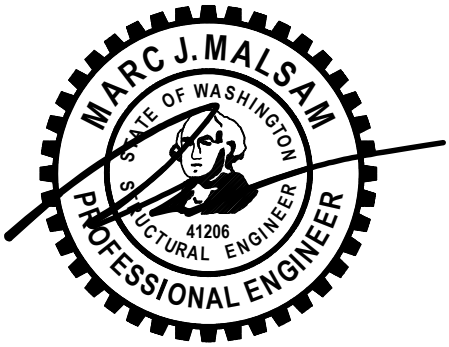
STRUCTURAL CALCULATIONS FOR:

TEKIELA RESIDENCE

6520 82ND AVE SE
MERCER ISLAND, WA

ARCHITECT: MCCLELLAN ARCHITECTS

JANUARY 30, 2024



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DESIGN CRITERIA IBC 2018

DEAD LOADS

ROOF	
Composition	2.5 psf
3/4" Plywood	2.4 psf
TJI @ 16" o.c.	2.3 psf
Insulation	1.0 psf
Gyp Board (5/8")	2.8 psf
MEP	1.5 psf
Solar Panels	5.0 psf
Total	17.5 psf
Use	20.0 psf

LIVE LOADS/OCCUPANCY

		ROOF LIVE		FLOOR LIVE		DECK LIVE	
Risk Category	II	Snow =	25 psf	Occupancy =	40 psf	Occupancy =	60 psf
Roof Deck	No			Stair/Corridor =	40 psf		
Common Access	No						

SEISMIC CRITERIA ASCE 7-16 Ch. 11 & Ch. 12

Imp. Factor = 1.00 | Seismic Ht, hn= 15 ft

Site Class = D(Geo) | T, Building= 0.2

R Value = 6.5 | Ts= 0.6

Geo. Ground Hazard? **No w/ASCE 11.4.8 Excep's**

S_s =	1.464		F_a =	1.000	Table 11.4-1
S_1 =	0.507		F_v =	NULL	Table 11.4-2
S_{ms} =	1.464	x 2/3 =	**S_{ds} =**	**0.976**	Eqn. 11.4-3
S_{m1} =	NULL	x 2/3 =	**S_{d1} =**	**NULL**	Eqn. 11.4-4

C_{SULT} =	**0.150**
C_{SALL} =	**0.105**

T/Ts= 0.245 ≤ 1.5

Okay, Cs Eqn. 12.8-2

SEISMIC WEIGHT ASCE 7-16 12.7.2

Partitions = 15 psf

***Roof weight = 1/2 Partition + Roof DL**

***Floor weight = Full Partition + Floor DL**

ROOF 25.0 psf

SEISMIC DESIGN CATEGORY IBC 1613.2.5

Seismic DC= D

WIND CRITERIA ASCE 7-16 Ch. 27 Directional Procedure

V = 98 mph | K_d = 0.85

Exposure = B | G = 0.85

h = 15 ft | K_{zt} = 1.00 ***See Kzt Worksheet**

Roof Slope = 1 : 12 = 4.8 °

PRESSURE COEFFICIENTS (Cp)

Windward Wall = 0.8 | Windward Roof = N/A

Leeward Wall = -0.5 | Leeward Roof = N/A

PRESSURE (PSF) $q = 0.00256 K_z K_{zt} K_d V^2$

Ht	K_z	q_z	$0.6xq_z$[1]	q_h	P_{WW}	P_{LW}	P_{WALL}	P_{ROOF}
0-15	0.57	11.9	7.1	7.1	4.9	3.0	**7.9**	**N/A**
15-20	0.62	13.0	7.8		5.3	3.0	**8.3**	
20-25	0.66	13.8	8.3		5.6	3.0	**8.7**	
25-30	0.70	14.6	8.8		6.0	3.0	**9.0**	
30-35	0.73	15.3	9.2		6.2	3.0	**9.3**	
35-40	0.76	15.9	9.5		6.5	3.0	**9.5**	
40-45	0.79	16.5	9.9		6.7	3.0	**9.8**	
45-50	0.81	16.9	10.2		6.9	3.0	**9.9**	

[1] Per IBC 2018 1605.3.1 Basic Load Combinations

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RJG — Design

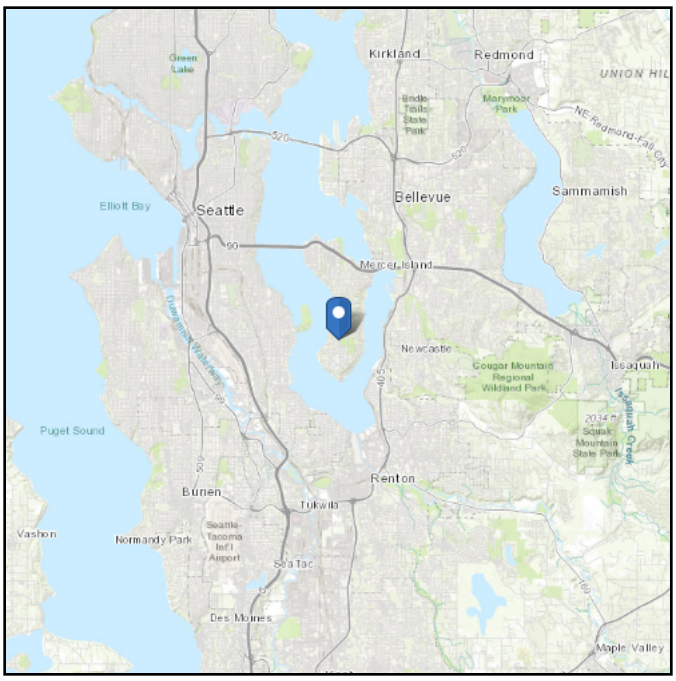
DC1 — Sheet

ASCE 7 Hazards Report

Address:
6520 82nd Ave SE
Mercer Island, Washington
98040

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

Latitude: 47.544584
Longitude: -122.228506
Elevation: 319.0423662034499 ft (NAVD 88)



Wind

Results:

Wind Speed	98 Vmph
10-year MRI	67 Vmph
25-year MRI	74 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: Fri Jan 05 2024

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.

