	0.00	-	-	2	2
Segment 1		-	-	11.75	16.50	4.75	4.75	1.71	-	-	-
Opening 1		-	-	16.50	22.50	6.00	6.00	-	5.00	-	-
Segment 2		-	-	22.50	26.00	3.50	3.50	2.31	-	-	-
Opening 2		-	-	26.00	29.00	3.00	3.00	-	4.00	-	-
Segment 3		-	-	29.00	31.50	2.50	2.50	3.24	-	-	-
Level 1											
Line 1		3	0.00	11.75	31.50	19.75	0.00	-	9.10	-	-
Wall 1-1	Prf	3	0.00	11.75	31.50	19.75	0.00	-	-	2	2
Segment 1		-	-	11.75	16.50	4.75	4.75	1.92	-	-	-
Opening 1		-	-	16.50	22.50	6.00	6.00	-	5.00	-	-
Segment 2		-	-	22.50	26.00	3.50	3.50	2.60	-	-	-
Opening 2		-	-	26.00	29.00	3.00	3.00	-	4.00	-	-
Segment 3		-	-	29.00	31.50	2.50	2.50	3.64	-	-	-
Line 2											
Level 2											
Line 2		5	2.00	2.00	53.00	51.00	26.25	-	8.10	-	-
Wall 2-1	NSW		6.00	-2.00	2.00	4.00	0.00	1.00	-	2	2
Wall 2-2	Prf	5	2.00	2.00	11.75	9.75	9.75	0.83	-	2	2
Wall 2-3	Prf	5	2.00	31.50	53.00	21.50	16.50	-	-	2	2
Segment 1		-	-	31.50	33.50	2.00	2.00	4.05	-	-	-
Opening 1		-	-	33.50	36.50	3.00	3.00	-	4.00	-	-
Segment 2		-	-	36.50	53.00	16.50	16.50	0.49	-	-	-
Level 1											
Line 2		4,5	2.00	4.00	51.00	47.00	23.25	-	9.10	-	-
Wall 2-1	NSW		6.00	0.00	4.00	4.00	0.00	1.00	-	2	2
Wall 2-2	Prf	5	2.00	4.00	11.75	7.75	7.75	1.17	-	2	2
Wall 2-3	Prf	4	2.00	31.50	51.00	19.50	15.50	-	-	2	2
Segment 1		-	-	31.50	39.00	7.50	7.50	1.21	-	-	-
Opening 1		-	-	39.00	43.00	4.00	4.00	-	2.00	-	-
Segment 2		-	-	43.00	51.00	8.00	8.00	1.14	-	-	-
Line 3											
Level 2											
Line 3	NSW		14.50	52.00	53.00	1.00	0.00	-	8.10	-	-
Wall 3-1	NSW		14.50	52.00	53.00	1.00	0.00	1.00	-	2	2
Line 4											
Level 2											
Line 4	Seg	7	20.00	-2.00	52.00	54.00	53.75	-	8.10	-	-
Wall 4-1	Seg	7	20.00	-2.00	52.00	54.00	53.75	0.15	-	2	2
Level 1											
Line 4	Seg	6	20.00	0.00	51.00	51.00	50.75	-	9.10	-	-
Wall 4-1	Seg	6	20.00	0.00	51.00	51.00	50.75	0.18	-	2	2
East-west Shearlines	Type	Wall Group	Location Y [ft]	Extent [ft]		Length [ft]	FHS [ft]	Aspect Ratio	Height [ft]	Studs	
				Start	End					W	E
Line A											
Level 2											
Line A		1	-2.00	6.00	20.00	14.00	6.00	-	8.10	-	-
Wall A-1	Seg	1	-2.00	6.00	20.00	14.00	6.00	-	-	2	2
Segment 1		-	-	6.00	9.00	3.00	2.75	2.70	-	2	2
Opening 1		-	-	9.00	17.00	8.00	-	-	5.00	2	2
Segment 2		-	-	17.00	20.00	3.00	2.75	2.70	-	2	2
Line B											
Level 1											
Line B		2	0.00	6.00	20.00	14.00	14.00	-	9.10	-	-
Wall B-1	FT	2	0.00	6.00	20.00	14.00	14.00	-	-	2	2
Segment 1		-	-	6.00	10.00	4.00	3.75	1.25	-	-	-
Opening 1		-	-	10.00	16.00	6.00	-	-	5.00	-	-
Segment 2		-	-	16.00	20.00	4.00	3.75	1.25	-	-	-
Line C											
Level 2											
Line C			2.00	2.00	20.00	18.00	0.00	-	8.10	-	-
Wall C-1	Prf		2.00	2.00	6.00	4.00	0.00	-	-	2	2
Segment 1		-	-	2.00	3.50	1.50	1.50	5.40	-	-	-
Opening 1		-	-	3.50	5.50	2.00	2.00	-	1.50	-	-
Segment 2		-	-	5.50	6.00	0.50	0.50	16.20	-	-	-
Line D											

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SHEARLINE, WALL and OPENING DIMENSIONS (continued)

Level 1											
Line D			4.00	2.00	20.00	18.00	0.00	-	9.10	-	-
Wall D-1	Prf		4.00	2.00	6.00	4.00	0.00	-	-	2	2
Segment 1		-	-	2.00	2.75	0.75	0.75	12.13	-	-	-
Opening 1		-	-	2.75	5.75	3.00	3.00	-	6.75	-	-
Segment 2		-	-	5.75	6.00	0.25	0.25	36.40	-	-	-
Line E											
Level 2											
Line E	Prf		11.75	0.00	20.00	20.00	0.00	-	8.10	-	-
Wall E-1	Prf		11.75	0.00	2.00	2.00	0.00	4.05	-	2	2
Level 1											
Line E	Prf		11.75	0.00	20.00	20.00	0.00	-	9.10	-	-
Wall E-1	Prf		11.75	0.00	2.00	2.00	0.00	4.55	-	2	2
Line F											
Level 2											
Line F	NSW		31.50	0.00	2.00	2.00	0.00	-	8.10	-	-
Wall F-1	NSW		31.50	0.00	2.00	2.00	0.00	1.00	-	2	2
Level 1											
Line F	NSW		31.50	0.00	2.00	2.00	0.00	-	9.10	-	-
Wall F-1	NSW		31.50	0.00	2.00	2.00	0.00	1.00	-	2	2
Line G											
Level 2											
Line G			52.00	2.00	20.00	18.00	0.00	-	8.10	-	-
Wall G-1	Prf		52.00	14.50	20.00	5.50	0.00	-	-	2	2
Segment 1		-	-	14.50	15.25	0.75	0.75	10.80	-	-	-
Opening 1		-	-	15.25	18.25	3.00	3.00	-	1.00	-	-
Segment 2		-	-	18.25	20.00	1.75	1.75	4.63	-	-	-
Level 1											
Line G		1	51.00	2.00	20.00	18.00	6.00	-	9.10	-	-
Wall G-1	Seg	1	51.00	2.00	20.00	18.00	6.00	-	-	2	2
Segment 1		-	-	2.00	5.00	3.00	2.75	3.03	-	2	2
Opening 1		-	-	5.00	17.00	12.00	-	-	7.00	2	2
Segment 2		-	-	17.00	20.00	3.00	2.75	3.03	-	2	2
Line H											
Level 2											
Line H		2	53.00	2.00	14.50	12.50	12.50	-	8.10	-	-
Wall H-1	FT	2	53.00	2.00	14.50	12.50	12.50	-	-	2	2
Segment 1		-	-	2.00	5.25	3.25	3.00	1.54	-	-	-
Opening 1		-	-	5.25	11.25	6.00	-	-	5.00	-	-
Segment 2		-	-	11.25	14.50	3.25	3.00	1.54	-	-	-

Legend:

Type – Seg: Segmented, Prf: Perforated, FT: FTAO (force transfer around openings), NSW: Non-shearwall, NW: Non-wood/Proprietary, ND: Not designed

Location – Position in structure perpendicular to wall

Length – Shear line: Distance between exterior perpendicular walls defining the shear line extent

Wall, segment, or opening: End-to-end length of the element

FHS – Depending on element, shows different definitions of full-height sheathing length (FHS):

Shear lines with multiple walls, segmented walls, or FTAO walls: Total shear-resisting FHS

Individual wall segments or walls without openings: Distance between hold-downs beff

Perforated walls: Sum of factored segment lengths bi defined in SDPWS 4.3.5.6

Aspect Ratio – Ratio of wall height to segment length (h/b); for FTAO walls, the aspect ratio of the central pier

Wall Group – Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall

Studs: Number of end studs at the south and north or west and east ends of a wall segment or a perforated or FTAO wall.

WoodWorks® Shearwalls

Loads

WIND SHEAR LOADS (as entered or generated)

Level 2 Block	F	Element	Load Case	Wnd Dir	Surf Dir	Prof	Location [ft]		Magnitude [lbs,plf,psf]		Trib Ht [ft]
							Start	End	Start	End	
Block 1	W	Wall	Min	W->E	Wind	Line	-2.00	2.00	32.4		
Block 1	W	Wall	1	W->E	Wind	Line	-2.00	2.00	40.0		
Block 1	W	L Gable	Min	W->E	Wind	Line	2.00	27.00	0.0	66.5	
Block 1	W	Wall	Min	W->E	Wind	Line	2.00	11.75	32.4		
Block 1	W	L Gable	1	W->E	Wind	Line	2.00	27.00	0.0	87.6	
Block 1	W	Wall	1	W->E	Wind	Line	2.00	11.75	40.0		
Block 1	W	Wall	1	W->E	Wind	Line	11.75	31.50	40.0		
Block 1	W	Wall	Min	W->E	Wind	Line	11.75	31.50	32.4		
Block 1	W	R Gable	Min	W->E	Wind	Line	27.00	52.00	66.5	0.0	
Block 1	W	R Gable	1	W->E	Wind	Line	27.00	52.00	87.6	0.0	
Block 1	W	Wall	Min	W->E	Wind	Line	31.50	53.00	32.4		
Block 1	W	Wall	1	W->E	Wind	Line	31.50	53.00	40.0		
Block 1	E	Wall	1	W->E	Lee	Line	-2.00	52.00	27.1		
Block 1	E	Wall	Min	W->E	Lee	Line	-2.00	52.00	32.4		
Block 1	E	L Gable	Min	W->E	Lee	Line	2.00	27.00	0.0	66.5	
Block 1	E	L Gable	1	W->E	Lee	Line	2.00	27.00	0.0	55.7	
Block 1	E	R Gable	1	W->E	Lee	Line	27.00	52.00	55.7	0.0	
Block 1	E	R Gable	Min	W->E	Lee	Line	27.00	52.00	66.5	0.0	
Block 1	E	Wall	Min	W->E	Lee	Line	52.00	53.00	32.4		
Block 1	E	Wall	1	W->E	Lee	Line	52.00	53.00	27.1		
Block 1	W	Wall	1	E->W	Lee	Line	-2.00	2.00	27.1		
Block 1	W	Wall	Min	E->W	Lee	Line	-2.00	2.00	32.4		
Block 1	W	Wall	1	E->W	Lee	Line	2.00	11.75	27.1		
Block 1	W	L Gable	1	E->W	Lee	Line	2.00	27.00	0.0	55.7	
Block 1	W	Wall	Min	E->W	Lee	Line	2.00	11.75	32.4		
Block 1	W	L Gable	Min	E->W	Lee	Line	2.00	27.00	0.0	66.5	
Block 1	W	Wall	Min	E->W	Lee	Line	11.75	31.50	32.4		
Block 1	W	Wall	1	E->W	Lee	Line	11.75	31.50	27.1		
Block 1	W	R Gable	Min	E->W	Lee	Line	27.00	52.00	66.5	0.0	
Block 1	W	R Gable	1	E->W	Lee	Line	27.00	52.00	55.7	0.0	
Block 1	W	Wall	1	E->W	Lee	Line	31.50	53.00	27.1		
Block 1	W	Wall	Min	E->W	Lee	Line	31.50	53.00	32.4		
Block 1	E	Wall	1	E->W	Wind	Line	-2.00	52.00	40.0		
Block 1	E	Wall	Min	E->W	Wind	Line	-2.00	52.00	32.4		
Block 1	E	L Gable	Min	E->W	Wind	Line	2.00	27.00	0.0	66.5	
Block 1	E	L Gable	1	E->W	Wind	Line	2.00	27.00	0.0	87.6	
Block 1	E	R Gable	Min	E->W	Wind	Line	27.00	52.00	66.5	0.0	
Block 1	E	R Gable	1	E->W	Wind	Line	27.00	52.00	87.6	0.0	
Block 1	E	Wall	1	E->W	Wind	Line	52.00	53.00	40.0		
Block 1	E	Wall	Min	E->W	Wind	Line	52.00	53.00	32.4		
Block 1	S	Wall	1	S->N	Wind	Line	0.00	2.00	40.0		
Block 1	S	Wall	Min	S->N	Wind	Line	0.00	2.00	32.4		
Block 1	S	Roof	1	S->N	Wind	Line	1.00	21.25	-7.1		
Block 1	S	Roof	Min	S->N	Wind	Line	1.00	21.25	35.9		
Block 1	S	Wall	Min	S->N	Wind	Line	2.00	6.00	32.4		
Block 1	S	Wall	1	S->N	Wind	Line	2.00	6.00	40.0		
Block 1	S	Wall	Min	S->N	Wind	Line	6.00	20.00	32.4		
Block 1	S	Wall	1	S->N	Wind	Line	6.00	20.00	40.0		
Block 1	N	Wall	Min	S->N	Lee	Line	0.00	2.00	32.4		
Block 1	N	Wall	1	S->N	Lee	Line	0.00	2.00	14.3		
Block 1	N	Roof	Min	S->N	Lee	Line	1.00	21.25	35.9		
Block 1	N	Roof	1	S->N	Lee	Line	1.00	21.25	68.4		
Block 1	N	Wall	Min	S->N	Lee	Line	2.00	14.50	32.4		
Block 1	N	Wall	1	S->N	Lee	Line	2.00	14.50	14.3		
Block 1	N	Wall	1	S->N	Lee	Line	14.50	20.00	14.3		
Block 1	N	Wall	Min	S->N	Lee	Line	14.50	20.00	32.4		
Block 1	S	Wall	1	N->S	Lee	Line	0.00	2.00	14.3		
Block 1	S	Wall	Min	N->S	Lee	Line	0.00	2.00	32.4		
Block 1	S	Roof	1	N->S	Lee	Line	1.00	21.25	68.4		
Block 1	S	Roof	Min	N->S	Lee	Line	1.00	21.25	35.9		
Block 1	S	Wall	1	N->S	Lee	Line	2.00	6.00	14.3		
Block 1	S	Wall	Min	N->S	Lee	Line	2.00	6.00	32.4		
Block 1	S	Wall	Min	N->S	Lee	Line	6.00	20.00	32.4		
Block 1	S	Wall	1	N->S	Lee	Line	6.00	20.00	14.3		
Block 1	N	Wall	Min	N->S	Wind	Line	0.00	2.00	32.4		
Block 1	N	Wall	1	N->S	Wind	Line	0.00	2.00	40.0		
Block 1	N	Roof	Min	N->S	Wind	Line	1.00	21.25	35.9		
Block 1	N	Roof	1	N->S	Wind	Line	1.00	21.25	-7.1		
Block 1	N	Wall	1	N->S	Wind	Line	2.00	14.50	40.0		

WoodWorks® Shearwalls

WIND SHEAR LOADS (as entered or generated) (continued)

Block 1	N	Wall	Min	N->S	Wind	Line	2.00	14.50	32.4	
Block 1	N	Wall	1	N->S	Wind	Line	14.50	20.00	40.0	
Block 1	N	Wall	Min	N->S	Wind	Line	14.50	20.00	32.4	
Block 2	W	Ctr Roof	Min	W->E	Wind	Line	-3.00	-0.00	137.0	
Block 2	W	R Roof	Min	W->E	Wind	Line	-0.00	16.25	68.5	0.0
Block 2	E	Ctr Roof	1	W->E	Lee	Line	-3.00	2.00	37.3	
Block 2	E	Ctr Roof	Min	W->E	Lee	Line	-3.00	2.00	19.0	
Block 2	E	R Roof	Min	W->E	Lee	Line	2.00	16.25	19.0	0.0
Block 2	E	R Roof	1	W->E	Lee	Line	2.00	16.25	37.3	0.0
Block 2	W	Ctr Roof	Min	E->W	Lee	Line	-3.00	-0.00	137.0	
Block 2	W	R Roof	Min	E->W	Lee	Line	-0.00	16.25	68.5	0.0
Block 2	E	Ctr Roof	Min	E->W	Wind	Line	-3.00	2.00	19.0	
Block 2	E	Ctr Roof	1	E->W	Wind	Line	-3.00	2.00	49.7	
Block 2	E	R Roof	1	E->W	Wind	Line	2.00	16.25	49.7	0.0
Block 2	E	R Roof	Min	E->W	Wind	Line	2.00	16.25	19.0	0.0
Block 2	S	L Gable	Min	S->N	Wind	Line	6.00	20.25	0.0	37.9
Block 2	S	L Gable	1	S->N	Wind	Line	6.00	20.25	0.0	49.2
Block 2	S	L Gable	Min	N->S	Lee	Line	6.00	20.25	0.0	37.9
Block 2	S	L Gable	1	N->S	Lee	Line	6.00	20.25	0.0	31.1
Block 3	W	L Gable	1	W->E	Wind	Line	52.00	52.43	0.0	1.4
Block 3	W	L Gable	Min	W->E	Wind	Line	52.00	52.43	0.0	1.1
Block 3	W	R Gable	1	W->E	Wind	Line	52.43	53.00	1.4	0.0
Block 3	W	R Gable	Min	W->E	Wind	Line	52.43	53.00	1.1	0.0
Block 3	E	L Gable	Min	W->E	Lee	Line	52.00	52.43	0.0	1.1
Block 3	E	L Gable	1	W->E	Lee	Line	52.00	52.43	0.0	0.4
Block 3	E	R Gable	1	W->E	Lee	Line	52.43	53.00	0.4	0.0
Block 3	E	R Gable	Min	W->E	Lee	Line	52.43	53.00	1.1	0.0
Block 3	W	L Gable	1	E->W	Lee	Line	52.00	52.43	0.0	0.4
Block 3	W	L Gable	Min	E->W	Lee	Line	52.00	52.43	0.0	1.1
Block 3	W	R Gable	1	E->W	Lee	Line	52.43	53.00	0.4	0.0
Block 3	W	R Gable	Min	E->W	Lee	Line	52.43	53.00	1.1	0.0
Block 3	E	L Gable	Min	E->W	Wind	Line	52.00	52.43	0.0	1.1
Block 3	E	L Gable	1	E->W	Wind	Line	52.00	52.43	0.0	1.4
Block 3	E	R Gable	1	E->W	Wind	Line	52.43	53.00	1.4	0.0
Block 3	E	R Gable	Min	E->W	Wind	Line	52.43	53.00	1.1	0.0
Block 3	S	Roof	Min	S->N	Wind	Line	1.00	15.75	2.5	
Block 3	S	Roof	1	S->N	Wind	Line	1.00	15.75	-1.9	
Block 3	N	Roof	Min	S->N	Lee	Line	1.00	15.75	2.6	
Block 3	N	Roof	1	S->N	Lee	Line	1.00	15.75	5.1	
Block 3	S	Roof	1	N->S	Lee	Line	1.00	15.75	6.2	
Block 3	S	Roof	Min	N->S	Lee	Line	1.00	15.75	2.5	
Block 3	N	Roof	Min	N->S	Wind	Line	1.00	15.75	2.6	
Block 3	N	Roof	1	N->S	Wind	Line	1.00	15.75	-1.5	
Block 4	W	L Gable	Min	W->E	Wind	Line	11.75	21.63	0.0	26.3
Block 4	W	L Gable	1	W->E	Wind	Line	11.75	21.63	0.0	33.9
Block 4	W	R Gable	Min	W->E	Wind	Line	21.63	31.50	26.3	0.0
Block 4	W	R Gable	1	W->E	Wind	Line	21.63	31.50	33.9	0.0
Block 4	W	L Gable	Min	E->W	Lee	Line	11.75	21.63	0.0	26.3
Block 4	W	L Gable	1	E->W	Lee	Line	11.75	21.63	0.0	21.4
Block 4	W	R Gable	1	E->W	Lee	Line	21.63	31.50	21.4	0.0
Block 4	W	R Gable	Min	E->W	Lee	Line	21.63	31.50	26.3	0.0
Block 4	S	Roof	Min	S->N	Wind	Line	-1.00	2.00	15.8	
Block 4	S	Roof	1	S->N	Wind	Line	-1.00	2.00	-9.2	
Block 4	N	Roof	1	S->N	Lee	Line	-1.00	2.00	30.8	
Block 4	N	Roof	Min	S->N	Lee	Line	-1.00	2.00	15.8	
Block 4	S	Roof	Min	N->S	Lee	Line	-1.00	2.00	15.8	
Block 4	S	Roof	1	N->S	Lee	Line	-1.00	2.00	30.8	
Block 4	N	Roof	1	N->S	Wind	Line	-1.00	2.00	-9.2	
Block 4	N	Roof	Min	N->S	Wind	Line	-1.00	2.00	15.8	
Level 1										
Block	F	Element	Load Case	Wnd Dir	Surf Dir	Prof	Location [ft]	Magnitude [lbs,plf,psf]	Trib Ht [ft]	
							Start	End	Start	End
Block 1	W	Wall	1	W->E	Wind	Line	-2.00	2.00	37.8	
Block 1	W	Wall	Min	W->E	Wind	Line	-2.00	2.00	32.4	
Block 1	W	Wall	Min	W->E	Wind	Line	0.00	4.00	45.1	
Block 1	W	Wall	1	W->E	Wind	Line	0.00	4.00	52.0	
Block 1	W	Wall	Min	W->E	Wind	Line	2.00	11.75	32.4	
Block 1	W	Wall	1	W->E	Wind	Line	2.00	11.75	37.8	
Block 1	W	Wall	1	W->E	Wind	Line	4.00	11.75	52.0	
Block 1	W	Wall	Min	W->E	Wind	Line	4.00	11.75	45.1	
Block 1	W	Wall	Min	W->E	Wind	Line	11.75	31.50	32.4	

WoodWorks® Shearwalls

WIND SHEAR LOADS (as entered or generated) (continued)

Block 1	W	Wall	1	W->E	Wind	Line	11.75	31.50	37.8
Block 1	W	Wall	1	W->E	Wind	Line	11.75	31.50	52.0
Block 1	W	Wall	Min	W->E	Wind	Line	11.75	31.50	45.1
Block 1	W	Wall	1	W->E	Wind	Line	31.50	53.00	37.8
Block 1	W	Wall	1	W->E	Wind	Line	31.50	51.00	52.0
Block 1	W	Wall	Min	W->E	Wind	Line	31.50	51.00	45.1
Block 1	W	Wall	Min	W->E	Wind	Line	31.50	53.00	32.4
Block 1	E	Wall	1	W->E	Lee	Line	-2.00	52.00	27.1
Block 1	E	Wall	Min	W->E	Lee	Line	-2.00	52.00	32.4
Block 1	E	Wall	1	W->E	Lee	Line	0.00	51.00	37.7
Block 1	E	Wall	Min	W->E	Lee	Line	0.00	51.00	45.1
Block 1	E	Wall	1	W->E	Lee	Line	52.00	53.00	27.1
Block 1	E	Wall	Min	W->E	Lee	Line	52.00	53.00	32.4
Block 1	W	Wall	1	E->W	Lee	Line	-2.00	2.00	27.1
Block 1	W	Wall	Min	E->W	Lee	Line	-2.00	2.00	32.4
Block 1	W	Wall	1	E->W	Lee	Line	0.00	4.00	37.7
Block 1	W	Wall	Min	E->W	Lee	Line	0.00	4.00	45.1
Block 1	W	Wall	Min	E->W	Lee	Line	2.00	11.75	32.4
Block 1	W	Wall	1	E->W	Lee	Line	2.00	11.75	27.1
Block 1	W	Wall	Min	E->W	Lee	Line	4.00	11.75	45.1
Block 1	W	Wall	1	E->W	Lee	Line	4.00	11.75	37.7
Block 1	W	Wall	Min	E->W	Lee	Line	11.75	31.50	45.1
Block 1	W	Wall	1	E->W	Lee	Line	11.75	31.50	27.1
Block 1	W	Wall	Min	E->W	Lee	Line	11.75	31.50	32.4
Block 1	W	Wall	1	E->W	Lee	Line	11.75	31.50	37.7
Block 1	W	Wall	Min	E->W	Lee	Line	31.50	53.00	32.4
Block 1	W	Wall	Min	E->W	Lee	Line	31.50	51.00	45.1
Block 1	W	Wall	1	E->W	Lee	Line	31.50	51.00	37.7
Block 1	W	Wall	1	E->W	Lee	Line	31.50	53.00	27.1
Block 1	E	Wall	1	E->W	Wind	Line	-2.00	52.00	37.8
Block 1	E	Wall	Min	E->W	Wind	Line	-2.00	52.00	32.4
Block 1	E	Wall	1	E->W	Wind	Line	0.00	51.00	52.0
Block 1	E	Wall	Min	E->W	Wind	Line	0.00	51.00	45.1
Block 1	E	Wall	1	E->W	Wind	Line	52.00	53.00	37.8
Block 1	E	Wall	Min	E->W	Wind	Line	52.00	53.00	32.4
Block 1	S	Wall	1	S->N	Wind	Line	0.00	2.00	52.0
Block 1	S	Wall	1	S->N	Wind	Line	0.00	2.00	37.8
Block 1	S	Wall	Min	S->N	Wind	Line	0.00	2.00	45.1
Block 1	S	Wall	Min	S->N	Wind	Line	0.00	2.00	32.4
Block 1	S	Wall	Min	S->N	Wind	Line	2.00	6.00	32.4
Block 1	S	Wall	Min	S->N	Wind	Line	2.00	6.00	45.1
Block 1	S	Wall	1	S->N	Wind	Line	2.00	6.00	52.0
Block 1	S	Wall	1	S->N	Wind	Line	2.00	6.00	37.8
Block 1	S	Wall	1	S->N	Wind	Line	6.00	20.00	37.8
Block 1	S	Wall	1	S->N	Wind	Line	6.00	20.00	52.0
Block 1	S	Wall	Min	S->N	Wind	Line	6.00	20.00	32.4
Block 1	S	Wall	Min	S->N	Wind	Line	6.00	20.00	45.1
Block 1	N	Wall	Min	S->N	Lee	Line	0.00	2.00	45.1
Block 1	N	Wall	1	S->N	Lee	Line	0.00	2.00	14.3
Block 1	N	Wall	Min	S->N	Lee	Line	0.00	2.00	32.4
Block 1	N	Wall	1	S->N	Lee	Line	0.00	2.00	19.8
Block 1	N	Wall	1	S->N	Lee	Line	2.00	20.00	19.8
Block 1	N	Wall	Min	S->N	Lee	Line	2.00	14.50	32.4
Block 1	N	Wall	1	S->N	Lee	Line	2.00	14.50	14.3
Block 1	N	Wall	Min	S->N	Lee	Line	2.00	20.00	45.1
Block 1	N	Wall	Min	S->N	Lee	Line	14.50	20.00	32.4
Block 1	N	Wall	1	S->N	Lee	Line	14.50	20.00	14.3
Block 1	S	Wall	1	N->S	Lee	Line	0.00	2.00	14.3
Block 1	S	Wall	1	N->S	Lee	Line	0.00	2.00	19.8
Block 1	S	Wall	Min	N->S	Lee	Line	0.00	2.00	45.1
Block 1	S	Wall	Min	N->S	Lee	Line	0.00	2.00	32.4
Block 1	S	Wall	1	N->S	Lee	Line	2.00	6.00	14.3
Block 1	S	Wall	Min	N->S	Lee	Line	2.00	6.00	45.1
Block 1	S	Wall	1	N->S	Lee	Line	2.00	6.00	19.8
Block 1	S	Wall	Min	N->S	Lee	Line	2.00	6.00	32.4
Block 1	S	Wall	Min	N->S	Lee	Line	6.00	20.00	45.1
Block 1	S	Wall	Min	N->S	Lee	Line	6.00	20.00	32.4
Block 1	S	Wall	1	N->S	Lee	Line	6.00	20.00	14.3
Block 1	S	Wall	1	N->S	Lee	Line	6.00	20.00	19.8
Block 1	N	Wall	1	N->S	Wind	Line	0.00	2.00	37.8
Block 1	N	Wall	Min	N->S	Wind	Line	0.00	2.00	45.1
Block 1	N	Wall	Min	N->S	Wind	Line	0.00	2.00	32.4
Block 1	N	Wall	1	N->S	Wind	Line	0.00	2.00	52.0

WoodWorks® Shearwalls

WIND SHEAR LOADS (as entered or generated) (continued)

Block 1	N	Wall	Min	N->S	Wind	Line	2.00	20.00	45.1
Block 1	N	Wall	1	N->S	Wind	Line	2.00	20.00	52.0
Block 1	N	Wall	Min	N->S	Wind	Line	2.00	14.50	32.4
Block 1	N	Wall	1	N->S	Wind	Line	2.00	14.50	37.8
Block 1	N	Wall	Min	N->S	Wind	Line	14.50	20.00	32.4
Block 1	N	Wall	1	N->S	Wind	Line	14.50	20.00	37.8

Legend:

Block - Block used in load generation

Accum. = loads from one block combined with another

Manual = user-entered loads (so no block)

F - Building face (north, south, east or west)

Element - Building surface on which loads generated or entered

Load Case - One of the following:

ASCE 7 All Heights: Case 1 or 2 from Fig 27.3-8 or minimum loads from 27.1.5

ASCE 7 Low-rise: Reference corner and Case A or B from Fig 28.3-1 or minimum loads from 28.3.4

Wind Dir - Direction of wind for loads with positive magnitude, also direction of MWFRS.

Surf Dir - Windward or leeward side of the building for loads in given direction

Prof - Profile (distribution)

Location - Start and end points on building element

Magnitude - Start = intensity of uniform and point loads or leftmost intensity of trapezoidal load, End = right intensity of trap load

Trib Ht - Tributary height of area loads only

Notes:

Windward load on the monoslope roof was not generated, to comply with ASCE 7 Figure 27.3-1, Note 7.

All loads entered by the user or generated by program are specified (unfactored) loads. The program applies a load factor of 0.60 to wind loads before distributing them to the shearlines.

WoodWorks® Shearwalls

DEAD LOADS (for hold-down calculations)

Shear Line	Level	Profile	Tributary Width [ft]	Location [ft]		Mag [lbs,psf,psi]	
				Start	End	Start	End
A	2	Line		6.00	20.00	97.2*	
D	2	Line		2.00	6.00	97.2*	
E	2	Line		0.00	2.00	97.2*	
F	2	Line		0.00	2.00	97.2*	
G	2	Line		2.00	14.50	97.2*	
G	2	Line		14.50	20.00	97.2*	
1	2	Line		2.00	11.75	97.2*	
1	2	Line		11.75	31.50	97.2*	
1	2	Line		31.50	53.00	97.2*	
	2	Line		-2.00	2.00	97.2*	
3	2	Line		52.00	53.00	97.2*	
4	2	Line		-2.00	52.00	97.2*	
A	1	Line		6.00	20.00	109.2*	
D	1	Line		2.00	6.00	109.2*	
E	1	Line		0.00	2.00	109.2*	
F	1	Line		0.00	2.00	109.2*	
G	1	Line		2.00	20.00	109.2*	
1	1	Line		4.00	11.75	109.2*	
1	1	Line		11.75	31.50	109.2*	
1	1	Line		31.50	51.00	109.2*	
	1	Line		0.00	4.00	109.2*	
4	1	Line		0.00	51.00	109.2*	

WoodWorks® Shearwalls

BUILDING MASSES

Level 2				Profile	Location [ft]		Magnitude [lbs,plf,psf]		Trib Width [ft]
Force Dir	Building Element	Block	Wall Line		Start	End	Start	End	
E-W	Roof	Block 1	2	Line	0.00	54.00	192.4	192.4	
E-W	Roof	Block 1		Line	0.00	54.00	192.4	192.4	
E-W	Roof	Block 2		Line	-3.00	2.00	173.4	173.4	
E-W	Roof	Block 2		Line	-3.00	2.00	135.4	135.4	
E-W	Roof	Block 3	2	Line	50.00	55.00	140.1	140.1	
E-W	Roof	Block 3		Line	50.00	55.00	140.1	140.1	
E-W	Roof	Block 4	1	Line	9.75	33.50	38.0	38.0	
E-W	Roof	Block 4		Line	9.75	33.50	19.0	19.0	
E-W	R Gable	Block 1	2	Line	2.00	27.00	99.8	0.0	
E-W	L Gable	Block 1	2	Line	27.00	52.00	0.0	99.8	
E-W	L Gable	Block 1		Line	2.00	27.00	99.8	0.0	
E-W	R Gable	Block 1		Line	27.00	52.00	0.0	99.8	
E-W	R Gable	Block 3	2	Line	52.00	52.43	1.7	0.0	
E-W	L Gable	Block 3	2	Line	52.43	53.00	0.0	1.7	
E-W	L Gable	Block 3		Line	52.00	52.43	1.7	0.0	
E-W	R Gable	Block 3		Line	52.43	53.00	0.0	1.7	
E-W	R Gable	Block 4	1	Line	11.75	21.63	39.4	0.0	
E-W	L Gable	Block 4	1	Line	21.63	31.50	0.0	39.4	
N-S	Roof	Block 1	C	Line	1.00	21.25	513.0	513.0	
N-S	Roof	Block 1		Line	1.00	21.25	513.0	513.0	
N-S	Roof	Block 2	A	Line	4.00	20.25	57.0	57.0	
N-S	Roof	Block 2	C	Line	4.00	20.25	38.0	38.0	
N-S	Roof	Block 3		Line	1.00	15.75	47.5	47.5	
N-S	Roof	Block 3	H	Line	1.00	15.75	47.5	47.5	
N-S	Roof	Block 4	E	Line	-1.00	2.00	225.6	225.6	
N-S	Roof	Block 4	F	Line	-1.00	2.00	225.6	225.6	
N-S	L Gable	Block 2	A	Line	6.00	20.25	56.9	0.0	
N-S	R Gable	Block 2	A	Line	20.25	20.25	0.0	56.9	
Both	Wall 1-2	n/a	1	Line	11.75	31.50	48.6	48.6	
Both	Wall 1-1	n/a	2	Line	2.00	11.75	48.6	48.6	
Both	Wall 1-3	n/a	2	Line	31.50	53.00	48.6	48.6	
Both	Wall 2-1	n/a		Line	-2.00	2.00	48.6	48.6	
Both	Wall 3-1	n/a	3	Line	52.00	53.00	48.6	48.6	
Both	Wall 4-1	n/a	4	Line	-2.00	52.00	48.6	48.6	
Both	Wall A-2	n/a	A	Line	6.00	20.00	48.6	48.6	
Both	Wall A-1	n/a	C	Line	2.00	6.00	48.6	48.6	
Both	Wall C-1	n/a	E	Line	0.00	2.00	48.6	48.6	
Both	Wall D-1	n/a	F	Line	0.00	2.00	48.6	48.6	
Both	Wall E-2	n/a		Line	14.50	20.00	48.6	48.6	
Both	Wall E-1	n/a	H	Line	2.00	14.50	48.6	48.6	
Level 1				Profile	Location [ft]		Magnitude [lbs,plf,psf]		Trib Width [ft]
Force Dir	Building Element	Block	Wall Line		Start	End	Start	End	
E-W	Floor F3	n/a	1	Line	11.75	31.50	150.0	150.0	
Both	Wall 1-2	n/a	1	Line	11.75	31.50	48.6	48.6	
Both	Wall 1-1	n/a	2	Line	2.00	11.75	48.6	48.6	
E-W	Floor F2	n/a	2	Line	4.00	11.75	135.0	135.0	
Both	Wall 1-3	n/a	2	Line	31.50	53.00	48.6	48.6	
E-W	Floor F4	n/a	2	Line	31.50	51.00	135.0	135.0	
Both	Wall 2-1	n/a		Line	-2.00	2.00	48.6	48.6	
E-W	Floor F1	n/a		Line	0.00	4.00	105.0	105.0	
Both	Wall 3-1	n/a	3	Line	52.00	53.00	48.6	48.6	
Both	Wall 4-1	n/a	4	Line	-2.00	52.00	48.6	48.6	
E-W	Floor F1	n/a	4	Line	0.00	4.00	105.0	105.0	
E-W	Floor F2	n/a	4	Line	4.00	11.75	135.0	135.0	
E-W	Floor F3	n/a	4	Line	11.75	31.50	150.0	150.0	
E-W	Floor F4	n/a	4	Line	31.50	51.00	135.0	135.0	

WoodWorks® Shearwalls

BUILDING MASSES (continued)

Both	Wall A-2	n/a	A	Line	6.00	20.00	48.6	48.6
N-S	Floor F3	n/a	B	Line	6.00	20.00	382.5	382.5
Both	Wall A-1	n/a	C	Line	2.00	6.00	48.6	48.6
N-S	Floor F2	n/a	D	Line	2.00	6.00	352.5	352.5
N-S	Floor F1	n/a	E	Line	0.00	2.00	148.1	148.1
Both	Wall C-1	n/a	E	Line	0.00	2.00	48.6	48.6
Both	Wall D-1	n/a	F	Line	0.00	2.00	48.6	48.6
N-S	Floor F1	n/a	F	Line	0.00	2.00	148.1	148.1
N-S	Floor F2	n/a	G	Line	2.00	6.00	352.5	352.5
N-S	Floor F3	n/a	G	Line	6.00	20.00	382.5	382.5
Both	Wall E-2	n/a		Line	14.50	20.00	48.6	48.6
Both	Wall E-1	n/a	H	Line	2.00	14.50	48.6	48.6
Both	Wall 1-2	n/a	1	Line	11.75	31.50	54.6	54.6
Both	Wall 1-1	n/a	2	Line	4.00	11.75	54.6	54.6
Both	Wall 1-3	n/a	2	Line	31.50	51.00	54.6	54.6
Both	Wall 2-1	n/a		Line	0.00	4.00	54.6	54.6
Both	Wall 4-1	n/a	4	Line	0.00	51.00	54.6	54.6
Both	Wall A-1	n/a	B	Line	6.00	20.00	54.6	54.6
Both	Wall B-1	n/a	D	Line	2.00	6.00	54.6	54.6
Both	Wall C-1	n/a	E	Line	0.00	2.00	54.6	54.6
Both	Wall D-1	n/a	F	Line	0.00	2.00	54.6	54.6
Both	Wall E-1	n/a	G	Line	2.00	20.00	54.6	54.6

Legend:

Force Dir - Direction in which the mass is used for seismic load generation, E-W, N-S, or Both

Building element - Roof, gable end, wall or floor area used to generate mass, wall line for user-applied masses, Floor F# - refer to Plan View for floor area number

Wall line - Shearline that equivalent line load is assigned to

Location - Start and end points of equivalent line load on wall line

Trib Width. - Tributary width; for user applied area loads only

WoodWorks® Shearwalls

SEISMIC LOADS

Level 2					
Force Dir	Profile	Location [ft]		Mag [lbs,pif,psf]	
		Start	End	Start	End
E-W	Line	-3.00	-2.00	38.2	38.2
E-W	Point	-2.00	-2.00	134	134
E-W	Line	-2.00	0.00	50.2	50.2
E-W	Line	0.00	2.00	97.8	97.8
E-W	Point	2.00	2.00	24	24
E-W	Line	2.00	9.75	59.6	67.3
E-W	Line	9.75	11.75	74.3	76.3
E-W	Point	11.75	11.75	12	12
E-W	Line	11.75	21.63	76.3	90.9
E-W	Line	21.63	27.00	90.9	93.6
E-W	Line	27.00	31.50	93.6	86.9
E-W	Point	31.50	31.50	12	12
E-W	Line	31.50	33.50	86.9	84.9
E-W	Line	33.50	50.00	77.9	61.6
E-W	Line	50.00	52.00	96.2	94.3
E-W	Point	52.00	52.00	33	33
E-W	Line	52.00	52.43	94.3	94.7
E-W	Line	52.43	53.00	94.7	94.3
E-W	Point	53.00	53.00	75	75
E-W	Line	53.00	54.00	82.2	82.2
E-W	Line	54.00	55.00	34.7	34.7
N-S	Line	-1.00	0.00	55.8	55.8
N-S	Point	0.00	0.00	167	167
N-S	Line	0.00	1.00	67.8	67.8
N-S	Line	1.00	2.00	206.5	206.5
N-S	Point	2.00	2.00	496	496
N-S	Line	2.00	4.00	150.6	150.6
N-S	Line	4.00	6.00	162.4	162.4
N-S	Point	6.00	6.00	24	24
N-S	Line	6.00	14.50	162.4	166.6
N-S	Point	14.50	14.50	6	6
N-S	Line	14.50	15.75	166.6	167.2
N-S	Point	14.75	14.75	0	0
N-S	Line	15.75	20.00	155.5	157.6
N-S	Point	20.00	20.00	325	325
N-S	Line	20.00	20.25	145.5	145.7
N-S	Point	20.25	20.25	309	309
N-S	Line	20.25	21.25	133.9	126.9
Level 1					
Force Dir	Profile	Location [ft]		Mag [lbs,pif,psf]	
		Start	End	Start	End
E-W	Point	-2.00	-2.00	2319	2319
E-W	Point	-2.00	-2.00	47	47
E-W	Line	-2.00	0.00	6.7	6.7
E-W	Point	0.00	0.00	53	53
E-W	Line	0.00	2.00	28.7	28.7
E-W	Point	2.00	2.00	13	13
E-W	Line	2.00	4.00	28.7	28.7
E-W	Point	4.00	4.00	15	15
E-W	Line	4.00	11.75	32.8	32.8
E-W	Point	11.75	11.75	14	14
E-W	Line	11.75	31.50	34.9	34.9
E-W	Point	31.50	31.50	14	14
E-W	Line	31.50	51.00	32.8	32.8
E-W	Point	51.00	51.00	68	68
E-W	Line	51.00	52.00	6.7	6.7
E-W	Point	52.00	52.00	18	18
E-W	Line	52.00	53.00	6.7	6.7
E-W	Point	53.00	53.00	2399	2399
E-W	Point	53.00	53.00	42	42
N-S	Point	0.00	0.00	140	140
N-S	Line	0.00	2.00	34.6	34.6
N-S	Point	2.00	2.00	207	207
N-S	Line	2.00	6.00	62.8	62.8
N-S	Point	6.00	6.00	28	28
N-S	Line	6.00	14.50	66.9	66.9

WoodWorks® Shearwalls

SEISMIC LOADS (continued)

N-S	Point	14.50	14.50	3	3
N-S	Line	14.50	20.00	66.9	66.9
N-S	Point	20.00	20.00	373	373

Legend:

Loads in table can be accumulation of loads from several building masses, so they do not correspond with a particular building element.

Location - Start and end of load in direction perpendicular to seismic force direction

Notes:

All loads entered by the user or generated by program are specified (unfactored) loads. The program applies a load factor of 0.70 and redundancy factor to seismic loads before distributing them to the shearlines.

WoodWorks® Shearwalls

Design Summary

SHEARWALL DESIGN

Wind Shear Loads, Flexible Diaphragm

The following under-capacity shear walls were found:
Level 1: G-1

Seismic Loads, Flexible Diaphragm

All shearwalls have sufficient design capacity.

HOLD-DOWN DESIGN

Wind Loads, Flexible Diaphragm

Under-capacity hold-downs were found on the following walls:
Level 1: G-1

Seismic Loads, Flexible Diaphragm

All hold-downs have sufficient design capacity.

COMPRESSION FORCE DESIGN

Wind Loads, Flexible Diaphragm

Bottom plate has sufficient perpendicular-to-grain compressive capacity under all wall end studs.

Seismic Loads, Flexible Diaphragm

Bottom plate has sufficient perpendicular-to-grain compressive capacity under all wall end studs.

This Design Summary does not include failures that occur due to excessive story drift from ASCE 7 CC.2.2 (wind) or 12.12 (seismic).

Refer to Story Drift table in this report to verify this design criterion.

Refer to the Deflection table for possible issues regarding fastener slippage (SDPWS Table C4.2.3D).

ALL ELEMENTS INDICATED AS
"UNDER-CAPACITY" HAVE BEEN REVIEWED AND
EITHER APPROVED WITH MINOR OVERSTRESSES
AND/OR DESIGN REVISED ON FINAL DOCS

WoodWorks® Shearwalls

Flexible Diaphragm Wind Design ASCE 7 Directional (All Heights) Loads

SHEAR RESULTS

N-S Shearlines	W Gp	For Dir	ASD Shear Force [plf]			Asp-Cub		Allowable Shear [plf]					Resp. Ratio	
			v	vmax/vft	V [lbs]	Int	Ext	Int	Ext	Co	C	Cmb		V [lbs]
Line 2														
Level 2														
Ln2, Lev2	-	Both	-	-	985	-	-	-	-	-	-	6851	-	
Wall 2-2	5	Both	4.7	4.7	45	1.0	.60	60	201	1.00	A	2545	0.02	
Wall 2-3	5	Both	56.9	56.9	940	1.0	.60	60	201	1.00	A	4307	0.22	
Level 1														
Ln2, Lev1	-	Both	-	-	2008	-	-	-	-	-	-	8765	-	
Wall 2-2	5	S->N	10.8	10.8	83	1.0	.60	60	201	1.00	A	261	0.04	
	5	N->S	10.7	10.7	83	1.0	.60	60	201	1.00	A	261	0.04	
Wall 2-3	4	S->N	124.1	124.1	1924	1.0	1.0	70	365	1.00	A	435	0.29	
	4	N->S	124.2	124.2	1924	1.0	1.0	70	365	1.00	A	435	0.29	
Line 4														
Level 2														
Ln4, Lev2	7	Both	17.2	-	929	1.0	1.0	150	150	-	A	300	16200	0.06
Level 1														
Ln4, Lev1	6	Both	34.6	-	1766	1.0	1.0	75	75	-	A	150	7650	0.23
E-W Shearlines	W Gp	For Dir	ASD Shear Force [plf]			Asp-Cub		Allowable Shear [plf]					Resp. Ratio	
			v	vmax/vft	V [lbs]	Int	Ext	Int	Ext	Co	C	Cmb	V [lbs]	
Line A														
Level 2														
LnA, Lev2	-	Both	-	-	2757	-	-	-	-	-	-	-	3750	-
Wall A-1	1	Both	-	-	2757	-	1.0	-	685	-	-	-	3750	-
Seg. 1	-	W->E	514.8	-	1545	-	.91	-	625	-	-	625	1875	0.82
	-	E->W	531.9	-	1596	-	.91	-	625	-	-	625	1875	0.85
Seg. 2	-	W->E	404.3	-	1213	-	.91	-	625	-	-	625	1875	0.65
	-	E->W	387.2	-	1162	-	.91	-	625	-	-	625	1875	0.62
Line B														
Level 1														
LnB, Lev1	-	Both	-	-	5206	-	-	-	-	-	-	-	13878	-
Wall B-1	2^	Both	-	-	5206	1.0	1.0	0	991	-	A	-	13878	-
Seg. 1	-	Both	650.7	31.7	2603	1.0	1.0	0	991	-	-	991	3965	0.66
Open. 1	-	Both	-	825.3	4952	-	-	0	991	-	-	991	5948	0.83
Seg. 2	-	Both	650.7	31.7	2603	1.0	1.0	0	991	-	-	991	3965	0.66
Line G														
LnG, Lev1	-	W->E	-	-	4801	-	-	-	-	-	-	-	3579	-
	-	E->W	-	-	4778	-	-	-	-	-	-	-	3579	-
Wall G-1	1^	W->E	-	-	4801	-	1.0	-	685	-	-	-	3579	-
	1	E->W	-	-	4778	-	1.0	-	685	-	-	-	3579	-
Seg. 1	-	W->E	783.3	-	2350	-	.87	-	597	-	-	597	1790	1.31*
	-	E->W	812.0	-	2436	-	.87	-	597	-	-	597	1790	1.36*
Seg. 2	-	W->E	816.9	-	2451	-	.87	-	597	-	-	597	1790	1.37*
	-	E->W	780.7	-	2342	-	.87	-	597	-	-	597	1790	1.31*
Line H														
Level 2														
LnH, Lev2	-	W->E	-	-	2357	-	-	-	-	-	-	-	12391	-
	-	E->W	-	-	2335	-	-	-	-	-	-	-	12391	-
Wall H-1	2	W->E	-	-	2357	1.0	1.0	0	991	-	A	-	12391	-
	2	E->W	-	-	2335	1.0	1.0	0	991	-	A	-	12391	-
Seg. 1	-	W->E	362.6	-92.2	1179	1.0	1.0	0	991	-	-	991	3222	0.37
	-	E->W	359.2	-91.3	1167	1.0	1.0	0	991	-	-	991	3222	0.36
Open. 1	-	W->E	-	492.7	2956	-	-	0	991	-	-	991	5948	0.50
	-	E->W	-	488.0	2928	-	-	0	991	-	-	991	5948	0.49
Seg. 2	-	W->E	362.6	-92.2	1179	1.0	1.0	0	991	-	-	991	3222	0.37
	-	E->W	359.2	-91.3	1167	1.0	1.0	0	991	-	-	991	3222	0.36

Legend:

W Gp - Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall. "^" means that this wall is critical for all walls in the Standard Wall group.

For Dir - Direction of wind force along shearline.

v - Design shear force on segment = ASD-factored shear force per unit length of full-height sheathing (FHS)

vmax/vft - Perforated walls: Collector and in-plane anchorage force as per SDPWS eqn. 4.3-9 = V/FHS/Co. FHS is factored for narrow segments as per 4.3.3.4

FTAO walls: Shear force in piers above and below either openings or piers beside opening(s). Aspect ratio factor does not apply to these piers.

V - ASD factored shear force. For shearline: total shearline force. For wall: total of all segments on wall. For segment: force on segment

WoodWorks® Shearwalls

Asp/Cub – Unblocked wood structural panel factor *Cub* from SDPWS 4.3.5.3 or Aspect Ratio factor from 4.3.3.2, which for perforated walls is sum b_i / FHS from 4.3.5.6 with b_i defined in 4.3.3.4. For multi-segment walls, wall row shows *Cub* and segment rows show *Asp*. For single-segment walls and perforated walls, value shown is *Asp* for blocked walls and *Cub* for unblocked walls.

Int, Ext - Nominal unit shear capacity of interior and exterior sheathing, factored by Table 4.3-1 Note 3 for framing specific gravity and Note 10 for presence of hold-downs. For wall segments, also include unblocked factor *Cub* and aspect ratio adjustments.

Co - Adjustment factor for perforated walls from SDPWS Equation 4.3-6.

C - Sheathing combination rule, A = Add capacities, S = Strongest side or twice weakest, G = Stiffness-based using Eqns. 4.3-3,-4.

Cmb - Combined interior and exterior unit shear capacity including perforated wall factor *Co*.

V – Total factored shear capacity of shearline, wall or segment.

Crit Resp – Response ratio = v/Cmb = design shear force/unit shear capacity. "S" indicates that the seismic design criterion was critical in selecting wall.

Notes:

Refer to Elevation View diagrams for individual level for uplift anchorage force t for perforated walls given by SDPWS 4.3.6.4.2,1.

*WARNING - Design capacity has been exceeded.

ALL ELEMENTS INDICATED AS
"UNDER-CAPACITY" HAVE BEEN REVIEWED AND
EITHER APPROVED WITH MINOR OVERSTRESSES
AND/OR DESIGN REVISED ON FINAL DOCS

WoodWorks® Shearwalls

Hold-Down and Compression Design (flexible wind design)

Level 1					Tensile Hold-down or Compressive Stud Force [lbs]				Hold-down	Cap [lbs]	Crit Resp.
Line-Wall	Posit'n	Location [ft]		Load Case	Shear	Dead	Uplift	Cmb'd			
		X	Y								
Line 1											
	V Elem	0.00	16.38	1	0	619		619	Compression		
	V Elem	0.00	22.63	1	0	619		619	Compression		
	V Elem	0.00	25.88	1	0	310		310	Compression		
	V Elem	0.00	29.13	1	0	310		310	Compression		
Line 2											
	V Elem	6.00	2.13	Min	46			46	Refer to upper level		
	V Elem	6.00	2.13	Min	46			46	Compression		
2-2	L End	2.00	4.13	Min	101			101	HDU5-SDS	5645	0.02
2-2	L End	2.00	4.13	Min	101			101	Compression	10312	0.01
2-2	R End	2.00	11.63	Min	147			147	HDU5-SDS	5645	0.03
2-2	R End	2.00	11.63	Min	148			148	Compression	10312	0.01
2-3	L End	2.00	31.63	Min	1148			1148	HDU5-SDS	5645	0.20
2-3	L End	2.00	31.63	Min	1148			1148	Compression	10312	0.11
	V Elem	2.00	36.63	Min	656			656	Refer to upper level		
	V Elem	2.00	36.63	Min	656			656	Compression		
2-3	R End	2.00	50.88	Min	1148			1148	HDU5-SDS	5645	0.20
2-3	R End	2.00	50.88	Min	1148			1148	Compression	10312	0.11
	V Elem	6.00	52.88	Min	656			656	Refer to upper level		
	V Elem	6.00	52.88	Min	656			656	Compression		
Line 4											
	V Elem	20.00	-1.87	Min	140	233		373	Compression		
4-1	L End	20.00	0.12	Min	317	528		844	Compression	10312	0.08
4-1	R End	20.00	50.88	Min	317	528		844	Compression	10312	0.08
	V Elem	20.00	51.88	Min	140	233		373	Compression		
Line A											
	V Elem	6.13	-2.00	Min	4830	87		4742	Refer to upper level		
	V Elem	6.13	-2.00	Min	4990	146		5136	Compression		
	V Elem	8.88	-2.00	Min	4990	321		4669	Refer to upper level		
	V Elem	8.88	-2.00	Min	4830	535		5364	Compression		
	V Elem	17.13	-2.00	Min	5407	321		5086	Refer to upper level		
	V Elem	17.13	-2.00	Min	5178	535		5713	Compression		
	V Elem	19.88	-2.00	Min	5178	87		5091	Refer to upper level		
	V Elem	19.88	-2.00	Min	5407	146		5553	Compression		
Line B											
B-1	L End	6.13	0.00	Min	3445			3445	HDU5-SDS	5645	0.61
B-1	L End	6.13	0.00	Min	3445			3445	Compression	10312	0.33
B-1	R End	19.88	0.00	Min	3445			3445	HDU5-SDS	5645	0.61
B-1	R End	19.88	0.00	Min	3445			3445	Compression	11601	0.30
Line D											
	V Elem	2.62	4.00	1	0	164		164	Compression		
	V Elem	5.88	4.00	1	0	164		164	Compression		
Line G											
G-1	L End	2.13	51.00	1	7776	98		7677	HDU5-SDS	5645	1.36*
G-1	L End	2.13	51.00	1	8061	164		8225	Compression	10312	0.80
G-1	L Op 1	4.88	51.00	1	8061	491		7570	HDU5-SDS	5645	1.34*
G-1	L Op 1	4.88	51.00	1	7776	819		8595	Compression	10312	0.83
G-1	R Op 1	17.13	51.00	1	8110	491		7618	HDU5-SDS	5645	1.35*
G-1	R Op 1	17.13	51.00	1	7750	819		8569	Compression	10312	0.83
G-1	R End	19.88	51.00	1	7750	98		7652	HDU5-SDS	5645	1.36*
G-1	R End	19.88	51.00	1	8110	164		8274	Compression	10312	0.80
Line H											
	V Elem	2.13	53.00	1	1559			1559	Refer to upper level		
	V Elem	2.13	53.00	1	1544			1544	Compression		
	V Elem	14.38	53.00	1	1544			1544	Refer to upper level		
	V Elem	14.38	53.00	1	1559			1559	Compression		
Level 2					Tensile Hold-down or Compressive Stud Force [lbs]				Hold-down	Cap [lbs]	Crit Resp.
Line-Wall	Posit'n	Location [ft]		Load Case	Shear	Dead	Uplift	Cmb'd			
		X	Y								
Line 1											
	V Elem	0.00	16.38	1	0	292		292	Compression		
	V Elem	0.00	22.63	1	0	292		292	Compression		
	V Elem	0.00	25.88	1	0	146		146	Compression		
	V Elem	0.00	29.13	1	0	146		146	Compression		
Line 2											
2-2	L End	2.00	2.13	Min	46			46	HDU5-SDS	5645	0.01
2-2	L End	2.00	2.13	Min	46			46	Compression	10312	0.00
2-2	R End	2.00	11.63	Min	46			46	HDU5-SDS	5645	0.01
2-2	R End	2.00	11.63	Min	46			46	Compression	10312	0.00

WoodWorks® Shearwalls

Hold-Down and Compression Design (flexible wind design, continued)

2-3	L End	2.00	36.63	Min	656		656	HDU5-SDS	5645	0.12
2-3	L End	2.00	36.63	Min	656		656	Compression	10312	0.06
2-3	R End	2.00	52.88	Min	656		656	HDU5-SDS	5645	0.12
2-3	R End	2.00	52.88	Min	656		656	Compression	10312	0.06
Line 4										
4-1	L End	20.00	-1.87	Min	140	233	373	Compression	10312	0.04
4-1	R End	20.00	51.88	Min	140	233	373	Compression	10312	0.04
Line A										
A-1	L End	6.13	-2.00	Min	4830	87	4742	HDU5-SDS	5645	0.84
A-1	L End	6.13	-2.00	Min	4990	146	5136	Compression	10312	0.50
A-1	L Op 1	8.88	-2.00	Min	4990	321	4669	HDU5-SDS	5645	0.83
A-1	L Op 1	8.88	-2.00	Min	4830	535	5364	Compression	11601	0.46
A-1	R Op 1	17.13	-2.00	Min	5407	321	5086	HDU5-SDS	5645	0.90
A-1	R Op 1	17.13	-2.00	Min	5178	535	5713	Compression	11601	0.49
A-1	R End	19.88	-2.00	Min	5178	87	5091	HDU5-SDS	5645	0.90
A-1	R End	19.88	-2.00	Min	5407	146	5553	Compression	10312	0.54
Line H										
H-1	L End	2.13	53.00	1	1559		1559	HDU5-SDS	5645	0.28
H-1	L End	2.13	53.00	1	1544		1544	Compression	10312	0.15
H-1	R End	14.38	53.00	1	1544		1544	HDU5-SDS	5645	0.27
H-1	R End	14.38	53.00	1	1559		1559	Compression	11601	0.13

Legend:

Line-Wall:

At wall or opening – Shearline and wall number

At vertical element – Shearline

Posit'n – Position of stud pack that hold-down is attached to or which is applying compression force:

V Elem – Vertical element: column or strengthened studs required where not at wall end or opening

L or R End – At left or right wall end

L or R Op n – At left or right side of opening n

t @ Op n – Uplift force t at opening n from offset opening in perforated wall above, from SDPWS 4.3.6.4.2.1

Location – Co-ordinates in Plan View

Load Case – Results are for critical load case:

ASCE 7 All Heights: Case 1 or 2 from Fig. 27.3-8

ASCE 7 Low-rise: Windward corner(s) and Case A or B from Fig. 28.3-1

ASCE 7 Minimum loads (27.1.5 / 28.3.4): "Min"

Tensile Hold-down or Compressive Stud Force – Upwards force on hold-down at one end of the wall or downward force on bottom plate under studs at the other end, for each force direction. Includes forces transferred from upper levels.

Shear – Overturning component = $V \times h / beff$ from SDPWS Eqn. 4.3-7; V = force on segment, ASD-factored by 0.60; h = wall height, beff = wall segment length – (tension stud pack width + hold-down anchor bolt offset) – (1/2 compression stud pack width). For perforated walls = $V \times h / Co$ sum (bi) from SDPWS Eqn. 4.3-8.

Dead – Dead load resisting component, factored for ASD by 0.60 for tension and 1.0 for compression

Uplift – Uplift wind load component, factored for ASD by 0.60

Cmb'd – Sum of ASD-factored overturning, dead and uplift forces. May also include the uplift force t from perforated walls from SDPWS

4.3.6.4.2.1 when openings are staggered.

Hold-down – Device model number from hold-down database; "Compression" for bearing of end stud pack on bottom plate

Cap – Hold-downs: Allowable ASD tension load from database; Compression: allowable ASD bearing force = $Ct CM Cb Fcp A$; A = cross sectional area of end studs. Refer to Framing materials table for details

Crit. Resp. – Critical Response = Combined ASD force / Allowable ASD tension load

Notes:

HDU5-SDS2.5 for studs with thickness > 0'-3" and depth > 0'-3.5" : Uses 14 1/4" x 2.5" SDS heavy-duty screws; 5/8" anchor bolt.

