STRUCTURAL CALCULATIONS

Project: Alyssa Gildea
Address: 4802 N 29th St
Tacoma, WA 98407
Project No.: 25160
Date: October 2, 2025

PERMIT SUBMITTAL

10/06/2025

Client:

Contents:

1412 Beach Drive NE Unit A | Tacoma WA, WA | 98422

253.533.0835 | tel

Structural Works, PLLC

These enclosed documents are to be used in conjunction with the plans referenced on the cover. It is essential that the contractor study the engineering requirements and required changes to the architectural plan prior to start of work. Changes may include additional foundation or footings, beam size changes, siding changes, etc.

Scope of Engineering: Engineering analyses and design to resist lateral and gravity loads in accordance with the 2021 IBC have been performed and incorporated into stamped "S" sheets. All analyses and calculations are included in this engineering report. Engineering assumptions are listed below. If these conditions are not present at the site, these calculations are void and Structural Works, PLLC must be contacted immediately.

Loading Criteria

- Building Code	2021 International Building Code
- Seismic Design Category	D
- Sds	1.113
- Response Mod Factor	6.5
- Site Class	D
- Basic Wind Speed	130 MPH, Exposure B

Live Loads U.N.O.

- Uninhabitable attics without storage	10 psf
- Uninhabitable attics with storage	20 psf
- Habitable attics and sleeping areas	30 psf
- Decks	60 psf
- All other areas	40 psf

Dead Loads U.N.O.

- Roof with composition roofing	15 psf
- Floor	10 psf

Snow Loads U.N.O.

- Snow	25 psf

Soils Criteria

- Soils consultant	None
- Soils Report #	None
- Bearing Pressure Required	1500 psf (min required – Assumed)
- Min Frost Depth	12"

Structural Works PLLC
1412 Beach Drive NE #A
Tacoma, WA 98422
(253) 533-0835

ROOF			
Member Name	**Results (Max UTIL %)**	**Current Solution**	**Comments**
GHDR-1	Passed (70% ΔL)	1 piece(s) 5 1/2" x 15" 24F-V4 DF Glulam	
GHDR-2	Passed (75% M)	1 piece(s) 6 x 12 DF No.2	

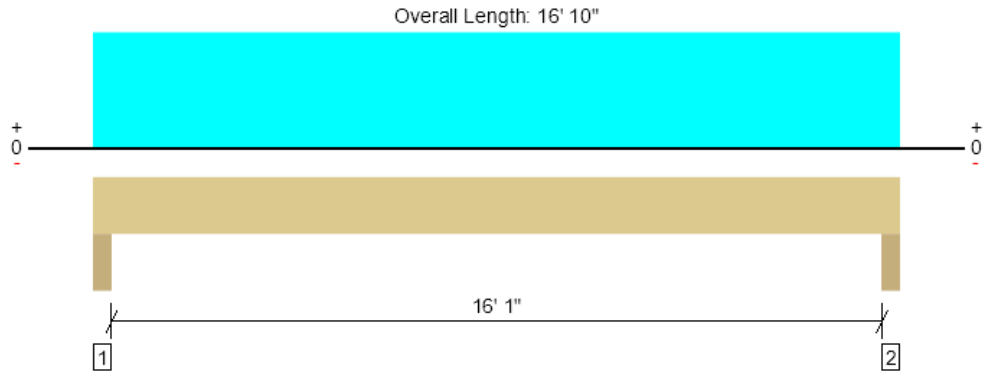
FORTEWEB

MEMBER REPORT

PASSED

ROOF, GHDR-1

1 piece(s) 5 1/2" x 15" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	8024 @ 3"	16088 (4.50")	Passed (50%)	--	1.0 D + 1.0 Lr (All Spans)
Shear (lbs)	6475 @ 1' 7 1/2"	18219	Passed (36%)	1.25	1.0 D + 1.0 Lr (All Spans)
Pos Moment (Ft-lbs)	31793 @ 8' 5"	51344	Passed (62%)	1.25	1.0 D + 1.0 Lr (All Spans)
Live Load Defl. (in)	0.383 @ 8' 5"	0.544	Passed (L/511)	--	1.0 D + 1.0 Lr (All Spans)
Total Load Defl. (in)	0.548 @ 8' 5"	0.817	Passed (L/357)	--	1.0 D + 1.0 Lr (All Spans)

Member Length : 16' 10"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Volume factor of 1.00 was calculated for positive bending using length L = 16' 4".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Factored	
1 - Trimmer - DF	4.50"	4.50"	2.24"	2413	5611	2806	8024	None
2 - Trimmer - DF	4.50"	4.50"	2.24"	2413	5611	2806	8024	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	16' 10" o/c	
Bottom Edge (Lu)	16' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 16' 10"	N/A	20.0	--	--	
1 - Uniform (PSF)	0 to 16' 10"	13' 4"	15.0	20.0	25.0	Default Load
2 - Uniform (PSF)	0 to 16' 10"	13' 4"	5.0	30.0	--	Roof

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

Weyerhaeuser

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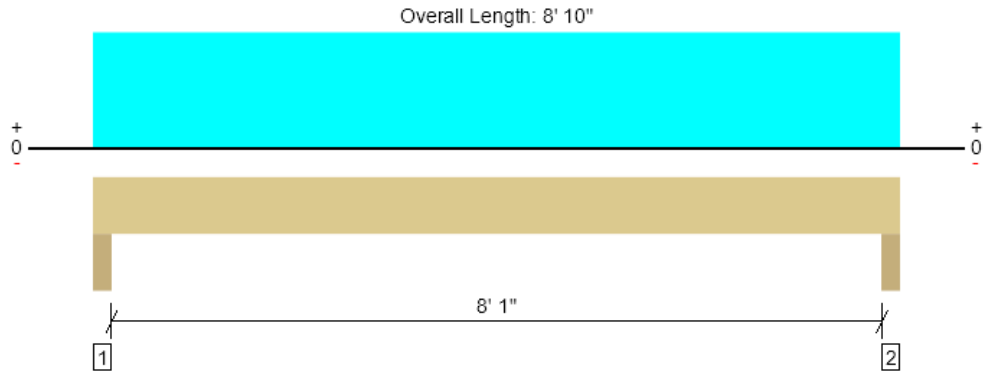
FORTEWEB

MEMBER REPORT

PASSED

ROOF, GHDR-2

1 piece(s) 6 x 12 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4206 @ 3"	15469 (4.50")	Passed (27%)	--	1.0 D + 1.0 Lr (All Spans)
Shear (lbs)	2936 @ 1' 4"	8960	Passed (33%)	1.25	1.0 D + 1.0 Lr (All Spans)
Moment (Ft-lbs)	8266 @ 4' 5"	11050	Passed (75%)	1.25	1.0 D + 1.0 Lr (All Spans)
Live Load Defl. (in)	0.080 @ 4' 5"	0.278	Passed (L/999+)	--	1.0 D + 1.0 Lr (All Spans)
Total Load Defl. (in)	0.114 @ 4' 5"	0.417	Passed (L/877)	--	1.0 D + 1.0 Lr (All Spans)

Member Length : 8' 10"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Lumber grading provisions must be extended over the length of the member per NDS 4.2.5.5.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Factored	
1 - Trimmer - DF	4.50"	4.50"	1.50"	1250	2955	1472	4206	None
2 - Trimmer - DF	4.50"	4.50"	1.50"	1250	2955	1472	4206	None

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

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 8' 10"	N/A	16.0	--	--	
1 - Uniform (PSF)	0 to 8' 10"	13' 4"	15.0	20.0	25.0	Default Load
2 - Uniform (PSF)	0 to 8' 10"	13' 5"	5.0	30.0	--	Roof

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Weyerhaeuser

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File Name: 25160

PASS

DATE:	3/26/2024	COMPANY:	--
STRUCALC BUILD:	StruCalc Pro	DESIGNED BY:	Ercin Sahin
CUSTOMER:		REVIEWED BY:	--
PROJ. ADDRESS:	--	PROJECT NAME:	1500 psf
	--		
LEVEL:	Main Floor	LOADING:	ASD
MEMBER NAME:	FT-3.0 SQR	CODE:	2021 International Building Code
MEMBER TYPE:	ISOLATED FOOTING	ACI:	ACI 318-19
MATERIAL:	Concrete		

3 (ft) X 3 (ft) X 12 (in)	Soil Depth TOF: 0 (ft)	Bot. (4) #4 Long, (4) #4 Short

MATERIAL PROPERTIES

FOOTING

Width (ft)	Length (ft)	Depth (in)	Volume (ft^3)	Footing Weight (lb/ft)
3	3	12	9	1305

CONCRETE

fc' (psi)	Ec (psi)	Density (lbf/ft^3)	Agg. Dia. (in)
2500	0	145	0.75

CALCULATION VARIABLES

Bo (in)
0

COLUMN

Width (in)	Length (in)	Material	Offset X (in)	Offset Y (in)
6	6	Wood	0	0

SOIL

Bearing Strength (lbf/ft^2)	Density (lbf/ft^3)	Cohesion	Friction Angle	Depth (ft)	Rankine Coefficient (Kp)
1500	110	0	30	0	3

REBAR

Bottom Bar Size #	fy (psi)	Es (psi)
4	40000	2.9E+07

COVER

Top Cover (in.	Bottom Cover (in.	Side Cover (in.
3	3	3

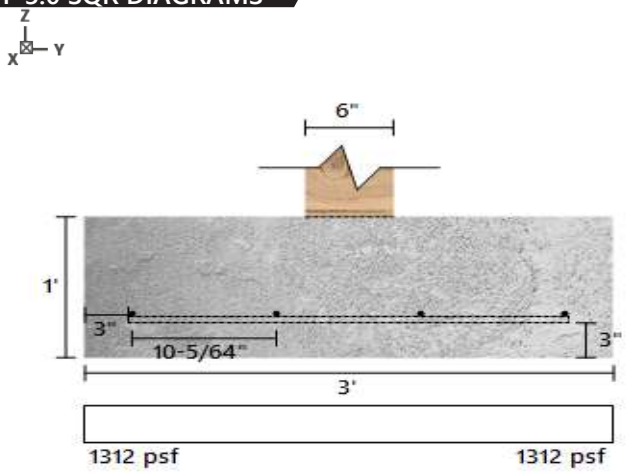
PASS-FAIL

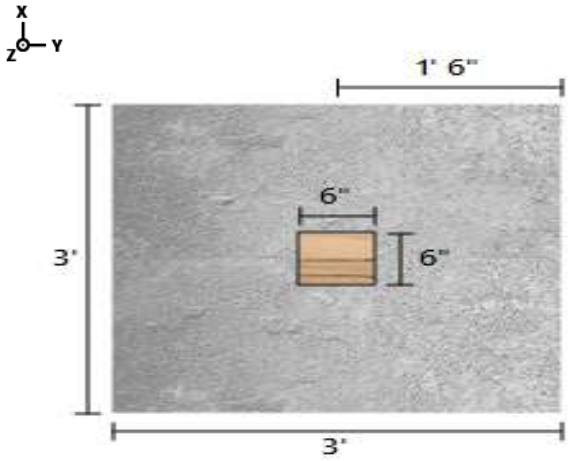
	PASS/FAIL	MAGNITUDE	STRENGTH	LOAD COMBO	CALCULATION TYPE
Soil Bearing Pressure (lbf/ft^2)	PASS (12.6%)	1311.7	1500.0	D	ASD
One-Way Shear X (lbf)	PASS (83.3%)	4338.5	25920.0	1.4D	LRFD
One-Way Shear Y (lbf)	PASS (83.3%)	4338.5	25920.0	1.4D	LRFD
Two-Way Shear (lbf)	PASS (85.6%)	12232.3	84960.0	1.4D	LRFD
Moment X (lbf-ft)	PASS (77.0%)	4632.0	20131.5	1.4D	LRFD
Moment Y (lbf-ft)	PASS (77.0%)	4632.0	20131.5	1.4D	LRFD
Crushing (lbf)	PASS (85.2%)	14700.0	99450.0	1.4D	LRFD
Compression (ft^2)	PASS (100.0%)	9.0	9.0	D	LRFD

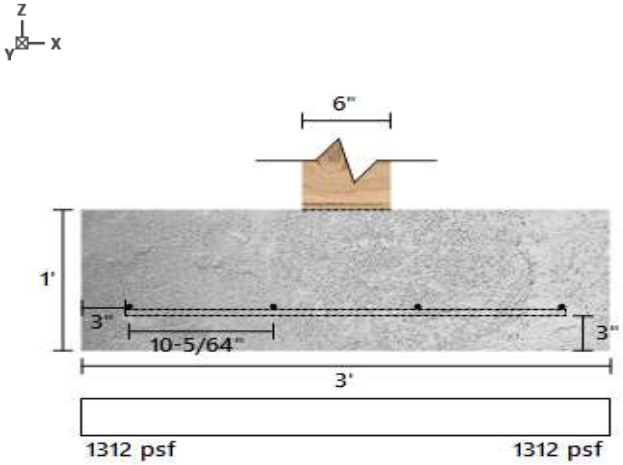
LOAD LIST

Type	Name	Left Magnitude	Right Magnitude	Load Start (ft)	Load End (ft)	Load Type	Direction
Point (lbf)	Point	10500	-	0	-	Dead	Z

