

Structural Load Calculations for the Peluso Addition

Job: 22-002

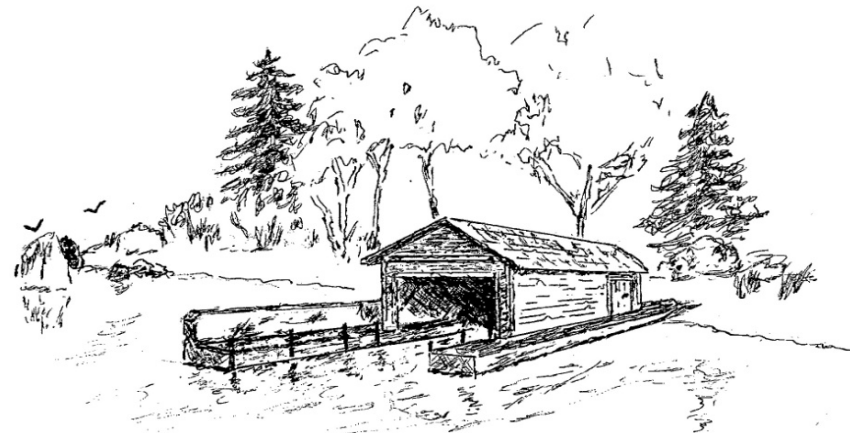
Site 5628 89th Ave SE

Address : Mercer Island, WA 98040

Date: March 7, 2022



Stoney Point Engineering



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	5 - 6	Vertical Load Keyplans
	7 - 9	Lateral Load Calculations
	10 - 12	Lateral Load Keyplans

Structural Design (2018 IBC)

Gravity Design Loads (IBC 1606, 1607, 1608)																														
Description	I.D.	Dead Loads (D)																	Live Load (L)	Snow Load (S) (ASCE 7-16 Chap. 7)										
		Pitch	Material ₁	Spc. (in.)	D ₁ (psf)	Material ₂	Spc. (in.)	D ₂ (psf)	Material ₃	Spc. (in.)	D ₃ (psf)	Material ₄	Spc. (in.)	D ₄ (psf)	Material ₅	Spc. (in.)	D ₅ (psf)	D (psf)			L/L _r (psf)	Drift Surcharges								
																		Flat		Slope		Used	W _b	h _r	X _d	W _d	Drift	Slide	Un-bal	Slope
1	Roof Load	R	3 : 12	2x12	24.00	1.6	1/2" Plywood		1.5	Comp		2.0	5/8" Sheetrock		2.8	Insulation	12.00	1.2	9.0	9.3	15.0	25.0								16
2	Floor	F		2x12	16.00	2.4	3/4" Plywood		2.3	Hardwood		3.4	Insulation	11.00	1.1				9.1	9.1	15.0	40.0								
3	Wall	W		2x6	16.00	1.2	1/2" Plywood		1.5	1/2" Sheetrock		2.2	Insulation	5.50	0.6				5.4	5.4	10.0	0.0								
4																														
5																														
6																														
7																														
8																														
9																														
10																														

Lumber Strengths (psi)		F _b	F _t	F _v	F _{c⊥}	F _c	E
Joist/Rafters							
	Hem-Fir #2	850	525	150	405	1300	1.30
Beams and Headers							
	4" Nominal Doug-Fir #2	900	575	180	625	1350	1.60
	6" Nominal Doug-Fir #1	1350	675	170	625	925	1.60
Posts							
	4" Nominal Doug-Fir #1	1000	675	180	625	1500	1.70
	6" Nominal Doug-Fir #1	1200	950	170	625	1000	1.60
	Studs Hem-Fir Stud	675	400	150	405	800	1.20
Laminated Strand Lumber (LSL)							
	1.3 E	1700		400	680	1400	1.30
	1.55 E	2325		310	400	2050	1.55
Microllam (LVL)							
	1.9 E	2600	1555	285	750	2510	1.90
Parallel Strand Lumber (PSL)							
	2.0 E	2900	2025	290	750	2900	2.00
	P.T. 2.0 E	2175		191	465	2059	1.78
Glu-Laminated Timbers							
	24F-V4	2400	1100	240	650	1650	1.80
APA Rated Sheathing							
		Span Rating		Max Span with Design Loads (in)			
	Roof 5/8" Ply	20/40		24.0			
	Wall 15/32" Ply	24/0		16.0			
	Floor (T&G) 3/4 Ply	48/24		24.0			

Wind Loads (IBC 1609.1.1)	
ASCE (7-16) Chap 27 Directional Procedure	
3 Second Gust = 110 mph	
Exposure Category = B	Sect. 26.7.3
Mean Roof Height = 13.0 ft	
K _d = 0.85 ft	Table 26.6-1
K _{zt} = 1.30	Eq 26.8.1
K _h = 0.70	Table 27.3-1
K _e = 0.99	Table 26.9-1
q _z = 23.7 lb/ft ²	Eq 26.10-1
G = 0.85	Sec. 26.11
p = q _h (GC _p - GC _{p_i})	Eq 27.3-1

