PRAXIS ENGINEERING, LLC
205 ALLEN ST.
KELSO, WA 98626
(360) 575-8348

January 22, 2024

Nisqually Tribe – Spec House E
Parcel #2183301000
Olympia, WA 98513

Lateral analysis for a single-story residence.

110 mph Ultimate Wind Speed, Exposure C, Seismic Zone – D1
1500 psf Assumed Minimum Soil Bearing Capacity

Limiting Conditions and Warning

Professional engineering provided herein is based upon plans and information provided by client and is limited to attached documents only, unless otherwise noted in signed and sealed documents and/or plans provided by professional engineer. If changes are made to the attached elevations or floorplans, contact our office before construction begins. No liability is assigned to any unsigned or unstamped plan, specification, or documents.

For payment of a one-time fee, Praxis Engineering, LLC grants the owner and/or contractor, a limited license to use this analysis and design to construct one single house or structure. After the initial analysis and design is purchased, customers may obtain a wet stamped renewal sheet for a subsequent house or structure (if the same design conditions exist) by paying a reduced additional order fee.

01/23/2024

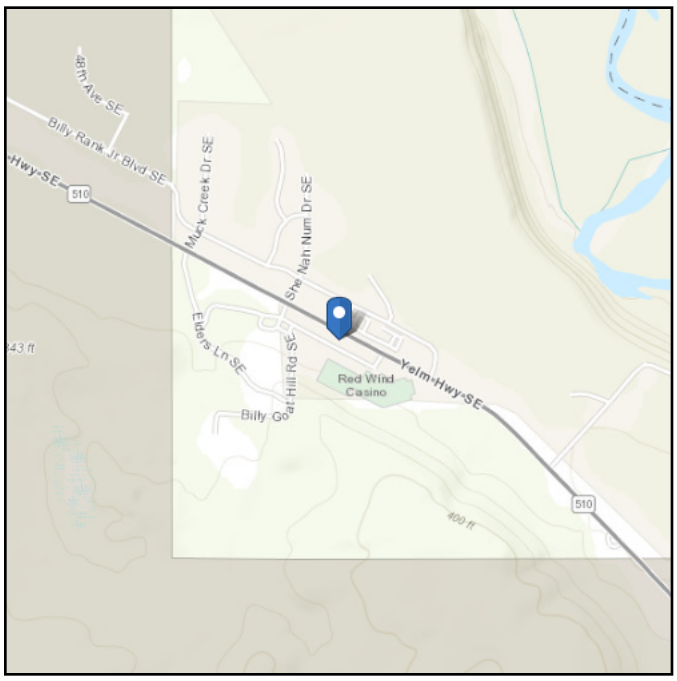
SIGNATURE MUST APPEAR IN BLUE INK TO BE A VALID SIGNATURE

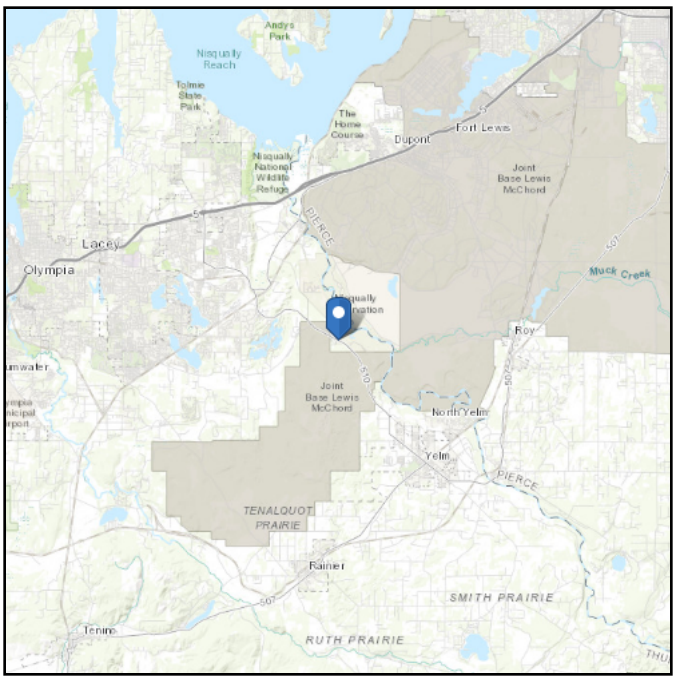
ASCE Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Stiff Soil