FT-3.0 SQR DIAGRAMS



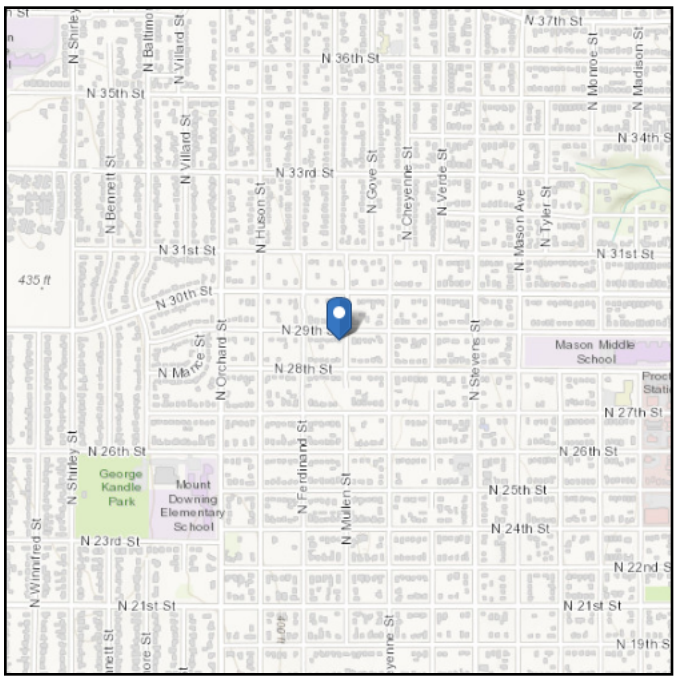


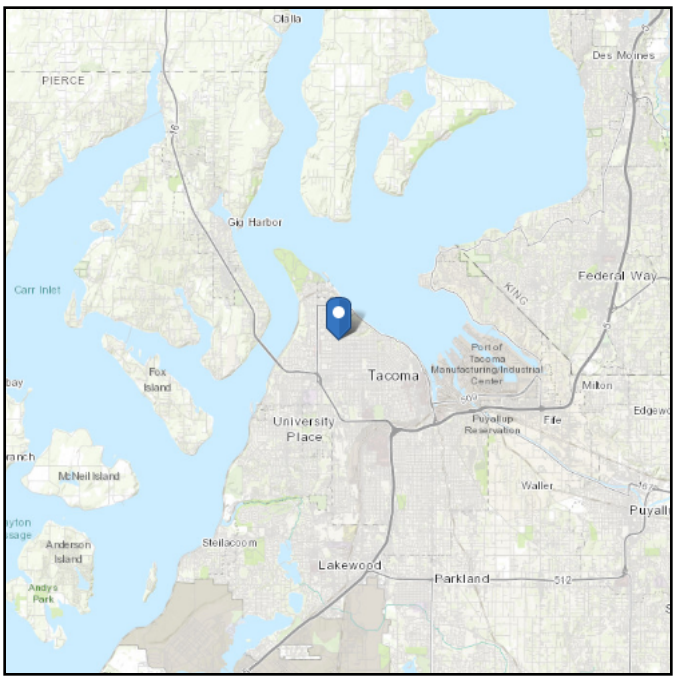


ASCE Hazards Report

Address:
4802 N 29th St
Tacoma, Washington
98407

Standard:	ASCE/SEI 7-16	**Latitude:**	47.273745
Risk Category:	II	**Longitude:**	-122.501054
Soil Class:	D - Default (see Section 11.4.3)	**Elevation:**	346.3195050553209 ft (NAVD 88)





Wind

Results:

Wind Speed	97 Vmph
10-year MRI	67 Vmph
25-year MRI	73 Vmph
50-year MRI	78 Vmph
100-year MRI	83 Vmph

Data Source:	ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed:	Tue May 06 2025

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

Seismic

Site Soil Class: D - Default (see Section 11.4.3)

Results:

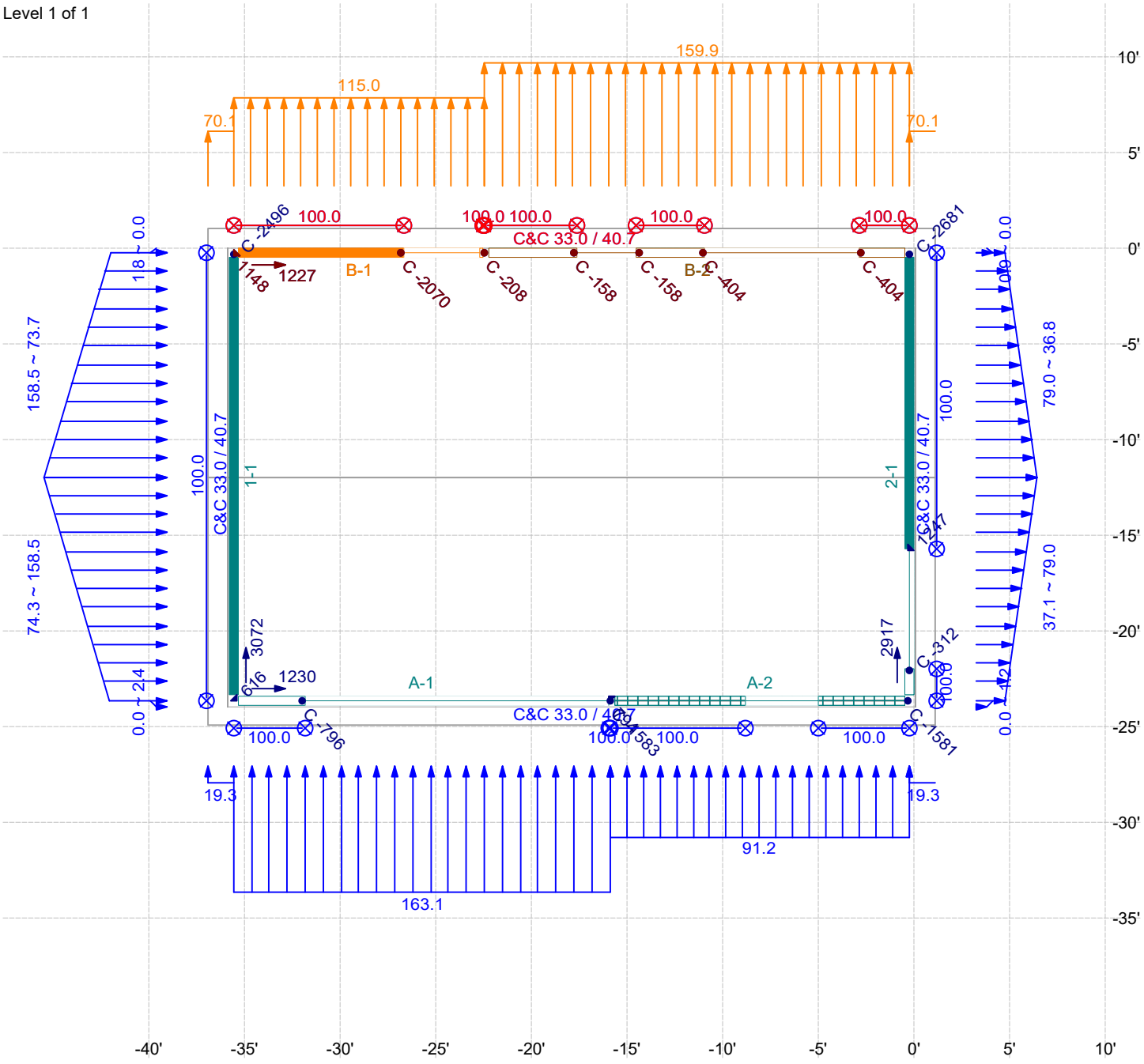
S_S :	1.391	S_{D1} :	N/A
S_1 :	0.481	T_L :	6
F_a :	1.2	PGA :	0.539
F_v :	N/A	PGA_M :	0.647
S_{MS} :	1.669	F_{PGA} :	1.2
S_{M1} :	N/A	I_e :	1
S_{DS} :	1.113	C_v :	1.378

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Tue May 06 2025

Date Source: USGS Seismic Design Maps

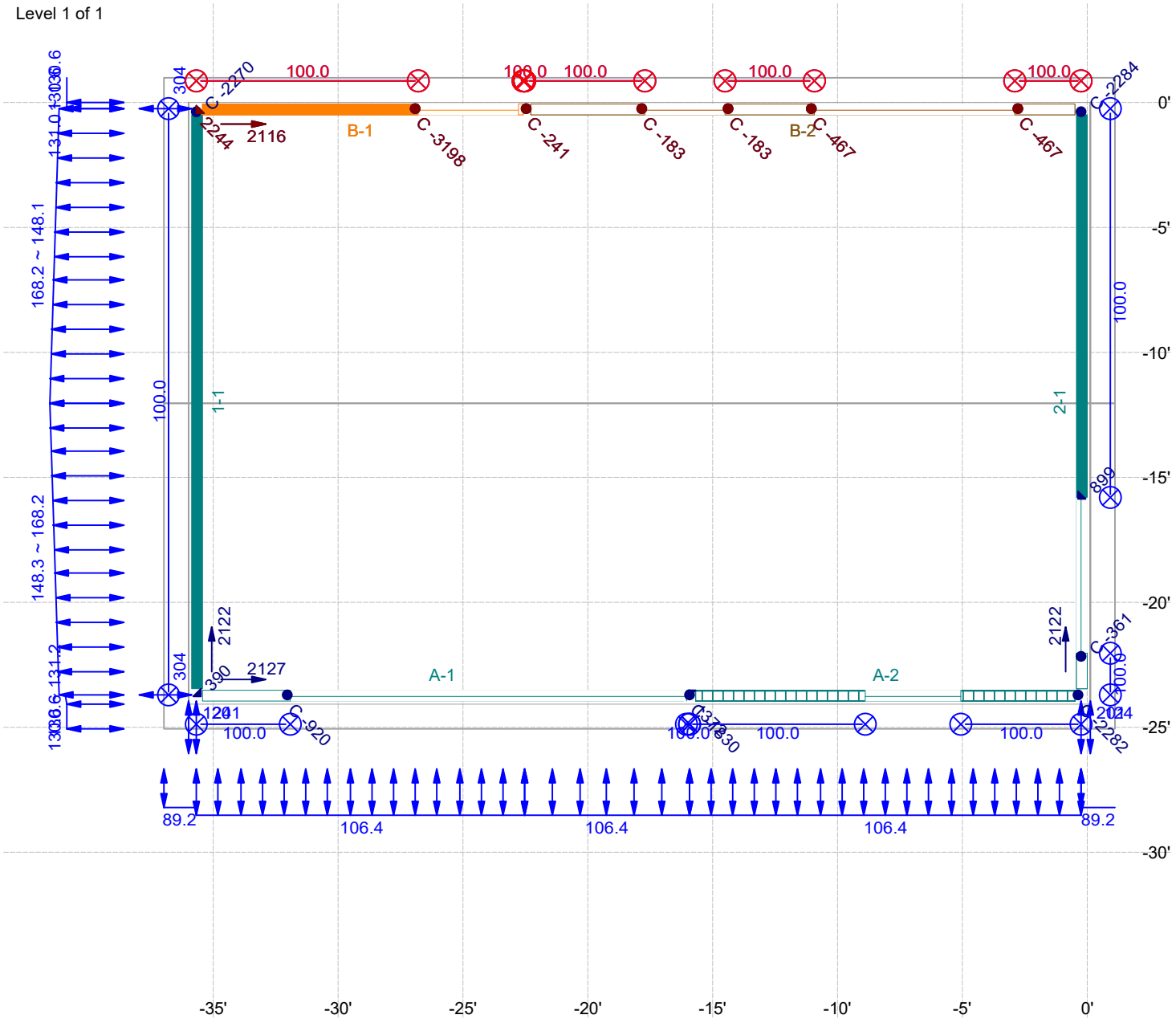
Level 1 of 1



Factored shearline force (lbs)
Factored hold-down force (lbs)
C Factored compression force (lbs)
Vertical element required
Unfactored applied shear load (plf)
Unfactored dead load (plf,lbs)
Unfactored uplift wind load (plf,lbs)
Applied point load or discontinuous shearline force (lbs)

Loads: Directional Case 1 Wind (W); Forces: 0.6W + 0.6D; Flexible distribution

Level 1 of 1



Factored shearline force (lbs)
Factored hold-down force (lbs)
C Factored compression force (lbs)
Vertical element required
Unfactored applied shear load (plf)
Unfactored dead load (plf,lbs)
Applied point load or discontinuous shearline force (lbs)

Loads: Seismic (Qe); Forces: 0.7E + 0.6D; E = pQe + 0.2 Sds D; p(NS) = 1.3; p(EW) = 1.3; Sds = 1.11; Flexible distribution

WoodWorks® Shearwalls 13.1.2

25160 SW.wswu May. 9, 2025 15:20:47

Project Information

DESIGN SETTINGS

Design Code	Wind Standard	Seismic Standard
IBC 2021/AWC SDPWS 2021	ASCE 7-16 Directional (All heights)	ASCE 7-16

Load Combinations		Building Code Capacity Modification	
For Design and MWFRS Deflection	For Deflection (Wind:Serviceability)	Wind	Seismic
0.7 Seismic + 0.6 Dead	1.0 Seismic + 0.9 Dead	1.00	1.00
0.6 Basic wind + 0.6 Dead	1.0 MRI wind + 1.0 Dead		

Service Conditions and Load Duration				Max Shearwall Offset [ft]	
Duration Factor	Temperature Range	Moisture Content		Plan (within story)	Elevation (between stories)
		Fabrication	Service		
1.60	T<=100F	19% (<=19%)	10% (<=19%)	0.50	-

Maximum Height-to-width Ratio						
Wood panels		Fiberboard	Lumber		Gypsum	
Blocked	Unblocked		Wind	Seismic	Blocked	Unblocked
3.5	2.0	-	-	-	-	-

Ignore shear resistance contribution of...		Forces based on...	
Wall segments	Seismic	Hold-downs	Applied loads
Side with invalid aspect ratio	Entirely gypsum or lumber	Drag struts	Applied loads

Shearwall relative rigidity:	Wall capacity
Non-identical materials and construction on the shearline:	Allowed, except for material type
Deflection Equation:	3-term from SDPWS 4.3-1
Drift limit for wind design:	1 / 500 story height
FTAO strap:	Continuous at top of highest opening and bottom of lowest

