SHEAR WALL CALCULATOR **SWL2** Vs =   1982 lbs   Vw =   3680 lbs   **Job#:** **2015-019**

(seismic)   (wind)

SWL Name	Shear (lbs)	Wall Length (ft)	SWL Length	Unit Shear (plf)	Wall Hgt. (ft)	Uplift (lbs)	Holdown	Anchor Bolt	Embedment	Studs	Panels
SWL2	3,680	37.5	15.5	237.4	9.0	2,137	HDU2	SSTB16	12	(2) 2x6	1
SEGMENT	Wind Load Governs									DF No. 2	

Shearwall Sheathing Specification: Nominal unit shear capacities from SDPWS Table 4.3A (Wood Frame Shear Walls)

v_s =	**128** plf	<	v_{allow} =	240 plf	⟶	**OK**	(seismic)	Edge Nail Spacing = 6 in
v_w =	**237** plf	<	v_{allow} =	335 plf	⟶	**OK**	(wind)	Sheathing both sides = NO

Sht. Panel Thickness =   7/16 in

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

Fastener Type =   8d
Min. Panel Length: bs =   15.5 ft
Max. AR: h/bs =   **0.58** ⟶ **OK**

Anchor Bolt Spacing   Max. AR Seismic Reduction: 2bs/h =   N/A

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	Out-of-Plane Seismic		Out-of-Plane Wind	(MWFRS)
AB DIA =	0.5 in	WDL =	12 psf	Ww =	47.17 psf
Zpara =	530 lbs	SDS =	0.976 g	Ltrib =	4.5 ft
Zperp =	290 lbs	Ie =	1.0		

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

ASCE 7-10 Sec. 12.11.2

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

Applying adjustment factors:		ka =	1.0 (concrete is rigid)		
CD =	1.6 (wind or seismic)	Wall Hgt. =	9.0 ft	V_{wperp} =	4,776 lbs
Zpara =	848 lbs	ρ =	1.0 (out-of-plane)		
Zperp =	464 lbs			Wind Load Governs:	

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

V_{sperp} =   553 lbs V_{perp} =   4,776 lbs

AB Spacing	V (lbs)	# of Bolts	Spacing (ft)
Perp. Load	4,776	10.3	**3.6**
Para. Load	3,680	4.3	**8.6**

La =   37.5 ft   La = available wall length for anchor bolts

Use 1/2" DIA anchor bolts, 7" min. embedment /w 3"x3"x1/4" washers @ 42" o/c spacing all of Wall 2.

A35   Framing Angle Spacing

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

Lac =	15.5 ft (available collector length)	
Fallow =	600 lbs	(F1 direction)
Unit Shear =	237.4 plf	
Spacing =	**2.5** ft	

Use A35 clips for top plt./blocking connection @ 30" o/c spacing.

Deflection	(based on strength-level seismic forces)	Panel #	b (ft)	Δs	
v_u =	179.0 plf	1	15.5	0.10	in
E =	1,600,000 psi	2	0	--	in
A =	16.5 in^2	3	0	--	in
Gt =	83,500 plf (Table C4.2.2A)	4	0	--	in
da =	0.088 in (Simpson Holdown)	5	0	--	in
en =	0.0036 in (Table C4.2.2D)		Max. Defl.	**0.10**	in
nail spacing =	6 in				
Sht. both sides =	NO	Cd =	4		

ASCE 7-10   Δ =   0.39 in
(Table 12.12-1)   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 adjacent panel edges 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.

Bearing on Wall Plates			Shearwall Gravity Loads	(Point loads are assumed to bear directly above SWL chord)		

Bearing on Wall Plates

			Shearwall Gravity Loads		
Top/Sill Plt. Species	HF		(plf)	W_{DL}	W_{LL}	W_{SL}/W_{LrL}
$F_{c\perp}$	405 psi		Wall Loads	257	209	155
$C_{t\_c\perp}$	1.00					
$CM_{c\perp}$	1.00		(lbs)	P_{DL}	P_{LL}	P_{SL}/P_{LrL}	$P_{W (+/-)}$	$P_{S (+/-)}$
C_b	1.00 (1.125)		Point loads	0	0	0	0	0
$F_{c\perp}'$	405.00 psi					
A_b	16.50 in^2		Wind ASD Load Cases from ASCE 7-10:		
P_c	2479 lbs		5.) D + W =	2,479 plf (governs)	
$f_{c\perp}$	150 psi		6a.) D + .75L + .75W + 75(Lr or S) =	2,309 plf	
CSI (bearing)	**0.37** → **OK**				

P_w = 2,137 lbs
P_s = 1,151 lbs

* SWL Chord Tension = **2,137** lbs
SWL Chord Comp. = **2,479** lbs

Stud Spacing = 16 in
Chord Studs = (2) 2x6
Chord Depth (dx) = 5.5 in
lb = 3.00 in

Chord in Tension (DF No. 2)

Seismic ASD Load Cases from ASCE 7-10:
5.) D + E = 1,494 plf
6b.) D + .75L + .75E + 75S = 1,570 plf

F_t	575 psi
CM_t	1.00
Ct_t	1.00
Ci_t	1.00
C_D	1.60 (wind)
CF_t	1.30
F_t'	1196 psi
A_n	16.50 in^2
f_t	130 psi
CSI (tension)	**0.11** → **OK**

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 =	237.4 plf
Spacing =	**11.4** in

E_{min} = 580,000 psi
CM_e = 1.00
Ct_e = 1.00
Ct_e = 1.00

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

Chord in Compression (DF No. 2)

F_c	1350 psi
CM_c	1.00
Ct_c	1.00
Ci_c	1.00
C_D	1.60 (wind)
CF_c	1.10
$(le/d)x$	18.82
E'_{min}	580,000 psi
F_{cE}	1346 psi
F_c*	2376 psi
c	0.80 sawn lumber
F_{cE}/F_c*	0.567
$1 + F_{cE}/F_c*/2c$	0.979
C_p	0.479
F_c'	1137 psi
f_c	150 psi
CSI (compression)	**0.13** → **OK**

Sill Plate at Foundation

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

*Only applicable at first story shearwalls.