DC2

Seismic

Site Soil Class: D - Stiff Soil

Results:

S_S :	1.464	S_{D1} :	N/A
S_1 :	0.507	T_L :	6
F_a :	1	PGA :	0.627
F_v :	N/A	PGA_M :	0.69
S_{MS} :	1.464	F_{PGA} :	1.1
S_{M1} :	N/A	I_e :	1
S_{DS} :	0.976	C_v :	1.393

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

Data Accessed: Fri Jan 05 2024

Date Source: USGS Seismic Design Maps

Snow

Results:

Ground Snow Load, p_g:	16 lb/ft^2
Mapped Elevation:	319.0 ft
Data Source:	
Date Accessed:	Fri Jan 05 2024

Statutory requirements of the Authority Having Jurisdiction are not included.

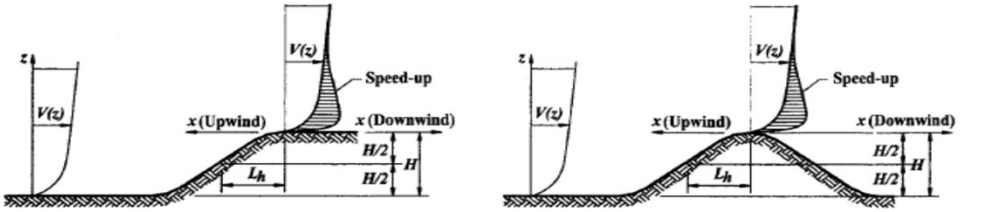
Snow load values are mapped to a 0.5 mile resolution. This resolution can create a mismatch between the mapped elevation and the site-specific elevation in topographically complex areas. Engineers should consult the local authority having jurisdiction in locations where the reported 'elevation' and 'mapped elevation' differ significantly from each other.

Kzt WORKSHEET

ASCE 7-10 26.8.1

Exposure = B
Bldg Height = 15 ft
Site Elev = 317 ft

Topographic Factor, K_{zt}
Figure 26.8-1



PROFILE 1	PROFILE 2	PROFILE 3	-- NOT USED --
Shape = 2-D Escarp	**Shape =** 2-D Escarp	**Shape =** 2-D Escarp	
H = 311 **ft**	**H =** 307 **ft**	**H =** 330 **ft**	
H/2 = 156 **ft**	**H/2 =** 154 **ft**	**H/2 =** 165 **ft**	
L_h = 1742 **ft**	**L_h =** 1584 **ft**	**L_h =** 2534 **ft**	
x = 475 **ft**	**x =** 158 **ft**	**x =** 1742 **ft**	
z = 15 **ft**	**z =** 15 **ft**	**z =** 15 **ft**	
Unobstructed[1] Yes	**Unobstructed**[1] Yes	**Unobstructed**[1] Yes	
Above Terrain[2] Yes	**Above Terrain**[2] Yes	**Above Terrain**[2] Yes	
Upper Half[3] Yes	**Upper Half**[3] Yes	**Upper Half**[3] Yes	
Site to Crest Upwind	**Site to Crest** Upwind	**Site to Crest** Upwind	
H/Lh[4] 0.178	**H/Lh**[4] 0.193813	**H/Lh**[4] 0.130208	
Calc Kzt ? NO	**Calc Kzt ?** NO	**Calc Kzt ?** NO	
K_1: $(K_1/H/L_h)$	K_1: $(K_1/H/L_h)$	K_1: $(K_1/H/L_h)$	
Coefficient = 0.75	Coefficient = 0.75	Coefficient = 0.75	
K_1 = N/A	**K_1 = N/A**	**K_1 = N/A**	
K_2: $(1 - \lvert x\rvert/\mu L_h)$	K_2: $(1 - \lvert x\rvert/\mu L_h)$	K_2: $(1 - \lvert x\rvert/\mu L_h)$	
μ = 1.5 (Figure 26.8-1)	μ = 1.5 (Figure 26.8-1)	μ = 1.5 (Figure 26.8-1)	
K_2 = N/A	**K_2 = N/A**	**K_2 = N/A**	
K_3: $e^{-\gamma z/Lh}$	K_3: $e^{-\gamma z/Lh}$	K_3: $e^{-\gamma z/Lh}$	
γ = 2.5 (Figure 26.8-1)	γ = 2.5 (Figure 26.8-1)	γ = 2.5 (Figure 26.8-1)	
K_3 = N/A	**K_3 = N/A**	**K_3 = N/A**	
$K_{zt} = (1 + K_1 K_2 K_3)^2$	$K_{zt} = (1 + K_1 K_2 K_3)^2$	$K_{zt} = (1 + K_1 K_2 K_3)^2$	
K_{zt} = 1.00	**K_{zt} = 1.00**	**K_{zt} = 1.00**	

1 ***Hill, ridge, or escarpment is isolated and unobstructed upwind by other similar topographic features of comparable height for 100H or 2 miles (whichever is less) ASCE 7-10 26.8.1***