Dead load in chord force for overturning design		
Tension end	Compression end	When completely counteracts overturning
Wall length / 2	Wall length / 2	Wall length / 2

SITE INFORMATION

Wind	
ASCE 7-16 Directional (All heights)	
Design Wind Speed	130 mph
Serviceability Wind Speed	100 mph
Exposure	Exposure B
Enclosure	Partially open
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: 0.480g	**Ss:** 1.390g

Fundamental Period	E-W	N-S
T Used	0.137s	0.137s
Approximate Ta	0.137s	0.137s
Maximum T	0.192s	0.192s
Response Factor R	6.50	6.50

Fa: 1.20 **Fv:** 1.82

Structural Data

STORY INFORMATION

	Story Elev [ft]	Floor/Ceiling Depth [in]	Wall Height [ft]	Hold-down Length subject to shrinkage [in]	Hold-down Bolt length [in]
Ceiling	12.00	0.0			
Level 1	2.00	0.0	10.00	3.75	4.5
Foundation	2.00				

BLOCK and ROOF INFORMATION

Block Dimensions [ft]			Roof Panels Face	Type	Slope	Overhang [ft]
Block 1	1 Story	E-W Ridge				
Location X,Y =	-36.08	-24.08	**North**	Side	26.5	1.00
Extent X,Y =	36.17	24.08	**South**	Side	26.5	1.00
Ridge Y Location, Offset	-12.04	0.00	**East**	Gable	90.0	1.00
Ridge Elevation, Height	18.00	6.00	**West**	Gable	90.0	1.00

SHEATHING MATERIALS by WALL GROUP

Grp	Surf	Material	Ratng	Sheathing Thick in	GU in	Ply	Or	Gvtv lbs/in	Fasteners Size	Type	RS	Eg in	Fd in	Bk	Apply Notes
1	Ext	Struct I OSB	24/16	7/16	-	-	Horz	83500	8d	Common	N	6	12	Y	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 C4.2.3C
Thick – Nominal panel thickness
GU - Gypsum underlay thickness
Ply – Number of plies (or layers) in construction of plywood sheets
Or – Orientation of longer dimension of sheathing panels or lumber planks. Dbl. = Double diagonal.
Gvtv – Shear stiffness in lb/in. of depth from SDPWS Tables C4.2.3A-B
Type – Fastener type from SDPWS Tables 4.3A-D:
Common: common wire nail; Box: galvanized box nail; Casing: casing nail; Roof: galvanized roofing nail; Cooler: cooler nail; WBoard: wallboard nail; Screw: drywall screw; Gauge: nail measured by gauge; Galv: galvanized gauge nail; GWB: Gypsum wallboard blued nail
Size - From Tables 4.3A-D and Table A1; shown in Wall Input fastener dropdown
Common nails: 6d = 0.113 x 2", 8d = 0.131 x 2.5", 10d = 0.148 x 3", 12d = 0.148 x 3.5"
Box or casing nails: 6d = 0.099 x 2", 8d = 0.113 x 2.5", 10d = 0.128 x 3", 12d = 0.126 x 3.5"
Gauge, roofing and GWB nails: 13 ga = 0.92" x 1-1/8"; 11 ga = 0.120" x 1-1/8" (GWB nail for gypsum lath & plaster), 1-1/4" (gyp. L&P), 1-1/2" (wire lath & plaster, 1/2" fiberboard ,1/2" GWB), 1-3/4" (GSB, 5/8" GWB, 25/32" fiberboard, 2-ply GWB base), 2-3/8" (2-ply GWB face)
Cooler or wallboard nail: 5d = .086" x 1-5/8"; 6d = .092" x 1-7/8"; 8d = .113" x 2-3/8"; 6/8d = 6d base ply, 8d face ply for 2-ply GWB.
Drywall screws: No. 6, 1-1/4" long.
RS – Ring-shank nails (non-shearwalls only), with increased withdrawal capacity as per NDS 12.2.3.2.
Eg – Panel edge fastener spacing. For lumber sheathing, no. of nails per board at shear wall boundary. For 2-ply GWB, spacing of all nails in face ply.
Fd – Field spacing interior to panels. For lumber sheathing, no. of nails per board at interior studs. For 2-ply GWB, spacing of all nails in face ply.
Bk – Sheathing is nailed to blocking at all panel edges; Y(es) or N(o)
Apply Notes – Notes below table legend which apply to sheathing side

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

FRAMING MATERIALS and STANDARD WALL by WALL GROUP

Wall Grp	Species	Grade	b in	d in	Spcg in	SG	E psi^6	Fcp	Standard Wall
1	D.Fir-L	No.2	1.50	5.50	16	0.50	1.60	625	

Legend:
Wall Grp – Wall Design Group
b – Stud breadth (thickness)
d – Stud depth (width)
Spcg – Maximum on-centre spacing of studs for design, actual spacing may be less.
SG – Specific gravity
E – Modulus of elasticity
Standard Wall - Standard wall designed as group.
Fcp - Compressive strength perpendicular to grain

Notes:
Check manufacture requirements for stud size, grade and specific gravity (G) for all shearwall hold-downs.
The following factors are applied to Fcp for compressive design and deformation under wall segment end studs :
Bearing area factor Cb from NDS 3.10.4, under window openings.

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]	Studs S	Studs N
Line 1											
Level 1											
Line 1	Seg	1	-35.75	-23.75	-0.25	23.50	23.25	-	10.00	-	-
Wall 1-1	Seg	1	-35.75	-23.75	-0.25	23.50	23.25	0.43	-	2	2
Line 2											
Level 1											
Line 2		1	-0.25	-23.75	-0.25	23.50	15.58	-	10.00	-	-
Wall 2-1	Seg	1	-0.25	-23.75	-0.25	23.50	15.58	-	-	2	2
Segment 1		-	-	-23.75	-22.08	1.67	-	6.00	-	2	2
Opening 1		-	-	-22.08	-15.83	6.25	-	-	7.00	2	2
Segment 2		-	-	-15.83	-0.25	15.58	15.33	0.64	-	2	2

East-west Shearlines	Type	Wall Group	Location Y [ft]	Extent [ft] Start	Extent [ft] End	Length [ft]	FHS [ft]	Aspect Ratio	Height [ft]	Studs W	Studs E
Line A											
Level 1											
Line A		1	-23.75	-35.75	-0.25	35.50	15.75	-	10.00	-	-
Wall A-1	NSW		-23.75	-35.75	-16.00	19.75	0.00	-	-	2	2
Segment 1		-	-	-35.75	-32.00	3.75	-	2.67	-	2	2
Opening 1		-	-	-32.00	-16.08	15.92	-	-	8.00	2	2
Segment 2		-	-	-16.08	-16.00	0.08	-	120.00	-	2	2
Wall A-2	FT	1	-23.75	-16.00	-0.25	15.75	15.75	-	-	2	2
Segment 1		-	-	-16.00	-8.92	7.08	6.83	0.56	-	-	-
Opening 1		-	-	-8.92	-5.08	3.83	-	-	4.00	-	-
Segment 2		-	-	-5.08	-0.25	4.83	4.58	0.83	-	-	-
Line B											
Level 1											
Line B		1	-0.25	-35.75	-0.25	35.50	8.92	-	10.00	-	-
Wall B-1	Seg	1	-0.25	-35.75	-22.58	13.17	8.92	-	-	2	2
Segment 1		-	-	-35.75	-26.83	8.92	8.67	1.12	-	2	2
Opening 1		-	-	-26.83	-22.67	4.17	-	-	4.00	2	2
Segment 2		-	-	-22.67	-22.58	0.08	-	120.00	-	2	2
Wall B-2	NSW		-0.25	-22.58	-0.25	22.33	0.00	-	-	2	2
Segment 1		-	-	-22.58	-17.75	4.83	-	2.07	-	2	2
Opening 1		-	-	-17.75	-14.58	3.17	-	-	7.00	2	2
Segment 2		-	-	-14.58	-11.00	3.58	-	2.79	-	2	2
Opening 2		-	-	-11.00	-2.92	8.08	-	-	8.00	2	2
Segment 3		-	-	-2.92	-0.25	2.67	-	3.75	-	2	2

Legend:
Type – Seg: Segmented, Prf: Perforated, FT: FTAO (force transfer around openings), NSW: Non-shearwall, NW: Non-wood/Proprietary, ND: Not designed
Location – Position in structure perpendicular to wall
Length – Shear line: Distance between exterior perpendicular walls defining the shear line extent
Wall, segment, or opening: End-to-end length of the element
FHS – Depending on element, shows different definitions of full-height sheathing length (FHS):
Shear lines with multiple walls, segmented walls, or FTAO walls: Total shear-resisting FHS
Individual wall segments or walls without openings: Distance between hold-downs beff
Perforated walls: Sum of factored segment lengths bi defined in SDPWS 4.3.5.6
Aspect Ratio – Ratio of wall height to segment length (h/b); for FTAO walls, the aspect ratio of the central pier
Wall Group – Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall
Studs: Number of end studs at the south and north or west and east ends of a wall segment or a perforated or FTAO wall.

Loads

WIND SHEAR LOADS (as entered or generated)

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]
Block 1	W	L Gable	1	W->E	Wind	Line	-24.08	-12.04	0.0	86.7	
Block 1	W	Wall	1	W->E	Wind	Line	-23.75	-0.25	71.9		
Block 1	W	R Gable	1	W->E	Wind	Line	-12.04	0.00	86.7	0.0	
Block 1	E	L Gable	1	W->E	Lee	Line	-24.08	-12.04	0.0	43.1	
Block 1	E	Wall	1	W->E	Lee	Line	-23.75	-0.25	35.9		
Block 1	E	R Gable	1	W->E	Lee	Line	-12.04	0.00	43.1	0.0	
Block 1	W	L Gable	1	E->W	Lee	Line	-24.08	-12.04	0.0	43.1	
Block 1	W	Wall	1	E->W	Lee	Line	-23.75	-0.25	35.9		
Block 1	W	R Gable	1	E->W	Lee	Line	-12.04	0.00	43.1	0.0	
Block 1	E	L Gable	1	E->W	Wind	Line	-24.08	-12.04	0.0	86.7	
Block 1	E	Wall	1	E->W	Wind	Line	-23.75	-0.25	71.9		
Block 1	E	R Gable	1	E->W	Wind	Line	-12.04	0.00	86.7	0.0	
Block 1	S	Roof	1	S->N	Wind	Line	-37.08	1.08	19.3		
Block 1	S	Wall	1	S->N	Wind	Line	-35.75	-16.00	71.9		
Block 1	S	Wall	1	S->N	Wind	Line	-35.75	-0.25	71.9		
Block 1	N	Roof	1	S->N	Lee	Line	-37.08	1.08	70.1		
Block 1	N	Wall	1	S->N	Lee	Line	-35.75	-0.25	44.9		
Block 1	N	Wall	1	S->N	Lee	Line	-22.58	-0.25	44.9		
Block 1	S	Roof	1	N->S	Lee	Line	-37.08	1.08	70.1		
Block 1	S	Wall	1	N->S	Lee	Line	-35.75	-0.25	44.9		
Block 1	S	Wall	1	N->S	Lee	Line	-35.75	-16.00	44.9		
Block 1	N	Roof	1	N->S	Wind	Line	-37.08	1.08	19.3		
Block 1	N	Wall	1	N->S	Wind	Line	-35.75	-0.25	71.9		
Block 1	N	Wall	1	N->S	Wind	Line	-22.58	-0.25	71.9		

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:
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.

WIND C&C LOADS

Block	Building Face	Wind Direction	Level	Magnitude [psf] Interior	Magnitude [psf] End Zone
Block 1	West	Windward	1	33.0	40.7
Block 1	West	Windward	1	33.0	40.7
Block 1	East	Leeward	1	33.0	40.7
Block 1	East	Leeward	1	33.0	40.7
Block 1	West	Leeward	1	33.0	40.7
Block 1	West	Leeward	1	33.0	40.7
Block 1	East	Windward	1	33.0	40.7
Block 1	East	Windward	1	33.0	40.7
Block 1	South	Windward	1	33.0	40.7
Block 1	South	Windward	1	33.0	40.7
Block 1	North	Leeward	1	33.0	40.7
Block 1	North	Leeward	1	33.0	40.7
Block 1	South	Leeward	1	33.0	40.7
Block 1	South	Leeward	1	33.0	40.7
Block 1	North	Windward	1	33.0	40.7
Block 1	North	Windward	1	33.0	40.7

DEAD LOADS (for hold-down calculations)

Shear Line	Level	Profile	Tributary Width [ft]	Location [ft] Start	Location [ft] End	Mag [lbs,psf,psi] Start	Mag [lbs,psf,psi] End
A	1	Line		-35.75	-16.00	100.0*	
A	1	Line		-16.00	-0.25	100.0*	
B	1	Line		-35.75	-22.58	100.0*	
B	1	Line		-22.58	-0.25	100.0*	
1	1	Line		-23.75	-0.25	100.0*	
2	1	Line		-23.75	-0.25	100.0*	

BUILDING MASSES

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 1		Line	-25.08	1.00	381.7	381.7	
E-W	Roof	Block 1		Line	-25.08	1.00	381.7	381.7	
E-W	R Gable	Block 1		Line	-24.08	-12.04	60.0	0.0	
E-W	L Gable	Block 1		Line	-12.04	0.00	0.0	60.0	
E-W	L Gable	Block 1		Line	-24.08	-12.04	60.0	0.0	
E-W	R Gable	Block 1		Line	-12.04	0.00	0.0	60.0	
N-S	Roof	Block 1		Line	-37.08	1.08	260.8	260.8	
N-S	Roof	Block 1		Line	-37.08	1.08	260.8	260.8	
Both	Wall 1-1	n/a	1	Line	-23.75	-0.25	50.0	50.0	
Both	Wall 2-1	n/a	2	Line	-23.75	-0.25	50.0	50.0	
Both	Wall A-1	n/a	A	Line	-35.75	-16.00	50.0	50.0	
Both	Wall A-2	n/a	A	Line	-16.00	-0.25	50.0	50.0	
Both	Wall B-1	n/a	B	Line	-35.75	-22.58	50.0	50.0	
Both	Wall B-2	n/a	B	Line	-22.58	-0.25	50.0	50.0	

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 1 Force Dir	Profile	Location [ft] Start	Location [ft] End	Mag [lbs,plf,psf] Start	Mag [lbs,plf,psf] End
E-W	Line	-25.08	-24.08	130.6	130.6
E-W	Line	-24.08	-23.75	130.6	131.2
E-W	Point	-23.75	-23.75	304	304
E-W	Line	-23.75	-12.04	148.3	168.2
E-W	Line	-12.04	-0.25	168.2	148.1
E-W	Point	-0.25	-0.25	304	304
E-W	Line	-0.25	0.00	131.0	130.6
E-W	Line	0.00	1.00	130.6	130.6
N-S	Line	-37.08	-35.75	89.2	89.2
N-S	Point	-36.08	-36.08	124	124
N-S	Point	-35.75	-35.75	201	201
N-S	Line	-35.75	-22.58	106.4	106.4
N-S	Line	-22.58	-16.00	106.4	106.4
N-S	Line	-16.00	-0.25	106.4	106.4
N-S	Point	-0.25	-0.25	201	201
N-S	Line	-0.25	1.08	89.2	89.2
N-S	Point	0.08	0.08	124	124

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.

