

## STRUCTURAL CALCULATIONS - SHED

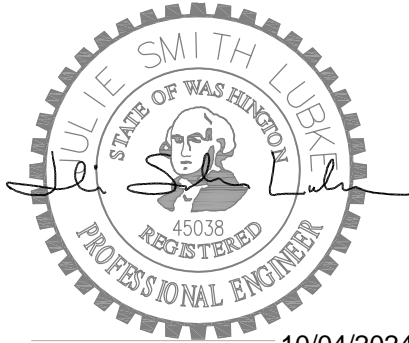
PROJECT:

Sam + June Mercer Island  
3064 68th Avenue SE  
Mercer Island, WA

PREPARED BY:

Julie Smith Lubke  
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Smith Lubke Structural Design  
P.O. Box 30954, Seattle, WA 98113  
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10/04/2024

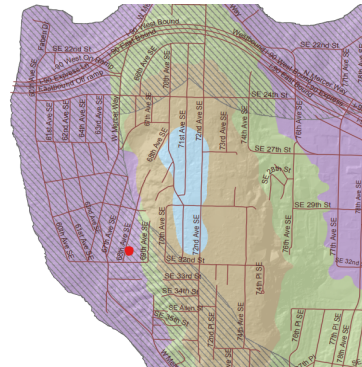
**CRITERIA**

shed	dead	green roof	30	live residential	40.0
roof		2x decking	4.3		
		built-up roofing	2.5		
		1/2" plywood	1.5		
		2x8 @ 24"oc	1.5		
		1/2" plywood	1.5		
		miscellaneous	1.7 4%		
			<u>43.0</u> psf		

walls		hardi board lap siding	2.3		
		2x furring	0.4		
		1/2" plywood/OSB	1.5		
		2x6 @ 16"oc	1.7		
		R21 insulation	0.8		
		5/8" gyp. wallboard	2.8		
		miscellaneous	0.5 5%		
			<u>10.0</u> psf		

**Lateral**

wind		wind importance factor	1.0		
		risk category	II		
		basic wind speed	98		
		wind exposure	C		
		topographical factor (Kzt)	1.00		



seismic		latitude/longitude	47.5822438/-122.2472145		
		seismic importance factor	1.0		
		seismic risk category	II		
		mapped spectral response (Ss/S1)	1.408 0.49	g	(from USGS)
		spectral response coef. (Sds/Sd1)	0.939	g	
		seismic design category	D		
		response modification factor (R)	6.5		

SHED			
Member Name	Results (Max UTIL %)	Current Solution	Comments
S1	Passed (47% M)	1 piece(s) 2 x 8 HF No.2 @ 24" OC	
S2	Passed (26% R)	1 piece(s) 2 x 8 HF No.2 @ 24" OC	
S3	Passed (52% M)	1 piece(s) 2 x 8 HF No.2 @ 24" OC	
s4	Passed (89% M)	1 piece(s) 2 x 8 HF No.2	
S5	Passed (37% M)	2 piece(s) 2 x 8 HF No.2	

ForteWEB Software Operator	Job Notes
Julie Smith Lubke Smith Lubke Structural Design (206) 852-1536 julie@smithlubke.com	



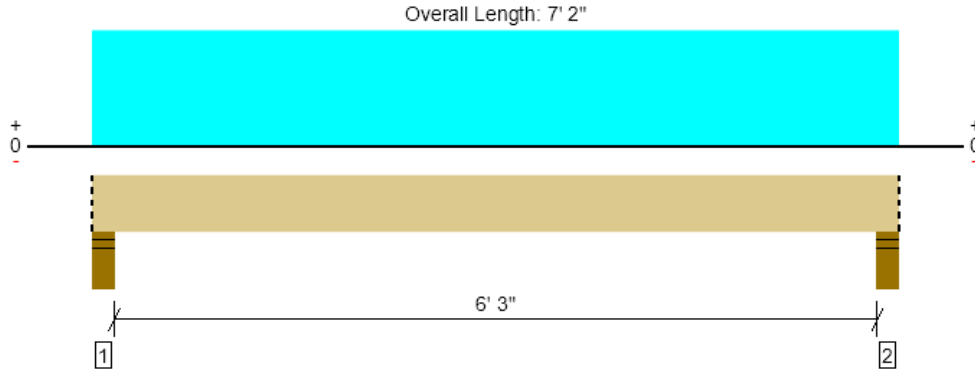
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File Name: Sam + June\_revised 03\_2023

SHED, S1

1 piece(s) 2 x 8 HF No.2 @ 24" OC



Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	487 @ 4 1/2"	3341 (5.50")	Passed (15%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	343 @ 1' 3/4"	1251	Passed (27%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	700 @ 3' 7"	1477	Passed (47%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.031 @ 3' 7"	0.321	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.084 @ 3' 7"	0.428	Passed (L/919)	--	1.0 D + 1.0 S (All Spans)