2 ***The hill, ridge, or escarpment protrudes above the height of the upwind terrain features within a 2-mi radlus in any quadrant by a factor of two or more. ASCE 7-10 26.8.1***

3 ***The structure is located as shown in Fig. 26.8-1 in the upper one-half of a hill or ridge or near the crest of an escarpment. ASCE 7-10 26.8.1***

4 ***For $H/L_h > 0.5$, assume $H/L_h = 0.5$ for K_1 and $L_h = 2H$ for K_2 and K_3***

Kzt = 1.00

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1/30/2024 — Date
0463-2023-05 — Proj. No.
RJG — Design
DC3 — Sheet

DESIGN CRITERIA

Profile #1

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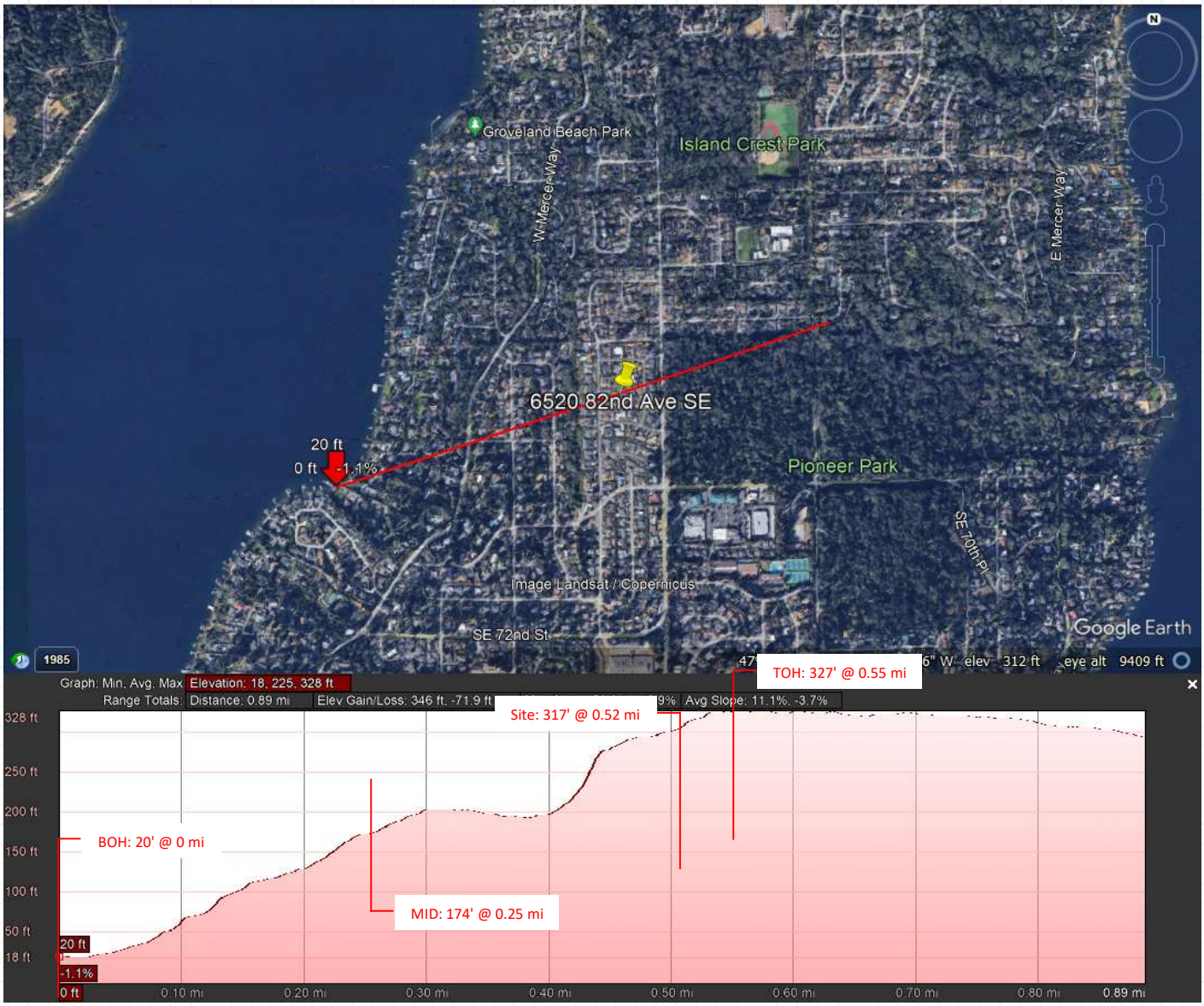
Mercer Island, WA	RJG (Design)
	DC4 (Sheet)