Latitude: 47.001324
Longitude: -122.669395
Elevation: 263.71501154583547 ft (NAVD 88)





Seismic

Site Soil Class: D - Stiff Soil

Results:

S_S :	1.333	S_{D1} :	N/A
S_1 :	0.481	T_L :	16
F_a :	1	PGA :	0.536
F_v :	N/A	PGA_M :	0.59
S_{MS} :	1.333	F_{PGA} :	1.1
S_{M1} :	N/A	I_e :	1
S_{DS} :	0.888	C_v :	1.367

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

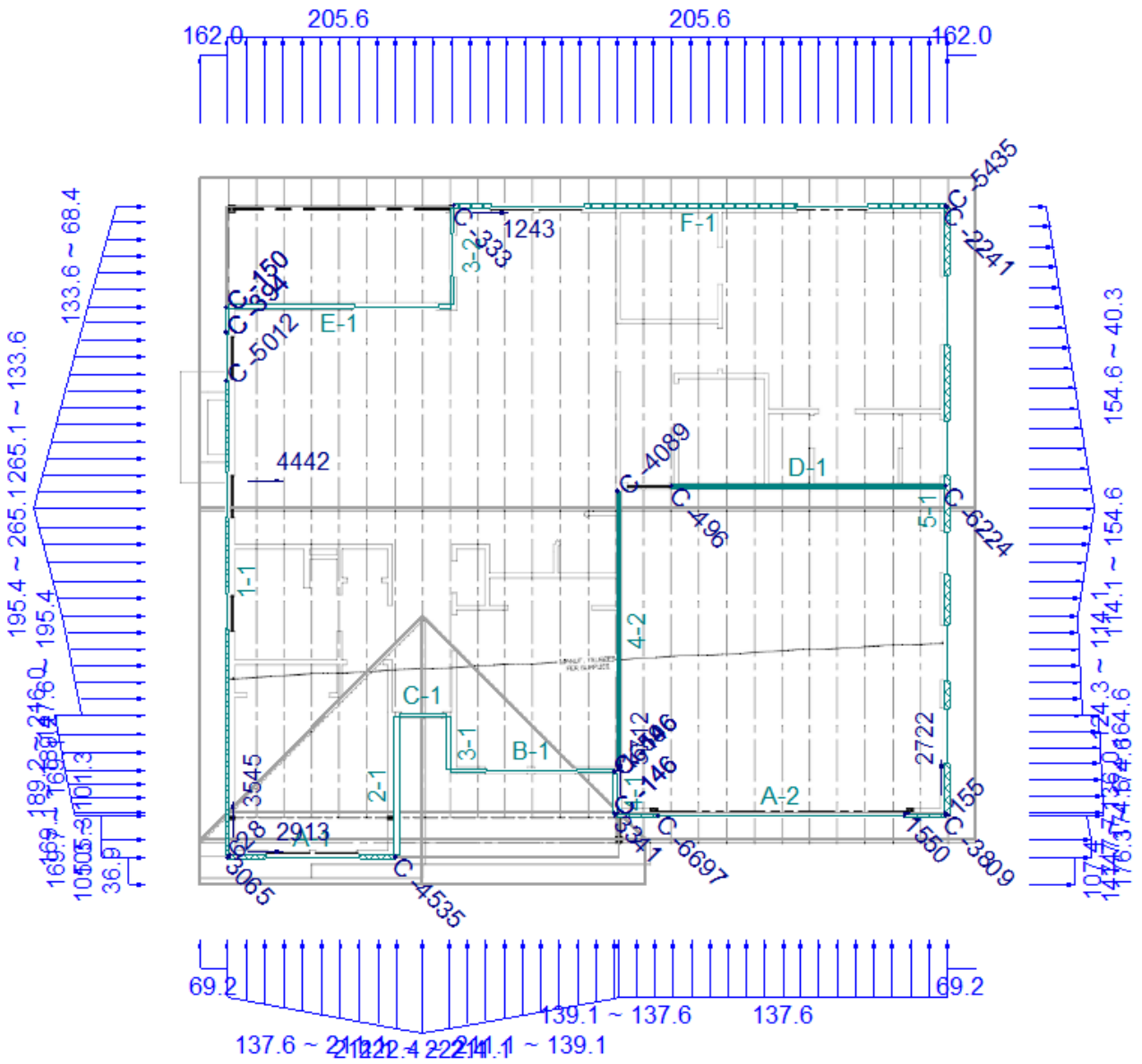