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

Components and Cladding Wind Loads, Out-of-plane Sheathing
All shearwalls have sufficient design capacity.

Components and Cladding Wind Loads, Nail Withdrawal
All shearwalls have sufficient design capacity.

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

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

HOLD-DOWN DESIGN

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

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

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

Seismic Loads, Rigid Diaphragm
All hold-downs have sufficient design capacity.

COMPRESSION FORCE DESIGN

Wind Loads, Flexible Diaphragm
Bottom plate has sufficient perpendicular-to-grain compressive capacity under all wall end studs.

Wind Loads, Rigid Diaphragm
Bottom plate has sufficient perpendicular-to-grain compressive capacity under all wall end studs.

Seismic Loads, Flexible Diaphragm
Bottom plate has sufficient perpendicular-to-grain compressive capacity under all wall end studs.

Seismic Loads, Rigid Diaphragm
Bottom plate has sufficient perpendicular-to-grain compressive capacity under all wall end studs.

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

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 1														
Ln1, Lev1	1	S->N	130.7	-	3072	-	1.0	-	393	-		393	9224	0.33S
	1	N->S	125.7	-	2955	-	1.0	-	393	-		393	9224	0.32S
Line 2														
Ln2, Lev1	-	S->N	-	-	2917	-	-	-	-	-		-	6116	-
	-	N->S	-	-	3076	-	-	-	-	-		-	6116	-
Wall 2-1	1	S->N	-	-	2917	-	1.0	-	393	-		-	6116	-
	1	N->S	-	-	3076	-	1.0	-	393	-		-	6116	-
Seg. 1	-	Both	0.0	-	0	-	1.0	-	393	-		393	-	- S
Seg. 2	-	S->N	187.2	-	2917	-	1.0	-	393	-		393	6116	0.48S
	-	N->S	197.4	-	3076	-	1.0	-	393	-		393	6116	0.50S

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 1														
LnA, Lev1	-	Both	-	-	1230	-	-	-	-	-		-	6182	-
Wall A-2	1	Both	-	-	1230	-	1.0	-	393	-		-	6182	-
Seg. 1	-	Both	103.2	61.4	731	-	1.0	-	393	-		393	2780	0.26S
Open. 1	-	Both	-	130.2	499	-	-	-	393	-		393	1505	0.33
Seg. 2	-	Both	103.2	61.4	499	-	1.0	-	393	-		393	1897	0.26S
Line B														
LnB, Lev1	-	Both	-	-	1227	-	-	-	-	-		-	3500	-
Wall B-1	1	Both	-	-	1227	-	1.0	-	393	-		-	3500	-
Seg. 1	-	Both	137.6	-	1227	-	1.0	-	393	-		393	3500	0.35S
Seg. 2	-	Both	0.0	-	0	-	1.0	-	393	-		393	-	- S

Legend:
W Gp - Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall. "^" means that this wall is critical for all walls in the Standard Wall group.
For Dir - Direction of wind force along shearline.
v – Design shear force on segment = ASD-factored shear force per unit length of full-height sheathing (FHS)
vmax/vft - Perforated walls: Collector and in-plane anchorage force as per SDPWS eqn. 4.3-9 = V/FHS/Co. FHS is factored for narrow segments as per 4.3.3.4
FTAO walls: Shear force in piers above and below either openings or piers beside opening(s). Aspect ratio factor does not apply to these piers.
V – ASD factored shear force. For shearline: total shearline force. For wall: total of all segments on wall. For segment: force on segment
Asp/Cub – Unblocked wood structural panel factor Cub from SDPWS 4.3.5.3 or Aspect Ratio factor from 4.3.5.5.1, which for perforated walls is sum bi / FHS from 4.3.5.6 with bi defined in 4.3.3.4. For multi-segment walls, wall row shows Cub and segment rows show Asp. For single-segment walls and perforated walls, value shown is Asp for blocked walls and Cub for unblocked walls.
Int, Ext - Nominal unit shear capacity of interior and exterior sheathing, factored by Table 4.3-1 Note 3 for framing specific gravity and Note 10 for presence of hold-downs. For wall segments, also include unblocked factor Cub and aspect ratio adjustments.
Co - Adjustment factor for perforated walls from SDPWS Equation 4.3-6.
C - Sheathing combination rule, A = Add capacities, S = Strongest side or twice weakest, G = Stiffness-based using Eqns. 4.3-3,-4.
Cmb - Combined interior and exterior unit shear capacity including perforated wall factor Co.
V – Total factored shear capacity of shearline, wall or segment.
Crit Resp – Response ratio = v/Cmb = design shear force/unit shear capacity. "S" indicates that the seismic design criterion was critical in selecting wall.

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

Hold-Down and Compression Design (flexible wind design)

Level 1 Line-Wall	Posit'n	Location [ft] X	Location [ft] Y	Load Case	Tensile Hold-down or Compressive Stud Force [lbs] Shear	Dead	Uplift	Cmb'd	Hold-down	Cap [lbs]	Crit Resp.
Line 1											
1-1	L End	-35.75	-23.62	1	1321	705		616	HDU2-SDS	3075	0.20
1-1	L End	-35.75	-23.62	1	1271	1175		2446	Compression	10312	0.24
1-1	R End	-35.75	-0.37	1	1271	705		566	HDU2-SDS	3075	0.18
1-1	R End	-35.75	-0.37	1	1321	1175		2496	Compression	10312	0.24
Line 2											
	V Elem	-0.25	-22.21	1	0	313		312	Compression		
2-1	R Op 1	-0.25	-15.71	1	1902	655		1247	HDU2-SDS	3075	0.41
2-1	R Op 1	-0.25	-15.71	1	2006	1092		3097	Compression	10312	0.30
2-1	R End	-0.25	-0.37	1	2006	468		1538	HDU2-SDS	3075	0.50
2-1	R End	-0.25	-0.37	1	1902	779		2681	Compression	10312	0.26
Line A											
A-1	L Op 1	-32.12	-23.75	1	0	796		796	Compression		-
A-1	R Op 1	-15.96	-23.75	1	0	1583		1583	Compression	10312	0.15
A-2	L End	-15.87	-23.75	1	794			794	HDU2-SDS	3075	0.26
A-2	L End	-15.87	-23.75	1	794			794	Compression	10312	0.08
A-2	R End	-0.37	-23.75	1	794	473		321	HDU2-SDS	3075	0.10
A-2	R End	-0.37	-23.75	1	794	788		1581	Compression	11601	0.14
Line B											
B-1	L End	-35.62	-0.25	1	1416	268		1148	HDU5-SDS	5645	0.20
B-1	L End	-35.62	-0.25	1	1416	446		1861	Compression	10312	0.18
B-1	L Op 1	-26.96	-0.25	1	1416	393		1023	HDU5-SDS	5645	0.18
B-1	L Op 1	-26.96	-0.25	1	1416	654		2070	Compression	11601	0.18
B-1	R Op 1	-22.54	-0.25	1	0	208		208	Compression		-
B-2	L Op 2	-17.87	-0.25	1	0	158		158	Compression		-
B-2	R Op 2	-14.46	-0.25	1	0	158		158	Compression		-
B-2	L Op 2	-11.12	-0.25	1	0	404		404	Compression		-
	V Elem	-2.79	-0.25	1	0	404		404	Compression		

Legend:
Line-Wall:
At wall or opening – Shearline and wall number
At vertical element – Shearline
Posit'n – Position of stud pack that hold-down is attached to or which is applying compression force:
V Elem – Vertical element: column or strengthened studs required where not at wall end or opening
L or R End – At left or right wall end
L or R Op n – At left or right side of opening n
t @ Op n – Uplift force t at opening n from offset opening in perforated wall above, from SDPWS 4.3.6.4.2.1
Location – Co-ordinates in Plan View
Load Case – Results are for critical load case:
ASCE 7 All Heights: Case 1 or 2 from Fig. 27.3-8
ASCE 7 Low-rise: Windward corner(s) and Case A or B from Fig. 28.3-1
ASCE 7 Minimum loads (27.1.5 / 28.3.4): "Min"
Tensile Hold-down or Compressive Stud Force – Upwards force on hold-down at one end of the wall or downward force on bottom plate under studs at the other end, for each force direction. Includes forces transferred from upper levels.
Shear – Overturning component = V x h / beff from SDPWS Eqn. 4.3-7; V = force on segment, ASD-factored by 0.60; h = wall height, beff = wall segment length – (tension stud pack width + hold-down anchor bolt offset) – (1/2 compression stud pack width). For perforated walls = V x h / Co sum (bi) from SDPWS Eqn. 4.3-8.
Dead – Dead load resisting component, factored for ASD by 0.60 for tension and 1.0 for compression
Uplift – Uplift wind load component, factored for ASD by 0.60
Cmb'd – Sum of ASD-factored overturning, dead and uplift forces. May also include the uplift force t from perforated walls from SDPWS 4.3.6.4.2.1 when openings are staggered.
Hold-down – Device model number from hold-down database; "Compression" for bearing of end stud pack on bottom plate
Cap – Hold-downs: Allowable ASD tension load from database; Compression: allowable ASD bearing force = Ct CM Cb Fcp A; A = cross sectional area of end studs. Refer to Framing materials table for details
Crit. Resp. – Critical Response = Combined ASD force / Allowable ASD tension load

Notes:
HDU2-SDS2.5 for studs with thickness > 0'-3" and depth > 0'-3.5" : Uses 6 1/4" x 2.5" SDS heavy-duty screws; 5/8" anchor bolt.
HDU5-SDS2.5 for studs with thickness > 0'-3" and depth > 0'-3.5" : Uses 14 1/4" x 2.5" SDS heavy-duty screws; 5/8" anchor bolt.
Refer to the Shear Line Dimensions table for wall height h, effective segment length beff and perforated wall adjusted sum of bi, to the Story Table for joist depth, and to the Shear Results table for perforated factor Co.
Most severe of wind load cases is used for overturning calculation.
Designer is responsible for design of connection from wall to floor or foundation for shear force shown in Shear Results table. Refer to SDPWS 4.3.6.4.3 for foundation anchor bolt requirements.

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 2								
2-1	Right Opening 1	-0.25	-15.83		-983	1036		
Line A								
A-2	Left Wall End	-16.00	-23.75		-684	684		
A-2	Left Opening 1	-8.92	-23.75		-495	495		
A-2	Right Opening 1	-5.08	-23.75		-129	129		
A-2	Left Opening 1	-8.92	-23.75				297	297
A-2	Right Opening 1	-5.08	-23.75				202	202
Line B								
B-1	Left Opening 1	-26.83	-0.25		919	-919		

Legend:
Line-Wall - Shearline and wall number
Position…- Side of opening or wall end that drag strut is attached to
Location - Co-ordinates in Plan View
Load Case - Results are for critical load case:
ASCE 7 All heights Case 1 or 2
ASCE 7 Low-rise corner; Case A or B
Drag strut Force - Axial force in transfer element at openings, gaps, or changes in design shear along shearline. + : tension; - : compression.
Based on ASD-factored shearline force (vmax from 4.3.6.4.1.1 for perforated walls)
Strap/Blocking Force – For FTAO walls, force transferred from above and below opening to shearwall pier.
-> Due to shearline force in the west-to-east or south-to-north direction
<- Due to shearline force in the east-to-west or north-to-south direction

MWFRS DEFLECTION (flexible wind design)

These deflections are used to determine shearwall stiffness for force distribution

Wall, segment	W Gp	Dir	Srf	v plf	b ft	h ft	Bending A sq.in	Bending Defl in	Ga kips/ in	Nail slip Vn lbs	Nail slip en in	Shear Defl in	Hold Defl in	Total Defl in
Level 1														
Line 1														
1-1	1	S->N	ExtS	130.7	23.50	10.00	16.5	.002	13.8	196	.032	.095	0.04	0.14
		N->S	ExtS	125.7	23.50	10.00	16.5	.002	13.8	196	.032	.091	0.04	0.13
Line 2														
2-1,2	1	S->N	ExtS	187.2	15.58	10.00	16.5	.004	13.8	196	.032	.136	0.07	0.21
		N->S	ExtS	197.4	15.58	10.00	16.5	.004	13.8	196	.032	.143	0.08	0.23
Line A														
A-2	1	Both	-	-					-	-	-	-		0.22
A-2,1		Both	ExtS	103.2	7.08	9.00	16.5	.003	13.8	196	.032	.067	0.12	0.19
A-2,2		W->E	ExtS	103.2	4.83	9.00	16.5	.005	13.8	196	.032	.067	0.18	0.25
		E->W	ExtS	103.2	4.83	9.00	16.5	.005	13.8	196	.032	.067	0.19	0.26
Line B														
B-1,1	1	W->E	ExtS	137.6	8.92	10.00	16.5	.005	13.8	196	.032	.100	0.11	0.22
		E->W	ExtS	137.6	8.92	10.00	16.5	.005	13.8	196	.032	.100	0.11	0.21

Legend:

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

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

Dir – Force direction.

