STRUCTURAL CALCULATIONS

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
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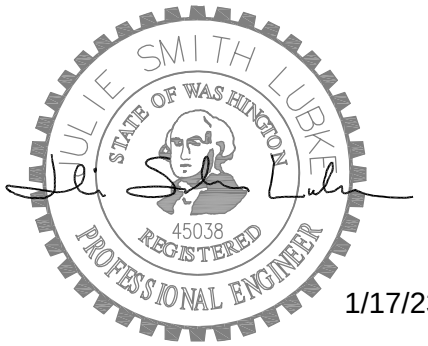

1/17/23

CRITERIA

Gravity

roof	dead	TPO roofing	2.0		live	snow	25.0 psf
		tapered rigid insulation, 9.5" max	1.8				
		1/2" plywood	1.5				
		11-7/8" TJI 230 @ 24"oc	2.3				
		R38 insulation	1.4				
		5/8" gyp. wallboard	2.8				
		slope factor	0				
		miscellaneous	1.7	13%			
			13.5	psf			
	total	dead + live	38.5	psf			
upper floor	dead	3/8" tile + thinset mortar	6.7		live	residential	40.0
		13/16" Warmboard	3.2				
		14" TJI 110 @ 16"oc	2.1				
		R19 insulation	0.8				
		3/4" plywood	2.3				
		1x decking	2.3				
		3x16 @ 24"oc	4.9				
		miscellaneous	2.7	11%			
			25.0	psf			
	total	dead + live	65.0	psf			
upper floor deck	dead	2X ipe decking w/ pedestals	6.0		live	roof deck	60.0 psf
		TPO roofing	0.4				
		3/4" protection board	2.5			hot tub	235 psf
		tapered rigid insulation, 9.5" max	1.8				
		3/4" plywood	2.3				
		1x decking	2.3				
		3x16 @ 24"oc	4.9				
		miscellaneous	3.8	16%			
			24.0	psf			
	total	dead + live	84.0	psf			
low roof w/ planting	dead	planting tray, saturated	22.0		live	snow	25.0 psf
		TPO roofing	0.4				
		3/4" protection board	2.5				
		tapered rigid insulation, 9.5" max	1.8				
		3/4" plywood	2.3				
		1x decking	2.3				
		3x16 @ 24"oc	4.9				
		miscellaneous	3.8	10%			
			40.0	psf			
	total	dead + live	65.0	psf			

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main floor	dead	3-1/2" concrete	43.8	live	residential	40.0
		1-1/8" plywood	3.4			
		14" TJI 560 @ 16"oc	3.2			
		R19 insulation	0.8			
		5/8" gyp. wallboard	2.8			
		miscellaneous	4.1 7%			
			58.0 psf			
	total	dead + live	98.0 psf			
main floor exterior above	dead	4" concrete	50.0	live	residential	60.0
		TPO roofing	0.4			
		3/4" protection board	2.5			
		tapered rigid insulation, 9.5" max	1.8			
		1-1/8" plywood	3.4			
		2x8 @ 16"oc	2.2			
		R19 insulation	0.8			
		5/8" gyp. wallboard	2.8			
		miscellaneous	3.1 5%			
			67.0 psf			
	total	dead + live	127.0 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%			
			10.0 psf			

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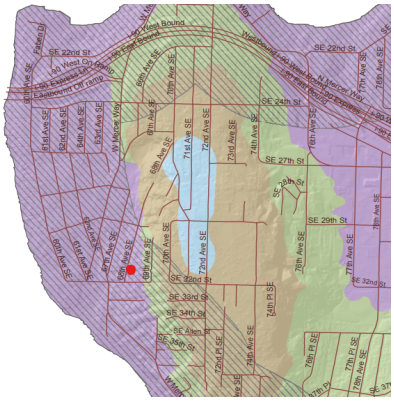
Lateral

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			

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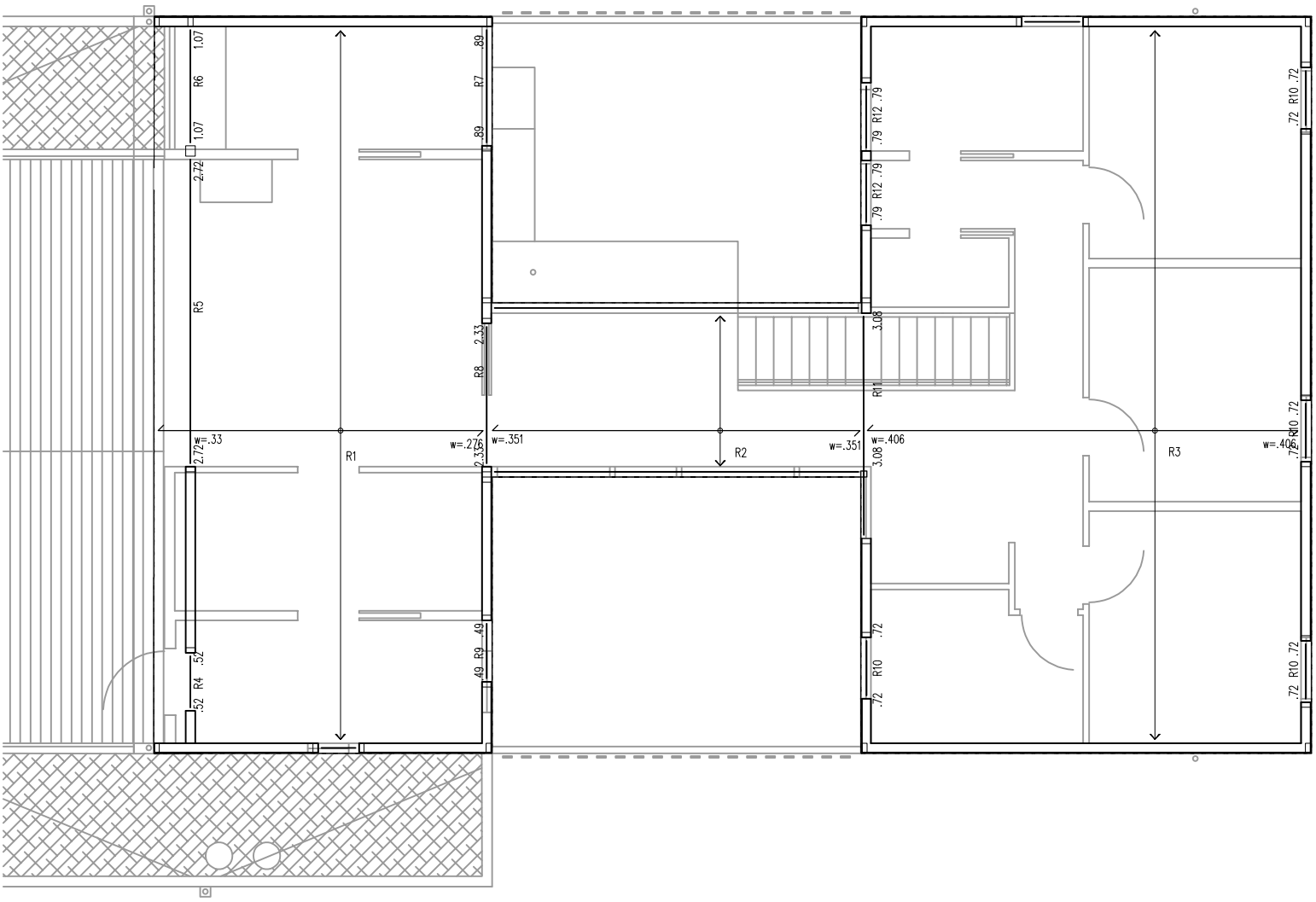
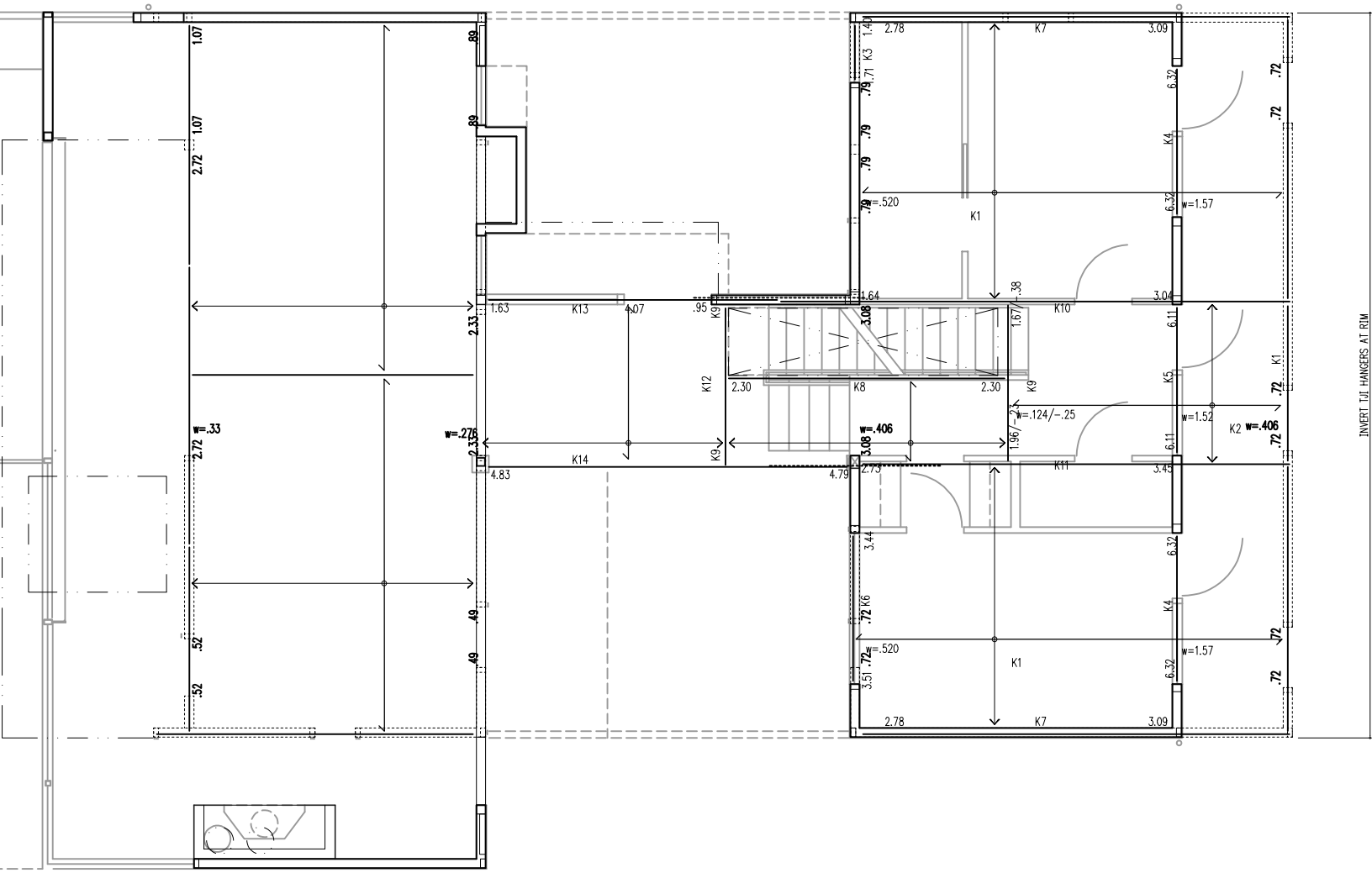
roof beam key