Deflection Limits (IBC Table 1604.3)			
	L	S or W	D + L
Roof			
Plaster	360	360	240
Nonplaster	240	240	180
None	180	180	120
Floor	360		240
Walls		240	

Seismic Loads (IBC 1613.1)	
ASCE (7-16) Sec. 12.14 Simplified Alternative for Simple Bearing Wall Systems	
Spectral Response Acceleration, S _S = 145.40	
Site Class = D	Table 20.3-1
Site Coefficient, F _a = 1.20	Table 11.4-1
Height Coefficient, F = 1.00	Sec. 12.14.8.1
Maximum Spectral Response Acceleration, S _{MS} = 174.5	Equation 11.4-1
5%Damped Design Spectral Response Acceleration, S _{DS} = 116.3	Equation 11.4-3
Seismic Design Category = D	Table 11.6-1
Default Response Modification Coefficient, R = 6.50	Table 12.14-1

Post Calculations

#	Location	I.D.	Length (ft.)		I.D.	X-section (in.)		Load Factors		Load Type		Span (ft.)	Placement (ft.)		Spacing (ft.)		C _D	C _F	C _b	K _f	C _p	Bearing		Buckling		All.	Trib.		Total	#	Footin g Size 1500	
			y-y	x-x		Live	Dead	#l _i	#l _f	X _i /X _p	X _f		Sp _i	Sp _f	F _v , F _c	F _c						F _{c⊥}	All.	Act.	All.		Act.	Live				Dead
1	Roof	2x6		9.00	PLY					R	R	3.20		3.20	7.70	7.70						0.74	340	61	593	61	2,805	308	185	500	1	7
2	Roof	2x6		9.00	PLY					R	R	9.20		9.20	3.40	3.40						0.74	340	87	593	87	2,805	391	235	720	2	8
										W	W	9.20		9.20	2.00	2.00											0	92				
3	Roof	2x6		9.00	PLY					R	R	4.80		4.80	15.20	15.20						0.74	340	177	593	177	2,805	912	547	1,460	3	12
4	Roof	2x6		9.00	PLY					R	R	5.20		5.20	10.80	10.80						0.74	340	137	593	137	2,805	702	421	1,130	4	10
5	Roof	2-2x4		9.00	PLY					R	R	12.90		12.90	8.40	8.40						0.41	340	207	331	207	3,478	1,355	813	2,170	5	
6	Roof	2x6		9.00	PLY					R	R	2.90		2.90	3.40	3.40						0.74	340	32	593	32	2,805	123	74	260	6	
										W	W	2.90		2.90	3.70	3.70											0	54				
7	Roof	2x6		9.00	PLY					R	R	5.80		5.80	3.40	3.40						0.74	340	62	593	62	2,805	247	148	510	7	
										W	W	5.80		5.80	3.70	3.70											0	107				
8	Roof	2x6		9.00	PLY					R	R	2.70		2.70	10.80	10.80						0.74	340	72	593	72	2,805	365	219	590	8	8
9	Roof	2x6		9.00	PLY					R	R	5.40		5.40	10.80	10.80						0.74	340	142	593	142	2,805	729	437	1,170	9	11
10	Roof	2x6		9.00	PLY					R	R	2.70		2.70	3.50	3.50						0.74	340	30	593	30	2,805	118	71	250	10	5
										W	W	2.70		2.70	4.50	4.40											0	60				
11	Main Floor	4x4	4.00	4.00	SPF					F	F	6.20		6.20	10.80	10.80						0.85	425	151	1,142	151	5,206	1,339	502	1,850	11	13
12	Main Floor	4x4	4.00	4.00	SPF					F	F	12.40		12.40	10.80	10.80						0.85	425	301	1,142	301	5,206	2,678	1,004	3,690	12	19
13	Main Floor	4x6	4.00	4.00	SPF					F	F	10.90		10.90	10.80	10.80						0.85	425	281	1,142	281	8,181	2,354	883	5,410	13	23
										5																1,355	813					
14	Main Floor	4x4	4.00	4.00	SPF					F	F	9.40		9.40	10.80	10.80						0.85	425	229	1,142	229	5,206	2,030	761	2,800	14	16
15	Main Floor	4x4	4.00	4.00	SPF					F	F	4.70		4.70	10.80	10.80						0.85	425	114	1,142	114	5,206	1,015	381	1,400	15	12