Data Accessed: Fri Jan 12 2024

Date Source: USGS Seismic Design Maps

PROJECT	NISQUALLY SPEC HOUSE PLAN E
ADDRESS	00000 SQUALLI-ABSCH ROAD, OLYMPIA, WA 98513
DATE	1.12.24
ENGR	LB

PRAXIS ENGINEERING

WIND DIAGRAM



PROJECT	NISQUALLY SPEC HOUSE PLAN E
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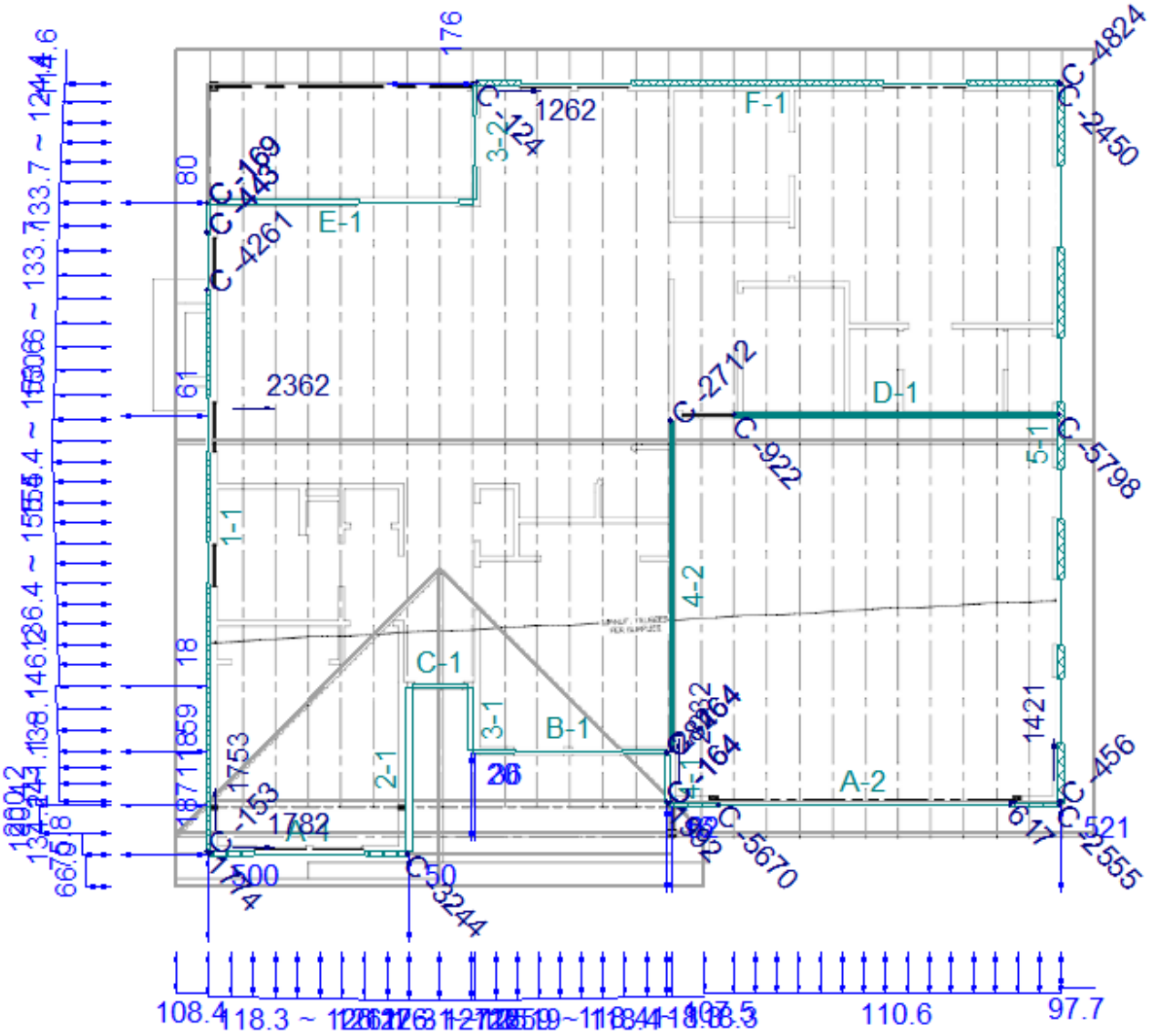
PRAXIS ENGINEERING