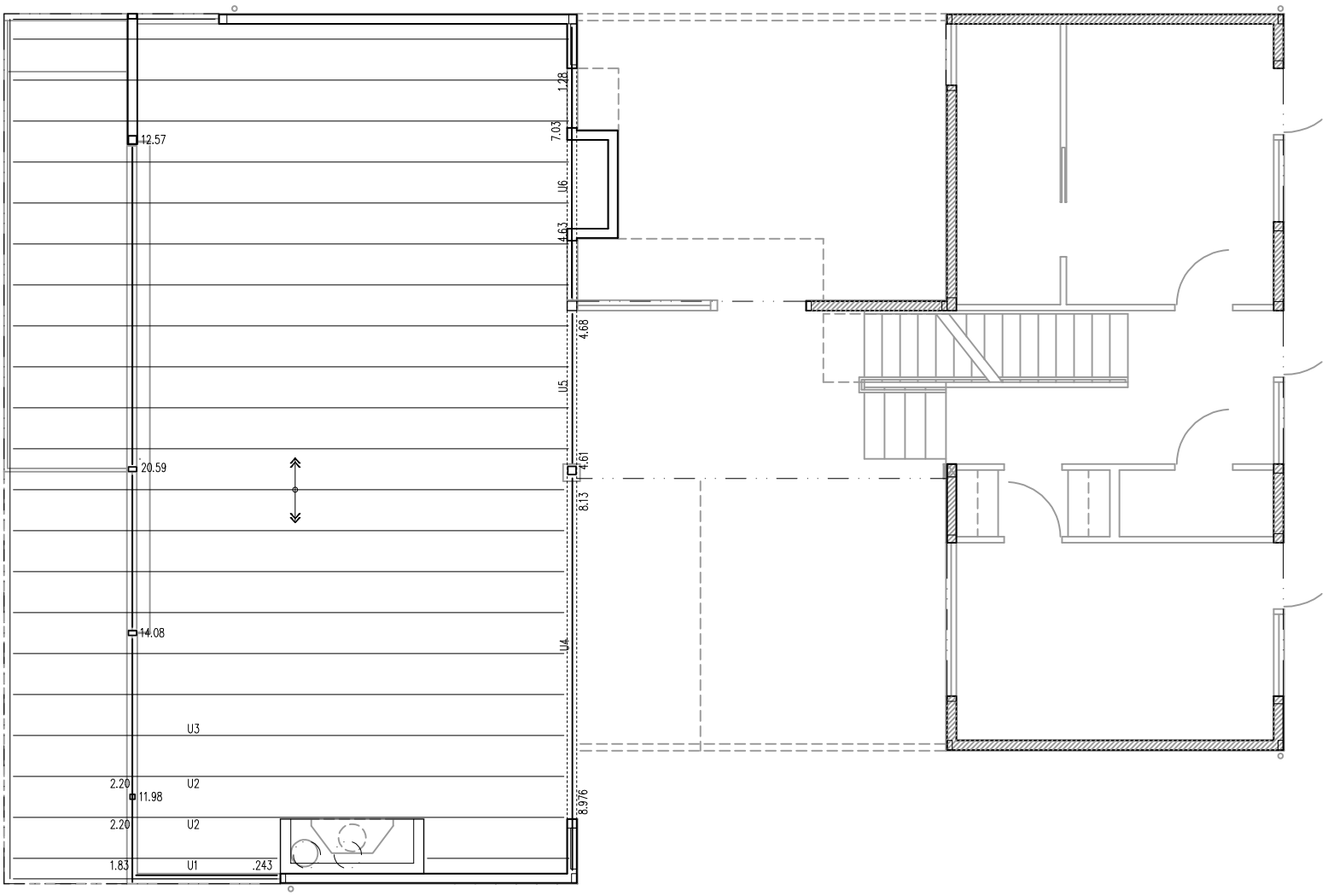
1 S2.4 ROOF FRAMING PLAN (UPPER FLOOR WALLS)
scale: 1/4" = 1'-0"

UPPER FLOOR BEAM KEY (TJI FRAMING)

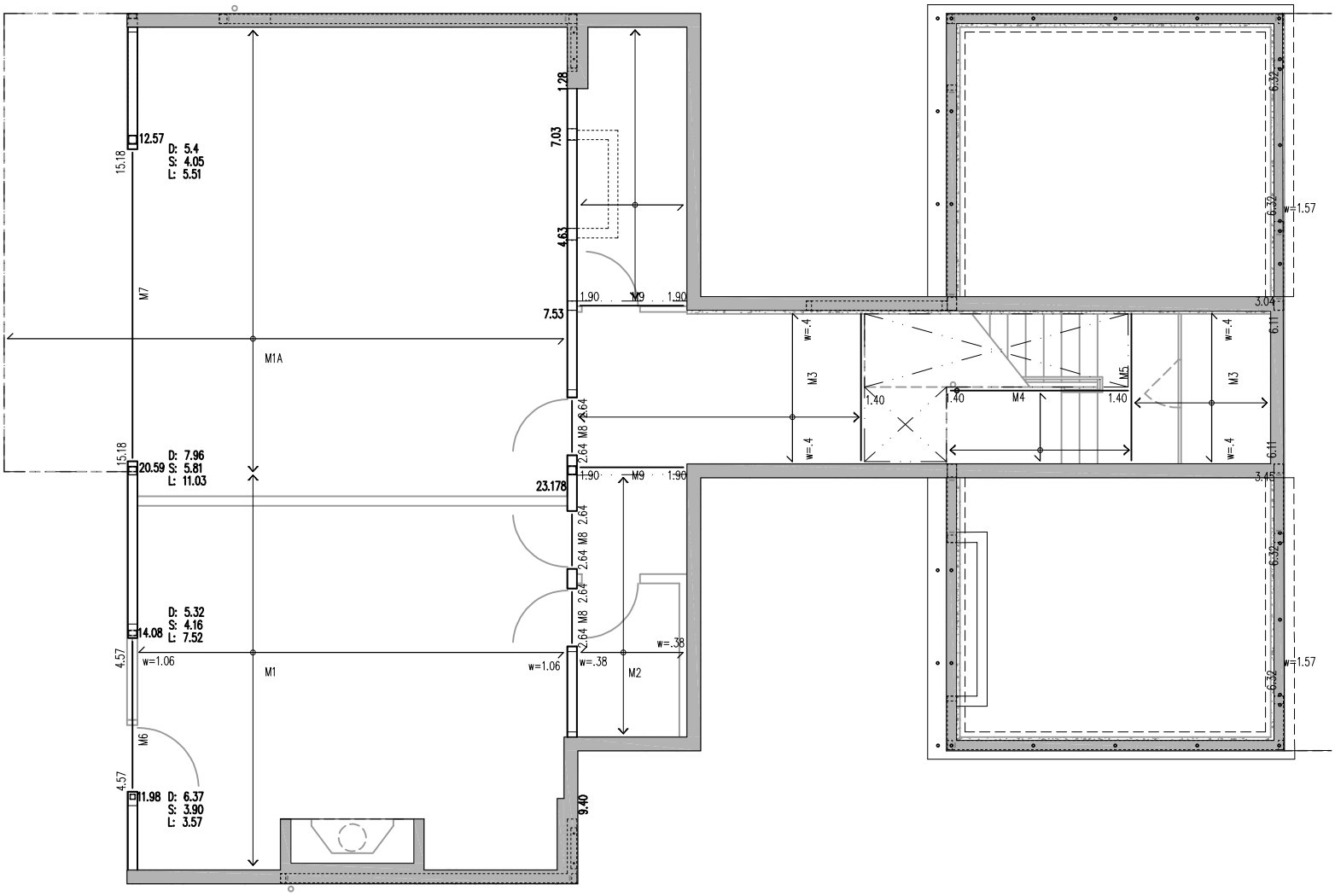
ALL THIS FRAMING OVER EXPOSED 4x IS JUST FURRING, NO PART OF PRIMARY STRUCTURE



UPPER FLOOR FRAMING KEY
(EXPOSED LUMBER OVER GREAT
ROOM)



main floor beam key



Roof			
Member Name	Results	Current Solution	Comments
R1	Passed	1 piece(s) 14" TJI® 110 @ 24" OC	
R2	Passed	1 piece(s) 14" TJI® 110 @ 24" OC	
R3	Passed	1 piece(s) 11 7/8" TJI® 210 @ 24" OC	
15' header	Passed	1 piece(s) 7" x 9 1/4" 2.0E Parallam® PSL	
kid roof	Passed	1 piece(s) 14" TJI® 110 @ 24" OC	
R4	Passed	2 piece(s) 2 x 6 HF No.2	
R5	Passed	3 piece(s) 1 3/4" x 9 1/4" 2.0E Microllam® LVL	
R6	Passed	2 piece(s) 2 x 8 HF No.2	
R7	Passed	2 piece(s) 2 x 8 HF No.2	
R8	Passed	2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
R9	Passed	2 piece(s) 2 x 6 HF No.2	
R10	Passed	2 piece(s) 2 x 6 HF No.2	
R11	Passed	2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
R12	Passed	2 piece(s) 2 x 6 HF No.2	
Upper Floor			
Member Name	Results	Current Solution	Comments
K1	Passed	1 piece(s) 14" TJI® 360 @ 16" OC	Cantilever Reinforcement (PB1) Required
K2	Passed	1 piece(s) 14" TJI® 360 @ 16" OC	Web Stiffeners Required
K3	Passed	2 piece(s) 2 x 8 HF No.2	
K4	Passed	2 piece(s) 1 3/4" x 11 1/4" 2.0E Microllam® LVL	
K5	Passed	2 piece(s) 1 3/4" x 11 1/4" 2.0E Microllam® LVL	
K6	Passed	1 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	
K7	Failed	2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	An excessive uplift of -1154 lbs at support located at 1 1/4" failed this product.
K8	Passed	1 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	
K9	Passed	1 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	
K10	Passed	2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	
K11	Passed	2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	
K12	Passed	1 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	
K13	Passed	2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	
K14	Passed	2 piece(s) 1 3/4" x 16" 2.0E Microllam® LVL	
U1	Passed	1 piece(s) 4 x 16 DF No.1 @ 24" OC	
U2	Passed	1 piece(s) 4 x 16 DF No.1 @ 24" OC	
U3	Passed	1 piece(s) 4 x 16 DF No.1 @ 24" OC	
U3 - hot tub	Passed	1 piece(s) 4 x 16 DF No.1 @ 24" OC	
U3 - south wall	Failed	1 piece(s) 4 x 16 DF No.1 @ 24" OC	
U3 - north point load	Passed	1 piece(s) 4 x 16 DF No.1 @ 24" OC	
U4 - no steel	Passed	1 piece(s) 5 1/4" x 18" 2.0E Parallam® PSL	
U5	Passed	2 piece(s) 1 3/4" x 18" 2.0E Microllam® LVL	
U6	Passed	1 piece(s) 3 1/2" x 9 1/4" 2.0E Parallam® PSL	