Beam Calculations

Beam			Loading								Adjustment factors				Stresses								Deflection								
#			Load Factors		Type		Span	Placement (ft.)		Spacing (ft.)		C _D	C _r	C _F	C _v	Loads (lb)		Shear (psi)			Moments				Live			Total			#
#	Location	I.D.	Live	Dead	#1 _i	#1 _f	(ft.)	X _i /X _p	X _f	Sp _i	Sp _f					Left	Right	f _V	F' _V	%	M _{max} (lb-ft)	f _b	F' _b	%	Δ _{act.}	Δ _{all.}	%	Δ _{act.}	Δ _{all.}	%	#
1	Roof	4x8			R	R	3.20		3.20	7.70	7.70			1.30		493	493	29	250	858	394	154	1235	800	0.00	0.16		0.00	0.21		1
2	Roof	4x8			R	R	9.20		9.20	3.40	3.40			1.30		718	718	42	250	589	1651	646	1235	191	0.08	0.46	560	0.15	0.61	407	2
					W	W	9.20		9.20	2.00	2.00																				
3	Roof	4x8			R	R	4.80		4.80	15.20	15.20			1.30		1459	1459	86	250	290	1751	685	1235	180	0.03	0.24	882	0.04	0.32	735	3
4	Roof	4x8			R	R	5.20		5.20	10.80	10.80			1.30		1123	1123	66	250	377	1460	571	1235	216	0.03	0.26	976	0.04	0.35	813	4
5	Roof	1.75x11.875 LVL			R	R	13.10		13.10	8.40	8.40	1.15			2201	2201	192	328	171	7208	3072	3072	100	0.53	0.66	124	0.85	0.87	103	5	
6	Roof	4x8			R	R	2.90		2.90	3.40	3.40			1.30		251	251	15	250		182	71	1235		0.00	0.15		0.00	0.19		6
					W	W	2.90		2.90	3.70	3.70																				
7	Roof	4x8			R	R	2.70		2.70	10.80	10.80			1.30		583	583	34	250	725	394	154	1235	802	0.00	0.14		0.00	0.18		7
8	Roof	4x8			R	R	2.70		2.70	3.50	3.50			1.30		249	249	15	250		168	66	1235		0.00	0.14		0.00	0.18		8
					W	W	2.70		2.70	4.50	4.40																				
9	Main Floor	4x8			F	F	6.20		6.20	10.80	10.80			1.30		1841	1841	109	250	230	2854	1117	1235	111	0.09	0.21	240	0.12	0.31	262	9

X|D

EXURBAN DESIGNS

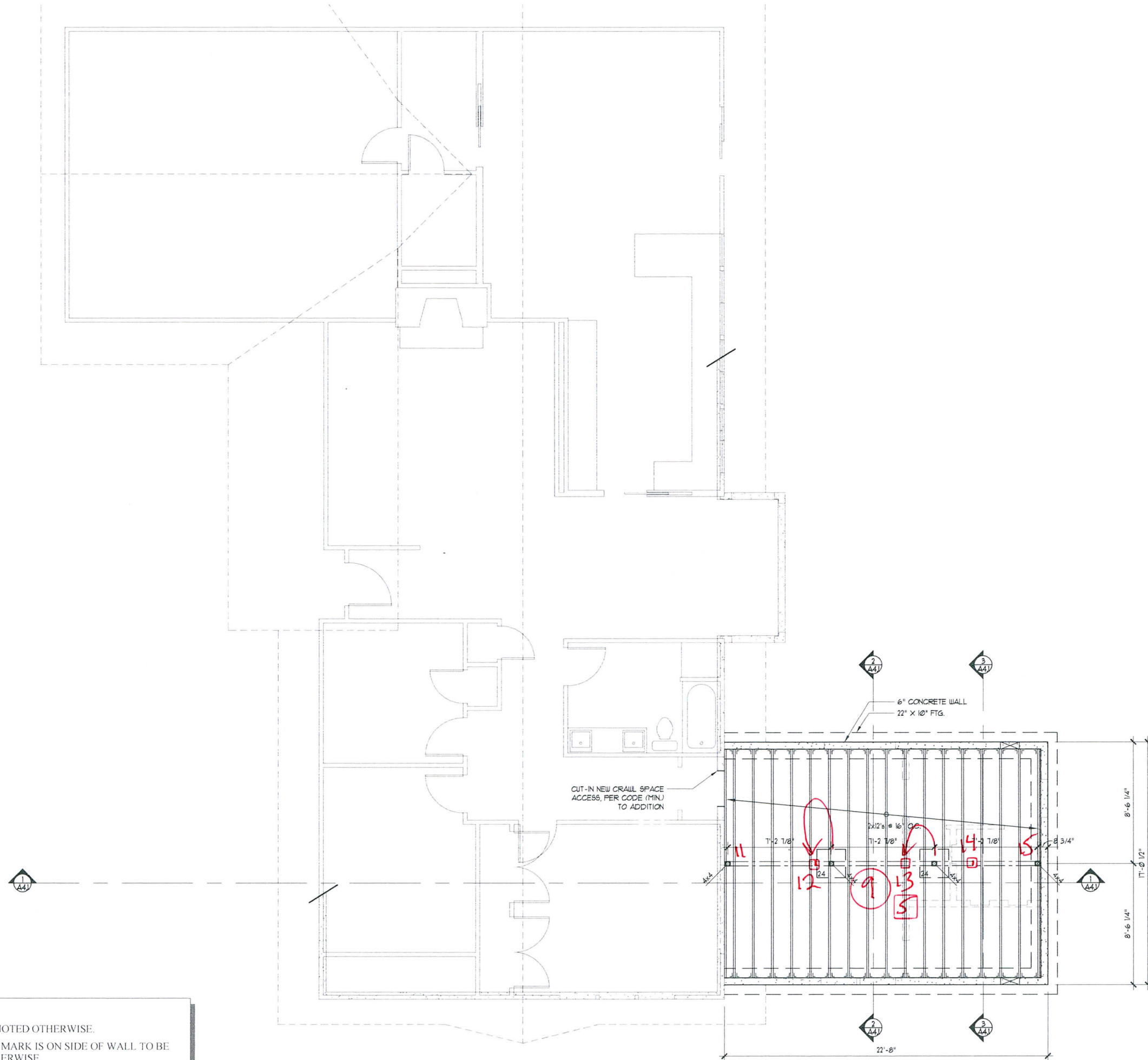
P 360.320.6297
24123 7TH AVE. WEST
BOTHELL, WASHINGTON 98021
www.ExurbanDesigns.com