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

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

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

Perforated walls = vmax from Eqn. 4.3-9, as per 4.3.4.2.

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

b – Wall or segment length.

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

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

FTAO wall = Length of wall including openings.

h – Wall height.

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

Defl – Horizontal shear wall deflection due to given term:

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

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

Shear = vh / 1000 Ga; Ga = vw / (vw / Gvtv + 0.75 en), from SDPWS Ex. C4.3.4-1.

vw = ASD sheathing capacity.

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

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

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

Hold – Anchorage system (hold-down) = da x h / beff.

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

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

beff is given in the Shear Wall Dimensions table.

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

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

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

MWFRS HOLD-DOWN DISPLACEMENT (flexible wind design)

These displacements are used to determine deflections for force distribution

Wall, segment	Dir	Hold-down	Tens. force lbs	Vert. Displacement Manuf in	Add in	da in	Slippage Vf lbs	da in	Shrink +Extra in	Comp. force lbs	Crush da in	Total da in	Horz Defl in
Level 1													
Line 1													
1-1	S->N	HDU2-SDS	616	.018	.000	0.018	-	-	.068	2496	0.01	0.09	0.04
	N->S	HDU2-SDS	566	.016	.000	0.016	-	-	.068	2446	0.01	0.09	0.04
Line 2													
2-1,2	S->N	HDU2-SDS	1247	.036	.000	0.036	-	-	.068	2682	0.01	0.11	0.07
	N->S	HDU2-SDS	1538	.044	.000	0.044	-	-	.068	3098	0.01	0.12	0.08
Line A													
A-2,1	W->E	HDU2-SDS	751	.021	.000	0.021	-	-	.068	1509	0.00	0.09	0.12
	E->W	HDU2-SDS	636	.018	.000	0.018	-	-	.068	1317	0.00	0.09	0.12
A-2,2	W->E	HDU2-SDS	720	.021	.000	0.021	-	-	.068	1221	0.00	0.09	0.18
	E->W	HDU2-SDS	835	.024	.000	0.024	-	-	.068	1413	0.00	0.10	0.19
Line B													
B-1,1	W->E	HDU5-SDS	1148	.023	.000	0.023	-	-	.068	2070	0.01	0.10	0.11
	E->W	HDU5-SDS	1023	.021	.000	0.021	-	-	.068	1861	0.00	0.09	0.11

Legend:

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

Dir – Force direction

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

da – Vertical displacements due to the following components:

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

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

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

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

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

Ab = bolt cross-sectional area

Es = steel modulus = 29000000 psi

L = Lb – Lh

Lb = Total bolt length shown in Storey Information table

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

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

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

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

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

Shrinkage = 0.002 x (19% fabrication – 10% in-service moisture contents) x Ls

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

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

= 0.02" x [r / 0.73, r < 0.73; (1 + (r - 0.73) / 0.27), 0.73 < r < 1; 2 r^3, r > 1]

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

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

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

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

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

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

Rigid 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 1														
Ln1, Lev1	1	S->N	135.4	-	3183	-	1.0	-	393	-		393	9224	0.35S
	1	N->S	131.7	-	3096	-	1.0	-	393	-		393	9224	0.34S
Line 2														
Ln2, Lev1	-	S->N	-	-	2806	-	-	-	-	-		-	6116	-
	-	N->S	-	-	2935	-	-	-	-	-		-	6116	-
Wall 2-1	1	S->N	-	-	2806	-	1.0	-	393	-		-	6116	-
	1	N->S	-	-	2935	-	1.0	-	393	-		-	6116	-
Seg. 1	-	Both	0.0	-	0	-	1.0	-	393	-		393	-	- S
Seg. 2	-	S->N	180.0	-	2806	-	1.0	-	393	-		393	6116	0.46S
	-	N->S	188.3	-	2935	-	1.0	-	393	-		393	6116	0.48S

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 1														
LnA, Lev1	-	Both	-	-	1498	-	-	-	-	-		-	6182	-
Wall A-2	1	Both	-	-	1498	-	1.0	-	393	-		-	6182	-
Seg. 1	-	Both	125.7	74.7	890	-	1.0	-	393	-		393	2780	0.32S
Open. 1	-	Both	-	158.5	608	-	-	-	393	-		393	1505	0.40
Seg. 2	-	Both	125.7	74.7	607	-	1.0	-	393	-		393	1897	0.32S
Line B														
LnB, Lev1	-	Both	-	-	959	-	-	-	-	-		-	3500	-
Wall B-1	1	Both	-	-	959	-	1.0	-	393	-		-	3500	-
Seg. 1	-	Both	107.6	-	959	-	1.0	-	393	-		393	3500	0.27S
Seg. 2	-	Both	0.0	-	0	-	1.0	-	393	-		393	-	- S

Legend:
W Gp - Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall. "^" means that this wall is critical for all walls in the Standard Wall group.
For Dir - Direction of wind force along shearline.
v – Design shear force on segment = ASD-factored shear force per unit length of full-height sheathing (FHS)
vmax/vft - Perforated walls: Collector and in-plane anchorage force as per SDPWS eqn. 4.3-9 = V/FHS/Co. FHS is factored for narrow segments as per 4.3.3.4
FTAO walls: Shear force in piers above and below either openings or piers beside opening(s). Aspect ratio factor does not apply to these piers.
V – ASD factored shear force. For shearline: total shearline force. For wall: total of all segments on wall. For segment: force on segment
Asp/Cub – Unblocked wood structural panel factor Cub from SDPWS 4.3.5.3 or Aspect Ratio factor from 4.3.5.5.1, which for perforated walls is sum bi / FHS from 4.3.5.6 with bi defined in 4.3.3.4. For multi-segment walls, wall row shows Cub and segment rows show Asp. For single-segment walls and perforated walls, value shown is Asp for blocked walls and Cub for unblocked walls.
Int, Ext - Nominal unit shear capacity of interior and exterior sheathing, factored by Table 4.3-1 Note 3 for framing specific gravity and Note 10 for presence of hold-downs. For wall segments, also include unblocked factor Cub and aspect ratio adjustments.
Co - Adjustment factor for perforated walls from SDPWS Equation 4.3-6.
C - Sheathing combination rule, A = Add capacities, S = Strongest side or twice weakest, G = Stiffness-based using Eqns. 4.3-3,-4.
Cmb - Combined interior and exterior unit shear capacity including perforated wall factor Co.
V – Total factored shear capacity of shearline, wall or segment.
Crit Resp – Response ratio = v/Cmb = design shear force/unit shear capacity. "S" indicates that the seismic design criterion was critical in selecting wall.

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

Hold-Down and Compression Design (rigid wind design)

Level 1 Line-Wall	Posit'n	Location [ft] X	Location [ft] Y	Load Case	Tensile Hold-down or Compressive Stud Force [lbs] Shear	Dead	Uplift	Cmb'd	Hold-down	Cap [lbs]	Crit Resp.
Line 1											
1-1	L End	-35.75	-23.62	1	1369	705		664	HDU2-SDS	3075	0.22
1-1	L End	-35.75	-23.62	1	1332	1175		2506	Compression	10312	0.24
1-1	R End	-35.75	-0.37	1	1332	705		627	HDU2-SDS	3075	0.20
1-1	R End	-35.75	-0.37	1	1369	1175		2544	Compression	10312	0.25
Line 2											
2-1	R Op 1	-0.25	-15.71	1	1830	468		1362	HDU2-SDS	3075	0.44
2-1	R Op 1	-0.25	-15.71	1	1914	779		2693	Compression	10312	0.26
2-1	R End	-0.25	-0.37	1	1914	468		1446	HDU2-SDS	3075	0.47
2-1	R End	-0.25	-0.37	1	1830	779		2609	Compression	10312	0.25
Line A											
A-2	L End	-15.87	-23.75	1	966	473		494	HDU2-SDS	3075	0.16
A-2	L End	-15.87	-23.75	1	966	788		1754	Compression	10312	0.17
A-2	R End	-0.37	-23.75	1	966	473		494	HDU2-SDS	3075	0.16
A-2	R End	-0.37	-23.75	1	966	788		1754	Compression	11601	0.15
Line B											
B-1	L End	-35.62	-0.25	1	1107	268		840	HDU5-SDS	5645	0.15
B-1	L End	-35.62	-0.25	1	1107	446		1553	Compression	10312	0.15
B-1	L Op 1	-26.96	-0.25	1	1107	268		840	HDU5-SDS	5645	0.15
B-1	L Op 1	-26.96	-0.25	1	1107	446		1553	Compression	11601	0.13

Legend:
Line-Wall:
At wall or opening – Shearline and wall number
At vertical element – Shearline
Posit'n – Position of stud pack that hold-down is attached to or which is applying compression force:
V Elem – Vertical element: column or strengthened studs required where not at wall end or opening
L or R End – At left or right wall end
L or R Op n – At left or right side of opening n
t @ Op n – Uplift force t at opening n from offset opening in perforated wall above, from SDPWS 4.3.6.4.2.1
Location – Co-ordinates in Plan View
Load Case – Results are for critical load case:
ASCE 7 All Heights: Case 1 or 2 from Fig. 27.3-8
ASCE 7 Low-rise: Windward corner(s) and Case A or B from Fig. 28.3-1
ASCE 7 Minimum loads (27.1.5 / 28.3.4): "Min"
Tensile Hold-down or Compressive Stud Force – Upwards force on hold-down at one end of the wall or downward force on bottom plate under studs at the other end, for each force direction. Includes forces transferred from upper levels.
Shear – Overturning component = V x h / beff from SDPWS Eqn. 4.3-7; V = force on segment, ASD-factored by 0.60; h = wall height, beff = wall segment length – (tension stud pack width + hold-down anchor bolt offset) – (1/2 compression stud pack width). For perforated walls = V x h / Co sum (bi) from SDPWS Eqn. 4.3-8.
Dead – Dead load resisting component, factored for ASD by 0.60 for tension and 1.0 for compression
Uplift – Uplift wind load component, factored for ASD by 0.60
Cmb'd – Sum of ASD-factored overturning, dead and uplift forces. May also include the uplift force t from perforated walls from SDPWS 4.3.6.4.2.1 when openings are staggered.
Hold-down – Device model number from hold-down database; "Compression" for bearing of end stud pack on bottom plate
Cap – Hold-downs: Allowable ASD tension load from database; Compression: allowable ASD bearing force = Ct CM Cb Fcp A; A = cross sectional area of end studs. Refer to Framing materials table for details
Crit. Resp. – Critical Response = Combined ASD force / Allowable ASD tension load

Notes:
HDU2-SDS2.5 for studs with thickness > 0'-3" and depth > 0'-3.5" : Uses 6 1/4" x 2.5" SDS heavy-duty screws; 5/8" anchor bolt.
HDU5-SDS2.5 for studs with thickness > 0'-3" and depth > 0'-3.5" : Uses 14 1/4" x 2.5" SDS heavy-duty screws; 5/8" anchor bolt.
Refer to the Shear Line Dimensions table for wall height h, effective segment length beff and perforated wall adjusted sum of bi, to the Story Table for joist depth, and to the Shear Results table for perforated factor Co.
Most severe of wind load cases is used for overturning calculation.
Designer is responsible for design of connection from wall to floor or foundation for shear force shown in Shear Results table. Refer to SDPWS 4.3.6.4.3 for foundation anchor bolt requirements.

COLLECTOR FORCES (rigid 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 2								
2-1	Right Opening 1	-0.25	-15.83		-945	989		
Line A								
A-2	Left Wall End	-16.00	-23.75		-833	833		
A-2	Left Opening 1	-8.92	-23.75		-603	603		
A-2	Right Opening 1	-5.08	-23.75		-157	157		
A-2	Left Opening 1	-8.92	-23.75				361	361
A-2	Right Opening 1	-5.08	-23.75				246	246
Line B								
B-1	Left Opening 1	-26.83	-0.25		718	-718		

Legend:
Line-Wall - Shearline and wall number
Position…- Side of opening or wall end that drag strut is attached to
Location - Co-ordinates in Plan View
Load Case - Results are for critical load case:
ASCE 7 All heights Case 1 or 2
ASCE 7 Low-rise corner; Case A or B
Drag strut Force - Axial force in transfer element at openings, gaps, or changes in design shear along shearline. + : tension; - : compression.
Based on ASD-factored shearline force (vmax from 4.3.6.4.1.1 for perforated walls)
Strap/Blocking Force – For FTAO walls, force transferred from above and below opening to shearwall pier.
-> Due to shearline force in the west-to-east or south-to-north direction
<- Due to shearline force in the east-to-west or north-to-south direction

MWFRS DEFLECTION (rigid wind design)

These deflections are used to determine shearwall stiffness for force distribution

Wall, segment	W Gp	Dir	Srf	v plf	b ft	h ft	Bending A sq.in	Bending Defl in	Ga kips/ in	Nail slip Vn lbs	Nail slip en in	Shear Defl in	Hold Defl in	Total Defl in
Level 1														
Line 1														
1-1	1	S->N	ExtS	135.4	23.50	10.00	16.5	.002	13.8	196	.032	.098	0.04	0.14
		N->S	ExtS	131.7	23.50	10.00	16.5	.002	13.8	196	.032	.096	0.04	0.14
Line 2														
2-1,2	1	S->N	ExtS	180.0	15.58	10.00	16.5	.004	13.8	196	.032	.131	0.07	0.21
		N->S	ExtS	188.3	15.58	10.00	16.5	.004	13.8	196	.032	.137	0.08	0.22
Line A														
A-2	1	Both	-	-					-	-	-	-		0.25
A-2,1		Both	ExtS	125.7	7.08	9.00	16.5	.004	13.8	196	.032	.082	0.13	0.22
A-2,2		Both	ExtS	125.7	4.83	9.00	16.5	.006	13.8	196	.032	.082	0.20	0.29
Line B														
B-1,1	1	Both	ExtS	107.6	8.92	10.00	16.5	.004	13.8	196	.032	.078	0.10	0.18

Legend:

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

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

Dir – Force direction.