THESE BEAM SHOWN AS 4x18 ON PLANS

ForteWEB Software Operator	Job Notes
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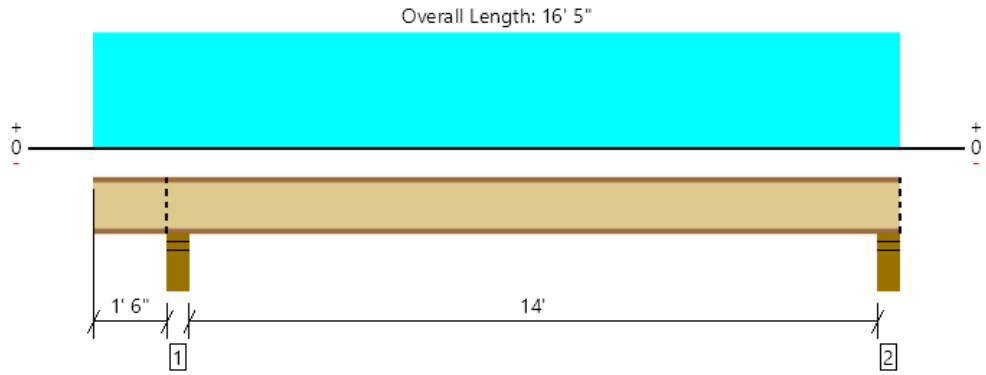
Main Floor			
Member Name	Results	Current Solution	Comments
M1	Passed	1 piece(s) 14" TJI® 560 @ 16" OC	
M1a	Passed	1 piece(s) 16" TJI® 560 @ 16" OC	
M2	Passed	1 piece(s) 2 x 8 HF No.2 @ 16" OC	
M3	Passed	1 piece(s) 14" TJI® 560 @ 12" OC	
M4	Passed	1 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	
M6	Passed	2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	
M7	Passed	1 piece(s) W10X30 (A992) ASTM Steel	
M8	Passed	2 piece(s) 2 x 10 HF No.1	
M9	Passed	2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	
LOADING AT NORTH END	Passed	2 piece(s) 2 x 4 DF No.1	

Roof, R1

1 piece(s) 14" TJI® 110 @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	552 @ 16' 1/2"	1581 (3.50")	Passed (35%)	1.15	1.0 D + 1.0 S (Alt Spans)
Shear (lbs)	518 @ 15' 11 1/2"	2139	Passed (24%)	1.15	1.0 D + 1.0 S (Alt Spans)
Moment (Ft-lbs)	1858 @ 8' 11 7/16"	4301	Passed (43%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	0.138 @ 8' 10 13/16"	0.716	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.203 @ 8' 10 15/16"	0.954	Passed (L/846)	--	1.0 D + 1.0 S (Alt Spans)

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).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - SPF	5.50"	5.50"	3.50"	216	449	665	Blocking
2 - Stud wall - SPF	5.50"	5.50"	1.75"	178	374	552	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)	4' 7" o/c	
Bottom Edge (Lu)	7' 4" o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.
•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 16' 5"	24"	12.0	25.0	Default Load

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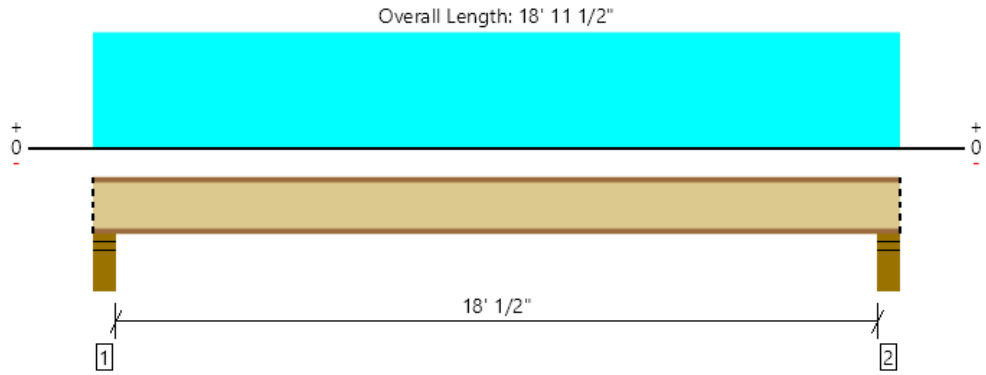
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Roof, R2

1 piece(s) 14" TJI® 110 @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	701 @ 4 1/2"	1581 (3.50")	Passed (44%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	668 @ 5 1/2"	2139	Passed (31%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3067 @ 9' 5 3/4"	4301	Passed (71%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.347 @ 9' 5 3/4"	0.910	Passed (L/630)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.514 @ 9' 5 3/4"	1.214	Passed (L/425)	--	1.0 D + 1.0 S (All Spans)

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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - SPF	5.50"	5.50"	1.75"	228	474	701	Blocking
2 - Stud wall - SPF	5.50"	5.50"	1.75"	228	474	701	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)	3' 6" o/c	
Bottom Edge (Lu)	19' o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.
•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 18' 11 1/2"	24"	12.0	25.0	Default Load

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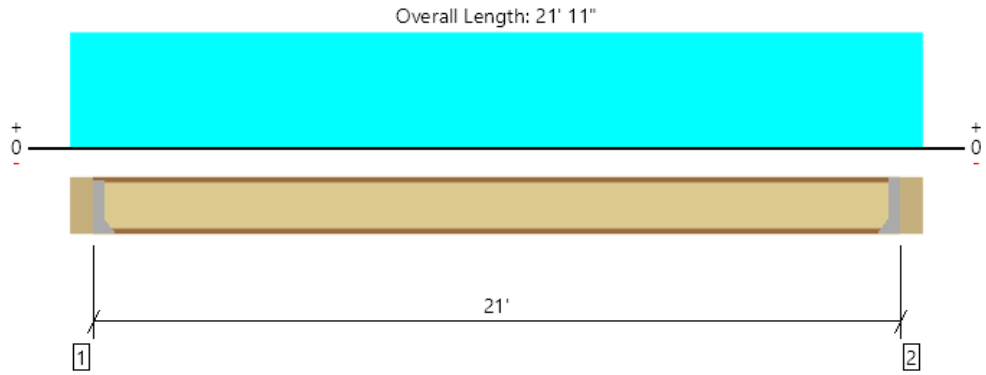
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Roof, R3

1 piece(s) 11 7/8" TJI® 210 @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	777 @ 5 1/2"	1156 (1.75")	Passed (67%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	777 @ 5 1/2"	1903	Passed (41%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	4079 @ 10' 11 1/2"	4364	Passed (93%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.744 @ 10' 11 1/2"	1.050	Passed (L/339)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	1.101 @ 10' 11 1/2"	1.400	Passed (L/229)	--	1.0 D + 1.0 S (All Spans)

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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Hanger on 11 7/8" SPF beam	5.50"	Hanger[1]	1.75" / - [2]	263	548	811	See note [1]
2 - Hanger on 11 7/8" SPF beam	5.50"	Hanger[1]	1.75" / - [2]	263	548	811	See note [1]

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.
- [2] Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 6" o/c	
Bottom Edge (Lu)	21' o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	IUS2.06/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip	
2 - Face Mount Hanger	IUS2.06/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Load	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 21' 11"	24"	12.0	25.0	Default Load

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ForteWEB Software Operator	Job Notes
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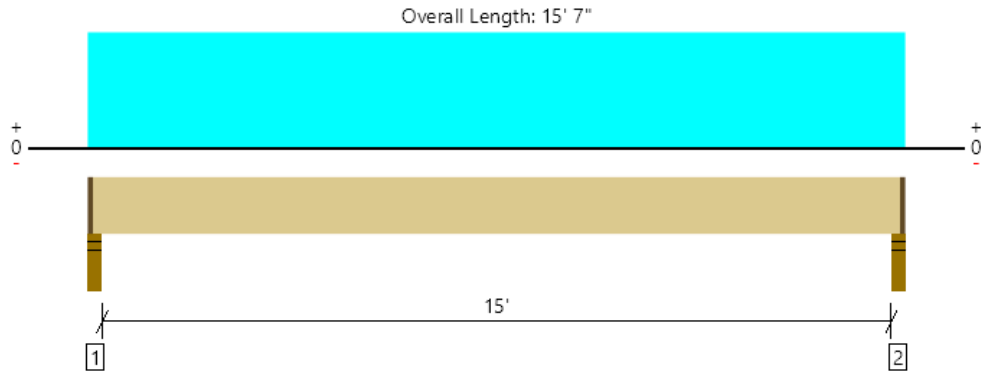
Weyerhaeuser

Roof, 15' header
1 piece(s) 7" x 9 1/4" 2.0E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2712 @ 2"	6694 (2.25")	Passed (41%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2374 @ 1' 3/4"	14396	Passed (16%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	10255 @ 7' 9 1/2"	28556	Passed (36%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.307 @ 7' 9 1/2"	0.762	Passed (L/595)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.483 @ 7' 9 1/2"	1.017	Passed (L/379)	--	1.0 D + 1.0 S (All Spans)

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.
- Member should be side-loaded from both sides of the member or braced to prevent rotation.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - SPF	3.50"	2.25"	1.50"	997	1749	2747	1 1/4" Rim Board
2 - Stud wall - SPF	3.50"	2.25"	1.50"	997	1749	2747	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)	15' 5" o/c	
Bottom Edge (Lu)	15' 5" 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 15' 5 3/4"	N/A	20.3	--	
1 - Uniform (PLF)	0 to 15' 7" (Front)	N/A	108.0	224.5	Linked from: Roof: Joist, Support 1