PELUSO ADDITION

5628 89TH AVE. SE.
MERCER ISLAND, WA 98040

NO. DATE REVISION

DATE: 02/11/20
JOB NUMBER: 210
PM: DK
FILE: 5 S2



CUT-IN NEW CRAWL SPACE ACCESS, PER CODE (MIN) TO ADDITION

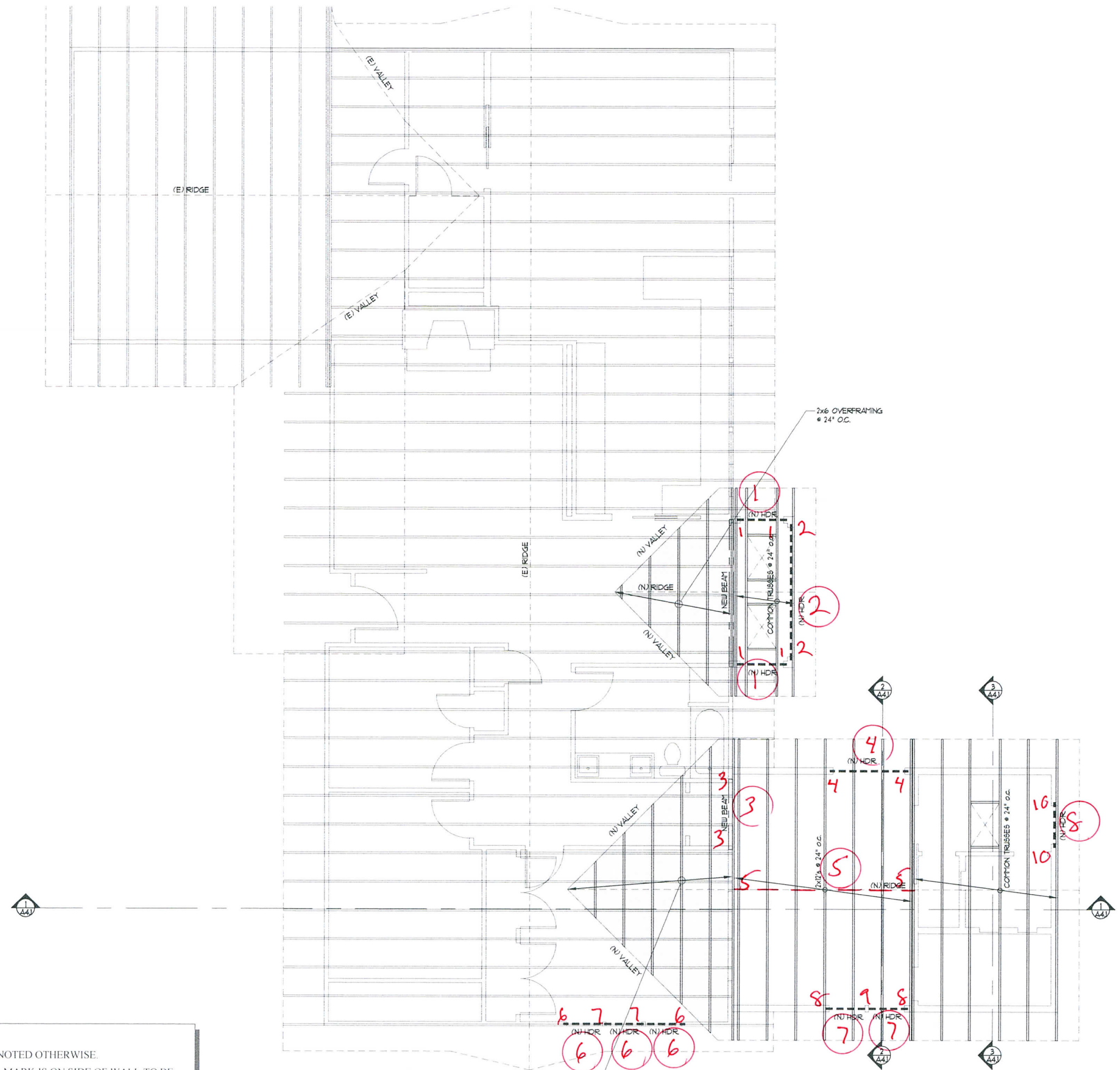
6" CONCRETE WALL
22' X 10' FTG.

