SHEAR WALL CALCULATOR **SWL2** Vs = 2649 lbs (seismic) Vw = 4294 lbs (wind) **Job#: 2015-002**

SWL Name	Shear (lbs)	Wall Length (ft)	SWL Length	Unit Shear (plf)	Wall Hgt. (ft)	Uplift (lbs)	Holdown	Anchor Bolt	Embedment	Studs	Panels
SWL2	4,294	24.5	7.8	554.1	9.0	4,987	HDU5	SB5/8X24	18	(2) 2x6	2
	Wind Load Governs									DF No. 2	

Shearwall Sheathing Specification:

Nominal unit shear capacities from SDPWS Table 4.3A (Wood Frame Shear Walls)

v_s = **342** plf < v_{allow} = 418 plf → **OK** (seismic)

v_w = **554** plf < v_{allow} = 670 plf → **OK** (wind)

Edge Nail Spacing = 6 in
Sheathing both sides = YES
Sht. Panel Thickness = 7/16 in
Fastener Type = 8d
Min. Panel Length: bs = 3 ft
Max. AR: h/bs = **3.00** → **OK**
Max. AR Seismic Reduction: 2bs/h = 0.67

Sheath both sides of shearwall. Use 7/16 OSB/PLY (APA Grade 24/16) w/ 8d nails @ 6" o/c edges, 12" o/c field, blocking required.

Anchor Bolt Spacing

Since we cannot control species of pressure treated sill plate assume weakest species from NDS 2012 Table 11E for anchor bolts (Northern Species G = 0.35):

Sill Plate: (1)-2x
AB DIA = 0.5 in
Zpara = 530 lbs
Zperp = 290 lbs
Applying adjustment factors:
CD = 1.6 (wind or seismic)
Zpara = 848 lbs
Zperp = 464 lbs

Out-of-Plane Seismic

$$F_p = 0.4 S_{DS} k_a I_e W_p$$

ASCE 7-10 Sec. 12.11.2

WDL = 12 psf
SDS = 0.978 g
Ie = 1.0
ka = 1.0 (concrete is rigid)
Wall Hgt. = 9.0 ft
ρ = 1.0 (out-of-plane)

Vsperp is given as the seismic force of half the dead weight of the wall.

V_{sperp} = 362 lbs

Out-of-Plane Wind (MWFRS)

Ww = 38.17 psf
Ltrib = 4.5 ft

Vwperp is given as the max. MWFRS wind force on the bottom half of an exterior wall.

V_{wperp} = 2,525 lbs

Wind Load Governs:

V_{perp} = 2,525 lbs

AB Spacing	V (lbs)	# of Bolts	Spacing (ft)
Perp. Load	2,525	5.4	**4.5**
Para. Load	4,294	5.1	**4.8**

La = 24.5 ft — La = available wall length for anchor bolts

Use 1/2" DIA anchor bolts, 7" min. embedment /w 3"x3"x1/4" washers @ 48" o/c spacing all of Wall 2.

A35 Framing Angle Spacing

Provide full depth blocking with A35 clips to top plt. per plan.

Lac = 24.5 ft (available collector length)
Fallow = 600 lbs (F1 direction)
Unit Shear = 175.3 plf
Spacing = **3.4** ft

Use A35 clips for top plt./blocking connection @ 24" o/c spacing.

