

Structural Load Calculations for the LeMaster Residence

Job: 25-032

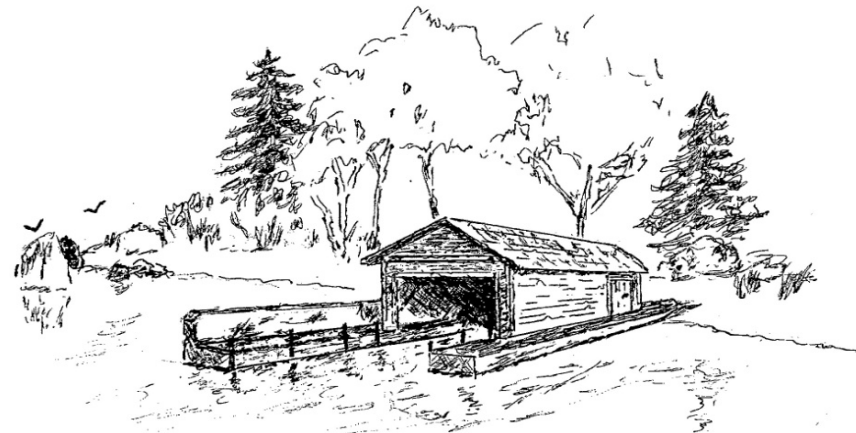
Site 4645 Forest Ave SE

Address : Mercer Island, WA 98040

Date: September 29, 2025



Stoney Point Engineering



12033 SE 40th Lane

Bellevue, WA 98006

Phone: 425-644-9500

dwayne@stoneypointengineering.com

Sheet:	2	Design Criteria
	3 - 4	Vertical load Calculations
	5	Vertical Load Keyplans

Structural Design (2021 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			Un-bal	Slope	S (psf)				
																		Flat	Slope	Used		W _b	h _r	X _d	W _d	Drift	Slide					
1	Deck	D	2x10	16.00	2.3	Compos. Decking		7.9										10.2	10.2	15.0	60.0										25.0	
2																																
3																																
4																																
5																																
6																																
7																																
8																																
9																																
10																																

Lumber Strengths (psi)		F _b	F _t	F _v	F _{c⊥}	F _c	E
Joist/Rafters							
Rafters	Doug-Fir #2	900	575	180	625	1350	1.60
Joist	Doug-Fir #2	900	575	180	625	1350	1.60
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
		Fb	Ft	Fv	Fc [^]	Fc	Ex106
Posts							
4" Nominal	Doug-Fir #1	1000	675	180	625	1500	1.70
6" Nominal	Doug-Fir #1	1200	950	170	405	1000	1.80
	Studs	850	525	150	405	1300	1.20
	Tie Plates	850	525	150	405	1300	2.00
	Sill Plates	Fb	Ft	Fv	25	Fc	2.10
Parallel Strand Lumber (PSL)							
	2.0 E	700	450	180	625	850	2.20
	P.T. 2.0 E	Fb	Ft	Fv	Fc [^]	Fc	2.30
Microllam (LVL)							
	1.9 E	Fb	Ft	Fv	Fc [^]	Fc	1.90
Laminated Strand Lumber (LSL)							
	1.3 E	900	575	180	625	1350	1.30
	1.55 E	Fb	Ft	Fv	Fc [^]	Fc	1.55
Glu-Laminated Timbers							
	Beams 24F-V4	1000	0		625	150.2	
	Columns 24F-V4	2400	1100	240	650	1234	1.70
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 =	C
	Sect. 26.7.3
Exposure =	Partially
Mean Roof Height =	32.0 ft
K _d =	0.85 ft
	Table 26.6-1
K _{zt} =	1.00
	Eq 26.8.1
K _h =	1.00
	Table 27.3-1
K _e =	1.00
	Table 26.9-1
q _z =	26.2 lb/ft ²
	Eq 26.10-1
G =	0.85
	Sect. 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 = 144.00	
Site Class =	D
	Table 20.3-1
Site Coefficient, F _a =	1.20
	Table 11.4-1
Height Coefficient, F =	1.10
	Sect. 12.14.8.1
Maximum Spectral Response Acceleration, S _{MS} =	172.8
	Equation 11.4-1
5%Damped Design Spectral Response Acceleration, S _{DS} =	115.2
	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	#1 _i	#1 _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	Deck	4x4	3.00	3.00	SPF					D	D	2.70		2.70	2.10	2.10						0.92	425	18	1,247	18	5,206	170	43	220	1	5
2	Deck	LUS210-2			HF2					D	D	7.40		7.40	1.00	1.00										1,323	222	56	1,310	2		
										4		7.40		4.00													170	43				
										5		7.40		4.30														653	163			
3	Deck	ML28Z								D	D	7.40		7.40	1.00	1.00											222	56	1,600	3		
										D	D	9.50		9.50	3.00	3.00											855	214				
										6		7.40	5.70														196	49				
4	Deck	LUS28			HF2					D	D	2.70		2.70	2.10	2.10										794	170	43	220	4		
5	Deck	MSTA24			HF2					D	D	12.10		12.10	1.80	1.80										1,226	653	163	820	5		
6	Deck									D	D	9.50		9.50	3.00	3.00											855	214	1,070	6		
7	Deck	4x4	1.00	1.00	HF2					D	D	3.50		3.50	4.00	4.00						0.99	405	164	1,340	164	4,961	420	105	2,010	7	
										8		3.50	-1.20														1,182	296				
8	Deck									D	D	7.40		7.40	1.00	1.00											222	56	1,110	8		
										6		7.40	1.70														659	165				

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	Deck	P.T. 4x12			D	D	12.10		12.10	1.80	1.80					817	817	31	150	482	2471	402	850	212	0.08	0.40	514	0.10	0.40	412	1
2	Deck	P.T. 2-2x10			D	D	7.40		7.40	1.00	1.00					277	278	15	250		513	144	850	590	0.01	0.25		0.02	0.25		2
					4		7.40		4.00																						
					5		7.40		4.30																						
3	Deck	P.T. 4x6			D	D	3.50		3.50	4.00	4.00					525	525	41	150	367	459	312	850	272	0.01	0.12		0.01	0.12	894	3
3	Deck	P.T. 4x6			D	D	3.50	3.50	4.70	4.00	4.00			1.30		439	439	34	150	438	1537	1045	1105	106	0.01	0.12		0.01	0.12		3
					8		3.50	4.70																							
4	Deck	P.T. 2-2x10			D	D	7.40		7.40	1.00	1.00					523	1101	59	250	420	1748	490	850	173	0.04	0.25	644	0.05	0.25	515	4
					6		7.40	5.70																							
5	Deck	P.T. 4x12			D	D	9.50		9.50	3.00	3.00					1069	1069	41	150	368	2538	413	850	206	0.05	0.32	638	0.06	0.32	510	5
6	Deck	P.T. 2-2x10			D	D	5.70		5.70	5.70	5.70					1218	1218	66	250	380	1736	487	850	175	0.03	0.19	741	0.03	0.19	592	6