Refer to the Shear Line Dimensions table for wall height h, effective segment length beff and perforated wall adjusted sum of bi, to the Story Table for joist depth, and to the Shear Results table for perforated factor Co.

Most severe of wind load cases is used for overturning calculation.

Designer is responsible for design of connection from wall to floor or foundation for shear force shown in Shear Results table. Refer to SDPWS 4.3.6.4.3 for foundation anchor bolt requirements.

***WARNING - Design capacity has been exceeded.**

ALL ELEMENTS INDICATED AS
"UNDER-CAPACITY" HAVE BEEN REVIEWED AND
EITHER APPROVED WITH MINOR OVERSTRESSES
AND/OR DESIGN REVISED ON FINAL DOCS

SOFTWARE BY DEFAULT PLACES AN HDU5.
THERE IS NO WAY TO REMOVE THIS. EOR HAS
REVIEWED THE ANALYSIS AND SELECTED THE
NECESSARY SIZE AND LOCATION OF THE HD'S

WoodWorks® Shearwalls

COLLECTOR FORCES (flexible wind design)

Level 1					Drag Strut Force [lbs]		Strap/Blocking Force [lbs]	
Line-Wall	Position on Wall or Opening	Location [ft]		Load Case	-->	<---	-->	<---
		X	Y					
Line 2								
2-2	Left Wall End	2.00	4.00		-171	171		
2-2	Right Wall End	2.00	11.75		-419	419		
2-3	Left Wall End	2.00	31.50		-1262	1262		
2-3	Left Opening 1	2.00	39.00		-651	652		
2-3	Right Opening 1	2.00	43.00		-822	822		
Line B								
B-1	Left Opening 1	10.00	0.00		-1360	1360		
B-1	Right Opening 1	16.00	0.00		1360	-1360		
B-1	Left Opening 1	10.00	0.00				2476	2476
B-1	Right Opening 1	16.00	0.00				2476	2476
Line G								
G-1	Left Opening 1	5.00	51.00		1550	-1640		
G-1	Right Opening 1	17.00	51.00		-1651	1546		
Level 2					Drag Strut Force [lbs]		Strap/Blocking Force [lbs]	
Line-Wall	Position on Wall or Opening	Location [ft]		Load Case	-->	<---	-->	<---
		X	Y					
Line 2								
2-2	Left Wall End	2.00	2.00		-77	77		
2-2	Right Wall End	2.00	11.75		-220	220		
2-3	Right Opening 1	2.00	36.50		-698	698		
Line A								
A-1	Left Opening 1	9.00	-2.00		954	-1005		
A-1	Right Opening 1	17.00	-2.00		-622	571		
Line H								
H-1	Left Opening 1	5.25	53.00		-912	904		
H-1	Right Opening 1	11.25	53.00		912	-904		
H-1	Left Opening 1	5.25	53.00				1478	1464
H-1	Right Opening 1	11.25	53.00				1478	1464

Legend:

Line-Wall - Shearline and wall number

Position... - Side of opening or wall end that drag strut is attached to

Location - Co-ordinates in Plan View

Load Case - Results are for critical load case:

ASCE 7 All heights Case 1 or 2

ASCE 7 Low-rise corner; Case A or B

Drag strut Force - Axial force in transfer element at openings, gaps, or changes in design shear along shearline. + : tension; - : compression.

Based on ASD-factored shearline force (vmax from 4.3.6.4.1.1 for perforated walls)

Strap/Blocking Force - For FTAO walls, force transferred from above and below opening to shearwall pier.

-> Due to shearline force in the west-to-east or south-to-north direction

<- Due to shearline force in the east-to-west or north-to-south direction

WoodWorks® Shearwalls

MWFRS DEFLECTION (flexible wind design)

These deflections are used to determine shearwall stiffness for force distribution

Wall, segment	W Gp	Dir	Srf	v plf	b ft	h ft	Bending A sq.in	Defl in	Ga kips/in	Nail slip Vn lbs	en in	Shear Defl in	Hold Defl in	Total Defl in
Level 1														
Line 2														
2-2	5	Both	ExtS	17.9	7.75	9.10	16.5	.001	15.4	168	.024	.011	0.17	0.18
2-3	4	S->N	ExtS	124.1	15.50	9.10	16.5	.002	13.4	183	.031	.084	0.10	0.18
		N->S	ExtS	124.2	15.50	9.10	16.5	.002	13.4	183	.031	.084	0.10	0.18
Line 4														
4-1	6	Both	Comb	34.6	51.00	9.10	16.5	.000	8.4	61	.030	.038	0.00	0.04
Line B														
B-1	2	Both	-	-	-	-	-	-	-	-	-	-	-	0.73
B-1,1		Both	ExtS	650.7	4.00	8.22	16.5	.032	56.0	165	.008	.096	0.60	0.73
B-1,2		Both	ExtS	650.7	4.00	8.22	16.5	.032	56.0	165	.008	.096	0.60	0.73
Line G														
G-1,1	1	W->E	ExtS	783.3	3.00	9.10	16.5	.068	25.3	171	.025	.282	1.09	1.44
		E->W	ExtS	812.0	3.00	9.10	16.5	.071	25.3	171	.025	.292	1.07	1.43
G-1,2		W->E	ExtS	816.9	3.00	9.10	16.5	.071	25.3	171	.025	.294	1.08	1.44
		E->W	ExtS	780.7	3.00	9.10	16.5	.068	25.3	171	.025	.281	1.09	1.43
Wall, segment	W Gp	Dir	Srf	v plf	b ft	h ft	Bending A sq.in	Defl in	Ga kips/in	Nail slip Vn lbs	en in	Shear Defl in	Hold Defl in	Total Defl in
Level 2														
Line 2														
2-2	5	Both	ExtS	7.8	9.75	8.10	16.5	.000	15.4	168	.024	.004	0.15	0.15
2-3	5	Both	ExtS	94.9	16.50	8.10	16.5	.001	15.4	168	.024	.050	0.10	0.15
Line 4														
4-1	7	Both	Comb	17.2	54.00	8.10	16.5	.000	15.1	70	.030	.009	0.00	0.01
Line A														
A-1,1	1	W->E	ExtS	514.8	3.00	8.10	16.5	.032	25.3	171	.025	.165	1.11	1.31
		E->W	ExtS	531.9	3.00	8.10	16.5	.033	25.3	171	.025	.170	1.10	1.31
A-1,2		W->E	ExtS	404.3	3.00	8.10	16.5	.025	25.3	171	.025	.130	1.16	1.31
		E->W	ExtS	387.2	3.00	8.10	16.5	.024	25.3	171	.025	.124	1.16	1.31
Line H														
H-1	2	W->E	-	-	12.50	8.10	-	-	-	-	-	-	-	0.77
		E->W	-	-	12.50	8.10	-	-	-	-	-	-	-	0.76
H-1,1		W->E	ExtS	362.6	3.25	7.22	16.5	.015	56.0	165	.008	.047	0.70	0.77
		E->W	ExtS	359.2	3.25	7.22	16.5	.015	56.0	165	.008	.046	0.70	0.76
H-1,2		W->E	ExtS	362.6	3.25	7.22	16.5	.015	56.0	165	.008	.047	0.70	0.77
		E->W	ExtS	359.2	3.25	7.22	16.5	.015	56.0	165	.008	.046	0.70	0.76

Legend:

Wall, segment – Wall and segment between openings, e.g. B-3,2 = second segment on Wall 3 on Shearline B.

W Gp – Wall design group, refer to Sheathing and Framing Materials tables.

Dir – Force direction.

Srf – Wall surface = Int(erior) or Ext(erior) for perimeter walls, 1 or 2 for interior partitions; Comb = Combined v and Ga for identical materials on each side; S = Ga from side with stronger shear resistance; W = 2 x Ga of weaker side.

v – ASD shear force per unit distance on wall segment.

Unblocked walls = v / C_{ub} as per SDPWS 4.3.4.3, C_{ub} = Unblocked factor from 4.3.5.3, shown in the Shear Results table.

Perforated walls = v_{max} from Eqn. 4.3-9, as per 4.3.4.2.

FTAO walls = Unit shear force in pier beside opening(s).

b – Wall or segment length.

Segmented wall or FTAO wall segments = Width of wall segment between openings.

Perforated wall = Sum of FHS segments, modified as in 4.3.3.4 per 4.3.4.2.

FTAO wall = Length of wall including openings.

h – Wall height.

FTAO piers = Distance from bottom of opening to top of wall; for end segments, results using that distance and the wall height are averaged.

Defl – Horizontal shear wall deflection due to given term:

Bending = $8vh^3 / EAb$; A = Effective cross sectional area of segment end stud(s), E = stud mod. of elasticity in Framing Materials table

For i studs at one end and j at the other, $A = 2ij / (i + j) \times$ area of one stud, based on Ex. C4.3.4-3

Shear = $vh / 1000 Ga$; $Ga = vw / (vw / G_{vtv} + 0.75 en)$, from SDPWS Ex. C4.3.4-1.

vw = ASD sheathing capacity.

G_{vtv} = Shear stiffness from C4.3.4, shown in Sheathing Materials table.

en = Nail slip from Table C4.2.3D of form aVn^b for WSP, varies linearly to value at capacity for other materials.

Vn = Shear force per nail along panel edge at ASD capacity vw .

Hold – Anchorage system (hold-down) = $da \times h / beff$.

da = Vertical hold-down displacement; refer to Hold-down Displacement table for components.

beff = Effective wall segment length = $b - (tension\ stud\ pack\ width + hold-down\ anchor\ bolt\ offset) - (1/2\ compression\ stud\ pack\ width)$

beff is given in the Shear Wall Dimensions table.

For FTAO walls, hold-down device at end of wall is applied to all segments, as per APA T555.

WoodWorks® Shearwalls

*Total Defl – Deflection from bending + shear + hold-down, as per Eqn. 4.3-2.
For FTAO walls, the average of the values for the segments, as per APA T555.*

WoodWorks® Shearwalls

MWFRS HOLD-DOWN DISPLACEMENT (flexible wind design)

These displacements are used to determine deflections for force distribution

Wall, segment	Dir	Hold-down	Tens. force lbs	Vert. Displacement			Slippage		Shrink +Extra in	Comp. force lbs	Crush da in	Total da in	Horz Defl in
				Manuf in	Add in	da in	Vf lbs	da in					
Level 1													
Line 2													
2-2	S->N	HDU5-SDS	101	.003	.000	0.003	-	-	.138	148	0.00	0.14	0.17
	N->S	HDU5-SDS	147	.004	.000	0.004	-	-	.138	101	0.00	0.14	0.17
	Both	HDU5-SDS	1148	.023	.001	0.024	-	-	.138	1148	0.00	0.17	0.10
Line 4													
4-1	Both	HDU5-SDS	0	.000	.000	0.000	-	-	.000	844	0.00	0.00	0.00
Line B													
B-1,1	W->E	HDU5-SDS	3445	.116	.005	0.122	-	-	.138	0	0.02	0.27	0.60
	E->W	HDU5-SDS	0	.116	.005	0.122	-	-	.138	3445	0.02	0.27	0.60
B-1,2	W->E	HDU5-SDS	0	.116	.005	0.122	-	-	.138	3445	0.02	0.27	0.60
	E->W	HDU5-SDS	3445	.116	.005	0.122	-	-	.138	0	0.02	0.27	0.60
Line G													
G-1,1	W->E	HDU5-SDS	7677	.156	.007	0.164	-	-	.138	8595	0.03	0.33	1.09
	E->W	HDU5-SDS	7570	.154	.007	0.161	-	-	.138	8225	0.03	0.32	1.07
G-1,2	W->E	HDU5-SDS	7618	.155	.007	0.162	-	-	.138	8274	0.03	0.33	1.08
	E->W	HDU5-SDS	7652	.156	.007	0.163	-	-	.138	8569	0.03	0.33	1.09
Wall, segment	Dir	Hold-down	Tens. force lbs	Vert. Displacement			Slippage		Shrink +Extra in	Comp. force lbs	Crush da in	Total da in	Horz Defl in
				Manuf in	Add in	da in	Vf lbs	da in					
Level 2													
Line 2													
2-2	Both	HDU5-SDS	46	.003	.000	0.003	-	-	.168	46	0.00	0.17	0.15
2-3	Both	HDU5-SDS	656	.036	.001	0.037	-	-	.168	656	0.00	0.21	0.10
Line 4													
4-1	Both	HDU5-SDS	0	.000	.000	0.000	-	-	.000	373	0.00	0.00	0.00
Line A													
A-1,1	W->E	HDU5-SDS	4742	.193	.003	0.196	-	-	.168	5364	0.01	0.38	1.11
	E->W	HDU5-SDS	4669	.190	.003	0.193	-	-	.168	5136	0.01	0.37	1.10
A-1,2	W->E	HDU5-SDS	5086	.207	.003	0.210	-	-	.168	5553	0.01	0.39	1.16
	E->W	HDU5-SDS	5091	.207	.003	0.211	-	-	.168	5713	0.02	0.39	1.16
Line H													
H-1,1	W->E	HDU5-SDS	1559	.116	.002	0.117	-	-	.168	0	0.01	0.29	0.70
	E->W	HDU5-SDS	0	.115	.002	0.116	-	-	.168	1544	0.01	0.29	0.70
H-1,2	W->E	HDU5-SDS	0	.116	.002	0.117	-	-	.168	1559	0.01	0.29	0.70
	E->W	HDU5-SDS	1544	.115	.002	0.116	-	-	.168	0	0.01	0.29	0.70

Legend:

Wall, segment – Wall and segment between openings, e.g. B-3,2 = second segment on Wall 3 on Shearline B

Dir – Force direction

Tens., Comp. – Accumulated ASD hold-down tension force T and end stud compression force C from overturning, dead and wind uplift loads.

da – Vertical displacements due to the following components:

Vert. Displacement – Elongation when slippage calculated separately; displacement when combined elongation/slippage used

Manuf – Using manufacturer's value for anchor bolt length, or no bolt contribution for connector-only elongation

Unless marked with * = (ASD tension force / ASD hold-down capacity) x max ASD elongation or displacement

* - Maximum strength-level elongation or displacement is used. May result in higher than actual displacements for lightly loaded hold-downs, causing the segment to draw less force due to lower than actual stiffness.

Add – Due to longer anchor bolt length than manufacturer's value, or entire bolt length for connector-only elongation = $TL / (Ab \times Es)$

Ab = bolt cross-sectional area

Es = steel modulus = 29000000 psi

L = Lb – Lh

Lb = Total bolt length shown in Storey Information table

Lh = Manufacturer's anchor bolt length for given displacement/elongation from hold-down database

Slippage – Due to vertical slippage of hold-down fasteners attached to stud(s) when not combined with elongation

Nails = en from SDPWS Table C4.2.3D using values for wood structural panels

Bolts = $Vf / (270,000 D^{1.5})$ (NDS 11.3.6); D = bolt diameter, Vf = Tension force T / number of fasteners

Shrink + Extra – Wood shrinkage plus extra displacement due to mis-cuts, gaps, etc.

Shrinkage = $0.002 \times (15\% \text{ fabrication} - 10\% \text{ in-service moisture contents}) \times Ls$

Ls = Length between anchor bolt fasteners subject to perp-to-grain shrinkage; see Story Information table

Crush – Deformation of bottom plate at compression end of wall segment

= $0.02'' \times [r / 0.73, r < 0.73; (1 + (r - 0.73) / 0.27), 0.73 < r < 1; 2r^3, r > 1]$

$r = fcp / Fcp'$; $Fcp' = Ct CM Fcp$; $fcp = C / A$, A = cross sectional area of end studs

Total da – Vert. Displacement + Slippage + Shrink + Crush + Extra

Horz Defl – Anchorage deflection term in SDPWS Eqn. C.4.3.4-1 = $h / beff \times da$

h = Wall height. For end segments in FTAO walls, h is the average of the wall height and the distance from the bottom of opening to top of wall

beff = Effective wall segment length = b - (tension stud pack width + hold-down anchor bolt offset) - (1/2 compression stud pack width)

h and b are shown in Deflection table, beff in the Shear Wall Dimensions table

WoodWorks® Shearwalls

Flexible Diaphragm Seismic Design

SEISMIC INFORMATION

Level	Mass [lbs]	Area [sq.ft]	Story Shear Fx [lbs]		Shear Resistance [lbs]		Diaphragm Force [lbs]			
			E-W	N-S	E-W	N-S	E-W		N-S	
							Fpx	Design	Fpx	Design
2	38180	1008.0	3305	3305	11530	15340	3472	3472	3472	3472
1	29166	941.5	1406	1406	12470	10618	2652	10909	2652	2652
All	67346	-	4711	4711	-	-	-	-	-	-

Legend:

Mass – Sum of all generated and input building masses on level = w_x in ASCE 7 Eqn. 12.8-12.

Story Shear – Total ASD-factored shear force induced at level x from Eqn. 12.8-11.

Shear Resistance – Lateral design strength of all shear-resisting elements on story, for use in weak story evaluation (4.1.8).

Diaphragm Force – used by Shearwalls only for drag strut forces, as per Exception to 12.10.2.1.

Fpx - Minimum ASD-factored force for diaphragm design from Eqns. 12.10-1, -2, and -3.

Design = The greater of the story shear and F_{px} + transfer forces from discontinuous shearlines, factored by overstrength (ω) as per 12.10.1.1. $\omega = 2.5$ as per 12.2-1.

Design force for drag struts are determined on a shearline-by-shearline basis, and can use F_x , F_{px} , or “Design” depending on the location of transfer forces.

Redundancy Factor ρ (rho):

E-W 1.00, N-S 1.00

Automatically calculated according to ASCE 7 12.3.4.2.

Vertical Earthquake Load E_v

$E_v = 0.2 S_{ds} D$; $S_{ds} = 0.65$; $E_v = 0.130 D$ unfactored; $0.091 D$ factored; total dead load factor: $0.6 - 0.091 = 0.509$ tension, $1.0 + 0.091 = 1.091$ compression.

Weak Story (SDPWS 4.1.8)

The lateral resistance V_r of story 1 is less than that of story 2.

$V_{r1} / V_{r2} = 0.692$, but $V_1 / V_1 = 0.444$, so the weak story is permitted.

WoodWorks® Shearwalls

SHEAR RESULTS (flexible seismic design)

N-S Shearlines	W Gp	For Dir	ASD Shear Force [plf]			Asp-Cub		Allowable Shear [plf]					Resp. Ratio	
			v	vmax/vft	V [lbs]	Int	Ext	Int	Ext	Co	C	Cmb		V [lbs]
Line 1														
Level 2														
Ln1, Lev2	3^	Both	0.0	nan(ind)	0	1.0	1.0	0	0	0.00	S	-	-	-
Level 1														
Ln1, Lev1	3^	Both	0.0	nan(ind)	0	1.0	1.0	0	0	0.00	S	-	-	-
Line 2														
Level 2														
Ln2, Lev2	-	Both	-	-	1722	-	-	-	-	-	-	-	3769	-
Wall 2-2	5	Both	39.4	39.4	384	1.0	.60	43	144	1.00	S	144	1400	0.27
Wall 2-3	5^	Both	81.1	81.1	1338	1.0	.60	43	144	1.00	S	144	2369	0.56
Level 1														
Ln2, Lev1	-	Both	-	-	2441	-	-	-	-	-	-	-	5154	-
Wall 2-2	5	S->N	38.4	38.4	298	1.0	.60	43	144	1.00	S	144	1113	0.27
	5	N->S	34.7	34.7	269	1.0	.60	43	144	1.00	S	144	1113	0.24
Wall 2-3	4	S->N	138.3	138.3	2143	1.0	1.0	50	261	1.00	S	261	4041	0.53
	4^	N->S	140.1	140.1	2172	1.0	1.0	50	261	1.00	S	261	4041	0.54
Line 4														
Level 2														
Ln4, Lev2	7^	Both	29.3	-	1583	1.0	1.0	107	107	-	A	214	11571	0.14
Level 1														
Ln4, Lev1	6^	Both	44.5	-	2270	1.0	1.0	54	54	-	A	107	5464	0.42
E-W Shearlines	W Gp	For Dir	ASD Shear Force [plf]			Asp-Cub		Allowable Shear [plf]					Resp. Ratio	
			v	vmax/vft	V [lbs]	Int	Ext	Int	Ext	Co	C	Cmb	V [lbs]	
Line A														
Level 2														
LnA, Lev2	-	Both	-	-	1624	-	-	-	-	-	-	-	2679	-
Wall A-1	1	Both	-	-	1624	-	1.0	-	489	-	-	-	2679	-
Seg. 1	-	W->E	300.5	-	902	-	.91	-	446	-	-	446	1339	0.67
	-	E->W	314.8	-	944	-	.91	-	446	-	-	446	1339	0.71
Seg. 2	-	W->E	240.7	-	722	-	.91	-	446	-	-	446	1339	0.54
	-	E->W	226.4	-	679	-	.91	-	446	-	-	446	1339	0.51
Line B														
Level 1														
LnB, Lev1	-	Both	-	-	2324	-	-	-	-	-	-	-	9913	-
Wall B-1	2	Both	-	-	2324	1.0	1.0	0	708	-	S	-	9913	-
Seg. 1	-	Both	290.5	14.2	1162	1.0	1.0	0	708	-	-	708	2832	0.41
Open. 1	-	Both	-	368.4	2210	-	-	0	708	-	-	708	4248	0.52
Seg. 2	-	Both	290.5	14.2	1162	1.0	1.0	0	708	-	-	708	2832	0.41
Line G														
LnG, Lev1	-	Both	-	-	2385	-	-	-	-	-	-	-	2557	-
Wall G-1	1	Both	-	-	2385	-	1.0	-	489	-	-	-	2557	-
Seg. 1	-	W->E	386.3	-	1159	-	.87	-	426	-	-	426	1278	0.91
	-	E->W	408.7	-	1226	-	.87	-	426	-	-	426	1278	0.96
Seg. 2	-	W->E	408.7	-	1226	-	.87	-	426	-	-	426	1278	0.96
	-	E->W	386.3	-	1159	-	.87	-	426	-	-	426	1278	0.91
Line H														
Level 2														
LnH, Lev2	-	Both	-	-	1679	-	-	-	-	-	-	-	8851	-
Wall H-1	2	Both	-	-	1679	1.0	1.0	0	708	-	S	-	8851	-
Seg. 1	-	Both	258.3	-65.7	840	1.0	1.0	0	708	-	-	708	2301	0.36
Open. 1	-	Both	-	351.0	2106	-	-	0	708	-	-	708	4248	0.50
Seg. 2	-	Both	258.3	-65.7	840	1.0	1.0	0	708	-	-	708	2301	0.36

Legend:

W Gp - Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall. "^" means that this wall is critical for all walls in the Standard Wall group.

For Dir - Direction of seismic force along shearline.

v - Design shear force on segment = ASD-factored shear force per unit length of full-height sheathing (FHS)

vmax/vft - Perforated walls: Collector and in-plane anchorage force as per SDPWS eqn. 4.3-9 = V/FHS/Co. FHS is factored for narrow segments as per 4.3.3.4

FTAO walls: Shear force in piers above and below either openings or piers beside opening(s). Aspect ratio factor does not apply to these piers.

V - ASD factored shear force. For shearline: total shearline force. For wall: total of all segments on wall. For segment: force on segment

Asp/Cub - Unblocked wood structural panel factor Cub from SDPWS 4.3.5.3 or Aspect Ratio factor from 4.3.3.2, which for perforated walls is sum bi / FHS from 4.3.5.6 with bi defined in 4.3.3.4. For multi-segment walls, wall row shows Cub and segment rows show Asp. For single-segment walls

WoodWorks® Shearwalls

and perforated walls, value shown is A_{sp} for blocked walls and C_{ub} for unblocked walls.

I_{nt} , E_{xt} - Nominal unit shear capacity of interior and exterior sheathing, factored by Table 4.3-1 Note 3 for framing specific gravity and Note 10 for presence of hold-downs. For wall segments, also include unblocked factor C_{ub} and aspect ratio adjustments.

C_o - Adjustment factor for perforated walls from SDPWS Equation 4.3-6.

C - Sheathing combination rule, A = Add capacities, S = Strongest side or twice weakest, G = Stiffness-based using Eqns. 4.3-3,-4.

C_{mb} - Combined interior and exterior unit shear capacity including perforated wall factor C_o .

V - Total factored shear capacity of shearline, wall or segment.

$Crit\ Resp$ - Response ratio = v/C_{mb} = design shear force/unit shear capacity. "W" indicates that the wind design criterion was critical in selecting wall.

Notes:

Refer to Elevation View diagrams for individual level for uplift anchorage force t for perforated walls given by SDPWS 4.3.6.4.2.1.

WoodWorks® Shearwalls

Hold-Down and Compression Design (flexible seismic design)

Level 1				Tensile Hold-down or Compressive Stud Force [lbs]				Hold-down	Cap [lbs]	Crit Resp.
Line-Wall	Posit'n	Location [ft]		Shear	Dead	Ev	Cmb'd			
		X	Y							
Line 1										
	V Elem	0.00	16.38	0	619	56	675	Compression		
	V Elem	0.00	22.63	0	619	56	675	Compression		
	V Elem	0.00	25.88	0	310	28	338	Compression		
	V Elem	0.00	29.13	0	310	28	338	Compression		
Line 2										
	V Elem	6.00	2.13	393			393	Refer to upper level		
	V Elem	6.00	2.13	393			393	Compression		
2-2	L End	2.00	4.13	361			361	HDU5-SDS	5645	0.06
2-2	L End	2.00	4.13	326			326	Compression	10312	0.03
2-2	R End	2.00	11.63	720			720	HDU5-SDS	5645	0.13
2-2	R End	2.00	11.63	755			754	Compression	10312	0.07
2-3	L End	2.00	31.63	1279			1279	HDU5-SDS	5645	0.23
2-3	L End	2.00	31.63	1296			1296	Compression	10312	0.13
	V Elem	2.00	36.63	934			934	Refer to upper level		
	V Elem	2.00	36.63	934			934	Compression		
2-3	R End	2.00	50.88	1296			1296	HDU5-SDS	5645	0.23
2-3	R End	2.00	50.88	1279			1279	Compression	10312	0.12
	V Elem	6.00	52.88	934			934	Refer to upper level		
	V Elem	6.00	52.88	934			934	Compression		
Line 4										
	V Elem	20.00	-1.87	239	239	36	36	Refer to upper level		
	V Elem	20.00	-1.87	239	398	36	672	Compression		
4-1	L End	20.00	0.12	407	678	445	1085	Compression	10312	0.11
4-1	R End	20.00	50.88	407	678	445	1085	Compression	10312	0.11
	V Elem	20.00	51.88	239	239	36	36	Refer to upper level		
	V Elem	20.00	51.88	239	398	36	672	Compression		
Line A										
	V Elem	6.13	-2.00	2819	87	13	2745	Refer to upper level		
	V Elem	6.13	-2.00	2953	146	13	3112	Compression		
	V Elem	8.88	-2.00	2953	321	49	2681	Refer to upper level		
	V Elem	8.88	-2.00	2819	535	49	3402	Compression		
	V Elem	17.13	-2.00	3218	321	49	2946	Refer to upper level		
	V Elem	17.13	-2.00	3027	535	49	3610	Compression		
	V Elem	19.88	-2.00	3027	87	13	2953	Refer to upper level		
	V Elem	19.88	-2.00	3218	146	13	3377	Compression		
Line B										
B-1	L End	6.13	0.00	1538			1538	HDU5-SDS	5645	0.27
B-1	L End	6.13	0.00	1538			1538	Compression	10312	0.15
B-1	R End	19.88	0.00	1538			1538	HDU5-SDS	5645	0.27
B-1	R End	19.88	0.00	1538			1538	Compression	11601	0.13
Line D										
	V Elem	2.62	4.00	0	164	15	179	Compression		
	V Elem	5.88	4.00	0	164	15	179	Compression		
Line G										
G-1	L End	2.13	51.00	3835	98	15	3752	HDU5-SDS	5645	0.66
G-1	L End	2.13	51.00	4057	164	15	4236	Compression	10312	0.41
G-1	L Op 1	4.88	51.00	4057	491	74	3640	HDU5-SDS	5645	0.64
G-1	L Op 1	4.88	51.00	3835	819	74	4729	Compression	10312	0.46
G-1	R Op 1	17.13	51.00	4057	491	74	3640	HDU5-SDS	5645	0.64
G-1	R Op 1	17.13	51.00	3835	819	74	4729	Compression	10312	0.46
G-1	R End	19.88	51.00	3835	98	15	3752	HDU5-SDS	5645	0.66
G-1	R End	19.88	51.00	4057	164	15	4236	Compression	10312	0.41
Line H										
	V Elem	2.13	53.00	1110			1110	Refer to upper level		
	V Elem	2.13	53.00	1110			1110	Compression		
	V Elem	14.38	53.00	1110			1110	Refer to upper level		
	V Elem	14.38	53.00	1110			1110	Compression		
Level 2				Tensile Hold-down or Compressive Stud Force [lbs]				Hold-down	Cap [lbs]	Crit Resp.
Line-Wall	Posit'n	Location [ft]		Shear	Dead	Ev	Cmb'd			
		X	Y							
Line 1										
	V Elem	0.00	16.38	0	292	27	318	Compression		
	V Elem	0.00	22.63	0	292	27	318	Compression		
	V Elem	0.00	25.88	0	146	13	159	Compression		
	V Elem	0.00	29.13	0	146	13	159	Compression		
Line 2										
2-2	L End	2.00	2.13	393			393	HDU5-SDS	5645	0.07
2-2	L End	2.00	2.13	393			393	Compression	10312	0.04

WoodWorks® Shearwalls

Hold-Down and Compression Design (flexible seismic design, continued)

2-2	R End	2.00	11.63	393			393	HDU5-SDS	5645	0.07
2-2	R End	2.00	11.63	393			393	Compression	10312	0.04
2-3	L End	2.00	36.63	934			934	HDU5-SDS	5645	0.17
2-3	L End	2.00	36.63	934			934	Compression	10312	0.09
2-3	R End	2.00	52.88	934			934	HDU5-SDS	5645	0.17
2-3	R End	2.00	52.88	934			934	Compression	10312	0.09
Line 4										
4-1	L End	20.00	-1.87	239	398	239	636	Compression	10312	0.06
4-1	R End	20.00	51.88	239	398	239	636	Compression	10312	0.06
Line A										
A-1	L End	6.13	-2.00	2819	87	13	2745	HDU5-SDS	5645	0.49
A-1	L End	6.13	-2.00	2953	146	13	3112	Compression	10312	0.30
A-1	L Op 1	8.88	-2.00	2953	321	49	2681	HDU5-SDS	5645	0.47
A-1	L Op 1	8.88	-2.00	2819	535	49	3402	Compression	11601	0.29
A-1	R Op 1	17.13	-2.00	3218	321	49	2946	HDU5-SDS	5645	0.52
A-1	R Op 1	17.13	-2.00	3027	535	49	3610	Compression	11601	0.31
A-1	R End	19.88	-2.00	3027	87	13	2953	HDU5-SDS	5645	0.52
A-1	R End	19.88	-2.00	3218	146	13	3377	Compression	10312	0.33
Line H										
H-1	L End	2.13	53.00	1110			1110	HDU5-SDS	5645	0.20
H-1	L End	2.13	53.00	1110			1110	Compression	10312	0.11
H-1	R End	14.38	53.00	1110			1110	HDU5-SDS	5645	0.20
H-1	R End	14.38	53.00	1110			1110	Compression	11601	0.10

Legend:

Line-Wall:

At wall or opening – Shearline and wall number

At vertical element – Shearline

Posit'n – Position of stud pack that hold-down is attached to:

V Elem – Vertical element: column or strengthened studs required where not at wall end or opening

L or R End – At left or right wall end

L or R Op n – At left or right side of opening n

t @ Op n – Uplift force t at opening n from offset opening in perforated wall above, from SDPWS 4.3.6.4.2.1

Location – Co-ordinates in Plan View

Tensile Hold-down or Compressive Stud Force – Upwards force on hold-down at one end of the wall or downward force on bottom plate under studs at the other end, for each force direction. Includes forces transferred from upper levels.

Shear – Overturning component = $V \times h / beff$ from SDPWS Eqn. 4.3-7; V = force on segment, ASD-factored by 0.70; h = wall height, beff = wall segment length – (tension stud pack width + hold-down anchor bolt offset) – (1/2 compression stud pack width). For perforated walls = $V \times h / Co$ sum (bi) from SDPWS Eqn. 4.3-8.

Dead – Dead load resisting component, factored for ASD by 0.60 for tension and 1.0 for compression

Ev – Vertical seismic load effect from ASCE 7 12.4.2.2 = $-0.2 Sds \times ASD \text{ factor} \times \text{unfactored } D = 0.152 SDS \times \text{factored } D$. Refer to Seismic Information table for more details.

Cmb'd – Sum of ASD-factored overturning, dead and vertical seismic forces. May also include the uplift force t from perforated walls from SDPWS 4.3.6.4.2.1 when openings are staggered.

Hold-down – Device model number from hold-down database; "Compression" for bearing of end stud pack on bottom plate

Cap – Hold-downs: Allowable ASD tension load from database; Compression: Allowable ASD bearing force = $Ct CM Cb Fcp A$; A = cross sectional area of end studs. Refer to Framing materials table for details.

Crit. Resp. – Critical Response = Combined ASD force/Allowable ASD tension load

Notes:

HDU5-SDS2.5 for studs with thickness > 0'-3" and depth > 0'-3.5" : Uses 14 1/4" x 2.5" SDS heavy-duty screws; 5/8" anchor bolt.

Combined force from ASCE 7 2.4.1 load combination 10 = $-(0.6D - 0.7Ev + 0.7Eh)$; Eh (from 12.4.2.1) = - shear overturning force

Refer to the Shear Line Dimensions table for wall height h, effective segment length beff and perforated wall adjusted sum of bi, to the Story Table for joist depth, and to the Shear Results table for perforated factor Co.

Designer is responsible for design of connection from wall to floor or foundation for shear force shown in Shear Results table. Refer to SDPWS 4.3.6.4.3 for foundation anchor bolt requirements.

SOFTWARE BY DEFAULT PLACES AN HDU5.
THERE IS NO WAY TO REMOVE THIS. EOR HAS
REVIEWED THE ANALYSIS AND SELECTED THE
NECESSARY SIZE AND LOCATION OF THE HD'S

WoodWorks® Shearwalls

COLLECTOR FORCES (flexible seismic design)

Level 1		Location [ft]		Drag Strut Force [lbs]		Strap/Blocking Force [lbs]	
Line-Wall	Position on Wall or Opening	X	Y	--->	<---	--->	<---
Line 2							
	Shearline force			3848	3848		
2-2	Left Wall End	2.00	4.00	-327	327		
2-2	Right Wall End	2.00	11.75	-493	538		
2-3	Left Wall End	2.00	31.50	-2110	2155		
2-3	Left Opening 1	2.00	39.00	-1089	1112		
2-3	Right Opening 1	2.00	43.00	-1416	1440		
Line B							
	Shearline force			5380	5380		
B-1	Left Opening 1	10.00	0.00	-1406	1406		
B-1	Right Opening 1	16.00	0.00	1406	-1406		
B-1	Left Opening 1	10.00	0.00			1105	1105
B-1	Right Opening 1	16.00	0.00			1105	1105
Line G							
	Shearline force			5529	5529		
G-1	Left Opening 1	5.00	51.00	1765	-1921		
G-1	Right Opening 1	17.00	51.00	-1921	1765		
Level 2							
Line-Wall	Position on Wall or Opening	X	Y	--->	<---	--->	<---
Line 2							
	Shearline force			1809	1809		
2-2	Left Wall End	2.00	2.00	-142	142		
2-2	Right Wall End	2.00	11.75	-84	84		
2-3	Right Opening 1	2.00	36.50	-962	962		
Line A							
	Shearline force			1707	1707		
A-1	Left Opening 1	9.00	-2.00	582	-627		
A-1	Right Opening 1	17.00	-2.00	-393	348		
Line H							
	Shearline force			1765	1765		
H-1	Left Opening 1	5.25	53.00	-683	683		
H-1	Right Opening 1	11.25	53.00	683	-683		
H-1	Left Opening 1	5.25	53.00			1053	1053
H-1	Right Opening 1	11.25	53.00			1053	1053

Legend:

Line-Wall - Shearline and wall number

Position...- Side of opening or wall end that drag strut is attached to

Location - Co-ordinates in Plan View

Drag strut Force - Axial force in transfer element at openings, gaps, or changes in design shear along shearline. + : tension; - : compression.

Based on ASD-factored shearline force shown. For SDC C-F, it is the greater of the design shearline force and the diaphragm force F_{px} , added to shearline force from story above and to forces transferred from discontinuous shearlines factored by overstrength (ω) as per 12.10.1.1.

Refer to Seismic Information table for diaphragm forces and ω factor.

For SDC D-F, if horizontal torsional irregularities 2, 3, or 4 are input, or vertical irregularity 4 detected or input, 25% increase from 12.3.3.4 applied.

For perforated walls, this force is converted to v_{max} using 4.3.6.4.1.1.

Strap/Blocking Force - For FTAO walls, force transferred from above and below opening to shearwall pier.

-> Due to shearline force in the west-to-east or south-to-north direction

<- Due to shearline force in the east-to-west or north-to-south direction

WoodWorks® Shearwalls

DEFLECTION (flexible seismic design)

Wall, segment	W Gp	Dir	Srf	v plf	b ft	h ft	Bending A sq.in	Defl in	Ga kips/in	Nail slip Vn lbs	en in	Shear Defl in	Hold Defl in	Total Defl in
Level 1														
Line 2														
2-2	5	S->N	ExtS	91.5	7.75	9.10	16.5	.003	15.4	168	.024	.054	0.18	0.24
		N->S	ExtS	82.6	7.75	9.10	16.5	.003	15.4	168	.024	.049	0.19	0.25
2-3	4	S->N	ExtS	197.6	15.50	9.10	16.5	.003	13.4	183	.031	.134	0.11	0.24
		N->S	ExtS	200.2	15.50	9.10	16.5	.003	13.4	183	.031	.136	0.11	0.25
Line 4														
4-1	6	Both	Comb	63.6	51.00	9.10	16.5	.000	8.4	61	.030	.069	0.00	0.07
Line B														
B-1	2	Both	-	-	-	-	-	-	-	-	-	-	-	0.57
B-1,1		Both	ExtS	415.0	4.00	8.22	16.5	.021	56.0	165	.008	.061	0.48	0.57
B-1,2		Both	ExtS	415.0	4.00	8.22	16.5	.021	56.0	165	.008	.061	0.48	0.57
Line G														
G-1,1	1	W->E	ExtS	551.9	3.00	9.10	16.5	.048	25.3	171	.025	.199	0.87	1.12
		E->W	ExtS	583.8	3.00	9.10	16.5	.051	25.3	171	.025	.210	0.86	1.12
G-1,2		W->E	ExtS	583.8	3.00	9.10	16.5	.051	25.3	171	.025	.210	0.86	1.12
		E->W	ExtS	551.9	3.00	9.10	16.5	.048	25.3	171	.025	.199	0.87	1.12
Wall, segment	W Gp	Dir	Srf	v plf	b ft	h ft	Bending A sq.in	Defl in	Ga kips/in	Nail slip Vn lbs	en in	Shear Defl in	Hold Defl in	Total Defl in
Level 2														
Line 2														
2-2	5	Both	ExtS	93.9	9.75	8.10	16.5	.002	15.4	168	.024	.049	0.16	0.21
2-3	5	Both	ExtS	193.0	16.50	8.10	16.5	.002	15.4	168	.024	.101	0.11	0.21
Line 4														
4-1	7	Both	Comb	41.9	54.00	8.10	16.5	.000	15.1	70	.030	.022	0.00	0.02
Line A														
A-1,1	1	W->E	ExtS	429.3	3.00	8.10	16.5	.026	25.3	171	.025	.138	0.99	1.15
		E->W	ExtS	449.7	3.00	8.10	16.5	.028	25.3	171	.025	.144	0.98	1.15
A-1,2		W->E	ExtS	343.8	3.00	8.10	16.5	.021	25.3	171	.025	.110	1.02	1.15
		E->W	ExtS	323.4	3.00	8.10	16.5	.020	25.3	171	.025	.104	1.03	1.15
Line H														
H-1	2	Both	-	-	-	-	-	-	-	-	-	-	-	0.76
H-1,1		Both	ExtS	369.0	3.25	7.22	16.5	.015	56.0	165	.008	.048	0.70	0.76
H-1,2		Both	ExtS	369.0	3.25	7.22	16.5	.015	56.0	165	.008	.048	0.70	0.76

Legend:

Wall, segment – Wall and segment between openings, e.g. B-3,2 = second segment on Wall 3 on Shearline B.

W Gp – Wall design group, refer to Sheathing and Framing Materials tables.

Dir – Force direction.

Srf – Wall surface = Int(erior) or Ext(erior) for perimeter walls, 1 or 2 for interior partitions; Comb = Combined v and Ga for identical materials on each side; S = Ga from side with stronger shear resistance; W = 2 x Ga of weaker side.

v – Unfactored (strength-level) shear force per unit distance on wall segment = ASD force / 0.70, as per ASCE 7 12.8.6.

Unblocked walls = v / Cub as per SDPWS 4.3.4.3, Cub = Unblocked factor from 4.3.5.3, shown in the Shear Results table.

Perforated walls = v_{max} from Eqn. 4.3-9, as per 4.3.4.2.

FTAO walls = Unit shear force in pier beside opening(s).

b – Wall or segment length.

Segmented wall or FTAO wall segments = Width of wall segment between openings.

Perforated wall = Sum of FHS segments, modified as in 4.3.3.4 per 4.3.4.2.

FTAO wall = Length of wall including openings.

h – Wall height.

FTAO piers = Distance from bottom of opening to top of wall; for end segments, results using that distance and the wall height are averaged.

Defl – Horizontal shear wall deflection due to given term:

Bending = $8vh^3 / EAb$; A = Effective cross sectional area of segment end stud(s), E = stud mod. of elasticity in Framing Materials table

For i studs at one end and j at the other, $A = 2ij / (i + j)$ x area of one stud, based on Ex. C4.3.4-3

Shear = $vh / 1000 Ga$; Ga = $1.4 vs / (1.4 vs / Gvtv + 0.75 en)$ from SDPWS Eqn. C4.2.3-3.

vs = ASD sheathing capacity.

Gvtv = Shear stiffness from C4.3.4, shown in Sheathing Materials table.

en = Nail slip from Table C4.2.3D, of form aVn^b for WSP, varies linearly to value at capacity for other materials.

Vn = Strength-level shear force per nail along panel edge at ASD capacity = 1.4 vs.

Hold – Anchorage system (hold-down) = $da \times h / beff$.

da = Vertical hold-down displacement; refer to Hold-down Displacement table for components.

beff = Effective wall segment length = b - (tension stud pack width + hold-down anchor bolt offset) - (1/2 compression stud pack width)

beff is given in the Shear Wall Dimensions table.

For FTAO walls, hold-down device at end of wall is applied to all segments, as per APA T555.

Total Defl – Deflection from bending + shear + hold-down, as per Eqn. 4.3-2.

For FTAO walls, the average of the values for the segments, as per APA T555.

WoodWorks® Shearwalls

HOLD-DOWN DISPLACEMENT (flexible seismic design)

Wall, segment	Dir	Hold-down	Tens. force lbs	Vert. Displacement			Slippage		Shrink +Extra in	Comp. force lbs	Crush da in	Total da in	Horz Defl in
				Manuf in	Add in	da in	Vf lbs	da in					
Level 1													
Line 2													
2-2	S->N	HDU5-SDS	361	.010	.001	0.011	-	-	.138	1078	0.00	0.15	0.18
	N->S	HDU5-SDS	720	.020	.001	0.021	-	-	.138	466	0.00	0.16	0.19
2-3	S->N	HDU5-SDS	1279	.036	.001	0.037	-	-	.138	1827	0.00	0.18	0.11
	N->S	HDU5-SDS	1296	.036	.001	0.038	-	-	.138	1852	0.00	0.18	0.11
Line 4													
4-1	Both	HDU5-SDS	0	.000	.000	0.000	-	-	.000	1486	0.00	0.00	0.00
Line B													
B-1,1	W->E	HDU5-SDS	1538	.071	.002	0.074	-	-	.138	0	0.01	0.22	0.48
	E->W	HDU5-SDS	0	.071	.002	0.074	-	-	.138	2197	0.01	0.22	0.48
B-1,2	W->E	HDU5-SDS	0	.071	.002	0.074	-	-	.138	2197	0.01	0.22	0.48
	E->W	HDU5-SDS	1538	.071	.002	0.074	-	-	.138	0	0.01	0.22	0.48
Line G													
G-1,1	W->E	HDU5-SDS	3752	.105	.004	0.109	-	-	.138	6732	0.02	0.26	0.87
	E->W	HDU5-SDS	3640	.102	.003	0.105	-	-	.138	6046	0.02	0.26	0.86
G-1,2	W->E	HDU5-SDS	3640	.102	.003	0.105	-	-	.138	6046	0.02	0.26	0.86
	E->W	HDU5-SDS	3752	.105	.004	0.109	-	-	.138	6732	0.02	0.26	0.87
Wall, segment	Dir	Hold-down	Tens. force lbs	Vert. Displacement			Slippage		Shrink +Extra in	Comp. force lbs	Crush da in	Total da in	Horz Defl in
				Manuf in	Add in	da in	Vf lbs	da in					
Level 2													
Line 2													
2-2	Both	HDU5-SDS	393	.022	.000	0.022	-	-	.168	562	0.00	0.19	0.16
2-3	Both	HDU5-SDS	934	.052	.001	0.053	-	-	.168	1335	0.00	0.22	0.11
Line 4													
4-1	Both	HDU5-SDS	0	.000	.000	0.000	-	-	.000	871	0.00	0.00	0.00
Line A													
A-1,1	W->E	HDU5-SDS	2745	.154	.002	0.155	-	-	.168	4845	0.01	0.34	0.99
	E->W	HDU5-SDS	2681	.150	.002	0.152	-	-	.168	4442	0.01	0.33	0.98
A-1,2	W->E	HDU5-SDS	2946	.165	.002	0.167	-	-	.168	4820	0.01	0.35	1.02
	E->W	HDU5-SDS	2953	.165	.002	0.167	-	-	.168	5142	0.01	0.35	1.03
Line H													
H-1,1	W->E	HDU5-SDS	1110	.113	.001	0.114	-	-	.168	0	0.01	0.29	0.70
	E->W	HDU5-SDS	0	.113	.001	0.114	-	-	.168	1586	0.01	0.29	0.70
H-1,2	W->E	HDU5-SDS	0	.113	.001	0.114	-	-	.168	1586	0.01	0.29	0.70
	E->W	HDU5-SDS	1110	.113	.001	0.114	-	-	.168	0	0.01	0.29	0.70

Legend:

Wall, segment – Wall and segment between openings, e.g. B-3,2 = second segment on Wall 3 on Shearline B

Dir – Force direction

Tens., Comp. – Accumulated ASD hold-down tension force T and strength-level end compression force C from overturning, dead and vertical earthquake loads.

Tens. – ASD-factored force, used for proportion of manufacturer's maximum elongation

Comp. – Strength level force as per ASCE 12.8.6

da – Vertical displacements due to the following components:

Vert. Displacement – Elongation when slippage calculated separately; displacement when combined elongation/slippage used

Manuf – Using manufacturer's value for anchor bolt length, or no bolt contribution for connector-only elongation

Unless marked with * = (ASD tension force / ASD hold-down capacity) x max strength-level elongation or displacement

* - Maximum strength-level elongation or displacement is used. May result in higher than actual displacements for lightly loaded hold-downs, causing the segment to draw less force due to lower than actual stiffness.

Add – Due to longer anchor bolt length than manufacturer's value, or entire bolt length for connector-only elongation = $TL / (Ab \times Es)$

T = Strength level tension force (not shown)

Ab = bolt cross-sectional area

Es = steel modulus = 29000000 psi

L = Lb – Lh

Lb = Total bolt length shown in Storey Information table

Lh = Manufacturer's anchor bolt length for given displacement/elongation from hold-down database

Slippage – Due to vertical slippage of hold-down fasteners attached to stud(s) when not combined with elongation

Nails = en from SDPWS Table C4.2.3D using values for wood structural panels

Bolts = $Vf / (270,000 D^{1.5})$ (NDS 11.3.6); D = bolt diameter, Vf = Tension force T / number of fasteners

Shrink + Extra – Wood shrinkage plus extra displacement due to mis-cuts, gaps, etc.

Shrinkage = $0.002 \times (15\% \text{ fabrication} - 10\% \text{ in-service moisture contents}) \times Ls$

Ls = Length between anchor bolt fasteners subject to perp-to-grain shrinkage; see Story Information table

Crush – Deformation of bottom plate at compression end of wall segment

= $0.02'' \times [r / 0.73, r < 0.73; (1 + (r - 0.73) / 0.27), 0.73 < r < 1; 2r^3, r > 1]$

r = fcp / Fcp' ; $Fcp' = Ct CM Fcp$; $fcp = C / A$, A = cross sectional area of end studs

Total da – Vert. Displacement + Slippage + Shrink + Crush + Extra

WoodWorks® Shearwalls

Horz Defl – Anchorage deflection term in SDPWS Eqn. C.4.3.4-1 = $h / beff \times da$

h = Wall height. For end segments in FTAO walls, h is the average of the wall height and the distance from the bottom of opening to top of wall

beff = Effective wall segment length = $b - (\text{tension stud pack width} + \text{hold-down anchor bolt offset}) - (1/2 \text{ compression stud pack width})$

h and b are shown in Deflection table, beff in the Shear Wall Dimensions table

WoodWorks® Shearwalls

STORY DRIFT (flexible seismic design)

Level	Dir	Const defl	Max dx _e	Actual Story Drift (in)					hsx ft	Allowable Story Drift		
				Line	Max dx	Center of Mass	C of M dx _e	C of M dx		Delta a in	Ratio Max	Ratio C of M
1	N<->S	0.08	0.25	2	0.75	10.62	0.16	0.52	10.18	3.06	0.24	0.17
	E<->W	0.42	1.12	G	3.23	25.61	0.40	1.14				
2	N<->S	0.08	0.21	2	0.61	10.52	0.12	0.37	8.10	2.43	0.25	0.15
	E<->W	0.45	1.15	A	3.24	27.98	0.00	0.00				

ASCE 7 Eqn. 12.8-15: $dx = dxc + (dxe - dxc) Cd / Ie$

Deflection amplification factor Cd from Table 12.2-1 = 4.0 (E-W), 4.0 (N-S)

Importance factor Ie = 1.00

Legend:

Const defl (dxc) – Deflection due to shrinkage, gaps, bolt hole, etc. (constant with respect to force)

Max dx_e – Largest deflection for any shearline on level in this direction; refer to Deflections table

Line – Shearline with largest deflection on level in this direction

hsx – Story height in ASCE Table 12.12-1 = Height of walls plus joist depth between this level and the one above.

Max dx – Largest amplified deflection on level in this direction using ASCE 7 Eq'n 12.8-15

C of M dx_e - Deflection at the center of mass of this level; from interpolating deflections at adjacent shearlines.

C of M dx - Amplified deflection at center of mass using Eq'n 12.8-15. Does not include differences between top and bottom diaphragm deflection.

Delta a = Allowable story drift on this level from ASCE 7 Table 12.12-1

Ratio - Proportion of allowable story drift experienced, on this level in this direction.

Notes:

*FAILURE – Story drift on this level is greater than maximum allowed by ASCE 7 Table 12.12-1.

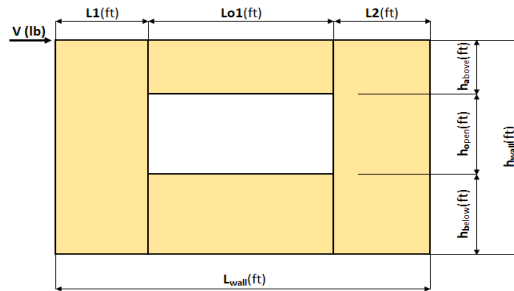
Maximum of all shearlines used to satisfy flexible diaphragm assumption in 12.3.1.1.

ALL ELEMENTS INDICATED AS
"UNDER-CAPACITY" HAVE BEEN REVIEWED AND
EITHER APPROVED WITH MINOR OVERSTRESSES
AND/OR DESIGN REVISED ON FINAL DOCS

STORY DRIFT IS A SERVICEABILITY RATIO AND
NOT A REQUIRED DESIGN ELEMENT IN LOW-RISE
RESIDENTIAL CONSTRUCTION. THIS HAS BEEN
REVIEWED AND DESIGN IS APPROVED PER EOR.

Project Information

Code:	2021 IRC	Date:	1/22/2024
Designer:	ROYAL MORTIER		
Client:			
Project:	1547 DUPLEX		
Wall Line:	E-1, UPPER FLOOR		



Shear Wall Calculation Variables

V	2330 lbf	Opening 1	Wall Pier Aspect Ratio	Adj. Factor
L1	3.25 ft	ha1	P1=ho1/L1=	N/A
L2	3.25 ft	ho1	P2=ho1/L2=	N/A
hwall	8.00 ft	hb1		
Lwall	12.50 ft	Lo1		

1. Hold-down forces: $H = Vh_{wall}/L_{wall}$ 1491 lbf

2. Unit shear above + below opening
First opening: $va1 = vb1 = H/(ha1+hb1) =$ 497 plf

3. Total boundary force above + below openings
First opening: $O1 = va1 \times (L_{o1}) =$ 2982 lbf

4. Corner forces
 $F1 = O1(L1)/(L1+L2) =$ 1491 lbf
 $F2 = O1(L2)/(L1+L2) =$ 1491 lbf

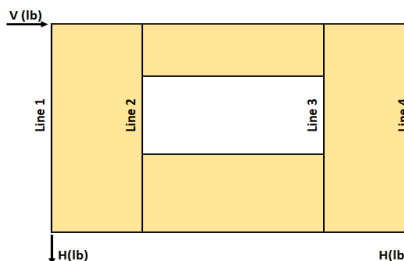
5. Tributary length of openings
 $T1 = (L1 \times Lo1)/(L1+L2) =$ 3.00 ft
 $T2 = (L2 \times Lo1)/(L1+L2) =$ 3.00 ft

6. Unit shear beside opening
 $V1 = (V/L)(L1+T1)/L1 =$ 358 plf
 $V2 = (V/L)(T2+L2)/L2 =$ 358 plf
Check $V1 \times L1 + V2 \times L2 = V?$ 2330 lbf OK

7. Resistance to corner forces
 $R1 = V1 \times L1 =$ 1165 lbf
 $R2 = V2 \times L2 =$ 1165 lbf

8. Difference corner force + resistance
 $R1 - F1 =$ -326 lbf
 $R2 - F2 =$ -326 lbf

9. Unit shear in corner zones
 $vc1 = (R1 - F1)/L1 =$ -100 plf
 $vc2 = (R2 - F2)/L2 =$ -100 plf



Check Summary of Shear Values for One Opening

Line 1: $vc1(ha1+hb1)+V1(ho1)=H?$		-301	1792	1491 lbf
Line 2: $va1(ha1+hb1)-vc1(ha1+hb1)-V1(ho1)=0?$	1491	-301	1792	0
Line 3: $vc2(ha1+hb1)+V2(ho1)=H?$		-301	1792	1491 lbf

Design Summary

Req. Sheathing Capacity	497 plf	4-Term Deflection	0.199 in.	3-Term Deflection	0.232 in.
Req. Strap Force	1491 lbf	4-Term Story Drift %	0.008 %	3-Term Story Drift %	0.010 %
Req. HD Force (H)	1491 lbf				

See Page 2

See Page 3

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Project Information

Code: 2021 IRC	Date: 1/22/2024
Designer: ROYAL MORTIER	
Client:	
Project: 1547 DUPLEX	
Wall Line: E-1, UPPER FLOOR	

Shear Wall Deflection Calculation Variables

Sheathing:	Wood End Post Values:	Nail Type: 8d common (penny weight)
Plywood	Species:	
15/32	E: 1.60E+06 (psi)	
APA Rated Sheathing	Qty: 2 Stud Size: 2x6	
	A: 16.5 (in. ²)	Nail Spacing: Pier 1: 2 (in.) Pier 2: 2 (in.)
Gt Override:	A Override: (in. ²)	HD Capacity: 5635 (lbf)
Ga Override:		HD Deflection: 0.022 (in.)

Four-Term Equation Deflection Check

$$\Delta = \frac{8vh^3}{EA b} + \frac{vh}{Gt} + 0.75he_a + d_a \frac{h}{b} \quad (\text{Equation 23-2})$$

	Pier 1-L	Pier 1-R	Pier 2-L	Pier 2-R	
Sheathing:	15/32	15/32	15/32	15/32	
Nail:	8d common	8d common	8d common	8d common	
v _{asd} :	358	358	358	358	(plf)
v _{strength} :	512	512	512	512	(plf)
E:	1.60E+06	1.60E+06	1.60E+06	1.60E+06	(psi)
h:	8.00	6.25	6.25	8.00	(ft)
A:	16.5	16.5	16.5	16.5	(in. ²)
Gt:	27,000	27,000	27,000	27,000	(lbf/in.)
Nail Spacing:	2	2	2	2	(in.)
Vn:	85	85	85	85	(plf)
e:	0.0026	0.0026	0.0026	0.0026	(in.)
b:	3.25	3.25	3.25	3.25	(ft)
HD Capacity:	5635	5635	5635	5635	(lbf)
HD Defl:	0.022	0.022	0.022	0.022	(in.)

Check Total Deflection of Wall System

Pier 1 (left)				Pier 1 (right)			
Term 1	Term 2	Term 3	Term 4	Term 1	Term 2	Term 3	Term 4
Bending	Shear	Fastener	HD-1	Bending	Shear	Fastener	HD-2
0.024	0.152	0.015	0.039	0.012	0.119	0.012	0.024
Sum			0.231	Sum			0.166
Pier 2 (left)				Pier 2 (right)			
Term 1	Term 2	Term 3	Term 4	Term 1	Term 2	Term 3	Term 4
Bending	Shear	Fastener	HD-1	Bending	Shear	Fastener	HD-2
0.012	0.119	0.012	0.024	0.024	0.152	0.015	0.039
Sum			0.166	Sum			0.231

Total Defl.	
0.199	(in.)
0.0083	%drift

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Project Information

Code:	2021 IRC	Date:	1/22/2024
Designer:	ROYAL MORTIER		
Client:			
Project:	1547 DUPLEX		
Wall Line:	E-1, UPPER FLOOR		

Three-Term Equation Deflection Check

$$\delta_{sw} = \frac{8vh^3}{EAb} + \frac{vh}{1000G_a} + \frac{h\Delta_a}{b} \quad (4.3-1)$$

	Pier 1-L	Pier 1-R	Pier 2-L	Pier 2-R	
Sheathing:	15/32	15/32	15/32	15/32	
Nail:	8d common	8d common	8d common	8d common	
V _{asd} :	358	358	358	358	(plf)
V _{strength} :	512	512	512	512	(plf)
E:	1.60E+06	1.60E+06	1.60E+06	1.60E+06	(psi)
h:	8.00	6.25	6.25	8.00	(ft)
A:	16.5	16.5	16.5	16.5	(in. ²)
G _a :	20.0	20.0	20.0	20.0	(kips/in.)
b:	3.25	3.25	3.25	3.25	(ft)
HD Capacity:	5635	5635	5635	5635	(lbf)
HD Defl:	0.022	0.022	0.022	0.022	(in.)

Check Total Deflection of Wall System

Pier 1 (left)			Pier 1 (right)		
Term 1	Term 2	Term 3	Term 1	Term 2	Term 3
Bending	Shear	Fastener	Bending	Shear	Fastener
0.024	0.205	0.039	0.012	0.160	0.024
Sum		0.269	Sum		0.196
Pier 2 (left)			Pier 2 (right)		
Term 1	Term 2	Term 3	Term 1	Term 2	Term 3
Bending	Shear	Fastener	Bending	Shear	Fastener
0.012	0.160	0.024	0.024	0.205	0.039
Sum		0.196	Sum		0.269

Total Defl.	(in.)
0.232	
0.0097 %drift	

Comment: The 3-term equation is calibrated to be approximately equal to 4-term equation at 1.4*ASD capacity.

