PRRNSF20230919

City of Puyallup
Development & Permitting Services
ISSUED PERMIT
Building | Planning
Engineering | Public Works
Fire | Traffic

City of Puyallup
Building
ACCEPTED
JMontgomery
07/19/2023
12:39:32 PM

ENGINEERING ANALYSIS FOR: HC HOMES SITE:

REPORT REQUIRED TO BE PROVIDED BY THE PERMITTEE ON SITE FOR ALL INSPECTIONS

433 43RD AVE SW PUYALLUP, WA

ORIGINAL STAMP
MUST BE RED
TO BE VALID

TODD PHILLIPS
STATE OF WASHINGTON
30394
STRUCTURAL ENGINEER
PROFESSIONAL ENGINEER

4/5/2023

DATE:	PLAN NUMBER:		PHILLIPS STRUCTURAL ENGINEERING, PLLC P.O. BOX 108, MILTON, WA 98354 Phone (253) 344-1666	
APR. 5, 2023	43rd AVE DUPLEX			

STRUCTURAL ENGINEERING CALCULATIONS

PHILLIPS STRUCTURAL ENGINEERING

The enclosed documents are to be used in conjunction with the plans referenced on the cover page. It is imperative that the contractor study and understand the engineering requirements and any required changes to the architectural plan prior to start of work. Modifications may include additional foundations or footings, beam and framing size, sheathing, etc.

Scope of Engineering: Engineering analysis and design to resist lateral and gravity loads in accordance with the 2018 IBC have been performed and incorporated into stamped "S" sheets. All analyses and calculations are included in this engineering report (see 8½x11 pages). Engineering assumptions are listed below. If the conditions listed below are not present at the site, all calculations and stamped drawings are void and *Phillips Structural Engineering* must be contacted immediately for further consultation.

STRUCTURAL DESIGN CRITERIA AND LOADING:

Building Code 2018 International Building Code (IBC)

EARTHQUAKE DESIGN DATA:

-Risk Category = II
- Seismic Importance Factor (Ie) = 1.0
- Mapped Spectral Response Acceleration Parameters
  - Ss = 1.26
  - S_1 = 0.44
- Seismic Design Category (SDC) = "D"
- Basic Seismic Force-Resisting System = Light-frame (wood) walls sheathed with wood structural panel rated for shear resistance
- Response Modification Factor (R) = 6.5
- Analysis Procedure Used = Equivalent Lateral Force

WIND DESIGN DATA:

- Basic Design Wind Speed (V) = 110 MPH
- Allowable Stress Design Wind Speed (Vasd) = 85 MPH
- Risk Category = II
- Wind Importance Factor (Iw) = 1.0
- Wind Exposure = "B"
- Topographical Effect (Kzt) = 1.00

ROOF LOADING:

- Dead Load = 15 PSF (No tile weight included)
- Roof Live Load (Lr) = 20PSF
- Typical Flat Roof Snow Load (Pf) = 25PSF
- Snow Exposure Factor (Ce) = 1.0
- Snow Load Importance Factor (Is) = 1.0

**Typical roof snow load shall not be less than 25PSF

FLOOR LOADING:

- Dead Load = 12 PSF (Standard wood framing without heavy finish)
- Typical Residential Occupancy Live Loading (L) = 40PSF
- Deck Live Load (L) = 60PSF (1.5x for area served)

SOILS CRITERIA

Soils Consultant	None (U.N.O.)
Soils Report #	None (U.N.O.)
Minimum Allowable Pressure Required	1500 PSF (Verify w/ Site Conditions)
Frost Bearing Depth	18"

* See plans/detailing for other soils considerations

PRRNSF20230919

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

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

City of Puyallup
Development & Permitting Services
ISSUED PERMIT
Building | Planning
Engineering | Public Works
Fire | Traffic

Hazards by Location

Search Information

Address: 409 43rd Ave SW, Puyallup, WA 98373, USA

Coordinates: 47.15146399999999, -122.297448

Elevation: 440 ft

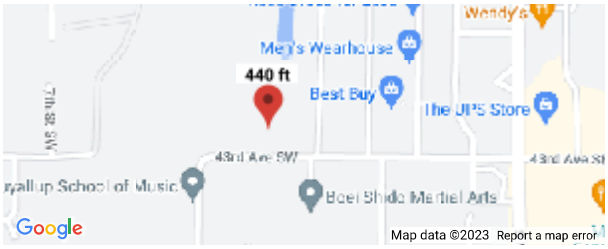
Timestamp: 2023-03-29T19:35:50.651Z

Hazard Type: Seismic

Reference Document: ASCE7-16

Risk Category: II

Site Class: D-default



Basic Parameters

Name	Value	Description
S_S	1.262	MCE_R ground motion (period=0.2s)
S_1	0.436	MCE_R ground motion (period=1.0s)
S_{MS}	1.515	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	1.01	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA

* See Section 11.4.8

Additional Information

Name	Value	Description
SDC	* null	Seismic design category
F_a	1.2	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s
CR_S	0.914	Coefficient of risk (0.2s)
CR_1	0.898	Coefficient of risk (1.0s)
PGA	0.5	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.6	Site modified peak ground acceleration
T_L	6	Long-period transition period (s)
SsRT	1.262	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.381	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.5	Factored deterministic acceleration value (0.2s)
S1RT	0.436	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.485	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.6	Factored deterministic acceleration value (1.0s)
PGAd	0.5	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

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

Please note that the ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

Disclaimer

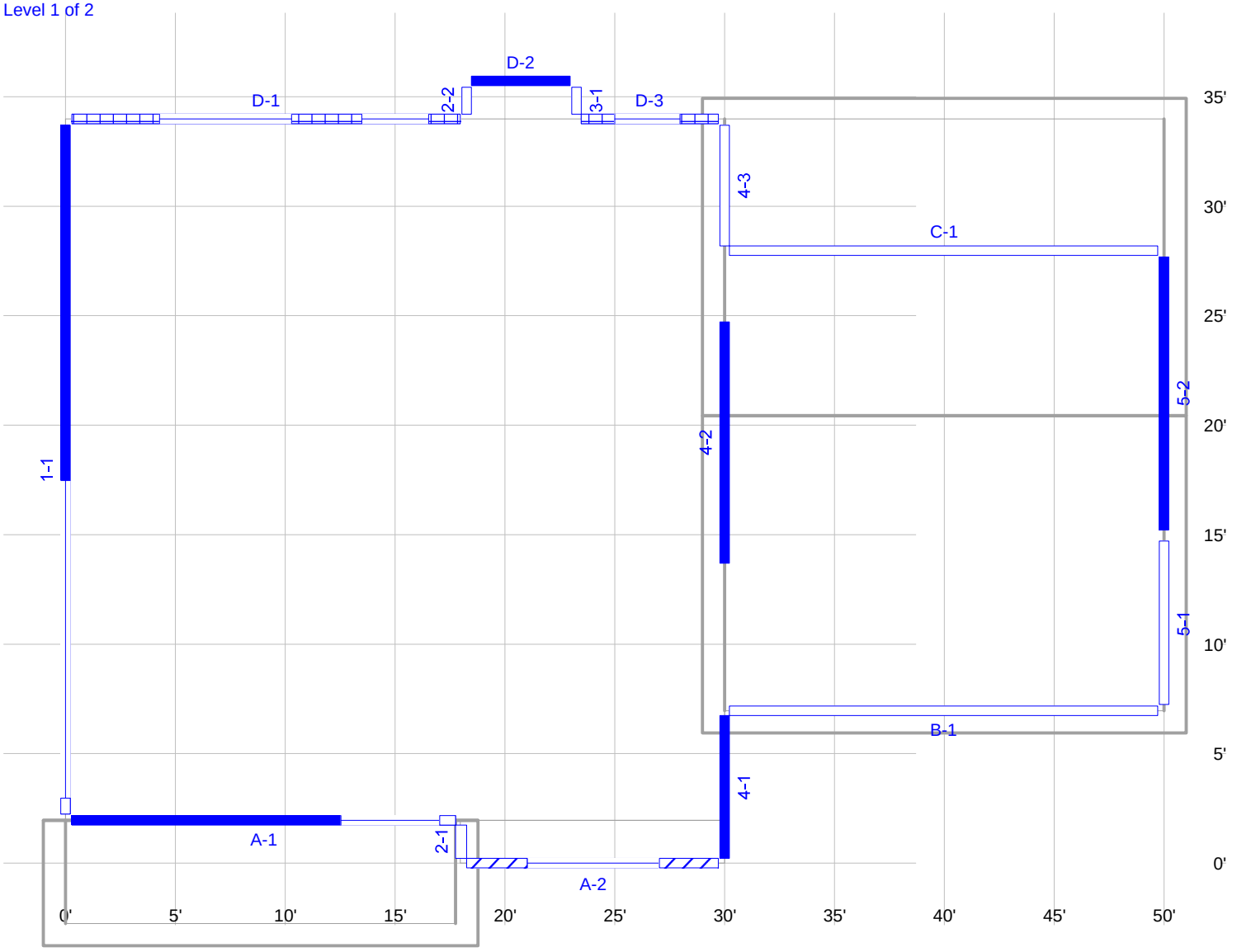
Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

While the information presented on this website is believed to be correct, ATC and its sponsors and contributors assume no responsibility or liability for its accuracy. The material presented in the report should not be used or relied upon for any specific application without competent examination and verification of its accuracy, suitability and applicability by engineers or other licensed professionals. ATC does not intend that the use of this information replace the sound judgment of such competent professionals, having experience and knowledge in the field of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the results of the report provided by this website. Users of the information from this website assume all liability arising from such use. Use of the output of this website does not imply approval by the governing building code bodies responsible for building code approval and interpretation for the building site described by latitude/longitude location in the report.

WoodWorks® Shearwalls

SOFTWARE FOR WOOD DESIGN

Level 1 of 2

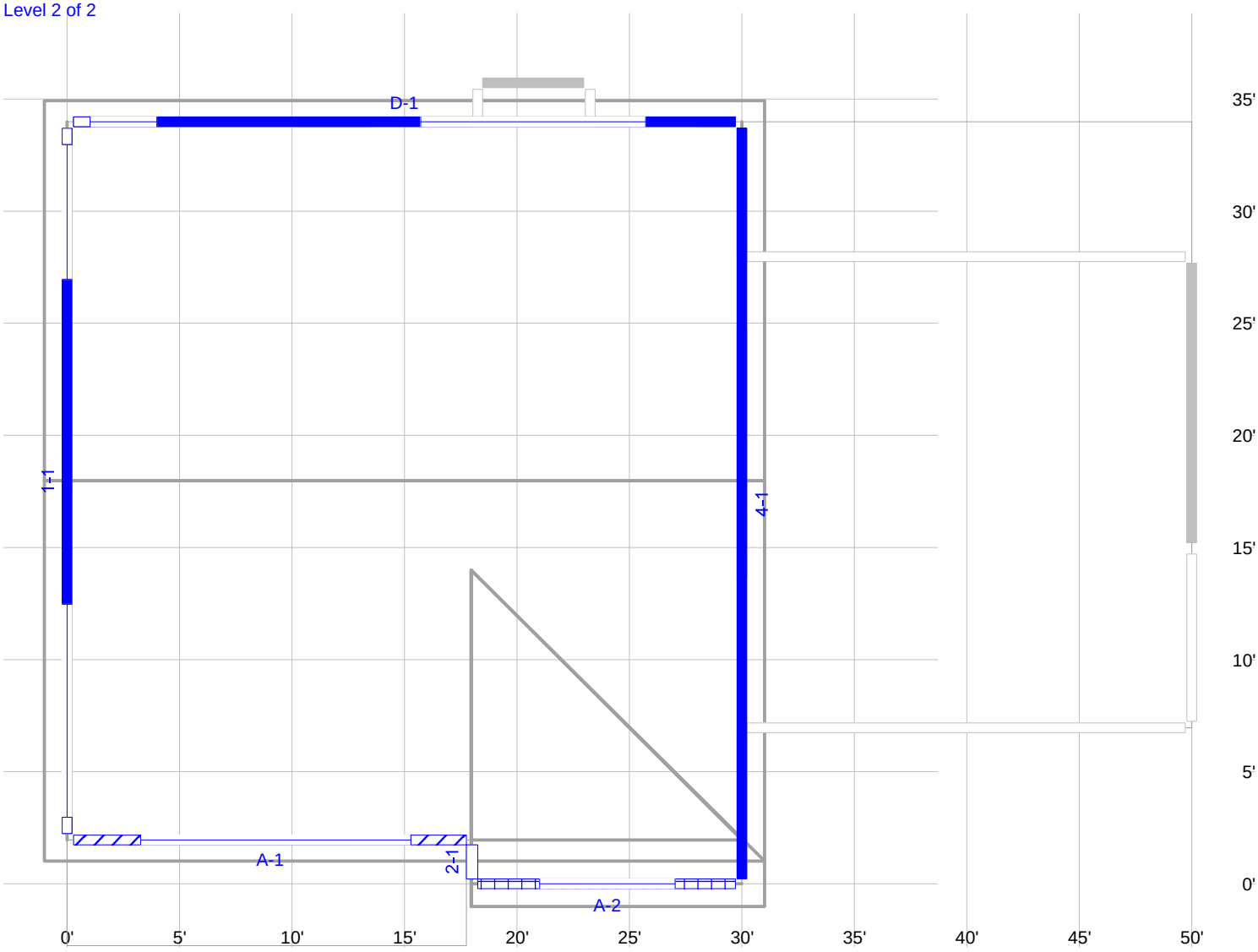


Segmented | Perforated | Force-transfer | Non-shearwall | Aspect factor | Orange = Selected wall(s)

WoodWorks® Shearwalls

SOFTWARE FOR WOOD DESIGN

Level 2 of 2



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

WoodWorks® Shearwalls — SOFTWARE FOR WOOD DESIGN

WoodWorks® Shearwalls 2019 (Update 3)

43rd Ave Duplex - SHEAR.wsw — **Mar. 29, 2023 14:14:48**

Project Information

COMPANY AND PROJECT INFORMATION

Company	Project
Phillips Structural Engineering PO Box 108 Milton, WA 98354	

DESIGN SETTINGS

Design Code	Wind Standard	Seismic Standard
IBC 2018/AWC SDPWS 2015	ASCE 7-16 Directional (All heights)	ASCE 7-16

Load Combinations

For Design (ASD)	For Deflection (Strength)
0.70 Seismic	1.00 Seismic
0.60 Wind	1.00 Wind

Building Code Capacity Modification

Wind	Seismic
1.00	1.00

Service Conditions and Load Duration

Duration Factor	Temperature Range	Moisture Content Fabrication	Moisture Content Service
-	-	-	-

Max Shearwall Offset [ft]

Plan (within story)	Elevation (between stories)
4.00	3.75

Maximum Height-to-width Ratio

Wood panels Wind	Wood panels Seismic	Fiberboard	Lumber Wind	Lumber Seismic	Gypsum Blocked	Gypsum Unblocked
3.5	3.5	-	-	-	-	-

Ignore non-wood-panel shear resistance contribution...

Wind	Seismic
Never	Always

Forces based on...

Hold-downs	Applied loads
Drag struts	Applied loads

Shearwall relative rigidity:	Wall capacity
Perforated shearwall Co factor:	SDPWS Equation 4.3-5
Non-identical materials and construction on the shearline:	Not allowed
Deflection Equation:	No deflection analysis
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)

Design Wind Speed	110 mph
Serviceability Wind Speed	100 mph
Exposure	Exposure B
Enclosure	Partially enclosed
Min Wind Loads: Walls	16 psf
Roofs	8 psf

Topographic Information [ft]

Shape	Height	Length
-	-	-

Site Location: -

Elev: 0ft
Rigid building - Static analysis

Case 2	E-W loads	N-S loads
Eccentricity (%)	15	15
Loaded at	75%	

Seismic — ASCE 7-16 12.8 Equivalent Lateral Force Procedure

Risk Category	Category II - All others
Structure Type	Regular
Building System	Bearing Wall
Design Category	D
Site Class	D

Spectral Response Acceleration

S1: 0.440g **Ss:** 1.260g

Fundamental Period	E-W	N-S
T Used	0.202s	0.202s
Approximate Ta	0.202s	0.202s
Maximum T	0.283s	0.283s
Response Factor R	6.50	6.50

Fa: 1.20 **Fv:** 1.86

Structural Data

STORY INFORMATION

	Story Elev [ft]	Floor/Ceiling Depth [in]	Wall Height [ft]
Ceiling	21.44	0.0	
Level 2	13.44	1'-6.0	8.00
Level 1	2.94	11.3	9.00
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	23.0	1.00
Extent X,Y =	30.00	32.00	**South**	Side	23.0	1.00
Ridge Y Location, Offset	18.00	0.00	**East**	Gable	90.0	1.00
Ridge Elevation, Height	28.23	6.79	**West**	Gable	90.0	1.00
Block 2	2 Story	N-S Ridge				
Location X,Y =	18.00	0.00	**North**	Joined	157.0	1.00
Extent X,Y =	12.00	2.00	**South**	Gable	90.0	1.00
Ridge X Location, Offset	18.00	-6.00	**East**	Side	23.0	1.00
Ridge Elevation, Height	26.53	5.09	**West**	Side	90.0	1.00
Block 3	1 Story	E-W Ridge				
Location X,Y =	30.00	7.00	**North**	Side	27.0	1.00
Extent X,Y =	20.00	27.00	**South**	Side	27.0	1.00
Ridge Y Location, Offset	20.50	0.00	**East**	Gable	90.0	1.00
Ridge Elevation, Height	20.32	6.88	**West**	Gable	90.0	1.00
Block 4	1 Story	E-W Ridge				
Location X,Y =	0.00	-2.75	**North**	Side	90.0	1.00
Extent X,Y =	17.75	4.75	**South**	Side	23.0	1.00
Ridge Y Location, Offset	2.00	2.38	**East**	Gable	90.0	1.00
Ridge Elevation, Height	15.45	2.02	**West**	Gable	90.0	1.00

SHEATHING MATERIALS by WALL GROUP

Grp	Surf	Material	Sheathing Ratng	Thick in	GU in	Ply	Or	Gvtv lbs/in	Fasteners Size	Type	Df	Eg in	Fd in	Bk	Apply Notes
1	Ext	Struct Sh OSB	24/16	7/16	-	-	Vert	83500	8d	Nail	N	6	12	Y	1,3
2	Ext	Struct Sh OSB	24/16	7/16	-	-	Vert	83500	8d	Nail	N	4	12	Y	1,2,3

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:
1.Capacity has been reduced for framing specific gravity according to SDPWS T4.3A Note 3.
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	Hem-Fir	No.2	1.50	5.50	16	0.43	1.30	
2	Hem-Fir	No.2	1.50	5.50	16	0.43	1.30	

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.