VENTILATION CALCULATIONS:

CRAWL SPACE AREA = 356 SF
 VENT AREA REQUIRED = $356 / 3000 = 1.19$ SF
 PROVIDE (2) 8" X 16" VENT OPENINGS
 (2) X 0.88 SF = 1.76 SF
 (PER IRC R402.2, WASHINGTON STATE AMENDMENT)

NOTES:
 TO BE P1-6, UNLESS NOTED OTHERWISE.
 HEARWALL MARKS. MARK IS ON SIDE OF WALL TO BE UNLESS NOTED OTHERWISE.

Gravity Load Keyplans



EXTERIOR WALL NOTES:
 EXTERIOR WALLS TO BE P1-6, UNLESS NOTED OTHERWISE.
 ↗ DENOTES SHEARWALL MARKS. MARK IS ON SIDE OF WALL TO BE

Main Wind Force Resisting System

Grid #	Factor	Grid # for Load Above	L (ft)	B (ft)	Proj. Area (ft ²)	Surface Direction	Surface Type	Roof Angle		Pressure Coefficients		Design Pressure	Design Load		Min. Design Load		Load used for Design <i>F</i> (lb)						
								Pitch	θ (Deg)	<i>C_p</i> (Fig 27.3.1) External	<i>G C_{pi}</i> (Table 26.13-1) Internal	<i>p</i> (Eq 27.3-1) (psf)	Tributary <i>F</i> (lb)	Total <i>F</i> (lb)	Tributary <i>F</i> (lb)	Total <i>F</i> (lb)							
1M			70.0	70.0	72	Windward	Wall			0.80	-0.18	16.1	1161	5678	1152	3136	3407						
			70.0	70.0	94	Windward	Wall			0.80	-0.18	16.1	1515		1504								
			70.0	70.0	118	Leeward	Wall			-0.50	0.18	10.1	1189										
			70.0	70.0	60	Windward	Roof	3	14.0	0.40	-0.18	8.1	484		480								
			70.0	70.0	110	Leeward	Roof	3	14.0	-0.60	0.18	12.1	1330										
2M			70.0	70.0	72	Windward	Wall			0.80	-0.18	16.1	1161	2531	1152	1392	1518						
			70.0	70.0	52	Leeward	Wall			-0.50	0.18	10.1	524										
			70.0	70.0	30	Windward	Roof	3	14.0	0.40	-0.18	8.1	242		240								
			70.0	70.0	50	Leeward	Roof	3	14.0	-0.60	0.18	12.1	604										
AM			70.0	70.0	130	Windward	Wall			0.80	-0.18	16.1	2095	4815	2080	2640	2889						
			70.0	70.0	130	Leeward	Wall			-0.50	0.18	10.1	1310										
			70.0	70.0	70	Windward	Roof	3	14.0	0.40	-0.18	8.1	564		560								
			70.0	70.0	70	Leeward	Roof	3	14.0	-0.60	0.18	12.1	846										