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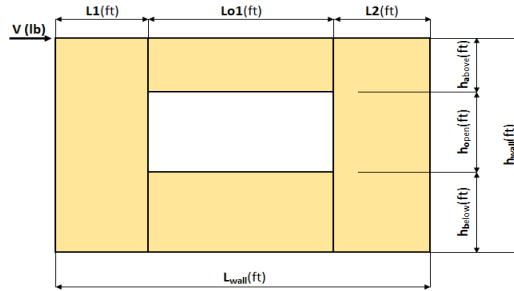
Force Transfer Around Openings Calculator

ONE OPENING

The force transfer around openings (FTAO) method of shear wall analysis is an approach that aims to reinforce the wall such that it performs as if there was no opening. This approach lends certain advantages over segmented shear walls: more versatility, because it allows for narrower wall segments while still meeting the height-to-width ratios and, often, fewer required hold-downs.

Project Information

Code:	2021 IRC	Date:	1/22/2024
Designer:	ROYAL MORTIER		
Client:			
Project:	1547 DUPLEX		
Wall Line:	A-1, MAIN FLOOR		



Shear Wall Calculation Variables

V	5236 lbf	Opening 1	Wall Pier Aspect Ratio	Adj. Factor
L1	4.00 ft	ha1	P1=ho1/L1=	N/A
L2	4.00 ft	ho1	P2=ho1/L2=	N/A
hwall	9.00 ft	hb1		
Lwall	14.00 ft	Lo1		

1. Hold-down forces: $H = Vh_{wall}/L_{wall}$ = 3366 lbf

2. Unit shear above + below opening
First opening: $va1 = vb1 = H/(ha1+hb1) =$ 842 plf

3. Total boundary force above + below openings
First opening: $O1 = va1 \times (Lo1) =$ 5049 lbf

4. Corner forces
 $F1 = O1(L1)/(L1+L2) =$ 2525 lbf
 $F2 = O1(L2)/(L1+L2) =$ 2525 lbf

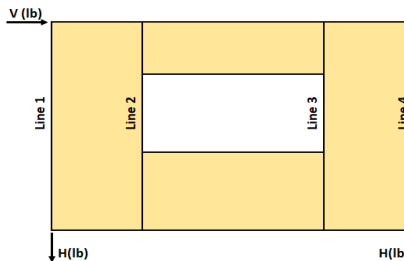
5. Tributary length of openings
 $T1 = (L1 \times Lo1)/(L1+L2) =$ 3.00 ft
 $T2 = (L2 \times Lo1)/(L1+L2) =$ 3.00 ft

6. Unit shear beside opening
 $V1 = (V/L)(L1+T1)/L1 =$ 655 plf
 $V2 = (V/L)(T2+L2)/L2 =$ 655 plf
Check $V1 \times L1 + V2 \times L2 = V?$ 5236 lbf OK

7. Resistance to corner forces
 $R1 = V1 \times L1 =$ 2618 lbf
 $R2 = V2 \times L2 =$ 2618 lbf

8. Difference corner force + resistance
 $R1 - F1 =$ 94 lbf
 $R2 - F2 =$ 94 lbf

9. Unit shear in corner zones
 $vc1 = (R1 - F1)/L1 =$ 23 plf
 $vc2 = (R2 - F2)/L2 =$ 23 plf



Check Summary of Shear Values for One Opening

Line 1: $vc1(ha1+hb1)+V1(ho1)=H?$		94	3273	3366 lbf
Line 2: $va1(ha1+hb1)-vc1(ha1+hb1)-V1(ho1)=0?$	3366	94	3273	0
Line 3: $vc2(ha1+hb1)+V2(ho1)=H?$		94	3273	3366 lbf

Design Summary

Req. Sheathing Capacity	842 plf	4-Term Deflection	0.478 in.	3-Term Deflection	0.480 in.
Req. Strap Force	2525 lbf	4-Term Story Drift %	0.018 %	3-Term Story Drift %	0.018 %
Req. HD Force (H)	3366 lbf		See Page 2		See Page 3

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Project Information

Code: 2021 IRC	Date: 1/22/2024
Designer: ROYAL MORTIER	
Client:	
Project: 1547 DUPLEX	
Wall Line: A-1, MAIN FLOOR	

Shear Wall Deflection Calculation Variables

Sheathing: Plywood		Wood End Post Values: Species: <input type="text"/>		Nail Type: 8d common (penny weight)	
15/32		E: 1.60E+06 (psi)		Pier 1	
APA Rated Sheathing		Dimensions: Qty: 2 Stud Size: 2x6		Pier 2	
Gt Override: <input type="text"/>		A: 16.5 (in. ²)		Nail Spacing: <input type="text"/> (in.)	
Ga Override: <input type="text"/>		A Override: <input type="text"/> (in. ²)		HD Capacity: 5635 (lbf)	
				HD Deflection: 0.022 (in.)	

Four-Term Equation Deflection Check

$$\Delta = \frac{8vh^3}{EAb} + \frac{vh}{Gt} + 0.75he_a + d_a \frac{h}{b} \quad (\text{Equation 23-2})$$

	Pier 1-L	Pier 1-R	Pier 2-L	Pier 2-R	
Sheathing:	15/32	15/32	15/32	15/32	
Nail:	8d common	8d common	8d common	8d common	
v _{asd} :	655	655	655	655	(plf)
v _{strength} :	935	935	935	935	(plf)
E:	1.60E+06	1.60E+06	1.60E+06	1.60E+06	(psi)
h:	9.00	7.25	7.25	9.00	(ft)
A:	16.5	16.5	16.5	16.5	(in. ²)
Gt:	27,000	27,000	27,000	27,000	(lbf/in.)
Nail Spacing:	2	2	2	2	(in.)
Vn:	156	156	156	156	(plf)
e:	0.0158	0.0158	0.0158	0.0158	(in.)
b:	4.00	4.00	4.00	4.00	(ft)
HD Capacity:	5635	5635	5635	5635	(lbf)
HD Defl:	0.022	0.022	0.022	0.022	(in.)

Check Total Deflection of Wall System

Pier 1 (left)				Pier 1 (right)			
Term 1	Term 2	Term 3	Term 4	Term 1	Term 2	Term 3	Term 4
Bending	Shear	Fastener	HD-1	Bending	Shear	Fastener	HD-2
0.052	0.312	0.107	0.074	0.027	0.251	0.086	0.048
Sum			0.544	Sum			0.412
Pier 2 (left)				Pier 2 (right)			
Term 1	Term 2	Term 3	Term 4	Term 1	Term 2	Term 3	Term 4
Bending	Shear	Fastener	HD-1	Bending	Shear	Fastener	HD-2
0.027	0.251	0.086	0.048	0.052	0.312	0.107	0.074
Sum			0.412	Sum			0.544

Total Defl.	
0.478	(in.)
0.0177	%drift

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Project Information

Code:	2021 IRC	Date:	1/22/2024
Designer:	ROYAL MORTIER		
Client:			
Project:	1547 DUPLEX		
Wall Line:	A-1, MAIN FLOOR		

Three-Term Equation Deflection Check

$$\delta_{sw} = \frac{8vh^3}{EAb} + \frac{vh}{1000G_a} + \frac{h\Delta_a}{b} \quad (4.3-1)$$

	Pier 1-L	Pier 1-R	Pier 2-L	Pier 2-R	
Sheathing:	15/32	15/32	15/32	15/32	
Nail:	8d common	8d common	8d common	8d common	
V _{asd} :	655	655	655	655	(plf)
V _{strength} :	935	935	935	935	(plf)
E:	1.60E+06	1.60E+06	1.60E+06	1.60E+06	(psi)
h:	9.00	7.25	7.25	9.00	(ft)
A:	16.5	16.5	16.5	16.5	(in. ²)
G _a :	20.0	20.0	20.0	20.0	(kips/in.)
b:	4.00	4.00	4.00	4.00	(ft)
HD Capacity:	5635	5635	5635	5635	(lbf)
HD Defl:	0.022	0.022	0.022	0.022	(in.)

Check Total Deflection of Wall System

Pier 1 (left)			Pier 1 (right)		
Term 1	Term 2	Term 3	Term 1	Term 2	Term 3
Bending	Shear	Fastener	Bending	Shear	Fastener
0.052	0.421	0.074	0.027	0.339	0.048
Sum		0.546	Sum		0.414
Pier 2 (left)			Pier 2 (right)		
Term 1	Term 2	Term 3	Term 1	Term 2	Term 3
Bending	Shear	Fastener	Bending	Shear	Fastener
0.027	0.339	0.048	0.052	0.421	0.074
Sum		0.414	Sum		0.546

Total Defl.	
0.480	(in.)
0.0178	%drift

Comment: The 3-term equation is calibrated to be approximately equal to 4-term equation at 1.4*ASD capacity.

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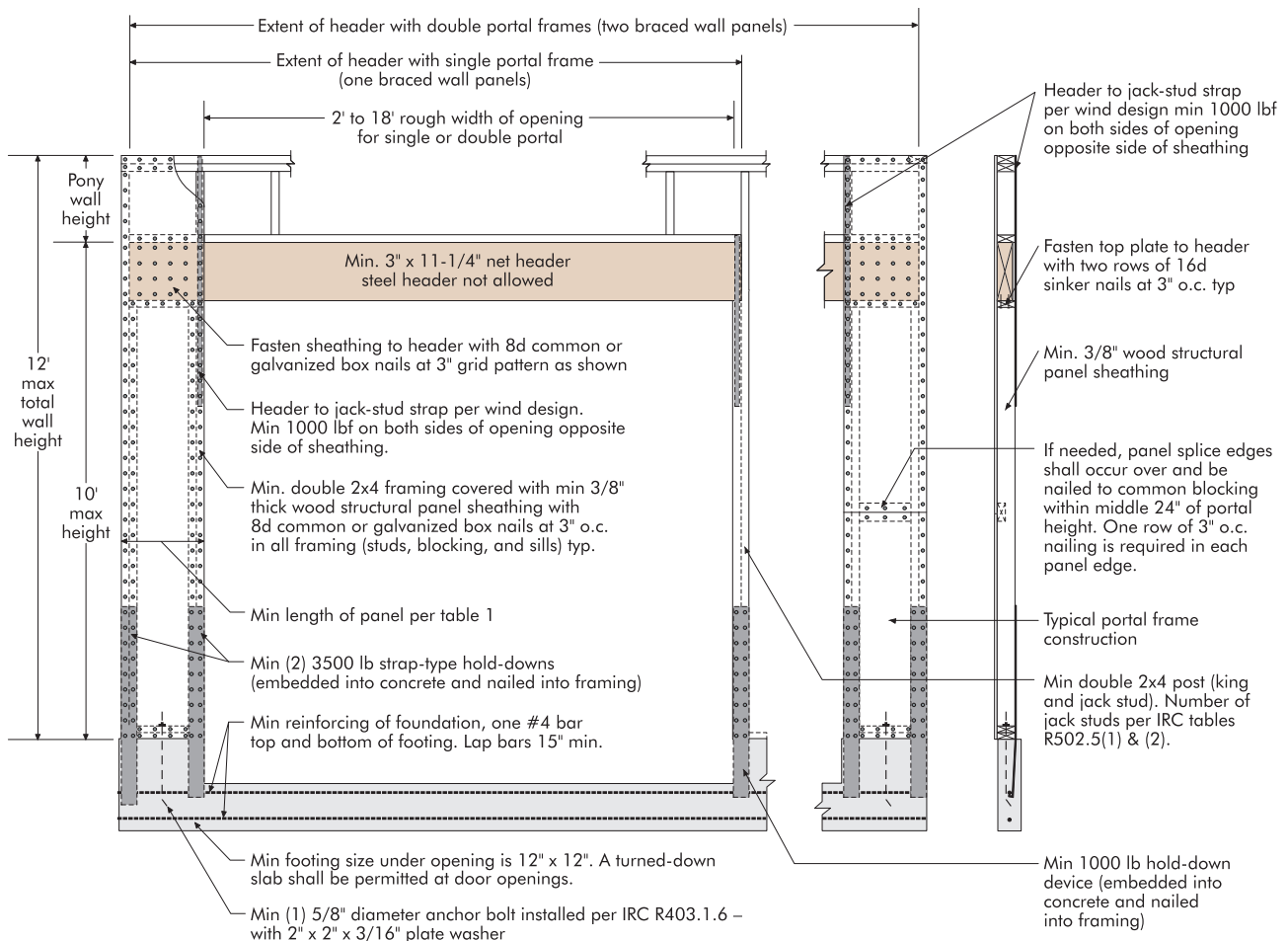
Table 1. Recommended Allowable Design Values for APA Portal Frame Used on a Rigid-Base

Minimum Width (in.)	Maximum Height (ft)	Allowable Design (ASD) Values per Frame Segment		
		Shear ^(e,f) (lbf)	Deflection (in.)	Load Factor
16	8	850	0.33	3.09
	10	625	0.44	2.97
24	8	1,675	0.38	2.88
	10	1,125	0.51	3.42

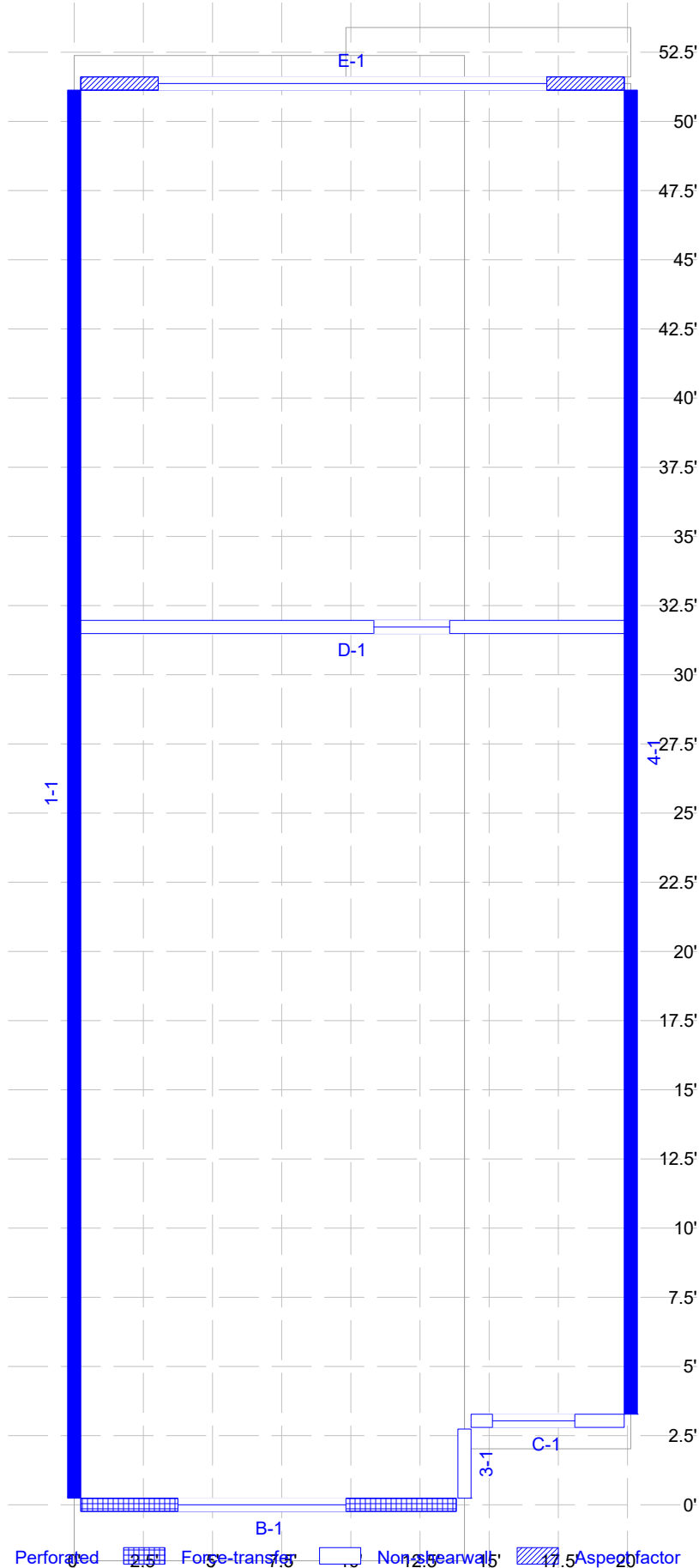
Foundation for Wind or Seismic Loading^(a,b,c,d)

- (a) Design values are based on the use of Douglas-fir or Southern pine framing. For other species of framing, multiply the above shear design value by the specific gravity adjustment factor = $(1 - (0.5 - SG))$, where SG = specific gravity of the actual framing. This adjustment shall not be greater than 1.0.
- (b) For construction as shown in Figure 1.
- (c) Values are for a single portal-frame segment (one vertical leg and a portion of the header). For multiple portal-frame segments, the allowable shear design values are permitted to be multiplied by the number of frame segments (e.g., two = 2x, three = 3x, etc.).
- (d) Interpolation of design values for heights between 8 and 10 feet, and for portal widths between 16 and 24 inches, is permitted.
- (e) The allowable shear design value is permitted to be multiplied by a factor of 1.4 for wind design.
- (f) If story drift is not a design consideration, the tabulated design shear values are permitted to be multiplied by a factor of 1.15. This factor is permitted to be used cumulatively with the wind-design adjustment factor in Footnote (e) above.

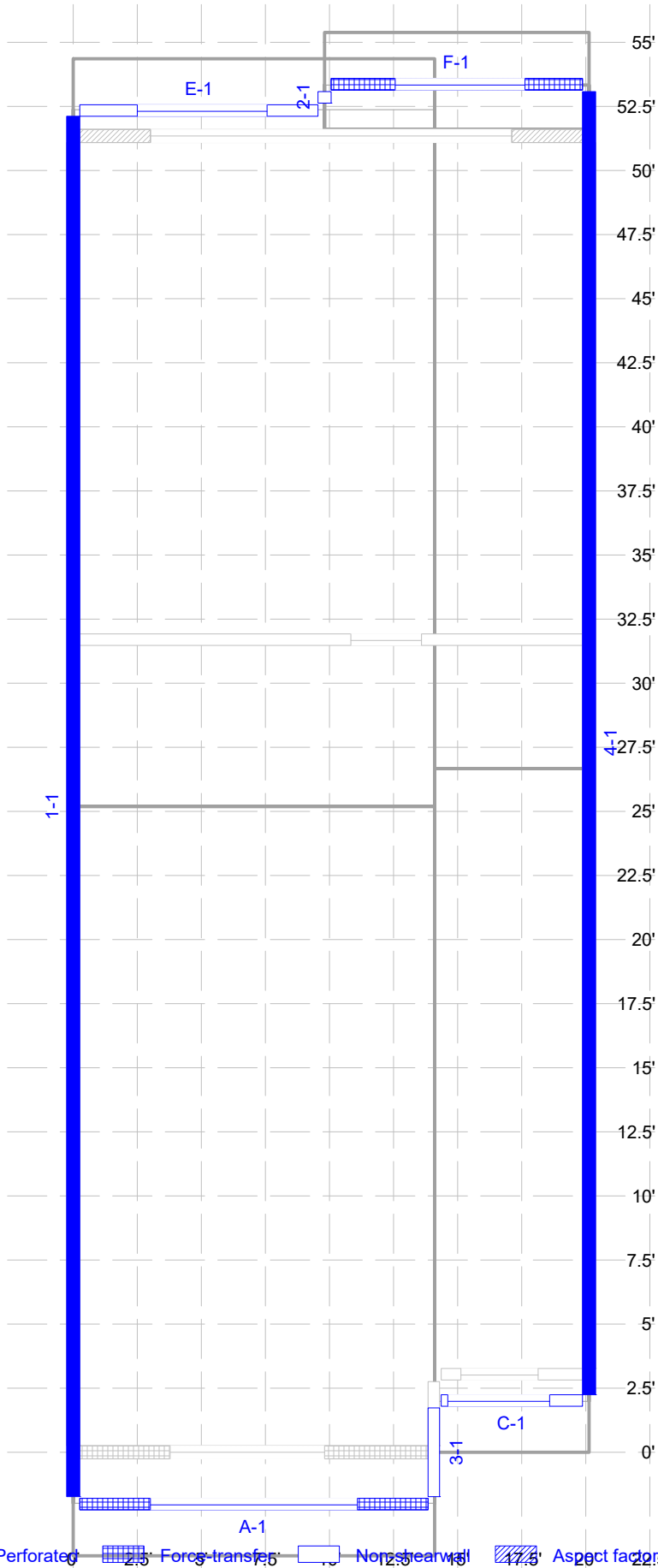
Figure 1. Construction Details for APA Portal-Frame Design with Hold Downs



Level 1 of 2



Level 2 of 2



Segmented Perforated Force transfer Non-shear wall Aspect factor Orange = Selected wall(s)

WoodWorks® Shearwalls 2019 (Update 3)

Project Information

COMPANY AND PROJECT INFORMATION

Company PLI R I S 327 W 3RD AVE, STE 207 SPOKANE, WA 99201 833. 4PLI R I S	Project
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DESIGN SETTINGS

Design Code IBC 2021/AWC SDPWS 2021		Wind Standard ASCE 7-16 Directional (All heights)		Seismic Standard ASCE 7-16	
Load Combinations		Building Code Capacity Modification			
For Design (ASD) 0.70 Seismic 0.60 Wind		For Deflection (Strength) 1.00 Seismic 1.00 Wind		Wind 1.00	
Service Conditions and Load Duration		Moisture Content		Max Shearwall Offset [ft]	
Duration Factor -	Temperature Range -	Fabrication 15% (<=19%)	Service 10% (<=19%)	Plan (within story) 4.00	Elevation (between stories) 0.83
Maximum Height-to-width Ratio					
Wood panels		Fiberboard		Lumber	
Wind 3.5	Seismic 3.5	-	Wind -	Seismic -	Gypsum
				Blocked 2.0	Unblocked 1.5
Ignore non-wood-panel shear resistance contribution...			Forces based on...		
Wind when comb'd w/ wood panels		Seismic when comb'd w/ wood panels		Hold-downs Applied loads	Drag struts Applied loads
Shearwall relative rigidity: Deflection-based stiffness of wall segments					
Perforated shearwall Co factor: SDPWS Equation 4.3-5					
Non-identical materials and construction on the shearline: Allowed, except for material type					
Deflection Equation: 3-term from SDPWS 4.3-1					
Drift limit for wind design: 1 / 500 story height					
Force-transfer strap: Continuous at top of highest opening and bottom of lowest					

SITE INFORMATION

Wind ASCE 7-16 Directional (All heights)			Seismic ASCE 7-16 12.8 Equivalent Lateral Force Procedure		
Design Wind Speed	105 mph		Risk Category	Category II - All others	
Serviceability Wind Speed	85 mph		Structure Type	Regular	
Exposure	Exposure B		Building System	Bearing Wall	
Enclosure	Enclosed		Design Category	D	
Min Wind Loads: Walls	16 psf		Site Class	D	
Roofs	8 psf		Spectral Response Acceleration		
Topographic Information [ft]			S1: 0.365g	Ss: 0.838g	
Shape	Height	Length	Fundamental Period T Used	E-W	N-S
-	-	-	0.209s	0.209s	0.209s
Site Location: -	Elev: 384ft		Approximate Ta	0.209s	0.209s
Rigid building - Static analysis			Maximum T	0.292s	0.292s
Case 2	E-W loads	N-S loads	Response Factor R	6.50	6.50
Eccentricity (%)	15	15	Fa: 1.16	Fv: 1.93	
Loaded at	75%				

WoodWorks® Shearwalls

Structural Data

STORY INFORMATION

	Story Elev [ft]	Floor/Ceiling Depth [in]	Wall Height [ft]	Length subject to shrinkage [in]	Hold-down Bolt length [in]
Ceiling	21.12	0.0			
Level 2	13.02	1'-1.0	8.10	16.8	17.5
Level 1	2.83	10.0	9.10	13.8	14.5
Foundation	2.00				

BLOCK and ROOF INFORMATION

	Block Dimensions [ft]		Ridge	Face	Type	Roof Panels	
	2 Story	E-W				Slope	Overhang [ft]
Block 1			E-W				
Location X,Y =	0.00	-2.00		North	Side	18.4	2.00
Extent X,Y =	14.00	54.00		South	Side	18.4	2.00
Ridge Y Location, Offset	25.00	0.00		East	Gable	90.0	0.00
Ridge Elevation, Height	30.10	8.98		West	Gable	90.0	0.00
Block 2			E-W				
Location X,Y =	14.00	2.00		North	Side	18.4	2.00
Extent X,Y =	6.00	49.00		South	Side	18.4	2.00
Ridge Y Location, Offset	26.50	0.00		East	Gable	90.0	0.00
Ridge Elevation, Height	29.27	8.15		West	Joined	90.0	0.00
Block 3			E-W				
Location X,Y =	9.75	51.25		North	Side	18.4	2.00
Extent X,Y =	10.25	1.75		South	Side	90.0	0.00
Ridge Y Location, Offset	51.25	-0.87		East	Gable	90.0	0.00
Ridge Elevation, Height	21.70	0.58		West	Gable	90.0	0.00

WoodWorks® Shearwalls

SHEATHING MATERIALS by WALL GROUP

Grp	Surf	Material	Ratng	Sheathing				Gvtv lbs/in	Size	Fasteners					Apply Notes
				Thick in	GU in	Ply	Or			Type	Df	Eg in	Fd in	Bk	
1	Ext	Struct Sh OSB	24/16	7/16	-	-	Horz	83500	8d	Nail	N	6	12	Y	3
	Int	Gyp WB 1-ply	24/16	1/2	-	-	Horz	40000	No. 6	Screw	N	4	12	Y	
2	Ext	Struct Sh OSB	24/16	7/16	-	-	Horz	83500	8d	Nail	N	2	12	Y	2,3
	Int	Gyp WB 1-ply	24/16	1/2	-	-	Horz	40000	No. 6	Screw	N	4	12	Y	
3	Ext	Struct Sh OSB	24/16	7/16	-	-	Vert	83500	8d	Nail	N	3	12	Y	2,3
4	Both	Gyp WB 1-ply	24/16	1/2	-	-	Horz	40000	5d	Nail	N	7	7	N	

Legend:

Grp – Wall Design Group number, used to reference wall in other tables (created by program)

Surf – Exterior or interior surface when applied to exterior wall

Ratng – Span rating, see SDPWS Table C4.2.2.2C

Thick – Nominal panel thickness

GU - Gypsum underlay thickness

Ply – Number of plies (or layers) in construction of plywood sheets

Or – Orientation of longer dimension of sheathing panels

Gvtv – Shear stiffness in lb/in. of depth from SDPWS Tables C4.2.2A-B

Type – Fastener type from SDPWS Tables 4.3A-D: Nail – common wire nail for structural panels and lumber, cooler or gypsum wallboard nail for GWB, plasterboard nail for gypsum lath, galvanised nail for gypsum sheathing; Box - box nail; Casing – casing nail; Roof – roofing nail; Screw – drywall screw

Size - Common, box, and casing nails: refer to SDPWS Table A1 (casing sizes = box sizes).

Gauges: 11 ga = 0.120" x 1-3/4" (gypsum sheathing, 25/32" fiberboard), 1-1/2" (lath & plaster, 1/2" fiberboard); 13 ga plasterboard = 0.92" x 1-1/8".

Cooler or gypsum wallboard nail: 5d = .086" x 1-5/8"; 6d = .092" x 1-7/8"; 8d = .113" x 2-3/8"; 6/8d = 6d base ply, 8d face ply for 2-ply GWB.

Drywall screws: No. 6, 1-1/4" long.

5/8" gypsum sheathing can also use 6d cooler or GWB nail

Df – Deformed nails (threaded or spiral), with increased withdrawal capacity

Eg – Panel edge fastener spacing

Fd – Field spacing interior to panels

Bk – Sheathing is nailed to blocking at all panel edges; Y(es) or N(o)

Apply Notes – Notes below table legend which apply to sheathing side

Notes:

2. Framing at adjoining panel edges must be 3" nominal or wider with staggered nailing according to SDPWS 4.3.7.1.4

3. Shear capacity for current design has been increased to the value for 15/32" sheathing with same nailing because stud spacing is 16" max. or panel orientation is horizontal. See SDPWS T4.3A Note 2.

FRAMING MATERIALS and STANDARD WALL by WALL GROUP

Wall Grp	Species	Grade	b in	d in	Spcg in	SG	E psi ⁶	Standard Wall
1	D.Fir-L	Stud	1.50	5.50	16	0.50	1.40	
2	D.Fir-L	Stud	1.50	5.50	16	0.50	1.40	
3	D.Fir-L	Stud	1.50	5.50	16	0.50	1.40	3/12B_SEG_OSB_7/16_8D
4	D.Fir-L	Stud	1.50	5.50	24	0.50	1.40	

Legend:

Wall Grp – Wall Design Group

b – Stud breadth (thickness)

d – Stud depth (width)

Spcg – Maximum on-centre spacing of studs for design, actual spacing may be less.

SG – Specific gravity

E – Modulus of elasticity

Standard Wall - Standard wall designed as group.

Notes:

Check manufacture requirements for stud size, grade and specific gravity (G) for all shearwall hold-downs.

WoodWorks® Shearwalls

SHEARLINE, WALL and OPENING DIMENSIONS

North-south Shearlines	Type	Wall Group	Location X [ft]	Extent [ft]		Length [ft]	FHS [ft]	Aspect Ratio	Height [ft]
				Start	End				
Line 1									
Level 2									
Line 1	Seg	4	0.00	-2.00	52.00	54.00	54.00	-	8.10
Wall 1-1	Seg	4	0.00	-2.00	52.00	54.00	54.00	0.15	-
Level 1									
Line 1	Seg	4	0.00	0.00	51.00	51.00	51.00	-	9.10
Wall 1-1	Seg	4	0.00	0.00	51.00	51.00	51.00	0.18	-
Line 2									
Level 2									
Line 2	NSW		9.75	52.00	53.00	1.00	0.00	-	8.10
Wall 2-1	NSW		9.75	52.00	53.00	1.00	0.00	1.00	-
Line 3									
Level 2									
Line 3	NSW		14.00	-2.00	3.00	5.00	0.00	-	8.10
Wall 3-1	NSW		14.00	-2.00	2.00	4.00	0.00	1.00	-
Level 1									
Line 3	NSW		14.00	-2.00	3.00	5.00	0.00	-	9.10
Wall 3-1	NSW		14.00	0.00	3.00	3.00	0.00	1.00	-
Line 4									
Level 2									
Line 4	Seg	4	20.00	2.00	53.00	51.00	51.00	-	8.10
Wall 4-1	Seg	4	20.00	2.00	53.00	51.00	51.00	0.16	-
Level 1									
Line 4	Seg	4	20.00	3.00	51.00	48.00	48.00	-	9.10
Wall 4-1	Seg	4	20.00	3.00	51.00	48.00	48.00	0.19	-
East-west Shearlines	Type	Wall Group	Location Y [ft]	Extent [ft]		Length [ft]	FHS [ft]	Aspect Ratio	Height [ft]
				Start	End				
Line A									
Level 2									
Line A		1	-2.00	0.00	14.00	14.00	14.00	-	8.10
Wall A-1	FT	1	-2.00	0.00	14.00	14.00	14.00	-	-
Segment 1		-	-	0.00	3.00	3.00	-	1.67	-
Opening 1		-	-	3.00	11.00	8.00	-	-	5.00
Segment 2		-	-	11.00	14.00	3.00	-	1.67	-
Line B									
Level 1									
Line B		2	0.00	0.00	14.00	14.00	14.00	-	9.10
Wall B-1	FT	2	0.00	0.00	14.00	14.00	14.00	-	-
Segment 1		-	-	0.00	3.75	3.75	-	1.33	-
Opening 1		-	-	3.75	9.75	6.00	-	-	5.00
Segment 2		-	-	9.75	14.00	4.25	-	1.18	-
Line C									
Level 2									
Line C			2.00	0.00	20.00	20.00	0.00	-	8.10
Wall C-1	Prf		2.00	14.00	20.00	6.00	0.00	-	-
Segment 1		-	-	14.00	14.50	0.50	0.50	16.20	-
Opening 1		-	-	14.50	18.50	4.00	4.00	-	1.50
Segment 2		-	-	18.50	20.00	1.50	1.50	5.40	-
Level 1									
Line C			3.00	0.00	20.00	20.00	0.00	-	9.10
Wall C-1	Prf		3.00	14.00	20.00	6.00	0.00	-	-
Segment 1		-	-	14.00	15.00	1.00	1.00	9.10	-
Opening 1		-	-	15.00	18.00	3.00	3.00	-	6.75
Segment 2		-	-	18.00	20.00	2.00	2.00	4.55	-
Line D									
Level 1									
Line D			31.50	0.00	20.00	20.00	0.00	-	9.10
Wall D-1	NSW		31.50	0.00	20.00	20.00	0.00	-	-
Segment 1		-	-	0.00	10.75	10.75	-	-	-
Opening 1		-	-	10.75	13.50	2.75	-	-	6.75
Segment 2		-	-	13.50	20.00	6.50	-	-	-
Line E									
Level 2									
Line E			52.00	0.00	20.00	20.00	0.00	-	8.10
Wall E-1	Prf		52.00	0.00	9.75	9.75	0.00	-	-
Segment 1		-	-	0.00	2.50	2.50	2.50	3.24	-
Opening 1		-	-	2.50	7.50	5.00	5.00	-	4.00
Segment 2		-	-	7.50	9.75	2.25	2.25	3.60	-

WoodWorks® Shearwalls

SHEARLINE, WALL and OPENING DIMENSIONS (continued)

Level 1									
Line E		3	51.00	0.00	20.00	20.00	6.00	-	9.10
Wall E-1	Seg	3	51.00	0.00	20.00	20.00	6.00	-	-
Segment 1		-	-	0.00	3.00	3.00	-	3.03	-
Opening 1		-	-	3.00	17.00	14.00	-	-	8.00
Segment 2		-	-	17.00	20.00	3.00	-	3.03	-
Line F									
Level 2									
Line F		1	53.00	9.75	20.00	10.25	10.25	-	8.10
Wall F-1	FT	1	53.00	9.75	20.00	10.25	10.25	-	-
Segment 1		-	-	9.75	12.50	2.75	-	1.45	-
Opening 1		-	-	12.50	17.50	5.00	-	-	4.00
Segment 2		-	-	17.50	20.00	2.50	-	1.60	-

Legend:

Type - Seg = segmented, Prf = perforated, FT = force-transfer, NSW = non-shearwall

Location - Dimension perpendicular to wall

FHS - Length of full-height sheathing used to resist shear force. For perforated walls, it is based on the factored segments L_i defined in SDPWS

4.3.4.3

Aspect Ratio – Ratio of wall height to segment length (h/b_s), for force-transfer walls, the aspect ratio of the central pier

Wall Group - Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall

If two wall group numbers listed, they are for rigid diaphragm and flexible diaphragm design.

WoodWorks® Shearwalls

Loads

WIND SHEAR LOADS (as entered or generated)

Level 2 Block	F	Element	Load Case	Wnd Dir	Surf Dir	Prof	Location [ft]		Magnitude [lbs,plf,psf]		Trib Ht [ft]
							Start	End	Start	End	
Block 1	W	Wall	Min	W->E	Wind	Line	-2.00	52.00	32.4		
Block 1	W	L Gable	Min	W->E	Wind	Line	-2.00	25.00	0.0	71.9	
Block 1	W	Wall	1	W->E	Wind	Line	-2.00	52.00	40.0		
Block 1	W	L Gable	1	W->E	Wind	Line	-2.00	25.00	0.0	94.9	
Block 1	W	R Gable	1	W->E	Wind	Line	25.00	52.00	94.9	0.0	
Block 1	W	R Gable	Min	W->E	Wind	Line	25.00	52.00	71.9	0.0	
Block 1	W	Wall	1	W->E	Wind	Line	52.00	53.00	40.0		
Block 1	W	Wall	Min	W->E	Wind	Line	52.00	53.00	32.4		
Block 1	E	Wall	1	W->E	Lee	Line	-2.00	2.00	27.2		
Block 1	E	L Gable	1	W->E	Lee	Line	-2.00	25.00	0.0	60.4	
Block 1	E	Wall	Min	W->E	Lee	Line	-2.00	2.00	32.4		
Block 1	E	L Gable	Min	W->E	Lee	Line	-2.00	25.00	0.0	71.9	
Block 1	E	Wall	Min	W->E	Lee	Line	2.00	53.00	32.4		
Block 1	E	Wall	1	W->E	Lee	Line	2.00	53.00	27.2		
Block 1	E	R Gable	1	W->E	Lee	Line	25.00	52.00	60.4	0.0	
Block 1	E	R Gable	Min	W->E	Lee	Line	25.00	52.00	71.9	0.0	
Block 1	W	L Gable	Min	E->W	Lee	Line	-2.00	25.00	0.0	71.9	
Block 1	W	L Gable	1	E->W	Lee	Line	-2.00	25.00	0.0	60.4	
Block 1	W	Wall	Min	E->W	Lee	Line	-2.00	52.00	32.4		
Block 1	W	Wall	1	E->W	Lee	Line	-2.00	52.00	27.2		
Block 1	W	R Gable	1	E->W	Lee	Line	25.00	52.00	60.4	0.0	
Block 1	W	R Gable	Min	E->W	Lee	Line	25.00	52.00	71.9	0.0	
Block 1	W	Wall	Min	E->W	Lee	Line	52.00	53.00	32.4		
Block 1	W	Wall	1	E->W	Lee	Line	52.00	53.00	27.2		
Block 1	E	L Gable	1	E->W	Wind	Line	-2.00	25.00	0.0	94.9	
Block 1	E	Wall	1	E->W	Wind	Line	-2.00	2.00	40.0		
Block 1	E	L Gable	Min	E->W	Wind	Line	-2.00	25.00	0.0	71.9	
Block 1	E	Wall	Min	E->W	Wind	Line	-2.00	2.00	32.4		
Block 1	E	Wall	1	E->W	Wind	Line	2.00	53.00	40.0		
Block 1	E	Wall	Min	E->W	Wind	Line	2.00	53.00	32.4		
Block 1	E	R Gable	1	E->W	Wind	Line	25.00	52.00	94.9	0.0	
Block 1	E	R Gable	Min	E->W	Wind	Line	25.00	52.00	71.9	0.0	
Block 1	S	Wall	Min	S->N	Wind	Line	0.00	14.00	32.4		
Block 1	S	Wall	1	S->N	Wind	Line	0.00	14.00	40.0		
Block 1	S	Roof	Min	S->N	Wind	Line	0.00	14.00	38.6		
Block 1	S	Roof	1	S->N	Wind	Line	0.00	14.00	-4.9		
Block 1	S	Wall	Min	S->N	Wind	Line	14.00	20.00	32.4		
Block 1	S	Wall	1	S->N	Wind	Line	14.00	20.00	40.0		
Block 1	N	Wall	Min	S->N	Lee	Line	0.00	9.75	32.4		
Block 1	N	Roof	Min	S->N	Lee	Line	0.00	14.00	38.6		
Block 1	N	Roof	1	S->N	Lee	Line	0.00	14.00	73.7		
Block 1	N	Wall	1	S->N	Lee	Line	0.00	9.75	11.3		
Block 1	N	Wall	Min	S->N	Lee	Line	9.75	20.00	32.4		
Block 1	N	Wall	1	S->N	Lee	Line	9.75	20.00	11.3		
Block 1	S	Wall	1	N->S	Lee	Line	0.00	14.00	11.3		
Block 1	S	Wall	Min	N->S	Lee	Line	0.00	14.00	32.4		
Block 1	S	Roof	1	N->S	Lee	Line	0.00	14.00	73.7		
Block 1	S	Roof	Min	N->S	Lee	Line	0.00	14.00	38.6		
Block 1	S	Wall	1	N->S	Lee	Line	14.00	20.00	11.3		
Block 1	S	Wall	Min	N->S	Lee	Line	14.00	20.00	32.4		
Block 1	N	Roof	1	N->S	Wind	Line	0.00	14.00	-4.9		
Block 1	N	Wall	1	N->S	Wind	Line	0.00	9.75	40.0		
Block 1	N	Roof	Min	N->S	Wind	Line	0.00	14.00	38.6		
Block 1	N	Wall	Min	N->S	Wind	Line	0.00	9.75	32.4		
Block 1	N	Wall	1	N->S	Wind	Line	9.75	20.00	40.0		
Block 1	N	Wall	Min	N->S	Wind	Line	9.75	20.00	32.4		
Block 2	E	L Gable	Min	W->E	Lee	Line	2.00	26.50	0.0	65.2	
Block 2	E	L Gable	1	W->E	Lee	Line	2.00	26.50	0.0	54.5	
Block 2	E	R Gable	Min	W->E	Lee	Line	26.50	51.00	65.2	0.0	
Block 2	E	R Gable	1	W->E	Lee	Line	26.50	51.00	54.5	0.0	
Block 2	E	L Gable	1	E->W	Wind	Line	2.00	26.50	0.0	85.8	
Block 2	E	L Gable	Min	E->W	Wind	Line	2.00	26.50	0.0	65.2	
Block 2	E	R Gable	1	E->W	Wind	Line	26.50	51.00	85.8	0.0	
Block 2	E	R Gable	Min	E->W	Wind	Line	26.50	51.00	65.2	0.0	
Block 2	S	Roof	Min	S->N	Wind	Line	14.00	20.00	35.3		
Block 2	S	Roof	1	S->N	Wind	Line	14.00	20.00	-7.2		
Block 2	N	Roof	Min	S->N	Lee	Line	14.00	20.00	35.3		
Block 2	N	Roof	1	S->N	Lee	Line	14.00	20.00	67.1		

WoodWorks® Shearwalls

WIND SHEAR LOADS (as entered or generated) (continued)

Block 2	S	Roof	1	N->S	Lee	Line	14.00	20.00	67.1		
Block 2	S	Roof	Min	N->S	Lee	Line	14.00	20.00	35.3		
Block 2	N	Roof	1	N->S	Wind	Line	14.00	20.00	-7.2		
Block 2	N	Roof	Min	N->S	Wind	Line	14.00	20.00	35.3		
Block 3	W	R Gable	Min	W->E	Wind	Line	51.25	53.00	4.7	0.0	
Block 3	W	R Gable	1	W->E	Wind	Line	51.25	53.00	5.9	0.0	
Block 3	E	R Gable	Min	W->E	Lee	Line	51.25	53.00	4.7	0.0	
Block 3	E	R Gable	1	W->E	Lee	Line	51.25	53.00	1.5	0.0	
Block 3	W	R Gable	1	E->W	Lee	Line	51.25	53.00	1.5	0.0	
Block 3	W	R Gable	Min	E->W	Lee	Line	51.25	53.00	4.7	0.0	
Block 3	E	R Gable	Min	E->W	Wind	Line	51.25	53.00	4.7	0.0	
Block 3	E	R Gable	1	E->W	Wind	Line	51.25	53.00	5.9	0.0	
Block 3	S	Roof	1	S->N	Wind	Line	9.75	20.00	5.9		
Block 3	S	Roof	Min	S->N	Wind	Line	9.75	20.00	0.7		
Block 3	N	Roof	Min	S->N	Lee	Line	9.75	20.00	5.0		
Block 3	S	Roof	1	N->S	Lee	Line	9.75	20.00	4.5		
Block 3	S	Roof	Min	N->S	Lee	Line	9.75	20.00	0.7		
Block 3	N	Roof	Min	N->S	Wind	Line	9.75	20.00	5.0		
Level 1											
Block	F	Element	Load Case	Wnd Dir	Surf Dir	Prof	Location [ft]		Magnitude [lbs,plf,psf]		Trib Ht [ft]
							Start	End	Start	End	
Block 1	W	Wall	1	W->E	Wind	Line	-2.00	52.00	37.8		
Block 1	W	Wall	Min	W->E	Wind	Line	-2.00	52.00	32.4		
Block 1	W	Wall	1	W->E	Wind	Line	0.00	51.00	52.0		
Block 1	W	Wall	Min	W->E	Wind	Line	0.00	51.00	45.1		
Block 1	W	Wall	Min	W->E	Wind	Line	52.00	53.00	32.4		
Block 1	W	Wall	1	W->E	Wind	Line	52.00	53.00	37.8		
Block 1	E	Wall	Min	W->E	Lee	Line	-2.00	2.00	32.4		
Block 1	E	Wall	1	W->E	Lee	Line	-2.00	2.00	27.2		
Block 1	E	Wall	Min	W->E	Lee	Line	0.00	3.00	45.1		
Block 1	E	Wall	1	W->E	Lee	Line	0.00	3.00	37.9		
Block 1	E	Wall	1	W->E	Lee	Line	2.00	53.00	27.2		
Block 1	E	Wall	Min	W->E	Lee	Line	2.00	53.00	32.4		
Block 1	E	Wall	1	W->E	Lee	Line	3.00	51.00	37.9		
Block 1	E	Wall	Min	W->E	Lee	Line	3.00	51.00	45.1		
Block 1	W	Wall	1	E->W	Lee	Line	-2.00	52.00	27.2		
Block 1	W	Wall	Min	E->W	Lee	Line	-2.00	52.00	32.4		
Block 1	W	Wall	1	E->W	Lee	Line	0.00	51.00	37.9		
Block 1	W	Wall	Min	E->W	Lee	Line	0.00	51.00	45.1		
Block 1	W	Wall	1	E->W	Lee	Line	52.00	53.00	27.2		
Block 1	W	Wall	Min	E->W	Lee	Line	52.00	53.00	32.4		
Block 1	E	Wall	1	E->W	Wind	Line	-2.00	2.00	37.8		
Block 1	E	Wall	Min	E->W	Wind	Line	-2.00	2.00	32.4		
Block 1	E	Wall	1	E->W	Wind	Line	0.00	3.00	52.0		
Block 1	E	Wall	Min	E->W	Wind	Line	0.00	3.00	45.1		
Block 1	E	Wall	Min	E->W	Wind	Line	2.00	53.00	32.4		
Block 1	E	Wall	1	E->W	Wind	Line	2.00	53.00	37.8		
Block 1	E	Wall	Min	E->W	Wind	Line	3.00	51.00	45.1		
Block 1	E	Wall	1	E->W	Wind	Line	3.00	51.00	52.0		
Block 1	S	Wall	Min	S->N	Wind	Line	0.00	14.00	45.1		
Block 1	S	Wall	Min	S->N	Wind	Line	0.00	14.00	32.4		
Block 1	S	Wall	1	S->N	Wind	Line	0.00	14.00	52.0		
Block 1	S	Wall	1	S->N	Wind	Line	0.00	14.00	37.8		
Block 1	S	Wall	Min	S->N	Wind	Line	14.00	20.00	45.1		
Block 1	S	Wall	1	S->N	Wind	Line	14.00	20.00	37.8		
Block 1	S	Wall	Min	S->N	Wind	Line	14.00	20.00	32.4		
Block 1	S	Wall	1	S->N	Wind	Line	14.00	20.00	52.0		
Block 1	N	Wall	1	S->N	Lee	Line	0.00	9.75	11.3		
Block 1	N	Wall	Min	S->N	Lee	Line	0.00	20.00	45.1		
Block 1	N	Wall	Min	S->N	Lee	Line	0.00	9.75	32.4		
Block 1	N	Wall	1	S->N	Lee	Line	0.00	20.00	15.7		
Block 1	N	Wall	Min	S->N	Lee	Line	9.75	20.00	32.4		
Block 1	N	Wall	1	S->N	Lee	Line	9.75	20.00	11.3		
Block 1	S	Wall	1	N->S	Lee	Line	0.00	14.00	11.3		
Block 1	S	Wall	1	N->S	Lee	Line	0.00	14.00	15.7		
Block 1	S	Wall	Min	N->S	Lee	Line	0.00	14.00	32.4		
Block 1	S	Wall	Min	N->S	Lee	Line	0.00	14.00	45.1		
Block 1	S	Wall	1	N->S	Lee	Line	14.00	20.00	11.3		
Block 1	S	Wall	1	N->S	Lee	Line	14.00	20.00	15.7		
Block 1	S	Wall	Min	N->S	Lee	Line	14.00	20.00	45.1		
Block 1	S	Wall	Min	N->S	Lee	Line	14.00	20.00	32.4		

WoodWorks® Shearwalls

WIND SHEAR LOADS (as entered or generated) (continued)

Block 1	N	Wall	Min	N->S	Wind	Line	0.00	20.00	45.1
Block 1	N	Wall	1	N->S	Wind	Line	0.00	9.75	37.8
Block 1	N	Wall	Min	N->S	Wind	Line	0.00	9.75	32.4
Block 1	N	Wall	1	N->S	Wind	Line	0.00	20.00	52.0
Block 1	N	Wall	Min	N->S	Wind	Line	9.75	20.00	32.4
Block 1	N	Wall	1	N->S	Wind	Line	9.75	20.00	37.8

Legend:

Block - Block used in load generation

Accum. = loads from one block combined with another

Manual = user-entered loads (so no block)

F - Building face (north, south, east or west)

Element - Building surface on which loads generated or entered

Load Case - One of the following:

ASCE 7 All Heights: Case 1 or 2 from Fig 27.3-8 or minimum loads from 27.1.5

ASCE 7 Low-rise: Reference corner and Case A or B from Fig 28.3-1 or minimum loads from 28.3.4

Wind Dir - Direction of wind for loads with positive magnitude, also direction of MWFRS.

Surf Dir - Windward or leeward side of the building for loads in given direction

Prof - Profile (distribution)

Location - Start and end points on building element

Magnitude - Start = intensity of uniform and point loads or leftmost intensity of trapezoidal load, End = right intensity of trap load

Trib Ht - Tributary height of area loads only

Notes:

Windward load on the monoslope roof was not generated, to comply with ASCE 7 Figure 27.3-1, Note 7.

All loads entered by the user or generated by program are specified (unfactored) loads. The program applies a load factor of 0.60 to wind loads before distributing them to the shearlines.

WoodWorks® Shearwalls

BUILDING MASSES

Level 2				Profile	Location [ft]		Magnitude [lbs,plf,psf]		Trib Width [ft]
Force Dir	Building Element	Block	Wall Line		Start	End	Start	End	
E-W	Roof	Block 1	1	Line	-4.00	54.00	133.0	133.0	
E-W	Roof	Block 1	3	Line	-4.00	54.00	133.0	133.0	
E-W	Roof	Block 2	3	Line	0.00	53.00	57.0	57.0	
E-W	Roof	Block 2	4	Line	0.00	53.00	57.0	57.0	
E-W	Roof	Block 3	2	Line	51.25	55.00	97.4	97.4	
E-W	Roof	Block 3	4	Line	51.25	55.00	97.4	97.4	
E-W	R Gable	Block 1	1	Line	-2.00	25.00	107.8	0.0	
E-W	L Gable	Block 1	1	Line	25.00	52.00	0.0	107.8	
E-W	L Gable	Block 1	3	Line	-2.00	25.00	107.8	0.0	
E-W	R Gable	Block 1	3	Line	25.00	52.00	0.0	107.8	
E-W	L Gable	Block 2	4	Line	2.00	26.50	97.8	0.0	
E-W	R Gable	Block 2	4	Line	26.50	51.00	0.0	97.8	
E-W	L Gable	Block 3	2	Line	51.25	53.00	0.0	7.0	
E-W	R Gable	Block 3	2	Line	51.25	51.25	7.0	0.0	
E-W	L Gable	Block 3	4	Line	51.25	51.25	7.0	0.0	
E-W	R Gable	Block 3	4	Line	51.25	53.00	0.0	7.0	
N-S	Roof	Block 1	A	Line	0.00	14.00	551.0	551.0	
N-S	Roof	Block 1		Line	0.00	14.00	551.0	551.0	
N-S	Roof	Block 2	C	Line	14.00	20.00	503.5	503.5	
N-S	Roof	Block 2	E	Line	14.00	20.00	503.5	503.5	
N-S	Roof	Block 3		Line	9.75	20.00	16.6	16.6	
N-S	Roof	Block 3	F	Line	9.75	20.00	54.6	54.6	
Both	Wall 1-1	n/a	1	Line	-2.00	52.00	48.6	48.6	
Both	Wall 2-1	n/a	2	Line	52.00	53.00	48.6	48.6	
Both	Wall 3-1	n/a	3	Line	-2.00	2.00	48.6	48.6	
Both	Wall 4-1	n/a	4	Line	2.00	53.00	48.6	48.6	
Both	Wall A-1	n/a	A	Line	0.00	14.00	48.6	48.6	
Both	Wall C-1	n/a	C	Line	14.00	20.00	48.6	48.6	
Both	Wall E-1	n/a		Line	0.00	9.75	48.6	48.6	
Both	Wall F-1	n/a	F	Line	9.75	20.00	48.6	48.6	
Level 1				Profile	Location [ft]		Magnitude [lbs,plf,psf]		Trib Width [ft]
Force Dir	Building Element	Block	Wall Line		Start	End	Start	End	
Both	Wall 1-1	n/a	1	Line	-2.00	52.00	48.6	48.6	
E-W	Floor F1	n/a	1	Line	0.00	3.00	105.0	105.0	
E-W	Floor F2	n/a	1	Line	3.00	51.00	150.0	150.0	
Both	Wall 2-1	n/a	2	Line	52.00	53.00	48.6	48.6	
Both	Wall 3-1	n/a	3	Line	-2.00	2.00	48.6	48.6	
E-W	Floor F1	n/a	3	Line	0.00	3.00	105.0	105.0	
Both	Wall 4-1	n/a	4	Line	2.00	53.00	48.6	48.6	
E-W	Floor F2	n/a	4	Line	3.00	51.00	150.0	150.0	
Both	Wall A-1	n/a	A	Line	0.00	14.00	48.6	48.6	
N-S	Floor F1	n/a	B	Line	0.00	14.00	382.5	382.5	
Both	Wall C-1	n/a	C	Line	14.00	20.00	48.6	48.6	
N-S	Floor F2	n/a		Line	14.00	20.00	360.0	360.0	
N-S	Floor F1	n/a	E	Line	0.00	14.00	382.5	382.5	
N-S	Floor F2	n/a	E	Line	14.00	20.00	360.0	360.0	
Both	Wall E-1	n/a		Line	0.00	9.75	48.6	48.6	
Both	Wall F-1	n/a	F	Line	9.75	20.00	48.6	48.6	
Both	Wall 1-1	n/a	1	Line	0.00	51.00	54.6	54.6	
Both	Wall 3-1	n/a	3	Line	0.00	3.00	54.6	54.6	
Both	Wall 4-1	n/a	4	Line	3.00	51.00	54.6	54.6	
Both	Wall B-1	n/a	B	Line	0.00	14.00	54.6	54.6	
Both	Wall C-1	n/a		Line	14.00	20.00	54.6	54.6	
Both	Wall D-1	n/a	D	Line	0.00	20.00	45.5	45.5	
Both	Wall E-1	n/a	E	Line	0.00	20.00	54.6	54.6	

WoodWorks® Shearwalls

BUILDING MASSES (continued)

Legend:

Force Dir - Direction in which the mass is used for seismic load generation, E-W, N-S, or Both

Building element - Roof, gable end, wall or floor area used to generate mass, wall line for user-applied masses, Floor F# - refer to Plan View for floor area number

Wall line - Shearline that equivalent line load is assigned to

Location - Start and end points of equivalent line load on wall line

Trib Width. - Tributary width; for user applied area loads only

WoodWorks® Shearwalls

SEISMIC LOADS

Level 2					
Force Dir	Profile	Location [ft]		Mag [lbs,plf,psf]	
		Start	End	Start	End
E-W	Line	-4.00	-2.00	33.1	33.1
E-W	Point	-2.00	-2.00	85	85
E-W	Line	-2.00	0.00	45.3	47.2
E-W	Line	0.00	2.00	61.4	63.4
E-W	Point	2.00	2.00	36	36
E-W	Line	2.00	25.00	63.4	97.8
E-W	Line	25.00	26.50	97.8	97.0
E-W	Line	26.50	51.00	97.0	60.5
E-W	Line	51.00	51.25	60.5	60.2
E-W	Line	51.25	52.00	86.2	84.7
E-W	Point	52.00	52.00	59	59
E-W	Line	52.00	53.00	84.7	83.7
E-W	Point	53.00	53.00	62	62
E-W	Line	53.00	54.00	57.4	57.4
E-W	Line	54.00	55.00	24.3	24.3
N-S	Point	0.00	0.00	690	690
N-S	Line	0.00	9.75	149.4	149.4
N-S	Point	9.75	9.75	7	7
N-S	Line	9.75	14.00	158.3	158.3
N-S	Point	14.00	14.00	387	387
N-S	Line	14.00	20.00	146.5	146.5
N-S	Point	20.00	20.00	608	608
Level 1					
Force Dir	Profile	Location [ft]		Mag [lbs,plf,psf]	
		Start	End	Start	End
E-W	Point	-2.00	-2.00	2307	2307
E-W	Point	-2.00	-2.00	47	47
E-W	Line	-2.00	0.00	6.7	6.7
E-W	Point	0.00	0.00	53	53
E-W	Line	0.00	2.00	28.9	28.9
E-W	Point	2.00	2.00	20	20
E-W	Line	2.00	3.00	28.9	28.9
E-W	Point	3.00	3.00	23	23
E-W	Line	3.00	51.00	35.1	35.1
E-W	Point	31.50	31.50	63	63
E-W	Point	51.00	51.00	76	76
E-W	Line	51.00	52.00	6.7	6.7
E-W	Point	52.00	52.00	33	33
E-W	Line	52.00	53.00	6.7	6.7
E-W	Point	53.00	53.00	2393	2393
E-W	Point	53.00	53.00	35	35
N-S	Point	0.00	0.00	375	375
N-S	Line	0.00	9.75	70.6	70.6
N-S	Point	9.75	9.75	3	3
N-S	Line	9.75	14.00	70.6	70.6
N-S	Point	14.00	14.00	25	25
N-S	Line	14.00	20.00	67.4	67.4
N-S	Point	20.00	20.00	354	354

Legend:

Loads in table can be accumulation of loads from several building masses, so they do not correspond with a particular building element.

Location - Start and end of load in direction perpendicular to seismic force direction

Notes:

All loads entered by the user or generated by program are specified (unfactored) loads. The program applies a load factor of 0.70 and redundancy factor to seismic loads before distributing them to the shearlines.

WoodWorks® Shearwalls

Design Summary

SHEARWALL DESIGN

Wind Shear Loads, Flexible Diaphragm

The following under-capacity shearlines were found:
Level 1: E-1

Seismic Loads, Flexible Diaphragm

The following under-capacity shearlines were found:

HOLDDOWN DESIGN

Wind Loads, Flexible Diaphragm

Under-capacity hold-downs were found on the following walls:
Level 1: E-1

Seismic Loads, Flexible Diaphragm

All hold-downs have sufficient design capacity.

This Design Summary does not include failures that occur due to excessive story drift from ASCE 7 CC.2.2 (wind) or 12.12 (seismic). Refer to Story Drift table in this report to verify this design criterion.

Refer to the Deflection table for possible issues regarding fastener slippage (SDPWS Table C4.2.2D).