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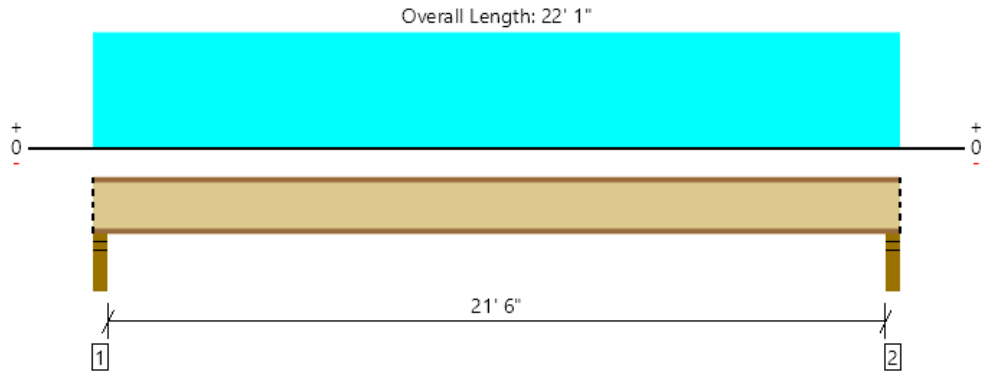
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Roof, kid roof

1 piece(s) 14" TJI® 110 @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	817 @ 2 1/2"	1581 (3.50")	Passed (52%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	796 @ 3 1/2"	2139	Passed (37%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	4342 @ 11' 1/2"	4301	Passed (101%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.677 @ 11' 1/2"	1.083	Passed (L/384)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	1.002 @ 11' 1/2"	1.444	Passed (L/259)	--	1.0 D + 1.0 S (All Spans)

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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - SPF	3.50"	3.50"	1.75"	265	552	817	Blocking
2 - Stud wall - SPF	3.50"	3.50"	1.75"	265	552	817	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)	2' 10" o/c	
Bottom Edge (Lu)	22' 1" o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.
•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 22' 1"	24"	12.0	25.0	Default Load

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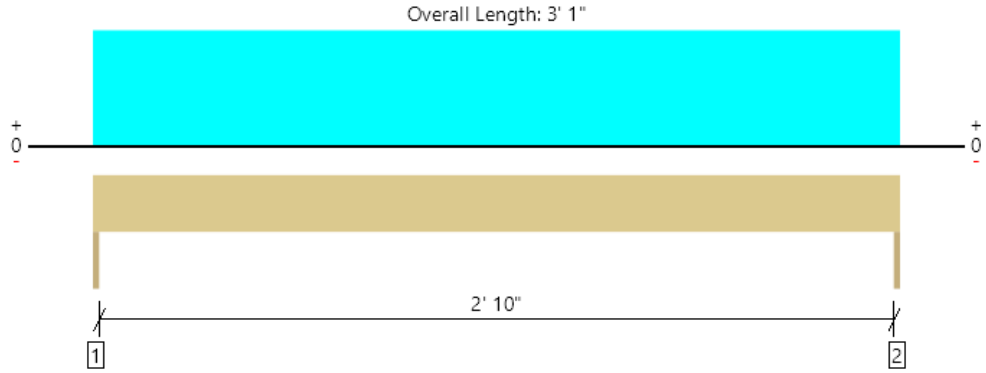
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Roof, R4

2 piece(s) 2 x 6 HF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	519 @ 0	1823 (1.50")	Passed (28%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	323 @ 7"	1898	Passed (17%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	400 @ 1' 6 1/2"	1602	Passed (25%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.008 @ 1' 6 1/2"	0.103	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.013 @ 1' 6 1/2"	0.154	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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 - Trimmer - SPF	1.50"	1.50"	1.50"	173	346	519	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	173	346	519	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 1" o/c	
Bottom Edge (Lu)	3' 1" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 1"	N/A	4.2	--	
1 - Uniform (PLF)	0 to 3' 1"	N/A	108.0	224.5	Linked from: R1, Support 1

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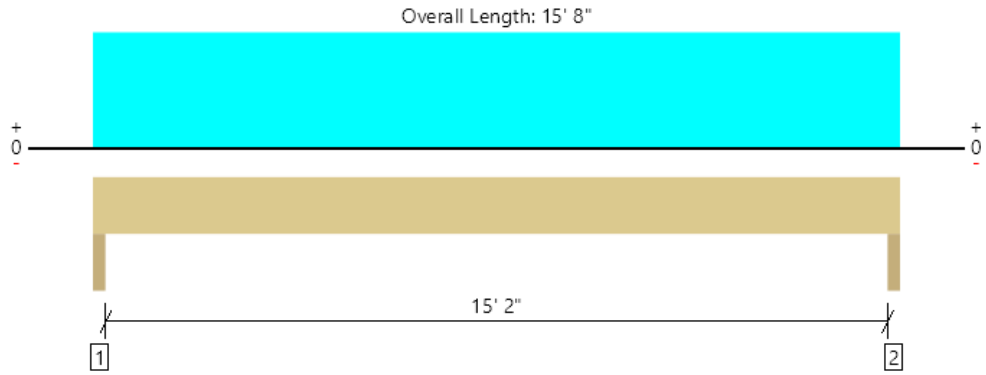
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Roof, R5

3 piece(s) 1 3/4" x 9 1/4" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2716 @ 1 1/2"	11419 (3.00")	Passed (24%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2362 @ 1' 1/4"	10611	Passed (22%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	10299 @ 7' 10"	19327	Passed (53%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.428 @ 7' 10"	0.514	Passed (L/432)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.661 @ 7' 10"	0.771	Passed (L/280)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Trimmer - SPF	3.00"	3.00"	1.50"	957	1759	2716	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	957	1759	2716	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	15' 8" o/c	
Bottom Edge (Lu)	15' 8" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 15' 8"	N/A	14.2	--	
1 - Uniform (PLF)	0 to 15' 8"	N/A	108.0	224.5	Linked from: R1, Support 1

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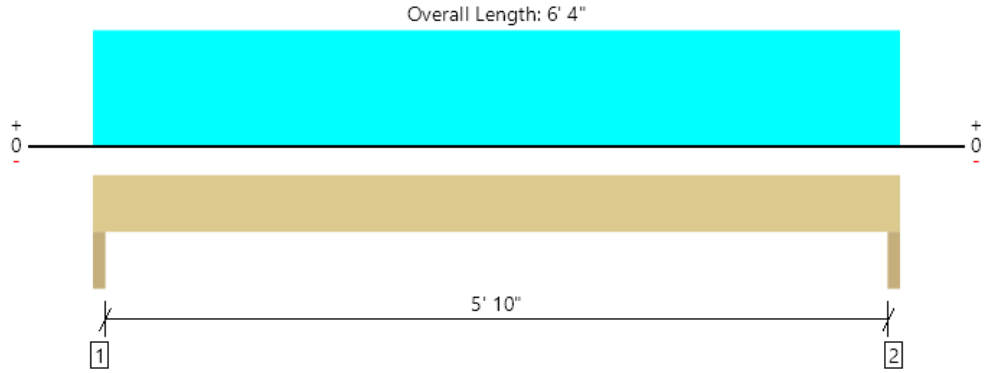
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Roof, R6

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



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1070 @ 1 1/2"	3645 (3.00")	Passed (29%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	782 @ 10 1/4"	2501	Passed (31%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1564 @ 3' 2"	2569	Passed (61%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.056 @ 3' 2"	0.203	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.084 @ 3' 2"	0.304	Passed (L/868)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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 - Trimmer - SPF	3.00"	3.00"	1.50"	359	711	1070	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	359	711	1070	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 4" o/c	
Bottom Edge (Lu)	6' 4" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 4"	N/A	5.5	--	
1 - Uniform (PLF)	0 to 6' 4"	N/A	108.0	224.5	Linked from: R1, Support 1

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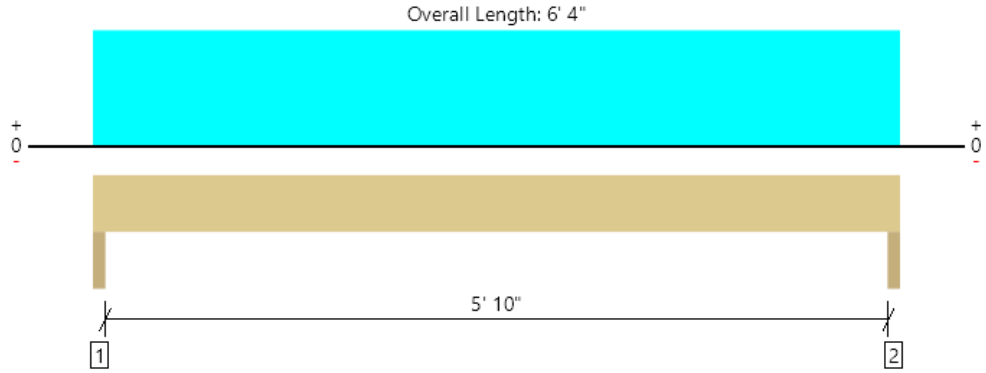
Roof, R7

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



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	891 @ 1 1/2"	3645 (3.00")	Passed (24%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	651 @ 10 1/4"	2501	Passed (26%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1302 @ 3' 2"	2569	Passed (51%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.047 @ 3' 2"	0.203	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.070 @ 3' 2"	0.304	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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 - Trimmer - SPF	3.00"	3.00"	1.50"	299	592	891	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	299	592	891	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 4" o/c	
Bottom Edge (Lu)	6' 4" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 4"	N/A	5.5	--	
1 - Uniform (PLF)	0 to 6' 4"	N/A	89.0	187.0	Linked from: R1, Support 2

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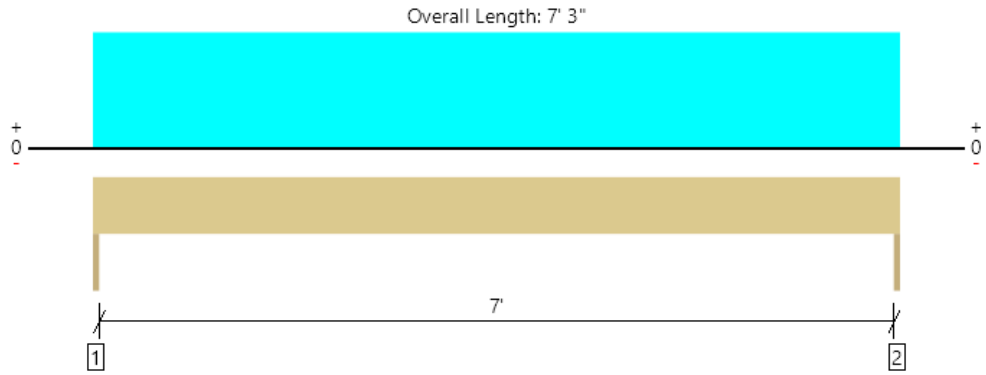
Roof, R8