SHEARLINE, WALL and OPENING DIMENSIONS

North-south Shearlines	Type	Wall Group	Location X [ft]	Extent [ft] Start	Extent [ft] End	Length [ft]	FHS [ft]	Aspect Ratio	Height [ft]
Line 1									
Level 2									
Line 1		1	0.00	2.00	34.00	32.00	14.50	-	8.00
Wall 1-1	Seg	1	0.00	2.00	34.00	32.00	14.50	-	-
Segment 1		-	-	2.00	3.00	1.00	-	8.00	-
Opening 1		-	-	3.00	12.50	9.50	-	-	4.00
Segment 2		-	-	12.50	27.00	14.50	-	0.55	-
Opening 2		-	-	27.00	33.00	6.00	-	-	4.00
Segment 3		-	-	33.00	34.00	1.00	-	8.00	-
Level 1									
Line 1		1	0.00	2.00	34.00	32.00	16.50	-	9.00
Wall 1-1	Seg	1	0.00	2.00	34.00	32.00	16.50	-	-
Segment 1		-	-	2.00	3.00	1.00	-	9.00	-
Opening 1		-	-	3.00	17.50	14.50	-	-	4.00
Segment 2		-	-	17.50	34.00	16.50	-	0.55	-
Line 2									
Level 2									
Line 2	NSW		18.00	0.00	35.75	35.75	0.00	-	8.00
Wall 2-1	NSW		18.00	0.00	2.00	2.00	0.00	1.00	-
Level 1									
Line 2			18.00	0.00	35.75	35.75	0.00	-	9.00
Wall 2-1	NSW		18.00	0.00	2.00	2.00	0.00	1.00	-
Wall 2-2	NSW		18.25	34.00	35.75	1.75	0.00	1.00	-
Line 3									
Level 1									
Line 3	NSW		23.25	34.00	35.75	1.75	0.00	-	9.00
Wall 3-1	NSW		23.25	34.00	35.75	1.75	0.00	1.00	-
Line 4									
Level 2									
Line 4	Seg	1	30.00	0.00	34.00	34.00	34.00	-	8.00
Wall 4-1	Seg	1	30.00	0.00	34.00	34.00	34.00	0.24	-
Level 1									
Line 4		1	30.00	0.00	28.00	28.00	18.50	-	9.00
Wall 4-1	Seg	1	30.00	0.00	7.00	7.00	7.00	1.29	-
Wall 4-2	Seg	1	30.00	13.50	25.00	11.50	11.50	0.78	-
Wall 4-3	NSW		30.00	28.00	34.00	6.00	0.00	1.00	-
Line 5									
Level 1									
Line 5		1	50.00	7.00	28.00	21.00	13.00	-	9.00
Wall 5-1	NSW		50.00	7.00	15.00	8.00	0.00	1.00	-
Wall 5-2	Seg	1	50.00	15.00	28.00	13.00	13.00	0.69	-

East-west Shearlines	Type	Wall Group	Location Y [ft]	Extent [ft] Start	Extent [ft] End	Length [ft]	FHS [ft]	Aspect Ratio	Height [ft]
Line A									
Level 2									
Line A		1	1.20	0.00	30.00	30.00	18.00	-	8.00
Wall A-1	Seg	1	2.00	0.00	18.00	18.00	6.00	-	-
Segment 1		-	-	0.00	3.25	3.25	-	2.46	-
Opening 1		-	-	3.25	15.25	12.00	-	-	4.00
Segment 2		-	-	15.25	18.00	2.75	-	2.91	-
Wall A-2	FT	1	0.00	18.00	30.00	12.00	12.00	-	-
Segment 1		-	-	18.00	21.00	3.00	-	1.33	-
Opening 1		-	-	21.00	27.00	6.00	-	-	4.00
Segment 2		-	-	27.00	30.00	3.00	-	1.33	-
Level 1									
Line A		1	1.20	0.00	30.00	30.00	18.50	-	9.00
Wall A-1	Seg	1	2.00	0.00	18.00	18.00	12.50	-	-
Segment 1		-	-	0.00	12.50	12.50	-	0.72	-
Opening 1		-	-	12.50	17.00	4.50	-	-	4.00
Segment 2		-	-	17.00	18.00	1.00	-	9.00	-
Wall A-2	Seg	1	0.00	18.00	30.00	12.00	6.00	-	-
Segment 1		-	-	18.00	21.00	3.00	-	3.00	-
Opening 1		-	-	21.00	27.00	6.00	-	-	5.00
Segment 2		-	-	27.00	30.00	3.00	-	3.00	-
Line B									
Level 1									
Line B	NSW		7.00	30.00	50.00	20.00	0.00	-	9.00
Wall B-1	NSW		7.00	30.00	50.00	20.00	0.00	1.00	-
Line C									

SHEARLINE, WALL and OPENING DIMENSIONS (continued)

Level 1									
Line C	NSW		28.00	30.00	50.00	20.00	0.00	-	9.00
Wall C-1	NSW		28.00	30.00	50.00	20.00	0.00	1.00	-
Line D									
Level 2									
Line D		1	34.00	0.00	30.00	30.00	16.00	-	8.00
Wall D-1	Seg	1	34.00	0.00	30.00	30.00	16.00	-	-
Segment 1		-	-	0.00	1.00	1.00	-	8.00	-
Opening 1		-	-	1.00	4.00	3.00	-	-	4.00
Segment 2		-	-	4.00	15.75	11.75	-	0.68	-
Opening 2		-	-	15.75	25.75	10.00	-	-	4.00
Segment 3		-	-	25.75	30.00	4.25	-	1.88	-
Level 1									
Line D		2	34.29	0.00	30.00	30.00	30.00	-	9.00
Wall D-1	FT	2	34.00	0.00	18.25	18.25	18.25	-	-
Segment 1		-	-	0.00	4.25	4.25	-	1.18	-
Opening 1		-	-	4.25	10.25	6.00	-	-	5.00
Segment 2		-	-	10.25	13.50	3.25	-	1.54	-
Opening 2		-	-	13.50	16.50	3.00	-	-	5.00
Segment 3		-	-	16.50	18.25	1.75	-	2.86	-
Wall D-2	Seg	2	35.75	18.25	23.25	5.00	5.00	1.80	-
Wall D-3	FT	2	34.00	23.25	30.00	6.75	6.75	-	-
Segment 1		-	-	23.25	25.00	1.75	-	2.86	-
Opening 1		-	-	25.00	28.00	3.00	-	-	5.00
Segment 2		-	-	28.00	30.00	2.00	-	2.50	-

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 Li defined in SDPWS 4.3.4.3
Aspect Ratio – Ratio of wall height to segment length (h/bs), 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.

Loads

WIND SHEAR LOADS (as entered or generated)

Level 2 Block	F	Element	Load Case	Wnd Dir	Surf Dir	Prof	Location [ft] Start	Location [ft] End	Magnitude [lbs,plf,psf] Start	Magnitude [lbs,plf,psf] End	Trib Ht [ft]
Block 1	W	Wall	1	W->E	Wind	Line	0.00	2.00	44.3		
Block 1	W	Wall	Min	W->E	Wind	Line	0.00	2.00	32.0		
Block 1	W	L Gable	Min	W->E	Wind	Line	2.00	18.00	0.0	54.3	
Block 1	W	Wall	1	W->E	Wind	Line	2.00	34.00	44.3		
Block 1	W	Wall	Min	W->E	Wind	Line	2.00	34.00	32.0		
Block 1	W	L Gable	1	W->E	Wind	Line	2.00	18.00	0.0	79.6	
Block 1	W	R Gable	1	W->E	Wind	Line	18.00	34.00	79.6	0.0	
Block 1	W	R Gable	Min	W->E	Wind	Line	18.00	34.00	54.3	0.0	
Block 1	E	Wall	1	W->E	Lee	Line	0.00	34.00	29.7		
Block 1	E	Wall	Min	W->E	Lee	Line	0.00	34.00	32.0		
Block 1	E	L Gable	1	W->E	Lee	Line	2.00	18.00	0.0	50.4	
Block 1	E	L Gable	Min	W->E	Lee	Line	2.00	18.00	0.0	54.3	
Block 1	E	R Gable	Min	W->E	Lee	Line	18.00	34.00	54.3	0.0	
Block 1	E	R Gable	1	W->E	Lee	Line	18.00	34.00	50.4	0.0	
Block 1	W	Wall	1	E->W	Lee	Line	0.00	2.00	29.7		
Block 1	W	Wall	Min	E->W	Lee	Line	0.00	2.00	32.0		
Block 1	W	L Gable	Min	E->W	Lee	Line	2.00	18.00	0.0	54.3	
Block 1	W	L Gable	1	E->W	Lee	Line	2.00	18.00	0.0	50.4	
Block 1	W	Wall	Min	E->W	Lee	Line	2.00	34.00	32.0		
Block 1	W	Wall	1	E->W	Lee	Line	2.00	34.00	29.7		
Block 1	W	R Gable	1	E->W	Lee	Line	18.00	34.00	50.4	0.0	
Block 1	W	R Gable	Min	E->W	Lee	Line	18.00	34.00	54.3	0.0	
Block 1	E	Wall	1	E->W	Wind	Line	0.00	34.00	44.3		
Block 1	E	Wall	Min	E->W	Wind	Line	0.00	34.00	32.0		
Block 1	E	L Gable	Min	E->W	Wind	Line	2.00	18.00	0.0	54.3	
Block 1	E	L Gable	1	E->W	Wind	Line	2.00	18.00	0.0	79.6	
Block 1	E	R Gable	Min	E->W	Wind	Line	18.00	34.00	54.3	0.0	
Block 1	E	R Gable	1	E->W	Wind	Line	18.00	34.00	79.6	0.0	
Block 1	S	Roof	1	S->N	Wind	Line	-1.00	31.00	1.5		
Block 1	S	Roof	Min	S->N	Wind	Line	-1.00	31.00	28.9		
Block 1	S	Wall	Min	S->N	Wind	Line	0.00	18.00	32.0		
Block 1	S	Wall	1	S->N	Wind	Line	0.00	18.00	44.3		
Block 1	S	Wall	Min	S->N	Wind	Line	18.00	30.00	32.0		
Block 1	S	Wall	1	S->N	Wind	Line	18.00	30.00	44.3		
Block 1	N	Roof	Min	S->N	Lee	Line	-1.00	31.00	28.9		
Block 1	N	Roof	1	S->N	Lee	Line	-1.00	31.00	64.3		
Block 1	N	Wall	Min	S->N	Lee	Line	0.00	30.00	32.0		
Block 1	N	Wall	1	S->N	Lee	Line	0.00	30.00	28.9		
Block 1	S	Roof	1	N->S	Lee	Line	-1.00	31.00	64.3		
Block 1	S	Roof	Min	N->S	Lee	Line	-1.00	31.00	28.9		
Block 1	S	Wall	Min	N->S	Lee	Line	0.00	18.00	32.0		
Block 1	S	Wall	1	N->S	Lee	Line	0.00	18.00	28.9		
Block 1	S	Wall	Min	N->S	Lee	Line	18.00	30.00	32.0		
Block 1	S	Wall	1	N->S	Lee	Line	18.00	30.00	28.9		
Block 1	N	Roof	1	N->S	Wind	Line	-1.00	31.00	1.5		
Block 1	N	Roof	Min	N->S	Wind	Line	-1.00	31.00	28.9		
Block 1	N	Wall	1	N->S	Wind	Line	0.00	30.00	44.3		
Block 1	N	Wall	Min	N->S	Wind	Line	0.00	30.00	32.0		
Block 2	W	Ctr Roof	Min	W->E	Wind	Line	-1.00	2.00	8.0		
Block 2	W	Ctr Roof	1	W->E	Wind	Line	-1.00	2.00	59.9		
Block 2	W	R Roof	Min	W->E	Wind	Line	2.00	14.00	8.0	0.0	
Block 2	W	R Roof	1	W->E	Wind	Line	2.00	14.00	59.9	0.0	
Block 2	E	Ctr Roof	Min	W->E	Lee	Line	-1.00	1.00	22.1		
Block 2	E	R Roof	Min	W->E	Lee	Line	1.00	14.00	22.1	0.0	
Block 2	W	Ctr Roof	Min	E->W	Lee	Line	-1.00	2.00	8.0		
Block 2	W	Ctr Roof	1	E->W	Lee	Line	-1.00	2.00	45.0		
Block 2	W	R Roof	Min	E->W	Lee	Line	2.00	14.00	8.0	0.0	
Block 2	W	R Roof	1	E->W	Lee	Line	2.00	14.00	45.0	0.0	
Block 2	E	Ctr Roof	Min	E->W	Wind	Line	-1.00	1.00	22.1		
Block 2	E	R Roof	Min	E->W	Wind	Line	1.00	14.00	22.1	0.0	
Block 2	S	R Gable	1	S->N	Wind	Line	18.00	30.00	59.3	0.0	
Block 2	S	R Gable	Min	S->N	Wind	Line	18.00	30.00	40.7	0.0	
Block 2	S	R Gable	1	N->S	Lee	Line	18.00	30.00	37.5	0.0	
Block 2	S	R Gable	Min	N->S	Lee	Line	18.00	30.00	40.7	0.0	

Level 1 Block	F	Element	Load Case	Wnd Dir	Surf Dir	Prof	Location [ft] Start	Location [ft] End	Magnitude [lbs,plf,psf] Start	Magnitude [lbs,plf,psf] End	Trib Ht [ft]

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

Block 1	W	Wall	Min	W->E	Wind	Line	0.00	2.00	32.0
Block 1	W	Wall	1	W->E	Wind	Line	0.00	2.00	41.7
Block 1	W	Wall	1	W->E	Wind	Line	0.00	2.00	61.7
Block 1	W	Wall	Min	W->E	Wind	Line	0.00	2.00	48.0
Block 1	W	Wall	Min	W->E	Wind	Line	2.00	34.00	48.0
Block 1	W	Wall	Min	W->E	Wind	Line	2.00	34.00	32.0
Block 1	W	Wall	1	W->E	Wind	Line	2.00	34.00	41.7
Block 1	W	Wall	1	W->E	Wind	Line	2.00	34.00	61.7
Block 1	W	Wall	Min	W->E	Wind	Line	34.00	35.75	48.0
Block 1	W	Wall	1	W->E	Wind	Line	34.00	35.75	61.7
Block 1	E	Wall	Min	W->E	Lee	Line	0.00	34.00	32.0
Block 1	E	Wall	1	W->E	Lee	Line	0.00	7.00	44.6
Block 1	E	Wall	1	W->E	Lee	Line	0.00	34.00	29.7
Block 1	E	Wall	Min	W->E	Lee	Line	0.00	7.00	48.0
Block 1	E	Wall	Min	W->E	Lee	Line	7.00	28.00	48.0
Block 1	E	Wall	1	W->E	Lee	Line	7.00	28.00	44.6
Block 1	E	Wall	1	W->E	Lee	Line	28.00	34.00	44.6
Block 1	E	Wall	Min	W->E	Lee	Line	28.00	34.00	48.0
Block 1	E	Wall	1	W->E	Lee	Line	34.00	35.75	44.6
Block 1	E	Wall	Min	W->E	Lee	Line	34.00	35.75	48.0
Block 1	W	Wall	1	E->W	Lee	Line	0.00	2.00	29.7
Block 1	W	Wall	Min	E->W	Lee	Line	0.00	2.00	48.0
Block 1	W	Wall	Min	E->W	Lee	Line	0.00	2.00	32.0
Block 1	W	Wall	1	E->W	Lee	Line	0.00	2.00	44.6
Block 1	W	Wall	1	E->W	Lee	Line	2.00	34.00	29.7
Block 1	W	Wall	Min	E->W	Lee	Line	2.00	34.00	32.0
Block 1	W	Wall	1	E->W	Lee	Line	2.00	34.00	44.6
Block 1	W	Wall	Min	E->W	Lee	Line	2.00	34.00	48.0
Block 1	W	Wall	Min	E->W	Lee	Line	34.00	35.75	48.0
Block 1	W	Wall	1	E->W	Lee	Line	34.00	35.75	44.6
Block 1	E	Wall	1	E->W	Wind	Line	0.00	7.00	61.7
Block 1	E	Wall	Min	E->W	Wind	Line	0.00	34.00	32.0
Block 1	E	Wall	1	E->W	Wind	Line	0.00	34.00	41.7
Block 1	E	Wall	Min	E->W	Wind	Line	0.00	7.00	48.0
Block 1	E	Wall	Min	E->W	Wind	Line	7.00	28.00	48.0
Block 1	E	Wall	1	E->W	Wind	Line	7.00	28.00	61.7
Block 1	E	Wall	1	E->W	Wind	Line	28.00	34.00	61.7
Block 1	E	Wall	Min	E->W	Wind	Line	28.00	34.00	48.0
Block 1	E	Wall	1	E->W	Wind	Line	34.00	35.75	61.7
Block 1	E	Wall	Min	E->W	Wind	Line	34.00	35.75	48.0
Block 1	S	Wall	Min	S->N	Wind	Line	0.00	18.00	32.0
Block 1	S	Wall	1	S->N	Wind	Line	0.00	18.00	61.7
Block 1	S	Wall	1	S->N	Wind	Line	0.00	18.00	41.7
Block 1	S	Wall	Min	S->N	Wind	Line	0.00	18.00	48.0
Block 1	S	Wall	1	S->N	Wind	Line	18.00	30.00	61.7
Block 1	S	Wall	Min	S->N	Wind	Line	18.00	30.00	32.0
Block 1	S	Wall	1	S->N	Wind	Line	18.00	30.00	41.7
Block 1	S	Wall	Min	S->N	Wind	Line	18.00	30.00	48.0
Block 1	S	Wall	Min	S->N	Wind	Line	30.00	50.00	48.0
Block 1	S	Wall	1	S->N	Wind	Line	30.00	50.00	61.7
Block 1	N	Wall	1	S->N	Lee	Line	0.00	18.25	43.4
Block 1	N	Wall	Min	S->N	Lee	Line	0.00	30.00	32.0
Block 1	N	Wall	1	S->N	Lee	Line	0.00	30.00	28.9
Block 1	N	Wall	Min	S->N	Lee	Line	0.00	18.25	48.0
Block 1	N	Wall	Min	S->N	Lee	Line	18.25	23.25	48.0
Block 1	N	Wall	1	S->N	Lee	Line	18.25	23.25	43.4
Block 1	N	Wall	Min	S->N	Lee	Line	23.25	30.00	48.0
Block 1	N	Wall	1	S->N	Lee	Line	23.25	30.00	43.4
Block 1	N	Wall	1	S->N	Lee	Line	30.00	50.00	43.4
Block 1	N	Wall	Min	S->N	Lee	Line	30.00	50.00	48.0
Block 1	S	Wall	Min	N->S	Lee	Line	0.00	18.00	48.0
Block 1	S	Wall	1	N->S	Lee	Line	0.00	18.00	43.4
Block 1	S	Wall	Min	N->S	Lee	Line	0.00	18.00	32.0
Block 1	S	Wall	1	N->S	Lee	Line	0.00	18.00	28.9
Block 1	S	Wall	1	N->S	Lee	Line	18.00	30.00	28.9
Block 1	S	Wall	Min	N->S	Lee	Line	18.00	30.00	32.0
Block 1	S	Wall	Min	N->S	Lee	Line	18.00	30.00	48.0
Block 1	S	Wall	1	N->S	Lee	Line	18.00	30.00	43.4
Block 1	S	Wall	1	N->S	Lee	Line	30.00	50.00	43.4
Block 1	S	Wall	Min	N->S	Lee	Line	30.00	50.00	48.0
Block 1	N	Wall	Min	N->S	Wind	Line	0.00	30.00	32.0
Block 1	N	Wall	1	N->S	Wind	Line	0.00	18.25	61.7