ALL ELEMENTS INDICATED AS
"UNDER-CAPACITY" HAVE BEEN REVIEWED AND
EITHER APPROVED WITH MINOR OVERSTRESSES
AND/OR DESIGN REVISED ON FINAL DOCS

WoodWorks® Shearwalls

Flexible Diaphragm Wind Design ASCE 7 Directional (All Heights) Loads

SHEAR RESULTS

N-S Shearlines	W Gp	For Dir	ASD Shear Force [plf]			Asp-Cub		Allowable Shear [plf]					Resp. Ratio	
			v	vmax/vft	V [lbs]	Int	Ext	Int	Ext	Co	C	Cmb		V [lbs]
Line 1														
Level 2														
Ln1, Lev2	4	Both	15.9	-	857	1.0	1.0	75	75	-	A	150	8100	0.11
Level 1														
Ln1, Lev1	4	Both	35.0	-	1787	1.0	1.0	75	75	-	A	150	7650	0.23
Line 4														
Level 2														
Ln4, Lev2	4	Both	16.8	-	858	1.0	1.0	75	75	-	A	150	7650	0.11
Level 1														
Ln4, Lev1	4	Both	37.2	-	1787	1.0	1.0	75	75	-	A	150	7200	0.25
E-W Shearlines	W Gp	For Dir	ASD Shear Force [plf]			Asp-Cub		Allowable Shear [plf]					Resp. Ratio	
			v	vmax/vft	V [lbs]	Int	Ext	Int	Ext	Co	C	Cmb	V [lbs]	
Line A														
Level 2														
LnA, Lev2	-	W->E	-	-	2777	-	-	-	-	-	-	-	5096	-
	-	E->W	-	-	2998	-	-	-	-	-	-	-	5096	-
Wall A-1	1	W->E	-	-	2777	1.0	1.0	0	364	-	A	-	5096	-
	1	E->W	-	-	2998	1.0	1.0	0	364	-	A	-	5096	-
Seg. 1	-	W->E	462.8	-228.2	1388	1.0	1.0	0	364	-	-	364	1092	1.27*
	-	E->W	499.7	-246.4	1499	1.0	1.0	0	364	-	-	364	1092	1.37*
Open. 1	-	W->E	-	518.2	4146	-	-	0	364	-	-	364	2912	1.42
	-	E->W	-	559.6	4477	-	-	0	364	-	-	364	2912	1.54
Seg. 2	-	W->E	462.8	-228.2	1388	1.0	1.0	0	364	-	-	364	1092	1.27*
	-	E->W	499.7	-246.4	1499	1.0	1.0	0	364	-	-	364	1092	1.37*
Line B														
Level 1														
LnB, Lev1	-	W->E	-	-	5224	-	-	-	-	-	-	-	12544	-
	-	E->W	-	-	5445	-	-	-	-	-	-	-	12544	-
Wall B-1	2	W->E	-	-	5224	1.0	1.0	0	896	-	A	-	12544	-
	2^	E->W	-	-	5445	1.0	1.0	0	896	-	A	-	12544	-
Seg. 1	-	W->E	653.0	31.9	2449	1.0	1.0	0	896	-	-	896	3360	0.73
	-	E->W	680.7	33.2	2553	1.0	1.0	0	896	-	-	896	3360	0.76
Open. 1	-	W->E	-	828.2	4969	-	-	0	896	-	-	896	5376	0.92
	-	E->W	-	863.3	5180	-	-	0	896	-	-	896	5376	0.96
Seg. 2	-	W->E	653.0	31.9	2775	1.0	1.0	0	896	-	-	896	3808	0.73
	-	E->W	680.7	33.2	2893	1.0	1.0	0	896	-	-	896	3808	0.76
Line E														
LnE, Lev1	-	W->E	-	-	5211	-	-	-	-	-	-	-	3584	-
	-	E->W	-	-	5449	-	-	-	-	-	-	-	3584	-
Wall E-1	3	W->E	-	-	5211	-	1.0	-	686	-	-	-	3584	-
	3^	E->W	-	-	5449	-	1.0	-	686	-	-	-	3584	-
Seg. 1	-	W->E	868.5	0.0	2605	-	.87	-	597	-	-	597	1792	1.45*
	-	E->W	908.2	0.0	2725	-	.87	-	597	-	-	597	1792	1.52*
Seg. 2	-	W->E	868.5	0.0	2605	-	.87	-	597	-	-	597	1792	1.45*
	-	E->W	908.2	0.0	2725	-	.87	-	597	-	-	597	1792	1.52*
Line F														
Level 2														
LnF, Lev2	-	W->E	-	-	2764	-	-	-	-	-	-	-	3731	-
	-	E->W	-	-	3002	-	-	-	-	-	-	-	3731	-
Wall F-1	1	W->E	-	-	2764	1.0	1.0	0	364	-	A	-	3731	-
	1^	E->W	-	-	3002	1.0	1.0	0	364	-	A	-	3731	-
Seg. 1	-	W->E	526.4	19.1	1448	1.0	1.0	0	364	-	-	364	1001	1.45*
	-	E->W	571.8	20.8	1572	1.0	1.0	0	364	-	-	364	1001	1.57*
Open. 1	-	W->E	-	532.7	2663	-	-	0	364	-	-	364	1820	1.46
	-	E->W	-	578.6	2893	-	-	0	364	-	-	364	1820	1.59
Seg. 2	-	W->E	526.4	19.1	1316	1.0	1.0	0	364	-	-	364	910	1.45*
	-	E->W	571.8	20.8	1430	1.0	1.0	0	364	-	-	364	910	1.57*

Legend:

W Gp - Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall. ""^" means that this wall is critical for all walls in the Standard Wall group.

For Dir - Direction of wind force along shearline.

v - Design shear force on segment = ASD-factored shear force per unit length of full-height sheathing (FHS)

vmax/vft - Perforated walls: Collector and in-plane anchorage force as per SDPWS eqn. 4.3-9 = V/FHS/Co. FHS is factored for narrow segments

WoodWorks® Shearwalls

as per 4.3.4.3

Force-transfer walls: Shear force in piers above and below either openings or piers beside opening(s). Aspect ratio factor does not apply to these piers.

V - ASD factored shear force. For shearline: total shearline force. For wall: total of all segments on wall. For segment: force on segment

Asp/Cub – For wall: Unblocked structural wood panel factor Cub from SDPWS 4.3.3.2. For segment or force-transfer pier: Aspect Ratio Factor from SDPWS 4.3.4.2.

Int - Unit shear capacity of interior sheathing; Ext - Unit shear capacity of exterior sheathing. For wall: Unfactored. For segment: Include Cub factor and aspect ratio adjustments.

Co - Adjustment factor for perforated walls from SDPWS Equation 4.3-5.

C - Sheathing combination rule, A = Add capacities, S = Strongest side or twice weakest, G = Stiffness-based using SDPWS 4.3-3.

Cmb - Combined interior and exterior unit shear capacity including perforated wall factor Co.

V – Total factored shear capacity of shearline, wall or segment.

Crit Resp – Response ratio = v/Cmb = design shear force/unit shear capacity. "S" indicates that the wind design criterion was critical in selecting wall.

Notes:

Refer to Elevation View diagrams for individual level for uplift anchorage force t for perforated walls given by SDPWS 4.3.6.4.2,4.

***WARNING - Design capacity has been exceeded.**

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WoodWorks® Shearwalls

HOLD-DOWN DESIGN (flexible wind design)

Level 1 Line-Wall	Posit'n	Location [ft]		Load Case	Tensile ASD Holddown Force [lbs]				Hold-down	Cap [lbs]	Crit Resp.
		X	Y		Shear	Dead	Uplift	Cmb'd			
Line 1											
	V Elem	0.00	-1.87	Min	201			201	Refer to upper level		
1-1	L End	0.00	0.12	Min	320			320	HDU5-SDS2.	5645	0.06
1-1	R End	0.00	50.88	Min	320			320	HDU5-SDS2.	5645	0.06
	V Elem	0.00	51.88	Min	201			201	Refer to upper level		
Line 4											
	V Elem	20.00	2.13	Min	203			203	Refer to upper level		
4-1	L End	20.00	3.13	Min	341			341	HDU5-SDS2.	5645	0.06
4-1	R End	20.00	50.88	Min	341			341	HDU5-SDS2.	5645	0.06
	V Elem	20.00	52.88	Min	203			203	Refer to upper level		
Line A											
	V Elem	0.12	-2.00	1	1636			1636	Refer to upper level		
	V Elem	13.88	-2.00	1	1766			1766	Refer to upper level		
Line B											
B-1	L End	0.12	0.00	1	3457			3457	HDU5-SDS2.	5645	0.61
B-1	R End	13.88	0.00	1	3604			3604	HDU5-SDS2.	5645	0.64
Line E											
E-1	L End	0.12	51.00	1	8622			8622	HDU5-SDS2.	5645	1.53*
E-1	L Op 1	2.88	51.00	1	9016			9016	HDU5-SDS2.	5645	1.60*
E-1	R Op 1	17.13	51.00	1	8622			8622	HDU5-SDS2.	5645	1.53*
E-1	R End	19.88	51.00	1	9016			9016	HDU5-SDS2.	5645	1.60*
Line F											
	V Elem	9.87	53.00	1	2239			2239	Refer to upper level		
	V Elem	19.88	53.00	1	2432			2432	Refer to upper level		
Level 2											
Level 2 Line-Wall	Posit'n	Location [ft]		Load Case	Tensile ASD Holddown Force [lbs]				Hold-down	Cap [lbs]	Crit Resp.
		X	Y		Shear	Dead	Uplift	Cmb'd			
Line 1											
1-1	L End	0.00	-1.87	Min	201			201	HDU5-SDS2.	5645	0.04
1-1	R End	0.00	51.88	Min	201			201	HDU5-SDS2.	5645	0.04
Line 4											
4-1	L End	20.00	2.13	Min	203			203	HDU5-SDS2.	5645	0.04
4-1	R End	20.00	52.88	Min	203			203	HDU5-SDS2.	5645	0.04
Line A											
A-1	L End	0.12	-2.00	1	1636			1636	HDU5-SDS2.	5645	0.29
A-1	R End	13.88	-2.00	1	1766			1766	HDU5-SDS2.	5645	0.31
Line F											
F-1	L End	9.87	53.00	1	2239			2239	HDU5-SDS2.	5645	0.40
F-1	R End	19.88	53.00	1	2432			2432	HDU5-SDS2.	5645	0.43

Legend:

Line-Wall:

At wall or opening – Shearline and wall number At vertical element - Shearline

Posit'n - Position of stud that hold-down is attached to:

V Elem - Vertical element: column or strengthened studs required where not at wall end or opening

L or R End - At left or right wall end

L or R Op n - At left or right side of opening n

t @ Op n - Uplift force t at opening n from offset opening in perforated wall above, from SDPWS 4.3.6.2.1

Location - Co-ordinates in Plan View

Load Case - Results are for critical load case:

ASCE 7 All Heights: Case 1 or 2 from Fig. 27.3-8

ASCE 7 Low-rise: Windward corner(s) and Case A or B from Fig. 28.3-1

ASCE 7 Minimum loads (27.1.5 / 28.3.4)

Hold-down Forces:

Shear – Wind shear overturning component, based on shearline force, factored for ASD by 0.60. For perforated walls, T from SDPWS 4.3-8 is used.

Dead – Dead load resisting component, factored for ASD by 0.60

Uplift - Uplift wind load component, factored for ASD by 0.60. For perforated walls, T from SDPWS 4.3-8 is used.

Cmb'd - Sum of ASD-factored overturning, dead and uplift forces. May also include the uplift force t from perforated walls from SDPWS 4.3.6.2.1 when openings are staggered.

Hold-down – Device used from hold-down database

Cap – Allowable ASD tension load

Crit. Resp. - Critical Response = Combined ASD force / Allowable ASD tension load

Notes:

Refer to Shear Results table for factor Co, and shearline dimensions table for the sum of Li, used to calculate tension force T for perforated walls

WoodWorks® Shearwalls

from SDPWS Eqn. 4.3-8.

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AND/OR DESIGN REVISED ON FINAL DOCS

SOFTWARE BY DEFAULT PLACES AN HDU5.
THERE IS NO WAY TO REMOVE THIS. EOR HAS
REVIEWED THE ANALYSIS AND SELECTED THE
NECESSARY SIZE AND LOCATION OF THE HD'S

WoodWorks® Shearwalls

COLLECTOR FORCES (flexible wind design)

Level 1					Drag Strut Force [lbs]		Strap/Blocking Force [lbs]	
Line-Wall	Position on Wall or Opening	Location [ft]		Load Case	-->	<--	-->	<--
		X	Y					
Line B								
B-1	Left Opening 1	3.75	0.00	1	-1280	1334		
B-1	Right Opening 1	9.75	0.00	1	1450	-1512		
B-1	Left Opening 1	3.75	0.00				2329	2428
B-1	Right Opening 1	9.75	0.00				2640	2752
Line E								
E-1	Left Opening 1	3.00	51.00	1	1824	-1907		
E-1	Right Opening 1	17.00	51.00	1	-1824	1907		
Level 2					Drag Strut Force [lbs]		Strap/Blocking Force [lbs]	
Line-Wall	Position on Wall or Opening	Location [ft]		Load Case	-->	<--	-->	<--
		X	Y					
Line A								
A-1	Left Opening 1	3.00	-2.00	1	-1280	1382		
A-1	Right Opening 1	11.00	-2.00	1	1280	-1382		
A-1	Left Opening 1	3.00	-2.00				2073	2238
A-1	Right Opening 1	11.00	-2.00				2073	2238
Line F								
F-1	Left Opening 1	12.50	53.00	1	-689	748		
F-1	Right Opening 1	17.50	53.00	1	626	-680		
F-1	Left Opening 1	12.50	53.00				1395	1515
F-1	Right Opening 1	17.50	53.00				1268	1378

Legend:

Line-Wall - Shearline and wall number

Position ... - Side of opening or wall end that drag strut is attached to

Location - Co-ordinates in Plan View

Load Case - Results are for critical load case:

ASCE 7 All heights Case 1 or 2

ASCE 7 Low-rise corner; Case A or B

Drag strut Force - Axial force in transfer element at openings, gaps, or changes in design shear along shearline. + : tension; - : compression.

Based on ASD-factored shearline force (vmax from 4.3.6.4.1.1 for perforated walls)

Strap/Blocking Force - For force-transfer walls, force transferred from above and below opening to shearwall pier.

-> Due to shearline force in the west-to-east or south-to-north direction

<- Due to shearline force in the east-to-west or north-to-south direction

WoodWorks® Shearwalls

MWFRS DEFLECTION (flexible wind design)

These deflections are used to determine shearwall stiffness for force distribution

Wall, segment	W Gp	Dir	Srf	v plf	b ft	h ft	Bending A sq.in	Defl in	Ga kips/in	Nail slip Vn lbs	en in	Shear Defl in	Hold Defl in	Total Defl in
Level 1														
Line 1														
1-1	4	Both	Both	35.0	51.00	9.10	16.5	.000	4.2	61	.030	.038	0.03	0.07
Line 4														
4-1	4	Both	Both	37.2	48.00	9.10	16.5	.000	4.2	61	.030	.041	0.04	0.08
Line B														
B-1	2	W->E	-	-	14.00	9.10	-	-	-	-	-	-	-	0.79
		E->W	-	-	14.00	9.10	-	-	-	-	-	-	-	0.81
B-1,1		W->E	Ext	653.0	3.75	8.22	16.5	.035	38.6	149	.017	.139	0.66	0.83
		W->E	Int	0.0					0.0	0	.000	.000		
		E->W	Ext	680.7	3.75	8.22	16.5	.036	38.6	149	.017	.145	0.67	0.85
		E->W	Int	0.0					0.0	0	.000	.000		
B-1,2		W->E	Ext	653.0	4.25	8.22	16.5	.031	38.6	149	.017	.139	0.58	0.75
		W->E	Int	0.0					0.0	0	.000	.000		
		E->W	Ext	680.7	4.25	8.22	16.5	.032	38.6	149	.017	.145	0.59	0.77
		E->W	Int	0.0					0.0	0	.000	.000		
Line E														
E-1,1	3	W->E	Ext	868.5	3.00	9.10	16.5	.076	25.2	172	.025	.313	1.10	1.49
		E->W	Ext	908.2	3.00	9.10	16.5	.079	25.2	172	.025	.328	1.12	1.53
E-1,2		W->E	Ext	868.5	3.00	9.10	16.5	.076	25.2	172	.025	.313	1.10	1.49
		E->W	Ext	908.2	3.00	9.10	16.5	.079	25.2	172	.025	.328	1.12	1.53
Wall, segment	W Gp	Dir	Srf	v plf	b ft	h ft	Bending A sq.in	Defl in	Ga kips/in	Nail slip Vn lbs	en in	Shear Defl in	Hold Defl in	Total Defl in
Level 2														
Line 1														
1-1	4	Both	Both	15.9	54.00	8.10	16.5	.000	4.2	61	.030	.015	0.03	0.05
Line 4														
4-1	4	Both	Both	16.8	51.00	8.10	16.5	.000	4.2	61	.030	.016	0.03	0.05
Line A														
A-1	1	W->E	-	-	14.00	8.10	-	-	-	-	-	-	-	1.13
		E->W	-	-	14.00	8.10	-	-	-	-	-	-	-	1.18
A-1,1		W->E	Ext	462.8	3.00	7.22	16.5	.021	13.4	182	.030	.249	0.86	1.13
		W->E	Int	0.0					0.0	0	.000	.000		
		E->W	Ext	499.7	3.00	7.22	16.5	.023	13.4	182	.030	.268	0.89	1.18
		E->W	Int	0.0					0.0	0	.000	.000		
A-1,2		W->E	Ext	462.8	3.00	7.22	16.5	.021	13.4	182	.030	.249	0.86	1.13
		W->E	Int	0.0					0.0	0	.000	.000		
		E->W	Ext	499.7	3.00	7.22	16.5	.023	13.4	182	.030	.268	0.89	1.18
		E->W	Int	0.0					0.0	0	.000	.000		
Line F														
F-1	1	W->E	-	-	10.25	8.10	-	-	-	-	-	-	-	1.24
		E->W	-	-	10.25	8.10	-	-	-	-	-	-	-	1.30
F-1,1		W->E	Ext	526.4	2.75	6.72	16.5	.023	13.4	182	.030	.263	0.90	1.19
		W->E	Int	0.0					0.0	0	.000	.000		
		E->W	Ext	571.8	2.75	6.72	16.5	.025	13.4	182	.030	.286	0.94	1.25
		E->W	Int	0.0					0.0	0	.000	.000		
F-1,2		W->E	Ext	526.4	2.50	6.72	16.5	.025	13.4	182	.030	.263	1.00	1.28
		W->E	Int	0.0					0.0	0	.000	.000		
		E->W	Ext	571.8	2.50	6.72	16.5	.027	13.4	182	.030	.286	1.03	1.35
		E->W	Int	0.0					0.0	0	.000	.000		

Legend:

Wall, segment - Wall and segment between openings, e.g. B-3, 2 = second segment on Wall 3 on Shearline B

W Gp - Wall design group defined in Sheathing and Materials tables, where it shows associated Standard Wall.

Dir - Force direction

Srf - Wall surface, interior or exterior for perimeter walls, 1 or 2 for interior partitions

v - ASD shear force per unit distance on wall segment. For perforated walls, v_{max} from SDPWS 4.3-9 is used, as per 4.3.2.1. For force-transfer walls, unit shear force in pier beside opening(s) is used.

b - Segmented wall or force-transfer wall segments: Width of wall segment between openings. Perforated wall: Sum of FHS segments, modified as per SDPWS 4.3.2.1. Force-transfer wall: Length of wall including openings.

h - Wall height. For force-transfer piers, distance from bottom of opening to top of wall is shown; for end segments, results using that distance and the wall height are averaged, as per APA T555.

Defl - Horizontal shearwall deflection due to given term:

Bending = $8vh^3 / Eab$ Cub; A - Cross sectional area of segment end stud(s); E - stud mod. of elasticity in Framing Materials table

Shear = $vh / 1000 Ga$ Cub. Ga - $vw / (vw / Gt + 0.75 en)$, from SDPWS Ex. C4.3.2-1; vw - ASD sheathing capacity; Gt - Shear stiffness from C4.3.3.2, value is in Sheathing Materials table; en - Nail slip from table C4.2.2D; Vn - Shear force per nail along panel edge using vv

Hold - Hold-down = $da \times h / b$; refer to Hold-down Displacement table for components of da. For force-transfer walls, hold-down device at end

WoodWorks® Shearwalls

of wall is applied to all segments, as per APA T555.

Cub – Unblocked factor from 4.3.2.2, shown in the Shear Results table.

Total defl = Deflection from bending + shear + hold-down, as per SDPWS C4.3.2-1. For force-transfer walls, the average of the values for the segments, as per APA T555.

WoodWorks® Shearwalls

MWFRS HOLD-DOWN DISPLACEMENT (flexible wind design)

These displacements are used to determine deflections for force distribution

Wall, segment	Dir	Hold-down	Uplift force lbs	Elong / Disp			Slippage		Shrink da in	Crush+ Extra in	Total da in	Hold Defl in
				Manuf in	Add in	da in	Pf lbs	da in				
Level 1												
Line 1												
1-1	Both	HDU5-SDS	320	.007	.000	0.007	-	-	.138	0.04	0.18	0.03
Line 4												
4-1	Both	HDU5-SDS	341	.007	.000	0.007	-	-	.138	0.04	0.18	0.04
Line B												
B-1,1	W->E	HDU5-SDS	5754	.117	.005	0.123	-	-	.138	0.04	0.30	0.66
	E->W	HDU5-SDS	5998	.122	.006	0.128	-	-	.138	0.04	0.31	0.67
B-1,2	W->E	HDU5-SDS	5706	.116	.005	0.122	-	-	.138	0.04	0.30	0.58
	E->W	HDU5-SDS	5948	.121	.006	0.127	-	-	.138	0.04	0.30	0.59
Line E												
E-1,1	W->E	HDU5-SDS	8622	.176	.008	0.184	-	-	.138	0.04	0.36	1.10
	E->W	HDU5-SDS	9016	.184	.009	0.192	-	-	.138	0.04	0.37	1.12
E-1,2	W->E	HDU5-SDS	8622	.176	.008	0.184	-	-	.138	0.04	0.36	1.10
	E->W	HDU5-SDS	9016	.184	.009	0.192	-	-	.138	0.04	0.37	1.12
Wall, segment	Dir	Hold-down	Uplift force lbs	Manuf in	Add in	da in	Pf lbs	da in	Shrink da in	Crush+ Extra in	Total da in	Hold Defl in
Level 2												
Line 1												
1-1	Both	HDU5-SDS	201	.008	.000	0.008	-	-	.168	0.04	0.22	0.03
Line 4												
4-1	Both	HDU5-SDS	203	.008	.000	0.008	-	-	.168	0.04	0.22	0.03
Line A												
A-1,1	W->E	HDU5-SDS	3647	.149	.002	0.151	-	-	.168	0.04	0.36	0.86
	E->W	HDU5-SDS	3939	.160	.002	0.163	-	-	.168	0.04	0.37	0.89
A-1,2	W->E	HDU5-SDS	3647	.149	.002	0.151	-	-	.168	0.04	0.36	0.86
	E->W	HDU5-SDS	3939	.160	.002	0.163	-	-	.168	0.04	0.37	0.89
Line F												
F-1,1	W->E	HDU5-SDS	3894	.159	.002	0.161	-	-	.168	0.04	0.37	0.90
	E->W	HDU5-SDS	4230	.172	.003	0.175	-	-	.168	0.04	0.38	0.94
F-1,2	W->E	HDU5-SDS	3934	.160	.002	0.163	-	-	.168	0.04	0.37	1.00
	E->W	HDU5-SDS	4273	.174	.003	0.177	-	-	.168	0.04	0.38	1.03

Legend:

Wall, segment – Wall and segment between openings, e.g. B-3, 2 = second segment on Wall 3 on Shearline B

Dir - Force direction

Uplift force (P) – Accumulated ASD hold-down tension force from overturning, dead and wind uplift. For perforated walls, T from SDPWS 4.3-8 is used for overturning

da – Vertical displacements due to the following components:

Elong/Disp – Elongation when slippage calculated separately; displacement when combined elongation/slippage used

Manuf - Using manufacturer's value for anchor bolt length, or no bolt contribution for connector-only elongation.

Unless marked with * = (ASD uplift force / ASD hold-down capacity) x max ASD elongation or displacement

* - Maximum strength-level elongation or displacement is used. May result in higher than actual displacements for lightly loaded hold-downs, causing the segment to draw less force due to lower than actual stiffness.

Add - Due to longer anchor bolt length than manufacturer's value, or entire bolt length for connector-only elongation = $PL / (Ab \times Es)$;

Ab – bolt cross-sectional area;

Es = steel modulus = 29000000 psi;

L = Lb – Lh;

Lb = Total bolt length shown in Storey Information table;

Lh = Manufacturer's anchor bolt length for given displacement/elongation from hold-down database.

Slippage – Due to vertical slippage of hold-down fasteners attached to stud(s) when not combined with elongation

Pf = ASD uplift force P / number of fasteners

Bolts: = $Pf / (270,000 D^{1.5})$ (NDS 11.3.6) ; D = bolt diameter

Nails: = en, from SDPWS Table C4.2.2D using Pf for Vn and values for Wood Structural Panel

Shrink - Wood shrinkage = $0.002 \times (15\% \text{ fabrication} - 10\% \text{ in-service moisture contents}) \times Ls$

Ls = Perp.-to-grain length between fasteners subject to shrinkage, shown in Storey Information table

Crush + Extra – 0.04" wood crushing at compression end of wall segment plus extra displacement due to mis-cuts, gaps, etc.

Total da = Elong/Disp + Slippage + Shrink + Crush + Extra

Hold Defl – Horizontal deflection = $h/b \times da$ (4th term in the deflection equation SDPWS C4.3.2-1)

h = wall height; b = segment length between openings; h,b values in Deflection table. For end segments from force-transfer walls, h is the average of the distance from bottom of opening to top of wall and the wall height.

WoodWorks® Shearwalls

Flexible Diaphragm Seismic Design

SEISMIC INFORMATION

Level	Mass [lbs]	Area [sq.ft]	Story Shear [lbs]		Diaphragm Force [lbs]					
			E-W	N-S	E-W:	Fpx	Design	N-S:	Fpx	Design
2	37719	1066.3	4700	4700		3422	3422		3422	3422
1	30983	1002.0	2150	2150		2811	11035		2811	2811
All	68702	-	6850	6850		-	-		-	-

Legend:

Mass – Sum of all generated and input building masses on level = w_x in ASCE 7 equation 12.8-12.

Story Shear – Total unfactored (strength-level) shear force induced at level x , = F_x in ASCE 7 equation 12.8-11.

Diaphragm Force – Minimum ASD-factored force for diaphragm design, used by Shearwalls only for drag strut forces, as per Exception to 12.10.2.1. F_{px} is from Eqns. 12.10-1, -2, and -3. *Design* = The greater of the story shear and F_{px} + transfer forces from discontinuous shearlines, factored by overstrength (ω) as per 12.10.1.1. $\omega = 2.5$ as per 12.2-1.

Redundancy Factor ρ (rho):

E-W 1.00, N-S 1.00

Automatically calculated according to ASCE 7 12.3.4.2.

Vertical Earthquake Load E_v

$E_v = 0$ for Seismic Design Category A as per ASCE 7 12.4.2.2.

WoodWorks® Shearwalls

SHEAR RESULTS (flexible seismic design)

N-S Shearlines	W Gp	For Dir	ASD Shear Force [plf]			Asp-Cub		Allowable Shear [plf]				Resp. Ratio		
			v	vmax/vft	V [lbs]	Int	Ext	Int	Ext	Co	C		Cmb	V [lbs]
Line 1														
Level 2														
Ln1, Lev2	4	Both	30.0	-	1621	1.0	1.0	75	75	-	A	150	8100	0.20
Level 1														
Ln1, Lev1	4	Both	46.7	-	2382	1.0	1.0	75	75	-	A	150	7650	0.31
Line 4														
Level 2														
Ln4, Lev2	4	Both	32.7	-	1669	1.0	1.0	75	75	-	A	150	7650	0.22
Level 1														
Ln4, Lev1	4^	Both	50.3	-	2412	1.0	1.0	75	75	-	A	150	7200	0.34
E-W Shearlines	W Gp	For Dir	ASD Shear Force [plf]			Asp-Cub		Allowable Shear [plf]				Resp. Ratio		
			v	vmax/vft	V [lbs]	Int	Ext	Int	Ext	Co	C		Cmb	V [lbs]
Line A														
Level 2														
LnA, Lev2	-	Both	-	-	1615	-	-	-	-	-	-	-	3640	-
Wall A-1	1	Both	-	-	1615	1.0	1.0	0	260	-	S	-	3640	-
Seg. 1	-	Both	269.1	-132.7	807	1.0	1.0	0	260	-	-	260	780	1.04*
Open. 1	-	Both	-	301.4	2411	-	-	0	260	-	-	260	2080	1.16
Seg. 2	-	Both	269.1	-132.7	807	1.0	1.0	0	260	-	-	260	780	1.04*
Line B														
Level 1														
LnB, Lev1	-	Both	-	-	2354	-	-	-	-	-	-	-	8960	-
Wall B-1	2	Both	-	-	2354	1.0	1.0	0	640	-	S	-	8960	-
Seg. 1	-	Both	294.3	14.4	1104	1.0	1.0	0	640	-	-	640	2400	0.46
Open. 1	-	Both	-	373.3	2240	-	-	0	640	-	-	640	3840	0.58
Seg. 2	-	Both	294.3	14.4	1251	1.0	1.0	0	640	-	-	640	2720	0.46
Line E														
LnE, Lev1	-	Both	-	-	2440	-	-	-	-	-	-	-	2560	-
Wall E-1	3	Both	-	-	2440	-	1.0	-	490	-	-	-	2560	-
Seg. 1	-	Both	406.7	0.0	1220	-	.87	-	427	-	-	427	1280	0.95
Seg. 2	-	Both	406.7	0.0	1220	-	.87	-	427	-	-	427	1280	0.95
Line F														
Level 2														
LnF, Lev2	-	Both	-	-	1675	-	-	-	-	-	-	-	2665	-
Wall F-1	1	Both	-	-	1675	1.0	1.0	0	260	-	S	-	2665	-
Seg. 1	-	Both	319.0	11.6	877	1.0	1.0	0	260	-	-	260	715	1.23*
Open. 1	-	Both	-	322.8	1614	-	-	0	260	-	-	260	1300	1.24
Seg. 2	-	Both	319.0	11.6	798	1.0	1.0	0	260	-	-	260	650	1.23*

Legend:

W Gp - Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall. "^" means that this wall is critical for all walls in the Standard Wall group.

For Dir - Direction of seismic force along shearline.

v - Design shear force on segment = ASD-factored shear force per unit length of full-height sheathing (FHS)

vmax/vft - Perforated walls: Collector and in-plane anchorage force as per SDPWS eqn. 4.3-9 = V/FHS/Co. FHS is factored for narrow segments as per 4.3.4.3

Force-transfer walls: Shear force in piers above and below either openings or piers beside opening(s). Aspect ratio factor does not apply to these piers.

V - ASD factored shear force. For shearline: total shearline force. For wall: total of all segments on wall. For segment: force on segment

Asp/Cub - For wall: Unblocked structural wood panel factor Cub from SDPWS 4.3.3.2. For segment or force-transfer pier: Aspect Ratio Factor from SDPWS 4.3.4.2.

Int - Unit shear capacity of interior sheathing; Ext - Unit shear capacity of exterior sheathing. For wall: Unfactored. For segment: Include Cub factor and aspect ratio adjustments.

Co - Adjustment factor for perforated walls from SDPWS Equation 4.3-5.

C - Sheathing combination rule, A = Add capacities, S = Strongest side or twice weakest, G = Stiffness-based using SDPWS 4.3-3.

Cmb - Combined interior and exterior unit shear capacity including perforated wall factor Co.

V - Total factored shear capacity of shearline, wall or segment.

Crit Resp - Response ratio = v/Cmb = design shear force/unit shear capacity. "W" indicates that the wind design criterion was critical in selecting wall.

Notes:

Refer to Elevation View diagrams for individual level for uplift anchorage force t for perforated walls given by SDPWS 4.3.6.4.2.4.

*WARNING - Design capacity has been exceeded.

WoodWorks® Shearwalls

HOLD-DOWN DESIGN (flexible seismic design)

Level 1				Tensile ASD Holddown Force [lbs]				Cmb'd	Hold-down	Cap [lbs]	Crit Resp.
Line-Wall	Posit'n	Location [ft]		Shear	Dead	Ev					
		X	Y								
Level 1											
Line 1	V Elem	0.00	-1.87	380			380	Refer to upper level			
1-1	L End	0.00	0.12	427			427	HDU5-SDS2.	5645	0.08	
1-1	R End	0.00	50.88	427			427	HDU5-SDS2.	5645	0.08	
	V Elem	0.00	51.88	380			380	Refer to upper level			
Line 4	V Elem	20.00	2.13	396			396	Refer to upper level			
4-1	L End	20.00	3.13	460			460	HDU5-SDS2.	5645	0.08	
4-1	R End	20.00	50.88	460			460	HDU5-SDS2.	5645	0.08	
	V Elem	20.00	52.88	396			396	Refer to upper level			
Line A	V Elem	0.12	-2.00	951			951	Refer to upper level			
	V Elem	13.88	-2.00	951			951	Refer to upper level			
Line B	B-1	L End	0.12	0.00	1558		1558	HDU5-SDS2.	5645	0.28	
	B-1	R End	13.88	0.00	1558		1558	HDU5-SDS2.	5645	0.28	
Line E	E-1	L End	0.12	51.00	4038		4038	HDU5-SDS2.	5645	0.72	
	E-1	L Op 1	2.88	51.00	4038		4038	HDU5-SDS2.	5645	0.72	
	E-1	R Op 1	17.13	51.00	4038		4038	HDU5-SDS2.	5645	0.72	
	E-1	R End	19.88	51.00	4038		4038	HDU5-SDS2.	5645	0.72	
Line F	V Elem	9.87	53.00	1357			1357	Refer to upper level			
	V Elem	19.88	53.00	1357			1357	Refer to upper level			
Level 2											
Line-Wall	Posit'n	Location [ft]		Shear	Dead	Ev	Cmb'd	Hold-down	Cap [lbs]	Crit Resp.	
		X	Y								
Level 2											
Line 1	1-1	L End	0.00	-1.87	380		380	HDU5-SDS2.	5645	0.07	
	1-1	R End	0.00	51.88	380		380	HDU5-SDS2.	5645	0.07	
Line 4	4-1	L End	20.00	2.13	396		396	HDU5-SDS2.	5645	0.07	
	4-1	R End	20.00	52.88	396		396	HDU5-SDS2.	5645	0.07	
Line A	A-1	L End	0.12	-2.00	951		951	HDU5-SDS2.	5645	0.17	
	A-1	R End	13.88	-2.00	951		951	HDU5-SDS2.	5645	0.17	
Line F	F-1	L End	9.87	53.00	1357		1357	HDU5-SDS2.	5645	0.24	
	F-1	R End	19.88	53.00	1357		1357	HDU5-SDS2.	5645	0.24	

Legend:

Line-Wall:

At wall or opening – Shearline and wall number

At vertical element - Shearline

Posit'n - Position of stud that hold-down is attached to:

V Elem - Vertical element: column or strengthened studs required where not at wall end or opening

L or R End - At left or right wall end

L or R Op n - At left or right side of opening n

t @ Op n - Uplift force t at opening n from offset opening in perforated wall above, from SDPWS 4.3.6.2.1

Location - Co-ordinates in Plan View

Hold-down Forces:

Shear – Seismic shear overturning component, factored for ASD by 0.7. For perforated walls, T from SDPWS 4.3-8 is used

Dead – Dead load resisting component, factored for ASD by 0.60

Ev – Vertical seismic load effect from ASCE 7 12.4.2.2 = -0.2S_{ds} x ASD seismic factor x unfactored D = 0.000 x factored D. Refer to Seismic

Information table for more details.

Cmb'd - Sum of ASD-factored overturning, dead and vertical seismic forces. May also include the uplift force t from perforated walls from SDPWS 4.3.6.2.1 when openings are staggered.

Hold-down – Device used from hold-down database

Cap – Allowable ASD tension load

Crit. Resp. – Critical Response = Combined ASD force/Allowable ASD tension load

Notes:

Combined force from ASCE 7 2.4.1 load combination 10 = - (0.6D - 0.7Ev + 0.7Eh); Eh (from 12.4.2.1) = - shear overturning force

Refer to Shear Results table for factor Co, and shearline dimensions table for the sum of Li, used to calculate tension force T for perforated walls from SDPWS Eqn. 4.3-8.

SOFTWARE BY DEFAULT PLACES AN HDU5. THERE IS NO WAY TO REMOVE THIS. EOR HAS REVIEWED THE ANALYSIS AND SELECTED THE NECESSARY SIZE AND LOCATION OF THE HD'S

WoodWorks® Shearwalls

COLLECTOR FORCES (flexible seismic design)

Level 1				Drag Strut Force [lbs]		Strap/Blocking Force [lbs]	
Line-Wall	Position on Wall or Opening	Location [ft]		--->	<---	--->	<---
		X	Y				
Line B							
	Shearline force			5418	5418		
B-1	Left Opening 1	3.75	0.00	-1327	1327		
B-1	Right Opening 1	9.75	0.00	1504	-1504		
B-1	Left Opening 1	3.75	0.00			1050	1050
B-1	Right Opening 1	9.75	0.00			1190	1190
Line E							
	Shearline force			5617	5617		
E-1	Left Opening 1	3.00	51.00	1966	-1966		
E-1	Right Opening 1	17.00	51.00	-1966	1966		
Level 2				Drag Strut Force [lbs]		Strap/Blocking Force [lbs]	
Line-Wall	Position on Wall or Opening	Location [ft]		--->	<---	--->	<---
		X	Y				
Line A							
	Shearline force			1680	1680		
A-1	Left Opening 1	3.00	-2.00	-774	774		
A-1	Right Opening 1	11.00	-2.00	774	-774		
A-1	Left Opening 1	3.00	-2.00			1205	1205
A-1	Right Opening 1	11.00	-2.00			1205	1205
Line F							
	Shearline force			1742	1742		
F-1	Left Opening 1	12.50	53.00	-434	434		
F-1	Right Opening 1	17.50	53.00	395	-395		
F-1	Left Opening 1	12.50	53.00			846	846
F-1	Right Opening 1	17.50	53.00			769	769

Legend:

Line-Wall - Shearline and wall number

Position ... - Side of opening or wall end that drag strut is attached to

Location - Co-ordinates in Plan View

Drag strut Force - Axial force in transfer element at openings, gaps, or changes in design shear along shearline. + : tension; - : compression.

Based on ASD-factored shearline force shown. For SDC C-F, it is the greater of the design shearline force and the diaphragm force F_{px} , added to shearline force from story above and to forces transferred from discontinuous shearlines factored by overstrength (ω) as per 12.10.1.1.

Refer to Seismic Information table for diaphragm forces and ω factor.

For SDC D-F, if horizontal torsional irregularities 2, 3, or 4 are input, or vertical irregularity 4 detected or input, 25% increase from 12.3.3.4 applied.

For perforated walls, this force is converted to v_{max} using 4.3.6.4.1.1.

Strap/Blocking Force – For force-transfer walls, force transferred from above and below opening to shearwall pier.

-> Due to shearline force in the west-to-east or south-to-north direction

<- Due to shearline force in the east-to-west or north-to-south direction

WoodWorks® Shearwalls

DEFLECTION (flexible seismic design)

Wall, segment	W Gp	Dir	Srf	v plf	b ft	h ft	Bending A sq.in	Defl in	Ga kips/in	Nail slip Vn lbs	en in	Shear Defl in	Hold Defl in	Total Defl in
Level 1														
Line 1														
1-1	4	Both	Both	66.7	51.00	9.10	16.5	.000	4.2	61	.030	.073	0.03	0.11
Line 4														
4-1	4	Both	Both	71.8	48.00	9.10	16.5	.000	4.2	61	.030	.078	0.04	0.11
Line B														
B-1	2	Both	-	-	-	-	-	-	-	-	-	-	-	0.63
B-1,1		Both	Ext	420.4	3.75	8.22	16.5	.022	38.6	149	.017	.090	0.56	0.67
		Both	Int	0.0	-	-	-	-	0.0	0	.000	.000	-	-
B-1,2		Both	Ext	420.4	4.25	8.22	16.5	.020	38.6	149	.017	.090	0.49	0.60
		Both	Int	0.0	-	-	-	-	0.0	0	.000	.000	-	-
Line E														
E-1,1	3	Both	Ext	581.0	3.00	9.10	16.5	.051	25.2	172	.025	.210	0.90	1.16
E-1,2		Both	Ext	581.0	3.00	9.10	16.5	.051	25.2	172	.025	.210	0.90	1.16
Level 2														
Line 1														
1-1	4	Both	Both	42.9	54.00	8.10	16.5	.000	4.2	61	.030	.042	0.03	0.08
Line 4														
4-1	4	Both	Both	46.7	51.00	8.10	16.5	.000	4.2	61	.030	.045	0.04	0.08
Line A														
A-1	1	Both	-	-	-	-	-	-	-	-	-	-	-	1.01
A-1,1		Both	Ext	384.4	3.00	7.22	16.5	.017	13.4	182	.030	.207	0.79	1.01
		Both	Int	0.0	-	-	-	-	0.0	0	.000	.000	-	-
A-1,2		Both	Ext	384.4	3.00	7.22	16.5	.017	13.4	182	.030	.207	0.79	1.01
		Both	Int	0.0	-	-	-	-	0.0	0	.000	.000	-	-
Line F														
F-1	1	Both	-	-	-	-	-	-	-	-	-	-	-	1.13
F-1,1		Both	Ext	455.8	2.75	6.72	16.5	.020	13.4	182	.030	.228	0.84	1.08
		Both	Int	0.0	-	-	-	-	0.0	0	.000	.000	-	-
F-1,2		Both	Ext	455.8	2.50	6.72	16.5	.022	13.4	182	.030	.228	0.92	1.17
		Both	Int	0.0	-	-	-	-	0.0	0	.000	.000	-	-

Legend:

Wall, segment - Wall and segment between openings, e.g. B-3, 2 = second segment on Wall 3 on Shearline B

W Gp - Wall design group, refer to Sheathing and Framing Materials

Dir - Force direction

Srf - Wall surface, interior or exterior for perimeter walls, 1 or 2 for interior partitions

v - Unfactored (strength-level) shear force per unit distance on wall segment = ASD force/0.70. For perforated walls, v_{max} from SDPWS 4.3-9 is used, as per 4.3.2.1. For force-transfer walls, unit shear force in pier beside opening(s) is used.

b - Segmented wall or force-transfer wall segments: Width of wall segment between openings. Perforated wall: Sum of FHS segments, modified as per SDPWS 4.3.2.1. Force-transfer wall: Length of wall including openings.

h - Wall height. For force-transfer piers, distance from bottom of opening to top of wall is shown; for end segments, results using that distance and the wall height are averaged, as per APA T555.

Defl - Horizontal shearwall deflection due to given term:

Bending = $8vh^3 / EAb$ Cub; A - Cross sectional area of segment end stud(s); E - stud mod. of elasticity in Framing Materials table

Shear = $vh / 1000 Ga$ Cub. Ga - $1.4 vs / (1.4 vs / Gt + 0.75 en)$ from SDPWS Ex. C4.3.2-1; vs - ASD sheathing capacity; Gt - Shear stiffness from C4.3.3.2, value is in Sheathing Materials table; en - Nail slip from table C4.2.2D; Vn - Shear force per nail along panel edge using 1.4 vs

Hold-down = $da \times h / b$; refer to Hold-down Displacement table for components of da. For force-transfer walls, hold-down device at end of wall is applied to all segments, as per APA T555.

Cub - Unblocked factor from 4.3.2.2, shown in the Shear Results table.

Total defl = Deflection from bending + shear + hold-down, as per SDPWS C4.3.2-1. For force-transfer walls, the average of the values for the segments, as per APA T555.

WoodWorks® Shearwalls

HOLD-DOWN DISPLACEMENT (flexible seismic design)

Wall, segment	Dir	Hold-down	Uplift force lbs	Elong / Disp			Slippage		Shrink da in	Crush+ Extra in	Total da in	Hold Defl in
				Manuf in	Add in	da in	Pf lbs	da in				
Level 1												
Line 1												
1-1	Both	HDU5-SDS	610	.012	.001	0.013	-	-	.138	0.04	0.19	0.03
Line 4												
4-1	Both	HDU5-SDS	657	.013	.001	0.013	-	-	.138	0.04	0.19	0.04
Line B												
B-1,1	Both	HDU5-SDS	3705	.073	.004	0.076	-	-	.138	0.04	0.25	0.56
B-1,2	Both	HDU5-SDS	3674	.072	.004	0.075	-	-	.138	0.04	0.25	0.49
Line E												
E-1,1	Both	HDU5-SDS	5768	.113	.006	0.119	-	-	.138	0.04	0.30	0.90
E-1,2	Both	HDU5-SDS	5768	.113	.006	0.119	-	-	.138	0.04	0.30	0.90
Level 2												
Line 1												
1-1	Both	HDU5-SDS	543	.021	.000	0.022	-	-	.168	0.04	0.23	0.03
Line 4												
4-1	Both	HDU5-SDS	565	.022	.000	0.022	-	-	.168	0.04	0.23	0.04
Line A												
A-1,1	Both	HDU5-SDS	3030	.119	.002	0.121	-	-	.168	0.04	0.33	0.79
A-1,2	Both	HDU5-SDS	3030	.119	.002	0.121	-	-	.168	0.04	0.33	0.79
Line F												
F-1,1	Both	HDU5-SDS	3372	.132	.002	0.134	-	-	.168	0.04	0.34	0.84
F-1,2	Both	HDU5-SDS	3406	.133	.002	0.136	-	-	.168	0.04	0.34	0.92

Legend:

Wall, segment – Wall and segment between openings, e.g. B-3, 2 = second segment on Wall 3 on Shearline B

Dir - Force direction

Uplift force (P) – Strength-level accumulated hold-down tension force from overturning, dead and wind uplift. For perforated walls, T from SDPWS 4.3-8 is used for overturning

da – Vertical displacements due to the following components:

Elong/Disp – Elongation when slippage calculated separately; displacement when combined elongation/slippage used

Manuf - Using manufacturer's value for anchor bolt length, or no bolt contribution for connector-only elongation.

Unless marked with * = (ASD uplift force / ASD hold-down capacity) x max strength-level elongation or displacement

* - Maximum strength-level elongation or displacement is used. May result in higher than actual displacements for lightly loaded hold-downs, causing the segment to draw less force due to lower than actual stiffness.

Add - Due to longer anchor bolt length than manufacturer's value, or entire bolt length for connector-only elongation = $PL / (Ab \times Es)$;

Ab – bolt cross-sectional area;

Es = steel modulus = 29000000 psi;

L = Lb – Lh;

Lb = Total bolt length shown in Storey Information table;

Lh = Manufacturer's anchor bolt length for given displacement/elongation from hold-down database.

Slippage – Due to vertical slippage of hold-down fasteners attached to stud(s) when not combined with elongation

Pf = ASD uplift force P / number of fasteners

Bolts: = $Pf / (270,000 D^{1.5})$ (NDS 11.3.6) ; D = bolt diameter

Nails: = en, from SDPWS Table C4.2.2D using Pf for Vn and values for Wood Structural Panel

Shrink - Wood shrinkage = $0.002 \times (15\% \text{ fabrication} - 10\% \text{ in-service moisture contents}) \times Ls$

Ls = Perp.-to-grain length between fasteners subject to shrinkage, shown in Storey Information table

Crush + Extra – 0.04" wood crushing at compression end of wall segment plus extra displacement due to mis-cuts, gaps, etc.

Total da = Elong/Disp + Slippage + Shrink + Crush + Extra

Hold Defl – Horizontal deflection = $h/b \times da$ (4th term in the deflection equation SDPWS C4.3.2-1)

h = wall height; b = segment length between openings; h,b values in Deflection table. For end segments from force-transfer walls, h is the average of the distance from bottom of opening to top of wall and the wall height.

WoodWorks® Shearwalls

STORY DRIFT (flexible seismic design)

Level	Dir	Wall height ft	Max dxe	Line	Actual Story Drift (in)				Allowable Story Drift			
					Max dx	Center of Mass	C of M dxe	C of M dx	hsx ft	Delta a in	Ratio Max	Ratio C of M
1	N<->S	9.10	0.11	4	0.46	9.88	0.11	0.44	10.18	3.06	0.15	0.15
	E<->W		1.16	E	4.63	25.94	0.57	2.26			1.52*	0.74
2	N<->S	8.10	0.08	4	0.33	10.14	0.08	0.32	8.10	2.43	0.13	0.13
	E<->W		1.13	F	4.51	28.00	0.00	0.00			1.86*	0.00

ASCE 7 Eqn. 12.8-15: $dx = dxe \times Cd / Ie$

Deflection amplification factor Cd from Table 12.2-1 = (E-W), 4.0 (N-S)

Importance factor $Ie = 1.00$

Legend:

Max dxe – Largest deflection for any shearline on level in this direction; refer to Deflections table

Line – Shearline with largest deflection on level in this direction

hsx – Story height in ASCE Table 12.12-1 = Height of walls plus joist depth between this level and the one above.

Max dx – Largest amplified deflection on level in this direction using ASCE 7 Eq'n 12.8-15

C of M dxe - Deflection at the center of mass of this level; from interpolating deflections at adjacent shearlines.

C of M dx - Amplified deflection at center of mass using Eq'n 12.8-15. Does not include differences between top and bottom diaphragm deflection.

Delta a = Allowable story drift on this level from ASCE 7 Table 12.12-1

Ratio - Proportion of allowable story drift experienced, on this level in this direction.

Notes:

*FAILURE – Story drift on this level is greater than maximum allowed by ASCE 7 Table 12.12-1.

Maximum of all shearlines used to satisfy flexible diaphragm assumption in 12.3.1.1.

ALL ELEMENTS INDICATED AS "UNDER-CAPACITY" HAVE BEEN REVIEWED AND EITHER APPROVED WITH MINOR OVERSTRESSES AND/OR DESIGN REVISED ON FINAL DOCS

STORY DRIFT IS A SERVICEABILITY RATIO AND NOT A REQUIRED DESIGN ELEMENT IN LOW-RISE RESIDENTIAL CONSTRUCTION. THIS HAS BEEN REVIEWED AND DESIGN IS APPROVED PER EOR.

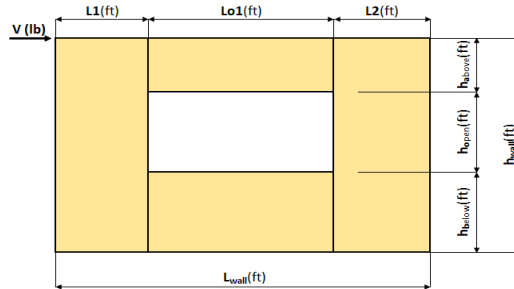
Force Transfer Around Openings Calculator

ONE OPENING

The force transfer around openings (FTAO) method of shear wall analysis is an approach that aims to reinforce the wall such that it performs as if there was no opening. This approach lends certain advantages over segmented shear walls: more versatility, because it allows for narrower wall segments while still meeting the height-to-width ratios and, often, fewer required hold-downs.

Project Information

Code:	2021 IRC	Date:	10/26/2023
Designer:	TORIN KUBO		
Client:			
Project:	PLEXALLEY-PLAN 1626-REG 1		
Wall Line:	A-1		



Shear Wall Calculation Variables

V	3000 lbf	Opening 1	
L1	3.00 ft	ha1	1.35 ft
L2	3.00 ft	ho1	5.00 ft
h _{wall}	8.10 ft	hb1	1.75 ft
L _{wall}	14.00 ft	Lo1	8.00 ft

Wall Pier Aspect Ratio		Adj. Factor
P1=ho1/L1=	1.67	N/A
P2=ho1/L2=	1.67	N/A

1. Hold-down forces: $H = Vh_{\text{wall}}/L_{\text{wall}}$ 1736 lbf

2. Unit shear above + below opening
First opening: $va1 = vb1 = H/(ha1+hb1) = 560$ plf

3. Total boundary force above + below openings
First opening: $O1 = va1 \times (Lo1) = 4479$ lbf

4. Corner forces
 $F1 = O1(L1)/(L1+L2) = 2240$ lbf
 $F2 = O1(L2)/(L1+L2) = 2240$ lbf

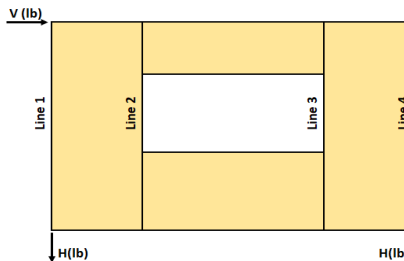
5. Tributary length of openings
 $T1 = (L1 \times Lo1)/(L1+L2) = 4.00$ ft
 $T2 = (L2 \times Lo1)/(L1+L2) = 4.00$ ft

6. Unit shear beside opening
 $V1 = (V/L)(L1+T1)/L1 = 500$ plf
 $V2 = (V/L)(T2+L2)/L2 = 500$ plf
Check $V1 \times L1 + V2 \times L2 = V?$ 3000 lbf OK

7. Resistance to corner forces
 $R1 = V1 \times L1 = 1500$ lbf
 $R2 = V2 \times L2 = 1500$ lbf

8. Difference corner force + resistance
 $R1-F1 = -740$ lbf
 $R2-F2 = -740$ lbf

9. Unit shear in corner zones
 $vc1 = (R1-F1)/L1 = -247$ plf
 $vc2 = (R2-F2)/L2 = -247$ plf



Check Summary of Shear Values for One Opening

Line 1: $vc1(ha1+hb1)+V1(ho1)=H?$		-764	2500	1736 lbf
Line 2: $va1(ha1+hb1)-vc1(ha1+hb1)-V1(ho1)=0?$	1736	-764	2500	0
Line 3: $vc2(ha1+hb1)+V2(ho1)=H?$		-764	2500	1736 lbf

Design Summary

Req. Sheathing Capacity	560 plf
Req. Strap Force	2240 lbf
Req. HD Force (H)	1736 lbf

4-Term Deflection	0.687 in.
4-Term Story Drift %	0.028 %

See Page 2

3-Term Deflection	0.681 in.
3-Term Story Drift %	0.028 %

See Page 3

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Project Information

Code: 2021 IRC	Date: 10/26/2023
Designer: TORIN KUBO	
Client:	
Project: PLEXALLEY-PLAN 1626-REG 1	
Wall Line: A-1	

Shear Wall Deflection Calculation Variables

Sheathing:	OSB	Sheathing Material	Wood End Post Values:	Nail Type:	8d common (penny weight)
	7/16	Performance Category	Species:		
	APA Rated Sheathing	Grade	E:	1.60E+06	(psi)
			Dimensions:	Qty	Stud Size
				2	2x6
		Gt Override	A:	16.5	(in. ²)
		Ga Override	A Override:		(in. ²)
				Nail Spacing:	Pier 1: 3 (in.) Pier 2: 3 (in.)
				HD Capacity:	Pier 1: 2695 (lbf) Pier 2: 2695 (lbf)
				HD Deflection:	Pier 1: 0.1 (in.) Pier 2: 0.1 (in.)

Four-Term Equation Deflection Check

$$\Delta = \frac{8vh^3}{EAb} + \frac{vh}{Gt} + 0.75he_a + d_a \frac{h}{b} \quad (\text{Equation 23-2})$$

	Pier 1-L	Pier 1-R	Pier 2-L	Pier 2-R	
Sheathing:	7/16	7/16	7/16	7/16	
Nail:	8d common	8d common	8d common	8d common	
v _{asd} :	500	500	500	500	(plf)
v _{strength} :	714	714	714	714	(plf)
E:	1.60E+06	1.60E+06	1.60E+06	1.60E+06	(psi)
h:	8.10	6.35	6.35	8.10	(ft)
A:	16.5	16.5	16.5	16.5	(in. ²)
Gt:	83,500	83,500	83,500	83,500	(lbf/in.)
Nail Spacing:	3	3	3	3	(in.)
Vn:	179	179	179	179	(plf)
e:	0.0238	0.0238	0.0238	0.0238	(in.)
b:	3.00	3.00	3.00	3.00	(ft)
HD Capacity:	2695	2695	2695	2695	(lbf)
HD Defl:	0.1	0.1	0.1	0.1	(in.)

Check Total Deflection of Wall System

Pier 1 (left)				Pier 1 (right)			
Term 1	Term 2	Term 3	Term 4	Term 1	Term 2	Term 3	Term 4
Bending	Shear	Fastener	HD-1	Bending	Shear	Fastener	HD-2
0.038	0.069	0.145	0.580	0.018	0.054	0.113	0.356
Sum			0.832	Sum			0.542
Pier 2 (left)				Pier 2 (right)			
Term 1	Term 2	Term 3	Term 4	Term 1	Term 2	Term 3	Term 4
Bending	Shear	Fastener	HD-1	Bending	Shear	Fastener	HD-2
0.018	0.054	0.113	0.356	0.038	0.069	0.145	0.580
Sum			0.542	Sum			0.832

Total Defl.	
0.687	(in.)
0.0283	%drift

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Project Information

Code:	2021 IRC	Date:	10/26/2023
Designer:	TORIN KUBO		
Client:			
Project:	PLEXALLEY-PLAN 1626-REG 1		
Wall Line:	A-1		

Three-Term Equation Deflection Check

$$\delta_{sw} = \frac{8vh^3}{EAb} + \frac{vh}{1000G_a} + \frac{h\Delta_a}{b} \quad (4.3-1)$$

	Pier 1-L	Pier 1-R	Pier 2-L	Pier 2-R	
Sheathing:	7/16	7/16	7/16	7/16	
Nail:	8d common	8d common	8d common	8d common	
V _{asd} :	500	500	500	500	(plf)
V _{strength} :	714	714	714	714	(plf)
E:	1.60E+06	1.60E+06	1.60E+06	1.60E+06	(psi)
h:	8.10	6.35	6.35	8.10	(ft)
A:	16.5	16.5	16.5	16.5	(in. ²)
G _a :	28.0	28.0	28.0	28.0	(kips/in.)
b:	3.00	3.00	3.00	3.00	(ft)
HD Capacity:	2695	2695	2695	2695	(lbf)
HD Defl:	0.1	0.1	0.1	0.1	(in.)

Check Total Deflection of Wall System

Pier 1 (left)			Pier 1 (right)		
Term 1	Term 2	Term 3	Term 1	Term 2	Term 3
Bending	Shear	Fastener	Bending	Shear	Fastener
0.038	0.207	0.580	0.018	0.162	0.356
Sum		0.825	Sum		0.537
Pier 2 (left)			Pier 2 (right)		
Term 1	Term 2	Term 3	Term 1	Term 2	Term 3
Bending	Shear	Fastener	Bending	Shear	Fastener
0.018	0.162	0.356	0.038	0.207	0.580
Sum		0.537	Sum		0.825

Total Defl.	
0.681	(in.)
0.0280	%drift

Comment: The 3-term equation is calibrated to be approximately equal to 4-term equation at 1.4*ASD capacity.

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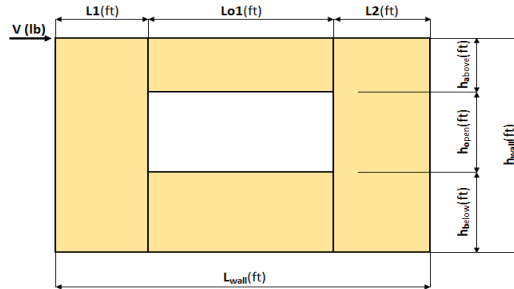
Force Transfer Around Openings Calculator

ONE OPENING

The force transfer around openings (FTAO) method of shear wall analysis is an approach that aims to reinforce the wall such that it performs as if there was no opening. This approach lends certain advantages over segmented shear walls: more versatility, because it allows for narrower wall segments while still meeting the height-to-width ratios and, often, fewer required hold-downs.

Project Information

Code:	2021 IRC	Date:	10/26/2023
Designer:	TORIN KUBO		
Client:			
Project:	PLEXALLEY-PLAN 1626 -REG 1		
Wall Line:	B-1		



Shear Wall Calculation Variables

V	5450 lbf	Opening 1	
L1	4.25 ft	ha1	2.35 ft
L2	3.75 ft	ho1	5.00 ft
hwall	9.10 ft	hb1	1.75 ft
Lwall	14.00 ft	Lo1	6.00 ft

Wall Pier Aspect Ratio		Adj. Factor	
P1=ho1/L1=	1.18		N/A
P2=ho1/L2=	1.33		N/A

1. Hold-down forces: $H = Vh_{wall}/L_{wall}$ = 3543 lbf

2. Unit shear above + below opening
First opening: $va1 = vb1 = H/(ha1+hb1) = 864$ plf

3. Total boundary force above + below openings
First opening: $O1 = va1 \times (Lo1) = 5184$ lbf

4. Corner forces
 $F1 = O1(L1)/(L1+L2) = 2754$ lbf
 $F2 = O1(L2)/(L1+L2) = 2430$ lbf

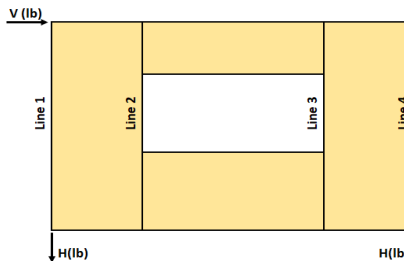
5. Tributary length of openings
 $T1 = (L1 \times Lo1)/(L1+L2) = 3.19$ ft
 $T2 = (L2 \times Lo1)/(L1+L2) = 2.81$ ft

6. Unit shear beside opening
 $V1 = (V/L)(L1+T1)/L1 = 681$ plf
 $V2 = (V/L)(T2+L2)/L2 = 681$ plf
Check $V1 \times L1 + V2 \times L2 = V?$ = 5450 lbf OK

7. Resistance to corner forces
 $R1 = V1 \times L1 = 2895$ lbf
 $R2 = V2 \times L2 = 2555$ lbf

8. Difference corner force + resistance
 $R1 - F1 = 141$ lbf
 $R2 - F2 = 125$ lbf

9. Unit shear in corner zones
 $vc1 = (R1 - F1)/L1 = 33$ plf
 $vc2 = (R2 - F2)/L2 = 33$ plf



Check Summary of Shear Values for One Opening

Line 1: $vc1(ha1+hb1)+V1(ho1)=H?$		136	3406	3543 lbf
Line 2: $va1(ha1+hb1)-vc1(ha1+hb1)-V1(ho1)=0?$	3543	136	3406	0
Line 3: $vc2(ha1+hb1)+V2(ho1)=H?$		136	3406	3543 lbf

Design Summary

Req. Sheathing Capacity	864 plf
Req. Strap Force	2754 lbf
Req. HD Force (H)	3543 lbf

4-Term Deflection	0.544 in.
4-Term Story Drift %	0.020 %

See Page 2

3-Term Deflection	0.529 in.
3-Term Story Drift %	0.019 %

See Page 3

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Project Information

Code: 2021 IRC	Date: 10/26/2023
Designer: TORIN KUBO	
Client:	
Project: PLEXALLEY-PLAN 1626 -REG 1	
Wall Line: B-1	

Shear Wall Deflection Calculation Variables

Sheathing:	OSB	Sheathing Material	Wood End Post Values:	Nail Type:	8d common (penny weight)
	7/16	Performance Category	Species:		
	APA Rated Sheathing	Grade	E:	1.60E+06	(psi)
			Dimensions:	Qty	Stud Size
				2	2x6
		Gt Override	A:	16.5	(in. ²)
		Ga Override	A Override:		(in. ²)
				Nail Spacing:	Pier 1: 2 (in.)
				HD Capacity:	Pier 2: 2 (in.)
					5645 (lbf)
				HD Deflection:	0.1 (in.)
					0.1 (in.)