SEISMIC DIAGRAM



WoodWorks® Shearwalls

SOFTWARE FOR WOOD DESIGN

WoodWorks® Shearwalls 2023

Nisqually Plan E Lateral.wsw **Jan. 18, 2024 14:56:54**

Project Information

COMPANY AND PROJECT INFORMATION

Company	Project
PRAXIS ENGINEERING 205 ALLEN ST, KELSO, WA	

DESIGN SETTINGS

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

Load Combinations

For Design (ASD)	For Deflection (Strength)
0.70 Seismic + 0.60 Dead	1.00 Seismic + 0.90 Dead
0.60 Wind + 0.60 Dead	1.00 Wind + 0.90 Dead

Building Code Capacity Modification

Wind	Seismic
1.00	1.00

Service Conditions and Load Duration

Duration Factor	Temperature Range	Moisture Content: Fabrication	Moisture Content: Service
-	-	19% (<=19%)	10% (<=19%)

Max Shearwall Offset [ft]

Plan (within story)	Elevation (between stories)
3.00	-

Maximum Height-to-width Ratio

Wood panels: Blocked	Wood panels: Unblocked	Fiberboard	Lumber: Wind	Lumber: Seismic	Gypsum: Blocked	Gypsum: Unblocked
3.5	2.0	-	-	-	2.0	1.5

Ignore shear resistance contribution of...

Wall segments	Seismic
Side with invalid aspect ratio	Any gypsum, lumber, fiberboard

Forces based on...

Hold-downs	Applied loads
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

SITE INFORMATION

Wind
ASCE 7-16 Directional (All heights)

Design Wind Speed	110 mph
Serviceability Wind Speed	100 mph
Exposure	Exposure C
Enclosure	Enclosed
Min Wind Loads: Walls	16 psf
Roofs	8 psf

Topographic Information [ft]

Shape	Height	Length
-	-	-

Site Location: -

Elev: 0ft
Rigid building - Static analysis

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

Seismic
ASCE 7-16 12.8 Equivalent Lateral Force Procedure

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

Spectral Response Acceleration
S1: 0.480g **Ss:** 1.330g

Fundamental Period	E-W	N-S
T Used	0.155s	0.155s
Approximate Ta	0.155s	0.155s
Maximum T	0.218s	0.218s
Response Factor R	6.50	6.50

Fa: 1.00 **Fv:** 1.82

Structural Data

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 Sh OSB	24/16	7/16	-	-	Vert	83500	8d	Common	N	6	12	Y	3
2	Ext	Struct Sh OSB	24/16	7/16	-	-	Vert	83500	8d	Common	N	3	12	Y	2,3

Legend:
Grp – Wall Design Group number, used to reference wall in other tables (created by program)
Surf – Exterior or interior surface when applied to exterior wall
Ratng – Span rating, see SDPWS Table C4.2.3C
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:
2. Framing at adjoining panel edges must be 3" nominal or wider with staggered nailing according to SDPWS 4.3.7.1 (5)
3. Shear capacity for current design has been increased to the value for 15/32" sheathing with same nailing because stud spacing is 16" max. or panel orientation is horizontal. See SDPWS Table 4.3A Note 2.

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	
2	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.