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

Block 1	N	Wall	Min	N->S	Wind	Line	0.00	18.25	48.0	
Block 1	N	Wall	1	N->S	Wind	Line	0.00	30.00	41.7	
Block 1	N	Wall	1	N->S	Wind	Line	18.25	23.25	61.7	
Block 1	N	Wall	Min	N->S	Wind	Line	18.25	23.25	48.0	
Block 1	N	Wall	Min	N->S	Wind	Line	23.25	30.00	48.0	
Block 1	N	Wall	1	N->S	Wind	Line	23.25	30.00	61.7	
Block 1	N	Wall	1	N->S	Wind	Line	30.00	50.00	61.7	
Block 1	N	Wall	Min	N->S	Wind	Line	30.00	50.00	48.0	
Block 3	W	L Gable	1	W->E	Wind	Line	7.00	20.50	0.0	72.1
Block 3	W	L Gable	Min	W->E	Wind	Line	7.00	20.50	0.0	55.0
Block 3	W	R Gable	1	W->E	Wind	Line	20.50	34.00	72.1	0.0
Block 3	W	R Gable	Min	W->E	Wind	Line	20.50	34.00	55.0	0.0
Block 3	E	L Gable	Min	W->E	Lee	Line	7.00	20.50	0.0	55.0
Block 3	E	L Gable	1	W->E	Lee	Line	7.00	20.50	0.0	45.8
Block 3	E	R Gable	1	W->E	Lee	Line	20.50	34.00	45.8	0.0
Block 3	E	R Gable	Min	W->E	Lee	Line	20.50	34.00	55.0	0.0
Block 3	W	L Gable	Min	E->W	Lee	Line	7.00	20.50	0.0	55.0
Block 3	W	L Gable	1	E->W	Lee	Line	7.00	20.50	0.0	45.8
Block 3	W	R Gable	Min	E->W	Lee	Line	20.50	34.00	55.0	0.0
Block 3	W	R Gable	1	E->W	Lee	Line	20.50	34.00	45.8	0.0
Block 3	E	L Gable	Min	E->W	Wind	Line	7.00	20.50	0.0	55.0
Block 3	E	L Gable	1	E->W	Wind	Line	7.00	20.50	0.0	72.1
Block 3	E	R Gable	Min	E->W	Wind	Line	20.50	34.00	55.0	0.0
Block 3	E	R Gable	1	E->W	Wind	Line	20.50	34.00	72.1	0.0
Block 3	S	Roof	Min	S->N	Wind	Line	29.00	51.00	29.6	
Block 3	S	Roof	1	S->N	Wind	Line	29.00	51.00	16.7	
Block 3	N	Roof	Min	S->N	Lee	Line	29.00	51.00	29.6	
Block 3	N	Roof	1	S->N	Lee	Line	29.00	51.00	59.0	
Block 3	S	Roof	1	N->S	Lee	Line	29.00	51.00	59.0	
Block 3	S	Roof	Min	N->S	Lee	Line	29.00	51.00	29.6	
Block 3	N	Roof	Min	N->S	Wind	Line	29.00	51.00	29.6	
Block 3	N	Roof	1	N->S	Wind	Line	29.00	51.00	16.7	
Block 4	W	L Gable	Min	W->E	Wind	Line	-2.75	2.00	0.0	16.1
Block 4	W	L Gable	1	W->E	Wind	Line	-2.75	2.00	0.0	20.7
Block 4	E	L Gable	Min	W->E	Lee	Line	-2.75	2.00	0.0	16.1
Block 4	E	L Gable	1	W->E	Lee	Line	-2.75	2.00	0.0	5.5
Block 4	W	L Gable	1	E->W	Lee	Line	-2.75	2.00	0.0	5.5
Block 4	W	L Gable	Min	E->W	Lee	Line	-2.75	2.00	0.0	16.1
Block 4	E	L Gable	1	E->W	Wind	Line	-2.75	2.00	0.0	20.7
Block 4	E	L Gable	Min	E->W	Wind	Line	-2.75	2.00	0.0	16.1
Block 4	S	Roof	Min	S->N	Wind	Line	-1.00	18.75	50.0	
Block 4	N	Roof	Min	S->N	Lee	Line	-1.00	18.75	8.1	
Block 4	N	Roof	1	S->N	Lee	Line	-1.00	18.75	15.6	
Block 4	S	Roof	Min	N->S	Lee	Line	-1.00	18.75	50.0	
Block 4	N	Roof	1	N->S	Wind	Line	-1.00	18.75	20.7	
Block 4	N	Roof	Min	N->S	Wind	Line	-1.00	18.75	8.1	

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.

BUILDING MASSES

Level 2 Force Dir	Building Element	Block	Wall Line	Profile	Location [ft] Start	Location [ft] End	Magnitude [lbs,plf,psf] Start	Magnitude [lbs,plf,psf] End	Trib Width [ft]
E-W	Roof	Block 1	1	Line	1.00	35.00	240.0	240.0	
E-W	Roof	Block 1	4	Line	1.00	35.00	240.0	240.0	
E-W	Roof	Block 2	2	Line	-1.00	2.00	105.0	105.0	
E-W	Roof	Block 2	4	Line	-1.00	2.00	105.0	105.0	
E-W	R Gable	Block 1	1	Line	2.00	18.00	67.9	0.0	
E-W	L Gable	Block 1	1	Line	18.00	34.00	0.0	67.9	
E-W	L Gable	Block 1	4	Line	2.00	18.00	67.9	0.0	
E-W	R Gable	Block 1	4	Line	18.00	34.00	0.0	67.9	
N-S	Roof	Block 1		Line	-1.00	31.00	255.0	255.0	
N-S	Roof	Block 1	D	Line	-1.00	31.00	255.0	255.0	
N-S	Roof	Block 2	A	Line	17.00	31.00	30.0	30.0	
N-S	Roof	Block 2		Line	17.00	31.00	15.0	15.0	
N-S	R Gable	Block 2	A	Line	18.00	30.00	0.0	50.9	
N-S	L Gable	Block 2	A	Line	18.00	18.00	50.9	0.0	
Both	Wall 1-1	n/a	1	Line	2.00	34.00	40.0	40.0	
Both	Wall 2-1	n/a	2	Line	0.00	2.00	40.0	40.0	
Both	Wall 4-1	n/a	4	Line	0.00	34.00	40.0	40.0	
Both	Wall A-2	n/a	A	Line	18.00	30.00	40.0	40.0	
Both	Wall A-1	n/a		Line	0.00	18.00	40.0	40.0	
Both	Wall D-1	n/a	D	Line	0.00	30.00	40.0	40.0	

Level 1 Force Dir	Building Element	Block	Wall Line	Profile	Location [ft] Start	Location [ft] End	Magnitude [lbs,plf,psf] Start	Magnitude [lbs,plf,psf] End	Trib Width [ft]
E-W	Roof	Block 3	4	Line	6.00	35.00	165.0	165.0	
E-W	Roof	Block 3	5	Line	6.00	35.00	165.0	165.0	
E-W	Roof	Block 4	1	Line	-3.75	3.00	148.1	148.1	
E-W	Roof	Block 4		Line	-3.75	3.00	148.1	148.1	
E-W	R Gable	Block 3	4	Line	7.00	20.50	68.8	0.0	
E-W	L Gable	Block 3	4	Line	20.50	34.00	0.0	68.8	
E-W	L Gable	Block 3	5	Line	7.00	20.50	68.8	0.0	
E-W	R Gable	Block 3	5	Line	20.50	34.00	0.0	68.8	
E-W	R Gable	Block 4	1	Line	-2.75	2.00	20.2	0.0	
E-W	L Gable	Block 4	1	Line	2.00	2.00	0.0	20.2	
E-W	L Gable	Block 4		Line	-2.75	2.00	20.2	0.0	
E-W	R Gable	Block 4		Line	2.00	2.00	0.0	20.2	
E-W	Floor F2	n/a	1	Line	2.00	7.00	180.0	180.0	
Both	Wall 1-1	n/a	1	Line	2.00	34.00	40.0	40.0	
E-W	Floor F3	n/a	1	Line	7.00	28.00	300.0	300.0	
E-W	Floor F4	n/a	1	Line	28.00	34.00	180.0	180.0	
E-W	Floor F1	n/a	2	Line	0.00	2.00	72.0	72.0	
Both	Wall 2-1	n/a	2	Line	0.00	2.00	40.0	40.0	
E-W	Floor F5	n/a		Line	34.00	35.75	30.0	30.0	
E-W	Floor F5	n/a	3	Line	34.00	35.75	30.0	30.0	
Both	Wall 4-1	n/a	4	Line	0.00	34.00	40.0	40.0	
E-W	Floor F1	n/a	4	Line	0.00	2.00	72.0	72.0	
E-W	Floor F2	n/a	4	Line	2.00	7.00	180.0	180.0	
E-W	Floor F4	n/a	4	Line	28.00	34.00	180.0	180.0	
E-W	Floor F3	n/a	5	Line	7.00	28.00	300.0	300.0	
N-S	Roof	Block 3	B	Line	29.00	51.00	217.5	217.5	
N-S	Roof	Block 3	D	Line	29.00	51.00	217.5	217.5	
N-S	Roof	Block 4		Line	-1.00	18.75	50.6	50.6	
N-S	Roof	Block 4		Line	-1.00	18.75	50.6	50.6	
N-S	Floor F2	n/a	A	Line	18.00	18.25	204.0	204.0	
Both	Wall A-2	n/a	A	Line	18.00	30.00	40.0	40.0	
N-S	Floor F3	n/a	A	Line	18.25	23.25	214.5	214.5	
N-S	Floor F4	n/a	A	Line	23.25	30.00	204.0	204.0	

BUILDING MASSES (continued)

N-S	Floor F1	n/a		Line	0.00	18.00	192.0	192.0
Both	Wall A-1	n/a		Line	0.00	18.00	40.0	40.0
N-S	Floor F5	n/a	B	Line	30.00	50.00	126.0	126.0
N-S	Floor F5	n/a	C	Line	30.00	50.00	126.0	126.0
N-S	Floor F1	n/a	D	Line	0.00	18.00	192.0	192.0
Both	Wall D-1	n/a	D	Line	0.00	30.00	40.0	40.0
N-S	Floor F2	n/a	D	Line	18.00	18.25	204.0	204.0
N-S	Floor F4	n/a	D	Line	23.25	30.00	204.0	204.0
N-S	Floor F3	n/a		Line	18.25	23.25	214.5	214.5
Both	Wall 1-1	n/a	1	Line	2.00	34.00	45.0	45.0
Both	Wall 2-1	n/a	2	Line	0.00	2.00	45.0	45.0
Both	Wall 2-2	n/a		Line	34.00	35.75	45.0	45.0
Both	Wall 3-1	n/a	3	Line	34.00	35.75	45.0	45.0
Both	Wall 4-1	n/a	4	Line	0.00	7.00	45.0	45.0
Both	Wall 4-2	n/a	4	Line	13.50	25.00	27.0	27.0
Both	Wall 4-3	n/a	4	Line	28.00	34.00	45.0	45.0
Both	Wall 5-1	n/a	5	Line	7.00	15.00	45.0	45.0
Both	Wall 5-2	n/a	5	Line	15.00	28.00	45.0	45.0
Both	Wall A-2	n/a	A	Line	18.00	30.00	45.0	45.0
Both	Wall A-1	n/a		Line	0.00	18.00	45.0	45.0
Both	Wall B-1	n/a	B	Line	30.00	50.00	45.0	45.0
Both	Wall C-1	n/a	C	Line	30.00	50.00	45.0	45.0
Both	Wall D-1	n/a	D	Line	0.00	18.25	45.0	45.0
Both	Wall D-3	n/a	D	Line	23.25	30.00	45.0	45.0
Both	Wall D-2	n/a		Line	18.25	23.25	45.0	45.0

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

SEISMIC LOADS

Level 2

Force Dir	Profile	Location [ft] Start	Location [ft] End	Mag [lbs,plf,psf] Start	Mag [lbs,plf,psf] End
E-W	Line	-1.00	0.00	44.7	44.7
E-W	Point	0.00	0.00	167	167
E-W	Line	0.00	1.00	61.7	61.7
E-W	Line	1.00	2.00	163.8	163.8
E-W	Point	2.00	2.00	153	153
E-W	Line	2.00	18.00	119.1	148.0
E-W	Line	18.00	34.00	148.0	119.1
E-W	Point	34.00	34.00	255	255
E-W	Line	34.00	35.00	102.1	102.1
N-S	Line	-1.00	0.00	108.5	108.5
N-S	Point	0.00	0.00	503	503
N-S	Line	0.00	17.00	125.5	125.5
N-S	Line	17.00	18.00	135.1	135.1
N-S	Point	18.00	18.00	17	17
N-S	Line	18.00	30.00	145.9	135.1
N-S	Point	30.00	30.00	520	520
N-S	Line	30.00	31.00	118.1	118.1

Level 1

Force Dir	Profile	Location [ft] Start	Location [ft] End	Mag [lbs,plf,psf] Start	Mag [lbs,plf,psf] End
E-W	Line	-3.75	-2.75	35.8	35.8
E-W	Line	-2.75	0.00	35.8	38.6
E-W	Point	0.00	0.00	123	123
E-W	Line	0.00	2.00	76.5	78.5
E-W	Point	2.00	2.00	185	185
E-W	Line	2.00	3.00	104.6	99.7
E-W	Line	3.00	6.00	64.0	64.0
E-W	Line	6.00	7.00	103.8	103.8
E-W	Point	7.00	7.00	109	109
E-W	Line	7.00	13.50	132.8	140.8
E-W	Line	13.50	15.00	144.1	145.9
E-W	Line	15.00	20.50	145.9	152.7
E-W	Line	20.50	25.00	152.7	147.1
E-W	Line	25.00	28.00	143.9	140.2
E-W	Point	28.00	28.00	109	109
E-W	Line	28.00	34.00	111.2	103.8
E-W	Point	34.00	34.00	281	281
E-W	Line	34.00	35.00	57.9	57.9
E-W	Line	35.00	35.75	18.1	18.1
E-W	Point	35.75	35.75	27	27
N-S	Line	-1.00	0.00	12.2	12.2
N-S	Point	0.00	0.00	334	334
N-S	Line	0.00	18.00	79.1	79.1
N-S	Point	17.75	17.75	6	6
N-S	Point	18.00	18.00	21	21
N-S	Line	18.00	18.25	82.0	82.0
N-S	Point	18.25	18.25	10	10
N-S	Line	18.25	18.75	84.5	84.5
N-S	Line	18.75	23.25	72.3	72.3
N-S	Point	23.25	23.25	10	10
N-S	Line	23.25	29.00	69.8	69.8
N-S	Line	29.00	30.00	122.3	122.3
N-S	Point	30.00	30.00	384	384
N-S	Line	30.00	50.00	93.8	93.8
N-S	Point	50.00	50.00	226	226
N-S	Line	50.00	51.00	52.5	52.5

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.