Four-Term Equation Deflection Check

$$\Delta = \frac{8vh^3}{EA b} + \frac{vh}{Gt} + 0.75he_a + d_a \frac{h}{b} \quad (\text{Equation 23-2})$$

	Pier 1-L	Pier 1-R	Pier 2-L	Pier 2-R	
Sheathing:	7/16	7/16	7/16	7/16	
Nail:	8d common	8d common	8d common	8d common	
v _{asd} :	681	681	681	681	(plf)
v _{strength} :	973	973	973	973	(plf)
E:	1.60E+06	1.60E+06	1.60E+06	1.60E+06	(psi)
h:	9.10	7.35	7.35	9.10	(ft)
A:	16.5	16.5	16.5	16.5	(in. ²)
Gt:	83,500	83,500	83,500	83,500	(lbf/in.)
Nail Spacing:	2	2	2	2	(in.)
Vn:	162	162	162	162	(plf)
e:	0.0178	0.0178	0.0178	0.0178	(in.)
b:	4.25	4.25	3.75	3.75	(ft)
HD Capacity:	5645	5645	5645	5645	(lbf)
HD Defl:	0.1	0.1	0.1	0.1	(in.)

Check Total Deflection of Wall System

Pier 1 (left)				Pier 1 (right)			
Term 1	Term 2	Term 3	Term 4	Term 1	Term 2	Term 3	Term 4
Bending	Shear	Fastener	HD-1	Bending	Shear	Fastener	HD-2
0.052	0.106	0.122	0.336	0.028	0.086	0.098	0.219
Sum			0.616	Sum			0.431
Pier 2 (left)				Pier 2 (right)			
Term 1	Term 2	Term 3	Term 4	Term 1	Term 2	Term 3	Term 4
Bending	Shear	Fastener	HD-1	Bending	Shear	Fastener	HD-2
0.031	0.086	0.098	0.248	0.059	0.106	0.122	0.381
Sum			0.464	Sum			0.668

Total Defl.	
0.544	(in.)
0.0199	%drift

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Project Information

Code:	2021 IRC	Date:	10/26/2023
Designer:	TORIN KUBO		
Client:			
Project:	PLEXALLEY-PLAN 1626 -REG 1		
Wall Line:	B-1		

Three-Term Equation Deflection Check

$$\delta_{sw} = \frac{8vh^3}{EAb} + \frac{vh}{1000G_a} + \frac{h\Delta_a}{b} \quad (4.3-1)$$

	Pier 1-L	Pier 1-R	Pier 2-L	Pier 2-R	
Sheathing:	7/16	7/16	7/16	7/16	
Nail:	8d common	8d common	8d common	8d common	
V _{asd} :	681	681	681	681	(plf)
V _{strength} :	973	973	973	973	(plf)
E:	1.60E+06	1.60E+06	1.60E+06	1.60E+06	(psi)
h:	9.10	7.35	7.35	9.10	(ft)
A:	16.5	16.5	16.5	16.5	(in. ²)
G _a :	42.0	42.0	42.0	42.0	(kips/in.)
b:	4.25	4.25	3.75	3.75	(ft)
HD Capacity:	5645	5645	5645	5645	(lbf)
HD Defl:	0.1	0.1	0.1	0.1	(in.)

Check Total Deflection of Wall System

Pier 1 (left)			Pier 1 (right)		
Term 1	Term 2	Term 3	Term 1	Term 2	Term 3
Bending	Shear	Fastener	Bending	Shear	Fastener
0.052	0.211	0.336	0.028	0.170	0.219
Sum		0.599	Sum		0.417
Pier 2 (left)			Pier 2 (right)		
Term 1	Term 2	Term 3	Term 1	Term 2	Term 3
Bending	Shear	Fastener	Bending	Shear	Fastener
0.031	0.170	0.248	0.059	0.211	0.381
Sum		0.450	Sum		0.651

Total Defl.	
0.529	(in.)
0.0194	%drift

Comment: The 3-term equation is calibrated to be approximately equal to 4-term equation at 1.4*ASD capacity.

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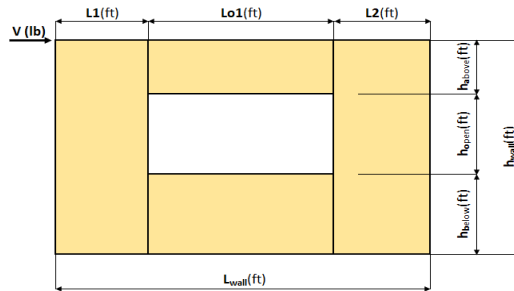
Force Transfer Around Openings Calculator

ONE OPENING

The force transfer around openings (FTAO) method of shear wall analysis is an approach that aims to reinforce the wall such that it performs as if there was no opening. This approach lends certain advantages over segmented shear walls: more versatility, because it allows for narrower wall segments while still meeting the height-to-width ratios and, often, fewer required hold-downs.

Project Information

Code:	2021 IRC	Date:	10/26/2023
Designer:	TORIN KUBO		
Client:			
Project:	PLEXALLEY-PLAN 1626-REG 1		
Wall Line:	F-1		



Shear Wall Calculation Variables

V	3005 lbf	Opening 1	Wall Pier Aspect Ratio	Adj. Factor
L1	2.50 ft	ha1	P1=ho1/L1=	N/A
L2	2.75 ft	ho1	P2=ho1/L2=	N/A
hwall	8.10 ft	hb1		
Lwall	10.25 ft	Lo1		

1. Hold-down forces: $H = Vh_{wall}/L_{wall}$ = 2375 lbf

2. Unit shear above + below opening
First opening: $va1 = vb1 = H/(ha1+hb1) = 579$ plf

3. Total boundary force above + below openings
First opening: $O1 = va1 \times (L_{o1}) = 2896$ lbf

4. Corner forces
 $F1 = O1(L1)/(L1+L2) = 1379$ lbf
 $F2 = O1(L2)/(L1+L2) = 1517$ lbf

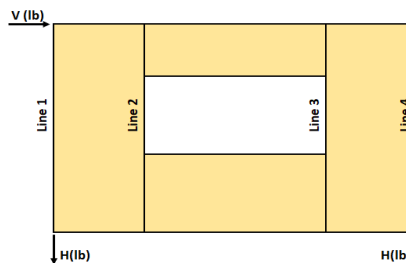
5. Tributary length of openings
 $T1 = (L1 \times Lo1)/(L1+L2) = 2.38$ ft
 $T2 = (L2 \times Lo1)/(L1+L2) = 2.62$ ft

6. Unit shear beside opening
 $V1 = (V/L)(L1+T1)/L1 = 572$ plf
 $V2 = (V/L)(T2+L2)/L2 = 572$ plf
Check $V1 \times L1 + V2 \times L2 = V?$ = 3005 lbf OK

7. Resistance to corner forces
 $R1 = V1 \times L1 = 1431$ lbf
 $R2 = V2 \times L2 = 1574$ lbf

8. Difference corner force + resistance
 $R1 - F1 = 52$ lbf
 $R2 - F2 = 57$ lbf

9. Unit shear in corner zones
 $vc1 = (R1 - F1)/L1 = 21$ plf
 $vc2 = (R2 - F2)/L2 = 21$ plf



Check Summary of Shear Values for One Opening

Line 1: $vc1(ha1+hb1)+V1(ho1)=H?$		85	2290	2375 lbf
Line 2: $va1(ha1+hb1)-vc1(ha1+hb1)-V1(ho1)=0?$	2375	85	2290	0
Line 3: $vc2(ha1+hb1)+V2(ho1)=H?$		85	2290	2375 lbf

Design Summary

Req. Sheathing Capacity	579 plf	4-Term Deflection	0.825 in.	3-Term Deflection	0.775 in.
Req. Strap Force	1517 lbf	4-Term Story Drift %	0.034 %	3-Term Story Drift %	0.032 %
Req. HD Force (H)	2375 lbf		See Page 2		See Page 3

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Project Information

Code: 2021 IRC	Date: 10/26/2023
Designer: TORIN KUBO	
Client:	
Project: PLEXALLEY-PLAN 1626-REG 1	
Wall Line: F-1	

Shear Wall Deflection Calculation Variables

Sheathing:		Wood End Post Values:		Nail Type: 8d common (penny weight)	
OSB	Sheathing Material	Species:		Pier 1	Pier 2
7/16	Performance Category	E:	1.60E+06 (psi)	3	3
APA Rated Sheathing	Grade	Dimensions:	Qty Stud Size	2	2x6
	Gt Override	A:	16.5 (in. ²)	Nail Spacing:	
	Ga Override	A Override:		HD Capacity:	2695 2695
				HD Deflection:	0.1 0.1

Four-Term Equation Deflection Check

$$\Delta = \frac{8vh^3}{EA b} + \frac{vh}{Gt} + 0.75he_a + d_a \frac{h}{b} \quad (\text{Equation 23-2})$$

	Pier 1-L	Pier 1-R	Pier 2-L	Pier 2-R	
Sheathing:	7/16	7/16	7/16	7/16	
Nail:	8d common	8d common	8d common	8d common	
v _{asd} :	572	572	572	572	(plf)
v _{strength} :	818	818	818	818	(plf)
E:	1.60E+06	1.60E+06	1.60E+06	1.60E+06	(psi)
h:	8.10	5.35	5.35	8.10	(ft)
A:	16.5	16.5	16.5	16.5	(in. ²)
Gt:	83,500	83,500	83,500	83,500	(lbf/in.)
Nail Spacing:	3	3	3	3	(in.)
Vn:	204	204	204	204	(plf)
e:	0.0358	0.0358	0.0358	0.0358	(in.)
b:	2.50	2.50	2.75	2.75	(ft)
HD Capacity:	2695	2695	2695	2695	(lbf)
HD Defl:	0.1	0.1	0.1	0.1	(in.)

Check Total Deflection of Wall System

Pier 1 (left)				Pier 1 (right)			
Term 1	Term 2	Term 3	Term 4	Term 1	Term 2	Term 3	Term 4
Bending	Shear	Fastener	HD-1	Bending	Shear	Fastener	HD-2
0.053	0.079	0.218	0.796	0.015	0.052	0.144	0.347
Sum			1.146	Sum			0.559
Pier 2 (left)				Pier 2 (right)			
Term 1	Term 2	Term 3	Term 4	Term 1	Term 2	Term 3	Term 4
Bending	Shear	Fastener	HD-1	Bending	Shear	Fastener	HD-2
0.014	0.052	0.144	0.316	0.048	0.079	0.218	0.724
Sum			0.526	Sum			1.069

Total Defl.	
0.825	(in.)
0.0339	%drift

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Project Information

Code:	2021 IRC	Date:	10/26/2023
Designer:	TORIN KUBO		
Client:			
Project:	PLEXALLEY-PLAN 1626-REG 1		
Wall Line:	F-1		

Three-Term Equation Deflection Check

$$\delta_{sw} = \frac{8vh^3}{EAb} + \frac{vh}{1000G_a} + \frac{h\Delta_a}{b} \quad (4.3-1)$$

	Pier 1-L	Pier 1-R	Pier 2-L	Pier 2-R	
Sheathing:	7/16	7/16	7/16	7/16	
Nail:	8d common	8d common	8d common	8d common	
V _{asd} :	572	572	572	572	(plf)
V _{strength} :	818	818	818	818	(plf)
E:	1.60E+06	1.60E+06	1.60E+06	1.60E+06	(psi)
h:	8.10	5.35	5.35	8.10	(ft)
A:	16.5	16.5	16.5	16.5	(in. ²)
G _a :	28.0	28.0	28.0	28.0	(kips/in.)
b:	2.50	2.50	2.75	2.75	(ft)
HD Capacity:	2695	2695	2695	2695	(lbf)
HD Defl:	0.1	0.1	0.1	0.1	(in.)

Check Total Deflection of Wall System

Pier 1 (left)			Pier 1 (right)		
Term 1	Term 2	Term 3	Term 1	Term 2	Term 3
Bending	Shear	Fastener	Bending	Shear	Fastener
0.053	0.237	0.796	0.015	0.156	0.347
Sum		1.085	Sum		0.519
Pier 2 (left)			Pier 2 (right)		
Term 1	Term 2	Term 3	Term 1	Term 2	Term 3
Bending	Shear	Fastener	Bending	Shear	Fastener
0.014	0.156	0.316	0.048	0.237	0.724
Sum		0.486	Sum		1.008

Total Defl.	
0.775	(in.)
0.0319	%drift

Comment: The 3-term equation is calibrated to be approximately equal to 4-term equation at 1.4*ASD capacity.

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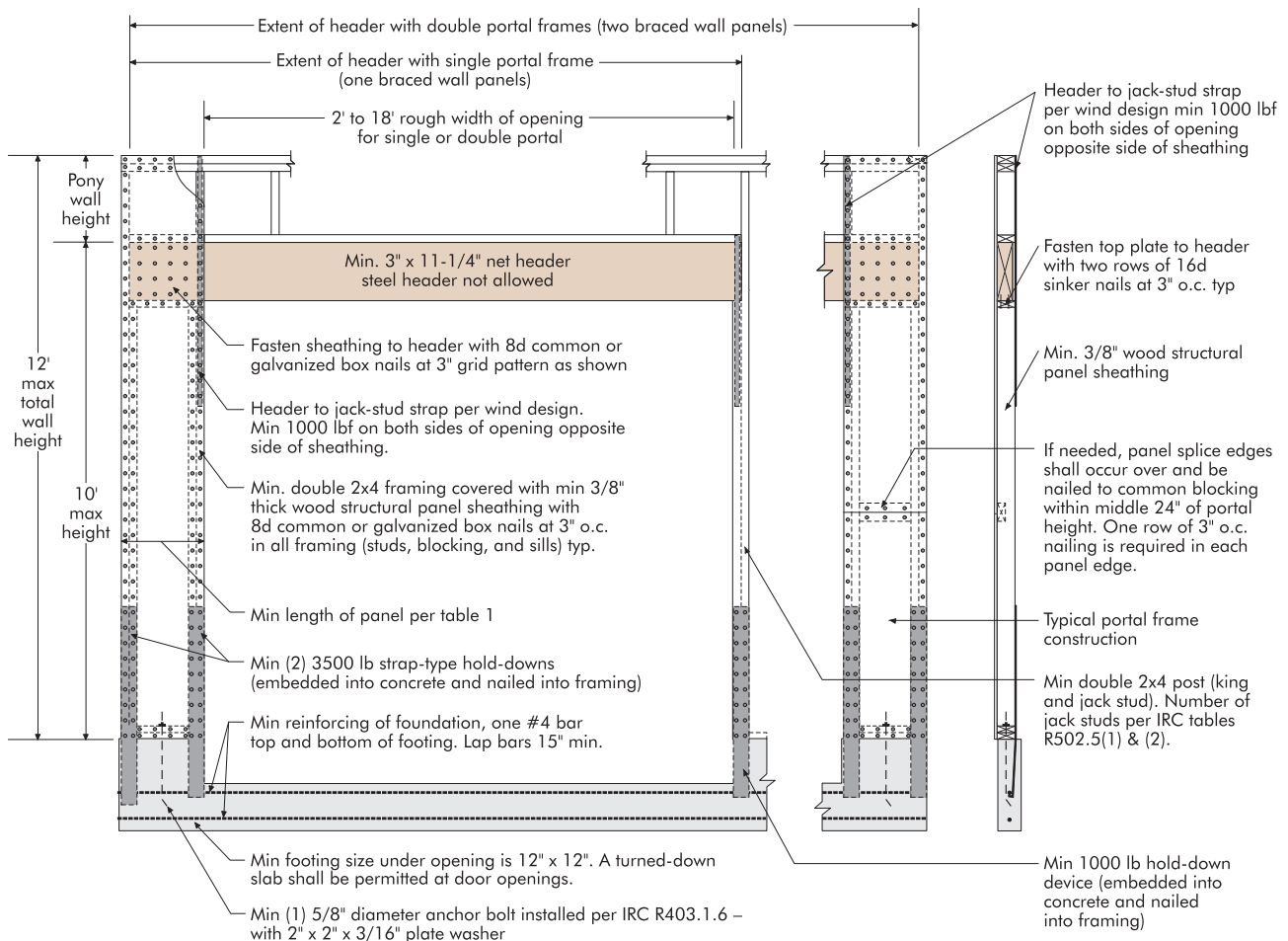
Table 1. Recommended Allowable Design Values for APA Portal Frame Used on a Rigid-Base

Minimum Width (in.)	Maximum Height (ft)	Allowable Design (ASD) Values per Frame Segment		
		Shear ^(e,f) (lbf)	Deflection (in.)	Load Factor
16	8	850	0.33	3.09
	10	625	0.44	2.97
24	8	1,675	0.38	2.88
	10	1,125	0.51	3.42

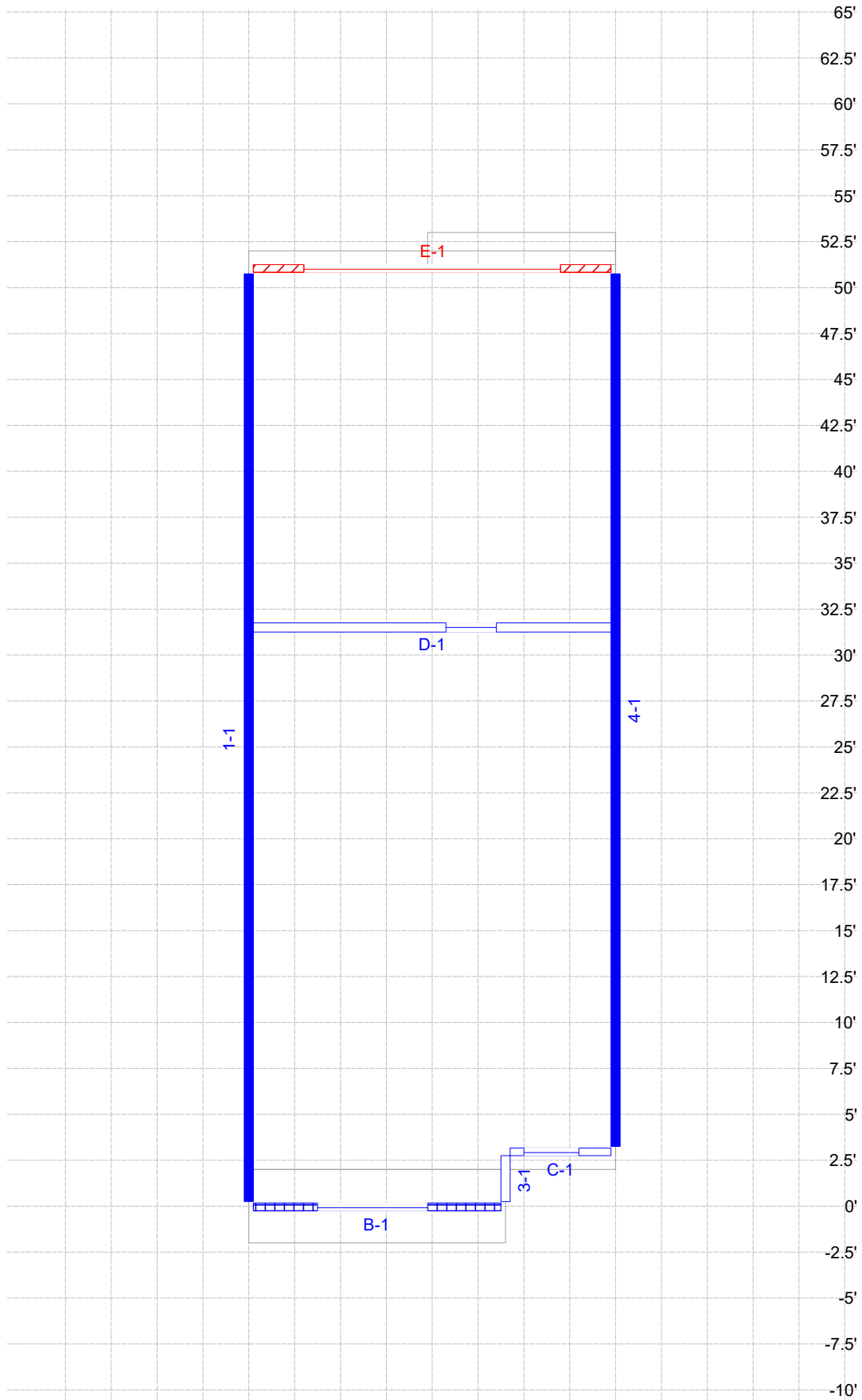
Foundation for Wind or Seismic Loading^(a,b,c,d)

- (a) Design values are based on the use of Douglas-fir or Southern pine framing. For other species of framing, multiply the above shear design value by the specific gravity adjustment factor = $(1 - (0.5 - SG))$, where SG = specific gravity of the actual framing. This adjustment shall not be greater than 1.0.
- (b) For construction as shown in Figure 1.
- (c) Values are for a single portal-frame segment (one vertical leg and a portion of the header). For multiple portal-frame segments, the allowable shear design values are permitted to be multiplied by the number of frame segments (e.g., two = 2x, three = 3x, etc.).
- (d) Interpolation of design values for heights between 8 and 10 feet, and for portal widths between 16 and 24 inches, is permitted.
- (e) The allowable shear design value is permitted to be multiplied by a factor of 1.4 for wind design.
- (f) If story drift is not a design consideration, the tabulated design shear values are permitted to be multiplied by a factor of 1.15. This factor is permitted to be used cumulatively with the wind-design adjustment factor in Footnote (e) above.

Figure 1. Construction Details for APA Portal-Frame Design with Hold Downs

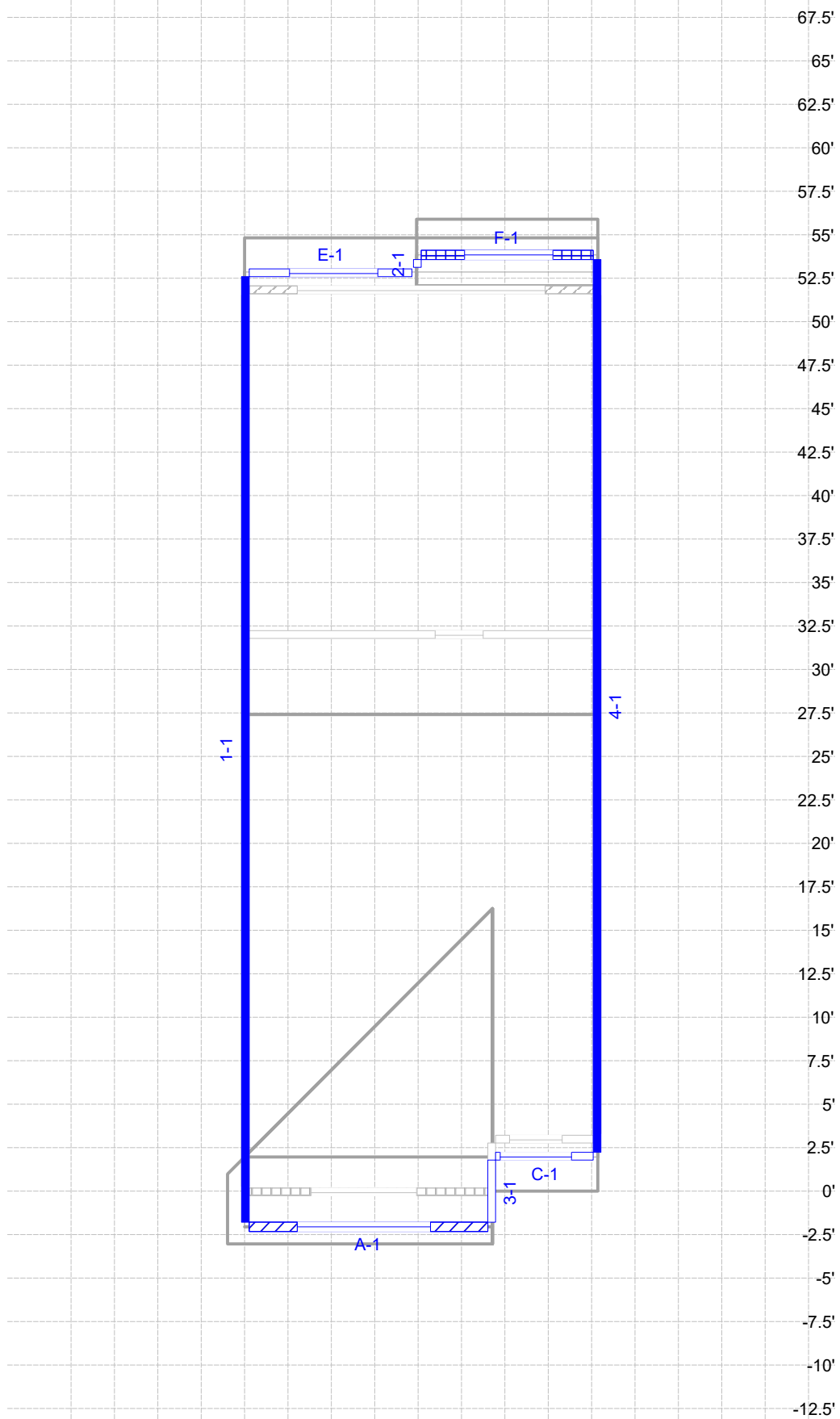


Level 1 of 2



Segmented -10' -7.5' -5' -2.5' 0' 2.5' 5' 7.5' 10' 12.5' 15' 17.5' 20' 22.5' 25' 27.5' 30' 32.5' Perforated Force-transfer Non-shearwall Aspect factor Selected wall(s) Red = Capac

Level 2 of 2



■ Segmented
 ▣ Perforated
 ▨ Free-transfer
 ▤ Non-shearwall
 ▧ Aspect factor
 ■ Orange = Selected wall(s)

WoodWorks® Shearwalls 2019 (Update 3)

Project Information

COMPANY AND PROJECT INFORMATION

Company	Project
PLIRIS 327 W 3RD AVE. SPOKANE, WA 99201 833.4PLIRIS	

DESIGN SETTINGS

Design Code		Wind Standard		Seismic Standard	
IBC 2018/AWC SDPWS 2015		ASCE 7-16 Directional (All heights)		ASCE 7-16	
Load Combinations			Building Code Capacity Modification		
For Design (ASD)		For Deflection (Strength)		Wind	Seismic
0.70 Seismic		1.00 Seismic		1.00	1.00
0.60 Wind		1.00 Wind			
Service Conditions and Load Duration			Max Shearwall Offset [ft]		
Duration	Temperature	Moisture Content		Plan	Elevation
Factor	Range	Fabrication	Service	(within story)	(between stories)
-	-	15% (<=19%)	10% (<=19%)	4.00	0.83
Maximum Height-to-width Ratio					
Wood panels		Fiberboard	Lumber		Gypsum
Wind	Seismic		Wind	Seismic	Blocked Unblocked
3.5	3.5	-	-	-	2.0 1.5
Ignore non-wood-panel shear resistance contribution...			Forces based on...		
Wind		Seismic		Hold-downs	Applied loads
when comb'd w/ wood panels		Always		Drag struts	Applied loads
Shearwall relative rigidity: Deflection-based stiffness of wall segments					
Perforated shearwall Co factor: SDPWS Equation 4.3-5					
Non-identical materials and construction on the shearline: Allowed, except for material type					
Deflection Equation: 3-term from SDPWS 4.3-1					
Drift limit for wind design: 1 / 500 story height					
Force-transfer strap: Continuous at top of highest opening and bottom of lowest					

SITE INFORMATION

Wind			Seismic		
ASCE 7-16 Directional (All heights)			ASCE 7-16 12.8 Equivalent Lateral Force Procedure		
Design Wind Speed	105 mph		Risk Category	Category II - All others	
Serviceability Wind Speed	85 mph		Structure Type	Regular	
Exposure	Exposure B		Building System	Bearing Wall	
Enclosure	Enclosed		Design Category	D	
Min Wind Loads: Walls	16 psf		Site Class	D	
Roofs	8 psf		Spectral Response Acceleration		
Topographic Information [ft]			S1: 0.370g	Ss: 0.840g	
Shape	Height	Length	Fundamental Period	E-W	N-S
-	-	-	T Used	0.206s	0.206s
Site Location: -			Approximate Ta	0.206s	0.206s
Elev: 384ft			Maximum T	0.289s	0.289s
Rigid building - Static analysis			Response Factor R	6.50	6.50
Case 2	E-W loads	N-S loads	Fa: 1.16	Fv: 1.93	
Eccentricity (%)	15	15			
Loaded at	75%				

WoodWorks® Shearwalls

Structural Data

STORY INFORMATION

	Story Elev [ft]	Floor/Ceiling Depth [in]	Wall Height [ft]	Hold-down Length subject to shrinkage [in]	Bolt length [in]
Ceiling	21.12	0.0			
Level 2	13.02	1'-1.0	8.10	16.8	17.5
Level 1	2.83	10.0	9.10	13.8	14.5
Foundation	2.00				

BLOCK and ROOF INFORMATION

	Block Dimensions [ft]		Roof Panels			
	Face	Type	Slope	Overhang [ft]		
Block 1	2 Story	E-W Ridge				
Location X,Y =	0.00	2.00	North	Side	18.4	2.00
Extent X,Y =	20.00	50.00	South	Side	18.4	2.00
Ridge Y Location, Offset	27.00	0.00	East	Gable	90.0	0.00
Ridge Elevation, Height	29.43	8.32	West	Gable	90.0	0.00
Block 3	2 Story	E-W Ridge				
Location X,Y =	9.75	51.25	North	Side	18.4	2.00
Extent X,Y =	10.25	1.75	South	Side	90.0	0.00
Ridge Y Location, Offset	51.25	-0.87	East	Gable	90.0	0.00
Ridge Elevation, Height	21.70	0.58	West	Gable	90.0	0.00
Block 4	2 Story	N-S Ridge				
Location X,Y =	0.00	-2.00	North	Joined	161.6	1.00
Extent X,Y =	14.00	4.00	South	Gable	90.0	1.00
Ridge X Location, Offset	14.00	7.00	East	Side	90.0	1.00
Ridge Elevation, Height	25.78	4.67	West	Side	18.4	1.00

WoodWorks® Shearwalls

SHEATHING MATERIALS by WALL GROUP

Grp	Surf	Material	Ratng	Sheathing				Gvtv lbs/in	Fasteners					Apply Notes	
				Thick in	GU in	Ply	Or		Size	Type	Df	Eg in	Fd in		Bk
1	Ext	Struct Sh OSB	24/16	7/16	-	-	Vert	83500	8d	Nail	N	3	12	Y	2,3
2	Ext	Struct Sh OSB	24/16	7/16	-	-	Horz	83500	8d	Nail	N	2	12	Y	2,3
	Int	Gyp WB 1-ply		1/2	-	-	Horz	40000	No. 6	Screw	N	4	12	Y	
3	Ext	Struct Sh OSB	24/16	7/16	-	-	Vert	83500	8d	Nail	N	3	12	Y	2,3
4	Ext	Struct Sh OSB	24/16	7/16	-	-	Horz	83500	8d	Nail	N	6	12	Y	3
	Int	Gyp WB 1-ply	24/16	1/2	-	-	Horz	40000	No. 6	Screw	N	4	12	Y	
5	Both	Gyp WB 1-ply	24/16	?	-	-	Horz	40000	?	Nail	N	?	?	N	5
6	Both	Gyp WB 1-ply	24/16	1/2	-	-	Horz	40000	5d	Nail	N	7	7	N	5

Legend:

Grp – Wall Design Group number, used to reference wall in other tables (created by program)

Surf – Exterior or interior surface when applied to exterior wall

Ratng – Span rating, see SDPWS Table C4.2.2.2C

Thick – Nominal panel thickness

GU - Gypsum underlay thickness

Ply – Number of plies (or layers) in construction of plywood sheets

Or – Orientation of longer dimension of sheathing panels

Gvtv – Shear stiffness in lb/in. of depth from SDPWS Tables C4.2.2A-B

Type – Fastener type from SDPWS Tables 4.3A-D: Nail – common wire nail for structural panels and lumber, cooler or gypsum wallboard nail for GWB, plasterboard nail for gypsum lath, galvanized nail for gypsum sheathing; Box - box nail; Casing – casing nail; Roof – roofing nail; Screw – drywall screw

Size - Common, box, and casing nails: refer to SDPWS Table A1 (casing sizes = box sizes).

Gauges: 11 ga = 0.120" x 1-3/4" (gypsum sheathing, 25/32" fiberboard), 1-1/2" (lath & plaster, 1/2" fiberboard); 13 ga plasterboard = 0.92" x 1-1/8".

Cooler or gypsum wallboard nail: 5d = .086" x 1-5/8"; 6d = .092" x 1-7/8"; 8d = .113" x 2-3/8"; 6/8d = 6d base ply, 8d face ply for 2-ply GWB.

Drywall screws: No. 6, 1-1/4" long.

5/8" gypsum sheathing can also use 6d cooler or GWB nail

Df – Deformed nails (threaded or spiral), with increased withdrawal capacity

Eg – Panel edge fastener spacing

Fd – Field spacing interior to panels

Bk – Sheathing is nailed to blocking at all panel edges; Y(es) or N(o)

Apply Notes – Notes below table legend which apply to sheathing side

? – Design for unknown parameter not performed for reasons given in notes below.

Notes:

2. Framing at adjoining panel edges must be 3" nominal or wider with staggered nailing according to SDPWS 4.3.7.1.4

3. Shear capacity for current design has been increased to the value for 15/32" sheathing with same nailing because stud spacing is 16" max. or panel orientation is horizontal. See SDPWS T4.3A Note 2.

5. This material does not contribute to seismic shear resistance because of the "Ignore non-wood-panel contribution for all walls" design setting.

FRAMING MATERIALS and STANDARD WALL by WALL GROUP

Wall Grp	Species	Grade	b in	d in	Spcg in	SG	E psi ⁶	Standard Wall
1	D.Fir-L	Stud	1.50	6.00	16	0.50	1.40	3/12B_SEG_OSB_7/16_8D
2	D.Fir-L	Stud	1.50	5.50	16	0.50	1.40	
3	D.Fir-L	Stud	1.50	5.50	16	0.50	1.40	3/12B_SEG_OSB_7/16_8D 42
4	D.Fir-L	Stud	1.50	5.50	16	0.50	1.40	
5	D.Fir-L	Stud	1.50	5.50	?	0.50	1.40	
6	D.Fir-L	Stud	1.50	5.50	24	0.50	1.40	

Legend:

Wall Grp – Wall Design Group

b – Stud breadth (thickness)

d – Stud depth (width)

Spcg – Maximum on-centre spacing of studs for design, actual spacing may be less.

SG – Specific gravity

E – Modulus of elasticity

Standard Wall - Standard wall designed as group.

Notes:

Check manufacture requirements for stud size, grade and specific gravity (G) for all shearwall hold-downs.

WoodWorks® Shearwalls

SHEARLINE, WALL and OPENING DIMENSIONS

North-south Shearlines	Type	Wall Group	Location X [ft]	Extent [ft]		Length [ft]	FHS [ft]	Aspect Ratio	Height [ft]
				Start	End				
Line 1									
Level 2									
Line 1	Seg	5,6	0.00	-2.00	52.00	54.00	54.00	-	8.10
Wall 1-1	Seg	5,6	0.00	-2.00	52.00	54.00	54.00	0.15	-
Level 1									
Line 1	Seg	5,6	0.00	0.00	51.00	51.00	51.00	-	9.10
Wall 1-1	Seg	5,6	0.00	0.00	51.00	51.00	51.00	0.18	-
Line 2									
Level 2									
Line 2	NSW		9.75	52.00	53.00	1.00	0.00	-	8.10
Wall 2-1	NSW		9.75	52.00	53.00	1.00	0.00	1.00	-
Line 3									
Level 2									
Line 3	NSW		14.00	-2.00	3.00	5.00	0.00	-	8.10
Wall 3-1	NSW		14.00	-2.00	2.00	4.00	0.00	1.00	-
Level 1									
Line 3	NSW		14.00	-2.00	3.00	5.00	0.00	-	9.10
Wall 3-1	NSW		14.00	0.00	3.00	3.00	0.00	1.00	-
Line 4									
Level 2									
Line 4	Seg	5,6	20.00	2.00	53.00	51.00	51.00	-	8.10
Wall 4-1	Seg	5,6	20.00	2.00	53.00	51.00	51.00	0.16	-
Level 1									
Line 4	Seg	5,6	20.00	3.00	51.00	48.00	48.00	-	9.10
Wall 4-1	Seg	5,6	20.00	3.00	51.00	48.00	48.00	0.19	-
East-west Shearlines	Type	Wall Group	Location Y [ft]	Extent [ft]		Length [ft]	FHS [ft]	Aspect Ratio	Height [ft]
				Start	End				
Line A									
Level 2									
Line A		1	-2.00	0.00	14.00	14.00	6.50	-	8.10
Wall A-1	Seg	1	-2.00	0.00	14.00	14.00	6.50	-	-
Segment 1		-	-	0.00	3.00	3.00	-	2.70	-
Opening 1		-	-	3.00	10.50	7.50	-	-	6.00
Segment 2		-	-	10.50	14.00	3.50	-	2.31	-
Line B									
Level 1									
Line B		2	0.00	0.00	14.00	14.00	14.00	-	9.10
Wall B-1	FT	2	0.00	0.00	14.00	14.00	14.00	-	-
Segment 1		-	-	0.00	3.75	3.75	-	1.33	-
Opening 1		-	-	3.75	9.75	6.00	-	-	5.00
Segment 2		-	-	9.75	14.00	4.25	-	1.18	-
Line C									
Level 2									
Line C			2.00	0.00	20.00	20.00	0.00	-	8.10
Wall C-1	Prf		2.00	14.00	20.00	6.00	0.00	-	-
Segment 1		-	-	14.00	14.50	0.50	0.50	16.20	-
Opening 1		-	-	14.50	18.50	4.00	4.00	-	1.50
Segment 2		-	-	18.50	20.00	1.50	1.50	5.40	-
Level 1									
Line C			3.00	0.00	20.00	20.00	0.00	-	9.10
Wall C-1	Prf		3.00	14.00	20.00	6.00	0.00	-	-
Segment 1		-	-	14.00	15.00	1.00	1.00	9.10	-
Opening 1		-	-	15.00	18.00	3.00	3.00	-	6.75
Segment 2		-	-	18.00	20.00	2.00	2.00	4.55	-
Line D									
Level 1									
Line D			31.50	0.00	20.00	20.00	0.00	-	9.10
Wall D-1	NSW		31.50	0.00	20.00	20.00	0.00	-	-
Segment 1		-	-	0.00	10.75	10.75	-	-	-
Opening 1		-	-	10.75	13.50	2.75	-	-	6.75
Segment 2		-	-	13.50	20.00	6.50	-	-	-
Line E									
Level 2									
Line E			52.00	0.00	20.00	20.00	0.00	-	8.10
Wall E-1	Prf		52.00	0.00	9.75	9.75	0.00	-	-
Segment 1		-	-	0.00	2.50	2.50	2.50	3.24	-
Opening 1		-	-	2.50	7.50	5.00	5.00	-	4.00
Segment 2		-	-	7.50	9.75	2.25	2.25	3.60	-

WoodWorks® Shearwalls

SHEARLINE, WALL and OPENING DIMENSIONS (continued)

Level 1									
Line E		3	51.00	0.00	20.00	20.00	6.00	-	9.10
Wall E-1	Seg	3	51.00	0.00	20.00	20.00	6.00	-	-
Segment 1		-	-	0.00	3.00	3.00	-	3.03	-
Opening 1		-	-	3.00	17.00	14.00	-	-	8.00
Segment 2		-	-	17.00	20.00	3.00	-	3.03	-
Line F									
Level 2									
Line F		4	53.00	9.75	20.00	10.25	10.25	-	8.10
Wall F-1	FT	4	53.00	9.75	20.00	10.25	10.25	-	-
Segment 1		-	-	9.75	12.50	2.75	-	1.45	-
Opening 1		-	-	12.50	17.50	5.00	-	-	4.00
Segment 2		-	-	17.50	20.00	2.50	-	1.60	-

Legend:

Type - Seg = segmented, Prf = perforated, FT = force-transfer, NSW = non-shearwall

Location - Dimension perpendicular to wall

FHS - Length of full-height sheathing used to resist shear force. For perforated walls, it is based on the factored segments L_i defined in SDPWS

4.3.4.3

Aspect Ratio – Ratio of wall height to segment length (h/b_s), for force-transfer walls, the aspect ratio of the central pier

Wall Group - Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall
If two wall group numbers listed, they are for rigid diaphragm and flexible diaphragm design.

WoodWorks® Shearwalls

Loads

WIND SHEAR LOADS (as entered or generated)

Level 2 Block	F	Element	Load Case	Wnd Dir	Surf Dir	Prof	Location [ft]		Magnitude [lbs,plf,psf]		Trib Ht [ft]
							Start	End	Start	End	
Block 1	W	Wall	Min	W->E	Wind	Line	-2.00	52.00	32.4		
Block 1	W	Wall	1	W->E	Wind	Line	-2.00	52.00	40.0		
Block 1	W	L Gable	Min	W->E	Wind	Line	2.00	27.00	0.0	66.5	
Block 1	W	L Gable	1	W->E	Wind	Line	2.00	27.00	0.0	87.6	
Block 1	W	R Gable	Min	W->E	Wind	Line	27.00	52.00	66.5	0.0	
Block 1	W	R Gable	1	W->E	Wind	Line	27.00	52.00	87.6	0.0	
Block 1	W	Wall	Min	W->E	Wind	Line	52.00	53.00	32.4		
Block 1	W	Wall	1	W->E	Wind	Line	52.00	53.00	40.0		
Block 1	E	Wall	1	W->E	Lee	Line	-2.00	2.00	27.1		
Block 1	E	Wall	Min	W->E	Lee	Line	-2.00	2.00	32.4		
Block 1	E	L Gable	Min	W->E	Lee	Line	2.00	27.00	0.0	66.5	
Block 1	E	Wall	Min	W->E	Lee	Line	2.00	53.00	32.4		
Block 1	E	L Gable	1	W->E	Lee	Line	2.00	27.00	0.0	55.7	
Block 1	E	Wall	1	W->E	Lee	Line	2.00	53.00	27.1		
Block 1	E	R Gable	1	W->E	Lee	Line	27.00	52.00	55.7	0.0	
Block 1	E	R Gable	Min	W->E	Lee	Line	27.00	52.00	66.5	0.0	
Block 1	W	Wall	Min	E->W	Lee	Line	-2.00	52.00	32.4		
Block 1	W	Wall	1	E->W	Lee	Line	-2.00	52.00	27.1		
Block 1	W	L Gable	Min	E->W	Lee	Line	2.00	27.00	0.0	66.5	
Block 1	W	L Gable	1	E->W	Lee	Line	2.00	27.00	0.0	55.7	
Block 1	W	R Gable	Min	E->W	Lee	Line	27.00	52.00	66.5	0.0	
Block 1	W	R Gable	1	E->W	Lee	Line	27.00	52.00	55.7	0.0	
Block 1	W	Wall	1	E->W	Lee	Line	52.00	53.00	27.1		
Block 1	W	Wall	Min	E->W	Lee	Line	52.00	53.00	32.4		
Block 1	E	Wall	1	E->W	Wind	Line	-2.00	2.00	40.0		
Block 1	E	Wall	Min	E->W	Wind	Line	-2.00	2.00	32.4		
Block 1	E	Wall	1	E->W	Wind	Line	2.00	53.00	40.0		
Block 1	E	Wall	Min	E->W	Wind	Line	2.00	53.00	32.4		
Block 1	E	L Gable	Min	E->W	Wind	Line	2.00	27.00	0.0	66.5	
Block 1	E	L Gable	1	E->W	Wind	Line	2.00	27.00	0.0	87.6	
Block 1	E	R Gable	Min	E->W	Wind	Line	27.00	52.00	66.5	0.0	
Block 1	E	R Gable	1	E->W	Wind	Line	27.00	52.00	87.6	0.0	
Block 1	S	Wall	1	S->N	Wind	Line	0.00	14.00	40.0		
Block 1	S	Roof	1	S->N	Wind	Line	0.00	20.00	-7.1		
Block 1	S	Wall	Min	S->N	Wind	Line	0.00	14.00	32.4		
Block 1	S	Roof	Min	S->N	Wind	Line	0.00	20.00	35.9		
Block 1	S	Wall	Min	S->N	Wind	Line	14.00	20.00	32.4		
Block 1	S	Wall	1	S->N	Wind	Line	14.00	20.00	40.0		
Block 1	N	Roof	Min	S->N	Lee	Line	0.00	20.00	35.9		
Block 1	N	Roof	1	S->N	Lee	Line	0.00	20.00	68.4		
Block 1	N	Wall	1	S->N	Lee	Line	0.00	9.75	14.9		
Block 1	N	Wall	Min	S->N	Lee	Line	0.00	9.75	32.4		
Block 1	N	Wall	Min	S->N	Lee	Line	9.75	20.00	32.4		
Block 1	N	Wall	1	S->N	Lee	Line	9.75	20.00	14.9		
Block 1	S	Wall	1	N->S	Lee	Line	0.00	14.00	14.9		
Block 1	S	Wall	Min	N->S	Lee	Line	0.00	14.00	32.4		
Block 1	S	Roof	Min	N->S	Lee	Line	0.00	20.00	35.9		
Block 1	S	Roof	1	N->S	Lee	Line	0.00	20.00	68.4		
Block 1	S	Wall	Min	N->S	Lee	Line	14.00	20.00	32.4		
Block 1	S	Wall	1	N->S	Lee	Line	14.00	20.00	14.9		
Block 1	N	Roof	1	N->S	Wind	Line	0.00	20.00	-7.1		
Block 1	N	Wall	1	N->S	Wind	Line	0.00	9.75	40.0		
Block 1	N	Roof	Min	N->S	Wind	Line	0.00	20.00	35.9		
Block 1	N	Wall	Min	N->S	Wind	Line	0.00	9.75	32.4		
Block 1	N	Wall	Min	N->S	Wind	Line	9.75	20.00	32.4		
Block 1	N	Wall	1	N->S	Wind	Line	9.75	20.00	40.0		
Block 3	W	R Gable	1	W->E	Wind	Line	51.25	53.00	5.9	0.0	
Block 3	W	R Gable	Min	W->E	Wind	Line	51.25	53.00	4.7	0.0	
Block 3	E	R Gable	1	W->E	Lee	Line	51.25	53.00	1.5	0.0	
Block 3	E	R Gable	Min	W->E	Lee	Line	51.25	53.00	4.7	0.0	
Block 3	W	R Gable	Min	E->W	Lee	Line	51.25	53.00	4.7	0.0	
Block 3	W	R Gable	1	E->W	Lee	Line	51.25	53.00	1.5	0.0	
Block 3	E	R Gable	1	E->W	Wind	Line	51.25	53.00	5.9	0.0	
Block 3	E	R Gable	Min	E->W	Wind	Line	51.25	53.00	4.7	0.0	
Block 3	S	Roof	Min	S->N	Wind	Line	9.75	20.00	0.7		
Block 3	S	Roof	1	S->N	Wind	Line	9.75	20.00	5.9		
Block 3	N	Roof	Min	S->N	Lee	Line	9.75	20.00	5.0		
Block 3	S	Roof	Min	N->S	Lee	Line	9.75	20.00	0.7		

WoodWorks® Shearwalls

WIND SHEAR LOADS (as entered or generated) (continued)

Block 3	S	Roof	1	N->S	Lee	Line	9.75	20.00	4.5		
Block 3	N	Roof	Min	N->S	Wind	Line	9.75	20.00	5.0		
Block 4	W	Ctr Roof	Min	W->E	Wind	Line	-3.00	1.00	126.5		
Block 4	W	R Roof	Min	W->E	Wind	Line	1.00	16.02	63.2	0.0	
Block 4	E	Ctr Roof	Min	W->E	Lee	Line	-3.00	2.00	18.7		
Block 4	E	Ctr Roof	1	W->E	Lee	Line	-3.00	2.00	36.7		
Block 4	E	R Roof	Min	W->E	Lee	Line	2.00	16.02	18.7	0.0	
Block 4	E	R Roof	1	W->E	Lee	Line	2.00	16.02	36.7	0.0	
Block 4	W	Ctr Roof	Min	E->W	Lee	Line	-3.00	1.00	126.5		
Block 4	W	R Roof	Min	E->W	Lee	Line	1.00	16.02	63.2	0.0	
Block 4	E	Ctr Roof	Min	E->W	Wind	Line	-3.00	2.00	18.7		
Block 4	E	Ctr Roof	1	E->W	Wind	Line	-3.00	2.00	48.9		
Block 4	E	R Roof	1	E->W	Wind	Line	2.00	16.02	48.9	0.0	
Block 4	E	R Roof	Min	E->W	Wind	Line	2.00	16.02	18.7	0.0	
Block 4	S	L Gable	Min	S->N	Wind	Line	0.00	14.00	0.0	37.3	
Block 4	S	L Gable	1	S->N	Wind	Line	0.00	14.00	0.0	48.4	
Block 4	S	L Gable	1	N->S	Lee	Line	0.00	14.00	0.0	30.6	
Block 4	S	L Gable	Min	N->S	Lee	Line	0.00	14.00	0.0	37.3	
Level 1											
Block	F	Element	Load Case	Wnd Dir	Surf Dir	Prof	Location [ft]		Magnitude [lbs,plf,psf]		Trib Ht [ft]
							Start	End	Start	End	
Block 1	W	Wall	1	W->E	Wind	Line	-2.00	52.00	37.8		
Block 1	W	Wall	Min	W->E	Wind	Line	-2.00	52.00	32.4		
Block 1	W	Wall	Min	W->E	Wind	Line	0.00	51.00	45.1		
Block 1	W	Wall	1	W->E	Wind	Line	0.00	51.00	52.0		
Block 1	W	Wall	Min	W->E	Wind	Line	52.00	53.00	32.4		
Block 1	W	Wall	1	W->E	Wind	Line	52.00	53.00	37.8		
Block 1	E	Wall	Min	W->E	Lee	Line	-2.00	2.00	32.4		
Block 1	E	Wall	1	W->E	Lee	Line	-2.00	2.00	27.1		
Block 1	E	Wall	1	W->E	Lee	Line	0.00	3.00	37.7		
Block 1	E	Wall	Min	W->E	Lee	Line	0.00	3.00	45.1		
Block 1	E	Wall	Min	W->E	Lee	Line	2.00	53.00	32.4		
Block 1	E	Wall	1	W->E	Lee	Line	2.00	53.00	27.1		
Block 1	E	Wall	1	W->E	Lee	Line	3.00	51.00	37.7		
Block 1	E	Wall	Min	W->E	Lee	Line	3.00	51.00	45.1		
Block 1	W	Wall	1	E->W	Lee	Line	-2.00	52.00	27.1		
Block 1	W	Wall	Min	E->W	Lee	Line	-2.00	52.00	32.4		
Block 1	W	Wall	1	E->W	Lee	Line	0.00	51.00	37.7		
Block 1	W	Wall	Min	E->W	Lee	Line	0.00	51.00	45.1		
Block 1	W	Wall	Min	E->W	Lee	Line	52.00	53.00	32.4		
Block 1	W	Wall	1	E->W	Lee	Line	52.00	53.00	27.1		
Block 1	E	Wall	1	E->W	Wind	Line	-2.00	2.00	37.8		
Block 1	E	Wall	Min	E->W	Wind	Line	-2.00	2.00	32.4		
Block 1	E	Wall	Min	E->W	Wind	Line	0.00	3.00	45.1		
Block 1	E	Wall	1	E->W	Wind	Line	0.00	3.00	52.0		
Block 1	E	Wall	1	E->W	Wind	Line	2.00	53.00	37.8		
Block 1	E	Wall	Min	E->W	Wind	Line	2.00	53.00	32.4		
Block 1	E	Wall	1	E->W	Wind	Line	3.00	51.00	52.0		
Block 1	E	Wall	Min	E->W	Wind	Line	3.00	51.00	45.1		
Block 1	S	Wall	Min	S->N	Wind	Line	0.00	14.00	32.4		
Block 1	S	Wall	Min	S->N	Wind	Line	0.00	14.00	45.1		
Block 1	S	Wall	1	S->N	Wind	Line	0.00	14.00	52.0		
Block 1	S	Wall	1	S->N	Wind	Line	0.00	14.00	37.8		
Block 1	S	Wall	Min	S->N	Wind	Line	14.00	20.00	45.1		
Block 1	S	Wall	1	S->N	Wind	Line	14.00	20.00	52.0		
Block 1	S	Wall	Min	S->N	Wind	Line	14.00	20.00	32.4		
Block 1	S	Wall	1	S->N	Wind	Line	14.00	20.00	37.8		
Block 1	N	Wall	1	S->N	Lee	Line	0.00	9.75	14.9		
Block 1	N	Wall	Min	S->N	Lee	Line	0.00	9.75	32.4		
Block 1	N	Wall	Min	S->N	Lee	Line	0.00	20.00	45.1		
Block 1	N	Wall	1	S->N	Lee	Line	0.00	20.00	20.8		
Block 1	N	Wall	Min	S->N	Lee	Line	9.75	20.00	32.4		
Block 1	N	Wall	1	S->N	Lee	Line	9.75	20.00	14.9		
Block 1	S	Wall	Min	N->S	Lee	Line	0.00	14.00	32.4		
Block 1	S	Wall	1	N->S	Lee	Line	0.00	14.00	20.8		
Block 1	S	Wall	1	N->S	Lee	Line	0.00	14.00	14.9		
Block 1	S	Wall	Min	N->S	Lee	Line	14.00	20.00	32.4		
Block 1	S	Wall	Min	N->S	Lee	Line	14.00	20.00	45.1		
Block 1	S	Wall	1	N->S	Lee	Line	14.00	20.00	20.8		

WoodWorks® Shearwalls

WIND SHEAR LOADS (as entered or generated) (continued)

Block 1	N	Wall	Min	N->S	Wind	Line	0.00	20.00	45.1
Block 1	N	Wall	Min	N->S	Wind	Line	0.00	9.75	32.4
Block 1	N	Wall	1	N->S	Wind	Line	0.00	9.75	37.8
Block 1	N	Wall	1	N->S	Wind	Line	0.00	20.00	52.0
Block 1	N	Wall	Min	N->S	Wind	Line	9.75	20.00	32.4
Block 1	N	Wall	1	N->S	Wind	Line	9.75	20.00	37.8

Legend:

Block - Block used in load generation

Accum. = loads from one block combined with another

Manual = user-entered loads (so no block)

F - Building face (north, south, east or west)

Element - Building surface on which loads generated or entered

Load Case - One of the following:

ASCE 7 All Heights: Case 1 or 2 from Fig 27.3-8 or minimum loads from 27.1.5

ASCE 7 Low-rise: Reference corner and Case A or B from Fig 28.3-1 or minimum loads from 28.3.4

Wind Dir - Direction of wind for loads with positive magnitude, also direction of MWFRS.

Surf Dir - Windward or leeward side of the building for loads in given direction

Prof - Profile (distribution)

Location - Start and end points on building element

Magnitude - Start = intensity of uniform and point loads or leftmost intensity of trapezoidal load, End = right intensity of trap load

Trib Ht - Tributary height of area loads only

Notes:

Windward load on the monoslope roof was not generated, to comply with ASCE 7 Figure 27.3-1, Note 7.

All loads entered by the user or generated by program are specified (unfactored) loads. The program applies a load factor of 0.60 to wind loads before distributing them to the shearlines.