2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2317 @ 0	3806 (1.50")	Passed (61%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1604 @ 1' 1 3/8"	9081	Passed (18%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	4199 @ 3' 7 1/2"	20525	Passed (20%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.035 @ 3' 7 1/2"	0.242	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.052 @ 3' 7 1/2"	0.363	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	780	1537	2317	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	780	1537	2317	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	7' 3" o/c	
Bottom Edge (Lu)	7' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 7' 3"	N/A	12.1	--	
1 - Uniform (PLF)	0 to 7' 3"	N/A	89.0	187.0	Linked from: R1, Support 2
2 - Uniform (PLF)	0 to 7' 3"	N/A	114.0	237.0	Linked from: R2, Support 1

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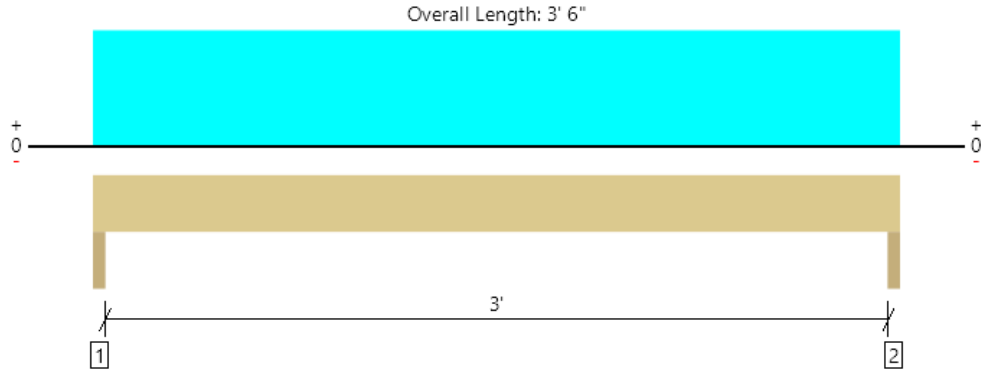
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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

Weyerhaeuser

Roof, R9

2 piece(s) 2 x 6 HF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	490 @ 1 1/2"	3645 (3.00")	Passed (13%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	292 @ 8 1/2"	1898	Passed (15%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	370 @ 1' 9"	1602	Passed (23%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.009 @ 1' 9"	0.108	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.013 @ 1' 9"	0.162	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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 - Trimmer - SPF	3.00"	3.00"	1.50"	163	327	490	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	163	327	490	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 6" o/c	
Bottom Edge (Lu)	3' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 6"	N/A	4.2	--	
1 - Uniform (PLF)	0 to 3' 6"	N/A	89.0	187.0	Linked from: R1, Support 2

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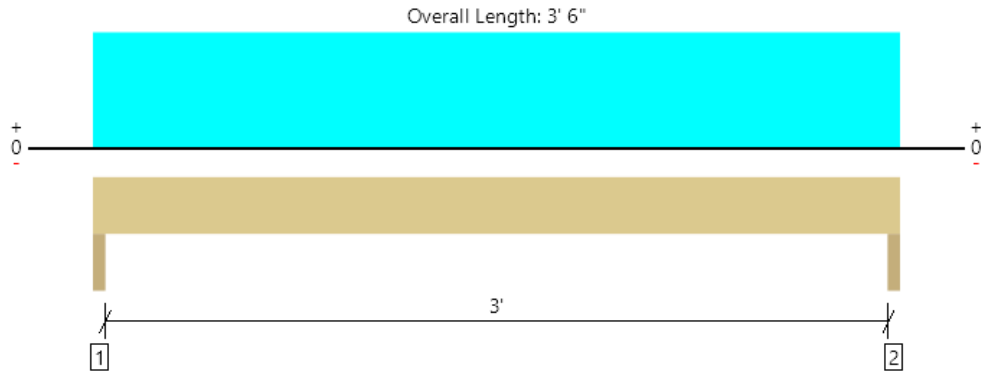
Roof, R10
2 piece(s) 2 x 6 HF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	717 @ 1 1/2"	3645 (3.00")	Passed (20%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	427 @ 8 1/2"	1898	Passed (22%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	541 @ 1' 9"	1602	Passed (34%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.013 @ 1' 9"	0.108	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.019 @ 1' 9"	0.162	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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 - Trimmer - SPF	3.00"	3.00"	1.50"	237	480	717	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	237	480	717	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 6" o/c	
Bottom Edge (Lu)	3' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 6"	N/A	4.2	--	
1 - Uniform (PLF)	0 to 3' 6"	N/A	131.5	274.0	Linked from: R3, Support 1

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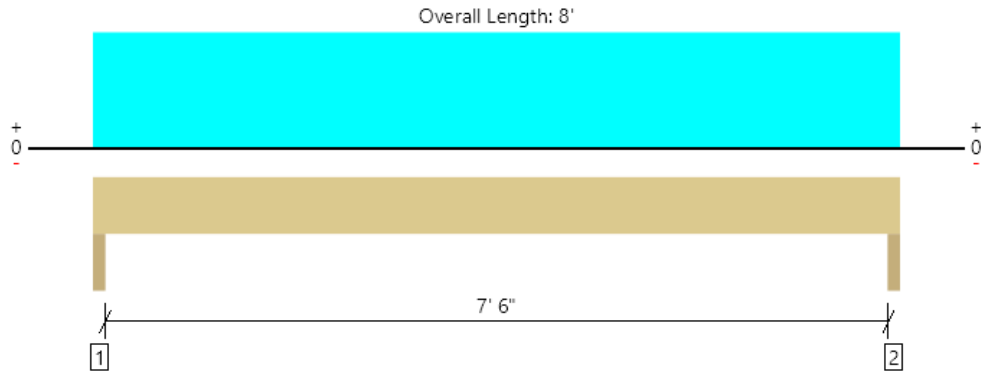
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Roof, R11

2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3074 @ 1 1/2"	7613 (3.00")	Passed (40%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2122 @ 1' 2 7/8"	9081	Passed (23%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	5771 @ 4'	20525	Passed (28%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.053 @ 4'	0.258	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.080 @ 4'	0.387	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Trimmer - SPF	3.00"	3.00"	1.50"	1030	2044	3074	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	1030	2044	3074	None

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

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 8'	N/A	12.1	--	
1 - Uniform (PLF)	0 to 8'	N/A	114.0	237.0	Linked from: R2, Support 2
2 - Uniform (PLF)	0 to 8'	N/A	131.5	274.0	Linked from: R3, Support 1

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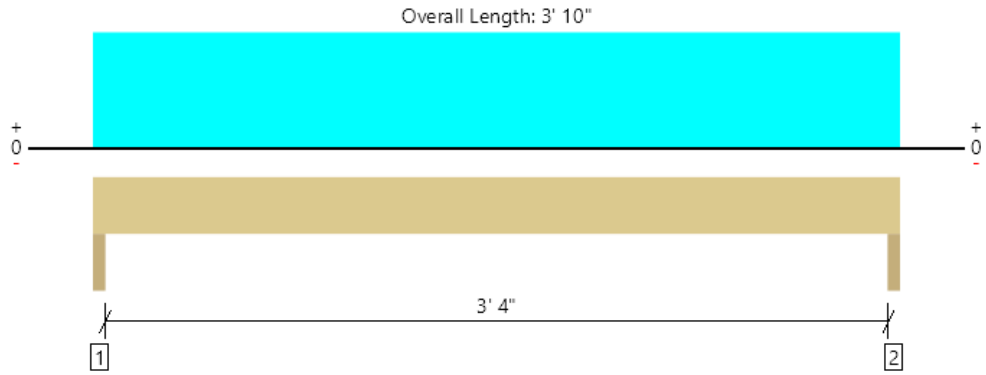
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Roof, R12
2 piece(s) 2 x 6 HF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	785 @ 1 1/2"	3645 (3.00")	Passed (22%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	495 @ 8 1/2"	1898	Passed (26%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	658 @ 1' 11"	1602	Passed (41%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.019 @ 1' 11"	0.119	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.028 @ 1' 11"	0.179	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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 - Trimmer - SPF	3.00"	3.00"	1.50"	260	525	785	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	260	525	785	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 10" o/c	
Bottom Edge (Lu)	3' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 10"	N/A	4.2	--	
1 - Uniform (PLF)	0 to 3' 10"	N/A	131.5	274.0	Linked from: R3, Support 1

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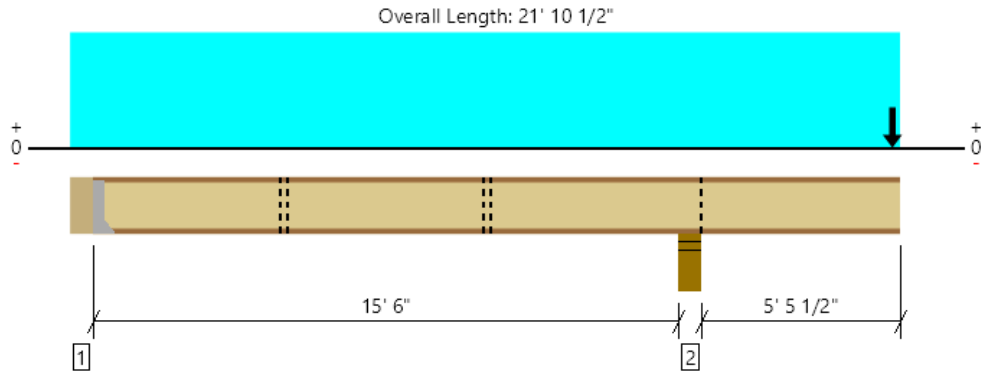
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Upper Floor, K1

1 piece(s) 14" TJI® 360 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1913 @ 16' 2 1/4"	3000 (5.25")	Passed (64%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	937 @ 15' 11 1/2"	1955	Passed (48%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-4637 @ 16' 2 1/4"	6326	Passed (73%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.237 @ 21' 10 1/2"	0.284	Passed (2L/576)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.403 @ 21' 10 1/2"	0.569	Passed (2L/338)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
TJ-Pro™ Rating	53	40	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Moment capacity over cantilever support 2 has been reduced by 25% to lessen the effects of buckling.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.
- Permanent bracing at third points in the back span or a direct applied ceiling over the entire back span length is required at the right span of the member. See literature detail (PB1) For clarification.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Hanger on 14" SPF beam	5.50"	Hanger[1]	1.75" / - [2]	252	444/-30	-127	696	See note [1]
2 - Stud wall - SPF	5.50"	5.50"	3.50"	1135	778	493	2088	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.
- [2] Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	7' 4" o/c	
Bottom Edge (Lu)	4' 9" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	IUS2.37/14	2.00"	N/A	12-10dx1.5	2-Strong-Grip	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 21' 10 1/2"	16"	37.0	40.0	-	Default Load
2 - Point (PLF)	21' 8"	16"	100.0	-	-	
3 - Point (PLF)	21' 8"	16"	131.5	-	274.0	Linked from: R3, Support 2