Seismic Calculations

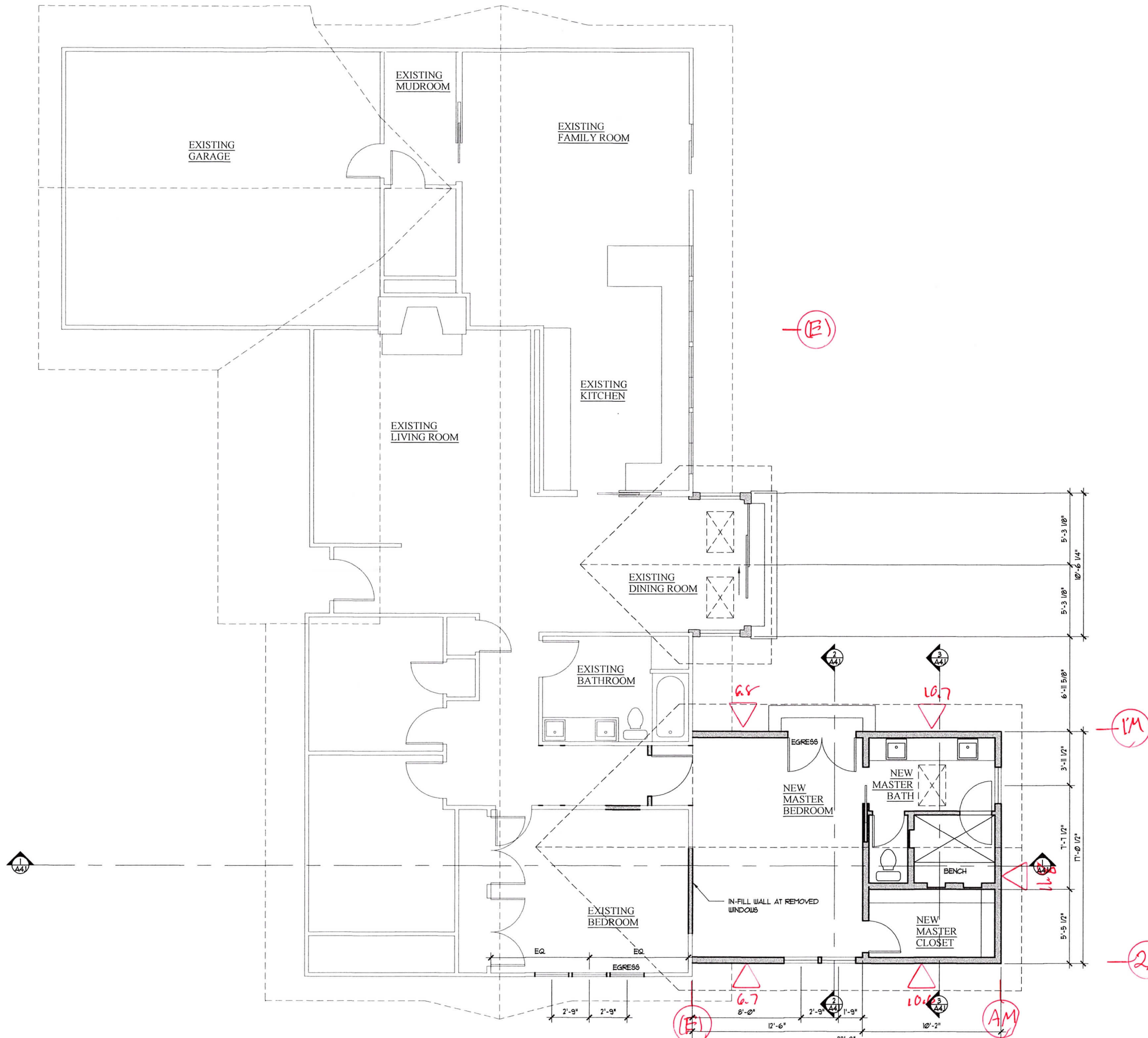
Spectral Response Acceleration, $S_s = 145.40$
Site Class = D
Site Coefficient, $F_a = 1.20$
Height Coefficient, $F = 1.00$

Maximum Spectral Response Acceleration, $S_{MS} = 1.74$
5%Damped Design Spectral Response Acceleration, $S_{DS} = 1.16$
Default Response Modification Coefficient, $R = 6.50$
Seismic Design Category = D