Design Summary

SHEARWALL DESIGN

Wind Shear Loads, Flexible Diaphragm
All shearwalls have sufficient design capacity.

Seismic Loads, Flexible Diaphragm
All shearwalls have sufficient design capacity.

HOLDDOWN DESIGN

Wind Loads, Flexible Diaphragm
All hold-downs have sufficient design capacity.

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).

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

SHEAR RESULTS

N-S Shearlines	W Gp	For Dir	ASD Shear Force [plf] v	vmax/vft	V [lbs]	Asp-Cub Int	Asp-Cub Ext	Allowable Shear [plf] Int	Ext	Co	C	Cmb	V [lbs]	Resp. Ratio
Line 1														
Level 2														
Ln1, Lev2	-	S->N	-	-	1348	-	-	-	339	-		-	4909	-
	-	N->S	-	-	1327	-	-	-	339	-		-	4909	-
Wall 1-1	1	S->N	-	-	1348	-	1.0	-	339	-		-	4909	-
	1	N->S	-	-	1327	-	1.0	-	339	-		-	4909	-
Seg. 1	-	Both	0.0	0.0	0	-	1.0	-	339	-		339	-	-
Seg. 2	-	S->N	93.0	0.0	1348	-	1.0	-	339	-		339	4909	0.27
	-	N->S	91.5	0.0	1327	-	1.0	-	339	-		339	4909	0.27
Seg. 3	-	Both	0.0	0.0	0	-	1.0	-	339	-		339	-	-
Level 1														
Ln1, Lev1	-	Both	-	-	3094	-	-	-	339	-		-	5586	-
Wall 1-1	1	Both	-	-	3094	-	1.0	-	339	-		-	5586	-
Seg. 1	-	Both	0.0	0.0	0	-	1.0	-	339	-		339	-	-
Seg. 2	-	Both	187.5	0.0	3094	-	1.0	-	339	-		339	5586	0.55
Line 4														
Level 2														
Ln4, Lev2	1	S->N	42.6	-	1447	-	1.0	-	339	-		339	11510	0.13
	1	N->S	40.9	-	1390	-	1.0	-	339	-		339	11510	0.12
Level 1														
Ln4, Lev1	-	S->N	-	-	4213	-	-	-	339	-		-	6263	-
	-	N->S	-	-	4174	-	-	-	339	-		-	6263	-
Wall 4-1	1	S->N	227.7	-	1594	-	1.0	-	339	-		339	2370	0.67
	1	N->S	225.6	-	1579	-	1.0	-	339	-		339	2370	0.67
Wall 4-2	1	S->N	227.7	-	2619	-	1.0	-	339	-		339	3893	0.67
	1	N->S	225.6	-	2595	-	1.0	-	339	-		339	3893	0.67
Line 5														
Ln5, Lev1	-	Both	-	-	1130	-	-	-	339	-		-	4401	-
Wall 5-2	1	Both	86.9	-	1130	-	1.0	-	339	-		339	4401	0.26

E-W Shearlines	W Gp	For Dir	ASD Shear Force [plf] v	vmax/vft	V [lbs]	Asp-Cub Int	Asp-Cub Ext	Allowable Shear [plf] Int	Ext	Co	C	Cmb	V [lbs]	Resp. Ratio
Line A														
Level 2														
LnA, Lev2	-	W->E	-	-	1682	-	-	-	339	-		-	5596	-
	-	E->W	-	-	1609	-	-	-	339	-		-	5596	-
Wall A-1	1	W->E	-	-	461	-	1.0	-	339	-		-	1534	-
	1	E->W	-	-	441	-	1.0	-	339	-		-	1534	-
Seg. 1	-	W->E	82.7	0.0	269	-	.81	-	275	-		275	894	0.30
	-	E->W	79.1	0.0	257	-	.81	-	275	-		275	894	0.29
Seg. 2	-	W->E	70.0	0.0	192	-	.69	-	233	-		233	640	0.30
	-	E->W	66.9	0.0	184	-	.69	-	233	-		233	640	0.29
Wall A-2	1	W->E	-	-	1221	-	1.0	-	339	-		-	4062	-
	1	E->W	-	-	1168	-	1.0	-	339	-		-	4062	-
Seg. 1	-	W->E	203.5	0.0	611	-	1.0	-	339	-		339	1016	0.60
	-	E->W	194.7	0.0	584	-	1.0	-	339	-		339	1016	0.58
Open. 1	-	W->E	-	203.5	1221	-	-	-	339	-		339	2031	0.60
	-	E->W	-	194.7	1168	-	-	-	339	-		339	2031	0.58
Seg. 2	-	W->E	203.5	0.0	611	-	1.0	-	339	-		339	1016	0.60
	-	E->W	194.7	0.0	584	-	1.0	-	339	-		339	1016	0.58
Level 1														
LnA, Lev1	-	W->E	-	-	4010	-	-	-	339	-		-	5586	-
	-	E->W	-	-	3937	-	-	-	339	-		-	5586	-
Wall A-1	1	W->E	-	-	3038	-	1.0	-	339	-		-	4232	-
	1	E->W	-	-	2983	-	1.0	-	339	-		-	4232	-
Seg. 1	-	W->E	243.0	0.0	3038	-	1.0	-	339	-		339	4232	0.72
	-	E->W	238.6	0.0	2983	-	1.0	-	339	-		339	4232	0.70
Seg. 2	-	Both	0.0	0.0	0	-	1.0	-	339	-		339	-	-
Wall A-2	1	W->E	-	-	972	-	1.0	-	339	-		-	1354	-
	1	E->W	-	-	954	-	1.0	-	339	-		-	1354	-
Seg. 1	-	W->E	162.0	0.0	486	-	.67	-	226	-		226	677	0.72
	-	E->W	159.1	0.0	477	-	.67	-	226	-		226	677	0.70
Seg. 2	-	W->E	162.0	0.0	486	-	.67	-	226	-		226	677	0.72
	-	E->W	159.1	0.0	477	-	.67	-	226	-		226	677	0.70
Line D														
Level 2														

SHEAR RESULTS (flexible wind design, continued)

LnD, Lev2	-	W->E	-	-	1400	-	-	-	339	-	-	5416	-
	-	E->W	-	-	1392	-	-	-	339	-	-	5416	-
Wall D-1	1	W->E	-	-	1400	-	1.0	-	339	-	-	5416	-
	1	E->W	-	-	1392	-	1.0	-	339	-	-	5416	-
Seg. 1	-	Both	0.0	0.0	0	-	1.0	-	339	-	339	-	-
Seg. 2	-	W->E	87.5	0.0	1028	-	1.0	-	339	-	339	3978	0.26
	-	E->W	87.0	0.0	1022	-	1.0	-	339	-	339	3978	0.26
Seg. 3	-	W->E	87.5	0.0	372	-	1.0	-	339	-	339	1439	0.26
	-	E->W	87.0	0.0	370	-	1.0	-	339	-	339	1439	0.26
Level 1													
LnD, Lev1	-	W->E	-	-	3802	-	-	-	495	-	-	14125	-
	-	E->W	-	-	3794	-	-	-	495	-	-	14125	-
Wall D-1	2	W->E	-	-	2480	-	1.0	-	495	-	-	8770	-
	2	E->W	-	-	2475	-	1.0	-	495	-	-	8770	-
Seg. 1	-	W->E	244.6	0.0	1040	-	1.0	-	495	-	495	2103	0.49
	-	E->W	244.1	0.0	1037	-	1.0	-	495	-	495	2103	0.49
Open. 1	-	W->E	-	305.8	1835	-	-	-	495	-	495	2969	0.62
	-	E->W	-	305.1	1831	-	-	-	495	-	495	2969	0.62
Seg. 2	-	W->E	326.2	-101.9	1060	-	1.0	-	495	-	495	1608	0.66
	-	E->W	325.5	-101.7	1058	-	1.0	-	495	-	495	1608	0.66
Open. 2	-	W->E	-	305.8	917	-	-	-	495	-	495	1484	0.62
	-	E->W	-	305.1	915	-	-	-	495	-	495	1484	0.62
Seg. 3	-	W->E	217.4	34.0	381	-	.70	-	346	-	346	606	0.63
	-	E->W	217.0	33.9	380	-	.70	-	346	-	346	606	0.63
Wall D-2	2	W->E	135.9	-	679	-	1.0	-	495	-	495	2474	0.27
	2	E->W	135.6	-	678	-	1.0	-	495	-	495	2474	0.27
Wall D-3	2	W->E	-	-	642	-	1.0	-	495	-	-	2882	-
	2	E->W	-	-	641	-	1.0	-	495	-	-	2882	-
Seg. 1	-	W->E	171.2	0.0	300	-	.70	-	346	-	346	606	0.49
	-	E->W	170.9	0.0	299	-	.70	-	346	-	346	606	0.49
Open. 1	-	W->E	-	214.0	642	-	-	-	495	-	495	1484	0.43
	-	E->W	-	213.6	641	-	-	-	495	-	495	1484	0.43
Seg. 2	-	Both	170.9	0.0	342	-	.80	-	396	-	396	792	0.43

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 adjustment from SDPWS 4.3.3.4.1
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.

HOLD-DOWN DESIGN (flexible wind design)

Level 1 Line-Wall	Posit'n	Location [ft] X	Location [ft] Y	Load Case	Tensile ASD Holddown Force [lbs] Shear	Dead	Uplift	Cmb'd	Hold-down	Cap [lbs]	Crit Resp.
Line 1											
	V Elem	0.00	2.88	1	419			419	Refer to upper level		
1-1	R Op 1	0.00	17.63	1	2541			2541	STHD14 (8"	3815	0.67
	V Elem	0.00	26.88	1	1228			1228	Refer to upper level		
1-1	R End	0.00	33.87	1	1713			1713	STHD14 (8"	3815	0.45
Line 4											
4-1	L End	30.00	0.12	1	2607			2607	STHD14 (8"	3815	0.68
4-1	R End	30.00	6.88	1	2106			2106	STHD14 (8"	3815	0.55
4-2	L End	30.00	13.63	1	2095			2095	STHD14 (8"	3815	0.55
4-2	R End	30.00	24.88	1	2076			2076	STHD14 (8"	3815	0.54
	V Elem	30.00	33.87	1	462			462	Refer to upper level		
Line 5											
5-2	L End	50.00	15.13	1	1393			1393	LIMIT w/o	1500	0.93
5-2	R End	50.00	27.88	1	1393			1393	LIMIT w/o	1500	0.93
Line A											
A-1	L End	0.12	2.00	1	2948			2948	STHD14 (8"	3815	0.77
	V Elem	3.13	0.00	1	686			686	Refer to upper level		
A-1	L Op 1	12.38	2.00	1	1979			1979	STHD14 (8"	3815	0.52
	V Elem	17.13	0.00	1	393			393	Refer to upper level		
	V Elem	17.87	0.00	1	589			589	Refer to upper level		
A-2	L End	18.13	0.00	1	2687			2687	STHD14 (8"	3815	0.70
A-2	L Op 1	20.88	0.00	1	1562			1562	STHD14 (8"	3815	0.41
A-2	R Op 1	27.13	0.00	1	1591			1591	STHD14 (8"	3815	0.42
A-2	R End	29.88	0.00	1	2610			2610	STHD14 (8"	3815	0.68
Line D											
D-1	L End	0.12	34.00	1	1240			1240	LIMIT w/o	1500	0.83
	V Elem	4.13	34.00	1	715			715	Refer to upper level		
	V Elem	13.38	34.00	1	207			207	Refer to upper level		
	V Elem	16.62	34.00	1	504			504	Refer to upper level		
D-1	R End	18.13	34.00	1	1237			1237	LIMIT w/o	1500	0.82
D-2	L End	18.38	35.75	1	1287			1287	LIMIT w/o	1500	0.86
D-2	R End	23.13	35.75	1	1285			1285	LIMIT w/o	1500	0.86
D-3	L End	23.38	34.00	1	889			889	LIMIT w/o	1500	0.59
	V Elem	24.88	34.00	1	527			527	Refer to upper level		
	V Elem	28.13	34.00	1	217			217	Refer to upper level		
D-3	R End	29.88	34.00	1	1627			1627	STHD14 (8"	3815	0.43

Level 2 Line-Wall	Posit'n	Location [ft] X	Location [ft] Y	Load Case	Tensile ASD Holddown Force [lbs] Shear	Dead	Uplift	Cmb'd	Hold-down	Cap [lbs]	Crit Resp.
Line 1											
1-1	R Op 1	0.00	12.63	1	1247			1247	MSTC48B3	3315	0.38
1-1	L Op 2	0.00	26.88	1	1228			1228	MST48	3640	0.34
Line 4											
4-1	L End	30.00	0.12	1	481			481	LIMIT w/o	1500	0.32
4-1	R End	30.00	33.87	1	462			462	LIMIT w/o	1500	0.31
Line A											
A-1	L End	0.12	2.00	1	717			717	LIMIT w/o	1500	0.48
A-1	L Op 1	3.13	2.00	1	686			686	LIMIT w/o	1500	0.46
A-1	R Op 1	15.38	2.00	1	616			616	LIMIT w/o	1500	0.41
A-1	R End	17.87	2.00	1	589			589	LIMIT w/o	1500	0.39
A-2	L End	18.13	0.00	1	1096			1096	LIMIT w/o	1500	0.73
A-2	R End	29.88	0.00	1	1049			1049	LIMIT w/o	1500	0.70
Line D											
D-1	R Op 1	4.13	34.00	1	715			715	LIMIT w/o	1500	0.48
D-1	L Op 2	15.63	34.00	1	711			711	LIMIT w/o	1500	0.47
D-1	R Op 2	25.88	34.00	1	744			744	LIMIT w/o	1500	0.50
D-1	R End	29.88	34.00	1	739			739	LIMIT w/o	1500	0.49

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 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.

COLLECTOR FORCES (flexible wind design)

Level 1 Line-Wall	Position on Wall or Opening	Location [ft] X	Location [ft] Y	Load Case	Drag Strut Force [lbs] --->	Drag Strut Force [lbs] <---	Strap/Blocking Force [lbs] --->	Strap/Blocking Force [lbs] <---
Line 1								
1-1	Right Opening 1	0.00	17.50	1	-1498	1498		
Line 4								
4-1	Right Wall End	30.00	7.00	1	541	-536		
4-2	Left Wall End	30.00	13.50	1	-437	433		
4-2	Right Wall End	30.00	25.00	1	451	-447		
Line 5								
5-2	Left Wall End	50.00	15.00	1	-431	431		
Line A								
A-1	Left Opening 1	12.50	2.00	1	1367	-1342		
A-2	Left Opening 1	21.00	0.00	1	717	-704		
A-2	Right Opening 1	27.00	0.00	1	-85	84		
Line D								
D-1	Left Opening 1	4.25	34.00	1	-539	537		
D-1	Right Opening 1	10.25	34.00	1	536	-535		
D-1	Left Opening 2	13.50	34.00	1	-207	207		
D-1	Right Opening 2	16.50	34.00	1	330	-329		
D-3	Left Opening 1	25.00	34.00	1	-8	8		
D-3	Right Opening 1	28.00	34.00	1	253	-253		
D-1	Left Opening 1	4.25	34.00				1040	1037
D-1	Right Opening 1	10.25	34.00				795	793
D-1	Left Opening 2	13.50	34.00				596	595
D-1	Right Opening 2	16.50	34.00				321	320
D-3	Left Opening 1	25.00	34.00				300	299
D-3	Right Opening 1	28.00	34.00				342	342

Level 2 Line-Wall	Position on Wall or Opening	Location [ft] X	Location [ft] Y	Load Case	Drag Strut Force [lbs] --->	Drag Strut Force [lbs] <---	Strap/Blocking Force [lbs] --->	Strap/Blocking Force [lbs] <---
Line 1								
1-1	Right Opening 1	0.00	12.50	1	-442	435		
1-1	Left Opening 2	0.00	27.00	1	295	-290		
Line A								
A-1	Left Opening 1	3.25	2.00	1	86	-83		
A-1	Right Opening 1	15.25	2.00	1	-586	561		
A-2	Left Opening 1	21.00	0.00	1	-716	685		
A-2	Right Opening 1	27.00	0.00	1	168	-161		
A-2	Left Opening 1	21.00	0.00				611	584
A-2	Right Opening 1	27.00	0.00				611	584
Line D								
D-1	Right Opening 1	4.00	34.00	1	-187	186		
D-1	Left Opening 2	15.75	34.00	1	293	-291		
D-1	Right Opening 2	25.75	34.00	1	-173	173		

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

Flexible Diaphragm Seismic Design

SEISMIC INFORMATION

Level	Mass [lbs]	Area [sq.ft]	Story Shear [lbs] E-W	Story Shear [lbs] N-S	Diaphragm Force [lbs] E-W:	Fpx	Design	N-S:	Fpx	Design
2	24549	984.0	5222	5222		3655	3655		3655	3655
1	43624	1412.8	5266	5266		6156	6156		6156	6156
All	**68173**	**-**	**10488**	**10488**		**-**	**-**		**-**	-

Legend:
Mass – Sum of all generated and input building masses on level = wx in ASCE 7 equation 12.8-12.
Story Shear – Total unfactored (strength-level) shear force induced at level x, = Fx 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 Fpx + transfer forces from discontinuous shearlines, factored by overstrength (omega) as per 12.10.1.1. Omega = 2.5 as per 12.2-1.

Redundancy Factor p (rho):
E-W 1.00, N-S 1.00
Automatically calculated according to ASCE 7 12.3.4.2.