DESIGN CRITERIA

Profile #2



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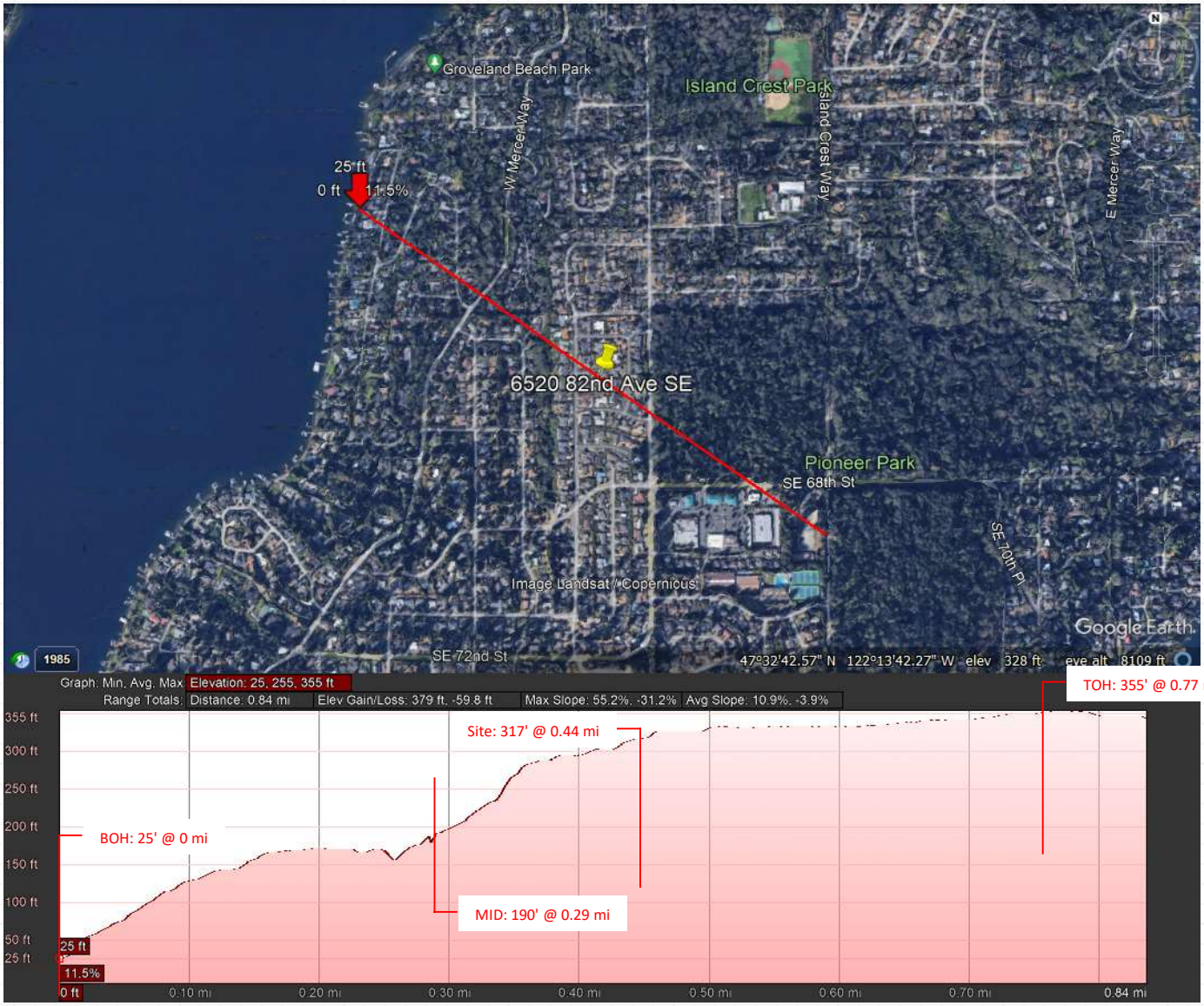
Mercer Island, WA	RJG (Design)
	DC5 (Sheet)

DESIGN CRITERIA

Profile #3



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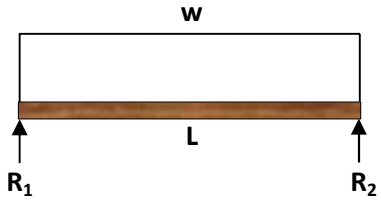
Mercer Island, WA	RJG (Design)
	DC6 (Sheet)

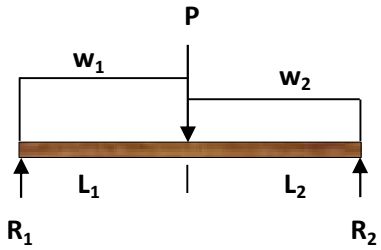
TYPICAL BEAM CASES

***ASSUME CASE 1 FOR ALL BEAMS U.N.O.**

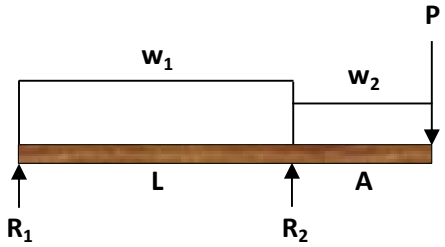
CASE #1: (C1)



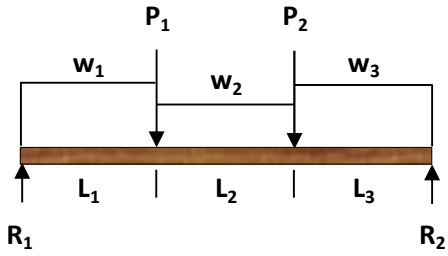
CASE #2: (C2)



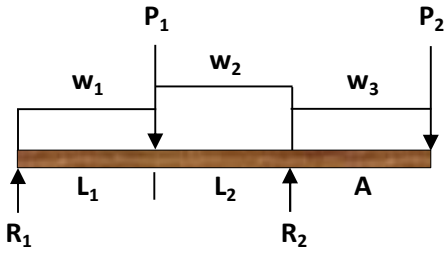
CASE #3: (C3)



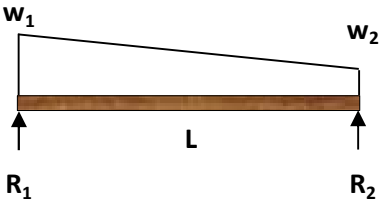
CASE #4: (C4)