Loads

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		0.00	12.50	90.0	
A	1	Area	4.00	0.00	12.50	15.0	
A	1	Line		28.00	52.00	90.0	
A	1	Area	13.50	28.00	52.00	15.0	
B	1	Line		16.00	28.00	90.0	
B	1	Area	22.00	16.00	28.00	15.0	
C	1	Line		12.50	16.00	90.0	
D	1	Line		32.00	52.00	90.0	
D	1	Area	22.00	32.00	52.00	15.0	
E	1	Line		0.00	16.50	90.0	
E	1	Area	22.50	0.00	16.50	15.0	
F	1	Line		16.50	52.00	90.0	
1	1	Line		0.00	40.00	90.0	
1	1	Area	4.00	0.00	40.00	15.0	
2	1	Line		0.00	10.50	90.0	
3	1	Line		6.50	10.50	90.0	
3	1	Line		40.00	47.00	90.0	
4	1	Line		3.00	6.50	90.0	
4	1	Line		6.50	26.50	90.0	
4	1	Area	4.00	6.50	26.50	15.0	
5	1	Line		3.00	47.00	90.0	
5	1	Area	4.00	3.00	47.00	15.0	

Design Summary

SHEARWALL DESIGN

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

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

HOLD-DOWN DESIGN

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

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

COMPRESSION FORCE DESIGN

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

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

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	Allowable Shear [plf] Ext	Co	C	Allowable Shear [plf] Cmb	V [lbs]	Resp. Ratio
Line 1														
Level 1														
Ln1, Lev1	1	S->N	123.3	137.9	3545	-	1.0	-	326	0.89		326	9383	0.38
	1	N->S	108.2	121.0	3112	-	1.0	-	326	0.89		326	9383	0.33
Line 4														
Ln4, Lev1	-	S->N	-	-	5712	-	-	-	-	-		-	7391	-
	-	N->S	-	-	5279	-	-	-	-	-		-	7391	-
Wall 4-2	1^	S->N	282.1	-	5712	-	1.0	-	365	-		365	7391	0.77
	1	N->S	260.7	-	5279	-	1.0	-	365	-		365	7391	0.71
Line 5														
Ln5, Lev1	1	Both	123.7	137.1	2722	-	.92	-	329	0.98		329	7246	0.38

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	Allowable Shear [plf] Ext	Co	C	Allowable Shear [plf] Cmb	V [lbs]	Resp. Ratio
Line A														
Level 1														
LnA, Lev1	-	Both	-	-	2913	-	-	-	-	-		-	3875	-
Wall A-1	1	Both	122.6	274.4	675	-	.61	-	163	0.73		163	897	0.75
Wall A-2	2^	Both	-	-	2239	-	1.0	-	685	-		-	2978	-
Seg. 1	-	Both	371.9	-	1209	-	.72	-	495	-		495	1608	0.75
Seg. 2	-	Both	343.3	-	1030	-	.67	-	457	-		457	1370	0.75
Line D														
LnD, Lev1	-	Both	-	-	4442	-	-	-	-	-		-	7300	-
Wall D-1	1	Both	222.1	-	4442	-	1.0	-	365	-		365	7300	0.61
Line F														
LnF, Lev1	1	Both	51.8	69.5	1243	-	.96	-	272	0.78		272	6528	0.19