Vertical Earthquake Load Ev
Ev = 0.2 Sds D; Sds = 1.00; Ev = 0.200 D unfactored; 0.140 D factored; total dead load factor: 0.6 - 0.140 = 0.460 tension, 1.0 + 0.140 = 1.140 compression.

SHEAR RESULTS (flexible seismic design)

N-S Shearlines	W Gp	For Dir	ASD Shear Force [plf] v	vmax/vft	V [lbs]	Asp-Cub Int	Asp-Cub Ext	Allowable Shear [plf] Int	Ext	Co	C	Cmb	V [lbs]	Resp. Ratio
Line 1														
Level 2														
Ln1, Lev2	-	Both	-	-	1782	-	-	-	242	-		-	3506	-
Wall 1-1	1	Both	-	-	1782	-	1.0	-	242	-		-	3506	-
Seg. 1	-	Both	0.0	0.0	0	-	1.0	-	242	-		242	-	-
Seg. 2	-	Both	122.9	0.0	1782	-	1.0	-	242	-		242	3506	0.51
Seg. 3	-	Both	0.0	0.0	0	-	1.0	-	242	-		242	-	-
Level 1														
Ln1, Lev1	-	Both	-	-	2857	-	-	-	242	-		-	3990	-
Wall 1-1	1	Both	-	-	2857	-	1.0	-	242	-		-	3990	-
Seg. 1	-	Both	0.0	0.0	0	-	1.0	-	242	-		242	-	-
Seg. 2	-	Both	173.1	0.0	2857	-	1.0	-	242	-		242	3990	0.72
Line 4														
Level 2														
Ln4, Lev2	1	Both	55.1	-	1873	-	1.0	-	242	-		242	8221	0.23
Level 1														
Ln4, Lev1	-	Both	-	-	3633	-	-	-	242	-		-	4473	-
Wall 4-1	1	Both	196.4	-	1375	-	1.0	-	242	-		242	1693	0.81
Wall 4-2	1	Both	196.4	-	2259	-	1.0	-	242	-		242	2781	0.81
Line 5														
Ln5, Lev1	-	Both	-	-	852	-	-	-	242	-		-	3143	-
Wall 5-2	1	Both	65.5	-	852	-	1.0	-	242	-		242	3143	0.27

E-W Shearlines	W Gp	For Dir	ASD Shear Force [plf] v	vmax/vft	V [lbs]	Asp-Cub Int	Asp-Cub Ext	Allowable Shear [plf] Int	Ext	Co	C	Cmb	V [lbs]	Resp. Ratio
Line A														
Level 2														
LnA, Lev2	-	Both	-	-	1869	-	-	-	242	-		-	3997	-
Wall A-1	1	Both	-	-	512	-	1.0	-	242	-		-	1096	-
Seg. 1	-	Both	91.9	0.0	299	-	.81	-	196	-		196	639	0.47
Seg. 2	-	Both	77.7	0.0	214	-	.69	-	166	-		166	457	0.47
Wall A-2	1	Both	-	-	1357	-	1.0	-	242	-		-	2902	-
Seg. 1	-	Both	226.1	0.0	678	-	1.0	-	242	-		242	725	0.94
Open. 1	-	Both	-	226.1	1357	-	-	-	242	-		242	1451	0.94
Seg. 2	-	Both	226.1	0.0	678	-	1.0	-	242	-		242	725	0.94
Level 1														
LnA, Lev1	-	Both	-	-	3727	-	-	-	242	-		-	3990	-
Wall A-1	1^	Both	-	-	2823	-	1.0	-	242	-		-	3023	-
Seg. 1	-	Both	225.9	0.0	2823	-	1.0	-	242	-		242	3023	0.93
Seg. 2	-	Both	0.0	0.0	0	-	1.0	-	242	-		242	-	-
Wall A-2	1^	Both	-	-	903	-	1.0	-	242	-		-	967	-
Seg. 1	-	Both	150.6	0.0	452	-	.67	-	161	-		161	484	0.93
Seg. 2	-	Both	150.6	0.0	452	-	.67	-	161	-		161	484	0.93
Line D														
Level 2														
LnD, Lev2	-	Both	-	-	1786	-	-	-	242	-		-	3869	-
Wall D-1	1	Both	-	-	1786	-	1.0	-	242	-		-	3869	-
Seg. 1	-	Both	0.0	0.0	0	-	1.0	-	242	-		242	-	-
Seg. 2	-	Both	111.6	0.0	1312	-	1.0	-	242	-		242	2841	0.46
Seg. 3	-	Both	111.6	0.0	474	-	1.0	-	242	-		242	1028	0.46
Level 1														
LnD, Lev1	-	Both	-	-	3617	-	-	-	353	-		-	10090	-
Wall D-1	2^	Both	-	-	2359	-	1.0	-	353	-		-	6264	-
Seg. 1	-	Both	232.7	0.0	989	-	1.0	-	353	-		353	1502	0.66
Open. 1	-	Both	-	290.9	1745	-	-	-	353	-		353	2120	0.82
Seg. 2	-	Both	310.3	-97.0	1008	-	1.0	-	353	-		353	1149	0.88
Open. 2	-	Both	-	290.9	873	-	-	-	353	-		353	1060	0.82
Seg. 3	-	Both	206.8	32.3	362	-	.70	-	247	-		247	433	0.84
Wall D-2	2	Both	129.3	-	646	-	1.0	-	353	-		353	1767	0.37
Wall D-3	2	Both	-	-	611	-	1.0	-	353	-		-	2059	-
Seg. 1	-	Both	162.9	0.0	285	-	.70	-	247	-		247	433	0.66
Open. 1	-	Both	-	203.6	611	-	-	-	353	-		353	1060	0.58
Seg. 2	-	Both	162.9	0.0	326	-	.80	-	283	-		283	565	0.58

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 adjustment from SDPWS 4.3.3.4.1
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.

HOLD-DOWN DESIGN (flexible seismic design)

Level 1 Line-Wall	Posit'n	Location [ft] X	Location [ft] Y	Tensile ASD Holddown Force [lbs] Shear	Dead	Ev	Cmb'd	Hold-down	Cap [lbs]	Crit Resp.
Line 1										
	V Elem	0.00	2.88	554			554	Refer to upper level		
1-1	R Op 1	0.00	17.63	2677			2677	STHD14 (8"	3815	0.70
	V Elem	0.00	26.88	1649			1649	Refer to upper level		
1-1	R End	0.00	33.87	1582			1582	STHD14 (8"	3815	0.41
Line 4										
4-1	L End	30.00	0.12	2456			2456	STHD14 (8"	3815	0.64
4-1	R End	30.00	6.88	1833			1833	STHD14 (8"	3815	0.48
4-2	L End	30.00	13.63	1807			1807	STHD14 (8"	3815	0.47
4-2	R End	30.00	24.88	1807			1807	STHD14 (8"	3815	0.47
	V Elem	30.00	33.87	623			623	Refer to upper level		
Line 5										
5-2	L End	50.00	15.13	1050			1050	LIMIT w/o	1500	0.70
5-2	R End	50.00	27.88	1050			1050	LIMIT w/o	1500	0.70
Line A										
A-1	L End	0.12	2.00	2870			2870	STHD14 (8"	3815	0.75
	V Elem	3.13	0.00	796			796	Refer to upper level		
A-1	L Op 1	12.38	2.00	1827			1827	STHD14 (8"	3815	0.48
	V Elem	17.13	0.00	437			437	Refer to upper level		
	V Elem	17.87	0.00	684			684	Refer to upper level		
A-2	L End	18.13	0.00	2696			2696	STHD14 (8"	3815	0.71
A-2	L Op 1	20.88	0.00	1478			1478	STHD14 (8"	3815	0.39
A-2	R Op 1	27.13	0.00	1478			1478	STHD14 (8"	3815	0.39
A-2	R End	29.88	0.00	2696			2696	STHD14 (8"	3815	0.71
Line D										
D-1	L End	0.12	34.00	1180			1180	LIMIT w/o	1500	0.79
	V Elem	4.13	34.00	913			913	Refer to upper level		
	V Elem	13.38	34.00	266			266	Refer to upper level		
	V Elem	16.62	34.00	646			646	Refer to upper level		
D-1	R End	18.13	34.00	1180			1180	LIMIT w/o	1500	0.79
D-2	L End	18.38	35.75	1225			1225	LIMIT w/o	1500	0.82
D-2	R End	23.13	35.75	1225			1225	LIMIT w/o	1500	0.82
D-3	L End	23.38	34.00	846			846	LIMIT w/o	1500	0.56
	V Elem	24.88	34.00	672			672	Refer to upper level		
	V Elem	28.13	34.00	277			277	Refer to upper level		
D-3	R End	29.88	34.00	1795			1795	STHD14 (8"	3815	0.47

Level 2 Line-Wall	Posit'n	Location [ft] X	Location [ft] Y	Tensile ASD Holddown Force [lbs] Shear	Dead	Ev	Cmb'd	Hold-down	Cap [lbs]	Crit Resp.
Line 1										
1-1	R Op 1	0.00	12.63	1649			1649	MSTC48B3	3315	0.50
1-1	L Op 2	0.00	26.88	1649			1649	MST48	3640	0.45
Line 4										
4-1	L End	30.00	0.12	623			623	LIMIT w/o	1500	0.42
4-1	R End	30.00	33.87	623			623	LIMIT w/o	1500	0.42
Line A										
A-1	L End	0.12	2.00	796			796	LIMIT w/o	1500	0.53
A-1	L Op 1	3.13	2.00	796			796	LIMIT w/o	1500	0.53
A-1	R Op 1	15.38	2.00	684			684	LIMIT w/o	1500	0.46
A-1	R End	17.87	2.00	684			684	LIMIT w/o	1500	0.46
A-2	L End	18.13	0.00	1218			1218	LIMIT w/o	1500	0.81
A-2	R End	29.88	0.00	1218			1218	LIMIT w/o	1500	0.81
Line D										
D-1	R Op 1	4.13	34.00	913			913	LIMIT w/o	1500	0.61
D-1	L Op 2	15.63	34.00	913			913	LIMIT w/o	1500	0.61
D-1	R Op 2	25.88	34.00	949			949	LIMIT w/o	1500	0.63
D-1	R End	29.88	34.00	949			949	LIMIT w/o	1500	0.63

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 = -0.2Sds x ASD seismic factor x unfactored D = 0.233 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.

COLLECTOR FORCES (flexible seismic design)

Level 1 Line-Wall	Position on Wall or Opening	Location [ft] X	Location [ft] Y	Drag Strut Force [lbs] --->	Drag Strut Force [lbs] <---	Strap/Blocking Force [lbs] --->	Strap/Blocking Force [lbs] <---
Line 1							
	Shearline force			3577	3577		
1-1	Right Opening 1	0.00	17.50	-1732	1732		
Line 4							
	Shearline force			4813	4813		
4-1	Right Wall End	30.00	7.00	618	-618		
4-2	Left Wall End	30.00	13.50	-499	499		
4-2	Right Wall End	30.00	25.00	516	-516		
Line 5							
	Shearline force			1422	1422		
5-2	Left Wall End	50.00	15.00	-542	542		
Line A							
	Shearline force			4970	4970		
A-1	Left Opening 1	12.50	2.00	1694	-1694		
A-2	Left Opening 1	21.00	0.00	889	-889		
A-2	Right Opening 1	27.00	0.00	-105	105		
Line D							
	Shearline force			4841	4841		
D-1	Left Opening 1	4.25	34.00	-686	686		
D-1	Right Opening 1	10.25	34.00	682	-682		
D-1	Left Opening 2	13.50	34.00	-264	264		
D-1	Right Opening 2	16.50	34.00	420	-420		
D-3	Left Opening 1	25.00	34.00	-11	11		
D-3	Right Opening 1	28.00	34.00	323	-323		
D-1	Left Opening 1	4.25	34.00			989	989
D-1	Right Opening 1	10.25	34.00			756	756
D-1	Left Opening 2	13.50	34.00			567	567
D-1	Right Opening 2	16.50	34.00			305	305
D-3	Left Opening 1	25.00	34.00			285	285
D-3	Right Opening 1	28.00	34.00			326	326

Level 2 Line-Wall	Position on Wall or Opening	Location [ft] X	Location [ft] Y	Drag Strut Force [lbs] --->	Drag Strut Force [lbs] <---	Strap/Blocking Force [lbs] --->	Strap/Blocking Force [lbs] <---
Line 1							
	Shearline force			1782	1782		
1-1	Right Opening 1	0.00	12.50	-585	585		
1-1	Left Opening 2	0.00	27.00	390	-390		
Line A							
	Shearline force			1869	1869		
A-1	Left Opening 1	3.25	2.00	96	-96		
A-1	Right Opening 1	15.25	2.00	-652	652		
A-2	Left Opening 1	21.00	0.00	-796	796		
A-2	Right Opening 1	27.00	0.00	187	-187		
A-2	Left Opening 1	21.00	0.00			678	678
A-2	Right Opening 1	27.00	0.00			678	678
Line D							
	Shearline force			1786	1786		
D-1	Right Opening 1	4.00	34.00	-238	238		
D-1	Left Opening 2	15.75	34.00	374	-374		
D-1	Right Opening 2	25.75	34.00	-221	221		

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 Fpx, added to shearline force from story above and to forces transferred from discontinuous shearlines factored by overstrength (omega) as per 12.10.1.1. Refer to Seismic Information table for diaphragm forces and omega 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 vmax 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

PRRNSF20230919

City of Puyallup
Development & Permitting Services
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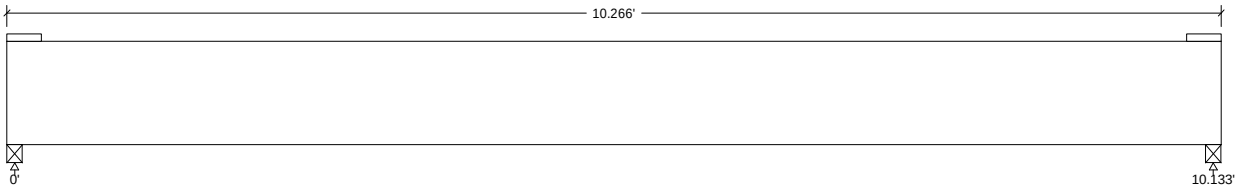
Design Check Calculation Sheet
WoodWorks Sizer 2023

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				15.00(17.50')		psf
Load2	Snow	Full Area				25.00(17.50')		psf
Self-weight	Dead	Full UDL				8.5		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	1390		1390
Snow	2246		2246
Factored:			
Total	3636		3636
Bearing:			
Capacity			
Beam	3636		3636
Support	3871		3871
Des ratio			
Beam	1.00		1.00
Support	0.94		0.94
Load comb	#2		#2
Length	1.60		1.60
Min req'd	1.60		1.60
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.11		1.11
Fcp sup	625		625

R1
Glulam-Unbal., West Species, 24F-V4 DF, 3-1/2"x10-1/2"
Supports: All - Timber-soft Beam, D.Fir-L No.2
Total length: 10.25'; Clear span: 10'; Volume = 2.6 cu.ft.; 7 laminations, 3-1/2" maximum width,
Lateral support: top = at supports, bottom = at supports;
This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 119	Fv' = 305	psi	fv/Fv' = 0.39
Bending(+)	fb = 1697	Fb' = 2625	psi	fb/Fb' = 0.65
Live Defl'n	0.17 = L/711	0.34 = L/360	in	0.51
Total Defl'n	0.33 = L/369	0.51 = L/240	in	0.65

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cvr	LC#
Fv'	265	1.15	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	2400	1.15	1.00	1.00	0.951	1.000	-	-	1.00	1.00	-	2
Fcp'	650	-	1.00	1.00	-	-	-	-	1.00	-	-	-
E'	1.8 million	1.00	1.00	1.00	-	-	-	-	1.00	-	-	2
Eminy'	0.85 million	1.00	1.00	1.00	-	-	-	-	1.00	-	-	2

CRITICAL LOAD COMBINATIONS:
Shear : LC #2 = D + S
Bending(+): LC #2 = D + S
Deflection: LC #2 = D + S (live)
LC #2 = D + S (total)
Bearing : Support 1 – LC #2 = D + S
Support 2 – LC #2 = D + S
D=dead S=snow
All LC's are listed in the Analysis output
Load Patterns: s=S/2, X=L+S or L+Lr, _=no pattern load in this span
Load combinations: ASD Basic from ASCE 7-16 2.4
CALCULATIONS:
V max = 3590, V design = 2922 (NDS 3.4.3.1(a)) lbs; M(+) = 9094 lbs-ft
EI = 607.74e06 lb-in^2
"Live" deflection is due to all non-dead loads (live, wind, snow…)
Total deflection = 1.50 permanent + "live"
Lateral stability(+): Lu = 10.13' Le = 19.13' RB = 14.0

Design Notes:
1. Analysis and design are in accordance with the ICC International Building Code (IBC 2021) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2015 and manufactured in accordance with ANSI A190.1-2012
4. GLULAM: bxd = actual breadth x actual depth.
5. Glulam Beams shall be laterally supported according to the provisions of NDS Clause 3.3.3.
6. GLULAM: bearing length based on smaller of Fcp(tension), Fcp(comp'n).