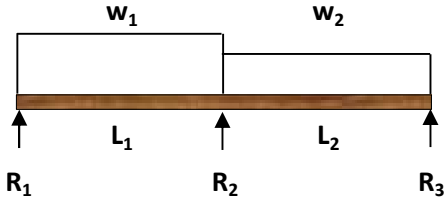
CASE #5: (C5)



CASE #6: (C6)



CASE #7: (C7)



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Mercer Island, WA	RJG
	Design
	DC7
	Sheet

LATERAL ANALYSIS

Seismic:

Level	Area (ft^2)	Unit Wt (psf)	Weight (kips)	Avg Ht (ft)	Wi·Hi (k-ft)	Distrib. (%)	Shear, V (kips)	Uniform (plf)
Roof	4900	25	122.50	15	1837.50	100%	**12.87**	125 / 334

Totals: 122.50 k 1837.50 100% **12.87 k**

Base Shear:

$V = C_S \times W$

= 0.15 x 122.5k = 18.38 kips (Ultimate)

= 0.105 x 122.5k = 12.87 kips (Allowable)

Wind:

North-South Exposure

Level	Trib (ft)	Wind Load (#/ft)	Length (ft)	Shear, V (kips)
Roof	7.5	7.5' x 7.9 = 60 plf	103	**6.18**

6.18 k

East-West Exposure

Level	Trib (ft)	Wind Load (#/ft)	Length (ft)	Shear, V (kips)
Roof	7.5	7.5' x 7.9 = 60 plf	38.5	**2.31**

2.31 k

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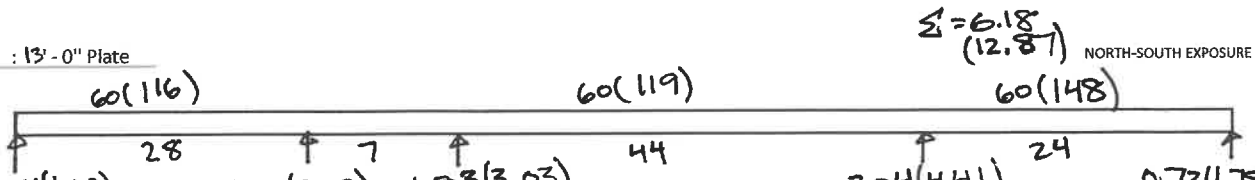
L-1 — Sheet

LATERAL ANALYSIS

(SEISMIC VALUES IN PARENTHESIS)

Roof : 13' - 0" Plate

NORTH-SOUTH EXPOSURE



R (k):	0.84(1.62)	1.05(2.03)	1.53(3.03)	2.04(4.41)	0.72(1.78)
L (ft):	13.4+9.4=22.8	25.9	14.75	12+22=34	9+6.75+12.5=28.25
V (#/ft):	37(71)	41(78)	104(205)	60(130)	26(63)
SW:	SW6	SW6	SW6	SW6	SW6
OT:	—	—	1.3(2.6)	0.8(1.7)	—
HD:	—	—	HDU4	HDU4	—
H:W:	—	—	—	—	—

$\Sigma = 6.18$ (12.87)

Roof : 13' - 0" Plate

WIND ONLY

EAST-WEST EXPOSURE

$\Sigma = 2.32$

R (k):	0.45	1.16	0.71	← SIMPSON STRONG-WALL
L (ft):	9.75+6+9+7.5=28.25	46.75	5(2)+6+2(2)=20	
V (#/ft):	16	25	36	
SW:	SW6	SW6	SW6	
OT:	—	—	—	
HD:	—	—	—	
H:W:	—	—	—	

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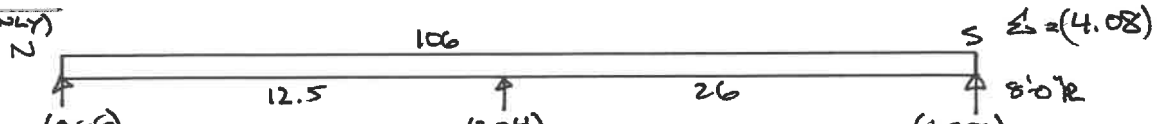
L-2
Sheet

LATERAL ANALYSIS

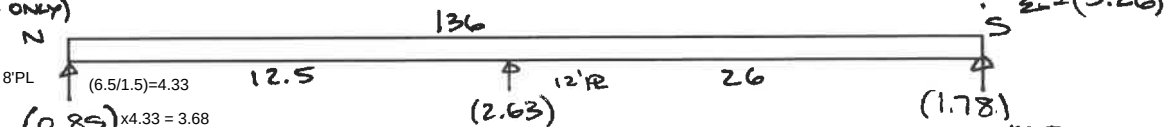
EAST-WEST EXPOSURE
(SEISMIC VALUES IN PARENTHESIS)

Roof: 13' - 0" Plate
WEST (EQ ONLY)



R (k):	(0.66)	(2.04)	(1.38)
L (ft):	5.75+6=11.75	23	S(2)=10
V (#/ft):	(56)	(89)	(138)
SW:	SW6	SW6	SW6
OT:	–	–	(1.1)
HD:	–	–	HDU4
H:W:	–	–	–

Roof: 13' - 0" Plate
CENTER (EQ ONLY)

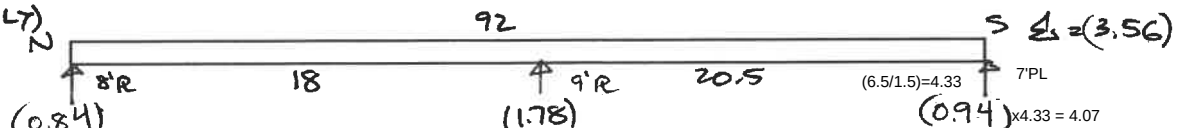


R (k):	(0.85) x4.33 = 3.68	(2.63)	(1.78)
L (ft):	9	14.5	(2)WSWH 24X13
V (#/ft):	(408)	(181)	See attached L4.0-L4.3
SW:	SW3	SW6	
OT:	(3.2)	(2.2)	(7.9)
HD:	HDU4	HDU4	WSWH-AB
H:W:	–	–	