Member Length : 7' 2"  
 System : Roof  
 Member Type : Joist  
 Building Use : Residential  
 Building Code : IBC 2018  
 Design Methodology : ASD  
 Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - SPF	5.50"	5.50"	1.50"	308	179	487	Blocking
2 - Stud wall - SPF	5.50"	5.50"	1.50"	308	179	487	Blocking

• Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	7' 2" o/c	
Bottom Edge (Lu)	7' 2" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 7' 2"	24"	43.0	25.0	Default Load

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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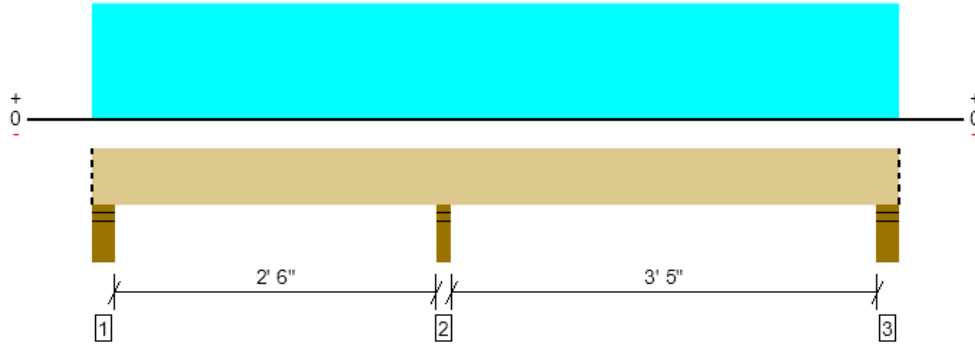


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SHED, S2

1 piece(s) 2 x 8 HF No.2 @ 24" OC

Overall Length: 7' 1 1/2"



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Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	551 @ 3' 1 1/4"	2126 (3.50")	Passed (26%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	196 @ 3' 10 1/4"	1251	Passed (16%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-183 @ 3' 1 1/4"	1477	Passed (12%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.002 @ 5' 1/2"	0.182	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.005 @ 5' 3/4"	0.243	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 7' 1 1/2"  
 System : Roof  
 Member Type : Joist  
 Building Use : Residential  
 Building Code : IBC 2018  
 Design Methodology : ASD  
 Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - SPF	5.50"	5.50"	1.50"	107	71	178	Blocking
2 - Stud wall - SPF	3.50"	3.50"	1.50"	348	203	551	None
3 - Stud wall - SPF	5.50"	5.50"	1.50"	157	94	251	Blocking

• Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	7' 2" o/c	
Bottom Edge (Lu)	7' 2" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 7' 1 1/2"	24"	43.0	25.0	Default Load

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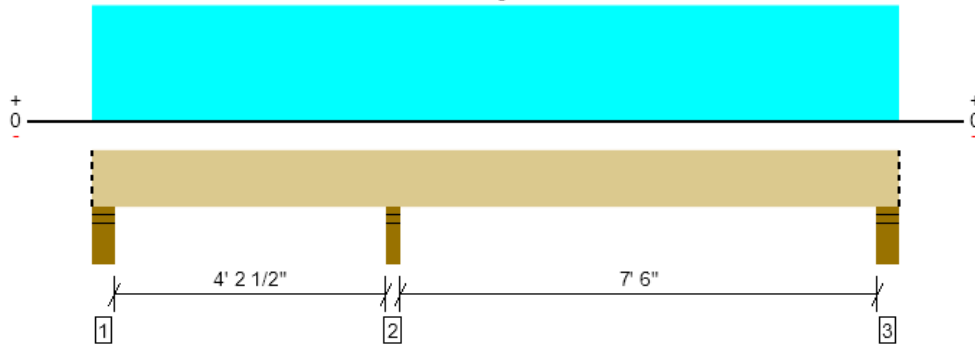


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SHED, S3

1 piece(s) 2 x 8 HF No.2 @ 24" OC

Overall Length: 12' 11"



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Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1100 @ 4' 9 3/4"	2126 (3.50")	Passed (52%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	523 @ 5' 6 3/4"	1251	Passed (42%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-767 @ 4' 9 3/4"	1477	Passed (52%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.038 @ 8' 11 13/16"	0.386	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.100 @ 9' 1/8"	0.515	Passed (L/928)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 12' 11"  
 System : Roof  
 Member Type : Joist  
 Building Use : Residential  
 Building Code : IBC 2018  
 Design Methodology : ASD  
 Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - SPF	5.50"	5.50"	1.50"	114	93	207	Blocking
2 - Stud wall - SPF	3.50"	3.50"	1.81"	695	404	1100	None
3 - Stud wall - SPF	5.50"	5.50"	1.50"	302	178	480	Blocking

• Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	12' 4" o/c	
Bottom Edge (Lu)	10' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 12' 11"	24"	43.0	25.0	Default Load