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

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

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

Perforated walls = vmax from Eqn. 4.3-9, as per 4.3.4.2.

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

b – Wall or segment length.

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

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

FTAO wall = Length of wall including openings.

h – Wall height.

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

Defl – Horizontal shear wall deflection due to given term:

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

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

Shear = vh / 1000 Ga; Ga = vw / (vw / Gvtv + 0.75 en), from SDPWS Ex. C4.3.4-1.

vw = ASD sheathing capacity.

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

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

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

Hold – Anchorage system (hold-down) = da x h / beff.

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

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

beff is given in the Shear Wall Dimensions table.

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

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

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

MWFRS HOLD-DOWN DISPLACEMENT (rigid wind design)

These displacements are used to determine deflections for force distribution

Wall, segment	Dir	Hold-down	Tens. force lbs	Vert. Displacement Manuf in	Add in	da in	Slippage Vf lbs	da in	Shrink +Extra in	Comp. force lbs	Crush da in	Total da in	Horz Defl in
Level 1													
Line 1													
1-1	S->N	HDU2-SDS	664	.019	.000	0.019	-	-	.068	2544	0.01	0.09	0.04
	N->S	HDU2-SDS	627	.018	.000	0.018	-	-	.068	2507	0.01	0.09	0.04
Line 2													
2-1,2	S->N	HDU2-SDS	1362	.039	.000	0.039	-	-	.068	2609	0.01	0.11	0.07
	N->S	HDU2-SDS	1446	.041	.000	0.041	-	-	.068	2693	0.01	0.12	0.08
Line A													
A-2,1	Both	HDU2-SDS	960	.027	.000	0.027	-	-	.068	1527	0.00	0.10	0.13
A-2,2	Both	HDU2-SDS	1048	.030	.000	0.030	-	-	.068	1434	0.00	0.10	0.20
Line B													
B-1,1	Both	HDU5-SDS	840	.017	.000	0.017	-	-	.068	1553	0.00	0.09	0.10

Legend:

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

Dir – Force direction

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

da – Vertical displacements due to the following components:

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

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

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

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

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

Ab = bolt cross-sectional area

Es = steel modulus = 29000000 psi

L = Lb – Lh

Lb = Total bolt length shown in Storey Information table

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

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

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

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

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

Shrinkage = 0.002 x (19% fabrication – 10% in-service moisture contents) x Ls

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

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

= 0.02" x [r / 0.73, r < 0.73; (1 + (r - 0.73) / 0.27), 0.73 < r < 1; 2 r^3, r > 1]

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

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

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

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

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

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

Flexible Diaphragm Seismic Design

SEISMIC INFORMATION

Level	Mass [lbs]	Area [sq.ft]	Story Shear Fx [lbs] E-W	Story Shear Fx [lbs] N-S	Shear Resistance [lbs] E-W	Shear Resistance [lbs] N-S	Diaphragm Force [lbs] E-W Fpx	Diaphragm Force [lbs] E-W Design	Diaphragm Force [lbs] N-S Fpx	Diaphragm Force [lbs] N-S Design
1	27256	834.3	3264	3264	6915	10957	4243	4243	4243	4243
All	27256	–	3264	3264	–	–	–	–	–	–

Legend:
Mass – Sum of all generated and input building masses on level = wx in ASCE 7 Eqn. 12.8-12.
Story Shear – Total ASD-factored shear force induced at level x from Eqn. 12.8-11.
Shear Resistance – Lateral design strength of all shear-resisting elements on story, for use in weak story evaluation (4.1.8).
Diaphragm Force – used by Shearwalls only for drag strut forces, as per Exception to 12.10.2.1.
Fpx - Minimum ASD-factored force for diaphragm design from Eqns. 12.10-1, -2, and -3.
Design = The greater of the story shear and 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 1.30, N-S 1.30
Input by user (overriding calculated value).
Applies to shearwall design, hold-down forces and the drag strut force component based on shearline forces; does not apply to story drift, out-of-plane force, or the diaphragm force Fpx and the drag strut force component based on it.

Vertical Earthquake Load Ev
Ev = 0.2 Sds D; Sds = 1.11; Ev = 0.222 D unfactored; 0.156 D factored; total dead load factor: 0.6 - 0.156 = 0.444 tension, 1.0 + 0.156 = 1.156 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 1														
Ln1, Lev1	1	Both	90.3	-	2122	-	1.0	-	280	-		280	6588	0.32
Line 2														
Ln2, Lev1	-	Both	-	-	2122	-	-	-	-	-		-	4369	-
Wall 2-1	1	Both	-	-	2122	-	1.0	-	280	-		-	4369	-
Seg. 1	-	Both	0.0	-	0	-	1.0	-	280	-		280	-	-
Seg. 2	-	Both	136.1	-	2122	-	1.0	-	280	-		280	4369	0.49

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 1														
LnA, Lev1	-	Both	-	-	2127	-	-	-	-	-		-	4416	-
Wall A-2	1	Both	-	-	2127	-	1.0	-	280	-		-	4416	-
Seg. 1	-	Both	178.5	106.1	1264	-	1.0	-	280	-		280	1986	0.64
Open. 1	-	Both	-	225.1	863	-	-	-	280	-		280	1075	0.80
Seg. 2	-	Both	178.5	106.1	863	-	1.0	-	280	-		280	1355	0.64
Line B														
LnB, Lev1	-	Both	-	-	2116	-	-	-	-	-		-	2500	-
Wall B-1	1^	Both	-	-	2116	-	1.0	-	280	-		-	2500	-
Seg. 1	-	Both	237.3	-	2116	-	1.0	-	280	-		280	2500	0.85
Seg. 2	-	Both	0.0	-	0	-	1.0	-	280	-		280	-	-

Legend:
W Gp - Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall. "^" means that this wall is critical for all walls in the Standard Wall group.
For Dir – Direction of seismic force along shearline.
v – Design shear force on segment = ASD-factored shear force per unit length of full-height sheathing (FHS)
vmax/vft - Perforated walls: Collector and in-plane anchorage force as per SDPWS eqn. 4.3-9 = V/FHS/Co. FHS is factored for narrow segments as per 4.3.3.4
FTAO walls: Shear force in piers above and below either openings or piers beside opening(s). Aspect ratio factor does not apply to these piers.
V – ASD factored shear force. For shearline: total shearline force. For wall: total of all segments on wall. For segment: force on segment
Asp/Cub – Unblocked wood structural panel factor Cub from SDPWS 4.3.5.3 or Aspect Ratio factor from 4.3.5.5.1, which for perforated walls is sum bi / FHS from 4.3.5.6 with bi defined in 4.3.3.4. For multi-segment walls, wall row shows Cub and segment rows show Asp. For single-segment walls and perforated walls, value shown is Asp for blocked walls and Cub for unblocked walls.
Int, Ext - Nominal unit shear capacity of interior and exterior sheathing, factored by Table 4.3-1 Note 3 for framing specific gravity and Note 10 for presence of hold-downs. For wall segments, also include unblocked factor Cub and aspect ratio adjustments.
Co - Adjustment factor for perforated walls from SDPWS Equation 4.3-6.
C - Sheathing combination rule, A = Add capacities, S = Strongest side or twice weakest, G = Stiffness-based using Eqns. 4.3-3,-4.
Cmb - Combined interior and exterior unit shear capacity including perforated wall factor Co.
V – Total factored shear capacity of shearline, wall or segment.
Crit Resp – Response ratio = v/Cmb = design shear force/unit shear capacity. "W" indicates that the wind design criterion was critical in selecting wall.

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

Hold-Down and Compression Design (flexible seismic design)

Level 1 Line-Wall	Posit'n	Location [ft] X	Location [ft] Y	Tensile Hold-down or Compressive Stud Force [lbs] Shear	Dead	Ev	Cmb'd	Hold-down	Cap [lbs]	Crit Resp.
Line 1										
1-1	L End	-35.75	-23.62	913	705	183	390	HDU2-SDS	3075	0.13
1-1	L End	-35.75	-23.62	913	1175	183	2270	Compression	10312	0.22
1-1	R End	-35.75	-0.37	913	705	183	390	HDU2-SDS	3075	0.13
1-1	R End	-35.75	-0.37	913	1175	183	2270	Compression	10312	0.22
Line 2										
	V Elem	-0.25	-22.21	0	313	49	361	Compression		
2-1	R Op 1	-0.25	-15.71	1384	655	170	899	HDU2-SDS	3075	0.29
2-1	R Op 1	-0.25	-15.71	1384	1092	170	2645	Compression	10312	0.26
2-1	R End	-0.25	-0.37	1384	468	121	1037	HDU2-SDS	3075	0.34
2-1	R End	-0.25	-0.37	1384	779	121	2284	Compression	10312	0.22
Line A										
A-1	L Op 1	-32.12	-23.75	0	796	124	920	Compression		-
A-1	R Op 1	-15.96	-23.75	0	1583	246	1830	Compression	10312	0.18
A-2	L End	-15.87	-23.75	1372			1372	HDU2-SDS	3075	0.45
A-2	L End	-15.87	-23.75	1372			1372	Compression	10312	0.13
A-2	R End	-0.37	-23.75	1372	473	123	1022	HDU2-SDS	3075	0.33
A-2	R End	-0.37	-23.75	1372	788	123	2282	Compression	11601	0.20
Line B										
B-1	L End	-35.62	-0.25	2442	268	69	2244	HDU5-SDS	5645	0.40
B-1	L End	-35.62	-0.25	2442	446	69	2957	Compression	10312	0.29
B-1	L Op 1	-26.96	-0.25	2442	393	102	2151	HDU5-SDS	5645	0.38
B-1	L Op 1	-26.96	-0.25	2442	654	102	3198	Compression	11601	0.28
B-1	R Op 1	-22.54	-0.25	0	208	32	241	Compression		-
B-2	L Op 2	-17.87	-0.25	0	158	25	183	Compression		-
B-2	R Op 2	-14.46	-0.25	0	158	25	183	Compression		-
B-2	L Op 2	-11.12	-0.25	0	404	63	467	Compression		-
	V Elem	-2.79	-0.25	0	404	63	467	Compression		

Legend:
Line-Wall:
At wall or opening – Shearline and wall number
At vertical element – Shearline
Posit'n – Position of stud pack that hold-down is attached to:
V Elem – Vertical element: column or strengthened studs required where not at wall end or opening
L or R End – At left or right wall end
L or R Op n – At left or right side of opening n
t @ Op n – Uplift force t at opening n from offset opening in perforated wall above, from SDPWS 4.3.6.4.2.1
Location – Co-ordinates in Plan View
Tensile Hold-down or Compressive Stud Force – Upwards force on hold-down at one end of the wall or downward force on bottom plate under studs at the other end, for each force direction. Includes forces transferred from upper levels.
Shear – Overturning component = V x h / beff from SDPWS Eqn. 4.3-7; V = force on segment, ASD-factored by 0.70; h = wall height , beff = wall segment length – (tension stud pack width + hold-down anchor bolt offset) – (1/2 compression stud pack width). For perforated walls = V x h / Co sum (bi) from SDPWS Eqn. 4.3-8.
Dead – Dead load resisting component, factored for ASD by 0.60 for tension and 1.0 for compression
Ev – Vertical seismic load effect from ASCE 7 12.4.2.2 = -0.2 Sds x ASD factor x unfactored D = 0.259 SDS 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 4.3.6.4.2.1 when openings are staggered.
Hold-down – Device model number from hold-down database; "Compression" for bearing of end stud pack on bottom plate
Cap – Hold-downs: Allowable ASD tension load from database; Compression: Allowable ASD bearing force = Ct CM Cb Fcp A; A = cross sectional area of end studs. Refer to Framing materials table for details.
Crit. Resp. – Critical Response = Combined ASD force/Allowable ASD tension load

Notes:
HDU2-SDS2.5 for studs with thickness > 0'-3" and depth > 0'-3.5" : Uses 6 1/4" x 2.5" SDS heavy-duty screws; 5/8" anchor bolt.
HDU5-SDS2.5 for studs with thickness > 0'-3" and depth > 0'-3.5" : Uses 14 1/4" x 2.5" SDS heavy-duty screws; 5/8" anchor bolt.
Combined force from ASCE 7 2.4.1 load combination 10 = - (0.6D - 0.7Ev + 0.7Eh); Eh (from 12.4.2.1) = - shear overturning force
Refer to the Shear Line Dimensions table for wall height h, effective segment length beff and perforated wall adjusted sum of bi, to the Story Table for joist depth, and to the Shear Results table for perforated factor Co.
Designer is responsible for design of connection from wall to floor or foundation for shear force shown in Shear Results table. Refer to SDPWS 4.3.6.4.3 for foundation anchor bolt requirements.