CANT COLUMNS
C3
L=9
A=2
W1=W2=0
P=1.84
R1=-0.4 fb=-4.1<2.9(1.6)=4.6
R2=2.2 fv=150
M= -3.7

PSL 3-1/2x5-1/4

Roof: 13' - 0" Plate
EAST (EQ ONLY)



R (k):	(0.84)	(1.78)	(0.94) x4.33 = 4.07
L (ft):	7.5	9.75	6
V (#/ft):	(112)	(183)	(678)
SW:	SW6	SW6	SW2-2
OT:	(0.9)	(1.6)	(4.7)
HD:	HDU4	HDU4	HDU8
H:W:	–	–	–

CANT COLUMNS
C3
L=8
A=1.5
W1=W2=0
P=2.04
R1=-0.4 fb=-1.5
R2=2.4 fv=111
M= -3.1

PSL 5-1/4x5-1/4

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Design: RJG
Sheet: L-3

SIMPSON STRONG-TIE COMPANY INC.
(800) 999-5099
5956 W. Las Positas Blvd., Pleasanton, CA 94588.
www.strongtie.com

Job Name: 6520 82nd Ave SE
Wall Name: Front
Application: Standard Wall on Concrete

Design Criteria:

* 2018 International Bldg Code
* Seismic R=6.5
* 2500 psi concrete
* ASD Design Shear = 1780 lbs
* Nominal wall height = 13 ft

Selected Strong-Wall® Panel Solution:

Model	Type	W (in)	H (in)	T (in)	Sill Anchor	End Anchor Bolts	Total Axial Load (lbs)	Actual Uplift (lbs)
WSWH24x13	Wood	24	156	3.5	N/A	2 - 1"	100	7884 lb
WSWH24x13	Wood	24	156	3.5	N/A	2 - 1"	100	7884 lb

Actual Shear & Drift Distribution:

Model	RR Relative Rigidity	Actual Shear (lbs)		Allowable Shear (lbs)		Actual / Allow Shear	Actual Drift (in)	Drift Limit (in)
WSWH24x13	0.50	890	≤	3110	OK	0.29	0.19	0.68
WSWH24x13	0.50	890	≤	3110	OK	0.29	0.19	0.68

Notes:

1. Strong-Wall High-Strength Wood Shearwalls have been evaluated to the 2021 IBC/IRC. See www.strongtie.com for additional design and installation information.

2. Anchor templates are recommended for proper anchor bolt placement, and are required in some jurisdictions.

3. The applied vertical load shall be a concentric point load or a uniformly distributed load not exceeding the allowable vertical load. Alternatively, the load may be applied anywhere along the width of the panel if imposed by a continuous bearing vertical load transfer element such as a rimboard or beam. For eccentric axial loads applied directly to the panel, the allowable vertical load shall be divided by two.

4. Panels may be trimmed to a minimum height of 74½".

Disclaimer:

SIMPSON STRONG-TIE COMPANY INC.
(800) 999-5099
5956 W. Las Positas Blvd., Pleasanton, CA 94588.
www.strongtie.com

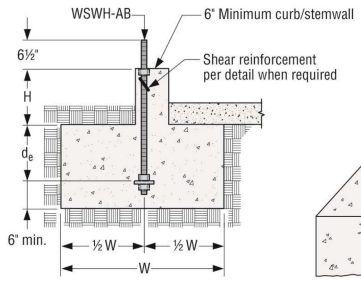
Job Name: 6520 82nd Ave SE
Wall Name: Front
Application: Standard Wall on Concrete

Design Criteria:

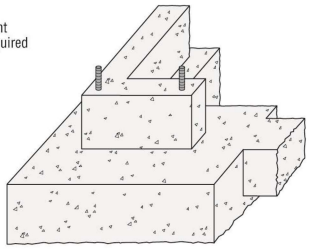
* Stemwall - Perimeter
* 2018 International Bldg Code
* Seismic R=6.5
* 2500 psi concrete

Anchor Solution Details:

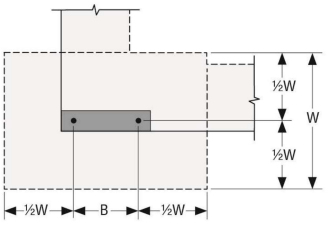
Stemwall Installation



Stemwall Section View

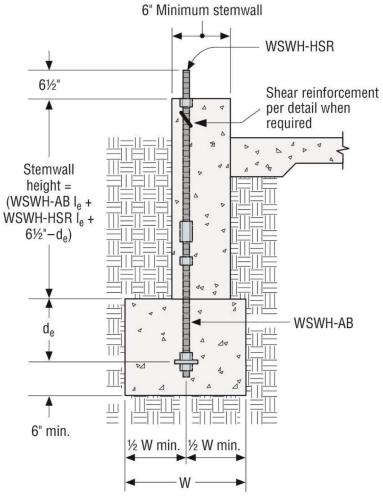


Perspective View
(Slab not shown for clarity)



Footing Plan

Stemwall Extension Installation



Section at Stemwall
WSWH-AB and WSWH-HSR
Extension Application

Anchor Solution Assuming Cracked Concrete Design:

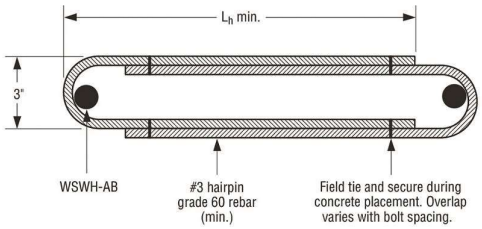
Model	W	de	B	Anchor Bolt	Strength
WSWH24x13	33	11	20	WSWH-AB	Standard

Anchor Solution Assuming Uncracked Concrete Design:

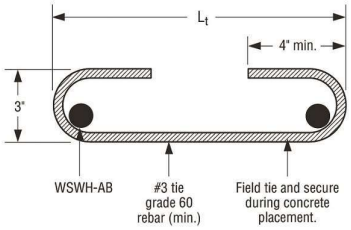
Model	W	de	B	Anchor Bolt	Strength
WSWH24x13	28	10	20	WSWH-AB	Standard

Notes:

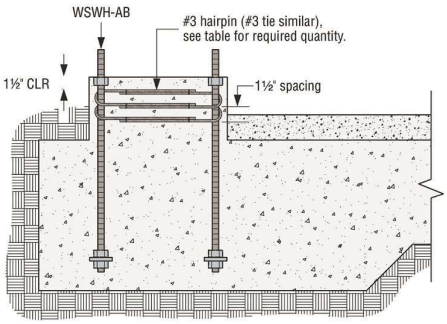
1. Anchorage designs conform to ACI 318-19, ACI 318-14 and 318-11 Appendix D with no supplementary reinforcement for cracked and uncracked concrete as noted.
2. Anchorage strength indicates required grade of anchor bolt. Standard (ASTM F1554 grade 36) or High Strength (HS)(ASTM A193 Grade B7).
3. Seismic indicates Seismic Design Category C though F. Detached 1 & 2 family dwellings in SDC C may use wind anchorage solutions. Seismic anchorage designs conform to ACI 318-11 section D.3.3.4.3 and ACI 318-14 section 17.2.3.4.3 and ACI 318-19 section 17.10.5.3.
4. Foundation dimensions are for anchorage only. Foundation design (size and reinforcement) by others. The registered design professional may specify alternate embedment, footing size or anchor bolt.



Hairpin Shear Reinforcement



Tie Shear Reinforcement



Hairpin Installation
(Garage curb shown, other footing types similar)

Shear Anchorage Solutions

Strong-Wall High-Strength Wood Shearwall Model No.	L_t or L_h (in.)	Seismic [3]		Wind [4]			
		Shear Reinforcement	Minimum Curb/ Stemwall Width (in.)	Shear Reinforcement	Minimum Curb/ Stemwall Width (in.)	ASD Allowable Shear Load, V (lb.) [7]	
						Uncracked	Cracked
WSWH12	10¼	(1) #3 Tie	6	See Note 7	6	1,080	770
WSWH18	15	(2) #3 hairpins[5,6]	6	(1) #3 hairpin	6	Hairpin reinforcement achieves maximum allowable shear load of the Strong-Wall® WSWH	
WSWH24	19	(2) #3 hairpins[5]	6	(2) #3 hairpins[5]	6		

1. Shear anchorage designs conform to ACI 318-14 Chapter 17 and ACI 318-11 and assume minimum 2,500 psi concrete.
2. Shear reinforcement is not required for interior foundation applications (panel installed away from edge of concrete), or braced wall panel applications.
3. Seismic indicates seismic design category C through F. Detached one- and two-family dwellings in SDC C may use wind anchorage solutions. Seismic shear reinforcement designs conform to ACI 318-14, section 17.2.3.5.3 and ACI 318-11 section D.3.3.5.
4. Wind includes seismic design category A and B and detached one- and two-family dwellings in SDC C.
5. Additional ties may be required at garage curb or stemwall installations below anchor reinforcement per designer.
6. Use (1) #3 hairpin for WSWH18 when standard strength anchor is used.
7. Use (1) #3 tie for WSWH12 when panel design shear force exceeds tabulated anchorage allowable shear load.
8. No. 4 grade 40 shear reinforcement may be substituted for WSWH shear anchorage solutions.
9. Concrete edge distance for anchors must comply with ACI 318-14 section 17.7.2 and ACI 318-11 section D.8.2.
10. The designer may specify alternate shear anchorage.

STRONG-WALL® WSWH SHEAR ANCHORAGE SCHEDULE AND DETAILS

VERTICAL ANALYSIS

Typical Units: L = ft, W = klf, P = kip, R = kip, M = k-ft, V = k, Fb = ksi, Fv = psi
Units in (Parenthesis) represent Dead Load or 0.6DL (Ω0=2.5)

ROOF FRAMING

TYPICAL ROOF FRAMING

WEST:

C3
L=12.5
A=3
$W_1=W_2=0.06$
P=0
$R_1=0.4$
$R_2=0.6$
$M=1.12<5.16$
$V=0.4<2.2$
$\Delta_T=0.09=L/1667$

14"TJI 210's AT 16"OC

C3
L=23.5
A=3
$W_1=W_2=0.06$
P=0
$R_1=0.7$
$R_2=0.9$
$M=4.1<8.4$
$V=0.7<2.2$
$\Delta_T=0.75=L/360$

14"TJI 360's AT 16"OC

CENTER:

C3
L=18.75
A=5
$W_1=W_2=0.06$
P=0
$R_1=0.6$
$R_2=0.9$
$M=2.4<8.4$
$V=0.6<2.2$
$\Delta_T=0.30=L/775$