SF1
Apr. 4, 2023 16:45

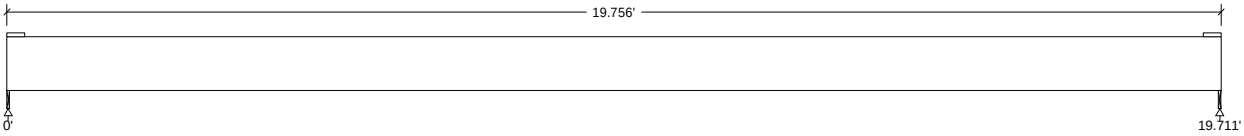
Design Check Calculation Sheet

WoodWorks Sizer 2023

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				15.00(4.50')		psf
Load2	Snow	Full Area				25.00(4.50')		psf
Self-weight	Dead	Full UDL				13.3		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	798		798
Snow	1111		1111
Factored:			
Total	1909		1909
Bearing:			
Capacity			
Beam	1909		1909
Support	1961		1961
Des ratio			
Beam	1.00		1.00
Support	0.97		0.97
Load comb	#2		#2
Length	0.53		0.53
Min req'd	0.53		0.53
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.07		1.07
Fcp sup	625		625

SF1

Glulam-Unbal., West Species, 24F-V4 DF, 5-1/2"x10-1/2"

Supports: All - Timber-soft Beam, D.Fir-L No.2
Total length: 19.75'; Clear span: 19.688'; Volume = 7.9 cu.ft.; 7 laminations, 5-1/2" maximum width,
Lateral support: top = at supports, bottom = at supports;
This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 45	Fv' = 305	psi	fv/Fv' = 0.15
Bending(+)	fb = 1115	Fb' = 2672	psi	fb/Fb' = 0.42
Live Defl'n	0.40 = L/591	0.66 = L/360	in	0.61
Total Defl'n	0.83 = L/284	0.99 = L/240	in	0.84

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cvr	LC#
Fv'	265	1.15	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	2400	1.15	1.00	1.00	0.968	1.000	-	-	1.00	1.00	-	2
Fcp'	650	-	1.00	1.00	-	-	-	-	1.00	-	-	-
E'	1.8 million		1.00	1.00	-	-	-	-	1.00	-	-	2
Eminy'	0.85 million		1.00	1.00	-	-	-	-	1.00	-	-	2

CRITICAL LOAD COMBINATIONS:
Shear : LC #2 = D + S
Bending(+): LC #2 = D + S
Deflection: LC #2 = D + S (live)
LC #2 = D + S (total)
Bearing : Support 1 – LC #2 = D + S
Support 2 – LC #2 = D + S
D=dead S=snow
All LC's are listed in the Analysis output
Load Patterns: s=S/2, X=L+S or L+Lr, _=no pattern load in this span
Load combinations: ASD Basic from ASCE 7-16 2.4
CALCULATIONS:
V max = 1905, V design = 1732 (NDS 3.4.3.1(a)) lbs; M(+) = 9388 lbs-ft
EI = 955.03e06 lb-in^2
"Live" deflection is due to all non-dead loads (live, wind, snow…)
Total deflection = 1.50 permanent + "live"
Lateral stability(+): Lu = 19.69' Le = 36.25' RB = 12.3

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2021) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2015 and manufactured in accordance with ANSI A190.1-2012
4. GLULAM: bxd = actual breadth x actual depth.
5. Glulam Beams shall be laterally supported according to the provisions of NDS Clause 3.3.3.
6. GLULAM: bearing length based on smaller of Fcp(tension), Fcp(comp'n).

SF2
Apr. 4, 2023 16:46

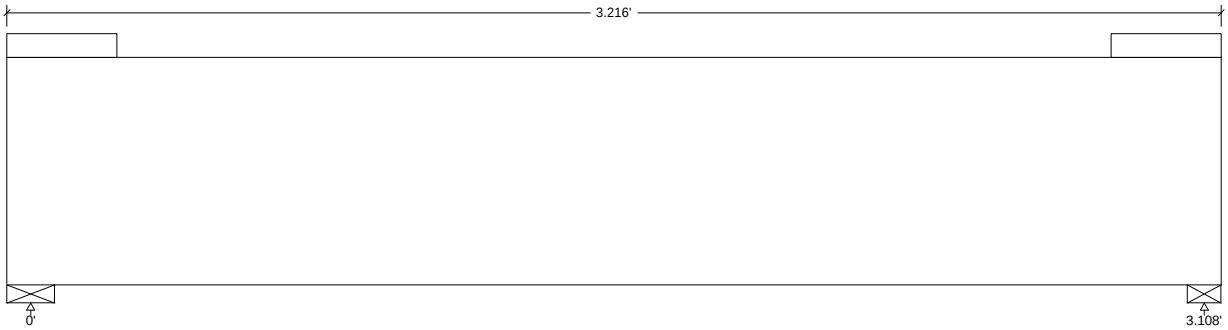
Design Check Calculation Sheet

WoodWorks Sizer 2023

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full UDL				80.0		plf
Load2	Dead	Full Area				12.00(7.25')		psf
Load3	Live	Full Area				40.00(7.25')		psf
Load4	Dead	Partial Area		1.00	3.13	15.00(17.08')		psf
Load5	Snow	Partial Area		1.00	3.13	25.00(17.08')		psf
Load6	Dead	Point		1.01		1390		lbs
Load7	Snow	Point		1.01		2246		lbs
Self-weight	Dead	Full UDL				6.0		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	1442		1049
Live	469		464
Snow	1887		1266
Factored:			
Total	3329		2346
Bearing:			
Capacity			
Beam	3329		2346
Support	3686		2597
Des ratio			
Beam	1.00		1.00
Support	0.90		0.90
Load comb	#4		#3
Length	1.52		1.07
Min req'd	1.52		1.07
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.11		1.11
Fcp sup	625		625

SF2

Lumber-soft, D.Fir-L, No.2, 4x8 (3-1/2"x7-1/4")

Supports: All - Timber-soft Beam, D.Fir-L No.2
Total length: 3.19'; Clear span: 3.0'; Volume = 0.6 cu.ft.
Lateral support: top = at supports, bottom = at supports;
This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 188	Fv' = 207	psi	fv/Fv' = 0.91
Bending(+)	fb = 1195	Fb' = 1339	psi	fb/Fb' = 0.89
Live Defl'n	0.01 = < L/999	0.10 = L/360	in	0.14
Total Defl'n	0.03 = < L/999	0.16 = L/240	in	0.20

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	LC#
Fv'	180	1.15	1.00	1.00	-	-	-	-	1.00	1.00	4
Fb'+	900	1.15	1.00	1.00	0.995	1.300	-	1.00	1.00	1.00	4
Fcp'	625	-	1.00	1.00	-	-	-	-	1.00	1.00	-
E'	1.6 million		1.00	1.00	-	-	-	-	1.00	1.00	4
Emin'	0.58 million		1.00	1.00	-	-	-	-	1.00	1.00	4

CRITICAL LOAD COMBINATIONS:
Shear : LC #4 = D + S
Bending(+): LC #4 = D + S
Deflection: LC #4 = D + S (live)
LC #4 = D + S (total)
Bearing : Support 1 – LC #4 = D + S
Support 2 – LC #3 = D + 0.75(L + S)
D=dead L=live S=snow
All LC's are listed in the Analysis output
Load Patterns: s=S/2, X=L+S or L+Lr, _=no pattern load in this span
Load combinations: ASD Basic from ASCE 7-16 2.4
CALCULATIONS:
V max = 3184, V design = 3184 (NDS 3.4.3.1(a)) lbs; M(+) = 3054 lbs-ft
EI = 177.83e06 lb-in^2
"Live" deflection is due to all non-dead loads (live, wind, snow…)
Total deflection = 1.50 permanent + "live"
Lateral stability(+): Lu = 3.13' Le = 6.38' RB = 6.7

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2021) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

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SF3
Apr. 4, 2023 16:46

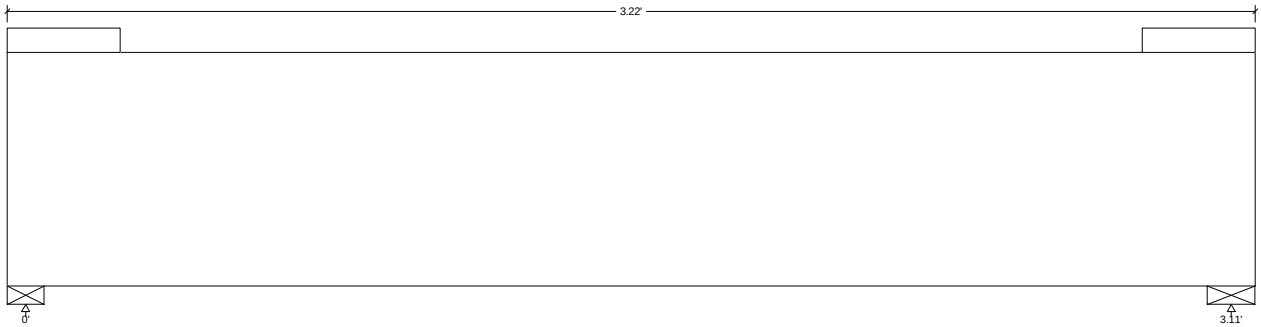
Design Check Calculation Sheet

WoodWorks Sizer 2023

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full UDL				80.0		plf
Load2	Dead	Full Area				12.00(7.25')		psf
Load3	Live	Full Area				40.00(7.25')		psf
Load4	Dead	Full Area				15.00(1.00')		psf
Load5	Snow	Full Area				25.00(1.00')		psf
Load6	Dead	Partial Area		0.00	2.12	15.00(17.00')		psf
Load7	Snow	Partial Area		0.00	2.12	25.00(17.00')		psf
Load8	Dead	Point		2.13		1390		lbs
Load9	Snow	Point		2.13		2246		lbs
Self-weight	Dead	Full UDL				6.0		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	1126		1411
Live	465		469
Snow	1391		1838
Factored:			
Total	2518		3249
Bearing:			
Capacity			
Beam	2518		3249
Support	2788		3597
Des ratio			
Beam	1.00		1.00
Support	0.90		0.90
Load comb	#3		#4
Length	1.15		1.49
Min req'd	1.15		1.49
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.11		1.11
Fcp sup	625		625

SF3

Lumber-soft, D.Fir-L, No.2, 4x8 (3-1/2"x7-1/4")

Supports: All - Timber-soft Beam, D.Fir-L No.2
Total length: 3.25'; Clear span: 3.0'; Volume = 0.6 cu.ft.
Lateral support: top = at supports, bottom = at supports;
This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 182	Fv' = 207	psi	fv/Fv' = 0.88
Bending(+)	fb = 1258	Fb' = 1339	psi	fb/Fb' = 0.94
Live Defl'n	0.02 = < L/999	0.10 = L/360	in	0.15
Total Defl'n	0.03 = < L/999	0.16 = L/240	in	0.21

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	LC#
Fv'	180	1.15	1.00	1.00	-	-	-	-	1.00	1.00	4
Fb'+	900	1.15	1.00	1.00	0.995	1.300	-	1.00	1.00	1.00	4
Fcp'	625	-	1.00	1.00	-	-	-	-	1.00	1.00	-
E'	1.6 million		1.00	1.00	-	-	-	-	1.00	1.00	4
Emin'	0.58 million		1.00	1.00	-	-	-	-	1.00	1.00	4

CRITICAL LOAD COMBINATIONS:
Shear : LC #4 = D + S
Bending(+): LC #4 = D + S
Deflection: LC #4 = D + S (live)
LC #4 = D + S (total)
Bearing : Support 1 - LC #3 = D + 0.75(L + S)
Support 2 - LC #4 = D + S
D=dead L=live S=snow
All LC's are listed in the Analysis output
Load Patterns: s=S/2, X=L+S or L+Lr, _=no pattern load in this span
Load combinations: ASD Basic from ASCE 7-16 2.4
CALCULATIONS:
V max = 3072, V design = 3072 (NDS 3.4.3.1(a)) lbs; M(+) = 3215 lbs-ft
EI = 177.83e06 lb-in^2
"Live" deflection is due to all non-dead loads (live, wind, snow…)
Total deflection = 1.50 permanent + "live"
Lateral stability(+): Lu = 3.13' Le = 6.44' RB = 6.7

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2021) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

SF4
Apr. 4, 2023 16:47

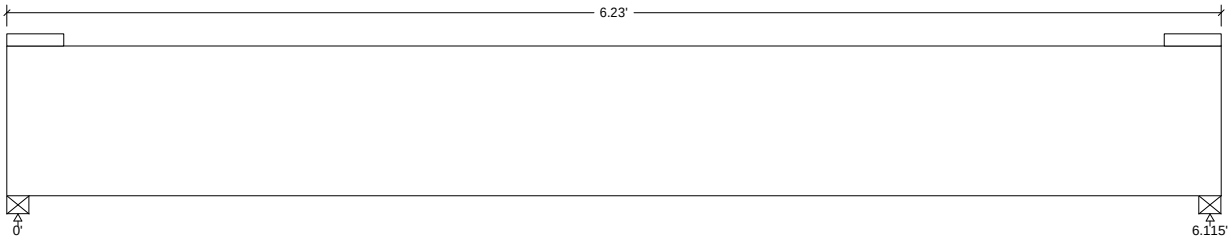
Design Check Calculation Sheet

WoodWorks Sizer 2023

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full UDL				80.0		plf
Load2	Dead	Full Area				12.00(7.08')		psf
Load3	Live	Full Area				40.00(7.08')		psf
Load4	Dead	Full Area				15.00(17.25')		psf
Load5	Snow	Full Area				25.00(17.25')		psf
Self-weight	Dead	Full UDL				7.7		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	1343		1343
Live	882		882
Snow	1343		1343
Factored:			
Total	3012		3012
Bearing:			
Capacity			
Beam	3012		3012
Support	3335		3335
Des ratio			
Beam	1.00		1.00
Support	0.90		0.90
Load comb	#3		#3
Length	1.38		1.38
Min req'd	1.38		1.38
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.11		1.11
Fcp sup	625		625

SF4

Lumber-soft, D.Fir-L, No.2, 4x10 (3-1/2"x9-1/4")

Supports: All - Timber-soft Beam, D.Fir-L No.2
Total length: 6.25'; Clear span: 6.0'; Volume = 1.4 cu.ft.
Lateral support: top = at supports, bottom = at supports;
This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 100	Fv' = 207	psi	fv/Fv' = 0.48
Bending(+)	fb = 1087	Fb' = 1227	psi	fb/Fb' = 0.89
Live Defl'n	0.05 = < L/999	0.20 = L/360	in	0.22
Total Defl'n	0.10 = L/728	0.31 = L/240	in	0.33

Additional Data:

```
FACTORS:  F/E(psi) CD    CM    Ct    CL     CF    Cfu    Cr   Cfrt   Ci    LC#
 Fv'         180    1.15  1.00  1.00   -      -     -     -    1.00  1.00    3
 Fb'+        900    1.15  1.00  1.00  0.988  1.200   -    1.00  1.00  1.00    3
 Fcp'        625     -    1.00  1.00   -      -     -     -    1.00  1.00    -
 E'         1.6 million  1.00  1.00   -      -     -     -    1.00  1.00    3
 Emin'    0.58 million  1.00  1.00   -      -     -     -    1.00  1.00    3
CRITICAL LOAD COMBINATIONS:
 Shear     : LC #3  = D + 0.75(L + S)
 Bending(+): LC #3  = D + 0.75(L + S)
 Deflection: LC #3  = D + 0.75(L + S)  (live)
             LC #3  = D + 0.75(L + S)  (total)
 Bearing   : Support 1 - LC #3 = D + 0.75(L + S)
             Support 2 - LC #3 = D + 0.75(L + S)
 D=dead L=live S=snow
 All LC's are listed in the Analysis output
 Load Patterns: s=S/2,  X=L+S or L+Lr,  _=no pattern load in this span
 Load combinations: ASD Basic from ASCE 7-16 2.4
CALCULATIONS:
 V max = 2957, V design = 2156 (NDS 3.4.3.1(a)) lbs; M(+) = 4521 lbs-ft
 EI = 369.34e06 lb-in^2
 "Live" deflection is due to all non-dead loads (live, wind, snow…)
 Total deflection = 1.50 permanent + "live"
 Lateral stability(+):  Lu = 6.13'  Le = 12.25'  RB = 10.5
```

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2021) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

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SF5
Apr. 4, 2023 16:48

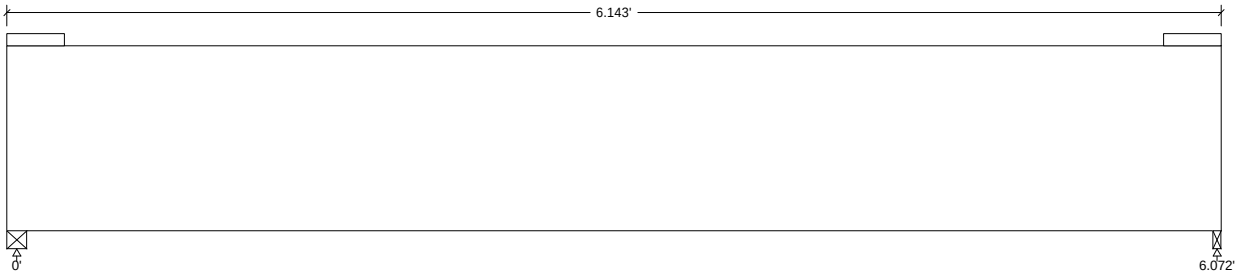
Design Check Calculation Sheet

WoodWorks Sizer 2023

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full UDL				80.0		plf
Load2	Dead	Full Area				12.00(1.00')		psf
Load3	Live	Full Area				40.00(1.00')		psf
Load4	Dead	Full Area				15.00(2.00')		psf
Load5	Snow	Full Area				25.00(2.00')		psf
Load6	Earthquake	Point		1.35		4123		lbs
Self-weight	Dead	Full UDL				9.4		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	405		401
Live	123		122
Snow	154		153
Earthquake	3240		883
Factored:			
Total	2673		1071
Bearing:			
Capacity			
Beam	2673		1094
Support	2959		1211
Des ratio			
Beam	1.00		0.98
Support	0.90		0.88
Load comb	#8		#5
Length	1.22		0.50*
Min req'd	1.22		0.50*
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.11		1.11
Fcp sup	625		625