Legend:
W Gp - Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall. "^" means that this wall is critical for all walls in the Standard Wall group.
For Dir - Direction of wind force along shearline.
v – Design shear force on segment = ASD-factored shear force per unit length of full-height sheathing (FHS)
vmax/vft - Perforated walls: Collector and in-plane anchorage force as per SDPWS eqn. 4.3-9 = V/FHS/Co. FHS is factored for narrow segments as per 4.3.3.4
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 – For wall: Unblocked structural wood panel factor Cub from SDPWS 4.3.5.3. For segment or FTAO pier: Aspect ratio factor from SDPWS 4.3.5.5.1. For perforated wall: Either Cub or sum bi / FHS, where bi is segment length adjusted per SDPWS 4.3.3.4.
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	0.00	0.00	1	2181	1553		628	HDU2-SDS	3075	0.20
1-1	L End	0.00	0.00	1	-1914	2588		4502	Compression	10312	0.44
1-1	R End	0.00	34.50	1	1914	1699		215	HDU2-SDS	3075	0.07
1-1	R End	0.00	34.50	1	-2181	2831		5012	Compression	10312	0.49
1-1	R Op 3	0.00	38.00	1	0	394		394	Compression	10312	0.04
1-1	R End	0.00	39.50	1	0	150		150	Compression	10312	0.01
Line 4											
4-1	L End	28.00	3.00	1	0	146		146	Compression		-
4-1	R End	28.00	6.00	1	0	146		146	Compression		-
4-2	L End	28.50	6.50	1	2571	911		1659	HDU2-SDS	3075	0.54
4-2	L End	28.50	6.50	1	-2375	1519		3894	Compression	10312	0.38
4-2	R End	28.50	26.50	1	2376	911		1464	HDU2-SDS	3075	0.48
4-2	R End	28.50	26.50	1	-2570	1519		4089	Compression	10312	0.40
Line 5											
5-1	L End	52.00	3.00	1	2135	1980		155	LSTHD8	2590	0.06
5-1	L End	52.00	3.00	1	-2135	3300		5435	Compression	10312	0.53
5-1	R End	52.00	47.00	1	2135	1980		155	LSTHD8	2590	0.06
5-1	R End	52.00	47.00	1	-2135	3300		5435	Compression	10312	0.53
Line A											
A-1	L End	0.00	0.00	1	3616	551		3065	HDU5-SDS	5645	0.54
A-1	L End	0.00	0.00	1	-3616	919		4535	Compression	10312	0.44
A-1	R End	12.00	0.00	1	3616	551		3065	HDU5-SDS	5645	0.54
A-1	R End	12.00	0.00	1	-3616	919		4535	Compression	10312	0.44
A-2	L End	28.00	3.00	1	3626	285		3341	HDU5-SDS	5645	0.59
A-2	L End	28.00	3.00	1	-3626	475		4101	Compression	10312	0.40
A-2	L Op 1	31.00	3.00	1	3626	1843		1784	HDU5-SDS	5645	0.32
A-2	L Op 1	31.00	3.00	1	-3626	3071		6697	Compression	10312	0.65
A-2	R Op 1	49.00	3.00	1	3371	1821		1550	HDU5-SDS	5645	0.27
A-2	R Op 1	49.00	3.00	1	-3371	3035		6405	Compression	10312	0.62
A-2	R End	52.00	3.00	1	3371	263		3107	HDU5-SDS	5645	0.55
A-2	R End	52.00	3.00	1	-3371	439		3809	Compression	10312	0.37
Line D											
D-1	L End	32.00	27.00	1	-2024	4200		6224	Compression	10312	0.60
D-1	R End	52.00	27.00	1	-2024	4200		6224	Compression	10312	0.60
Line F											
F-1	L End	16.50	47.00	1	-632	1609		2241	Compression	10312	0.22
F-1	R End	52.00	47.00	1	-632	1609		2241	Compression	10312	0.22

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

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	56612	2141.0	5406	5406	12645	17158	7027	7027	7027	7027
All	**56612**	-	**7722**	**7722**	-	-	-	-	-	-

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 1.00, N-S 1.00
Automatically calculated according to ASCE 7 12.3.4.2.

Vertical Earthquake Load Ev
Ev = 0.2 Sds D; Sds = 0.89; Ev = 0.177 D unfactored; 0.124 D factored; total dead load factor: 0.6 - 0.124 = 0.476 tension, 1.0 + 0.124 = 1.124 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	61.0	68.2	1753	-	1.0	-	233	0.89		233	6702	0.26
Line 4														
Ln4, Lev1	-	Both	-	-	2232	-	-	-	-	-		-	5279	-
Wall 4-2	1	Both	110.2	-	2232	-	1.0	-	261	-		261	5279	0.42
Line 5														
Ln5, Lev1	1	Both	64.6	71.6	1421	-	.92	-	235	0.98		235	5176	0.27