14"TJI 360's AT 16"OC

EAST:

C3
L=18.5
A=3
$W_1=W_2=0.06$
P=0
$R_1=0.6$
$R_2=0.8$
$M=2.3<5.16$
$V=0.6<2.2$
$\Delta_T=0.39=L/582$

14"TJI 210's AT 16"OC

C3
L=20.5
A=7
$W_1=W_2=0.06$
P=0
$R_1=0.6$
$R_2=1.1$
$M=2.7<13.0$
$V=0.7<2.7$
$\Delta_T=0.27=L/936$

14"TJI 360's AT 16"OC

#101 - BM AT CENTER

C3
L=15
A=3
$W_1=(31/2)(0.02)=0.31$
$W_2=(39.5/2)(0.045)=0.89$
P=0
$R_1=2.1$
$R_2=5.3$
$M=6.8$
D=0.5
R=46
$\Delta_C=-0.04=L/1622$

PSL 5¼X14

#102 - BM AT CENTER

L=23.5
$W=(31/2)(0.045)=0.70$
R=8.2
M=48.3
$S_{X\,REQ'D}=\frac{48.3}{50}(12)(1.67)=19.4$
TRY W12X58 $S_X=47.5>19.4$ ✓
$\Delta_T=0.35=L/809$

W12X58

#103 - CENTER CANT BM

C3
L=12.75
A=3
$W_1=W_2=0.06$
P=1.5
$R_1=0.01$
$R_2=2.4$
M=-4.8
D=-0.5
R=49
$\Delta_C=0.08=L/870$

PSL 3½X14

#104 - CENTER CANT BM

C3
L=18
A=5
$W_1=W_2=0.06$
P=2.4
$R_1=-0.17$
$R_2=3.9$
M=-12.8
D=-0.9
R=54
$\Delta_C=0.30=L/402$

PSL 5¼X14

#105 - CENTER HDR

L=15.5
W=0.54
R=4.2
M=16.2
fb=1.1
fv=73
DELTA=0.29=L/637

PSL 5-1/4x14

#106 - CENTER HDR

L=14
W=0.36
R=2.5
M=8.8
fb=0.62
fv=43
DELTA=0.13=L/1296

PSL 5-1/4x14

MALSAM TSANG
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Tekiela Residence
Project

6520 82nd Ave SE

Mercer Island, WA

1/9/2024
Date

0463-2023-05
Proj. No.

RJG
Design

V-1
Sheet

VERTICAL ANALYSIS

Typical Units: L = ft, W = klf, P = kip, R = kip, M = k-ft, V = k, Fb = ksi, Fv = psi
Units in (Parenthesis) represent Dead Load or 0.6DL (Ωo=2.5)

#107- WEST CANT BM

C3
L=12.5
A=3
$W_1=W_2=0.06$
P=0.4
$R_1=0.3$
$R_2=1.1$
M=-1.5

$f_b=-0.2$
$f_v=16$
$\Delta_C=0.01=24/6515$

LSL 3½X14

#108-WEST HDR

L=7.25
W=0.6
R=2.2
M=3.9

$f_b=1.0$
$f_v=82$
$\Delta_T=0.10=4/893$

GL 3½X9

#109- WEST HDR

L=18
W=0.9
R=8.1
M=36.5

$f_b=2.0$
$f_v=123$
$\Delta_T=0.59=4/364$

PSL 5¼X16

#110- WEST OVERHANG BM

L=24.5
$W=(7/2)(0.045)=0.16$
R=2.0
M=12.0

$f_b=0.6$
$f_v=27$
$\Delta_T=0.41=4/726$

PSL 7X14

#111- WEST CANT BM

C3
L=20
A=7
$W_1=W_2=0.06$
P=2.0
$R_1=-0.2$
$R_2=3.8$
M=-13.5

$S_{x\,REQ'D}=\frac{15.5}{50}(12)(1.67)=26.2$

TRY W12X22 $S_x=25.4>26.2$ ✓

$\Delta_C=0.32=24/531$

W12X22

#112-WEST HDR

L=9.75
W=1.1
R=5.4
M=13.1

$f_b=1.9$
$f_v=152$
$\Delta_T=0.25=4/475$

GL 3½X9

#113- WEST HDR

L=8
W=0.47
R=1.9
M=3.8

fb=0.26
fv=27
DELTA=0.02=L/5321

PSL 5-1/4x14

#114- WEST INT

L=14
$W=(38/2)(0.045)=0.86$
R=6.0
M=21.0

$f_b=1.5$
$f_v=102$
$\Delta_T=0.31=4/543$

PSL 5¼X14

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6520 82nd Ave SE
Mercer Island, WA

Date: 1/9/2024
Proj. No.: 0463-2023-05
Design: RJG
Sheet: V-2

VERTICAL ANALYSIS

Foundation: 2,000 psf Assumed Soil Bearing

Side	North	South
Roof	.80	1.10
Wall	.15	.15
Level 1	.07	.07
Foundation	.30	.30
Totals:	1.32	1.62

South: 1.62 / 2.00 (12) = 9.8" Wide Ftg Req'd Use 18" Wide Ftg

Point Loads on the Stem Walls:

Maximum 10 kip point load distributed over 4'-0" of continuous 16" wide footing = 1.88psf OK

PT LOADS

P= 11.1/2.0 = 5.5# ⇒ USE 2'-6" SQ PTG

P= 14/2.0 = 7.0# ⇒ USE 3'-0" SQ FTG

MALSAM TSANG STRUCTURAL ENGINEERING

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Proj. No.

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Design

V-3
Sheet