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 2							
	Shearline force			2122	2122		
2-1	Right Opening 1	-0.25	-15.83	-715	715		
Line A							
	Shearline force			2127	2127		
A-2	Left Wall End	-16.00	-23.75	-1183	1183		
A-2	Left Opening 1	-8.92	-23.75	-856	856		
A-2	Right Opening 1	-5.08	-23.75	-223	223		
A-2	Left Opening 1	-8.92	-23.75			513	513
A-2	Right Opening 1	-5.08	-23.75			350	350
Line B							
	Shearline force			2116	2116		
B-1	Left Opening 1	-26.83	-0.25	1585	-1585		

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 FTAO walls, force transferred from above and below opening to shearwall pier.
-> Due to shearline force in the west-to-east or south-to-north direction
<- Due to shearline force in the east-to-west or north-to-south direction

DEFLECTION (flexible seismic design)

Wall, segment	W Gp	Dir	Srf	v plf	b ft	h ft	Bending A sq.in	Bending Defl in	Ga kips/ in	Nail slip Vn lbs	Nail slip en in	Shear Defl in	Hold Defl in	Total Defl in
Level 1														
Line 1														
1-1	1	Both	ExtS	99.2	23.50	10.00	16.5	.001	13.8	196	.032	.072	0.04	0.11
Line 2														
2-1,2	1	S->N	ExtS	149.6	15.58	10.00	16.5	.003	13.8	196	.032	.108	0.07	0.18
		N->S	ExtS	149.6	15.58	10.00	16.5	.003	13.8	196	.032	.108	0.08	0.19
Line A														
A-2	1	Both	-	-					-	-	-	-		0.35
A-2,1		W->E	ExtS	196.1	7.08	9.00	16.5	.006	13.8	196	.032	.128	0.17	0.31
		E->W	ExtS	196.1	7.08	9.00	16.5	.006	13.8	196	.032	.128	0.17	0.30
A-2,2		W->E	ExtS	196.1	4.83	9.00	16.5	.009	13.8	196	.032	.128	0.26	0.39
		E->W	ExtS	196.1	4.83	9.00	16.5	.009	13.8	196	.032	.128	0.27	0.40
Line B														
B-1,1	1	Both	ExtS	260.8	8.92	10.00	16.5	.009	13.8	196	.032	.189	0.16	0.36

Legend:
Wall, segment – Wall and segment between openings, e.g. B-3,2 = second segment on Wall 3 on Shearline B.
W Gp – Wall design group, refer to Sheathing and Framing Materials tables.
Dir – Force direction.
Srf – Wall surface = Int(erior) or Ext(erior) for perimeter walls, 1 or 2 for interior partitions; Comb = Combined v and Ga for identical materials on each side; S = Ga from side with stronger shear resistance; W = 2 x Ga of weaker side.
v – Unfactored (strength-level) shear force per unit distance on wall segment = ASD force / 0.70, as per ASCE 7 12.8.6,.
Unblocked walls = v / Cub as per SDPWS 4.3.4.3, Cub = Unblocked factor from 4.3.5.3, shown in the Shear Results table.
Perforated walls = vmax from Eqn. 4.3-9, as per 4.3.4.2.
FTAO walls = Unit shear force in pier beside opening(s).
b – Wall or segment length.
Segmented wall or FTAO wall segments = Width of wall segment between openings.
Perforated wall = Sum of FHS segments, modified as in 4.3.3.4 per 4.3.4.2.
FTAO wall = Length of wall including openings.
h – Wall height.
FTAO piers = Distance from bottom of opening to top of wall; for end segments, results using that distance and the wall height are averaged.
Defl – Horizontal shear wall deflection due to given term:
Bending = 8vh^3 / EAb; A = Effective cross sectional area of segment end stud(s), E = stud mod. of elasticity in Framing Materials table
For i studs at one end and j at the other, A = 2 ij / (i + j) x area of one stud, based on Ex. C4.3.4-3
Shear = vh / 1000 Ga; Ga = 1.4 vs / (1.4 vs / Gvtv + 0.75 en) from SDPWS Eqn. C4.2.3-3.
vs = ASD sheathing capacity.
Gvtv = Shear stiffness from C4.3.4, shown in Sheathing Materials table.
en = Nail slip from Table C4.2.3D, of form aVn^b for WSP, varies linearly to value at capacity for other materials.
Vn = Strength-level shear force per nail along panel edge at ASD capacity = 1.4 vs.
Hold – Anchorage system (hold-down) = da x h / beff.
da = Vertical hold-down displacement; refer to Hold-down Displacement table for components.
beff = Effective wall segment length = b - (tension stud pack width + hold-down anchor bolt offset) - (1/2 compression stud pack width)
beff is given in the Shear Wall Dimensions table.
For FTAO walls, hold-down device at end of wall is applied to all segments, as per APA T555.
Total Defl – Deflection from bending + shear + hold-down, as per Eqn. 4.3-2.
For FTAO walls, the average of the values for the segments, as per APA T555.

HOLD-DOWN DISPLACEMENT (flexible seismic design)

Wall, segment	Dir	Hold-down	Tens. force lbs	Vert. Displacement Manuf in	Add in	da in	Slippage Vf lbs	da in	Shrink +Extra in	Comp. force lbs	Crush da in	Total da in	Horz Defl in
Level 1													
Line 1													
1-1	Both	HDU2-SDS	390	.015	.000	0.015	-	-	.068	2909	0.01	0.09	0.04
Line 2													
2-1,2	S->N	HDU2-SDS	899	.034	.000	0.034	-	-	.068	2785	0.01	0.11	0.07
	N->S	HDU2-SDS	1037	.040	.000	0.040	-	-	.068	3292	0.01	0.12	0.08
Line A													
A-2,1	W->E	HDU2-SDS	1508	.058	.000	0.058	-	-	.068	2715	0.01	0.13	0.17
	E->W	HDU2-SDS	1423	.055	.000	0.055	-	-	.068	2404	0.01	0.13	0.17
A-2,2	W->E	HDU2-SDS	1501	.058	.000	0.058	-	-	.068	2254	0.01	0.13	0.26
	E->W	HDU2-SDS	1587	.061	.000	0.061	-	-	.068	2565	0.01	0.14	0.27
Line B													
B-1,1	W->E	HDU5-SDS	2244	.063	.000	0.063	-	-	.068	3745	0.01	0.14	0.16
	E->W	HDU5-SDS	2151	.060	.000	0.060	-	-	.068	3407	0.01	0.14	0.16

Legend:
Wall, segment – Wall and segment between openings, e.g. B-3,2 = second segment on Wall 3 on Shearline B
Dir – Force direction
Tens., Comp. – Accumulated ASD hold-down tension force T and strength-level end compression force C from overturning, dead and vertical earthquake loads.
Tens. – ASD-factored force, used for proportion of manufacturer's maximum elongation
Comp. – Strength level force as per ASCE 12.8.6
da – Vertical displacements due to the following components:
Vert. Displacement – Elongation when slippage calculated separately; displacement when combined elongation/slippage used
Manuf – Using manufacturer's value for anchor bolt length, or no bolt contribution for connector-only elongation
*Unless marked with * = (ASD tension force / ASD hold-down capacity) x max strength-level elongation or displacement*
** - Maximum strength-level elongation or displacement is used. May result in higher than actual displacements for lightly loaded hold-downs, causing the segment to draw less force due to lower than actual stiffness.*
Add – Due to longer anchor bolt length than manufacturer's value, or entire bolt length for connector-only elongation = TL / (Ab x Es)
T = Strength level tension force (not shown)
Ab = bolt cross-sectional area
Es = steel modulus = 29000000 psi
L = Lb – Lh
Lb = Total bolt length shown in Storey Information table
Lh = Manufacturer's anchor bolt length for given displacement/elongation from hold-down database
Slippage – Due to vertical slippage of hold-down fasteners attached to stud(s) when not combined with elongation
Nails = en from SDPWS Table C4.2.3D using values for wood structural panels
Bolts = Vf / (270,000 D^1.5) (NDS 11.3.6); D = bolt diameter, Vf = Tension force T / number of fasteners
Shrink + Extra – Wood shrinkage plus extra displacement due to mis-cuts, gaps, etc.
Shrinkage = 0.002 x (19% fabrication – 10% in-service moisture contents) x Ls
Ls = Length between anchor bolt fasteners subject to perp-to-grain shrinkage; see Story Information table
Crush – Deformation of bottom plate at compression end of wall segment
= 0.02" x [r / 0.73, r < 0.73; (1 + (r - 0.73) / 0.27), 0.73 < r < 1; 2 r^3, r > 1]
r = fcp / Fcp'; Fcp' = Ct CM Fcp; fcp = C / A, A = cross sectional area of end studs
Total da – Vert. Displacement + Slippage + Shrink + Crush + Extra
Horz Defl – Anchorage deflection term in SDPWS Eqn. C.4.3.4-1 = h / beff x da
h = Wall height. For end segments in FTAO walls, h is the average of the wall height and the distance from the bottom of opening to top of wall
beff = Effective wall segment length = b - (tension stud pack width + hold-down anchor bolt offset) - (1/2 compression stud pack width)
h and b are shown in Deflection table, beff in the Shear Wall Dimensions table

Rigid Diaphragm Seismic Design

SEISMIC INFORMATION

Level	Mass [lbs]	Area [sq.ft]	Story Shear Fx [lbs] E-W	Story Shear Fx [lbs] N-S	Shear Resistance [lbs] E-W	Shear Resistance [lbs] N-S	Diaphragm Force [lbs] E-W Fpx	Diaphragm Force [lbs] E-W Design	Diaphragm Force [lbs] N-S Fpx	Diaphragm Force [lbs] N-S Design
1	27256	834.3	3264	3264	6915	10957	4243	4243	4243	4243
All	27256	–	3264	3264	–	–	–	–	–	–

Legend:
Mass – Sum of all generated and input building masses on level = wx in ASCE 7 Eqn. 12.8-12.
Story Shear – Total ASD-factored shear force induced at level x from Eqn. 12.8-11.
Shear Resistance – Lateral design strength of all shear-resisting elements on story, for use in weak story evaluation (4.1.8).
Diaphragm Force – used by Shearwalls only for drag strut forces, as per Exception to 12.10.2.1.
Fpx - Minimum ASD-factored force for diaphragm design from Eqns. 12.10-1, -2, and -3.
Design = The greater of the story shear and Fpx + transfer forces from discontinuous shearlines, factored by overstrength (omega) as per 12.10.1.1.
Omega = 3.0 as per 12.2-1.

On at least one level and force direction, a torsional irregularity was detected and torsional amplification factor Ax applied according to 12.8.4.3. Refer to the Torsional Analysis section of the Log File output for the values of Ax.

Redundancy Factor p (rho):
E-W 1.30, N-S 1.30
Input by user (overriding calculated value).
Applies to shearwall design, hold-down forces and the drag strut force component based on shearline forces; does not apply to story drift, out-of-plane force, or the diaphragm force Fpx and the drag strut force component based on it.

Vertical Earthquake Load Ev
Ev = 0.2 Sds D; Sds = 1.11; Ev = 0.222 D unfactored; 0.156 D factored; total dead load factor: 0.6 - 0.156 = 0.444 tension, 1.0 + 0.156 = 1.156 compression.

SHEAR RESULTS (rigid 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 1														
Ln1, Lev1	1	Both	102.9	-	2417	-	1.0	-	280	-		280	6588	0.37
Line 2														
Ln2, Lev1	-	Both	-	-	2236	-	-	-	-	-		-	4369	-
Wall 2-1	1	Both	-	-	2236	-	1.0	-	280	-		-	4369	-
Seg. 1	-	Both	0.0	-	0	-	1.0	-	280	-		280	-	-
Seg. 2	-	Both	143.5	-	2236	-	1.0	-	280	-		280	4369	0.51

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 1														
LnA, Lev1	-	Both	-	-	2587	-	-	-	-	-		-	4416	-
Wall A-2	1	Both	-	-	2587	-	1.0	-	280	-		-	4416	-
Seg. 1	-	Both	217.1	129.0	1538	-	1.0	-	280	-		280	1986	0.77
Open. 1	-	Both	-	273.8	1049	-	-	-	280	-		280	1075	0.98
Seg. 2	-	Both	217.1	129.0	1049	-	1.0	-	280	-		280	1355	0.77
Line B														
LnB, Lev1	-	Both	-	-	1656	-	-	-	-	-		-	2500	-
Wall B-1	1	Both	-	-	1656	-	1.0	-	280	-		-	2500	-
Seg. 1	-	Both	185.7	-	1656	-	1.0	-	280	-		280	2500	0.66
Seg. 2	-	Both	0.0	-	0	-	1.0	-	280	-		280	-	-

Legend:
W Gp - Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall. "^" means that this wall is critical for all walls in the Standard Wall group.
For Dir – Direction of seismic force along shearline.
v – Design shear force on segment = ASD-factored shear force per unit length of full-height sheathing (FHS)
vmax/vft - Perforated walls: Collector and in-plane anchorage force as per SDPWS eqn. 4.3-9 = V/FHS/Co. FHS is factored for narrow segments as per 4.3.3.4
FTAO walls: Shear force in piers above and below either openings or piers beside opening(s). Aspect ratio factor does not apply to these piers.
V – ASD factored shear force. For shearline: total shearline force. For wall: total of all segments on wall. For segment: force on segment
Asp/Cub – Unblocked wood structural panel factor Cub from SDPWS 4.3.5.3 or Aspect Ratio factor from 4.3.5.5.1, which for perforated walls is sum bi / FHS from 4.3.5.6 with bi defined in 4.3.3.4. For multi-segment walls, wall row shows Cub and segment rows show Asp. For single-segment walls and perforated walls, value shown is Asp for blocked walls and Cub for unblocked walls.
Int, Ext - Nominal unit shear capacity of interior and exterior sheathing, factored by Table 4.3-1 Note 3 for framing specific gravity and Note 10 for presence of hold-downs. For wall segments, also include unblocked factor Cub and aspect ratio adjustments.
Co - Adjustment factor for perforated walls from SDPWS Equation 4.3-6.
C - Sheathing combination rule, A = Add capacities, S = Strongest side or twice weakest, G = Stiffness-based using Eqns. 4.3-3,-4.
Cmb - Combined interior and exterior unit shear capacity including perforated wall factor Co.
V – Total factored shear capacity of shearline, wall or segment.
Crit Resp – Response ratio = v/Cmb = design shear force/unit shear capacity. "W" indicates that the wind design criterion was critical in selecting wall.