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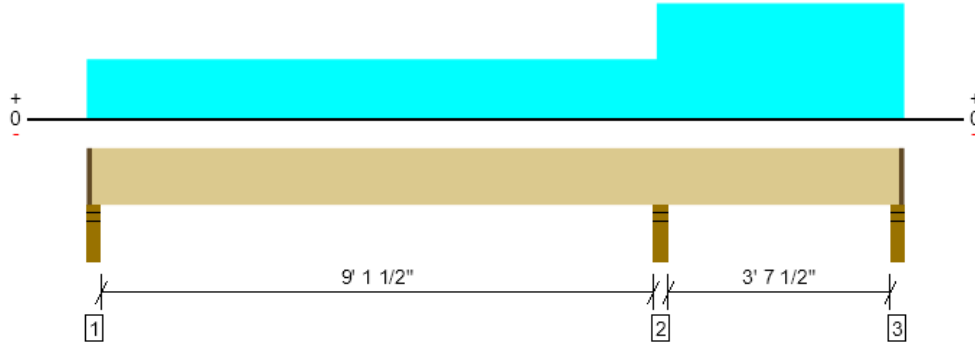


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SHED, s4

1 piece(s) 2 x 8 HF No.2

Overall Length: 13' 7 1/2"



Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1495 @ 9' 6 3/4"	2126 (3.50")	Passed (70%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	627 @ 8' 9 3/4"	1251	Passed (50%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-1137 @ 9' 6 3/4"	1284	Passed (89%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.074 @ 4' 4 7/8"	0.470	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.195 @ 4' 4 9/16"	0.626	Passed (L/578)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 13' 5"  
 System : Roof  
 Member Type : Flush Beam  
 Building Use : Residential  
 Building Code : IBC 2018  
 Design Methodology : ASD  
 Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - SPF	3.50"	2.25"	1.50"	318	187	505	1 1/4" Rim Board
2 - Stud wall - SPF	3.50"	3.50"	2.46"	949	546	1495	None
3 - Stud wall - SPF	3.50"	2.25"	1.50"	146	129/-1	276	1 1/4" Rim Board

• Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' 5" o/c	
Bottom Edge (Lu)	5' 1" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	1 1/4" to 13' 6 1/4"	N/A	2.8	--	
1 - Uniform (PLF)	9' 6" to 13' 7 1/2" (Front)	N/A	154.0	89.5	Linked from: S1, Support 1
2 - Uniform (PLF)	0 to 9' 6" (Front)	N/A	78.5	47.0	Linked from: S2, Support 3

• Side loads are assumed to not induce cross-grain tension.

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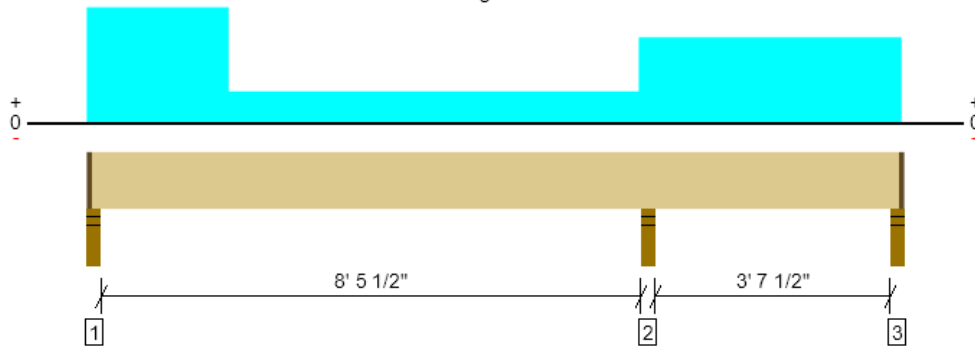


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SHED, S5

2 piece(s) 2 x 8 HF No.2

Overall Length: 12' 11 1/2"



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Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1330 @ 8' 10 3/4"	4253 (3.50")	Passed (31%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	541 @ 9' 7 3/4"	2501	Passed (22%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-944 @ 8' 10 3/4"	2569	Passed (37%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.029 @ 3' 10 15/16"	0.436	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.074 @ 3' 10 3/8"	0.582	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 12' 9"  
 System : Roof  
 Member Type : Flush Beam  
 Building Use : Residential  
 Building Code : IBC 2018  
 Design Methodology : ASD  
 Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - SPF	3.50"	2.25"	1.50"	501	302	803	1 1/4" Rim Board
2 - Stud wall - SPF	3.50"	3.50"	1.50"	840	490	1330	None
3 - Stud wall - SPF	3.50"	2.25"	1.50"	178	134	312	1 1/4" Rim Board

• Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	12' 9" o/c	
Bottom Edge (Lu)	12' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	1 1/4" to 12' 10 1/4"	N/A	5.5	--	
1 - Uniform (PLF)	8' 9" to 12' 11" (Front)	N/A	154.0	89.5	Linked from: S1, Support 1
2 - Uniform (PLF)	0 to 8' 9" (Front)	N/A	53.5	35.5	Linked from: S2, Support 1
3 - Uniform (PLF)	0 to 2' 3" (Front)	N/A	151.0	89.0	Linked from: S3, Support 3

• Side loads are assumed to not induce cross-grain tension.

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