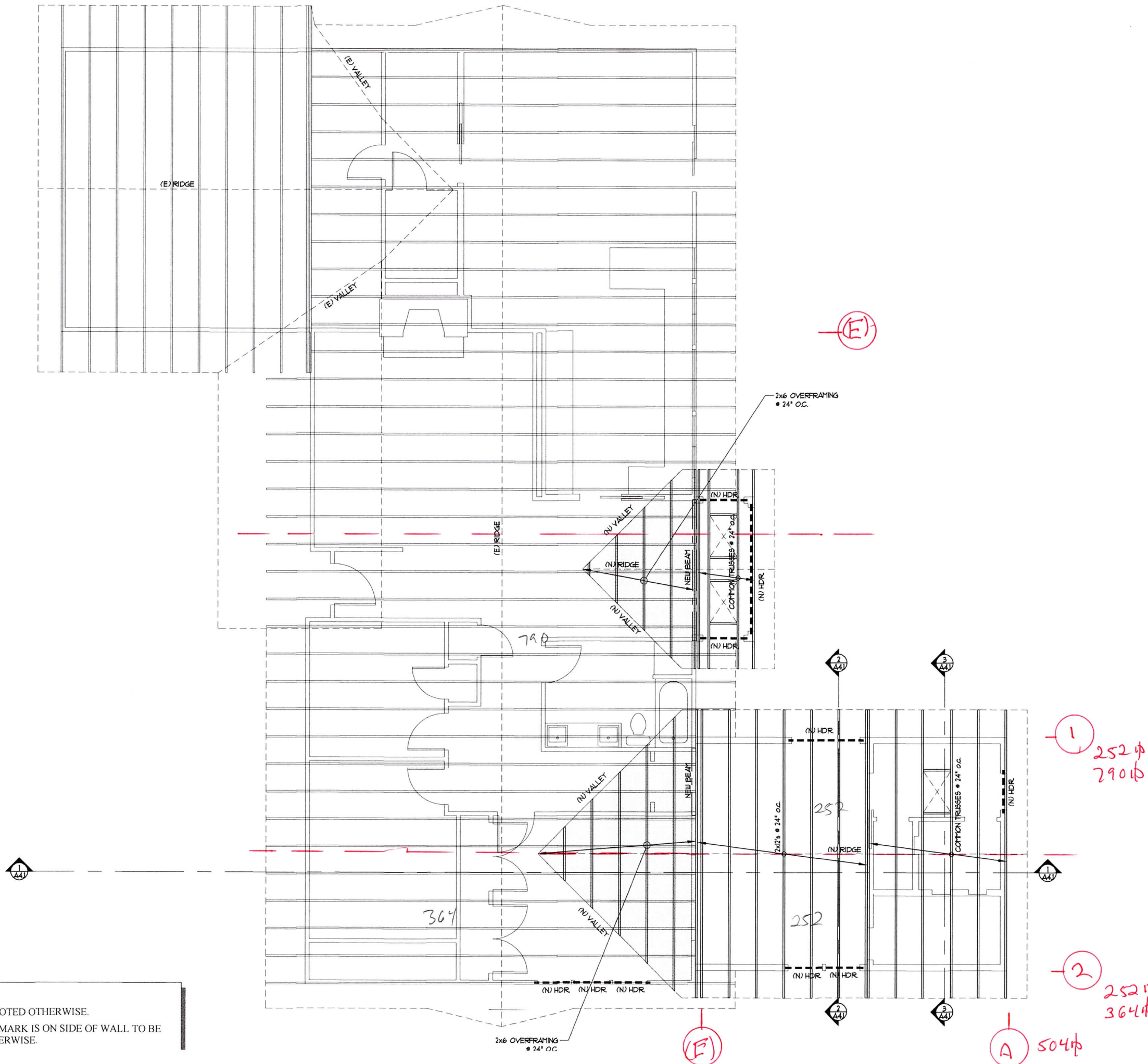
Grid #	Load Type	Level	Direction (On Page)	Areas (ft ²)	Code Sect.	Fctr.	Ω_o	R	Loads							Eq. 12.4-3 $E = \rho Q_E$ (lb)	Eq. 5 0.7*E (lb)	Eq. 12.4-7 $E_m = \Omega_o Q_E$ (lb)				
									Live (lb/ft ²)	Dead (lb/ft ²)	w_x (lb)	FS_{DS}/R	F_{xi} (lb)	Q_E (lb)	ρ_{used}							
1M	R	Main Floor	L-R	252						15.0	3780	0.179	676	2797	1.30	3636	2800					
	R			790						15.0	11850	0.179	2121									
2M	R	Main Floor	L-R	252						15.0	3780	0.179	676	1654	1.30	2150	1655					
	R			364						15.0	5460	0.179	977									
AM	R	Main Floor	U-D	504						15.0	7560	0.179	1353	1353	1.30	1759	1354					

Panel Analysis


Panel														Design Loads		Panel Shears								Holdown Options											
Grid #		Materials				Height (ft.)	Individual Panel Lengths						Shear Panel Adjustments		Wind (lb)	Seismic (lb)	Wind			Seismic				Post Loads			Anchor Bolt Holdowns								
Level _i	Grid Above	Wall Size	Nail Size	Panel Type	S.G.		#1 (ft)	#2 (ft)	#3 (ft)	#4 (ft)	#5 (ft)	#6 (ft)	Perforated Panel				S.G.	Act. (lb/ft)	Allowable			Act. (lb/ft)	Allowable			Uplift (lb)	2/3 Dead (lb)	Net (lb)	Model	Post		Cap. (lb)	Tie Straps		
													Max Height (ft)	Total Width (ft)					%	C _o	C _{SG}		Type	Base (lb/ft)	Cap. (lb/ft)					Type	Base (lb/ft)		C _s	Cap. (lb/ft)	Grade
Defaults (Dflt.)																																			
		2x6	8d	15/32" Ply	0.4																														
1M						9.0	10.7	6.8						0.93	3,407	2,800	195	P1-6	365	339	160	P1-6	260		242	1752		1752	HDU2			2215	MSTC40	2320	9
2M						9.0	10.6	6.7						0.93	1,518	1,655	88	P1-6	365	339	96	P1-6	260		242	861		861							
AM						9.0	11.8							0.93	2,889	1,354	245	P1-6	365	339	115	P1-6	260		242	2204		2204	HDU2			2215	MSTC40	2320	11