*Minimum bearing length setting used: 1/2" for end supports

SF5

Lumber-soft, D.Fir-L, No.2, 4x12 (3-1/2"x11-1/4")

Supports: All - Timber-soft Beam, D.Fir-L No.2
Total length: 6.13'; Clear span: 6.0'; Volume = 1.7 cu.ft.
Lateral support: top = at supports, bottom = at supports;
This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 97	Fv' = 288	psi	fv/Fv' = 0.34
Bending(+)	fb = 546	Fb' = 1550	psi	fb/Fb' = 0.35
Live Defl'n	0.02 = < L/999	0.20 = L/360	in	0.11
Total Defl'n	0.03 = < L/999	0.30 = L/240	in	0.10

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	LC#
Fv'	180	1.60	1.00	1.00	-	-	-	-	1.00	1.00	8
Fb'+	900	1.60	1.00	1.00	0.978	1.100	-	1.00	1.00	1.00	8
Fcp'	625	-	1.00	1.00	-	-	-	-	1.00	1.00	-
E'	1.6 million		1.00	1.00	-	-	-	-	1.00	1.00	8
Emin'	0.58 million		1.00	1.00	-	-	-	-	1.00	1.00	8

CRITICAL LOAD COMBINATIONS:
Shear : LC #8 = D + 0.7E
Bending(+): LC #8 = D + 0.7E
Deflection: LC #8 = D + 0.7E (live)
LC #8 = D + 0.7E (total)
Bearing : Support 1 – LC #8 = D + 0.7E
Support 2 – LC #5 = D + 0.75(L + S + 0.7E)
D=dead L=live S=snow E=earthquake
All LC's are listed in the Analysis output
Load Patterns: s=S/2, X=L+S or L+Lr, _=no pattern load in this span
Load combinations: ASD Basic from ASCE 7-16 2.4
CALCULATIONS:
V max = 2667, V design = 2537 (NDS 3.4.3.1(a)) lbs; M(+) = 3358 lbs-ft
EI = 664.44e06 lb-in^2
"Live" deflection is due to all non-dead loads (live, wind, snow…)
Total deflection = 1.50 permanent + "live"
Lateral stability(+): Lu = 6.06' Le = 12.50' RB = 11.7

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2021) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

PRRNSF20230919

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SF6
Apr. 4, 2023 16:48

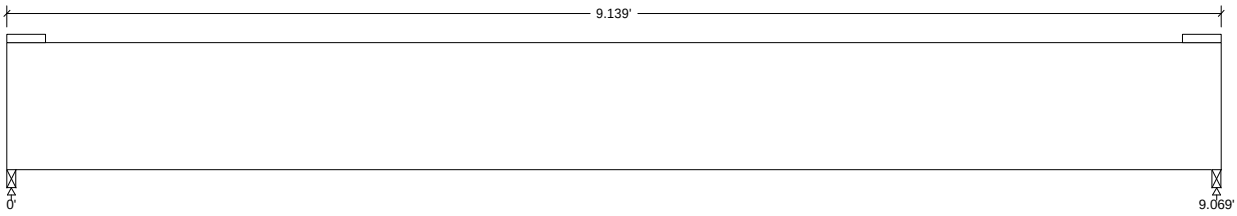
Design Check Calculation Sheet

WoodWorks Sizer 2023

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				12.00(11.75')		psf
Load2	Live	Full Area				40.00(11.75')		psf
Self-weight	Dead	Full UDL				15.0		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	712		712
Live	2148		2148
Factored:			
Total	2860		2860
Bearing:			
Capacity			
Beam	2860		2860
Support	3055		3055
Des ratio			
Beam	1.00		1.00
Support	0.94		0.94
Load comb	#2		#2
Length	0.83		0.83
Min req'd	0.83		0.83
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.07		1.07
Fcp sup	625		625

SF6

Timber-soft, D.Fir-L, No.2, 6x12 (5-1/2"x11-1/2")

Supports: All - Timber-soft Beam, D.Fir-L No.2
Total length: 9.13'; Clear span: 9.0'; Volume = 4.0 cu.ft.; Beam or stringer
Lateral support: top = at supports, bottom = at supports;
This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 53	Fv' = 170	psi	fv/Fv' = 0.31
Bending(+)	fb = 637	Fb' = 869	psi	fb/Fb' = 0.73
Live Defl'n	0.08 = < L/999	0.30 = L/360	in	0.26
Total Defl'n	0.12 = L/920	0.45 = L/240	in	0.26

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	LC#
Fv'	170	1.00	1.00	1.00	-	-	-	-	1.00	1.00	2
Fb'+	875	1.00	1.00	1.00	0.993	1.000	-	1.00	1.00	1.00	2
Fcp'	625	-	1.00	1.00	-	-	-	-	1.00	1.00	-
E'	1.3 million	1.00	1.00	-	-	-	-	-	1.00	1.00	2
Emin'	0.47 million	1.00	1.00	-	-	-	-	-	1.00	1.00	2

CRITICAL LOAD COMBINATIONS:
Shear : LC #2 = D + L
Bending(+): LC #2 = D + L
Deflection: LC #2 = D + L (live)
LC #2 = D + L (total)
Bearing : Support 1 - LC #2 = D + L
Support 2 - LC #2 = D + L
D=dead L=live
All LC's are listed in the Analysis output
Load Patterns: s=S/2, X=L+S or L+Lr, _=no pattern load in this span
Load combinations: ASD Basic from ASCE 7-16 2.4
CALCULATIONS:
V max = 2839, V design = 2217 (NDS 3.4.3.1(a)) lbs; M(+) = 6437 lbs-ft
EI = 906.17e06 lb-in^2
"Live" deflection is due to all non-dead loads (live, wind, snow…)
Total deflection = 1.50 permanent + "live"
Lateral stability(+): Lu = 9.06' Le = 17.69' RB = 9.0

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2021) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

SF7
Apr. 4, 2023 16:49

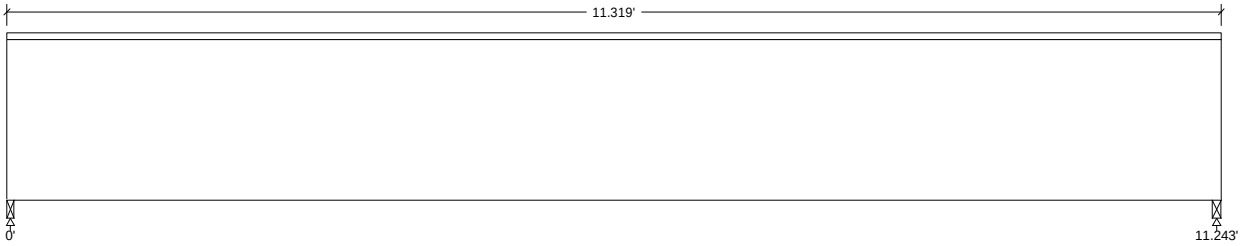
Design Check Calculation Sheet

WoodWorks Sizer 2023

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Partial Area		0.00	4.67	12.00(4.25')		psf
Load2	Live	Partial Area		0.00	4.67	40.00(4.25')		psf
Load3	Dead	Partial Area		4.67	11.25	12.00(8.25')		psf
Load4	Live	Partial Area		4.67	11.25	40.00(8.25')		psf
Load5	Dead	Point		4.67		113		lbs
Load6	Live	Point		4.67		264		lbs
Self-weight	Dead	Full UDL				18.2		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	550		656
Live	1428		1801
Factored:			
Total	1978		2458
Bearing:			
Capacity			
Beam	2144		2664
Support	1978		2458
Des ratio			
Beam	0.92		0.92
Support	1.00		1.00
Load comb	#2		#2
Length	0.82		1.01
Min req'd	0.82**		1.01**
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.11		1.11
Fcp sup	625		625

**Minimum bearing length governed by the required width of the supporting member.

SF7

LVL n-ply, 1.8E, 2600Fb, 1-3/4"x18", 2-ply (3-1/2"x18")

Supports: All - Timber-soft Beam, D.Fir-L No.2
Total length: 11.31'; Clear span: 11.188'; Volume = 5.0 cu.ft.
Lateral support: top = continuous, bottom = at supports;
This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 43	Fv' = 285	psi	fv/Fv' = 0.15
Bending(+)	fb = 433	Fb' = 2460	psi	fb/Fb' = 0.18
Live Defl'n	0.04 = < L/999	0.37 = L/360	in	0.12
Total Defl'n	0.07 = < L/999	0.56 = L/240	in	0.12

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Ci	LC#
Fv'	285	1.00	-	1.00	-	-	-	-	1.00	-	2
Fb'+	2600	1.00	-	1.00	1.000	0.946	-	1.00	1.00	-	2
Fcp'	750	-	-	1.00	-	-	-	-	1.00	-	-
E'	1.9 million		-	1.00	-	-	-	-	1.00	-	2
Eminy'	0.95 million		-	1.00	-	-	-	-	1.00	-	2

CRITICAL LOAD COMBINATIONS:
Shear : LC #2 = D + L
Bending(+): LC #2 = D + L
Deflection: LC #2 = D + L (live)
LC #2 = D + L (total)
Bearing : Support 1 – LC #2 = D + L
Support 2 – LC #2 = D + L
D=dead L=live
All LC's are listed in the Analysis output
Load Patterns: s=S/2, X=L+S or L+Lr, _=no pattern load in this span
Load combinations: ASD Basic from ASCE 7-16 2.4
CALCULATIONS:
V max = 2458, V design = 1803 (NDS 3.4.3.1(a)) lbs; M(+) = 6824 lbs-ft
EI = 1607.44e06 lb-in^2/ply GA = 7.44e06 lb
"Live" deflection is due to all non-dead loads (live, wind, snow…)
Total deflection = 1.50 permanent + "live"

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2021) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. BUILT-UP BEAMS: it is assumed that each ply is a single continuous member (that is, no butt joints are present) and that each ply is equally top-loaded. Where beams are side-loaded, special fastening details may be required.
4. SCL: Structural composite lumber design has assumed: - dry service conditions - no preservative or fire-retardant treatment - no notches
5. BUILT-UP SCL: Contact manufacturer for connection details when side-loaded or when loads are not applied equally to all plies.
6. SCL: Shear deflection is calculated using true modulus of elasticity E and shear modulus G = E/16.

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SF8
Apr. 4, 2023 16:49

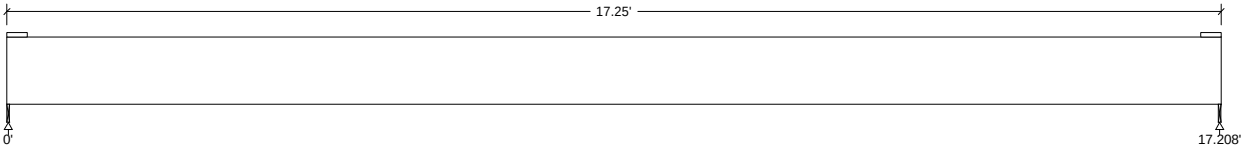
Design Check Calculation Sheet

WoodWorks Sizer 2023

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				15.00(4.25')		psf
Load2	Snow	Full Area				25.00(4.25')		psf
Self-weight	Dead	Full UDL				15.0		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	679		679
Snow	916		916
Factored:			
Total	1596		1596
Bearing:			
Capacity			
Beam	1719		1719
Support	1836		1836
Des ratio			
Beam	0.93		0.93
Support	0.87		0.87
Load comb	#2		#2
Length	0.50*		0.50*
Min req'd	0.50*		0.50*
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.07		1.07
Fcp sup	625		625

*Minimum bearing length setting used: 1/2" for end supports

SF8

Timber-soft, D.Fir-L, No.2, 6x12 (5-1/2"x11-1/2")

Supports: All - Timber-soft Beam, D.Fir-L No.2
Total length: 17.25'; Clear span: 17.188'; Volume = 7.6 cu.ft.; Beam or stringer
Lateral support: top = at supports, bottom = at supports;
This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 33	Fv' = 195	psi	fv/Fv' = 0.17
Bending(+)	fb = 678	Fb' = 989	psi	fb/Fb' = 0.69
Live Defl'n	0.23 = L/892	0.57 = L/360	in	0.40
Total Defl'n	0.49 = L/422	0.86 = L/240	in	0.57

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	LC#
Fv'	170	1.15	1.00	1.00	-	-	-	-	1.00	1.00	2
Fb'+	875	1.15	1.00	1.00	0.983	1.000	-	1.00	1.00	1.00	2
Fcp'	625	-	1.00	1.00	-	-	-	-	1.00	1.00	-
E'	1.3 million		1.00	1.00	-	-	-	-	1.00	1.00	2
Emin'	0.47 million		1.00	1.00	-	-	-	-	1.00	1.00	2

CRITICAL LOAD COMBINATIONS:
Shear : LC #2 = D + S
Bending(+): LC #2 = D + S
Deflection: LC #2 = D + S (live)
LC #2 = D + S (total)
Bearing : Support 1 - LC #2 = D + S
Support 2 - LC #2 = D + S
D=dead S=snow
All LC's are listed in the Analysis output
Load Patterns: s=S/2, X=L+S or L+Lr, _=no pattern load in this span
Load combinations: ASD Basic from ASCE 7-16 2.4
CALCULATIONS:
V max = 1592, V design = 1411 (NDS 3.4.3.1(a)) lbs; M(+) = 6849 lbs-ft
EI = 906.17e06 lb-in^2
"Live" deflection is due to all non-dead loads (live, wind, snow…)
Total deflection = 1.50 permanent + "live"
Lateral stability(+): Lu = 17.19' Le = 31.69' RB = 12.0

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2021) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

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SF9
Apr. 5, 2023 09:25

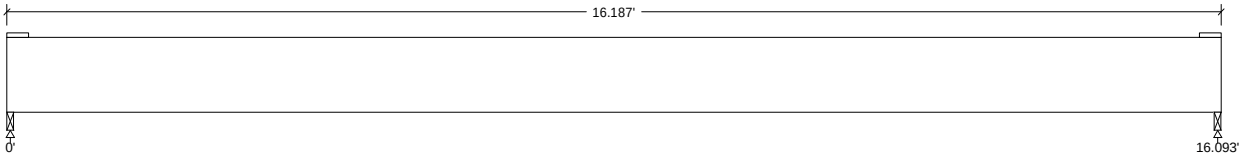
Design Check Calculation Sheet

WoodWorks Sizer 2023

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				15.00(12.00')		psf
Load2	Snow	Full Area				25.00(12.00')		psf
Self-weight	Dead	Full UDL				15.2		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	1579		1579
Snow	2428		2428
Factored:			
Total	4007		4007
Bearing:			
Capacity			
Beam	4007		4007
Support	4116		4116
Des ratio			
Beam	1.00		1.00
Support	0.97		0.97
Load comb	#2		#2
Length	1.12		1.12
Min req'd	1.12		1.12
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.07		1.07
Fcp sup	625		625

SF9

Glulam-Unbal., West Species, 24F-V4 DF, 5-1/2"x12"

Supports: All - Timber-soft Beam, D.Fir-L No.2
Total length: 16.19'; Clear span: 16'; Volume = 7.4 cu.ft.; 8 laminations, 5-1/2" maximum width,
Lateral support: top = at supports, bottom = at supports;
This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 79	Fv' = 305	psi	fv/Fv' = 0.26
Bending(+)	fb = 1457	Fb' = 2681	psi	fb/Fb' = 0.54
Live Defl'n	0.32 = L/608	0.54 = L/360	in	0.59
Total Defl'n	0.63 = L/307	0.80 = L/240	in	0.78

Additional Data:

```
FACTORS:  F/E(psi) CD    CM    Ct    CL     CV    Cfu    Cr   Cfrt  Notes Cvr   LC#
 Fv'        265    1.15  1.00  1.00   -      -     -     -    1.00  1.00  1.00   2
 Fb'+      2400    1.15  1.00  1.00  0.971  1.000  -     -    1.00  1.00   -     2
 Fcp'       650     -    1.00  1.00   -      -     -     -    1.00   -     -      -
 E'        1.8 million  1.00  1.00   -      -     -     -    1.00   -     -     2
 Eminy'   0.85 million  1.00  1.00   -      -     -     -    1.00   -     -     2
CRITICAL LOAD COMBINATIONS:
 Shear     : LC #2  = D + S
 Bending(+): LC #2  = D + S
 Deflection: LC #2  = D + S  (live)
             LC #2  = D + S  (total)
 Bearing   : Support 1 - LC #2 = D + S
             Support 2 - LC #2 = D + S
 D=dead S=snow
 All LC's are listed in the Analysis output
 Load Patterns: s=S/2,  X=L+S or L+Lr,  _=no pattern load in this span
 Load combinations: ASD Basic from ASCE 7-16 2.4
CALCULATIONS:
 V max = 3985, V design = 3466 (NDS 3.4.3.1(a)) lbs; M(+) = 16032 lbs-ft
 EI = 1425.58e06 lb-in^2
 "Live" deflection is due to all non-dead loads (live, wind, snow…)
 Total deflection = 1.50 permanent + "live"
 Lateral stability(+):  Lu = 16.06'  Le = 29.63'  RB = 11.9
```

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2021) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2015 and manufactured in accordance with ANSI A190.1-2012
4. GLULAM: bxd = actual breadth x actual depth.
5. Glulam Beams shall be laterally supported according to the provisions of NDS Clause 3.3.3.
6. GLULAM: bearing length based on smaller of Fcp(tension), Fcp(comp'n).