Deflection (based on strength-level seismic forces)

vu = 478.5 plf
E = 1,600,000 psi
A = 16.5 in^2
Gt = 83,500 plf (Table C4.2.2A)
da = 0.115 in (Simpson Holdown)
en = 0.0085 in (Table C4.2.2D)
nail spacing = 6 in
Sht. both sides = YES

Panel #	b (ft)	Δs	
1	3	0.46	in
2	4.75	0.32	in
3	0	--	in
4	0	--	in
5	0	--	in
	Max. Defl.	**0.46**	in

Cd = 4
ASCE 7-10 (Table 12.12-1)
Δ = 1.85 in
Δlimit = 2.16 in → **OK**

General Notes:

1. For unblocked shearwalls w/ studs @ 16" o/c capacity is reduced by 0.6.
2. All stemwall foundations walls with HDU8 or greater holdown (anchor bolt ≥ 7/8" DIA) shall be 8" min. thickness.
3. Uplift on holdowns calculated with dead load counter action neglected (conservative).
4. Where the required nominal unit shear capacity on either side of a shear wall exceeds 700 plf in SDC D framing members at panel edges and sill plate shall be 3X or double 2X.
6. All holdowns over TJI floor, use CNW coupler nut and threaded rod for extension. Solid squash blocks beneath all shearwall chords equal to chord cross section.

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Bearing on Wall Plates

Top/Sill Plt. Species	HF	
$F_{c\perp}$	405	psi
$C_{t\_c\perp}$	1.00	
$C_{M\_c\perp}$	1.00	
Cb	1.00	(1.125)
$F_{c\perp}'$	405.00	psi
Ab	16.50	in^2
Pc	5335	lbs
$f_{c\perp}$	323	psi
CSI (bearing)	**0.80** →	**OK**

Chord in Tension

(DF No. 2)

Ft	575	psi
C_{M_t}	1.00	
C_{t_t}	1.00	
C_{i_t}	1.00	
CD	1.60	(wind)
C_{F_t}	1.30	
Ft'	1196	psi
An	16.50	in^2
ft	302	psi
CSI (tension)	**0.25** →	**OK**

Chord in Compression

(DF No. 2)

Fc	1350	psi
C_{M_c}	1.00	
C_{t_c}	1.00	
C_{i_c}	1.00	
CD	1.60	(wind)
C_{F_c}	1.10	
(le/d)x	18.82	
E'min	580,000	psi
FcE	1346	psi
Fc*	2376	psi
c	0.80	sawn lumber
FcE/Fc*	0.567	
1 + FcE/Fc*/2c	0.979	
Cp	0.479	
Fc'	1137	psi
fc	323	psi
CSI (compression)	**0.28** →	**OK**

Shearwall Gravity Loads

(Point loads are assumed to bear directly above SWL chord)

(plf)	W_{DL}	W_{LL}	W_{SL}/W_{LrL}
Wall Loads	261	0	303

(lbs)	P_{DL}	P_{LL}	P_{SL}/P_{LrL}	P_W	P_S
Point loads	0	0	0	0	0

P_W = 4,987 lbs

P_S = 3,076 lbs

Wind ASD Load Cases from ASCE 7-10:

5.) D + W = 5,335 plf (governs)

6a.) D + .75L + .75W + 75(Lr or S) = 4,391 plf

Seismic ASD Load Cases from ASCE 7-10:

5.) D + E = 3,424 plf

6b.) D + .75L + .75E + 75S = 2,958 plf

SWL Chord Tension = **4,987** lbs

SWL Chord Comp. = **5,335** lbs

Stud Spacing = 16 in

Chord Studs = (2) 2x6

Chord Depth (dx) = 5.5 in

lb = 3.00 in

Bottom Plate (Sole Plt.) Attachment to Floor

This section is only applicable when shearwall is framed on top of a wood joist or TJI floor.

Z =	141	lbs	(NDS 2012 Table 11Q for 16d nail, DF G = 0.5)
CD =	1.6	(wind or seismic)	
Z' =	226	lbs	
Unit Shear =	554.1	plf	
Spacing =	**4.9**	in	

Emin = 580,000 psi

C_{M_e} = 1.00

C_{t_e} = 1.00

C_{t_e} = 1.00

Nail 2x bottom plate to rim joist below w/ 16d nails @ 4" o/c spacing.

Sill Plate at Foundation

Use (1)-2x HF No. 2 pressure treated plate at foundation.