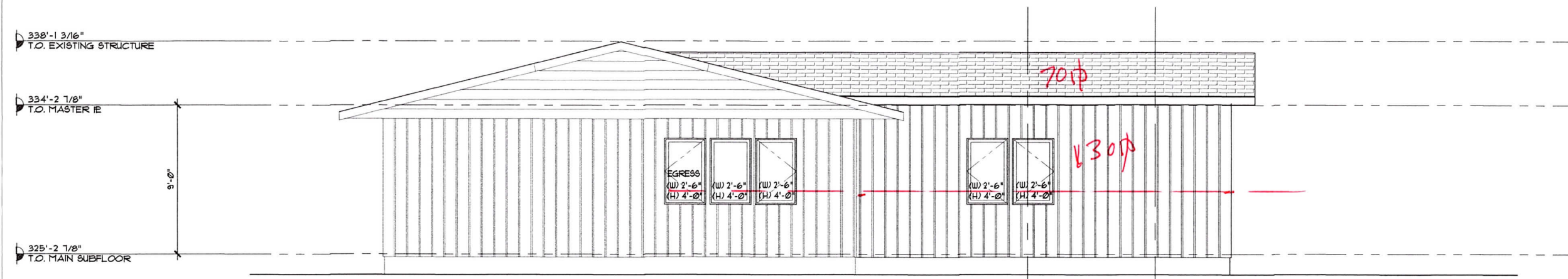
Main Floor
Shearwall Plan 10



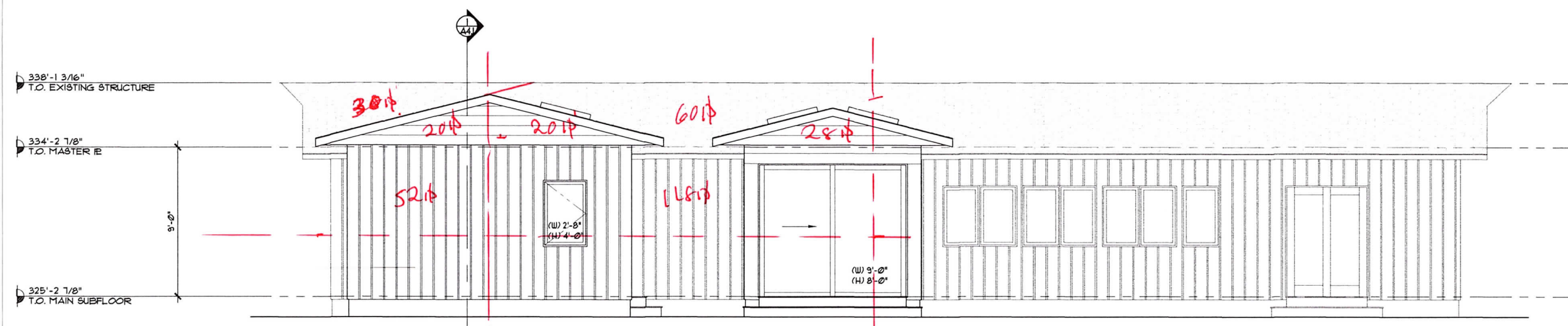
SHEARWALL NOTES:

1. ALL EXTERIOR WALLS TO BE P1-6, UNLESS NOTED OTHERWISE.
2.  DENOTES SHEARWALL MARKS. MARK IS ON SIDE OF WALL TO BE SHEATHED, UNLESS NOTED OTHERWISE.

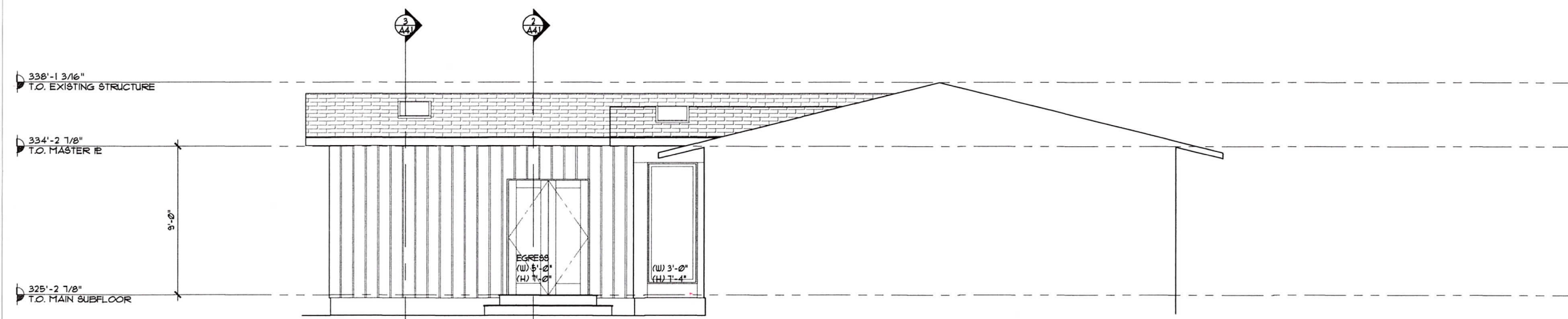
Area Takeoffs for
Roof Framing
Seismic Loads 11



1 PROPOSED SOUTH EXTERIOR ELEVATION
 SCALE: 1/4" = 1'-0"
 1 2 4 8 12 FT.
 (E) (A)



2 PROPOSED EAST EXTERIOR ELEVATION
 SCALE: 1/4" = 1'-0"
 1 2 4 8 12 FT.
 (E) (1)



3 PROPOSED NORTH EXTERIOR ELEVATION
 SCALE: 1/4" = 1'-0"
 1 2 4 8 12 FT.

Area Takeoffs for Wind Loads 12

VIR