WoodWorks® Shearwalls

BUILDING MASSES

Level 2				Profile	Location [ft]		Magnitude [lbs,plf,psf]		Trib Width [ft]
Force Dir	Building Element	Block	Wall Line		Start	End	Start	End	
E-W	Roof	Block 1	1	Line	0.00	54.00	190.0	190.0	
E-W	Roof	Block 1	4	Line	0.00	54.00	190.0	190.0	
E-W	Roof	Block 3	2	Line	51.25	55.00	97.4	97.4	
E-W	Roof	Block 3	4	Line	51.25	55.00	97.4	97.4	
E-W	Roof	Block 4	1	Line	-3.00	2.00	152.0	152.0	
E-W	Roof	Block 4	3	Line	-3.00	2.00	152.0	152.0	
E-W	R Gable	Block 1	1	Line	2.00	27.00	99.8	0.0	
E-W	L Gable	Block 1	1	Line	27.00	52.00	0.0	99.8	
E-W	L Gable	Block 1	4	Line	2.00	27.00	99.8	0.0	
E-W	R Gable	Block 1	4	Line	27.00	52.00	0.0	99.8	
E-W	L Gable	Block 3	2	Line	51.25	53.00	0.0	7.0	
E-W	R Gable	Block 3	2	Line	51.25	51.25	7.0	0.0	
E-W	R Gable	Block 3	4	Line	51.25	53.00	0.0	7.0	
E-W	L Gable	Block 3	4	Line	51.25	51.25	7.0	0.0	
N-S	Roof	Block 1	C	Line	0.00	20.00	513.0	513.0	
N-S	Roof	Block 1		Line	0.00	20.00	513.0	513.0	
N-S	Roof	Block 3		Line	9.75	20.00	16.6	16.6	
N-S	Roof	Block 3	F	Line	9.75	20.00	54.6	54.6	
N-S	Roof	Block 4	A	Line	-1.00	15.00	57.0	57.0	
N-S	Roof	Block 4	C	Line	-1.00	15.00	38.0	38.0	
N-S	L Gable	Block 4	A	Line	0.00	14.00	56.0	0.0	
N-S	R Gable	Block 4	A	Line	14.00	14.00	0.0	56.0	
Both	Wall 1-1	n/a	1	Line	-2.00	52.00	48.6	48.6	
Both	Wall 2-1	n/a	2	Line	52.00	53.00	48.6	48.6	
Both	Wall 3-1	n/a	3	Line	-2.00	2.00	48.6	48.6	
Both	Wall 4-1	n/a	4	Line	2.00	53.00	48.6	48.6	
Both	Wall A-1	n/a	A	Line	0.00	14.00	48.6	48.6	
Both	Wall C-1	n/a	C	Line	14.00	20.00	48.6	48.6	
Both	Wall E-1	n/a		Line	0.00	9.75	48.6	48.6	
Both	Wall F-1	n/a	F	Line	9.75	20.00	48.6	48.6	
Level 1				Profile	Location [ft]		Magnitude [lbs,plf,psf]		Trib Width [ft]
Force Dir	Building Element	Block	Wall Line		Start	End	Start	End	
Both	Wall 1-1	n/a	1	Line	-2.00	52.00	48.6	48.6	
E-W	Floor F1	n/a	1	Line	0.00	3.00	105.0	105.0	
E-W	Floor F2	n/a	1	Line	3.00	51.00	150.0	150.0	
Both	Wall 2-1	n/a	2	Line	52.00	53.00	48.6	48.6	
Both	Wall 3-1	n/a	3	Line	-2.00	2.00	48.6	48.6	
E-W	Floor F1	n/a	3	Line	0.00	3.00	105.0	105.0	
Both	Wall 4-1	n/a	4	Line	2.00	53.00	48.6	48.6	
E-W	Floor F2	n/a	4	Line	3.00	51.00	150.0	150.0	
Both	Wall A-1	n/a	A	Line	0.00	14.00	48.6	48.6	
N-S	Floor F1	n/a	B	Line	0.00	14.00	382.5	382.5	
Both	Wall C-1	n/a	C	Line	14.00	20.00	48.6	48.6	
N-S	Floor F2	n/a		Line	14.00	20.00	360.0	360.0	
N-S	Floor F1	n/a	E	Line	0.00	14.00	382.5	382.5	
N-S	Floor F2	n/a	E	Line	14.00	20.00	360.0	360.0	
Both	Wall E-1	n/a		Line	0.00	9.75	48.6	48.6	
Both	Wall F-1	n/a	F	Line	9.75	20.00	48.6	48.6	
Both	Wall 1-1	n/a	1	Line	0.00	51.00	54.6	54.6	
Both	Wall 3-1	n/a	3	Line	0.00	3.00	54.6	54.6	
Both	Wall 4-1	n/a	4	Line	3.00	51.00	54.6	54.6	
Both	Wall B-1	n/a	B	Line	0.00	14.00	54.6	54.6	
Both	Wall C-1	n/a		Line	14.00	20.00	54.6	54.6	
Both	Wall D-1	n/a	D	Line	0.00	20.00	45.5	45.5	
Both	Wall E-1	n/a	E	Line	0.00	20.00	54.6	54.6	

WoodWorks® Shearwalls

BUILDING MASSES (continued)

Legend:

Force Dir - Direction in which the mass is used for seismic load generation, E-W, N-S, or Both

Building element - Roof, gable end, wall or floor area used to generate mass, wall line for user-applied masses, Floor F# - refer to Plan View for floor area number

Wall line - Shearline that equivalent line load is assigned to

Location - Start and end points of equivalent line load on wall line

Trib Width - Tributary width; for user applied area loads only

WoodWorks® Shearwalls

SEISMIC LOADS

Level 2					
Force Dir	Profile	Location [ft]		Mag [lbs,plf,psf]	
		Start	End	Start	End
E-W	Line	-3.00	-2.00	38.3	38.3
E-W	Point	-2.00	-2.00	135	135
E-W	Line	-2.00	0.00	50.5	50.5
E-W	Line	0.00	2.00	98.4	98.4
E-W	Point	2.00	2.00	37	37
E-W	Line	2.00	27.00	60.1	85.2
E-W	Line	27.00	51.25	85.2	60.9
E-W	Line	51.25	52.00	87.1	85.6
E-W	Point	52.00	52.00	60	60
E-W	Line	52.00	53.00	85.6	84.6
E-W	Point	53.00	53.00	63	63
E-W	Line	53.00	54.00	72.4	72.4
E-W	Line	54.00	55.00	24.5	24.5
N-S	Line	-1.00	0.00	12.0	12.0
N-S	Point	0.00	0.00	645	645
N-S	Line	0.00	9.75	153.4	158.3
N-S	Point	9.75	9.75	7	7
N-S	Line	9.75	14.00	167.3	169.5
N-S	Point	14.00	14.00	24	24
N-S	Line	14.00	15.00	169.5	162.4
N-S	Line	15.00	20.00	150.4	150.4
N-S	Point	20.00	20.00	627	627
Level 1					
Force Dir	Profile	Location [ft]		Mag [lbs,plf,psf]	
		Start	End	Start	End
E-W	Point	-2.00	-2.00	2213	2213
E-W	Point	-2.00	-2.00	48	48
E-W	Line	-2.00	0.00	6.8	6.8
E-W	Point	0.00	0.00	54	54
E-W	Line	0.00	2.00	29.2	29.2
E-W	Point	2.00	2.00	20	20
E-W	Line	2.00	3.00	29.2	29.2
E-W	Point	3.00	3.00	23	23
E-W	Line	3.00	51.00	35.5	35.5
E-W	Point	31.50	31.50	64	64
E-W	Point	51.00	51.00	77	77
E-W	Line	51.00	52.00	6.8	6.8
E-W	Point	52.00	52.00	33	33
E-W	Line	52.00	53.00	6.8	6.8
E-W	Point	53.00	53.00	2253	2253
E-W	Point	53.00	53.00	35	35
N-S	Point	0.00	0.00	379	379
N-S	Line	0.00	9.75	71.3	71.3
N-S	Point	9.75	9.75	3	3
N-S	Line	9.75	14.00	71.3	71.3
N-S	Point	14.00	14.00	25	25
N-S	Line	14.00	20.00	68.2	68.2
N-S	Point	20.00	20.00	358	358

Legend:

Loads in table can be accumulation of loads from several building masses, so they do not correspond with a particular building element.

Location - Start and end of load in direction perpendicular to seismic force direction

Notes:

All loads entered by the user or generated by program are specified (unfactored) loads. The program applies a load factor of 0.70 and redundancy factor to seismic loads before distributing them to the shearlines.

WoodWorks® Shearwalls

Design Summary

SHEARWALL DESIGN

Wind Shear Loads, Flexible Diaphragm

The following under-capacity shearlines were found:
Level 1: E-1

Seismic Loads, Flexible Diaphragm

The following under-capacity shearlines were found:

HOLDDOWN DESIGN

Wind Loads, Flexible Diaphragm

Under-capacity hold-downs were found on the following walls:
Level 1: E-1

Seismic Loads, Flexible Diaphragm

All hold-downs have sufficient design capacity.

This Design Summary does not include failures that occur due to excessive story drift from ASCE 7 CC.2.2 (wind) or 12.12 (seismic). Refer to Story Drift table in this report to verify this design criterion.

Refer to the Deflection table for possible issues regarding fastener slippage (SDPWS Table C4.2.2D).

ALL ELEMENTS INDICATED AS
"UNDER-CAPACITY" HAVE BEEN REVIEWED AND
EITHER APPROVED WITH MINOR OVERSTRESSES
AND/OR DESIGN REVISED ON FINAL DOCS

WoodWorks® Shearwalls

Flexible Diaphragm Wind Design ASCE 7 Directional (All Heights) Loads

SHEAR RESULTS

N-S Shearlines	W Gp	For Dir	ASD Shear Force [plf]			Asp-Cub		Allowable Shear [plf]				Resp. Ratio		
			v	vmax/vft	V [lbs]	Int	Ext	Int	Ext	Co	C		Cmb	V [lbs]
Line 1														
Level 2														
Ln1, Lev2	6	Both	16.9	-	913	1.0	1.0	75	75	-	A	150	8100	0.11
Level 1														
Ln1, Lev1	6	Both	36.1	-	1842	1.0	1.0	75	75	-	A	150	7650	0.24
Line 4														
Level 2														
Ln4, Lev2	6	Both	18.0	-	919	1.0	1.0	75	75	-	A	150	7650	0.12
Level 1														
Ln4, Lev1	6^	Both	38.5	-	1849	1.0	1.0	75	75	-	A	150	7200	0.26
E-W Shearlines	W Gp	For Dir	ASD Shear Force [plf]			Asp-Cub		Allowable Shear [plf]				Resp. Ratio		
			v	vmax/vft	V [lbs]	Int	Ext	Int	Ext	Co	C		Cmb	V [lbs]
Line A														
Level 2														
LnA, Lev2	-	Both	-	-	2674	-	-	-	-	-	-	-	4185	-
Wall A-1	1^	Both	-	-	2674	-	1.0	-	686	-	-	-	4185	-
Seg. 1	-	Both	413.8	0.0	1241	-	.91	-	626	-	-	626	1878	0.66
Seg. 2	-	Both	409.3	0.0	1433	-	.96	-	659	-	-	659	2307	0.62
Line B														
Level 1														
LnB, Lev1	-	Both	-	-	5122	-	-	-	-	-	-	-	12544	-
Wall B-1	2^	Both	-	-	5122	1.0	1.0	0	896	-	A	-	12544	-
Seg. 1	-	Both	640.3	31.2	2401	1.0	1.0	0	896	-	-	896	3360	0.71
Open. 1	-	Both	-	812.1	4873	-	-	0	896	-	-	896	5376	0.91
Seg. 2	-	Both	640.3	31.2	2721	1.0	1.0	0	896	-	-	896	3808	0.71
Line E														
LnE, Lev1	-	W->E	-	-	4716	-	-	-	-	-	-	-	3584	-
	-	E->W	-	-	4726	-	-	-	-	-	-	-	3584	-
Wall E-1	3	W->E	-	-	4716	-	1.0	-	686	-	-	-	3584	-
	3^	E->W	-	-	4726	-	1.0	-	686	-	-	-	3584	-
Seg. 1	-	W->E	786.1	0.0	2358	-	.87	-	597	-	-	597	1792	1.32*
	-	E->W	787.6	0.0	2363	-	.87	-	597	-	-	597	1792	1.32*
Seg. 2	-	W->E	786.1	0.0	2358	-	.87	-	597	-	-	597	1792	1.32*
	-	E->W	787.6	0.0	2363	-	.87	-	597	-	-	597	1792	1.32*
Line F														
Level 2														
LnF, Lev2	-	W->E	-	-	2273	-	-	-	-	-	-	-	3731	-
	-	E->W	-	-	2282	-	-	-	-	-	-	-	3731	-
Wall F-1	4	W->E	-	-	2273	1.0	1.0	0	364	-	A	-	3731	-
	4^	E->W	-	-	2282	1.0	1.0	0	364	-	A	-	3731	-
Seg. 1	-	W->E	433.0	15.7	1191	1.0	1.0	0	364	-	-	364	1001	1.19*
	-	E->W	434.7	15.8	1195	1.0	1.0	0	364	-	-	364	1001	1.19*
Open. 1	-	W->E	-	438.1	2191	-	-	0	364	-	-	364	1820	1.20
	-	E->W	-	439.9	2199	-	-	0	364	-	-	364	1820	1.21
Seg. 2	-	W->E	433.0	15.7	1082	1.0	1.0	0	364	-	-	364	910	1.19*
	-	E->W	434.7	15.8	1087	1.0	1.0	0	364	-	-	364	910	1.19*

Legend:

W Gp - Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall. "^" means that this wall is critical for all walls in the Standard Wall group.

For Dir - Direction of wind force along shearline.

v - Design shear force on segment = ASD-factored shear force per unit length of full-height sheathing (FHS)

vmax/vft - Perforated walls: Collector and in-plane anchorage force as per SDPWS eqn. 4.3-9 = V/FHS/Co. FHS is factored for narrow segments as per 4.3.4.3

Force-transfer walls: Shear force in piers above and below either openings or piers beside opening(s). Aspect ratio factor does not apply to these piers.

V - ASD factored shear force. For shearline: total shearline force. For wall: total of all segments on wall. For segment: force on segment

Asp/Cub - For wall: Unblocked structural wood panel factor Cub from SDPWS 4.3.3.2. For segment or force-transfer pier: Aspect Ratio Factor from SDPWS 4.3.4.2.

Int - Unit shear capacity of interior sheathing; Ext - Unit shear capacity of exterior sheathing. For wall: Unfactored. For segment: Include Cub factor and aspect ratio adjustments.

Co - Adjustment factor for perforated walls from SDPWS Equation 4.3-5.

C - Sheathing combination rule, A = Add capacities, S = Strongest side or twice weakest, G = Stiffness-based using SDPWS 4.3-3.

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Cmb - Combined interior and exterior unit shear capacity including perforated wall factor C_o .

V - Total factored shear capacity of shearline, wall or segment.

Crit Resp - Response ratio = v/Cmb = design shear force/unit shear capacity. "S" indicates that the wind design criterion was critical in selecting wall.

Notes:

Refer to Elevation View diagrams for individual level for uplift anchorage force t for perforated walls given by SDPWS 4.3.6.4.2,4.

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WoodWorks® Shearwalls

HOLD-DOWN DESIGN (flexible wind design)

Level 1 Line-Wall	Posit'n	Location [ft]		Load Case	Tensile ASD Holddown Force [lbs]				Hold-down	Cap [lbs]	Crit Resp.
		X	Y		Shear	Dead	Uplift	Cmb'd			
Line 1											
	V Elem	0.00	-1.87	Min	203			203	Refer to upper level		
1-1	L End	0.00	0.12	Min	330			330	HDU5-SDS2.	5645	0.06
1-1	R End	0.00	50.88	Min	330			330	HDU5-SDS2.	5645	0.06
	V Elem	0.00	51.88	Min	203			203	Refer to upper level		
Line 4											
	V Elem	20.00	2.13	Min	221			221	Refer to upper level		
4-1	L End	20.00	3.13	Min	352			352	HDU5-SDS2.	5645	0.06
4-1	R End	20.00	50.88	Min	352			352	HDU5-SDS2.	5645	0.06
	V Elem	20.00	52.88	Min	221			221	Refer to upper level		
Line A											
	V Elem	0.12	-2.00	Min	3882			3882	Refer to upper level		
	V Elem	2.88	-2.00	Min	3882			3882	Refer to upper level		
	V Elem	10.63	-2.00	Min	5370			5370	Refer to upper level		
	V Elem	13.88	-2.00	Min	5370			5370	Refer to upper level		
Line B											
B-1	L End	0.12	0.00	Min	3390			3390	HDU5-SDS2.	5645	0.60
B-1	R End	13.88	0.00	Min	3390			3390	HDU5-SDS2.	5645	0.60
Line E											
E-1	L End	0.12	51.00	1	7804			7804	HDU5-SDS2.	5645	1.38*
E-1	L Op 1	2.88	51.00	1	7819			7819	HDU5-SDS2.	5645	1.39*
E-1	R Op 1	17.13	51.00	1	7804			7804	HDU5-SDS2.	5645	1.38*
E-1	R End	19.88	51.00	1	7819			7819	HDU5-SDS2.	5645	1.39*
Line F											
	V Elem	9.87	53.00	1	1841			1841	Refer to upper level		
	V Elem	19.88	53.00	1	1849			1849	Refer to upper level		

Level 2 Line-Wall	Posit'n	Location [ft]		Load Case	Tensile ASD Holddown Force [lbs]				Hold-down	Cap [lbs]	Crit Resp.
		X	Y		Shear	Dead	Uplift	Cmb'd			
Line 1											
1-1	L End	0.00	-1.87	Min	203			203	HDU5-SDS2.	5645	0.04
1-1	R End	0.00	51.88	Min	203			203	HDU5-SDS2.	5645	0.04
Line 4											
4-1	L End	20.00	2.13	Min	221			221	HDU5-SDS2.	5645	0.04
4-1	R End	20.00	52.88	Min	221			221	HDU5-SDS2.	5645	0.04
Line A											
A-1	L End	0.12	-2.00	Min	3882			3882	HDU5-SDS2.	5645	0.69
A-1	L Op 1	2.88	-2.00	Min	3882			3882	HDU5-SDS2.	5645	0.69
A-1	R Op 1	10.63	-2.00	Min	5370			5370	HDU5-SDS2.	5645	0.95
A-1	R End	13.88	-2.00	Min	5370			5370	HDU5-SDS2.	5645	0.95
Line F											
F-1	L End	9.87	53.00	1	1841			1841	HDU5-SDS2.	5645	0.33
F-1	R End	19.88	53.00	1	1849			1849	HDU5-SDS2.	5645	0.33

Legend:

Line-Wall:

At wall or opening – Shearline and wall number At vertical element - Shearline

Posit'n - Position of stud that hold-down is attached to:

V Elem - Vertical element: column or strengthened studs required where not at wall end or opening

L or R End - At left or right wall end

L or R Op n - At left or right side of opening n

t @ Op n - Uplift force t at opening n from offset opening in perforated wall above, from SDPWS 4.3.6.2.1

Location - Co-ordinates in Plan View

Load Case - Results are for critical load case:

ASCE 7 All Heights: Case 1 or 2 from Fig. 27.3-8

ASCE 7 Low-rise: Windward corner(s) and Case A or B from Fig. 28.3-1

ASCE 7 Minimum loads (27.1.5 / 28.3.4)

Hold-down Forces:

Shear – Wind shear overturning component, based on shearline force, factored for ASD by 0.60. For perforated walls, T from SDPWS 4.3-8 is used.

Dead – Dead load resisting component, factored for ASD by 0.60

Uplift - Uplift wind load component, factored for ASD by 0.60. For perforated walls, T from SDPWS 4.3-8 is used.

Cmb'd - Sum of ASD-factored overturning, dead and uplift forces. May also include the uplift force t from perforated walls from SDPWS 4.3.6.2.1 when openings are staggered.

Hold-down – Device used from hold-down database

Cap – Allowable ASD tension load

Crit. Resp. - Critical Response = Combined ASD force / Allowable ASD tension load

SOFTWARE BY DEFAULT PLACES AN HDU5. THERE IS NO WAY TO REMOVE THIS. EOR HAS REVIEWED THE ANALYSIS AND SELECTED THE NECESSARY SIZE AND LOCATION OF THE HD'S

WoodWorks® Shearwalls

Notes:

Refer to Shear Results table for factor C_o , and shearline dimensions table for the sum of L_i , used to calculate tension force T for perforated walls from SDPWS Eqn. 4.3-8.

Designer is responsible for design of connection from wall to floor or foundation for shear force shown in Shear Results table. Refer to SDPWS 4.3.6.4.3 for foundation anchor bolt requirements.

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WoodWorks® Shearwalls

COLLECTOR FORCES (flexible wind design)

Level 1					Drag Strut Force [lbs]		Strap/Blocking Force [lbs]	
Line-Wall	Position on Wall or Opening	Location [ft]		Load Case	-->	<---	-->	<---
		X	Y					
Line B								
B-1	Left Opening 1	3.75	0.00	1	-1255	1255		
B-1	Right Opening 1	9.75	0.00	1	1422	-1422		
B-1	Left Opening 1	3.75	0.00				2284	2284
B-1	Right Opening 1	9.75	0.00				2589	2589
Line E								
E-1	Left Opening 1	3.00	51.00	1	1651	-1654		
E-1	Right Opening 1	17.00	51.00	1	-1651	1654		
Level 2					Drag Strut Force [lbs]		Strap/Blocking Force [lbs]	
Line-Wall	Position on Wall or Opening	Location [ft]		Load Case	-->	<---	-->	<---
		X	Y					
Line A								
A-1	Left Opening 1	3.00	-2.00	1	668	-668		
A-1	Right Opening 1	10.50	-2.00	1	-764	764		
Line F								
F-1	Left Opening 1	12.50	53.00	1	-567	569		
F-1	Right Opening 1	17.50	53.00	1	515	-517		
F-1	Left Opening 1	12.50	53.00				1147	1152
F-1	Right Opening 1	17.50	53.00				1043	1047

Legend:

Line-Wall - Shearline and wall number

Position ... - Side of opening or wall end that drag strut is attached to

Location - Co-ordinates in Plan View

Load Case - Results are for critical load case:

ASCE 7 All heights Case 1 or 2

ASCE 7 Low-rise corner; Case A or B

Drag strut Force - Axial force in transfer element at openings, gaps, or changes in design shear along shearline. + : tension; - : compression.

Based on ASD-factored shearline force (v_{max} from 4.3.6.4.1.1 for perforated walls)

Strap/Blocking Force - For force-transfer walls, force transferred from above and below opening to shearwall pier.

-> Due to shearline force in the west-to-east or south-to-north direction

<- Due to shearline force in the east-to-west or north-to-south direction

WoodWorks® Shearwalls

MWFRS DEFLECTION (flexible wind design)

These deflections are used to determine shearwall stiffness for force distribution

Wall, segment	W Gp	Dir	Srf	v plf	b ft	h ft	Bending A sq.in	Defl in	Ga kips/in	Nail slip Vn lbs	en in	Shear Defl in	Hold Defl in	Total Defl in
Level 1														
Line 1														
1-1	6	Both	Both	36.1	51.00	9.10	16.5	.000	4.2	61	.030	.039	0.03	0.07
Line 4														
4-1	6	Both	Both	38.5	48.00	9.10	16.5	.000	4.2	61	.030	.042	0.04	0.08
Line B														
B-1	2	Both	-	-	-	-	-	-	-	-	-	-	-	0.78
B-1,1		Both	Ext	640.3	3.75	8.22	16.5	.034	38.6	149	.017	.137	0.65	0.82
		Both	Int	0.0					0.0	0	.000	.000		
B-1,2		Both	Ext	640.3	4.25	8.22	16.5	.030	38.6	149	.017	.137	0.57	0.74
		Both	Int	0.0					0.0	0	.000	.000		
Line E														
E-1,1	3	W->E	Ext	786.1	3.00	9.10	16.5	.068	25.2	172	.025	.284	1.04	1.40
		E->W	Ext	787.6	3.00	9.10	16.5	.069	25.2	172	.025	.284	1.04	1.40
E-1,2		W->E	Ext	786.1	3.00	9.10	16.5	.068	25.2	172	.025	.284	1.04	1.40
		E->W	Ext	787.6	3.00	9.10	16.5	.069	25.2	172	.025	.284	1.04	1.40
Wall, segment	W Gp	Dir	Srf	v plf	b ft	h ft	Bending A sq.in	Defl in	Ga kips/in	Nail slip Vn lbs	en in	Shear Defl in	Hold Defl in	Total Defl in
Level 2														
Line 1														
1-1	6	Both	Both	16.9	54.00	8.10	16.5	.000	4.2	61	.030	.016	0.03	0.05
Line 4														
4-1	6	Both	Both	18.0	51.00	8.10	16.5	.000	4.2	61	.030	.017	0.03	0.05
Line A														
A-1,1	1	Both	Ext	413.8	3.00	8.10	18.0	.023	25.2	172	.025	.133	0.99	1.15
A-1,2		Both	Ext	409.3	3.50	8.10	18.0	.020	25.2	172	.025	.131	0.99	1.15
Line F														
F-1	4	Both	-	-	-	-	-	-	-	-	-	-	-	1.11
F-1,1		W->E	Ext	433.0	2.75	6.72	16.5	.019	13.4	182	.030	.217	0.83	1.07
		W->E	Int	0.0					0.0	0	.000	.000		
		E->W	Ext	434.7	2.75	6.72	16.5	.019	13.4	182	.030	.217	0.83	1.07
		E->W	Int	0.0					0.0	0	.000	.000		
F-1,2		W->E	Ext	433.0	2.50	6.72	16.5	.021	13.4	182	.030	.217	0.92	1.16
		W->E	Int	0.0					0.0	0	.000	.000		
		E->W	Ext	434.7	2.50	6.72	16.5	.021	13.4	182	.030	.217	0.92	1.16
		E->W	Int	0.0					0.0	0	.000	.000		

Legend:

Wall, segment - Wall and segment between openings, e.g. B-3, 2 = second segment on Wall 3 on Shearline B

W Gp - Wall design group defined in Sheathing and Materials tables, where it shows associated Standard Wall.

Dir - Force direction

Srf - Wall surface, interior or exterior for perimeter walls, 1 or 2 for interior partitions

v - ASD shear force per unit distance on wall segment. For perforated walls, v_{max} from SDPWS 4.3-9 is used, as per 4.3.2.1. For force-transfer walls, unit shear force in pier beside opening(s) is used.

b - Segmented wall or force-transfer wall segments: Width of wall segment between openings. Perforated wall: Sum of FHS segments, modified as per SDPWS 4.3.2.1. Force-transfer wall: Length of wall including openings.

h - Wall height. For force-transfer piers, distance from bottom of opening to top of wall is shown; for end segments, results using that distance and the wall height are averaged, as per APA T555.

Defl - Horizontal shearwall deflection due to given term:

Bending = $8vh^3 / EAb$ Cub; A - Cross sectional area of segment end stud(s); E - stud mod. of elasticity in Framing Materials table

Shear = $vh / 1000 Ga$ Cub. Ga = $vw / (vw / Gt + 0.75 en)$, from SDPWS Ex. C4.3.2-1; vw - ASD sheathing capacity; Gt - Shear stiffness from C4.3.3.2, value is in Sheathing Materials table; en - Nail slip from table C4.2.2D; Vn - Shear force per nail along panel edge using vw

Hold - Hold-down = $da \times h / b$; refer to Hold-down Displacement table for components of da. For force-transfer walls, hold-down device at end of wall is applied to all segments, as per APA T555.

Cub - Unblocked factor from 4.3.2.2, shown in the Shear Results table.

Total defl = Deflection from bending + shear + hold-down, as per SDPWS C4.3.2-1. For force-transfer walls, the average of the values for the segments, as per APA T555.

WoodWorks® Shearwalls

MWFRS HOLD-DOWN DISPLACEMENT (flexible wind design)

These displacements are used to determine deflections for force distribution

Wall, segment	Dir	Hold-down	Uplift force lbs	Elong / Disp			Slippage		Shrink da in	Crush+ Extra in	Total da in	Hold Defl in
				Manuf in	Add in	da in	Pf lbs	da in				
Level 1												
Line 1												
1-1	Both	HDU5-SDS	330	.007	.000	0.007	-	-	.138	0.04	0.18	0.03
Line 4												
4-1	Both	HDU5-SDS	352	.007	.000	0.008	-	-	.138	0.04	0.19	0.04
Line B												
B-1,1	Both	HDU5-SDS	5643	.115	.005	0.120	-	-	.138	0.04	0.30	0.65
B-1,2	Both	HDU5-SDS	5596	.114	.005	0.119	-	-	.138	0.04	0.30	0.57
Line E												
E-1,1	W->E	HDU5-SDS	7804	.159	.007	0.166	-	-	.138	0.04	0.34	1.04
	E->W	HDU5-SDS	7819	.159	.007	0.167	-	-	.138	0.04	0.34	1.04
E-1,2	W->E	HDU5-SDS	7804	.159	.007	0.166	-	-	.138	0.04	0.34	1.04
	E->W	HDU5-SDS	7819	.159	.007	0.167	-	-	.138	0.04	0.34	1.04
Wall, segment	Dir	Hold-down	Uplift force lbs	Elong / Disp			Slippage		Shrink da in	Crush+ Extra in	Total da in	Hold Defl in
Manuf in	Add in	da in	Pf lbs	da in	da in	da in	da in	da in	da in	da in	da in	da in
Level 2												
Line 1												
1-1	Both	HDU5-SDS	203	.008	.000	0.008	-	-	.168	0.04	0.22	0.03
Line 4												
4-1	Both	HDU5-SDS	221	.009	.000	0.009	-	-	.168	0.04	0.22	0.03
Line A												
A-1,1	Both	HDU5-SDS	3882	.158	.002	0.161	-	-	.168	0.04	0.37	0.99
A-1,2	Both	HDU5-SDS	5370	.219	.003	0.222	-	-	.168	0.04	0.43	0.99
Line F												
F-1,1	W->E	HDU5-SDS	3203	.130	.002	0.132	-	-	.168	0.04	0.34	0.83
	E->W	HDU5-SDS	3216	.131	.002	0.133	-	-	.168	0.04	0.34	0.83
F-1,2	W->E	HDU5-SDS	3235	.132	.002	0.134	-	-	.168	0.04	0.34	0.92
	E->W	HDU5-SDS	3248	.132	.002	0.134	-	-	.168	0.04	0.34	0.92

Legend:

Wall, segment – Wall and segment between openings, e.g. B-3, 2 = second segment on Wall 3 on Shearline B

Dir - Force direction

Uplift force (P) – Accumulated ASD hold-down tension force from overturning, dead and wind uplift. For perforated walls, T from SDPWS 4.3-8 is used for overturning

da – Vertical displacements due to the following components:

Elong/Disp – Elongation when slippage calculated separately; displacement when combined elongation/slippage used

Manuf - Using manufacturer's value for anchor bolt length, or no bolt contribution for connector-only elongation.

Unless marked with * = (ASD uplift force / ASD hold-down capacity) x max ASD elongation or displacement

* - Maximum strength-level elongation or displacement is used. May result in higher than actual displacements for lightly loaded hold-downs, causing the segment to draw less force due to lower than actual stiffness.

Add - Due to longer anchor bolt length than manufacturer's value, or entire bolt length for connector-only elongation = $PL / (Ab \times Es)$;

Ab – bolt cross-sectional area;

Es = steel modulus = 29000000 psi;

L = Lb – Lh;

Lb = Total bolt length shown in Storey Information table;

Lh = Manufacturer's anchor bolt length for given displacement/elongation from hold-down database.

Slippage – Due to vertical slippage of hold-down fasteners attached to stud(s) when not combined with elongation

Pf = ASD uplift force P / number of fasteners

Bolts: = $Pf / (270,000 D^{1.5})$ (NDS 11.3.6) ; D = bolt diameter

Nails: = en, from SDPWS Table C4.2.2D using Pf for Vn and values for Wood Structural Panel

Shrink - Wood shrinkage = $0.002 \times (15\% \text{ fabrication} - 10\% \text{ in-service moisture contents}) \times Ls$

Ls = Perp.-to-grain length between fasteners subject to shrinkage, shown in Storey Information table

Crush + Extra – 0.04" wood crushing at compression end of wall segment plus extra displacement due to mis-cuts, gaps, etc.

Total da = Elong/Disp + Slippage + Shrink + Crush + Extra

Hold Defl – Horizontal deflection = $h/b \times da$ (4th term in the deflection equation SDPWS C4.3.2-1)

h = wall height; b = segment length between openings; h,b values in Deflection table. For end segments from force-transfer walls, h is the average of the distance from bottom of opening to top of wall and the wall height.

WoodWorks® Shearwalls

Flexible Diaphragm Seismic Design

SEISMIC INFORMATION

Level	Mass [lbs]	Area [sq.ft]	Story Shear [lbs]		Diaphragm Force [lbs]					
			E-W	N-S	E-W:	Fpx	Design	N-S:	Fpx	Design
2	35482	1066.3	4469	4469		3227	3227		3227	3227
1	30983	1002.0	2173	2173		2818	10632		2818	2818
All	66465	-	6642	6642		-	-		-	-

Legend:

Mass – Sum of all generated and input building masses on level = w_x in ASCE 7 equation 12.8-12.

Story Shear – Total unfactored (strength-level) shear force induced at level x , = F_x in ASCE 7 equation 12.8-11.

Diaphragm Force – Minimum ASD-factored force for diaphragm design, used by Shearwalls only for drag strut forces, as per Exception to 12.10.2.1.

Fpx is from Eqns. 12.10-1, -2, and -3. *Design* = The greater of the story shear and F_{px} + transfer forces from discontinuous shearlines, factored by overstrength (ω) as per 12.10.1.1. $\omega = 2.5$ as per 12.2-1.

Redundancy Factor ρ (rho):

E-W 1.00, N-S 1.00

Automatically calculated according to ASCE 7 12.3.4.2.

Vertical Earthquake Load E_v

$E_v = 0.2 S_{ds} D$; $S_{ds} = 0.65$; $E_v = 0.130 D$ unfactored; $0.091 D$ factored; total dead load factor: $0.6 - 0.091 = 0.509$ tension, $1.0 + 0.091 = 1.091$ compression.

WoodWorks® Shearwalls

SHEAR RESULTS (flexible seismic design)

N-S Shearlines	W Gp	For Dir	ASD Shear Force [plf]			Asp-Cub		Allowable Shear [plf]				V [lbs]	Resp. Ratio	
			v	vmax/vft	V [lbs]	Int	Ext	Int	Ext	Co	C			Cmb
Line 1														
Level 2														
Ln1, Lev2	5^	Both	0.0	-	0	1.0	1.0	0	0	-	A	-	-	-
Level 1														
Ln1, Lev1	5^	Both	0.0	-	0	1.0	1.0	0	0	-	A	-	-	-
Line 4														
Level 2														
Ln4, Lev2	5^	Both	0.0	-	0	1.0	1.0	0	0	-	A	-	-	-
Level 1														
Ln4, Lev1	5^	Both	0.0	-	0	1.0	1.0	0	0	-	A	-	-	-
E-W Shearlines	W Gp	For Dir	ASD Shear Force [plf]			Asp-Cub		Allowable Shear [plf]				V [lbs]	Resp. Ratio	
			v	vmax/vft	V [lbs]	Int	Ext	Int	Ext	Co	C			Cmb
Line A														
Level 2														
LnA, Lev2	-	Both	-	-	1549	-	-	-	-	-	-	-	2989	-
Wall A-1	1	Both	-	-	1549	-	1.0	-	490	-	-	-	2989	-
Seg. 1	-	Both	234.7	0.0	704	-	.91	-	447	-	-	447	1341	0.52
Seg. 2	-	Both	241.3	0.0	845	-	.96	-	471	-	-	471	1648	0.51
Line B														
Level 1														
LnB, Lev1	-	Both	-	-	2297	-	-	-	-	-	-	-	8960	-
Wall B-1	2	Both	-	-	2297	1.0	1.0	0	640	-	S	-	8960	-
Seg. 1	-	Both	287.1	14.0	1077	1.0	1.0	0	640	-	-	640	2400	0.45
Open. 1	-	Both	-	364.1	2185	-	-	0	640	-	-	640	3840	0.57
Seg. 2	-	Both	287.1	14.0	1220	1.0	1.0	0	640	-	-	640	2720	0.45
Line E														
Level 1														
LnE, Lev1	-	Both	-	-	2351	-	-	-	-	-	-	-	2560	-
Wall E-1	3	Both	-	-	2351	-	1.0	-	490	-	-	-	2560	-
Seg. 1	-	Both	391.8	0.0	1175	-	.87	-	427	-	-	427	1280	0.92
Seg. 2	-	Both	391.8	0.0	1175	-	.87	-	427	-	-	427	1280	0.92
Line F														
Level 2														
LnF, Lev2	-	Both	-	-	1577	-	-	-	-	-	-	-	2665	-
Wall F-1	4	Both	-	-	1577	1.0	1.0	0	260	-	S	-	2665	-
Seg. 1	-	Both	300.4	10.9	826	1.0	1.0	0	260	-	-	260	715	1.16*
Open. 1	-	Both	-	303.9	1520	-	-	0	260	-	-	260	1300	1.17
Seg. 2	-	Both	300.4	10.9	751	1.0	1.0	0	260	-	-	260	650	1.16*

Legend:

W Gp - Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall. "A" means that this wall is critical for all walls in the Standard Wall group.

For Dir - Direction of seismic force along shearline.

v - Design shear force on segment = ASD-factored shear force per unit length of full-height sheathing (FHS)

vmax/vft - Perforated walls: Collector and in-plane anchorage force as per SDPWS eqn. 4.3-9 = V/FHS/Co. FHS is factored for narrow segments as per 4.3.4.3

Force-transfer walls: Shear force in piers above and below either openings or piers beside opening(s). Aspect ratio factor does not apply to these piers.

V - ASD factored shear force. For shearline: total shearline force. For wall: total of all segments on wall. For segment: force on segment

Asp/Cub - For wall: Unblocked structural wood panel factor Cub from SDPWS 4.3.3.2. For segment or force-transfer pier: Aspect Ratio Factor from SDPWS 4.3.4.2.

Int - Unit shear capacity of interior sheathing; Ext - Unit shear capacity of exterior sheathing. For wall: Unfactored. For segment: Include Cub factor and aspect ratio adjustments.

Co - Adjustment factor for perforated walls from SDPWS Equation 4.3-5.

C - Sheathing combination rule, A = Add capacities, S = Strongest side or twice weakest, G = Stiffness-based using SDPWS 4.3-3.

Cmb - Combined interior and exterior unit shear capacity including perforated wall factor Co.

V - Total factored shear capacity of shearline, wall or segment.

Crit Resp - Response ratio = v/Cmb = design shear force/unit shear capacity. "W" indicates that the wind design criterion was critical in selecting wall.

Notes:

Refer to Elevation View diagrams for individual level for uplift anchorage force t for perforated walls given by SDPWS 4.3.6.4.2.4.

The contribution to shear resistance from gypsum, fiberboard, or lumber sheathing is taken as zero because of the "Ignore non-wood-panel contribution..." Design Setting. Refer to the Sheathing Materials table for the wall groups affected.

*WARNING - Design capacity has been exceeded.

ALL ELEMENTS INDICATED AS
"UNDER-CAPACITY" HAVE BEEN REVIEWED AND
EITHER APPROVED WITH MINOR OVERSTRESSES
AND/OR DESIGN REVISED ON FINAL DOCS

WoodWorks® Shearwalls

HOLD-DOWN DESIGN (flexible seismic design)

Level 1				Tensile ASD Holddown Force [lbs]				Cmb'd	Hold-down	Cap [lbs]	Crit Resp.
Line-Wall	Posit'n	Location [ft]		Shear	Dead	Ev					
		X	Y								
Level 1											
Line A											
	V Elem	0.12	-2.00	2202			2202	Refer to upper level			
	V Elem	2.88	-2.00	2202			2202	Refer to upper level			
	V Elem	10.63	-2.00	3166			3166	Refer to upper level			
	V Elem	13.88	-2.00	3166			3166	Refer to upper level			
Line B											
B-1	L End	0.12	0.00	1520			1520	HDU5-SDS2.	5645	0.27	
B-1	R End	13.88	0.00	1520			1520	HDU5-SDS2.	5645	0.27	
Line E											
E-1	L End	0.12	51.00	3889			3889	HDU5-SDS2.	5645	0.69	
E-1	L Op 1	2.88	51.00	3889			3889	HDU5-SDS2.	5645	0.69	
E-1	R Op 1	17.13	51.00	3889			3889	HDU5-SDS2.	5645	0.69	
E-1	R End	19.88	51.00	3889			3889	HDU5-SDS2.	5645	0.69	
Line F											
	V Elem	9.87	53.00	1277			1277	Refer to upper level			
	V Elem	19.88	53.00	1277			1277	Refer to upper level			
Level 2											
Level 2				Tensile ASD Holddown Force [lbs]				Cmb'd	Hold-down	Cap [lbs]	Crit Resp.
Line-Wall	Posit'n	Location [ft]		Shear	Dead	Ev					
		X	Y								
Level 2											
Line A											
A-1	L End	0.12	-2.00	2202			2202	HDU5-SDS2.	5645	0.39	
A-1	L Op 1	2.88	-2.00	2202			2202	HDU5-SDS2.	5645	0.39	
A-1	R Op 1	10.63	-2.00	3166			3166	HDU5-SDS2.	5645	0.56	
A-1	R End	13.88	-2.00	3166			3166	HDU5-SDS2.	5645	0.56	
Line F											
F-1	L End	9.87	53.00	1277			1277	HDU5-SDS2.	5645	0.23	
F-1	R End	19.88	53.00	1277			1277	HDU5-SDS2.	5645	0.23	

Legend:

Line-Wall:

At wall or opening – Shearline and wall number
 At vertical element - Shearline

Posit'n - Position of stud that hold-down is attached to:

V Elem - Vertical element: column or strengthened studs required where not at wall end or opening

L or R End - At left or right wall end

L or R Op n - At left or right side of opening n

t @ Op n - Uplift force t at opening n from offset opening in perforated wall above, from SDPWS 4.3.6.2.1

Location - Co-ordinates in Plan View

Hold-down Forces:

Shear – Seismic shear overturning component, factored for ASD by 0.7. For perforated walls, T from SDPWS 4.3-8 is used

Dead – Dead load resisting component, factored for ASD by 0.60

Ev – Vertical seismic load effect from ASCE 7 12.4.2.2 = -0.2S_{ds} x ASD seismic factor x unfactored D = 0.152 x factored D. Refer to Seismic Information table for more details.

Cmb'd - Sum of ASD-factored overturning, dead and vertical seismic forces. May also include the uplift force t from perforated walls from SDPWS 4.3.6.2.1 when openings are staggered.

Hold-down – Device used from hold-down database

Cap – Allowable ASD tension load

Crit. Resp. – Critical Response = Combined ASD force/Allowable ASD tension load

Notes:

Combined force from ASCE 7 2.4.1 load combination 10 = - (0.6D - 0.7Ev + 0.7Eh); Eh (from 12.4.2.1) = - shear overturning force

Refer to Shear Results table for factor Co, and shearline dimensions table for the sum of Li, used to calculate tension force T for perforated walls from SDPWS Eqn. 4.3-8.

Designer is responsible for design of connection from wall to floor or foundation for shear force shown in Shear Results table. Refer to SDPWS 4.3.6.4.3 for foundation anchor bolt requirements.

**SOFTWARE BY DEFAULT PLACES AN HDU5.
 THERE IS NO WAY TO REMOVE THIS. EOR HAS
 REVIEWED THE ANALYSIS AND SELECTED THE
 NECESSARY SIZE AND LOCATION OF THE HD'S**

WoodWorks® Shearwalls

COLLECTOR FORCES (flexible seismic design)

Level 1		Location [ft]		Drag Strut Force [lbs]		Strap/Blocking Force [lbs]	
Line-Wall	Position on Wall or Opening	X	Y	--->	<---	--->	<---
Line B							
	Shearline force			5257	5257		
B-1	Left Opening 1	3.75	0.00	-1288	1288		
B-1	Right Opening 1	9.75	0.00	1460	-1460		
B-1	Left Opening 1	3.75	0.00			1024	1024
B-1	Right Opening 1	9.75	0.00			1161	1161
Line E							
	Shearline force			5375	5375		
E-1	Left Opening 1	3.00	51.00	1881	-1881		
E-1	Right Opening 1	17.00	51.00	-1881	1881		
Level 2		Location [ft]		Drag Strut Force [lbs]		Strap/Blocking Force [lbs]	
Line-Wall	Position on Wall or Opening	X	Y	--->	<---	--->	<---
Line A							
	Shearline force			1599	1599		
A-1	Left Opening 1	3.00	-2.00	384	-384		
A-1	Right Opening 1	10.50	-2.00	-472	472		
Line F							
	Shearline force			1628	1628		
F-1	Left Opening 1	12.50	53.00	-406	406		
F-1	Right Opening 1	17.50	53.00	369	-369		
F-1	Left Opening 1	12.50	53.00			796	796
F-1	Right Opening 1	17.50	53.00			724	724

Legend:

Line-Wall - Shearline and wall number

Position... - Side of opening or wall end that drag strut is attached to

Location - Co-ordinates in Plan View

Drag strut Force - Axial force in transfer element at openings, gaps, or changes in design shear along shearline. + : tension; - : compression.

Based on ASD-factored shearline force shown. For SDC C-F, it is the greater of the design shearline force and the diaphragm force F_{px} , added to shearline force from story above and to forces transferred from discontinuous shearlines factored by overstrength (ω) as per 12.10.1.1.

Refer to Seismic Information table for diaphragm forces and ω factor.

For SDC D-F, if horizontal torsional irregularities 2, 3, or 4 are input, or vertical irregularity 4 detected or input, 25% increase from 12.3.3.4 applied.

For perforated walls, this force is converted to v_{max} using 4.3.6.4.1.1.

Strap/Blocking Force – For force-transfer walls, force transferred from above and below opening to shearwall pier.

-> Due to shearline force in the west-to-east or south-to-north direction

<- Due to shearline force in the east-to-west or north-to-south direction

WoodWorks® Shearwalls

DEFLECTION (flexible seismic design)

Wall, segment	W Gp	Dir	Srf	v plf	b ft	h ft	Bending A sq.in	Defl in	Ga kips/in	Nail slip Vn lbs	en in	Shear Defl in	Hold Defl in	Total Defl in
Level 1														
Line B														
B-1	2	Both	-	-					-	-	-	-		0.63
B-1,1		Both	Ext	410.1	3.75	8.22	16.5	.022	38.6	149	.017	.087	0.55	0.66
		Both	Int	0.0					0.0	0	.000	.000		
B-1,2		Both	Ext	410.1	4.25	8.22	16.5	.019	38.6	149	.017	.087	0.49	0.59
		Both	Int	0.0					0.0	0	.000	.000		
Line E														
E-1,1	3	Both	Ext	559.7	3.00	9.10	16.5	.049	25.2	172	.025	.202	0.88	1.14
E-1,2		Both	Ext	559.7	3.00	9.10	16.5	.049	25.2	172	.025	.202	0.88	1.14
Level 2														
Line A														
A-1,1	1	Both	Ext	335.3	3.00	8.10	18.0	.019	25.2	172	.025	.108	0.90	1.02
A-1,2		Both	Ext	344.8	3.50	8.10	18.0	.017	25.2	172	.025	.111	0.90	1.02
Line F														
F-1	4	Both	-	-					-	-	-	-		1.09
F-1,1		Both	Ext	429.1	2.75	6.72	16.5	.018	13.4	182	.030	.215	0.82	1.05
		Both	Int	0.0					0.0	0	.000	.000		
F-1,2		Both	Ext	429.1	2.50	6.72	16.5	.020	13.4	182	.030	.215	0.90	1.14
		Both	Int	0.0					0.0	0	.000	.000		

Legend:

Wall, segment - Wall and segment between openings, e.g. B-3, 2 = second segment on Wall 3 on Shearline B

W Gp - Wall design group, refer to Sheathing and Framing Materials

Dir - Force direction

Srf - Wall surface, interior or exterior for perimeter walls, 1 or 2 for interior partitions

v - Unfactored (strength-level) shear force per unit distance on wall segment = ASD force/0.70. For perforated walls, v_{max} from SDPWS 4.3-9 is used, as per 4.3.2.1. For force-transfer walls, unit shear force in pier beside opening(s) is used.

b - Segmented wall or force-transfer wall segments: Width of wall segment between openings. Perforated wall: Sum of FHS segments, modified as per SDPWS 4.3.2.1. Force-transfer wall: Length of wall including openings.

h - Wall height. For force-transfer piers, distance from bottom of opening to top of wall is shown; for end segments, results using that distance and the wall height are averaged, as per APA T555.

Defl - Horizontal shearwall deflection due to given term:

Bending = $8vh^3 / EAb$ Cub; A - Cross sectional area of segment end stud(s); E - stud mod. of elasticity in Framing Materials table

Shear = $vh / 1000 Ga$ Cub. Ga - $1.4 vs / (1.4 vs / Gt + 0.75 en)$ from SDPWS Ex. C4.3.2-1; vs - ASD sheathing capacity; Gt - Shear stiffness from C4.3.3.2, value is in Sheathing Materials table; en - Nail slip from table C4.2.2D; Vn - Shear force per nail along panel edge using 1.4 vs

Hold - Hold-down = $da \times h / b$; refer to Hold-down Displacement table for components of da. For force-transfer walls, hold-down device at end of wall is applied to all segments, as per APA T555.

Cub - Unblocked factor from 4.3.2.2, shown in the Shear Results table.

Total defl = Deflection from bending + shear + hold-down, as per SDPWS C4.3.2-1. For force-transfer walls, the average of the values for the segments, as per APA T555.

WoodWorks® Shearwalls

HOLD-DOWN DISPLACEMENT (flexible seismic design)

Wall, segment	Dir	Hold-down	Uplift force lbs	Elong / Disp			Slippage		Shrink da in	Crush+ Extra in	Total da in	Hold Defl in
				Manuf in	Add in	da in	Pf lbs	da in				
Level 1												
Line B												
B-1,1	Both	HDU5-SDS	3614	.071	.003	0.074	-	-	.138	0.04	0.25	0.55
B-1,2	Both	HDU5-SDS	3584	.070	.003	0.074	-	-	.138	0.04	0.25	0.49
Line E												
E-1,1	Both	HDU5-SDS	5556	.109	.005	0.114	-	-	.138	0.04	0.29	0.88
E-1,2	Both	HDU5-SDS	5556	.109	.005	0.114	-	-	.138	0.04	0.29	0.88
Wall, segment	Dir	Hold-down	Uplift force lbs	Elong / Disp			Slippage		Shrink da in	Crush+ Extra in	Total da in	Hold Defl in
							Pf lbs	da in				
Level 2												
Line A												
A-1,1	Both	HDU5-SDS	3146	.123	.002	0.125	-	-	.168	0.04	0.33	0.90
A-1,2	Both	HDU5-SDS	4523	.177	.003	0.180	-	-	.168	0.04	0.39	0.90
Line F												
F-1,1	Both	HDU5-SDS	3174	.124	.002	0.126	-	-	.168	0.04	0.33	0.82
F-1,2	Both	HDU5-SDS	3206	.126	.002	0.128	-	-	.168	0.04	0.34	0.90

Legend:

Wall, segment – Wall and segment between openings, e.g. B-3, 2 = second segment on Wall 3 on Shearline B

Dir - Force direction

Uplift force (P) –Strength-level accumulated hold-down tension force from overturning, dead and wind uplift. For perforated walls, T from SDPWS 4.3-8 is used for overturning

da – Vertical displacements due to the following components:

Elong/Disp – Elongation when slippage calculated separately; displacement when combined elongation/slippage used

Manuf - Using manufacturer's value for anchor bolt length, or no bolt contribution for connector-only elongation.

Unless marked with * = (ASD uplift force / ASD hold-down capacity) x max strength-level elongation or displacement

* - Maximum strength-level elongation or displacement is used. May result in higher than actual displacements for lightly loaded hold-downs, causing the segment to draw less force due to lower than actual stiffness.

Add - Due to longer anchor bolt length than manufacturer's value, or entire bolt length for connector-only elongation = $PL / (Ab \times Es)$;

Ab – bolt cross-sectional area;

Es = steel modulus = 29000000 psi;

L = Lb – Lh;

Lb = Total bolt length shown in Storey Information table;

Lh = Manufacturer's anchor bolt length for given displacement/elongation from hold-down database.

Slippage – Due to vertical slippage of hold-down fasteners attached to stud(s) when not combined with elongation

Pf = ASD uplift force P / number of fasteners

Bolts: = $Pf / (270,000 D^{1.5})$ (NDS 11.3.6) ; D = bolt diameter

Nails: = en, from SDPWS Table C4.2.2D using Pf for Vn and values for Wood Structural Panel

Shrink - Wood shrinkage = $0.002 \times (15\% \text{ fabrication} - 10\% \text{ in-service moisture contents}) \times Ls$

Ls = Perp.-to-grain length between fasteners subject to shrinkage, shown in Storey Information table

Crush + Extra – 0.04" wood crushing at compression end of wall segment plus extra displacement due to mis-cuts, gaps, etc.

Total da = Elong/Disp + Slippage + Shrink + Crush + Extra

Hold Defl – Horizontal deflection = $h/b \times da$ (4th term in the deflection equation SDPWS C4.3.2-1)

h = wall height; b = segment length between openings; h,b values in Deflection table. For end segments from force-transfer walls, h is the average of the distance from bottom of opening to top of wall and the wall height.

WoodWorks® Shearwalls

STORY DRIFT (flexible seismic design)

Level	Dir	Wall height ft	Max dxe	Line	Actual Story Drift (in)				Allowable Story Drift			
					Max dx	Center of Mass	C of M dxe	C of M dx	hsx ft	Delta a in	Ratio Max	Ratio C of M
1	N<->S	9.10	0.11	4	0.46	9.88	0.11	0.44	10.18	3.06	0.15	0.15
	E<->W		1.14	E	4.54	25.94	0.55	2.22			1.49*	0.73
2	N<->S	8.10	0.08	4	0.32	10.14	0.08	0.31	8.10	2.43	0.13	0.13
	E<->W		1.09	F	4.37	27.76	0.00	0.00			1.80*	0.00

ASCE 7 Eqn. 12.8-15: $dx = dxe \times Cd / Ie$

Deflection amplification factor Cd from Table 12.2-1 = (E-W), 4.0 (N-S)

Importance factor $Ie = 1.00$

Legend:

Max dxe – Largest deflection for any shearline on level in this direction; refer to Deflections table

Line – Shearline with largest deflection on level in this direction

hsx – Story height in ASCE Table 12.12-1 = Height of walls plus joist depth between this level and the one above.

Max dx – Largest amplified deflection on level in this direction using ASCE 7 Eq'n 12.8-15

C of M dxe - Deflection at the center of mass of this level; from interpolating deflections at adjacent shearlines.

C of M dx - Amplified deflection at center of mass using Eq'n 12.8-15. Does not include differences between top and bottom diaphragm deflection.

Delta a = Allowable story drift on this level from ASCE 7 Table 12.12-1

Ratio - Proportion of allowable story drift experienced, on this level in this direction.

Notes:

*FAILURE – Story drift on this level is greater than maximum allowed by ASCE 7 Table 12.12-1.

Maximum of all shearlines used to satisfy flexible diaphragm assumption in 12.3.1.1.

ALL ELEMENTS INDICATED AS
"UNDER-CAPACITY" HAVE BEEN REVIEWED AND
EITHER APPROVED WITH MINOR OVERSTRESSES
AND/OR DESIGN REVISED ON FINAL DOCS

STORY DRIFT IS A SERVICEABILITY RATIO AND
NOT A REQUIRED DESIGN ELEMENT IN LOW-RISE
RESIDENTIAL CONSTRUCTION. THIS HAS BEEN
REVIEWED AND DESIGN IS APPROVED PER EOR.



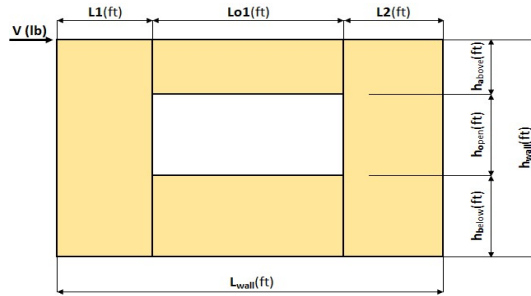
Force Transfer Around Openings Calculator

ONE OPENING

The force transfer around openings (FTAO) method of shear wall analysis is an approach that aims to reinforce the wall such that it performs as if there was no opening. This approach lends certain advantages over segmented shear walls: more versatility, because it allows for narrower wall segments while still meeting the height-to-width ratios and, often, fewer required hold-downs.

Project Information

Code:	2021 IBC/IRC	Date:	6/24/2025
Designer:	JUSTIN CONCEPCION		
Client:			
Project:	1626 REG 1 ELEV H BASE PLAN		
Wall Line:	F-1 (UPPER)		



Shear Wall Calculation Variables

V	2282 lbf	Opening 1	Wall Pier Aspect Ratio	Adj. Factor
L1	2.50 ft	ha1	P1=ho1/L1=	N/A
L2	2.75 ft	ho1	P2=ho1/L2=	N/A
hwall	8.10 ft	hb1		
Lwall	10.25 ft	Lo1		

1. Hold-down forces: $H = Vh_{wall}/L_{wall}$ = 1803 lbf

2. Unit shear above + below opening
 First opening: $va1 = vb1 = H/(ha1+hb1) =$ 440 plf

3. Total boundary force above + below openings
 First opening: $O1 = va1 \times (Lo1) =$ 2199 lbf

4. Corner forces
 $F1 = O1(L1)/(L1+L2) =$ 1047 lbf
 $F2 = O1(L2)/(L1+L2) =$ 1152 lbf

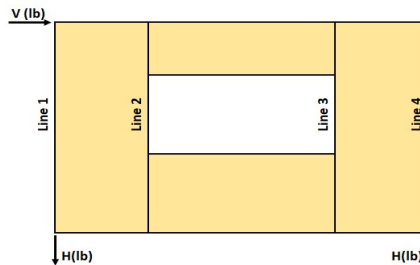
5. Tributary length of openings
 $T1 = (L1*Lo1)/(L1+L2) =$ 2.38 ft
 $T2 = (L2*Lo1)/(L1+L2) =$ 2.62 ft

6. Unit shear beside opening
 $V1 = (V/L)(L1+T1)/L1 =$ 435 plf
 $V2 = (V/L)(T2+L2)/L2 =$ 435 plf
 Check $V1*L1+V2*L2=V?$ 2282 lbf **OK**

7. Resistance to corner forces
 $R1 = V1*L1 =$ 1087 lbf
 $R2 = V2*L2 =$ 1195 lbf

8. Difference corner force + resistance
 $R1-F1 =$ 39 lbf
 $R2-F2 =$ 43 lbf

9. Unit shear in corner zones
 $vc1 = (R1-F1)/L1 =$ 16 plf
 $vc2 = (R2-F2)/L2 =$ 16 plf



Check Summary of Shear Values for One Opening

Line 1: $vc1(ha1+hb1)+V1(ho1)=H?$		65	1739	1803 lbf
Line 2: $va1(ha1+hb1)-vc1(ha1+hb1)-V1(ho1)=0?$	1803	65	1739	0
Line 3: $vc2(ha1+hb1)+V2(ho1)=H?$		65	1739	1803 lbf

Design Summary

Req. Sheathing Capacity	440 plf	4-Term Deflection	0.518 in.	3-Term Deflection	0.538 in.
Req. Strap Force	1152 lbf	4-Term Story Drift %	0.021 %	3-Term Story Drift %	0.022 %
Req. HD Force (H)	1803 lbf				

See Page 2

See Page 3

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Project Information

Code:	2021 IBC/IRC	Date:	6/24/2025
Designer:	JUSTIN CONCEPCION		
Client:			
Project:	1626 REG 1 ELEV H BASE PLAN		
Wall Line:	F-1 (UPPER)		

Shear Wall Deflection Calculation Variables

Sheathing:	OSB	Sheathing Material	Wood End Post Values:		Nail Type: 8d common (penny weight)	
	7/16	Performance Category	Species:			
	APA Rated Sheathing	Grade	E:	1.60E+06 (psi)		
			Qty	2	Stud Size	2x6
			A:	16.5 (in. ²)		
			A Override:			
		Gt Override				
		Ga Override				

	Pier 1	Pier 2	
Nail Spacing:	3	3	(in.)
HD Capacity:	2695	2695	(lbf)
HD Deflection:	0.088	0.088	(in.)

Four-Term Equation Deflection Check

$$\Delta = \frac{8vh^3}{EAb} + \frac{vh}{Gt} + 0.75he_a + d_a \frac{h}{b} \quad (\text{Equation 23-2})$$

	Pier 1-L	Pier 1-R	Pier 2-L	Pier 2-R	
Sheathing:	7/16	7/16	7/16	7/16	
Nail:	8d common	8d common	8d common	8d common	
V_{assd}:	435	435	435	435	(plf)
V_{strength}:	621	621	621	621	(plf)
E:	1.60E+06	1.60E+06	1.60E+06	1.60E+06	(psi)
h:	8.10	5.35	5.35	8.10	(ft)
A:	16.5	16.5	16.5	16.5	(in. ²)
Gt:	83,500	83,500	83,500	83,500	(lbf/in.)
Nail Spacing:	3	3	3	3	(in.)
Vn:	155	155	155	155	(plf)
e:	0.0156	0.0156	0.0156	0.0156	(in.)
b:	2.50	2.50	2.75	2.75	(ft)
HD Capacity:	2695	2695	2695	2695	(lbf)
HD Defl:	0.088	0.088	0.088	0.088	(in.)

Check Total Deflection of Wall System

Pier 1 (left)				Pier 1 (right)			
Term 1	Term 2	Term 3	Term 4	Term 1	Term 2	Term 3	Term 4
Bending	Shear	Fastener	HD-1	Bending	Shear	Fastener	HD-2
0.040	0.060	0.095	0.532	0.012	0.040	0.063	0.232
Sum			0.727	Sum			0.346

Pier 2 (left)				Pier 2 (right)			
Term 1	Term 2	Term 3	Term 4	Term 1	Term 2	Term 3	Term 4
Bending	Shear	Fastener	HD-1	Bending	Shear	Fastener	HD-2
0.010	0.040	0.063	0.211	0.036	0.060	0.095	0.484
Sum			0.324	Sum			0.675

Total Defl.	0.518	(in.)
	0.0213	%drift

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Project Information

Code:	2021 IBC/IRC	Date:	6/24/2025
Designer:	JUSTIN CONCEPCION		
Client:			
Project:	1626 REG 1 ELEV H BASE PLAN		
Wall Line:	F-1 (UPPER)		

Three-Term Equation Deflection Check

$$\delta_{sw} = \frac{8vh^3}{EAb} + \frac{vh}{1000G_a} + \frac{h\Delta_a}{b} \quad (4.3-1)$$

	Pier 1-L	Pier 1-R	Pier 2-L	Pier 2-R	
Sheathing:	7/16	7/16	7/16	7/16	
Nail:	8d common	8d common	8d common	8d common	
V _{asd} :	435	435	435	435	(plf)
V _{strength} :	621	621	621	621	(plf)
E:	1.60E+06	1.60E+06	1.60E+06	1.60E+06	(psi)
h:	8.10	5.35	5.35	8.10	(ft)
A:	16.5	16.5	16.5	16.5	(in. ²)
G _a :	28.0	28.0	28.0	28.0	(kips/in.)
b:	2.50	2.50	2.75	2.75	(ft)
HD Capacity:	2695	2695	2695	2695	(lbf)
HD Defl:	0.088	0.088	0.088	0.088	(in.)