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

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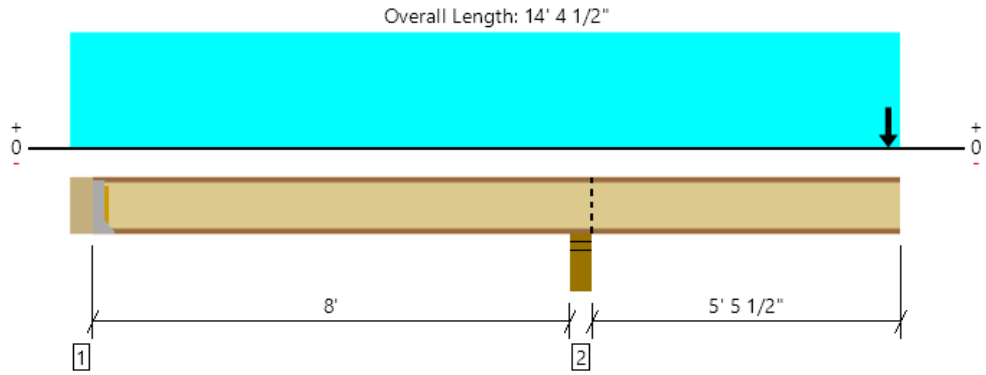
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Upper Floor, K2

1 piece(s) 14" TJI® 360 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2022 @ 8' 8 1/4"	3450 (5.25")	Passed (59%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1070 @ 8' 11"	2248	Passed (48%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	-4637 @ 8' 8 1/4"	8435	Passed (55%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.164 @ 14' 4 1/2"	0.284	Passed (2L/832)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.338 @ 14' 4 1/2"	0.569	Passed (2L/404)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
TJ-Pro™ Rating	66	40	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Right cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- -320 lbs uplift at support located at 5 1/2". Strapping or other restraint may be required.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Hanger on 14" SPF beam	5.50"	Hanger[1]	1.75" / - [2]	-77	244/-80	-243	167/-320	See note [1]
2 - Stud wall - SPF	5.50"	5.50"	3.50"	1095	628	609	2022	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.
- [2] Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	9' 7" o/c	
Bottom Edge (Lu)	4' 9" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	U3516/20	2.00"	N/A	16-10dx1.5	6-10dx1.5	Web Stiffeners

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 14' 4 1/2"	16"	37.0	40.0	-	Default Load
2 - Point (PLF)	14' 2"	16"	100.0	-	-	
3 - Point (PLF)	14' 2"	16"	131.5	-	274.0	Linked from: R3, Support 2

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

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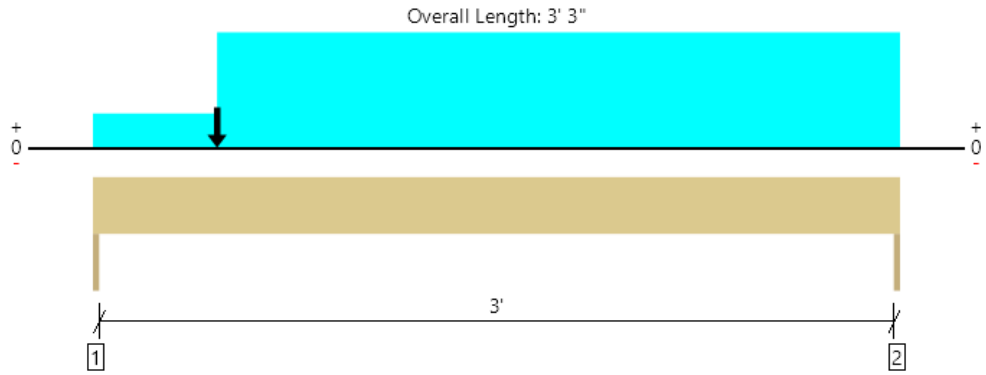
Upper Floor, K3
2 piece(s) 2 x 8 HF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern) [Group]
Member Reaction (lbs)	1714 @ 0	1823 (1.50")	Passed (94%)	--	1.0 D + 0.75 L + 0.75 S (All Spans) [1]
Shear (lbs)	1044 @ 8 3/4"	2501	Passed (42%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans) [1]
Moment (Ft-lbs)	1060 @ 1' 6 15/16"	2234	Passed (47%)	1.00	1.0 D + 1.0 L (All Spans) [1]
Live Load Defl. (in)	0.009 @ 1' 6 7/8"	0.108	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans) [1]
Total Load Defl. (in)	0.019 @ 1' 6 7/8"	0.162	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans) [1]

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- 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	Floor Live	Snow	Factored	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	852	541/-37	608	1714	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	727	541/-37	361	1404	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 3" o/c	
Bottom Edge (Lu)	3' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 3"	N/A	5.5	--	--	
1 - Uniform (PLF)	0 to 3' 3"	N/A	100.0	-	-	
2 - Uniform (PLF)	6" to 3' 3"	N/A	131.5	-	274.0	Linked from: R3, Support 1
3 - Point (lb)	6"	N/A	260	-	525	Linked from: R12, Support 2
4 - Uniform (PLF)	0 to 3' 3"	N/A	189.0	333.0/-22.5	-95.3	Linked from: K1, Support 1

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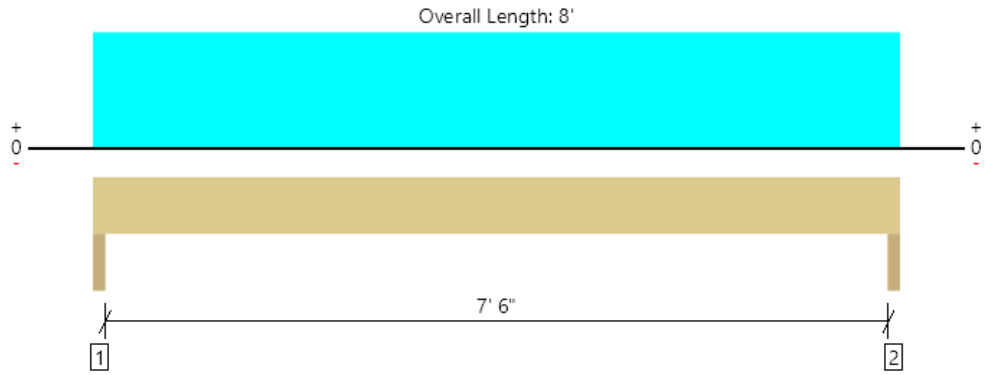
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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

Weyerhaeuser

Upper Floor, K4

2 piece(s) 1 3/4" x 11 1/4" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	6311 @ 1 1/2"	7613 (3.00")	Passed (83%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	4068 @ 1' 2 1/4"	7481	Passed (54%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	10858 @ 4'	16137	Passed (67%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.086 @ 4'	0.258	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.189 @ 4'	0.387	Passed (L/492)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Trimmer - SPF	3.00"	3.00"	2.49"	3451	2334	1479	6311	None
2 - Trimmer - SPF	3.00"	3.00"	2.49"	3451	2334	1479	6311	None

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

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 8'	N/A	11.5	--	--	
1 - Uniform (PLF)	0 to 8'	N/A	851.3	583.5	369.8	Linked from: K1, Support 2

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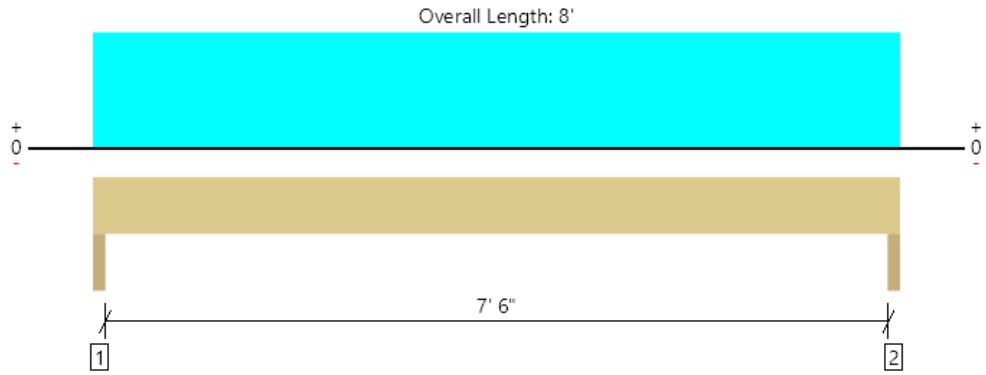
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Upper Floor, K5

2 piece(s) 1 3/4" x 11 1/4" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	6114 @ 1 1/2"	7613 (3.00")	Passed (80%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	4299 @ 1' 2 1/4"	8603	Passed (50%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	11476 @ 4'	18558	Passed (62%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.083 @ 4'	0.258	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.183 @ 4'	0.387	Passed (L/508)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Trimmer - SPF	3.00"	3.00"	2.41"	3331	1884	1827	6114	None
2 - Trimmer - SPF	3.00"	3.00"	2.41"	3331	1884	1827	6114	None

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

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 8'	N/A	11.5	--	--	
1 - Uniform (PLF)	0 to 8'	N/A	821.3	471.0	456.8	Linked from: K2, Support 2

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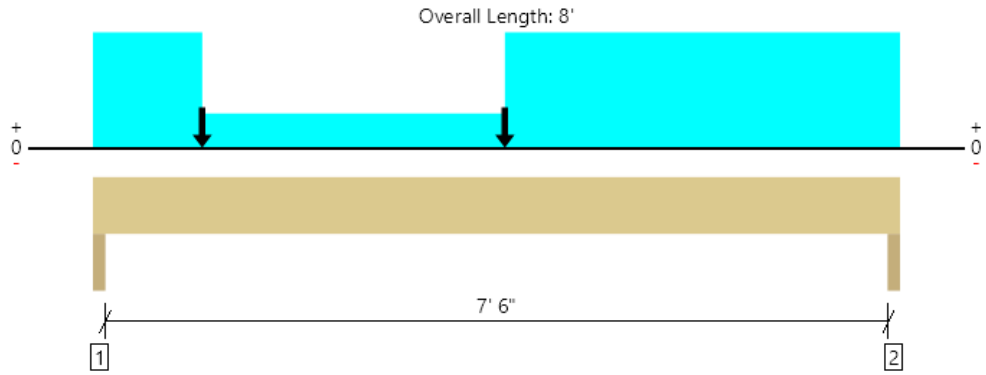
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Upper Floor, K6