PRRNSF20230919

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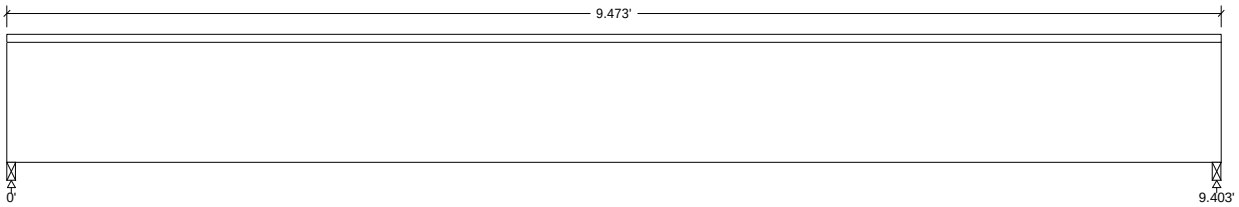
F1
Apr. 4, 2023 16:50

Design Check Calculation Sheet
WoodWorks Sizer 2023

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				12.00(24.0")		psf
Load2	Live	Full Area				40.00(24.0")		psf
Self-weight	Dead	Full UDL				3.5		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	130		130
Live	379		379
Factored:			
Total	509		509
Bearing:			
Capacity			
Joist	509		509
Support	982		982
Des ratio			
Joist	1.00		1.00
Support	0.52		0.52
Load comb	#2		#2
Length	0.84		0.84
Min req'd	0.84		0.84
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.25		1.25
Fcp sup	625		625

F1
Lumber-soft, Hem-Fir, No.2, 2x12 (1-1/2"x11-1/4")
Supports: All - Timber-soft Beam, D.Fir-L No.2
Floor joist spaced at 24.0" c/c; Total length: 9.5'; Clear span: 9.313'; Volume = 1.1 cu.ft.
Lateral support: top = continuous, bottom = at supports; Repetitive factor: applied where permitted (refer to online help);
This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 36	Fv' = 150	psi	fv/Fv' = 0.24
Bending(+)	fb = 451	Fb' = 977	psi	fb/Fb' = 0.46
Live Defl'n	0.06 = < L/999	0.31 = L/360	in	0.19
Total Defl'n	0.09 = < L/999	0.47 = L/240	in	0.20

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	LC#
Fv'	150	1.00	1.00	1.00	-	-	-	-	1.00	1.00	2
Fb'+	850	1.00	1.00	1.00	1.000	1.000	-	1.15	1.00	1.00	2
Fcp'	405	-	1.00	1.00	-	-	-	-	1.00	1.00	-
E'	1.3 million		1.00	1.00	-	-	-	-	1.00	1.00	2
Emin'	0.47 million		1.00	1.00	-	-	-	-	1.00	1.00	2

CRITICAL LOAD COMBINATIONS:
Shear : LC #2 = D + L
Bending(+): LC #2 = D + L
Deflection: LC #2 = D + L (live)
LC #2 = D + L (total)
Bearing : Support 1 – LC #2 = D + L
Support 2 – LC #2 = D + L
D=dead L=live
All LC's are listed in the Analysis output
Load Patterns: s=S/2, X=L+S or L+Lr, _=no pattern load in this span
Load combinations: ASD Basic from ASCE 7-16 2.4

CALCULATIONS:
V max = 505, V design = 401 (NDS 3.4.3.1(a)) lbs; M(+) = 1188 lbs-ft
EI = 231.37e06 lb-in^2
"Live" deflection is due to all non-dead loads (live, wind, snow…)
Total deflection = 1.50 permanent + "live"

Design Notes:
1. Analysis and design are in accordance with the ICC International Building Code (IBC 2021) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

F2
Apr. 4, 2023 16:51

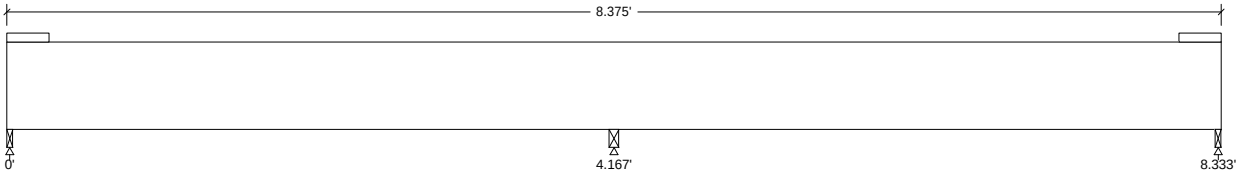
Design Check Calculation Sheet

WoodWorks Sizer 2023

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area	No			12.00(7.17')		psf
Load2	Live	Full Area	Yes			40.00(7.17')		psf
Self-weight	Dead	Full UDL	No			6.0		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:					
Dead	146		479		146
Live	529		1493		529
Factored:					
Total	674		1972		674
Bearing:					
Capacity					
Beam	1094		2602		1094
Support	1211		1972		1211
Des ratio					
Beam	0.62		0.76		0.62
Support	0.56		1.00		0.56
Load comb	#3		#2		#4
Length	0.50*		0.81		0.50*
Min req'd	0.50*		0.81**		0.50*
Cb	1.00		1.46		1.00
Cb min	1.00		1.46		1.00
Cb support	1.11		1.11		1.11
Fcp sup	625		625		625

*Minimum bearing length setting used: 1/2" for end supports
**Minimum bearing length governed by the required width of the supporting member.

F2

Lumber-soft, D.Fir-L, No.2, 4x8 (3-1/2"x7-1/4")
Supports: All - Timber-soft Beam, D.Fir-L No.2
Total length: 8.38'; Clear span: 4.125', 4.125'; Volume = 1.5 cu.ft.
Lateral support: top = at end supports, bottom = at end supports;
This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 44	Fv' = 180	psi	fv/Fv' = 0.24
Bending(+)	fb = 229	Fb' = 1157	psi	fb/Fb' = 0.20
Bending(-)	fb = 322	Fb' = 1157	psi	fb/Fb' = 0.28
Live Defl'n	0.01 = < L/999	0.14 = L/360	in	0.06
Total Defl'n	0.01 = < L/999	0.21 = L/240	in	0.05

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	LC#
Fv'	180	1.00	1.00	1.00	-	-	-	-	1.00	1.00	2
Fb'+	900	1.00	1.00	1.00	0.989	1.300	-	1.00	1.00	1.00	3
Fb'-	900	1.00	1.00	1.00	0.989	1.300	-	1.00	1.00	1.00	2
Fcp'	625	-	1.00	1.00	-	-	-	-	1.00	1.00	-
E'	1.6 million		1.00	1.00	-	-	-	-	1.00	1.00	3
Emin'	0.58 million		1.00	1.00	-	-	-	-	1.00	1.00	3

CRITICAL LOAD COMBINATIONS:
Shear : LC #2 = D + L
Bending(+): LC #3 = D + L (pattern: L_)
Bending(-): LC #2 = D + L
Deflection: LC #3 = (live)
LC #3 = (total)
Bearing : Support 1 - LC #3 = D + L (pattern: L_)
Support 2 - LC #2 = D + L
Support 3 - LC #4 = D + L (pattern: _L)
D=dead L=live
All LC's are listed in the Analysis output
Load Patterns: s=S/2, X=L+S or L+Lr, _=no pattern load in this span
Load combinations: ASD Basic from ASCE 7-16 2.4
CALCULATIONS:
V max = 986, V design = 745 (NDS 3.4.3.1(a)) lbs; M(+) = 586 lbs-ft; M(-) = 822 lbs-ft
EI = 177.83e06 lb-in^2
"Live" deflection is due to all non-dead loads (live, wind, snow…)
Total deflection = 1.50 permanent + "live"
Lateral stability(+): Lu = 8.31' Le = 15.38' RB = 10.5; Lu based on full length
Lateral stability(-): Lu = 8.31' Le = 15.38' RB = 10.5; Lu based on full length

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2021) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Continuous or Cantilevered Beams: NDS Clause 4.2.5.5 requires that normal grading provisions be extended to the middle 2/3 of 2 span beams and to the full length of cantilevers and other spans.
4. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

WoodWorks® SOFTWARE FOR WOOD DESIGN

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F3
Apr. 4, 2023 16:52

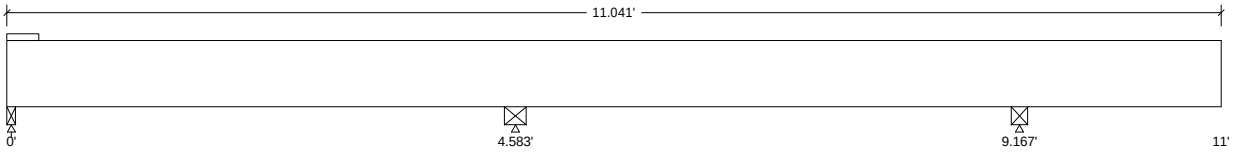
Design Check Calculation Sheet

WoodWorks Sizer 2023

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area	No			12.00(8.08')		psf
Load2	Live	Full Area	Yes			40.00(8.08')		psf
Load3	Dead	Full Area	No			12.00(11.75')		psf
Load4	Live	Full Area	Yes			40.00(11.75')		psf
Self-weight	Dead	Full UDL	No			6.0		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:								
Dead	451		1264		978			
Live	1696		4544		3408			
Factored:								
Total	2147		5808		4387			
Bearing:								
Capacity								
Beam	2147		6066		4783			
Support	2377		5808		4387			
Des ratio								
Beam	1.00		0.96		0.92			
Support	0.90		1.00		1.00			
Load comb	#7		#5		#8			
Length	0.98		2.40		1.81			
Min req'd	0.98		2.40**		1.81**			
Cb	1.00		1.16		1.21			
Cb min	1.00		1.16		1.21			
Cb support	1.11		1.11		1.11			
Fcp sup	625		625		625			

**Minimum bearing length governed by the required width of the supporting member.

F3

Lumber-soft, D.Fir-L, No.2, 4x8 (3-1/2"x7-1/4")

Supports: All - Timber-soft Beam, D.Fir-L No.2
Total length: 11.06'; Clear span: 4.438', 4.438', 1.75'; Volume = 1.9 cu.ft.
Lateral support: top = at end supports, bottom = at end supports;
This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 132	Fv' = 180	psi	fv/Fv' = 0.73
Bending(+)	fb = 836	Fb' = 1155	psi	fb/Fb' = 0.72
Bending(-)	fb = 1026	Fb' = 1155	psi	fb/Fb' = 0.89
Deflection:				
Interior Live	0.04 = < L/999	0.15 = L/360	in	0.23
Total	0.05 = < L/999	0.23 = L/240	in	0.20
Cantil. Live	0.06 = L/387	0.12 = L/180	in	0.46
Total	0.06 = L/347	0.18 = L/120	in	0.35

Additional Data:

```
FACTORS:  F/E(psi) CD    CM    Ct    CL     CF    Cfu    Cr   Cfrt   Ci    LC#
 Fv'       180    1.00  1.00  1.00    -      -     -     -    1.00  1.00    5
 Fb'+      900    1.00  1.00  1.00  0.987  1.300   -    1.00  1.00  1.00    7
 Fb'-      900    1.00  1.00  1.00  0.987  1.300   -    1.00  1.00  1.00    5
 Fcp'      625     -    1.00  1.00    -      -     -     -    1.00  1.00    -
 E'        1.6 million  1.00  1.00    -      -     -     -    1.00  1.00    7
 Emin'    0.58 million  1.00  1.00    -      -     -     -    1.00  1.00    7
CRITICAL LOAD COMBINATIONS:
 Shear     : LC #5  = D + L (pattern: LL_)
 Bending(+): LC #7  = D + L (pattern: L_L)
 Bending(-): LC #5  = D + L (pattern: LL_)
 Deflection: LC #7  =   (live)
             LC #7  =   (total)
 Bearing   : Support 1 - LC #7 = D + L (pattern: L_L)
             Support 2 - LC #5 = D + L (pattern: LL_)
             Support 3 - LC #8 = D + L (pattern: _LL)
 D=dead L=live
 All LC's are listed in the Analysis output
 Load Patterns: s=S/2,  X=L+S or L+Lr,  _=no pattern load in this span
 Load combinations: ASD Basic from ASCE 7-16 2.4
CALCULATIONS:
 V max = 2949, V design = 2227 (NDS 3.4.3.1(a)) lbs; M(+) = 2136 lbs-ft; M(-) = 2621 lbs-ft
 EI = 177.83e06 lb-in^2
 "Live" deflection is due to all non-dead loads (live, wind, snow…)
 Total deflection = 1.50 permanent + "live"
 Lateral stability(+):  Lu = 11.00'  Le = 17.63'  RB = 11.2; Lu based on full length
 Lateral stability(-):  Lu = 11.00'  Le = 17.63'  RB = 11.2; Lu based on full length
```

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2021) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Continuous or Cantilevered Beams: NDS Clause 4.2.5.5 requires that normal grading provisions be extended to the middle 2/3 of 2 span beams and to the full length of cantilevers and other spans.
4. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.
5. The critical deflection value has been determined using maximum back-span deflection. Cantilever deflections do not govern design.

F4
Apr. 4, 2023 16:53

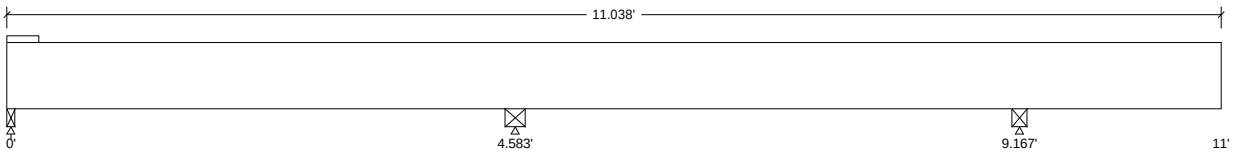
Design Check Calculation Sheet

WoodWorks Sizer 2023

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area	No			12.00(9.17')		psf
Load2	Live	Full Area	Yes			40.00(9.17')		psf
Load3	Dead	Full Area	No			12.00(9.17')		psf
Load4	Live	Full Area	Yes			40.00(9.17')		psf
Self-weight	Dead	Full UDL	No			6.0		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:								
Dead	418		1171		907		
Live	1566		4202		3152		
Factored:								
Total	1983		5373		4058		
Bearing:								
Capacity								
Beam	1983		5673		4486		
Support	2196		5373		4058		
Des ratio								
Beam	1.00		0.95		0.90		
Support	0.90		1.00		1.00		
Load comb	#7		#5		#8		
Length	0.91		2.22		1.68		
Min req'd	0.91		2.22**		1.68**		
Cb	1.00		1.17		1.22		
Cb min	1.00		1.17		1.22		
Cb support	1.11		1.11		1.11		
Fcp sup	625		625		625		

**Minimum bearing length governed by the required width of the supporting member.

Lumber-soft, D.Fir-L, No.2, 4x8 (3-1/2"x7-1/4")
Supports: All - Timber-soft Beam, D.Fir-L No.2
Total length: 11.06'; Clear span: 4.438', 4.438', 1.75'; Volume = 1.9 cu.ft.
Lateral support: top = at end supports, bottom = at end supports;
This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 122	Fv' = 180	psi	fv/Fv' = 0.68
Bending(+)	fb = 773	Fb' = 1155	psi	fb/Fb' = 0.67
Bending(-)	fb = 949	Fb' = 1155	psi	fb/Fb' = 0.82
Deflection:				
Interior Live	0.03 = < L/999	0.15 = L/360	in	0.21
Total	0.04 = < L/999	0.23 = L/240	in	0.18
Cantil. Live	0.05 = L/418	0.12 = L/180	in	0.43
Total	0.06 = L/375	0.18 = L/120	in	0.32

Additional Data:

```
FACTORS:  F/E(psi) CD    CM    Ct    CL     CF    Cfu    Cr   Cfrt   Ci    LC#
 Fv'       180    1.00  1.00  1.00    -      -     -     -    1.00  1.00    5
 Fb'+      900    1.00  1.00  1.00  0.987  1.300   -    1.00  1.00  1.00    7
 Fb'-      900    1.00  1.00  1.00  0.987  1.300   -    1.00  1.00  1.00    5
 Fcp'      625     -    1.00  1.00    -      -     -     -    1.00  1.00    -
 E'       1.6 million  1.00  1.00    -      -     -     -    1.00  1.00    7
 Emin'    0.58 million  1.00  1.00    -      -     -     -    1.00  1.00    7
CRITICAL LOAD COMBINATIONS:
 Shear     : LC #5  = D + L (pattern: LL_)
 Bending(+): LC #7  = D + L (pattern: L_L)
 Bending(-): LC #5  = D + L (pattern: LL_)
 Deflection: LC #7  =   (live)
             LC #7  =   (total)
 Bearing   : Support 1 - LC #7 = D + L (pattern: L_L)
             Support 2 - LC #5 = D + L (pattern: LL_)
             Support 3 - LC #8 = D + L (pattern: _LL)
 D=dead L=live
 All LC's are listed in the Analysis output
 Load Patterns: s=S/2,  X=L+S or L+Lr,  _=no pattern load in this span
 Load combinations: ASD Basic from ASCE 7-16 2.4
CALCULATIONS:
 V max = 2728, V design = 2067 (NDS 3.4.3.1(a)) lbs; M(+) = 1976 lbs-ft; M(-) = 2425 lbs-ft
 EI = 177.83e06 lb-in^2
 "Live" deflection is due to all non-dead loads (live, wind, snow…)
 Total deflection = 1.50 permanent + "live"
 Lateral stability(+):  Lu = 11.00'  Le = 17.63'  RB = 11.2; Lu based on full length
 Lateral stability(-):  Lu = 11.00'  Le = 17.63'  RB = 11.2; Lu based on full length
```

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2021) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Continuous or Cantilevered Beams: NDS Clause 4.2.5.5 requires that normal grading provisions be extended to the middle 2/3 of 2 span beams and to the full length of cantilevers and other spans.
4. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.
5. The critical deflection value has been determined using maximum back-span deflection. Cantilever deflections do not govern design.