Check Total Deflection of Wall System

Pier 1 (left)			Pier 1 (right)		
Term 1	Term 2	Term 3	Term 1	Term 2	Term 3
Bending	Shear	Fastener	Bending	Shear	Fastener
0.040	0.180	0.532	0.012	0.119	0.232
Sum		0.752	Sum		0.362
Pier 2 (left)			Pier 2 (right)		
Term 1	Term 2	Term 3	Term 1	Term 2	Term 3
Bending	Shear	Fastener	Bending	Shear	Fastener
0.010	0.119	0.211	0.036	0.180	0.484
Sum		0.340	Sum		0.700

Total Defl.	0.538	(in.)
	0.0222	%drift

Comment: The 3-term equation is calibrated to be approximately equal to 4-term equation at 1.4*ASD capacity.

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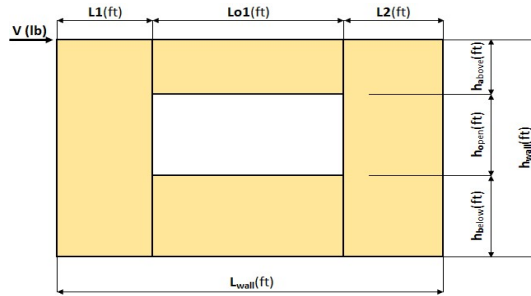
Force Transfer Around Openings Calculator

ONE OPENING

The force transfer around openings (FTAO) method of shear wall analysis is an approach that aims to reinforce the wall such that it performs as if there was no opening. This approach lends certain advantages over segmented shear walls: more versatility, because it allows for narrower wall segments while still meeting the height-to-width ratios and, often, fewer required hold-downs.

Project Information

Code:	2021 IBC/IRC	Date:	6/24/2025
Designer:	JUSTIN CONCEPCION		
Client:			
Project:	16226 REG 1 ELEV H BASE PLAN		
Wall Line:	B-1 (MAIN)		



Shear Wall Calculation Variables

V	5122 lbf	Opening 1		Wall Pier Aspect Ratio	Adj. Factor
L1	4.25 ft	ha1	2.35 ft	P1=ho1/L1=	N/A
L2	3.75 ft	ho1	5.00 ft	P2=ho1/L2=	N/A
hwall	9.10 ft	hb1	1.75 ft		
Lwall	14.00 ft	Lo1	6.00 ft		

1. Hold-down forces: $H = Vh_{wall}/L_{wall}$ = 3329 lbf

2. Unit shear above + below opening
 First opening: $va1 = vb1 = H/(ha1+hb1) = 812$ plf

3. Total boundary force above + below openings
 First opening: $O1 = va1 \times (Lo1) = 4872$ lbf

4. Corner forces
 $F1 = O1(L1)/(L1+L2) = 2588$ lbf
 $F2 = O1(L2)/(L1+L2) = 2284$ lbf

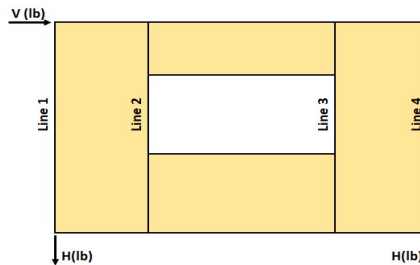
5. Tributary length of openings
 $T1 = (L1 \times Lo1)/(L1+L2) = 3.19$ ft
 $T2 = (L2 \times Lo1)/(L1+L2) = 2.81$ ft

6. Unit shear beside opening
 $V1 = (V/L)(L1+T1)/L1 = 640$ plf
 $V2 = (V/L)(T2+L2)/L2 = 640$ plf
 Check $V1 \times L1 + V2 \times L2 = V?$ = 5122 lbf **OK**

7. Resistance to corner forces
 $R1 = V1 \times L1 = 2721$ lbf
 $R2 = V2 \times L2 = 2401$ lbf

8. Difference corner force + resistance
 $R1 - F1 = 133$ lbf
 $R2 - F2 = 117$ lbf

9. Unit shear in corner zones
 $vc1 = (R1 - F1)/L1 = 31$ plf
 $vc2 = (R2 - F2)/L2 = 31$ plf



Check Summary of Shear Values for One Opening

Line 1: $vc1(ha1+hb1)+V1(ho1)=H?$		128	3201	3329 lbf
Line 2: $va1(ha1+hb1)-vc1(ha1+hb1)-V1(ho1)=0?$	3329	128	3201	0
Line 3: $vc2(ha1+hb1)+V2(ho1)=H?$		128	3201	3329 lbf

Design Summary

Req. Sheathing Capacity	812 plf	4-Term Deflection	0.541 in.	3-Term Deflection	0.539 in.
Req. Strap Force	2588 lbf	4-Term Story Drift %	0.020 %	3-Term Story Drift %	0.020 %
Req. HD Force (H)	3329 lbf				

See Page 2

See Page 3

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Project Information

Code:	2021 IBC/IRC	Date:	6/24/2025
Designer:	JUSTIN CONCEPCION		
Client:			
Project:	16226 REG 1 ELEV H BASE PLAN		
Wall Line:	B-1 (MAIN)		

Three-Term Equation Deflection Check

$$\delta_{sw} = \frac{8vh^3}{EAb} + \frac{vh}{1000G_a} + \frac{h\Delta_a}{b} \quad (4.3-1)$$

	Pier 1-L	Pier 1-R	Pier 2-L	Pier 2-R	
Sheathing:	7/16	7/16	7/16	7/16	
Nail:	8d common	8d common	8d common	8d common	
V _{asd} :	640	640	640	640	(plf)
V _{strength} :	915	915	915	915	(plf)
E:	1.60E+06	1.60E+06	1.60E+06	1.60E+06	(psi)
h:	9.10	7.35	7.35	9.10	(ft)
A:	16.5	16.5	16.5	16.5	(in. ²)
G _a :	42.0	42.0	42.0	42.0	(kips/in.)
b:	4.25	4.25	3.75	3.75	(ft)
HD Capacity:	5645	5645	5645	5645	(lbf)
HD Defl:	0.115	0.115	0.115	0.115	(in.)

Check Total Deflection of Wall System

Pier 1 (left)			Pier 1 (right)		
Term 1	Term 2	Term 3	Term 1	Term 2	Term 3
Bending	Shear	Fastener	Bending	Shear	Fastener
0.049	0.198	0.363	0.026	0.160	0.237
Sum		0.610	Sum		0.423
Pier 2 (left)			Pier 2 (right)		
Term 1	Term 2	Term 3	Term 1	Term 2	Term 3
Bending	Shear	Fastener	Bending	Shear	Fastener
0.029	0.160	0.268	0.056	0.198	0.411
Sum		0.458	Sum		0.665

Total Defl.	0.539	(in.)
	0.0197	%drift

Comment: The 3-term equation is calibrated to be approximately equal to 4-term equation at 1.4*ASD capacity.

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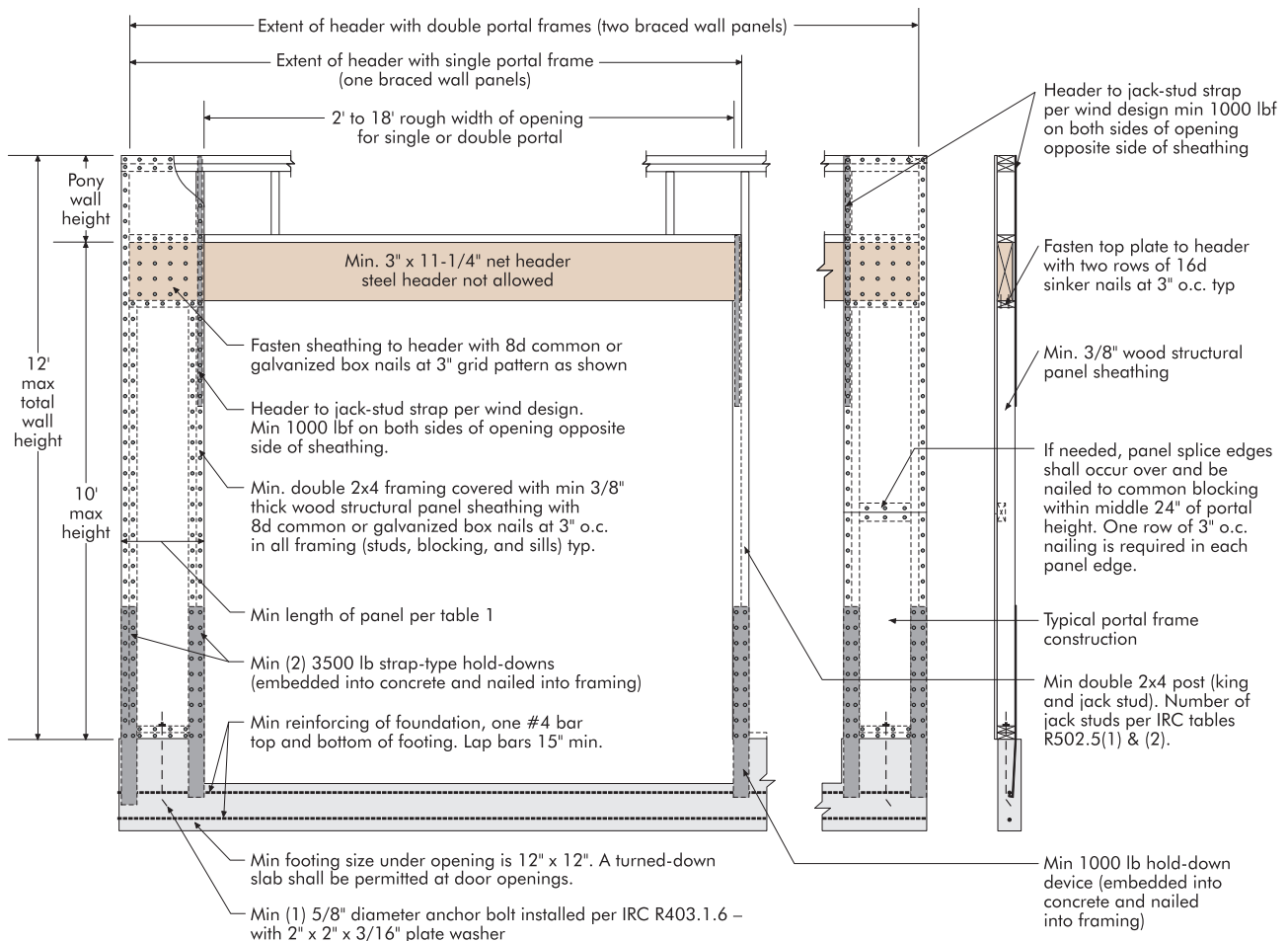
Table 1. Recommended Allowable Design Values for APA Portal Frame Used on a Rigid-Base

Minimum Width (in.)	Maximum Height (ft)	Allowable Design (ASD) Values per Frame Segment		
		Shear ^(e,f) (lbf)	Deflection (in.)	Load Factor
16	8	850	0.33	3.09
	10	625	0.44	2.97
24	8	1,675	0.38	2.88
	10	1,125	0.51	3.42

Foundation for Wind or Seismic Loading^(a,b,c,d)

- (a) Design values are based on the use of Douglas-fir or Southern pine framing. For other species of framing, multiply the above shear design value by the specific gravity adjustment factor = $(1 - (0.5 - SG))$, where SG = specific gravity of the actual framing. This adjustment shall not be greater than 1.0.
- (b) For construction as shown in Figure 1.
- (c) Values are for a single portal-frame segment (one vertical leg and a portion of the header). For multiple portal-frame segments, the allowable shear design values are permitted to be multiplied by the number of frame segments (e.g., two = 2x, three = 3x, etc.).
- (d) Interpolation of design values for heights between 8 and 10 feet, and for portal widths between 16 and 24 inches, is permitted.
- (e) The allowable shear design value is permitted to be multiplied by a factor of 1.4 for wind design.
- (f) If story drift is not a design consideration, the tabulated design shear values are permitted to be multiplied by a factor of 1.15. This factor is permitted to be used cumulatively with the wind-design adjustment factor in Footnote (e) above.

Figure 1. Construction Details for APA Portal-Frame Design with Hold Downs



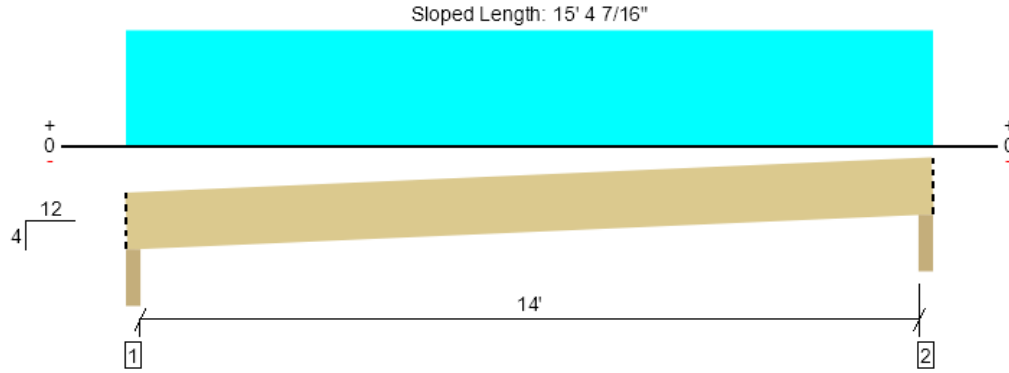
ROOF			
Member Name	Results (Max UTIL %)	Current Solution	Comments
RAFTERS	Passed (82% M)	1 piece(s) 2 x 12 DF No.2 @ 24" OC	
UPPER			
Member Name	Results (Max UTIL %)	Current Solution	Comments
3.5'-SIDE WINDOW (GABLE END)	Passed (12% R)	1 piece(s) 4 x 8 DF No.2	
6'-REAR WINDOW	Passed (26% M)	1 piece(s) 4 x 8 DF No.2	
3'-REAR WINDOW (PRIMARY BATH)	Passed (30% M)	1 piece(s) 4 x 6 DF No.2 (Plank)	
UPPER FLOOR			
Member Name	Results (Max UTIL %)	Current Solution	Comments
17'-FLOOR BEAM	Passed (66% ΔL)	1 piece(s) 5 1/2" x 15" 24F-V4 DF Glulam	
9'-FLOOR BEAM	Passed (51% R)	1 piece(s) 3 1/2" x 14" 24F-V4 DF Glulam	
3.25'-FLOOR BEAM	Passed (11% R)	1 piece(s) 5 1/2" x 14" 24F-V4 DF Glulam	
13.25'-FLOOR BEAM	Passed (49% M+)	1 piece(s) 5 1/2" x 14" 24F-V4 DF Glulam	
MAIN			
Member Name	Results (Max UTIL %)	Current Solution	Comments
3'-FRONT ENTRY	Passed (33% R)	1 piece(s) 4 x 8 DF No.2	
3.5'-FRONT WINDOW	Passed (38% R)	1 piece(s) 4 x 8 DF No.2	
14'-GARAGE	Passed (78% ΔT)	1 piece(s) 5 1/2" x 11 7/8" 24F-V4 DF Glulam	
4'-SIDE WINDOW	Passed (21% M)	1 piece(s) 4 x 8 DF No.2	
3.5'-SIDE WINDOW (GABLE END)	Passed (18% R)	1 piece(s) 4 x 8 DF No.2	
2.75'-INTERIOR HEADER	Passed (29% M)	2 piece(s) 2 x 6 DF No.2	
6'-FRONT PORCH	Passed (35% M)	1 piece(s) 6 x 8 DF No.2	
MAIN FLOOR			
Member Name	Results (Max UTIL %)	Current Solution	Comments
FLOOR GIRDER, TYP.	Passed (68% M)	1 piece(s) 4 x 8 DF No.2	

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ROOF, RAFTERS

1 piece(s) 2 x 12 DF No.2 @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	749 @ 2 1/2"	3281 (3.50")	Passed (23%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	628 @ 1' 2 3/16"	2329	Passed (27%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2577 @ 7' 3 1/2"	3138	Passed (82%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.177 @ 7' 3 1/2"	0.747	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.363 @ 7' 3 1/2"	0.996	Passed (L/493)	--	1.0 D + 1.0 S (All Spans)

Member Length : 15' 8 3/16"
 System : Roof
 Member Type : Joist
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD
 Member Pitch : 4/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Factored	
1 - Beveled Plate - DF	3.50"	3.50"	1.50"	384	292	365	749	Blocking
2 - Beveled Plate - DF	3.50"	3.50"	1.50"	384	292	365	749	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' 8" o/c	
Bottom Edge (Lu)	15' 4" o/c	

- Maximum allowable bracing intervals based on applied load.
- Dimensions for lateral bracing intervals are measured along the length of the member for sloped conditions.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 14' 7"	24"	25.0	20.0	25.0	Default Load

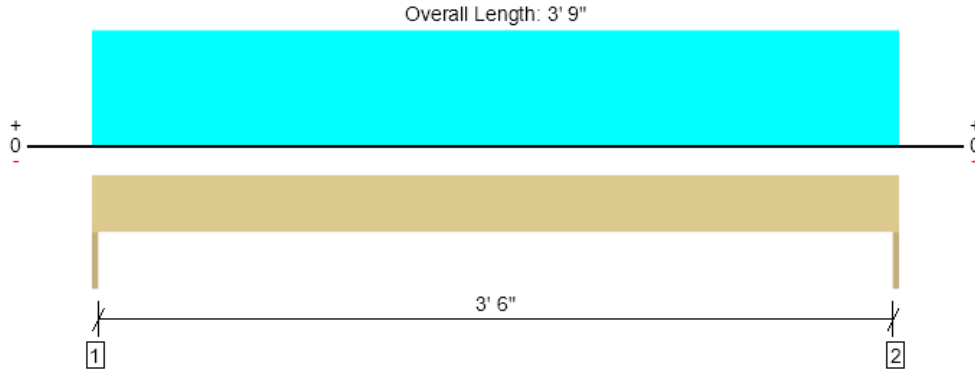
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UPPER, 3.5'-SIDE WINDOW (GABLE END)

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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	387 @ 0	3281 (1.50")	Passed (12%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	237 @ 8 3/4"	3502	Passed (7%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	363 @ 1' 10 1/2"	3438	Passed (11%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.005 @ 1' 10 1/2"	0.125	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.005 @ 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 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Snow	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	12	375	387	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	12	375	387	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	6.4	--	
1 - Uniform (PLF)	0 to 3' 9"	N/A	--	200.0	GABLE

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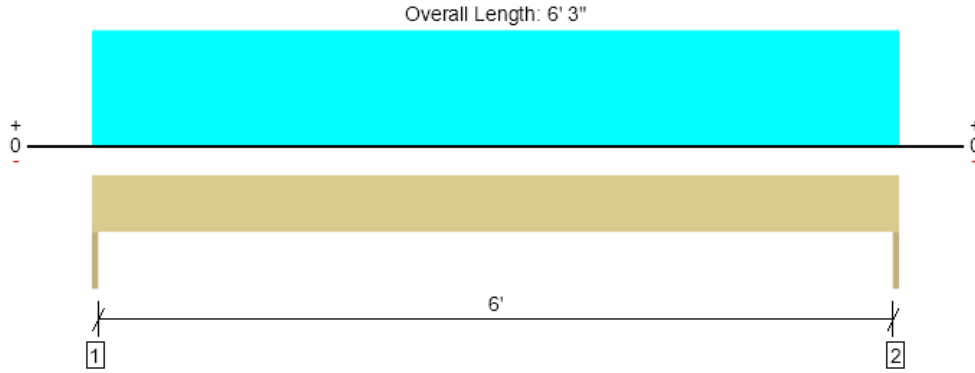
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UPPER, 6'-REAR WINDOW
1 piece(s) 4 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	567 @ 0	3281 (1.50")	Passed (17%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	435 @ 8 3/4"	3502	Passed (12%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	886 @ 3' 1 1/2"	3438	Passed (26%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.017 @ 3' 1 1/2"	0.208	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.035 @ 3' 1 1/2"	0.313	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 6' 3"
 System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Roof Live	Snow	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	294	219	273	567	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	294	219	273	567	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 3" o/c	
Bottom Edge (Lu)	6' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 3"	N/A	6.4	--	--	
1 - Uniform (PSF)	0 to 6' 3"	3' 6"	25.0	20.0	25.0	ROOF

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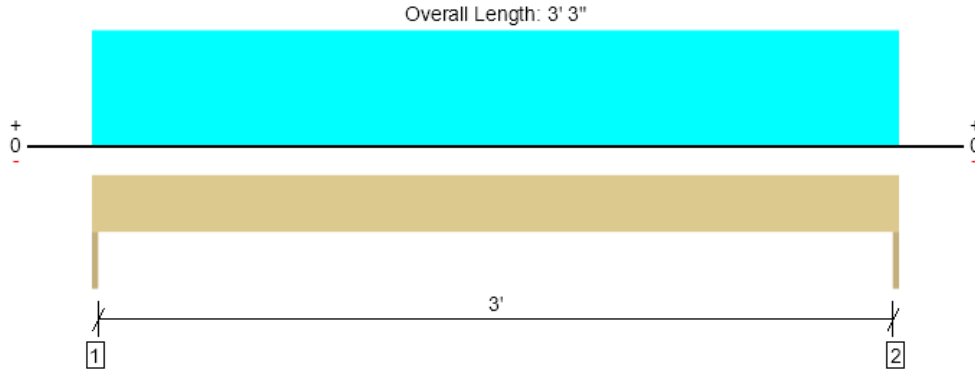
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UPPER, 3'-REAR WINDOW (PRIMARY BATH)

1 piece(s) 4 x 6 DF No.2 (Plank)



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	495 @ 0	5156 (1.50")	Passed (10%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	368 @ 5"	2657	Passed (14%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	403 @ 1' 7 1/2"	1322	Passed (30%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.012 @ 1' 7 1/2"	0.108	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.024 @ 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 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Member has been designed in flat (plank) orientation.
- 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	Roof Live	Snow	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	252	195	244	495	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	252	195	244	495	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)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 3"	N/A	4.9	--	--	
1 - Uniform (PSF)	0 to 3' 3"	6'	25.0	20.0	25.0	ROOF

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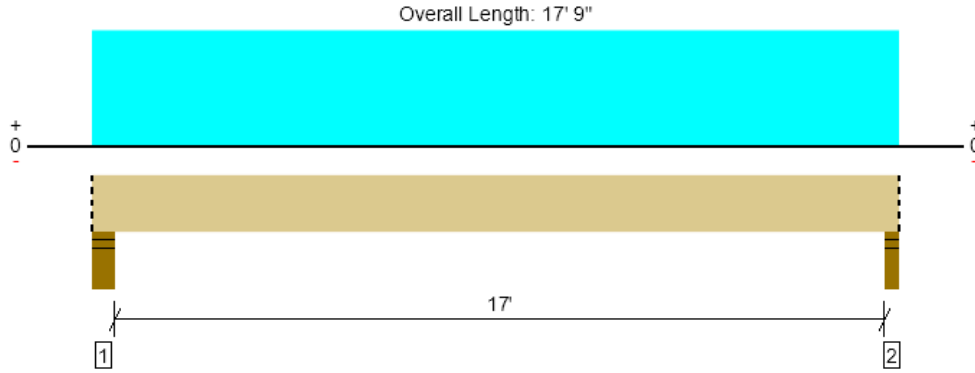
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UPPER FLOOR, 17'-FLOOR BEAM

1 piece(s) 5 1/2" x 15" 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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5451 @ 17' 7"	12031 (3.50")	Passed (45%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4495 @ 1' 8 1/2"	14575	Passed (31%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	23063 @ 8' 11 1/2"	40852	Passed (56%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.286 @ 8' 11 1/2"	0.431	Passed (L/723)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.444 @ 8' 11 1/2"	0.863	Passed (L/467)	--	1.0 D + 1.0 L (All Spans)

Member Length : 17' 9"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 0.99 was calculated for positive bending using length L = 17' 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	Factored	
1 - Stud wall - DF	5.50"	5.50"	1.62"	1971	3583	5555	Blocking
2 - Stud wall - DF	3.50"	3.50"	1.59"	1935	3517	5451	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)	17' 9" o/c	
Bottom Edge (Lu)	17' 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 17' 9"	N/A	20.0	--	
1 - Uniform (PSF)	0 to 17' 9" (Front)	10'	20.0	40.0	Default Load

• Side loads are assumed to not induce cross-grain tension.

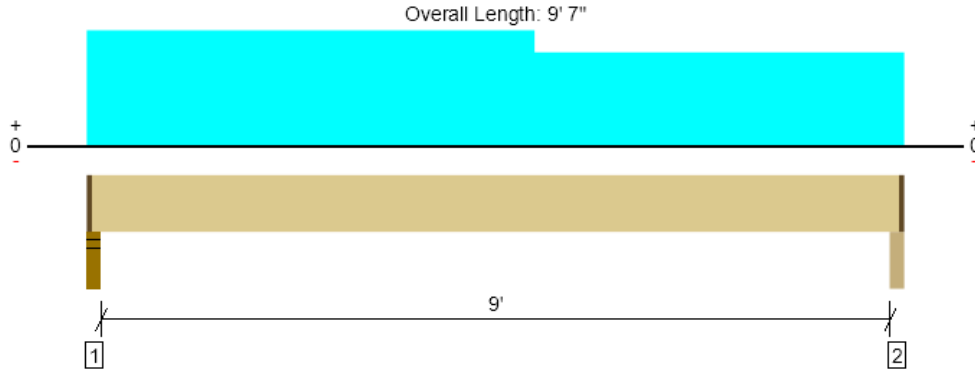
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UPPER FLOOR, 9'-FLOOR BEAM

1 piece(s) 3 1/2" x 14" 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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2524 @ 2"	4922 (2.25")	Passed (51%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1766 @ 1' 5 1/2"	8657	Passed (20%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	5536 @ 4' 7 3/8"	22867	Passed (24%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.038 @ 4' 9 1/16"	0.231	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.059 @ 4' 9 1/16"	0.463	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 9' 4 1/2"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 1.00 was calculated for positive bending using length L = 9' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	3.50"	2.25"	1.50"	897	1683	2581	1 1/4" Rim Board
2 - Column - DF	3.50"	2.25"	1.50"	811	1511	2323	1 1/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	9' 5" o/c	
Bottom Edge (Lu)	9' 5" 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)	1 1/4" to 9' 5 3/4"	N/A	11.9	--	
1 - Uniform (PSF)	0 to 5' 3" (Front)	2' 7 1/2"	20.0	40.0	Default Load
2 - Uniform (PSF)	5' 3" to 9' 7" (Front)	10 1/2"	20.0	40.0	
3 - Uniform (PSF)	0 to 9' 7" (Back)	6' 6"	20.0	40.0	

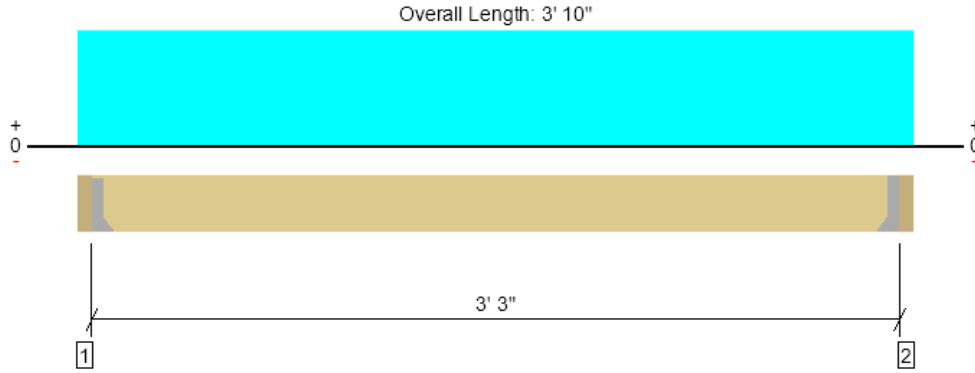
• Side loads are assumed to not induce cross-grain tension.

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UPPER FLOOR, 3.25'-FLOOR BEAM
1 piece(s) 5 1/2" x 14" 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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	615 @ 3 1/2"	5363 (1.50")	Passed (11%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	174 @ 1' 5 1/2"	13603	Passed (1%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	500 @ 1' 11"	35933	Passed (1%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.000 @ 1' 11"	0.081	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.000 @ 1' 11"	0.162	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 3' 3"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 1.00 was calculated for positive bending 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	Floor Live	Factored	
1 - Hanger on 14" DF beam	3.50"	Hanger ¹	1.50"	260	460	720	See note ¹
2 - Hanger on 14" DF beam	3.50"	Hanger ¹	1.50"	260	460	720	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)	3' 3" o/c	
Bottom Edge (Lu)	3' 3" 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)	Comments
0 - Self Weight (PLF)	3 1/2" to 3' 6 1/2"	N/A	18.7	--	
1 - Uniform (PSF)	0 to 3' 10" (Back)	6'	20.0	40.0	Default Load

- Side loads are assumed to not induce cross-grain tension.

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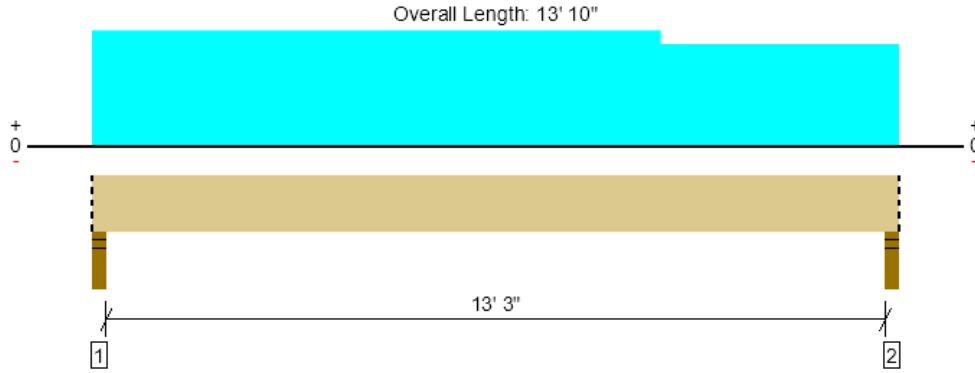
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UPPER FLOOR, 13.25'-FLOOR BEAM
1 piece(s) 5 1/2" x 14" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5370 @ 2"	12031 (3.50")	Passed (45%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4227 @ 1' 5 1/2"	13603	Passed (31%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	17511 @ 6' 10 3/16"	35933	Passed (49%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.165 @ 6' 10 13/16"	0.450	Passed (L/984)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.253 @ 6' 10 13/16"	0.675	Passed (L/640)	--	1.0 D + 1.0 L (All Spans)

Member Length : 13' 10"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 1.00 was calculated for positive bending using length L = 13' 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	Factored	
1 - Stud wall - DF	3.50"	3.50"	1.56"	1876	3493	5370	Blocking
2 - Stud wall - DF	3.50"	3.50"	1.50"	1788	3317	5104	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' 10" o/c	
Bottom Edge (Lu)	13' 10" 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 13' 10"	N/A	18.7	--	
1 - Uniform (PSF)	0 to 9' 9" (Front)	12' 9"	20.0	40.0	FLOOR
2 - Uniform (PSF)	9' 9" to 13' 10" (Front)	11' 3"	20.0	40.0	FLOOR

• Side loads are assumed to not induce cross-grain tension.

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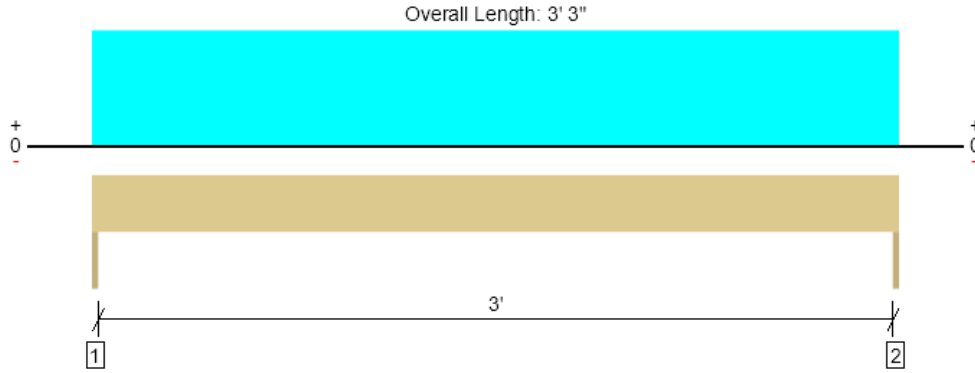
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MAIN, 3'-FRONT ENTRY
1 piece(s) 4 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1075 @ 0	3281 (1.50")	Passed (33%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	550 @ 8 3/4"	3045	Passed (18%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	811 @ 1' 7 1/2"	2989	Passed (27%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.004 @ 1' 7 1/2"	0.108	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.009 @ 1' 7 1/2"	0.162	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 3' 3"
 System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Roof Live	Snow	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	608	390	187	234	1075	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	608	390	187	234	1075	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)	Floor Live (1.00)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 3"	N/A	6.4	--	--	--	
1 - Uniform (PSF)	0 to 3' 3"	5' 9"	26.4	--	20.0	25.0	ROOF
2 - Uniform (PSF)	0 to 3' 3"	8'	12.0	--	--	--	WALL
3 - Uniform (PSF)	0 to 3' 3"	6'	20.0	40.0	--	--	UPPER FLOOR

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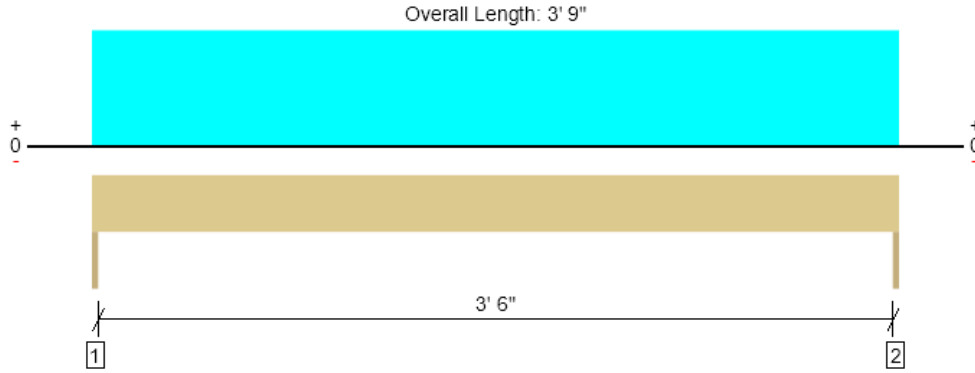
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MAIN, 3.5'-FRONT WINDOW
1 piece(s) 4 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1247 @ 0	3281 (1.50")	Passed (38%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	685 @ 8 3/4"	3045	Passed (22%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1050 @ 1' 10 1/2"	2989	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.010 @ 1' 10 1/2"	0.125	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.017 @ 1' 10 1/2"	0.188	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 3' 9"
 System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	501	619	375	1247	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	501	619	375	1247	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)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 9"	N/A	6.4	--	--	
1 - Uniform (PLF)	0 to 3' 9"	N/A	--	--	200.0	GABLE
2 - Uniform (PSF)	0 to 3' 9"	8'	12.0	--	--	WALL
3 - Uniform (PSF)	0 to 3' 9"	8' 3"	20.0	40.0	--	UPPER FLOOR

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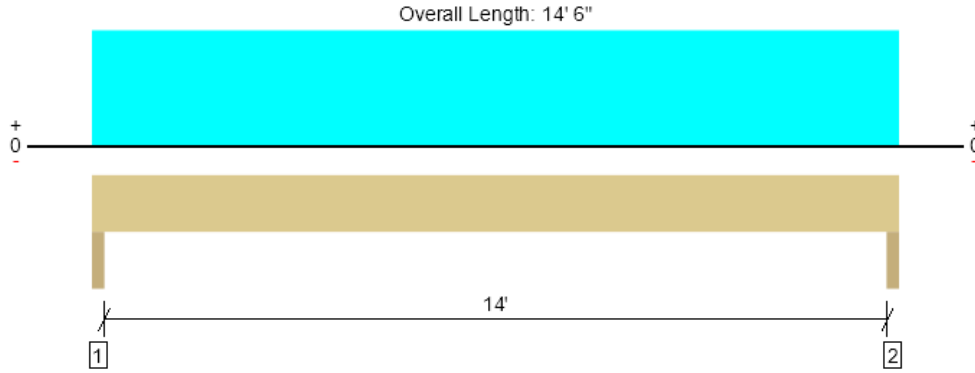
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MAIN, 14'-GARAGE

1 piece(s) 5 1/2" x 11 7/8" 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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	6018 @ 1 1/2"	10725 (3.00")	Passed (56%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	4767 @ 1' 2 7/8"	11539	Passed (41%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	20133 @ 7' 3"	25853	Passed (78%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.253 @ 7' 3"	0.475	Passed (L/676)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.557 @ 7' 3"	0.712	Passed (L/307)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 14' 6"
 System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 1.00 was calculated for positive bending using length L = 14' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Snow	Factored	
1 - Trimmer - DF	3.00"	3.00"	1.68"	3285	2465	943	1178	6018	None
2 - Trimmer - DF	3.00"	3.00"	1.68"	3285	2465	943	1178	6018	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	14' 6" o/c	
Bottom Edge (Lu)	14' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 14' 6"	N/A	15.9	--	--	--	
1 - Uniform (PSF)	0 to 14' 6"	6' 6"	26.4	--	20.0	25.0	ROOF
2 - Uniform (PSF)	0 to 14' 6"	8'	12.0	--	--	--	WALL
3 - Uniform (PSF)	0 to 14' 6"	8' 6"	20.0	40.0	--	--	FLOOR

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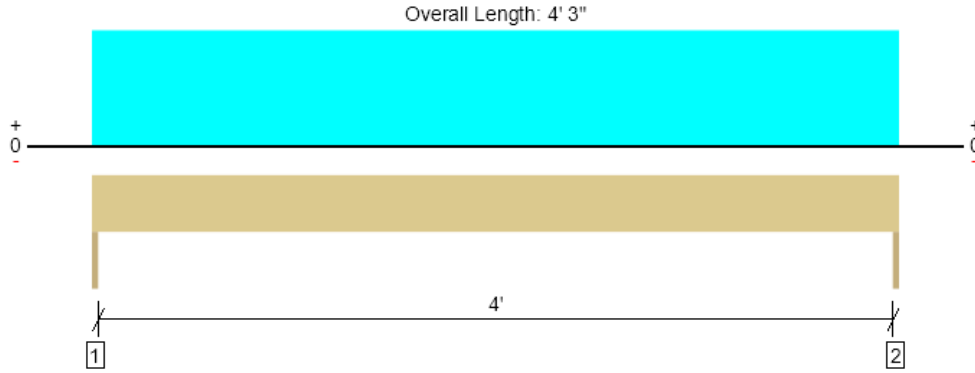
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MAIN, 4'-SIDE WINDOW

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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	685 @ 0	3281 (1.50")	Passed (21%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	450 @ 8 3/4"	3502	Passed (13%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	728 @ 2' 1 1/2"	3438	Passed (21%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.008 @ 2' 1 1/2"	0.142	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.013 @ 2' 1 1/2"	0.213	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 4' 3"
 System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	260	85	425	685	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	260	85	425	685	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 3" o/c	
Bottom Edge (Lu)	4' 3" 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 4' 3"	N/A	6.4	--	--	
1 - Uniform (PLF)	0 to 4' 3"	N/A	--	--	200.0	GABLE
2 - Uniform (PSF)	0 to 4' 3"	8'	12.0	--	--	WALL
3 - Uniform (PSF)	0 to 4' 3"	1'	20.0	40.0	--	UPPER FLOOR

Weyerhaeuser Notes

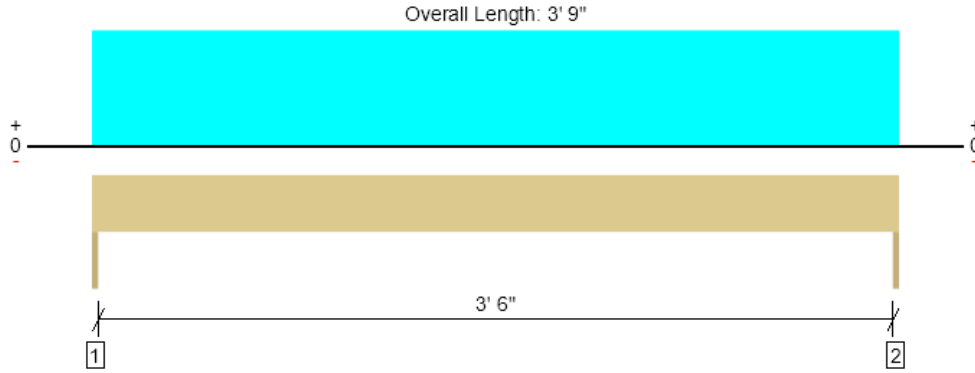
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MAIN, 3.5'-SIDE WINDOW (GABLE END)
1 piece(s) 4 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	605 @ 0	3281 (1.50")	Passed (18%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	369 @ 8 3/4"	3502	Passed (11%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	567 @ 1' 10 1/2"	3438	Passed (16%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.005 @ 1' 10 1/2"	0.125	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.008 @ 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 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	230	75	375	605	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	230	75	375	605	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)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 9"	N/A	6.4	--	--	
1 - Uniform (PLF)	0 to 3' 9"	N/A	--	--	200.0	GABLE
2 - Uniform (PSF)	0 to 3' 9"	8'	12.0	--	--	WALL
3 - Uniform (PSF)	0 to 3' 9"	1'	20.0	40.0	--	UPPER FLOOR

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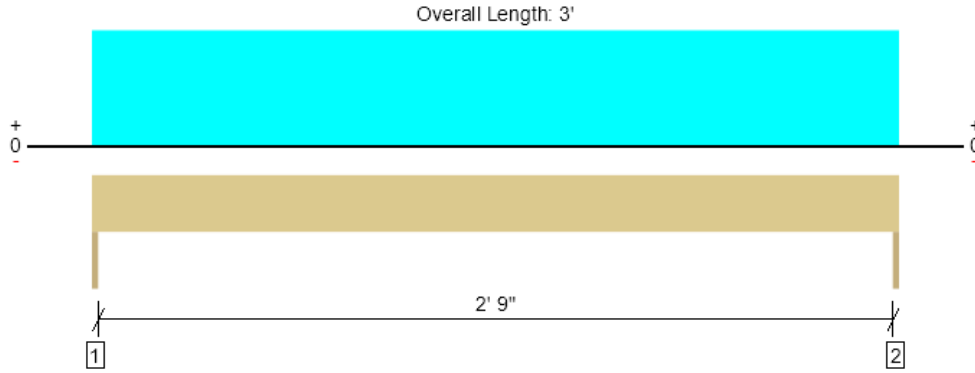
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Justin Concepcion Pliris Plans +639772505777 justinc@plirisplans.com	



MAIN, 2.75'-INTERIOR HEADER
2 piece(s) 2 x 6 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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	569 @ 0	2813 (1.50")	Passed (20%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	348 @ 7"	1980	Passed (18%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	427 @ 1' 6"	1475	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.007 @ 1' 6"	0.100	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.010 @ 1' 6"	0.150	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 3'
 System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Factored	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	194	375	569	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	194	375	569	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' o/c	
Bottom Edge (Lu)	3' 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 3'	N/A	4.2	--	
1 - Uniform (PSF)	0 to 3'	6' 3"	20.0	40.0	UPPER FLOOR

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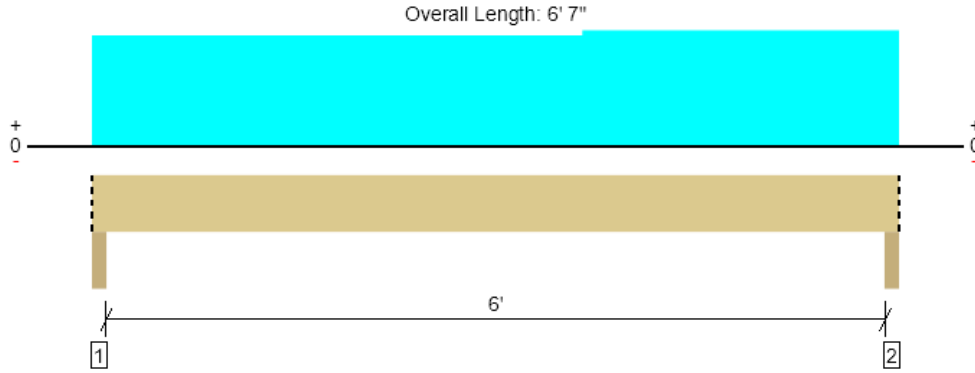
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Justin Concepcion Pliris Plans +639772505777 justinc@plirisplans.com	



MAIN, 6'-FRONT PORCH
1 piece(s) 6 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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	968 @ 6' 5"	12031 (3.50")	Passed (8%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	669 @ 5' 8"	5376	Passed (12%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1288 @ 3' 5 5/8"	3706	Passed (35%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.018 @ 3' 4 3/8"	0.208	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.036 @ 3' 3 7/8"	0.313	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 6' 7"
 System : Floor
 Member Type : Drop Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Roof Live	Snow	Factored	
1 - Column - SPF	3.50"	3.50"	1.50"	443	132	226	376	823	Blocking
2 - Column - SPF	3.50"	3.50"	1.50"	427	132	94	541	968	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' 7" o/c	
Bottom Edge (Lu)	6' 7" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 7"	N/A	10.4	--	--	--	
1 - Uniform (PLF)	4' to 6' 7" (Front)	N/A	--	--	--	200.0	GABLE
2 - Uniform (PSF)	4' to 6' 7" (Front)	8'	12.0	--	--	--	WALL
3 - Uniform (PSF)	0 to 6' 7" (Front)	1'	20.0	40.0	--	--	UPPER FLOOR
4 - Uniform (PSF)	0 to 4' (Top)	4'	26.4	--	20.0	25.0	ROOF-MAIN

• Side loads are assumed to not induce cross-grain tension.

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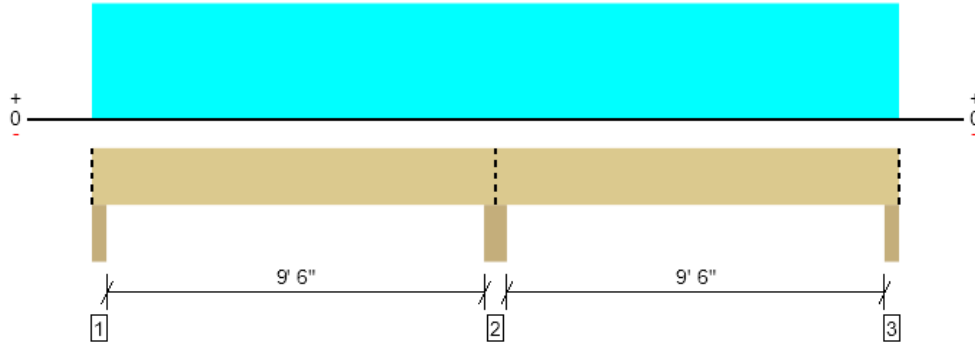
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MAIN FLOOR, FLOOR GIRDER, TYP.

1 piece(s) 4 x 8 DF No.2

Overall Length: 20' 1/2"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2050 @ 10' 1/4"	12031 (5.50")	Passed (17%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	886 @ 10' 10 1/4"	3045	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-2020 @ 10' 1/4"	2989	Passed (68%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.089 @ 15' 2 5/8"	0.328	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.119 @ 4' 8 3/16"	0.493	Passed (L/996)	--	1.0 D + 1.0 L (Alt Spans)

Member Length : 20' 1/2"
 System : Floor
 Member Type : Drop Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Factored	
1 - Ledger - SPF	3.50"	3.50"	1.50"	231	478/-66	708	Blocking
2 - Column - SPF	5.50"	5.50"	1.50"	736	1314	2050	Blocking
3 - Ledger - SPF	3.50"	3.50"	1.50"	231	478/-66	708	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	20' 1" o/c	
Bottom Edge (Lu)	20' 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 20' 1/2"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 20' 1/2" (Top)	2' 8"	20.0	40.0	Default Load

• Side loads are assumed to not induce cross-grain tension.

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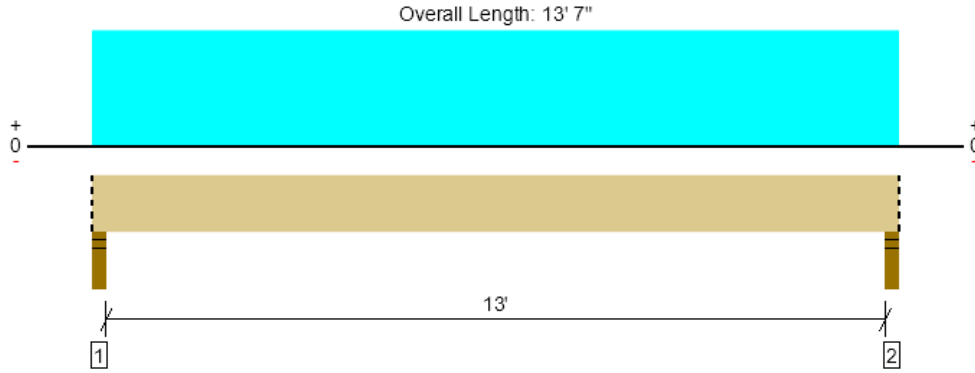
ROOF			
Member Name	Results (Max UTIL %)	Current Solution	Comments
13'-ROOF BEAM	Passed (66% R)	1 piece(s) 5 1/2" x 15" 24F-V4 DF Glulam	
UPPER			
Member Name	Results (Max UTIL %)	Current Solution	Comments
8'-FRONT WINDOW	Passed (39% M)	1 piece(s) 4 x 8 DF No.2	
4'-FRONT WINDOW	Passed (69% M)	1 piece(s) 4 x 8 DF No.2	
5'-REAR WINDOW	Passed (33% M)	1 piece(s) 4 x 8 DF No.2	
UPPER FLOOR			
Member Name	Results (Max UTIL %)	Current Solution	Comments
19'-GARAGE BEAM	Passed (59% M+)	1 piece(s) 5 1/2" x 16 1/2" 24F-V4 DF Glulam	
9'-FLOOR BEAM	Passed (51% R)	1 piece(s) 3 1/2" x 14" 24F-V4 DF Glulam	
3.25'-FLOOR BEAM	Passed (11% R)	1 piece(s) 5 1/2" x 14" 24F-V4 DF Glulam	
14'-FLOOR BEAM	Passed (53% M+)	1 piece(s) 5 1/2" x 14" 24F-V4 DF Glulam	
MAIN			
Member Name	Results (Max UTIL %)	Current Solution	Comments
3'-FRONT ENTRY	Passed (21% R)	1 piece(s) 4 x 8 DF No.2	
3.5'-FRONT WINDOW	Passed (33% M)	1 piece(s) 4 x 8 DF No.2	
16'-GARAGE	Passed (73% ΔT)	1 piece(s) 5 1/2" x 13 1/2" 24F-V4 DF Glulam	
2.75'-INTERIOR HEADER	Passed (29% M)	2 piece(s) 2 x 6 DF No.2	
FRONT PORCH RAFTERS	Passed (8% M)	1 piece(s) 4 x 6 DF No.2 @ 24" OC	
6'-FRONT PORCH	Passed (34% M)	1 piece(s) 6 x 8 DF No.2	
MAIN FLOOR			
Member Name	Results (Max UTIL %)	Current Solution	Comments
FLOOR GIRDER, TYP.	Passed (68% M)	1 piece(s) 4 x 8 DF No.2	
FLOOR GIRDER, LOAD BEARING	Passed (40% R)	1 piece(s) 4 x 8 DF No.2	

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ROOF, 13'-ROOF BEAM

1 piece(s) 5 1/2" x 15" 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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	7947 @ 2"	12031 (3.50")	Passed (66%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	6143 @ 1' 6 1/2"	16761	Passed (37%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	25677 @ 6' 9 1/2"	47438	Passed (54%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.143 @ 6' 9 1/2"	0.663	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.291 @ 6' 9 1/2"	0.883	Passed (L/546)	--	1.0 D + 1.0 S (All Spans)

Member Length : 13' 7"
 System : Roof
 Member Type : Drop Beam
 Building Use : Residential
 Building Code : IBC 2021
 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.
- Volume factor of 1.00 was calculated for positive bending using length L = 13' 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	Roof Live	Snow	Factored	
1 - Stud wall - DF	3.50"	3.50"	2.31"	4041	3124	3905	7947	Blocking
2 - Stud wall - DF	3.50"	3.50"	2.31"	4041	3124	3905	7947	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' 7" o/c	
Bottom Edge (Lu)	13' 7" o/c	

• Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 13' 7"	N/A	20.0	--	--	
1 - Uniform (PSF)	0 to 13' 7" (Front)	23'	25.0	20.0	25.0	ROOF

• Side loads are assumed to not induce cross-grain tension.

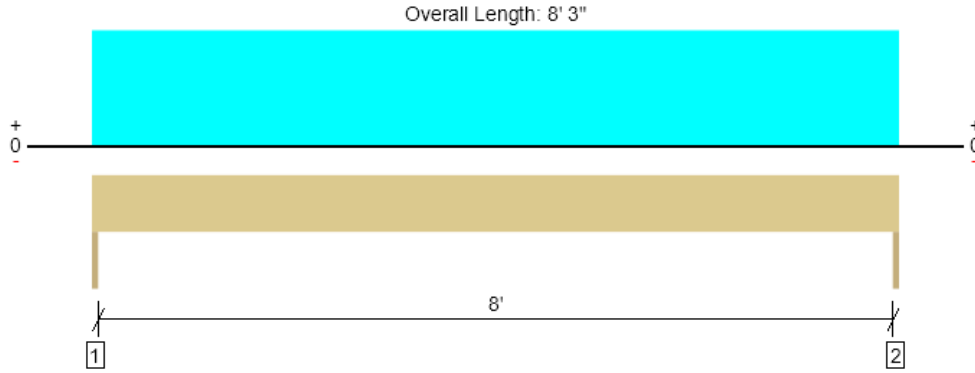
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UPPER, 8'-FRONT WINDOW

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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	645 @ 0	3281 (1.50")	Passed (20%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	531 @ 8 3/4"	3502	Passed (15%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1331 @ 4' 1 1/2"	3438	Passed (39%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.044 @ 4' 1 1/2"	0.275	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.092 @ 4' 1 1/2"	0.313	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 8' 3"
 System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 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	Roof Live	Snow	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	336	248	309	645	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	336	248	309	645	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' 3" o/c	
Bottom Edge (Lu)	8' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 8' 3"	N/A	6.4	--	--	
1 - Uniform (PSF)	0 to 8' 3"	3'	25.0	20.0	25.0	ROOF

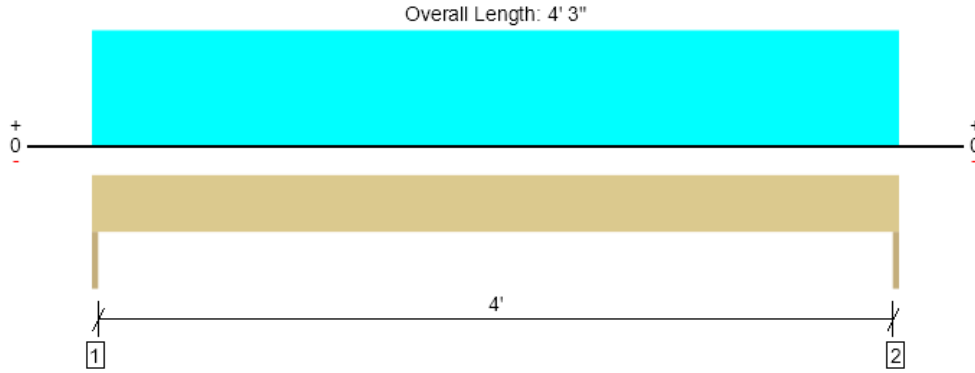
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UPPER, 4'-FRONT WINDOW

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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2245 @ 0	3281 (1.50")	Passed (68%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1475 @ 8 3/4"	3502	Passed (42%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2385 @ 2' 1 1/2"	3438	Passed (69%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.022 @ 2' 1 1/2"	0.142	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.044 @ 2' 1 1/2"	0.213	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 4' 3"
 System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Roof Live	Snow	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	1129	893	1116	2245	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	1129	893	1116	2245	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 3" o/c	
Bottom Edge (Lu)	4' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 4' 3"	N/A	6.4	--	--	
1 - Uniform (PSF)	0 to 4' 3"	21'	25.0	20.0	25.0	ROOF

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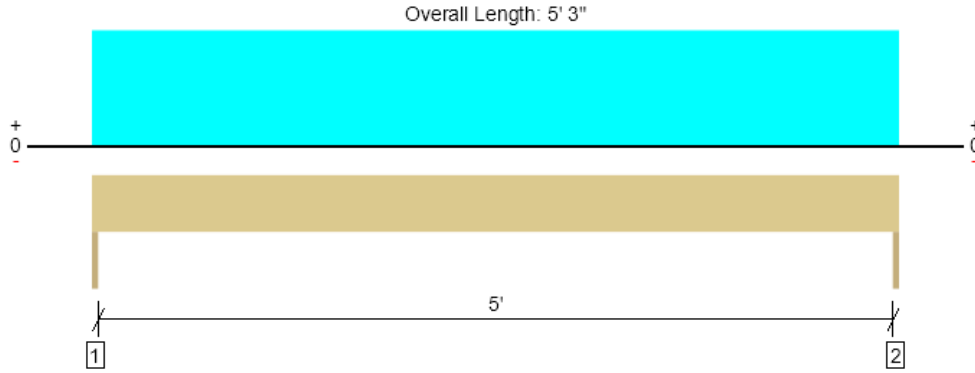
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UPPER, 5'-REAR WINDOW
1 piece(s) 4 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	876 @ 0	3281 (1.50")	Passed (27%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	633 @ 8 3/4"	3502	Passed (18%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1150 @ 2' 7 1/2"	3438	Passed (33%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.015 @ 2' 7 1/2"	0.175	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.032 @ 2' 7 1/2"	0.262	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 5' 3"
 System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Roof Live	Snow	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	458	335	418	876	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	458	335	418	876	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 3" o/c	
Bottom Edge (Lu)	5' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 5' 3"	N/A	6.4	--	--	
1 - Uniform (PSF)	0 to 5' 3"	6' 4 1/2"	26.4	20.0	25.0	ROOF

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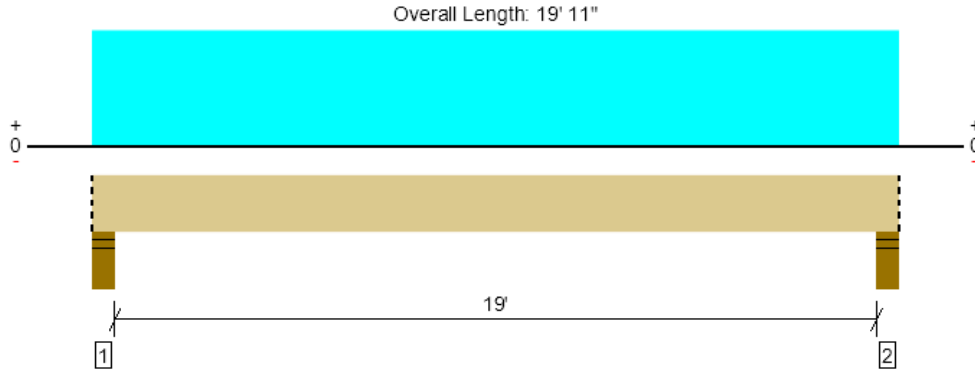
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UPPER FLOOR, 19'-GARAGE BEAM
1 piece(s) 5 1/2" x 16 1/2" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	6195 @ 4"	18906 (5.50")	Passed (33%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	5054 @ 1' 10"	16033	Passed (32%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	28814 @ 9' 11 1/2"	48427	Passed (59%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.333 @ 9' 11 1/2"	0.642	Passed (L/693)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.519 @ 9' 11 1/2"	0.962	Passed (L/445)	--	1.0 D + 1.0 L (All Spans)

Member Length : 19' 11"
 System : Floor
 Member Type : Drop Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 0.97 was calculated for positive bending 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	Factored	
1 - Stud wall - DF	5.50"	5.50"	1.80"	2211	3983	6195	Blocking
2 - Stud wall - DF	5.50"	5.50"	1.80"	2211	3983	6195	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)	19' 11" o/c	
Bottom Edge (Lu)	19' 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 19' 11"	N/A	22.1	--	
1 - Uniform (PSF)	0 to 19' 11" (Front)	10'	20.0	40.0	FLOOR

• Side loads are assumed to not induce cross-grain tension.