1 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern) [Group]
Member Reaction (lbs)	3371 @ 1 1/2"	3806 (3.00")	Passed (89%)	--	1.0 D + 0.75 L + 0.75 S (All Spans) [1]
Shear (lbs)	1995 @ 1' 5"	4655	Passed (43%)	1.00	1.0 D + 1.0 L (All Spans) [1]
Moment (Ft-lbs)	5804 @ 4' 1"	12129	Passed (48%)	1.00	1.0 D + 1.0 L (All Spans) [1]
Live Load Defl. (in)	0.053 @ 4' 1"	0.258	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans) [1]
Total Load Defl. (in)	0.113 @ 4' 1"	0.387	Passed (L/826)	--	1.0 D + 0.75 L + 0.75 S (All Spans) [1]

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Trimmer - SPF	3.00"	3.00"	2.66"	1765	1332/-90	809	3371	None
2 - Trimmer - SPF	3.00"	3.00"	2.60"	1736	1332/-90	759	3304	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	7' 8" o/c	
Bottom Edge (Lu)	8' o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 8'	N/A	7.2	--	--	
1 - Uniform (PLF)	0 to 8'	N/A	100.0	-	-	WALL LOAD
2 - Uniform (PLF)	0 to 1' 1"	N/A	131.5	-	274.0	Linked from: R3, Support 1
3 - Uniform (PLF)	4' 1" to 8'	N/A	131.5	-	274.0	Linked from: R3, Support 1
4 - Point (lb)	1' 1"	N/A	237	-	480	Linked from: R10, Support 1
5 - Point (lb)	4' 1"	N/A	237	-	480	Linked from: R10, Support 2
6 - Uniform (PLF)	0 to 8'	N/A	189.0	333.0/-22.5	-95.3	Linked from: K1, Support 1

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

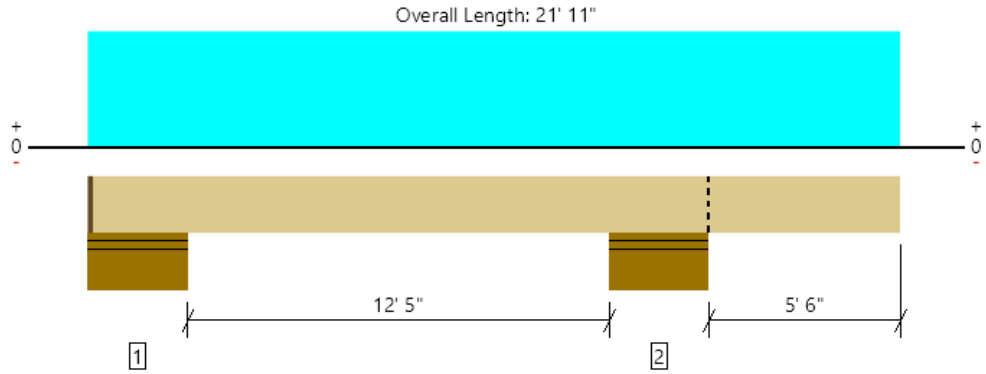
ForteWEB Software Operator	Job Notes
Julie Smith Lubke Smith Lubke Structural Design (206) 852-1536 julie@smithlubke.com	

Weyerhaeuser

Upper Floor, K7

2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL

An excessive uplift of -1154 lbs at support located at 1 1/4" failed this product.



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2779 @ 1' 10 1/2"	20825 (14.00")	Passed (13%)	--	1.0 D + 0.75 L + 0.75 S (Adj Spans)
Shear (lbs)	924 @ 3' 2"	9310	Passed (10%)	1.00	1.0 D + 1.0 L (Adj Spans)
Moment (Ft-lbs)	-2826 @ 16' 3 1/2"	24258	Passed (12%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.010 @ 21' 11"	0.281	Passed (2L/999+)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.047 @ 21' 11"	0.563	Passed (2L/999+)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Stud wall - SPF	24.00"	22.75"	22.75"	2214/-962	412/-192	364/-169	2779	1 1/4" Rim Board
2 - Stud wall - SPF	24.00"	24.00"	24.00"	2063	812/-403	550/-57	3085	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- 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)	21' 10" o/c	
Bottom Edge (Lu)	21' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	1 1/4" to 21' 11"	N/A	14.3	--	--	
1 - Uniform (PSF)	0 to 21' 11" (Front)	8"	37.0	40.0	-	Default Load
2 - Uniform (PLF)	0 to 21' 11" (Front)	N/A	100.0	-	-	
3 - Uniform (PSF)	0 to 21' 11" (Front)	1'	13.0	-	25.0	

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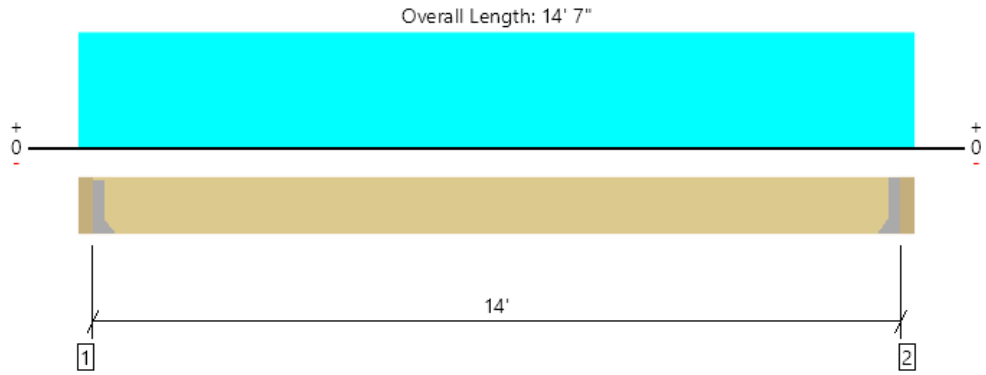
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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

Weyerhaeuser

Upper Floor, K8

1 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2206 @ 3 1/2"	2206 (1.68")	Passed (100%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1838 @ 1' 5 1/2"	4655	Passed (39%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	7721 @ 7' 3 1/2"	12129	Passed (64%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.191 @ 7' 3 1/2"	0.350	Passed (L/879)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.377 @ 7' 3 1/2"	0.700	Passed (L/446)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Hanger on 14" SPF beam	3.50"	Hanger[1]	1.68"	1129	1167	2296	See note [1]
2 - Hanger on 14" SPF beam	3.50"	Hanger[1]	1.68"	1129	1167	2296	See note [1]

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' o/c	
Bottom Edge (Lu)	14' o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HUS1.81/10	3.00"	N/A	30-10dx1.5	10-10d	
2 - Face Mount Hanger	HUS1.81/10	3.00"	N/A	30-10dx1.5	10-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	3 1/2" to 14' 3 1/2"	N/A	7.2	--	
1 - Uniform (PSF)	0 to 14' 7" (Front)	4'	37.0	40.0	Default Load

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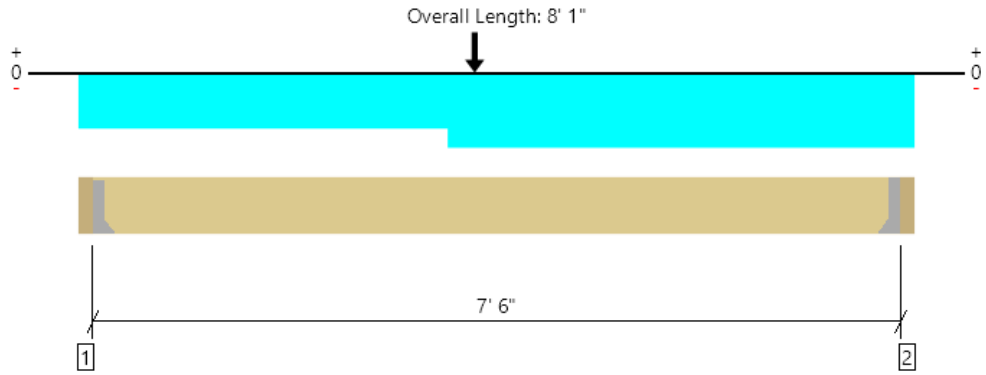
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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

Weyerhaeuser

Upper Floor, K9

1 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern) [Group]
Member Reaction (lbs)	1906 @ 3 1/2"	1969 (1.50")	Passed (97%)	--	1.0 D + 1.0 L (All Spans) [1]
Shear (lbs)	1662 @ 1' 5 1/2"	4655	Passed (36%)	1.00	1.0 D + 1.0 L (All Spans) [1]
Moment (Ft-lbs)	5440 @ 3' 10"	12129	Passed (45%)	1.00	1.0 D + 1.0 L (All Spans) [1]
Live Load Defl. (in)	0.057 @ 3' 10"	0.188	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans) [1]
Total Load Defl. (in)	0.083 @ 3' 10"	0.375	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans) [1]

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- -241 lbs uplift at support located at 3 1/2". Strapping or other restraint may be required.
- -383 lbs uplift at support located at 7' 9 1/2". Strapping or other restraint may be required.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Hanger on 14" SPF beam	3.50"	Hanger[1]	1.50"	495	1470	-737	1965/-241	See note [1]
2 - Hanger on 14" SPF beam	3.50"	Hanger[1]	1.50"	353	1320	-737	1673/-383	See note [1]

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	7' 6" o/c	
Bottom Edge (Lu)	7' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HUS1.81/10	3.00"	N/A	30-10dx1.5	10-10d	
2 - Face Mount Hanger	U14	2.00"	N/A	14-16d	6-10dx1.5	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	3 1/2" to 7' 9 1/2"	N/A	7.2	--	--	
1 - Uniform (PSF)	0 to 3' 7" (Front)	1'	37.0	40.0	-	
2 - Point (lb)	3' 10" (Front)	N/A	1129	1167	-	Linked from: K8, Support 1
3 - Uniform (PLF)	0 to 8' 1" (Front)	N/A	-57.8	183.0/-60.0	-182.3	Linked from: K2, Support 1

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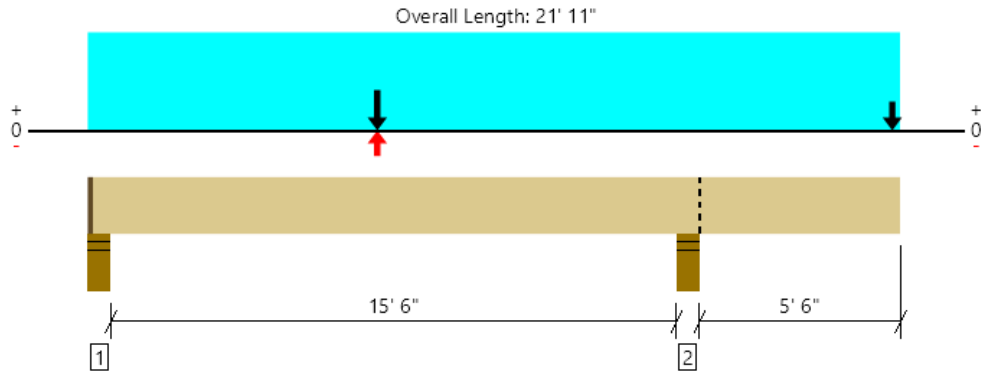
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Upper Floor, K10