E-W Shearlines	W Gp	For Dir	ASD Shear Force [plf] v	vmax/vft	V [lbs]	Asp-Cub Int	Asp-Cub Ext	Allowable Shear [plf] Int	Ext	Co	C	Cmb	V [lbs]	Resp. Ratio
Line A														
Level 1														
LnA, Lev1	-	Both	-	-	1782	-	-	-	-	-		-	2768	-
Wall A-1	1	Both	75.0	167.8	413	-	.61	-	117	0.73		117	641	0.64
Wall A-2	2	Both	-	-	1369	-	1.0	-	489	-		-	2127	-
Seg. 1	-	Both	227.5	-	739	-	.72	-	353	-		353	1148	0.64
Seg. 2	-	Both	210.0	-	630	-	.67	-	326	-		326	979	0.64
Line D														
LnD, Lev1	-	Both	-	-	2362	-	-	-	-	-		-	5214	-
Wall D-1	1	Both	118.1	-	2362	-	1.0	-	261	-		261	5214	0.45
Line F														
LnF, Lev1	1	Both	52.6	70.6	1262	-	.96	-	194	0.78		194	4663	0.27

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 – For wall: Unblocked structural wood panel factor Cub from SDPWS 4.3.5.3. For segment or FTAO pier: Aspect ratio factor from SDPWS 4.3.5.5.1. For perforated wall: Either Cub or sum bi / FHS, where bi is segment length adjusted per SDPWS 4.3.3.4.
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	0.00	0.00	-1078	2588	321	3987	Compression	10312	0.39
1-1	R End	0.00	34.50	-1078	2831	351	4261	Compression	10312	0.41
1-1	R Op 3	0.00	38.00	0	394	49	443	Compression	10312	0.04
1-1	R End	0.00	39.50	0	150	19	169	Compression	10312	0.02
Line 4										
4-1	L End	28.00	3.00	0	146	18	164	Compression		-
4-1	R End	28.00	6.00	0	146	18	164	Compression		-
4-2	L End	28.50	6.50	1004	911	189	282	HDU2-SDS	3075	0.09
4-2	L End	28.50	6.50	-1004	1519	189	2712	Compression	10312	0.26
4-2	R End	28.50	26.50	1004	911	189	282	HDU2-SDS	3075	0.09
4-2	R End	28.50	26.50	-1004	1519	189	2712	Compression	10312	0.26
Line 5										
5-1	L End	52.00	3.00	-1114	3300	410	4824	Compression	10312	0.47
5-1	R End	52.00	47.00	-1114	3300	410	4824	Compression	10312	0.47
Line A										
A-1	L End	0.00	0.00	2212	551	114	1774	HDU5-SDS	5645	0.31
A-1	L End	0.00	0.00	-2211	919	114	3244	Compression	10312	0.31
A-1	R End	12.00	0.00	2212	551	114	1774	HDU5-SDS	5645	0.31
A-1	R End	12.00	0.00	-2211	919	114	3244	Compression	10312	0.31
A-2	L End	28.00	3.00	2218	285	59	1992	HDU5-SDS	5645	0.35
A-2	L End	28.00	3.00	-2218	475	59	2752	Compression	10312	0.27
A-2	L Op 1	31.00	3.00	2218	1843	381	756	HDU5-SDS	5645	0.13
A-2	L Op 1	31.00	3.00	-2218	3071	381	5670	Compression	10312	0.55
A-2	R Op 1	49.00	3.00	2061	1821	377	617	HDU5-SDS	5645	0.11
A-2	R Op 1	49.00	3.00	-2061	3035	377	5473	Compression	10312	0.53
A-2	R End	52.00	3.00	2061	263	54	1853	HDU5-SDS	5645	0.33
A-2	R End	52.00	3.00	-2061	439	54	2555	Compression	10312	0.25
Line D										
D-1	L End	32.00	27.00	-1076	4200	521	5798	Compression	10312	0.56
D-1	R End	52.00	27.00	-1076	4200	521	5798	Compression	10312	0.56
Line F										
F-1	L End	16.50	47.00	-642	1609	200	2450	Compression	10312	0.24
F-1	R End	52.00	47.00	-642	1609	200	2450	Compression	10312	0.24

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 = 0.207 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