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

Hold-Down and Compression Design (rigid seismic design)

Level 1 Line-Wall	Posit'n	Location [ft] X	Location [ft] Y	Tensile Hold-down or Compressive Stud Force [lbs] Shear	Dead	Ev	Cmb'd	Hold-down	Cap [lbs]	Crit Resp.
Line 1										
1-1	L End	-35.75	-23.62	1040	705	183	517	HDU2-SDS	3075	0.17
1-1	L End	-35.75	-23.62	1040	1175	183	2397	Compression	10312	0.23
1-1	R End	-35.75	-0.37	1040	705	183	517	HDU2-SDS	3075	0.17
1-1	R End	-35.75	-0.37	1040	1175	183	2397	Compression	10312	0.23
Line 2										
2-1	R Op 1	-0.25	-15.71	1458	468	121	1112	HDU2-SDS	3075	0.36
2-1	R Op 1	-0.25	-15.71	1458	779	121	2359	Compression	10312	0.23
2-1	R End	-0.25	-0.37	1458	468	121	1112	HDU2-SDS	3075	0.36
2-1	R End	-0.25	-0.37	1458	779	121	2359	Compression	10312	0.23
Line A										
A-2	L End	-15.87	-23.75	1669	473	123	1319	HDU2-SDS	3075	0.43
A-2	L End	-15.87	-23.75	1669	788	123	2579	Compression	10312	0.25
A-2	R End	-0.37	-23.75	1669	473	123	1319	HDU2-SDS	3075	0.43
A-2	R End	-0.37	-23.75	1669	788	123	2579	Compression	11601	0.22
Line B										
B-1	L End	-35.62	-0.25	1911	268	69	1713	HDU5-SDS	5645	0.30
B-1	L End	-35.62	-0.25	1911	446	69	2426	Compression	10312	0.24
B-1	L Op 1	-26.96	-0.25	1911	268	69	1713	HDU5-SDS	5645	0.30
B-1	L Op 1	-26.96	-0.25	1911	446	69	2426	Compression	11601	0.21

Legend:
Line-Wall:
At wall or opening – Shearline and wall number
At vertical element – Shearline
Posit'n – Position of stud pack that hold-down is attached to:
V Elem – Vertical element: column or strengthened studs required where not at wall end or opening
L or R End – At left or right wall end
L or R Op n – At left or right side of opening n
t @ Op n – Uplift force t at opening n from offset opening in perforated wall above, from SDPWS 4.3.6.4.2.1
Location – Co-ordinates in Plan View
Tensile Hold-down or Compressive Stud Force – Upwards force on hold-down at one end of the wall or downward force on bottom plate under studs at the other end, for each force direction. Includes forces transferred from upper levels.
Shear – Overturning component = V x h / beff from SDPWS Eqn. 4.3-7; V = force on segment, ASD-factored by 0.70; h = wall height , beff = wall segment length – (tension stud pack width + hold-down anchor bolt offset) – (1/2 compression stud pack width). For perforated walls = V x h / Co sum (bi) from SDPWS Eqn. 4.3-8.
Dead – Dead load resisting component, factored for ASD by 0.60 for tension and 1.0 for compression
Ev – Vertical seismic load effect from ASCE 7 12.4.2.2 = -0.2 Sds x ASD factor x unfactored D = 0.259 SDS 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 4.3.6.4.2.1 when openings are staggered.
Hold-down – Device model number from hold-down database; "Compression" for bearing of end stud pack on bottom plate
Cap – Hold-downs: Allowable ASD tension load from database; Compression: Allowable ASD bearing force = Ct CM Cb Fcp A; A = cross sectional area of end studs. Refer to Framing materials table for details.
Crit. Resp. – Critical Response = Combined ASD force/Allowable ASD tension load

Notes:
HDU2-SDS2.5 for studs with thickness > 0'-3" and depth > 0'-3.5" : Uses 6 1/4" x 2.5" SDS heavy-duty screws; 5/8" anchor bolt.
HDU5-SDS2.5 for studs with thickness > 0'-3" and depth > 0'-3.5" : Uses 14 1/4" x 2.5" SDS heavy-duty screws; 5/8" anchor bolt.
Combined force from ASCE 7 2.4.1 load combination 10 = - (0.6D - 0.7Ev + 0.7Eh); Eh (from 12.4.2.1) = - shear overturning force
Refer to the Shear Line Dimensions table for wall height h, effective segment length beff and perforated wall adjusted sum of bi, to the Story Table for joist depth, and to the Shear Results table for perforated factor Co.
Designer is responsible for design of connection from wall to floor or foundation for shear force shown in Shear Results table. Refer to SDPWS 4.3.6.4.3 for foundation anchor bolt requirements.

COLLECTOR FORCES (rigid 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 2							
	Shearline force			2236	2236		
2-1	Right Opening 1	-0.25	-15.83	-753	753		
Line A							
	Shearline force			2587	2587		
A-2	Left Wall End	-16.00	-23.75	-1439	1439		
A-2	Left Opening 1	-8.92	-23.75	-1041	1041		
A-2	Right Opening 1	-5.08	-23.75	-271	271		
A-2	Left Opening 1	-8.92	-23.75			624	624
A-2	Right Opening 1	-5.08	-23.75			426	426
Line B							
	Shearline force			1656	1656		
B-1	Left Opening 1	-26.83	-0.25	1240	-1240		

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 1a or 1b are detected, or if other horizontal irregularities are input, or if 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 FTAO walls, force transferred from above and below opening to shearwall pier.
-> Due to shearline force in the west-to-east or south-to-north direction
<- Due to shearline force in the east-to-west or north-to-south direction

DEFLECTION (rigid seismic design)

Wall, segment	W Gp	Dir	Srf	v plf	b ft	h ft	Bending A sq.in	Bending Defl in	Ga kips/ in	Nail slip Vn lbs	Nail slip en in	Shear Defl in	Hold Defl in	Total Defl in
Level 1														
Line 1														
1-1	1	Both	ExtS	113.0	23.50	10.00	16.5	.001	13.8	196	.032	.082	0.04	0.12
Line 2														
2-1,2	1	Both	ExtS	157.7	15.58	10.00	16.5	.003	13.8	196	.032	.114	0.08	0.19
Line A														
A-2	1	Both	-	-					-	-	-	-		0.41
A-2,1		Both	ExtS	238.6	7.08	9.00	16.5	.008	13.8	196	.032	.156	0.19	0.36
A-2,2		Both	ExtS	238.6	4.83	9.00	16.5	.011	13.8	196	.032	.156	0.29	0.46
Line B														
B-1,1	1	Both	ExtS	204.1	8.92	10.00	16.5	.007	13.8	196	.032	.148	0.14	0.30

Legend:
Wall, segment – Wall and segment between openings, e.g. B-3,2 = second segment on Wall 3 on Shearline B.
W Gp – Wall design group, refer to Sheathing and Framing Materials tables.
Dir – Force direction.
Srf – Wall surface = Int(erior) or Ext(erior) for perimeter walls, 1 or 2 for interior partitions; Comb = Combined v and Ga for identical materials on each side; S = Ga from side with stronger shear resistance; W = 2 x Ga of weaker side.
v – Unfactored (strength-level) shear force per unit distance on wall segment = ASD force / 0.70, as per ASCE 7 12.8.6,.
Unblocked walls = v / Cub as per SDPWS 4.3.4.3, Cub = Unblocked factor from 4.3.5.3, shown in the Shear Results table.
Perforated walls = vmax from Eqn. 4.3-9, as per 4.3.4.2.
FTAO walls = Unit shear force in pier beside opening(s).
b – Wall or segment length.
Segmented wall or FTAO wall segments = Width of wall segment between openings.
Perforated wall = Sum of FHS segments, modified as in 4.3.3.4 per 4.3.4.2.
FTAO wall = Length of wall including openings.
h – Wall height.
FTAO piers = Distance from bottom of opening to top of wall; for end segments, results using that distance and the wall height are averaged.
Defl – Horizontal shear wall deflection due to given term:
Bending = 8vh^3 / EAb; A = Effective cross sectional area of segment end stud(s), E = stud mod. of elasticity in Framing Materials table
For i studs at one end and j at the other, A = 2 ij / (i + j) x area of one stud, based on Ex. C4.3.4-3
Shear = vh / 1000 Ga; Ga = 1.4 vs / (1.4 vs / Gvtv + 0.75 en) from SDPWS Eqn. C4.2.3-3.
vs = ASD sheathing capacity.
Gvtv = Shear stiffness from C4.3.4, shown in Sheathing Materials table.
en = Nail slip from Table C4.2.3D, of form aVn^b for WSP, varies linearly to value at capacity for other materials.
Vn = Strength-level shear force per nail along panel edge at ASD capacity = 1.4 vs.
Hold – Anchorage system (hold-down) = da x h / beff.
da = Vertical hold-down displacement; refer to Hold-down Displacement table for components.
beff = Effective wall segment length = b - (tension stud pack width + hold-down anchor bolt offset) - (1/2 compression stud pack width)
beff is given in the Shear Wall Dimensions table.
For FTAO walls, hold-down device at end of wall is applied to all segments, as per APA T555.
Total Defl – Deflection from bending + shear + hold-down, as per Eqn. 4.3-2.
For FTAO walls, the average of the values for the segments, as per APA T555.

HOLD-DOWN DISPLACEMENT (rigid seismic design)

Wall, segment	Dir	Hold-down	Tens. force lbs	Vert. Displacement Manuf in	Add in	da in	Slippage Vf lbs	da in	Shrink +Extra in	Comp. force lbs	Crush da in	Total da in	Horz Defl in
Level 1													
Line 1													
1-1	Both	HDU2-SDS	517	.020	.000	0.020	-	-	.068	3049	0.01	0.10	0.04
Line 2													
2-1,2	Both	HDU2-SDS	1112	.043	.000	0.043	-	-	.068	2867	0.01	0.12	0.08
Line A													
A-2,1	Both	HDU2-SDS	1868	.072	.000	0.072	-	-	.068	2800	0.01	0.15	0.19
A-2,2	Both	HDU2-SDS	1953	.075	.000	0.075	-	-	.068	2656	0.01	0.15	0.29
Line B													
B-1,1	Both	HDU5-SDS	1713	.048	.000	0.048	-	-	.068	2823	0.01	0.12	0.14

Legend:
Wall, segment – Wall and segment between openings, e.g. B-3,2 = second segment on Wall 3 on Shearline B
Dir – Force direction
Tens., Comp. – Accumulated ASD hold-down tension force T and strength-level end compression force C from overturning, dead and vertical earthquake loads.
Tens. – ASD-factored force, used for proportion of manufacturer's maximum elongation
Comp. – Strength level force as per ASCE 12.8.6
da – Vertical displacements due to the following components:
Vert. Displacement – Elongation when slippage calculated separately; displacement when combined elongation/slippage used
Manuf – Using manufacturer's value for anchor bolt length, or no bolt contribution for connector-only elongation
*Unless marked with * = (ASD tension force / ASD hold-down capacity) x max strength-level elongation or displacement*
** - Maximum strength-level elongation or displacement is used. May result in higher than actual displacements for lightly loaded hold-downs, causing the segment to draw less force due to lower than actual stiffness.*
Add – Due to longer anchor bolt length than manufacturer's value, or entire bolt length for connector-only elongation = TL / (Ab x Es)
T = Strength level tension force (not shown)
Ab = bolt cross-sectional area
Es = steel modulus = 29000000 psi
L = Lb – Lh
Lb = Total bolt length shown in Storey Information table
Lh = Manufacturer's anchor bolt length for given displacement/elongation from hold-down database
Slippage – Due to vertical slippage of hold-down fasteners attached to stud(s) when not combined with elongation
Nails = en from SDPWS Table C4.2.3D using values for wood structural panels
Bolts = Vf / (270,000 D^1.5) (NDS 11.3.6); D = bolt diameter, Vf = Tension force T / number of fasteners
Shrink + Extra – Wood shrinkage plus extra displacement due to mis-cuts, gaps, etc.
Shrinkage = 0.002 x (19% fabrication – 10% in-service moisture contents) x Ls
Ls = Length between anchor bolt fasteners subject to perp-to-grain shrinkage; see Story Information table
Crush – Deformation of bottom plate at compression end of wall segment
= 0.02" x [r / 0.73, r < 0.73; (1 + (r - 0.73) / 0.27), 0.73 < r < 1; 2 r^3, r > 1]
r = fcp / Fcp'; Fcp' = Ct CM Fcp; fcp = C / A, A = cross sectional area of end studs
Total da – Vert. Displacement + Slippage + Shrink + Crush + Extra
Horz Defl – Anchorage deflection term in SDPWS Eqn. C.4.3.4-1 = h / beff x da
h = Wall height. For end segments in FTAO walls, h is the average of the wall height and the distance from the bottom of opening to top of wall
beff = Effective wall segment length = b - (tension stud pack width + hold-down anchor bolt offset) - (1/2 compression stud pack width)
h and b are shown in Deflection table, beff in the Shear Wall Dimensions table