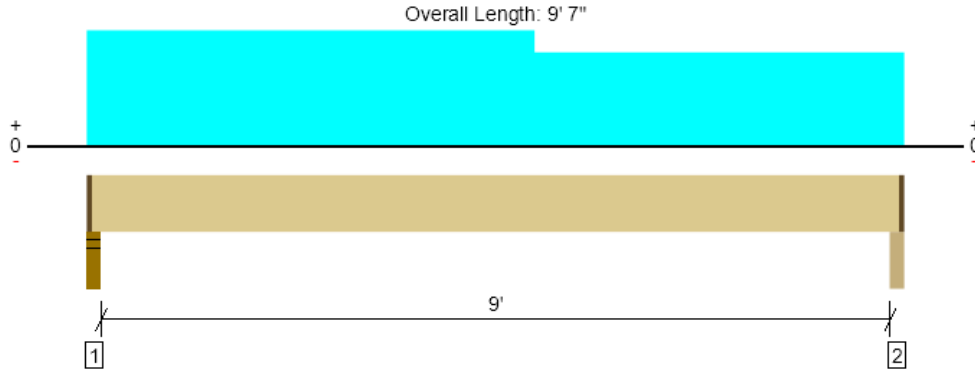
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UPPER FLOOR, 9'-FLOOR BEAM

1 piece(s) 3 1/2" x 14" 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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2524 @ 2"	4922 (2.25")	Passed (51%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1766 @ 1' 5 1/2"	8657	Passed (20%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	5536 @ 4' 7 3/8"	22867	Passed (24%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.038 @ 4' 9 1/16"	0.231	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.059 @ 4' 9 1/16"	0.463	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 9' 4 1/2"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 1.00 was calculated for positive bending using length L = 9' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	3.50"	2.25"	1.50"	897	1683	2581	1 1/4" Rim Board
2 - Column - DF	3.50"	2.25"	1.50"	811	1511	2323	1 1/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	9' 5" o/c	
Bottom Edge (Lu)	9' 5" 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)	1 1/4" to 9' 5 3/4"	N/A	11.9	--	
1 - Uniform (PSF)	0 to 5' 3" (Front)	2' 7 1/2"	20.0	40.0	Default Load
2 - Uniform (PSF)	5' 3" to 9' 7" (Front)	10 1/2"	20.0	40.0	FLOOR
3 - Uniform (PSF)	0 to 9' 7" (Back)	6' 6"	20.0	40.0	FLOOR

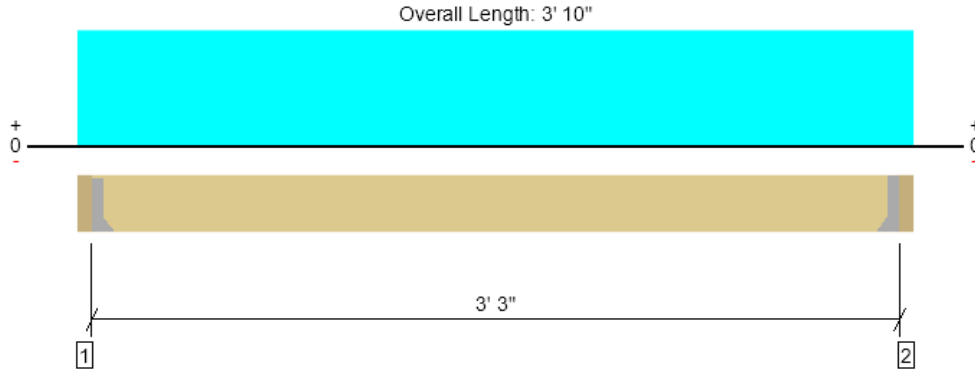
• Side loads are assumed to not induce cross-grain tension.

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UPPER FLOOR, 3.25'-FLOOR BEAM
1 piece(s) 5 1/2" x 14" 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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	615 @ 3 1/2"	5363 (1.50")	Passed (11%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	174 @ 1' 5 1/2"	13603	Passed (1%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	500 @ 1' 11"	35933	Passed (1%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.000 @ 1' 11"	0.081	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.000 @ 1' 11"	0.162	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 3' 3"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 1.00 was calculated for positive bending 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	Floor Live	Factored	
1 - Hanger on 14" DF beam	3.50"	Hanger ¹	1.50"	260	460	720	See note ¹
2 - Hanger on 14" DF beam	3.50"	Hanger ¹	1.50"	260	460	720	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)	3' 3" o/c	
Bottom Edge (Lu)	3' 3" 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)	Comments
0 - Self Weight (PLF)	3 1/2" to 3' 6 1/2"	N/A	18.7	--	
1 - Uniform (PSF)	0 to 3' 10" (Back)	6'	20.0	40.0	Default Load

• Side loads are assumed to not induce cross-grain tension.

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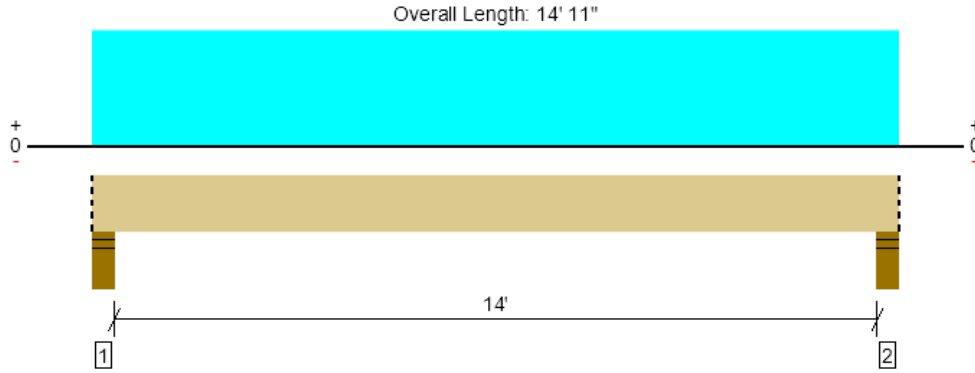
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UPPER FLOOR, 14'-FLOOR BEAM

1 piece(s) 5 1/2" x 14" 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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5621 @ 4"	18906 (5.50")	Passed (30%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4397 @ 1' 7 1/2"	13603	Passed (32%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	19131 @ 7' 5 1/2"	35933	Passed (53%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.201 @ 7' 5 1/2"	0.475	Passed (L/852)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.309 @ 7' 5 1/2"	0.712	Passed (L/554)	--	1.0 D + 1.0 L (All Spans)

Member Length : 14' 11"
 System : Floor
 Member Type : Drop Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 1.00 was calculated for positive bending using length L = 14' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	5.50"	5.50"	1.64"	1967	3655	5621	Blocking
2 - Stud wall - DF	5.50"	5.50"	1.64"	1967	3655	5621	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)	14' 11" o/c	
Bottom Edge (Lu)	14' 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 14' 11"	N/A	18.7	--	
1 - Uniform (PSF)	0 to 14' 11" (Back)	5' 6"	20.0	40.0	FLOOR
2 - Uniform (PSF)	0 to 14' 11" (Front)	6' 9"	20.0	40.0	FLOOR

• Side loads are assumed to not induce cross-grain tension.

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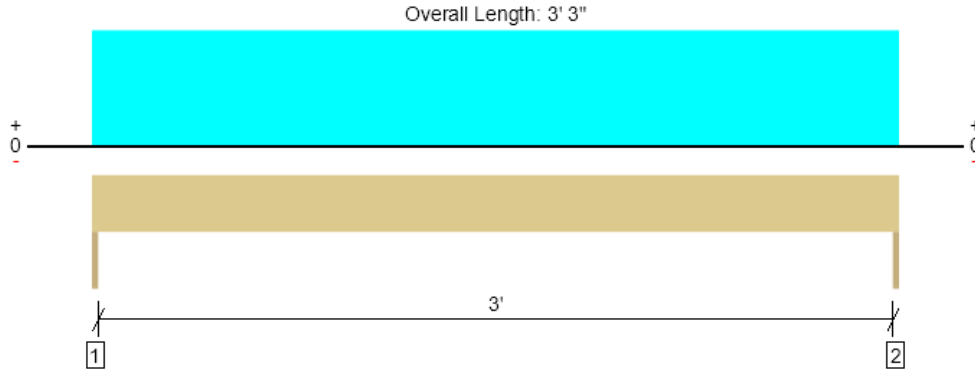
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MAIN, 3'-FRONT ENTRY
1 piece(s) 4 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	703 @ 0	3281 (1.50")	Passed (21%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	387 @ 8 3/4"	3045	Passed (13%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	571 @ 1' 7 1/2"	2989	Passed (19%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.003 @ 1' 7 1/2"	0.108	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.006 @ 1' 7 1/2"	0.162	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 3' 3"
 System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	345	358	703	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	345	358	703	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)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 3' 3"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 3' 3"	8'	12.0	--	WALL
2 - Uniform (PSF)	0 to 3' 3"	5' 6"	20.0	40.0	UPPER FLOOR

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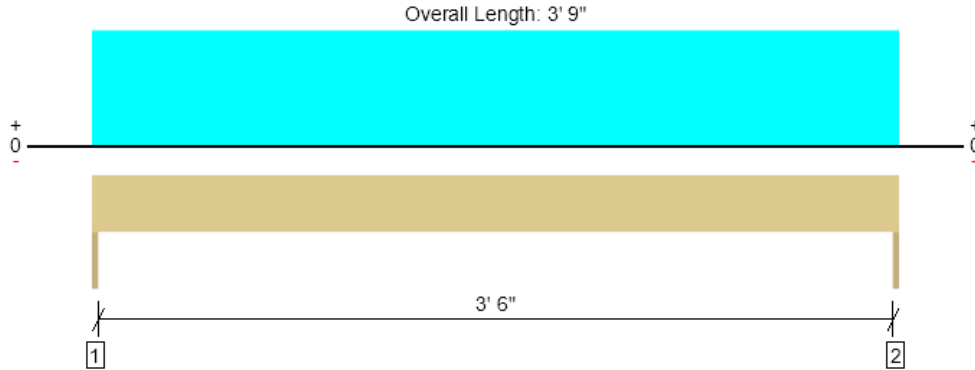
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MAIN, 3.5'-FRONT WINDOW

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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1064 @ 0	3281 (1.50")	Passed (32%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	650 @ 8 3/4"	3045	Passed (21%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	997 @ 1' 10 1/2"	2989	Passed (33%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.008 @ 1' 10 1/2"	0.125	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.014 @ 1' 10 1/2"	0.188	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

 Member Length : 3' 9"
 System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	483	581	1064	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	483	581	1064	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)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 3' 9"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 3' 9"	8'	12.0	--	WALL
2 - Uniform (PSF)	0 to 3' 9"	7' 9"	20.0	40.0	UPPER FLOOR

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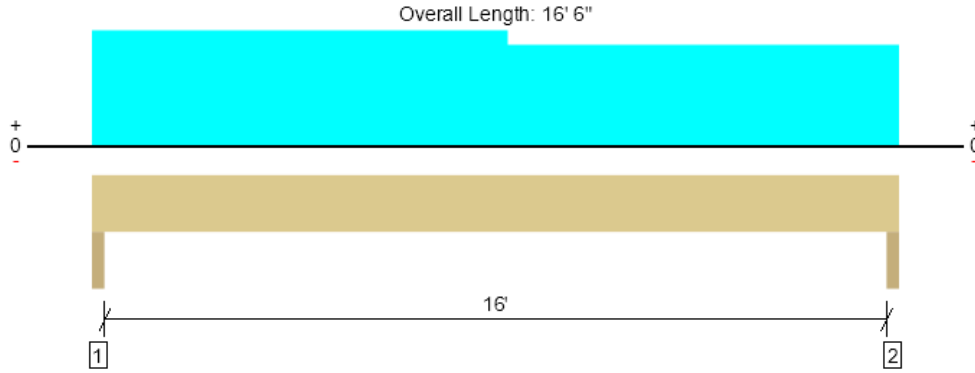
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Justin Concepcion Pliris Plans +639772505777 justinc@plirisplans.com	



MAIN, 16'-GARAGE

1 piece(s) 5 1/2" x 13 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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	6518 @ 1' 1/2"	10725 (3.00")	Passed (61%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	5172 @ 1' 4 1/2"	13118	Passed (39%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	24311 @ 8' 1/2"	33413	Passed (73%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.269 @ 8' 2 7/16"	0.542	Passed (L/726)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.593 @ 8' 2 1/2"	0.813	Passed (L/329)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 16' 6"
 System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 1.00 was calculated for positive bending using length L = 16' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Snow	Factored	
1 - Trimmer - DF	3.00"	3.00"	1.82"	3552	2687	1014	1267	6518	None
2 - Trimmer - DF	3.00"	3.00"	1.71"	3363	2520	930	1163	6125	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	16' 6" o/c	
Bottom Edge (Lu)	16' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 16' 6"	N/A	18.0	--	--	--	
1 - Uniform (PSF)	0 to 8' 6"	6' 4 1/2"	25.0	--	20.0	25.0	ROOF
2 - Uniform (PSF)	8' 6" to 16' 6"	5' 4 1/2"	25.0	--	20.0	25.0	ROOF
3 - Uniform (PSF)	0 to 16' 6"	8'	12.0	--	--	--	WALL
4 - Uniform (PSF)	0 to 8' 6"	8' 4 1/2"	20.0	40.0	--	--	UPPER FLOOR
5 - Uniform (PSF)	8' 6" to 16' 6"	7' 4 1/2"	20.0	40.0	--	--	UPPER FLOOR

Weyerhaeuser Notes

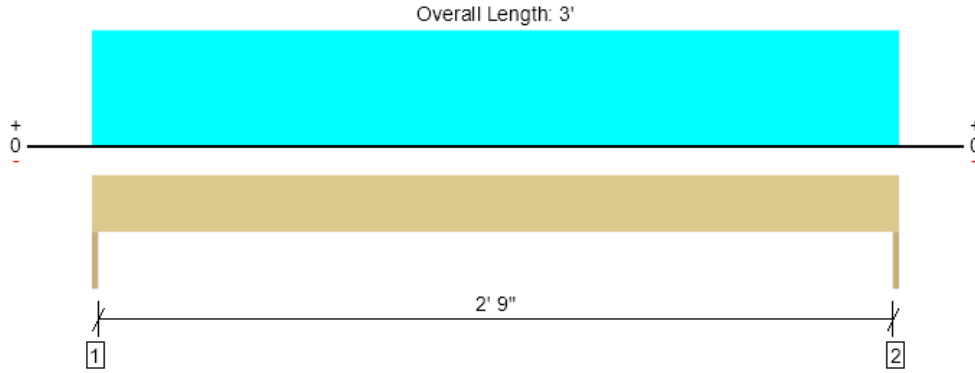
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Justin Concepcion Pliris Plans +639772505777 justinc@plirisplans.com	



MAIN, 2.75'-INTERIOR HEADER
2 piece(s) 2 x 6 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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	569 @ 0	2813 (1.50")	Passed (20%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	348 @ 7"	1980	Passed (18%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	427 @ 1' 6"	1475	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.007 @ 1' 6"	0.100	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.010 @ 1' 6"	0.150	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 3'
 System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Factored	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	194	375	569	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	194	375	569	None

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

•Maximum allowable bracing intervals based on applied load.

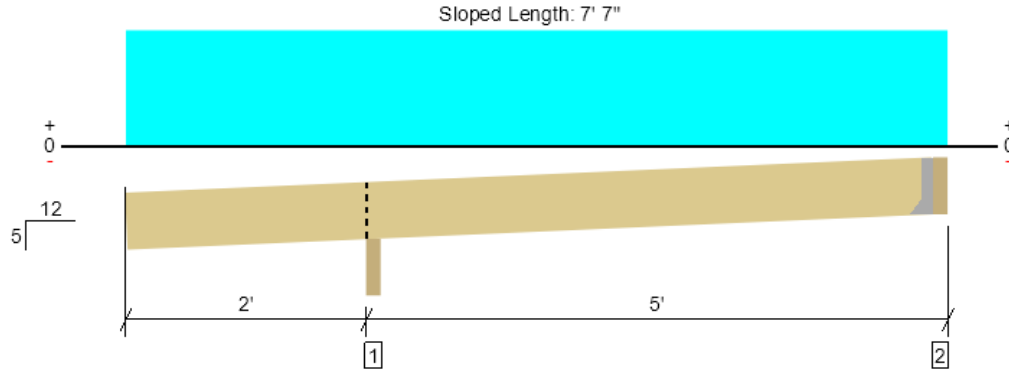
Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 3'	N/A	4.2	--	
1 - Uniform (PSF)	0 to 3'	6' 3"	20.0	40.0	UPPER FLOOR

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Justin Concepcion Pliris Plans +639772505777 justinc@plirisplans.com	



MAIN, FRONT PORCH RAFTERS
1 piece(s) 4 x 6 DF No.2 @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	407 @ 2' 1 3/4"	8294 (3.50")	Passed (5%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	183 @ 2' 8 9/16"	2657	Passed (7%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-190 @ 2' 1 3/4"	2275	Passed (8%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.008 @ 0	0.232	Passed (2L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.009 @ 0	0.310	Passed (2L/999+)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 7' 5 1/2"
 System : Roof
 Member Type : Joist
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD
 Member Pitch : 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.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Factored	
1 - Beveled Plate - DF	3.50"	3.50"	1.50"	160	197	247	407	Blocking
2 - Hanger on 5 1/2" DF beam	3.50"	Hanger ¹	1.50"	66	93	116	183	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)	7' 3" o/c	
Bottom Edge (Lu)	7' 3" o/c	

- Maximum allowable bracing intervals based on applied load.
- Dimensions for lateral bracing intervals are measured along the length of the member for sloped conditions.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	U46X SLD22	2.00"	N/A	8-10dx1.5	4-10d	

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

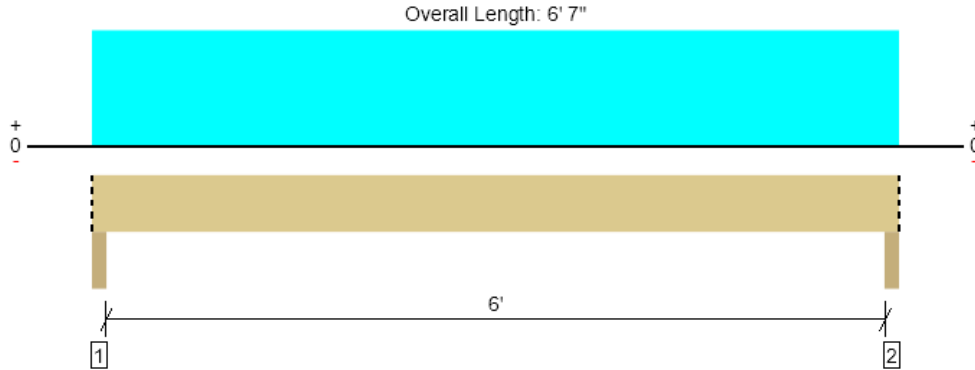
Vertical Load	Location (Side)	Spacing	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 7'	24"	15.0	20.0	25.0	ROOF

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MAIN, 6'-FRONT PORCH
1 piece(s) 6 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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	857 @ 2"	12031 (3.50")	Passed (7%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	619 @ 11"	5376	Passed (12%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1272 @ 3' 3 1/2"	3706	Passed (34%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.017 @ 3' 3 1/2"	0.208	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.036 @ 3' 3 1/2"	0.313	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 6' 7"
 System : Floor
 Member Type : Drop Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Roof Live	Snow	Factored	
1 - Column - SPF	3.50"	3.50"	1.50"	446	329	411	857	Blocking
2 - Column - SPF	3.50"	3.50"	1.50"	446	329	411	857	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' 7" o/c	
Bottom Edge (Lu)	6' 7" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 7"	N/A	10.4	--	--	
1 - Uniform (PSF)	0 to 6' 7" (Top)	5'	25.0	20.0	25.0	ROOF

• Side loads are assumed to not induce cross-grain tension.

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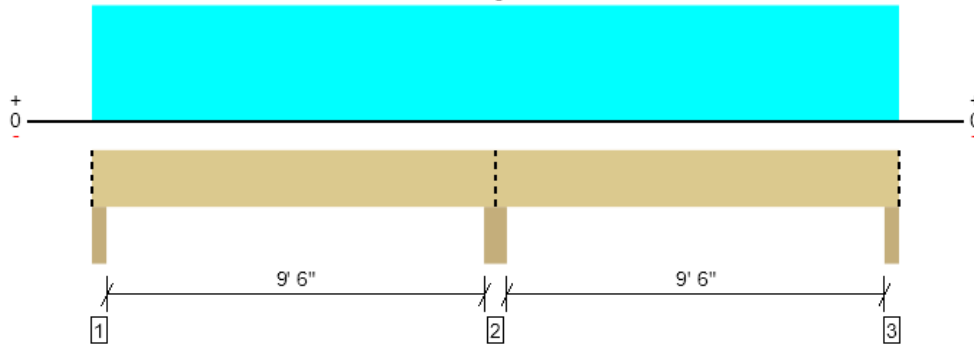
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MAIN FLOOR, FLOOR GIRDER, TYP.

1 piece(s) 4 x 8 DF No.2

Overall Length: 20' 1/2"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2050 @ 10' 1/4"	12031 (5.50")	Passed (17%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	886 @ 10' 10 1/4"	3045	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-2020 @ 10' 1/4"	2989	Passed (68%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.089 @ 15' 2 5/8"	0.328	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.119 @ 4' 8 3/16"	0.493	Passed (L/996)	--	1.0 D + 1.0 L (Alt Spans)

 Member Length : 20' 1/2"
 System : Floor
 Member Type : Drop Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Factored	
1 - Ledger - SPF	3.50"	3.50"	1.50"	231	478/-66	708	Blocking
2 - Column - SPF	5.50"	5.50"	1.50"	736	1314	2050	Blocking
3 - Ledger - SPF	3.50"	3.50"	1.50"	231	478/-66	708	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	20' 1" o/c	
Bottom Edge (Lu)	20' 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 20' 1/2"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 20' 1/2" (Top)	2' 8"	20.0	40.0	Default Load

- Side loads are assumed to not induce cross-grain tension.

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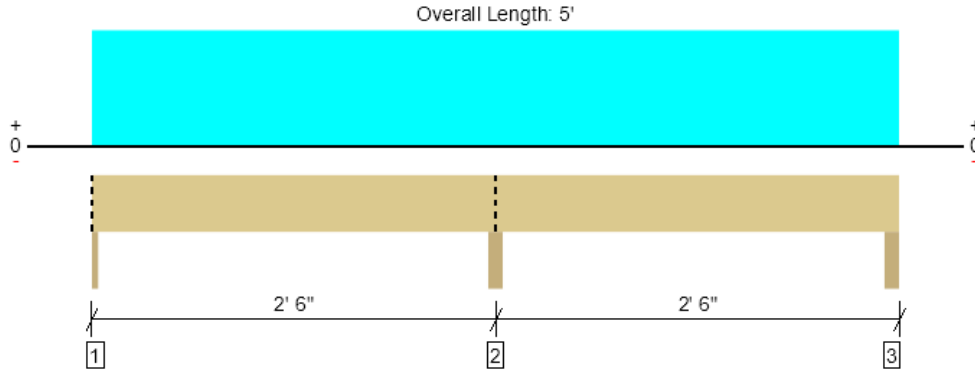
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MAIN FLOOR, FLOOR GIRDER, LOAD BEARING
1 piece(s) 4 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3081 @ 2' 6"	7656 (3.50")	Passed (40%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	808 @ 1' 9"	3045	Passed (27%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-747 @ 2' 6"	2989	Passed (25%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.002 @ 1' 1 13/16"	0.083	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.003 @ 1' 1 1/4"	0.125	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)

Member Length : 5'
 System : Floor
 Member Type : Drop Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Factored	
1 - Ledger - DF	1.50"	1.50"	1.50"	387	669/-81	1056	Blocking
2 - Column - DF	3.50"	3.50"	1.50"	1221	1860	3081	Blocking
3 - Column - DF	3.50"	3.50"	1.50"	412	733/-107	1145	None

• 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' o/c	
Bottom Edge (Lu)	5' 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 5'	N/A	6.4	--	
1 - Uniform (PSF)	0 to 5' (Front)	14' 3"	20.0	40.0	UPPER FLOOR
2 - Uniform (PSF)	0 to 5' (Front)	9'	10.0	--	WALL
3 - Uniform (PSF)	0 to 5' (Front)	1' 1 1/2"	20.0	40.0	MAIN FLOOR

• Side loads are assumed to not induce cross-grain tension.

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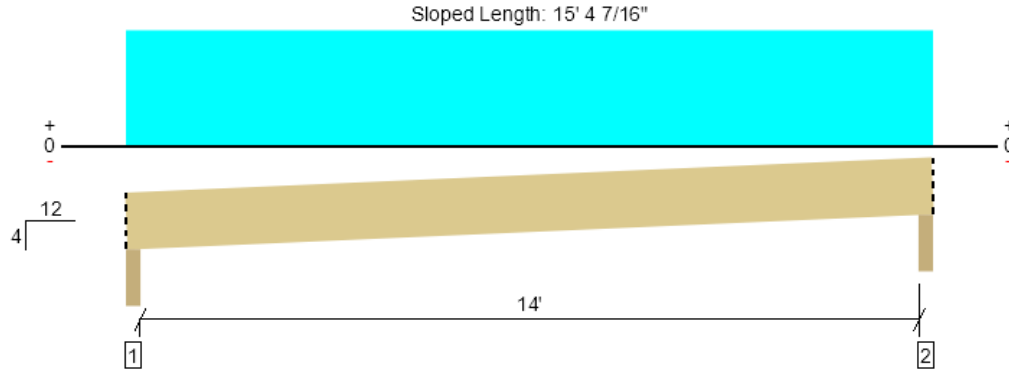
ROOF			
Member Name	Results (Max UTIL %)	Current Solution	Comments
RAFTERS	Passed (82% M)	1 piece(s) 2 x 12 DF No.2 @ 24" OC	
UPPER			
Member Name	Results (Max UTIL %)	Current Solution	Comments
3.5'-FRONT WINDOW	Passed (12% R)	1 piece(s) 4 x 8 DF No.2	
4'-FRONT WINDOW	Passed (19% M)	1 piece(s) 4 x 8 DF No.2	
5'-REAR WINDOW	Passed (33% M)	1 piece(s) 4 x 8 DF No.2	
UPPER FLOOR			
Member Name	Results (Max UTIL %)	Current Solution	Comments
19'-GARAGE BEAM	Passed (59% M+)	1 piece(s) 5 1/2" x 16 1/2" 24F-V4 DF Glulam	
9'-FLOOR BEAM	Passed (51% R)	1 piece(s) 3 1/2" x 14" 24F-V4 DF Glulam	
3.25'-FLOOR BEAM	Passed (11% R)	1 piece(s) 5 1/2" x 14" 24F-V4 DF Glulam	
14'-FLOOR BEAM	Passed (53% M+)	1 piece(s) 5 1/2" x 14" 24F-V4 DF Glulam	
MAIN			
Member Name	Results (Max UTIL %)	Current Solution	Comments
3'-FRONT ENTRY	Passed (21% R)	1 piece(s) 4 x 8 DF No.2	
3.5'-FRONT WINDOW	Passed (33% M)	1 piece(s) 4 x 8 DF No.2	
16'-GARAGE	Passed (73% ΔT)	1 piece(s) 5 1/2" x 13 1/2" 24F-V4 DF Glulam	
2.75'-INTERIOR HEADER	Passed (29% M)	2 piece(s) 2 x 6 DF No.2	
FRONT PORCH RAFTERS	Passed (8% M)	1 piece(s) 4 x 6 DF No.2 @ 24" OC	
6'-FRONT PORCH	Passed (34% M)	1 piece(s) 6 x 8 DF No.2	
MAIN FLOOR			
Member Name	Results (Max UTIL %)	Current Solution	Comments
FLOOR GIRDER, TYP.	Passed (68% M)	1 piece(s) 4 x 8 DF No.2	
FLOOR GIRDER, LOAD BEARING	Passed (40% R)	1 piece(s) 4 x 8 DF No.2	

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ROOF, RAFTERS

1 piece(s) 2 x 12 DF No.2 @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	749 @ 2 1/2"	3281 (3.50")	Passed (23%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	628 @ 1' 2 3/16"	2329	Passed (27%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2577 @ 7' 3 1/2"	3138	Passed (82%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.177 @ 7' 3 1/2"	0.747	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.363 @ 7' 3 1/2"	0.996	Passed (L/493)	--	1.0 D + 1.0 S (All Spans)

Member Length : 15' 8 3/16"
 System : Roof
 Member Type : Joist
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD
 Member Pitch : 4/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Factored	
1 - Beveled Plate - DF	3.50"	3.50"	1.50"	384	292	365	749	Blocking
2 - Beveled Plate - DF	3.50"	3.50"	1.50"	384	292	365	749	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' 8" o/c	
Bottom Edge (Lu)	15' 4" o/c	

- Maximum allowable bracing intervals based on applied load.
- Dimensions for lateral bracing intervals are measured along the length of the member for sloped conditions.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 14' 7"	24"	25.0	20.0	25.0	Default Load

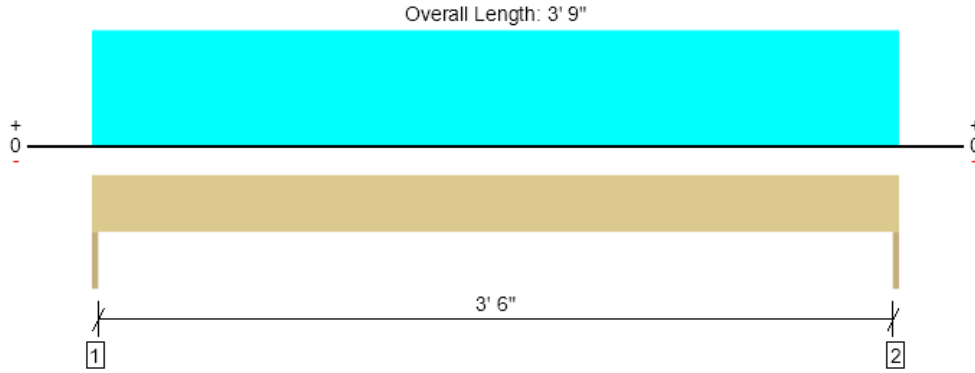
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UPPER, 3.5'-FRONT WINDOW

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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	387 @ 0	3281 (1.50")	Passed (12%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	237 @ 8 3/4"	3502	Passed (7%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	363 @ 1' 10 1/2"	3438	Passed (11%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.005 @ 1' 10 1/2"	0.125	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.005 @ 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 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Snow	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	12	375	387	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	12	375	387	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	6.4	--	
1 - Uniform (PLF)	0 to 3' 9"	N/A	--	200.0	GABLE

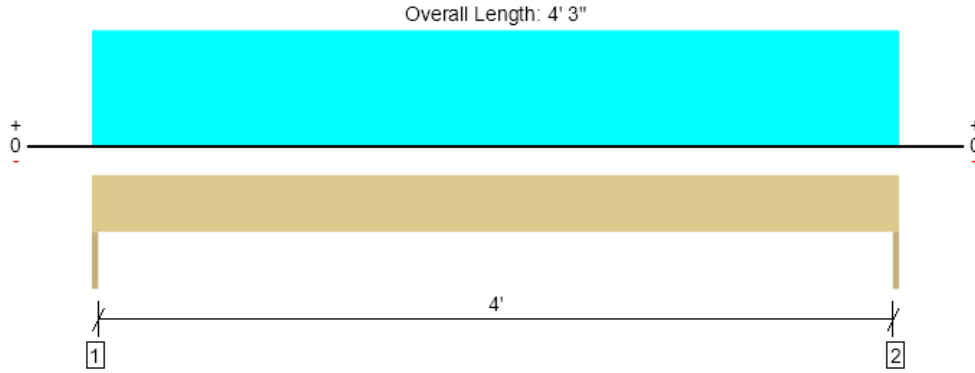
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UPPER, 4'-FRONT WINDOW

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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	625 @ 0	3281 (1.50")	Passed (19%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	410 @ 8 3/4"	3502	Passed (12%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	664 @ 2' 1 1/2"	3438	Passed (19%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.006 @ 2' 1 1/2"	0.142	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.012 @ 2' 1 1/2"	0.213	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 4' 3"
 System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Roof Live	Snow	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	319	244	305	625	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	319	244	305	625	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 3" o/c	
Bottom Edge (Lu)	4' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 4' 3"	N/A	6.4	--	--	
1 - Uniform (PSF)	0 to 4' 3"	5' 9"	25.0	20.0	25.0	ROOF

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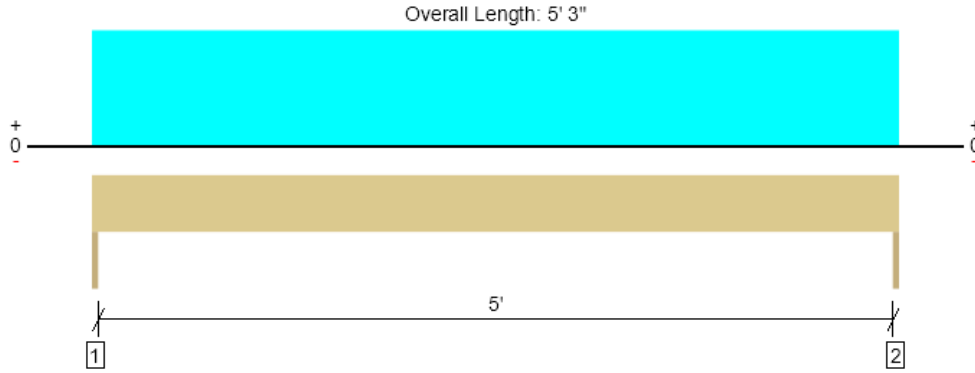
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UPPER, 5'-REAR WINDOW
1 piece(s) 4 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	876 @ 0	3281 (1.50")	Passed (27%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	633 @ 8 3/4"	3502	Passed (18%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1150 @ 2' 7 1/2"	3438	Passed (33%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.015 @ 2' 7 1/2"	0.175	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.032 @ 2' 7 1/2"	0.262	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 5' 3"
 System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Roof Live	Snow	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	458	335	418	876	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	458	335	418	876	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 3" o/c	
Bottom Edge (Lu)	5' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 5' 3"	N/A	6.4	--	--	
1 - Uniform (PSF)	0 to 5' 3"	6' 4 1/2"	26.4	20.0	25.0	ROOF

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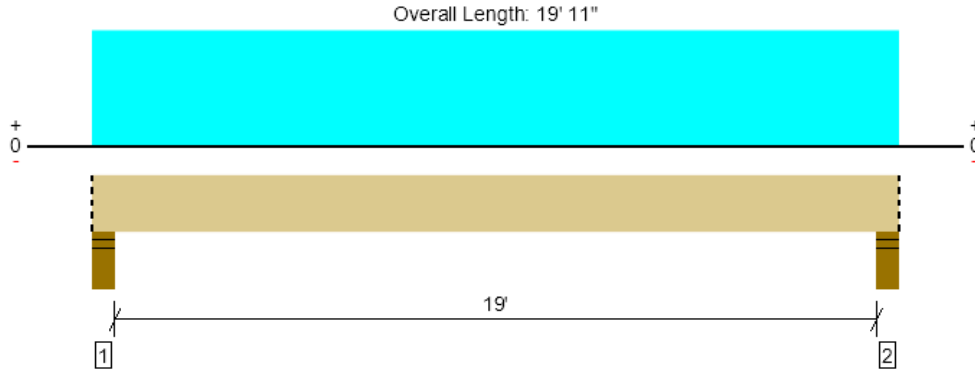
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UPPER FLOOR, 19'-GARAGE BEAM
1 piece(s) 5 1/2" x 16 1/2" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	6195 @ 4"	18906 (5.50")	Passed (33%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	5054 @ 1' 10"	16033	Passed (32%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	28814 @ 9' 11 1/2"	48427	Passed (59%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.333 @ 9' 11 1/2"	0.642	Passed (L/693)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.519 @ 9' 11 1/2"	0.962	Passed (L/445)	--	1.0 D + 1.0 L (All Spans)

Member Length : 19' 11"
 System : Floor
 Member Type : Drop Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 0.97 was calculated for positive bending 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	Factored	
1 - Stud wall - DF	5.50"	5.50"	1.80"	2211	3983	6195	Blocking
2 - Stud wall - DF	5.50"	5.50"	1.80"	2211	3983	6195	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)	19' 11" o/c	
Bottom Edge (Lu)	19' 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 19' 11"	N/A	22.1	--	
1 - Uniform (PSF)	0 to 19' 11" (Front)	10'	20.0	40.0	FLOOR

• Side loads are assumed to not induce cross-grain tension.

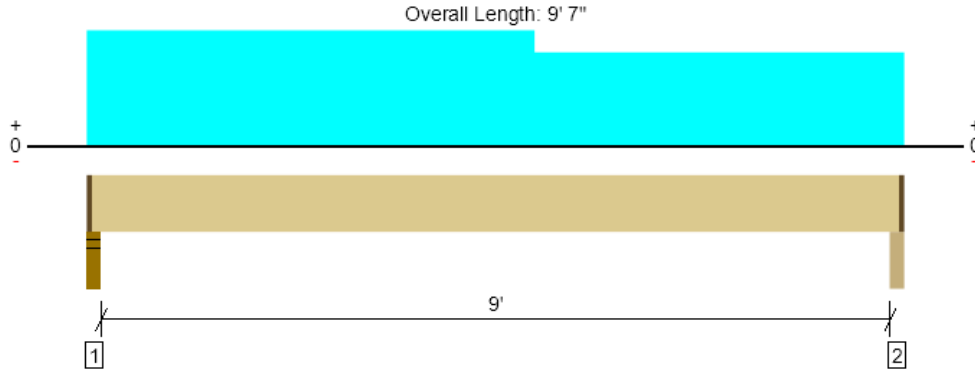
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UPPER FLOOR, 9'-FLOOR BEAM

1 piece(s) 3 1/2" x 14" 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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2524 @ 2"	4922 (2.25")	Passed (51%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1766 @ 1' 5 1/2"	8657	Passed (20%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	5536 @ 4' 7 3/8"	22867	Passed (24%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.038 @ 4' 9 1/16"	0.231	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.059 @ 4' 9 1/16"	0.463	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 9' 4 1/2"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 1.00 was calculated for positive bending using length L = 9' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	3.50"	2.25"	1.50"	897	1683	2581	1 1/4" Rim Board
2 - Column - DF	3.50"	2.25"	1.50"	811	1511	2323	1 1/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	9' 5" o/c	
Bottom Edge (Lu)	9' 5" 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)	1 1/4" to 9' 5 3/4"	N/A	11.9	--	
1 - Uniform (PSF)	0 to 5' 3" (Front)	2' 7 1/2"	20.0	40.0	Default Load
2 - Uniform (PSF)	5' 3" to 9' 7" (Front)	10 1/2"	20.0	40.0	FLOOR
3 - Uniform (PSF)	0 to 9' 7" (Back)	6' 6"	20.0	40.0	FLOOR

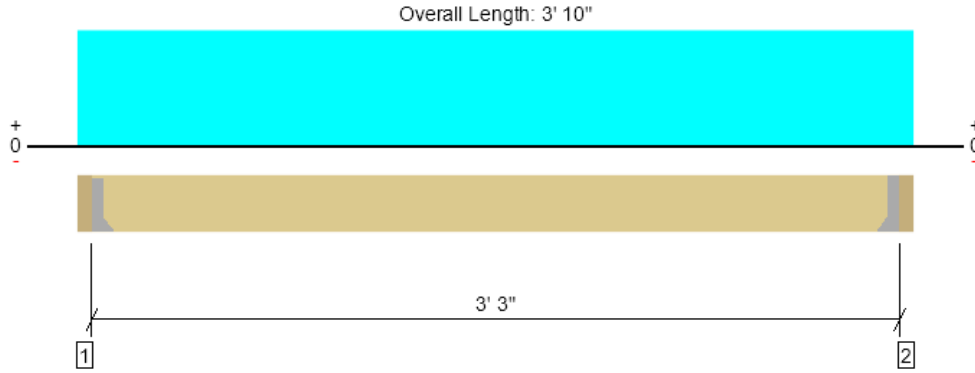
• Side loads are assumed to not induce cross-grain tension.

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UPPER FLOOR, 3.25'-FLOOR BEAM
1 piece(s) 5 1/2" x 14" 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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	615 @ 3 1/2"	5363 (1.50")	Passed (11%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	174 @ 1' 5 1/2"	13603	Passed (1%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	500 @ 1' 11"	35933	Passed (1%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.000 @ 1' 11"	0.081	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.000 @ 1' 11"	0.162	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 3' 3"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 1.00 was calculated for positive bending 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	Floor Live	Factored	
1 - Hanger on 14" DF beam	3.50"	Hanger ¹	1.50"	260	460	720	See note ¹
2 - Hanger on 14" DF beam	3.50"	Hanger ¹	1.50"	260	460	720	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)	3' 3" o/c	
Bottom Edge (Lu)	3' 3" 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)	Comments
0 - Self Weight (PLF)	3 1/2" to 3' 6 1/2"	N/A	18.7	--	
1 - Uniform (PSF)	0 to 3' 10" (Back)	6'	20.0	40.0	Default Load

- Side loads are assumed to not induce cross-grain tension.

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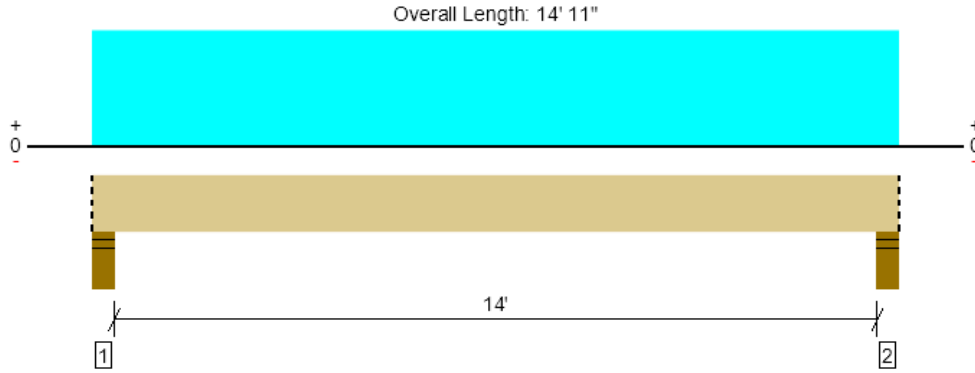
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
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UPPER FLOOR, 14'-FLOOR BEAM

1 piece(s) 5 1/2" x 14" 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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5621 @ 4"	18906 (5.50")	Passed (30%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4397 @ 1' 7 1/2"	13603	Passed (32%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	19131 @ 7' 5 1/2"	35933	Passed (53%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.201 @ 7' 5 1/2"	0.475	Passed (L/852)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.309 @ 7' 5 1/2"	0.712	Passed (L/554)	--	1.0 D + 1.0 L (All Spans)

Member Length : 14' 11"
 System : Floor
 Member Type : Drop Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 1.00 was calculated for positive bending using length L = 14' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	5.50"	5.50"	1.64"	1967	3655	5621	Blocking
2 - Stud wall - DF	5.50"	5.50"	1.64"	1967	3655	5621	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)	14' 11" o/c	
Bottom Edge (Lu)	14' 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 14' 11"	N/A	18.7	--	
1 - Uniform (PSF)	0 to 14' 11" (Back)	5' 6"	20.0	40.0	FLOOR
2 - Uniform (PSF)	0 to 14' 11" (Front)	6' 9"	20.0	40.0	FLOOR

• Side loads are assumed to not induce cross-grain tension.

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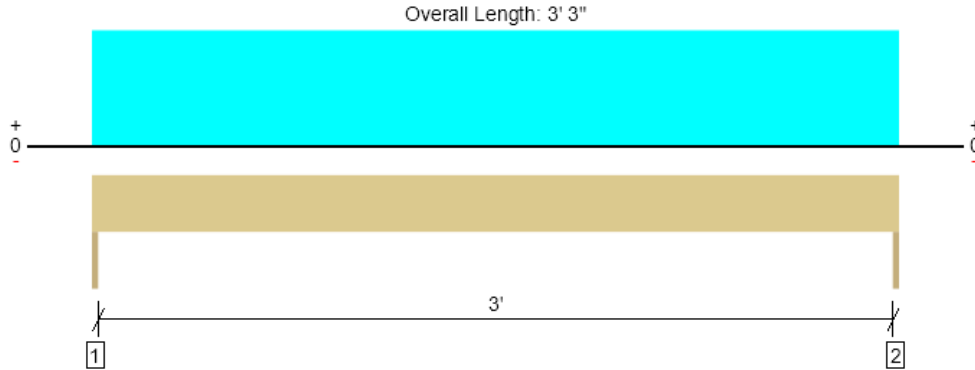
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MAIN, 3'-FRONT ENTRY
1 piece(s) 4 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	703 @ 0	3281 (1.50")	Passed (21%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	387 @ 8 3/4"	3045	Passed (13%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	571 @ 1' 7 1/2"	2989	Passed (19%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.003 @ 1' 7 1/2"	0.108	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.006 @ 1' 7 1/2"	0.162	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 3' 3"
 System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	345	358	703	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	345	358	703	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)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 3' 3"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 3' 3"	8'	12.0	--	WALL
2 - Uniform (PSF)	0 to 3' 3"	5' 6"	20.0	40.0	UPPER FLOOR

Weyerhaeuser Notes

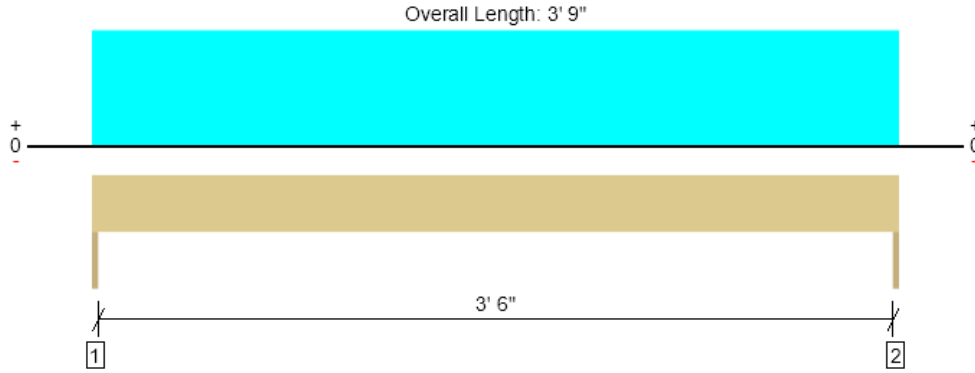
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MAIN, 3.5'-FRONT WINDOW
1 piece(s) 4 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1064 @ 0	3281 (1.50")	Passed (32%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	650 @ 8 3/4"	3045	Passed (21%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	997 @ 1' 10 1/2"	2989	Passed (33%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.008 @ 1' 10 1/2"	0.125	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.014 @ 1' 10 1/2"	0.188	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 3' 9"
 System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	483	581	1064	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	483	581	1064	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)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 3' 9"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 3' 9"	8'	12.0	--	WALL
2 - Uniform (PSF)	0 to 3' 9"	7' 9"	20.0	40.0	UPPER FLOOR

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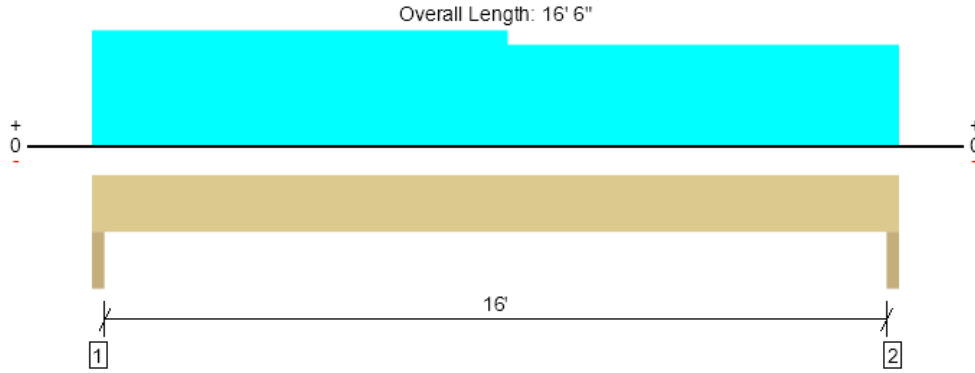
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MAIN, 16'-GARAGE

1 piece(s) 5 1/2" x 13 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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	6518 @ 1' 1/2"	10725 (3.00")	Passed (61%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	5172 @ 1' 4 1/2"	13118	Passed (39%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	24311 @ 8' 1/2"	33413	Passed (73%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.269 @ 8' 2 7/16"	0.542	Passed (L/726)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.593 @ 8' 2 1/2"	0.813	Passed (L/329)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 16' 6"
 System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 1.00 was calculated for positive bending using length L = 16' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Snow	Factored	
1 - Trimmer - DF	3.00"	3.00"	1.82"	3552	2687	1014	1267	6518	None
2 - Trimmer - DF	3.00"	3.00"	1.71"	3363	2520	930	1163	6125	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	16' 6" o/c	
Bottom Edge (Lu)	16' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 16' 6"	N/A	18.0	--	--	--	
1 - Uniform (PSF)	0 to 8' 6"	6' 4 1/2"	25.0	--	20.0	25.0	ROOF
2 - Uniform (PSF)	8' 6" to 16' 6"	5' 4 1/2"	25.0	--	20.0	25.0	ROOF
3 - Uniform (PSF)	0 to 16' 6"	8'	12.0	--	--	--	WALL
4 - Uniform (PSF)	0 to 8' 6"	8' 4 1/2"	20.0	40.0	--	--	UPPER FLOOR
5 - Uniform (PSF)	8' 6" to 16' 6"	7' 4 1/2"	20.0	40.0	--	--	UPPER FLOOR

Weyerhaeuser Notes

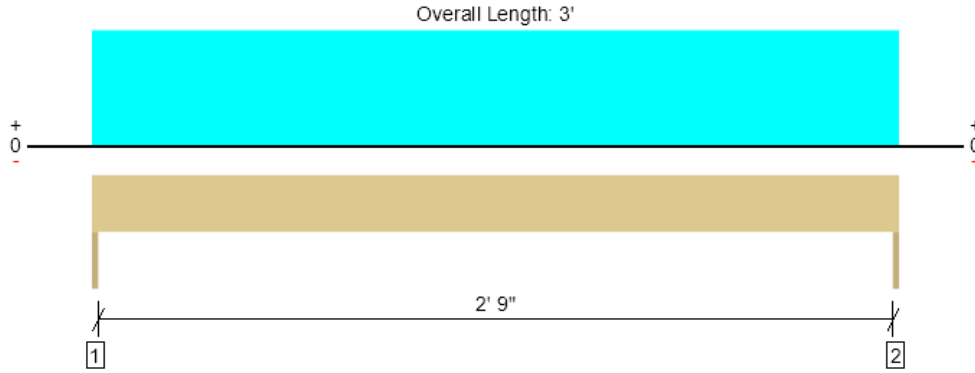
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MAIN, 2.75'-INTERIOR HEADER
2 piece(s) 2 x 6 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	569 @ 0	2813 (1.50")	Passed (20%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	348 @ 7"	1980	Passed (18%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	427 @ 1' 6"	1475	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.007 @ 1' 6"	0.100	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.010 @ 1' 6"	0.150	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 3'
 System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Factored	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	194	375	569	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	194	375	569	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' o/c	
Bottom Edge (Lu)	3' 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 3'	N/A	4.2	--	
1 - Uniform (PSF)	0 to 3'	6' 3"	20.0	40.0	UPPER FLOOR

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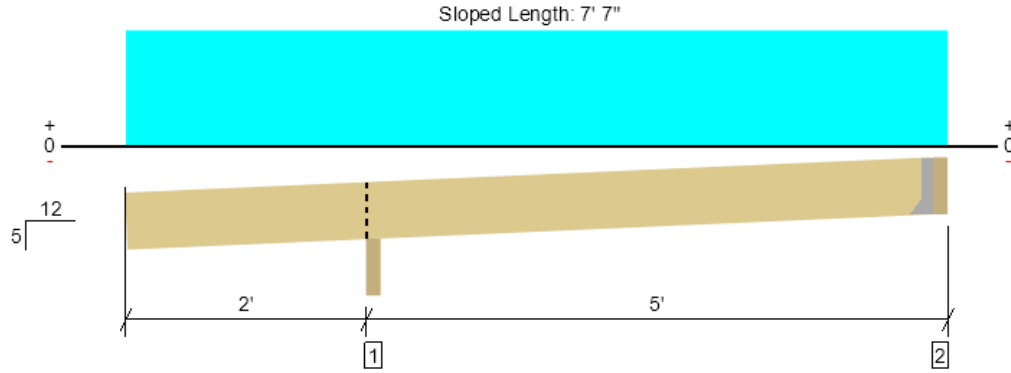
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MAIN, FRONT PORCH RAFTERS
1 piece(s) 4 x 6 DF No.2 @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	407 @ 2' 1 3/4"	8294 (3.50")	Passed (5%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	183 @ 2' 8 9/16"	2657	Passed (7%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-190 @ 2' 1 3/4"	2275	Passed (8%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.008 @ 0	0.232	Passed (2L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.009 @ 0	0.310	Passed (2L/999+)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 7' 5 1/2"
 System : Roof
 Member Type : Joist
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD
 Member Pitch : 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.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Factored	
1 - Beveled Plate - DF	3.50"	3.50"	1.50"	160	197	247	407	Blocking
2 - Hanger on 5 1/2" DF beam	3.50"	Hanger ¹	1.50"	66	93	116	183	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)	7' 3" o/c	
Bottom Edge (Lu)	7' 3" o/c	

- Maximum allowable bracing intervals based on applied load.
- Dimensions for lateral bracing intervals are measured along the length of the member for sloped conditions.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	U46X SLD22	2.00"	N/A	8-10dx1.5	4-10d	

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

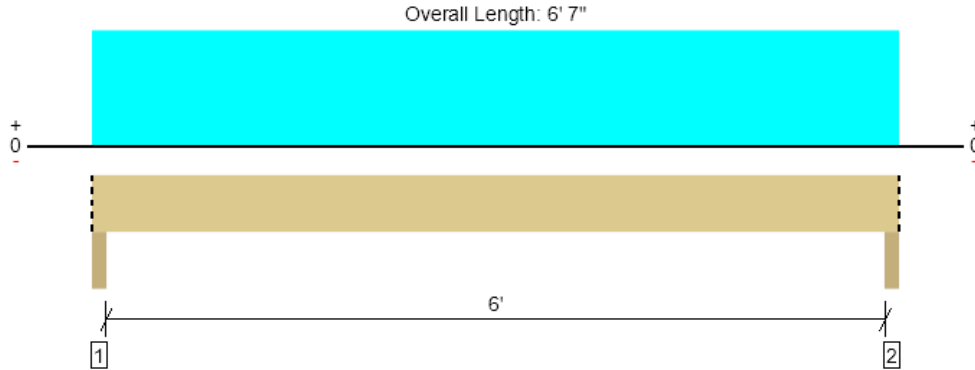
Vertical Load	Location (Side)	Spacing	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 7'	24"	15.0	20.0	25.0	ROOF

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MAIN, 6'-FRONT PORCH
1 piece(s) 6 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 (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	857 @ 2"	12031 (3.50")	Passed (7%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	619 @ 11"	5376	Passed (12%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1272 @ 3' 3 1/2"	3706	Passed (34%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.017 @ 3' 3 1/2"	0.208	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.036 @ 3' 3 1/2"	0.313	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 6' 7"
 System : Floor
 Member Type : Drop Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Roof Live	Snow	Factored	
1 - Column - SPF	3.50"	3.50"	1.50"	446	329	411	857	Blocking
2 - Column - SPF	3.50"	3.50"	1.50"	446	329	411	857	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' 7" o/c	
Bottom Edge (Lu)	6' 7" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 7"	N/A	10.4	--	--	
1 - Uniform (PSF)	0 to 6' 7" (Top)	5'	25.0	20.0	25.0	ROOF

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

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

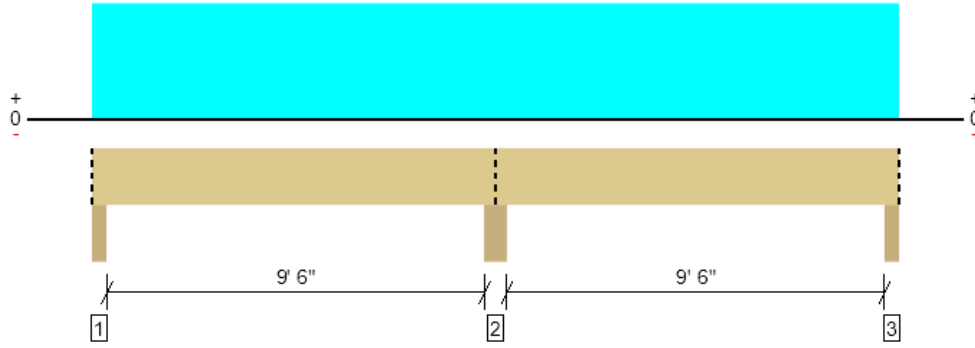
ForteWEB Software Operator	Job Notes
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MAIN FLOOR, FLOOR GIRDER, TYP.

1 piece(s) 4 x 8 DF No.2

Overall Length: 20' 1/2"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2050 @ 10' 1/4"	12031 (5.50")	Passed (17%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	886 @ 10' 10 1/4"	3045	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-2020 @ 10' 1/4"	2989	Passed (68%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.089 @ 15' 2 5/8"	0.328	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.119 @ 4' 8 3/16"	0.493	Passed (L/996)	--	1.0 D + 1.0 L (Alt Spans)

Member Length : 20' 1/2"
 System : Floor
 Member Type : Drop Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Factored	
1 - Ledger - SPF	3.50"	3.50"	1.50"	231	478/-66	708	Blocking
2 - Column - SPF	5.50"	5.50"	1.50"	736	1314	2050	Blocking
3 - Ledger - SPF	3.50"	3.50"	1.50"	231	478/-66	708	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	20' 1" o/c	
Bottom Edge (Lu)	20' 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 20' 1/2"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 20' 1/2" (Top)	2' 8"	20.0	40.0	Default Load

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

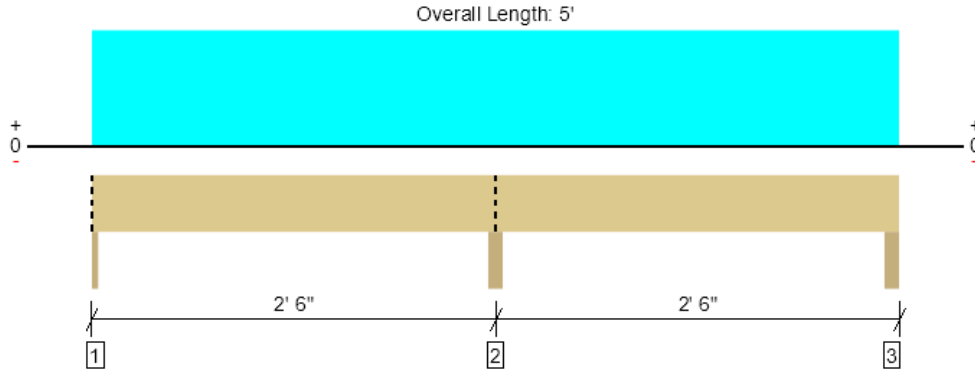
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MAIN FLOOR, FLOOR GIRDER, LOAD BEARING
1 piece(s) 4 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3081 @ 2' 6"	7656 (3.50")	Passed (40%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	808 @ 1' 9"	3045	Passed (27%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-747 @ 2' 6"	2989	Passed (25%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.002 @ 1' 1 13/16"	0.083	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.003 @ 1' 1 1/4"	0.125	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)

Member Length : 5'
 System : Floor
 Member Type : Drop Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Factored	
1 - Ledger - DF	1.50"	1.50"	1.50"	387	669/-81	1056	Blocking
2 - Column - DF	3.50"	3.50"	1.50"	1221	1860	3081	Blocking
3 - Column - DF	3.50"	3.50"	1.50"	412	733/-107	1145	None

• 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' o/c	
Bottom Edge (Lu)	5' 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 5'	N/A	6.4	--	
1 - Uniform (PSF)	0 to 5' (Front)	14' 3"	20.0	40.0	UPPER FLOOR
2 - Uniform (PSF)	0 to 5' (Front)	9'	10.0	--	WALL
3 - Uniform (PSF)	0 to 5' (Front)	1' 1 1/2"	20.0	40.0	MAIN FLOOR

• Side loads are assumed to not induce cross-grain tension.

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