2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3043 @ 16' 2 1/4"	8181 (5.50")	Passed (37%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1812 @ 14' 9 1/2"	9310	Passed (19%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	8746 @ 7' 9 3/4"	24258	Passed (36%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.211 @ 21' 11"	0.286	Passed (2L/652)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.260 @ 21' 11"	0.573	Passed (2L/528)	--	1.0 D + 1.0 S (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Stud wall - SPF	5.50"	4.25"	1.50"	506	1138/-50	-580	1644/-74	1 1/4" Rim Board
2 - Stud wall - SPF	5.50"	5.50"	2.05"	1637	1406	565	3043	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- 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)	19' 11" o/c	
Bottom Edge (Lu)	21' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	1 1/4" to 21' 11"	N/A	14.3	--	--	
1 - Uniform (PSF)	0 to 21' 11" (Front)	1' 4"	37.0	40.0	-	Default Load
2 - Point (lb)	21' 8 1/2" (Front)	N/A	134	-	-	
3 - Point (lb)	21' 8 1/2" (Front)	N/A	263	-	548	Linked from: R3, Support 2
4 - Point (lb)	7' 9 3/4" (Front)	N/A	353	1320	-737	Linked from: K9, Support 2

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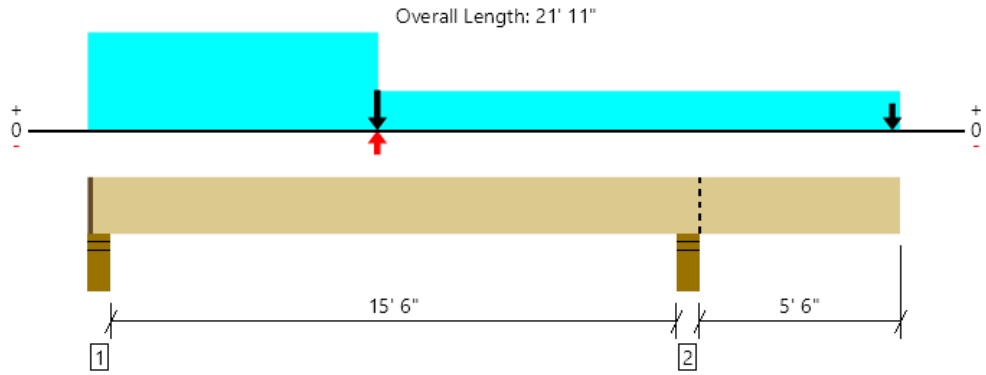
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Upper Floor, K11

2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2703 @ 4"	6322 (4.25")	Passed (43%)	--	1.0 D + 1.0 L (Alt Spans)
Shear (lbs)	2291 @ 1' 7 1/2"	9310	Passed (25%)	1.00	1.0 D + 1.0 L (Alt Spans)
Moment (Ft-lbs)	12175 @ 7' 9 3/4"	24258	Passed (50%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.211 @ 21' 11"	0.286	Passed (2L/652)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.320 @ 7' 9 3/4"	0.793	Passed (L/595)	--	1.0 D + 1.0 L (Alt Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Stud wall - SPF	5.50"	4.25"	1.82"	1029	1701/-41	-580	2730	1 1/4" Rim Board
2 - Stud wall - SPF	5.50"	5.50"	2.32"	1834	1618	565	3452	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- 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)	13' 8" o/c	
Bottom Edge (Lu)	21' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	1 1/4" to 21' 11"	N/A	14.3	--	--	
1 - Uniform (PSF)	0 to 21' 11" (Front)	1' 4"	37.0	40.0	-	Default Load
2 - Point (lb)	21' 8 1/2" (Front)	N/A	134	-	-	
3 - Uniform (PSF)	0 to 7' 10" (Front)	2'	37.0	40.0	-	
4 - Point (lb)	21' 8 1/2" (Front)	N/A	263	-	548	Linked from: R3, Support 2
5 - Point (lb)	7' 9 3/4" (Front)	N/A	495	1470	-737	Linked from: K9, Support 1

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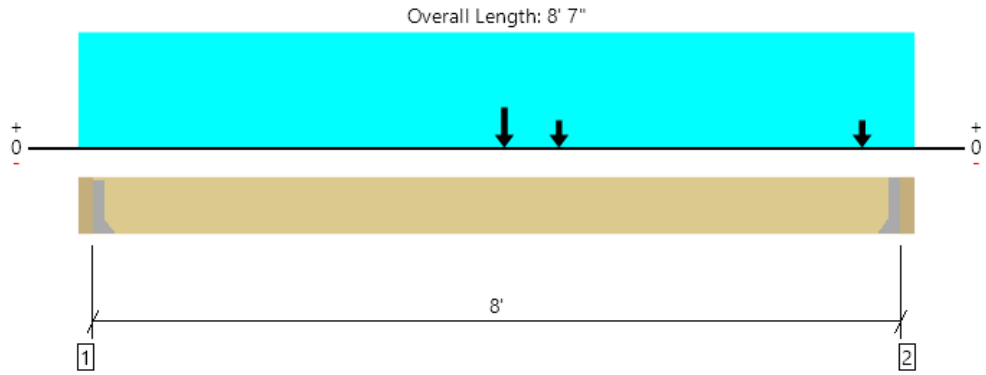
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Upper Floor, K12

1 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3648 @ 8' 3 1/2"	3648 (2.78")	Passed (100%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2648 @ 7' 1 1/2"	4655	Passed (57%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	8168 @ 4' 4 1/2"	12129	Passed (67%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.080 @ 4' 4 1/2"	0.200	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.140 @ 4' 4 1/2"	0.400	Passed (L/684)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Hanger on 14" SPF beam	3.50"	Hanger[1]	1.77"	1052	1322	2374	See note [1]
2 - Hanger on 14" SPF beam	3.50"	Hanger[1]	2.78"	1422	2271	3693	See note [1]

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 7" o/c	
Bottom Edge (Lu)	8' o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HUS1.81/10	3.00"	N/A	30-10dx1.5	10-10d	
2 - Face Mount Hanger	HUS1.81/10	3.00"	N/A	30-10d	10-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	3 1/2" to 8' 3 1/2"	N/A	7.2	--	
1 - Uniform (PSF)	0 to 8' 7" (Front)	2'	37.0	40.0	
2 - Point (lb)	7' 11" (Front)	N/A	326	870	
3 - Point (lb)	4' 11" (Front)	N/A	326	870	
4 - Point (lb)	4' 4 1/2" (Front)	N/A	1129	1167	Linked from: K8, Support 1

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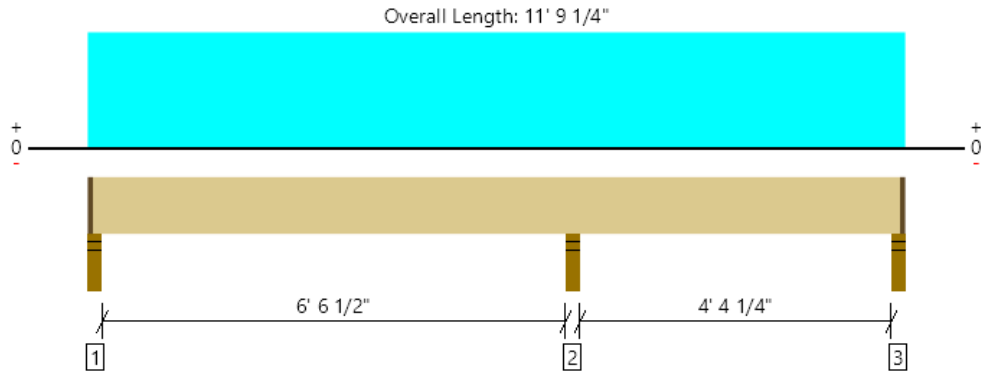
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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

Weyerhaeuser

Upper Floor, K13

2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4069 @ 6' 11 3/4"	5206 (3.50")	Passed (78%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1433 @ 5' 8"	9310	Passed (15%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-2355 @ 6' 11 3/4"	24258	Passed (10%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.007 @ 3' 3 11/16"	0.170	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.017 @ 3' 3"	0.341	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Stud wall - SPF	3.50"	2.25"	1.50"	1023	511/-9	299	1630	1 1/4" Rim Board
2 - Stud wall - SPF	3.50"	3.50"	2.74"	2596	1228	737	4069	None
3 - Stud wall - SPF	3.50"	2.25"	1.50"	527	374/-107	187	948	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)	11' 7" o/c	
Bottom Edge (Lu)	11' 7" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	1 1/4" to 11' 8"	N/A	14.3	--	--	
1 - Uniform (PSF)	0 to 11' 9 1/4" (Front)	4' 2"	37.0	40.0	-	Default Load
2 - Uniform (PLF)	0 to 11' 9 1/4" (Front)	N/A	100.0	-	-	
3 - Uniform (PSF)	0 to 11' 9 1/4" (Front)	4'	21.0	-	25.0	awning

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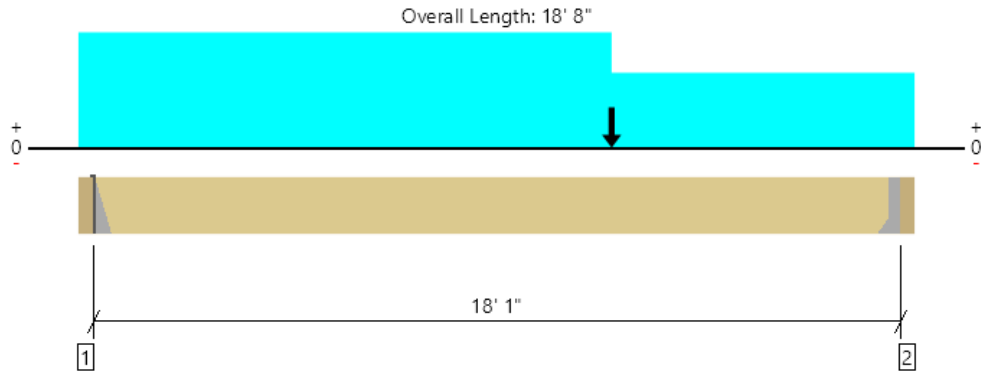
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Upper Floor, K14

2 piece(s) 1 3/4" x 16" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4696 @ 18' 4 1/2"	4696 (1.79")	Passed (100%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4310 @ 17' 1/2"	10640	Passed (41%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	24522 @ 10' 10 5/8"	31114	Passed (79%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.272 @ 9' 6 1/2"	0.452	Passed (L/797)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.636 @ 9' 5 7/8"	0.904	Passed (L/341)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Hanger on 16" SPF beam	3.50"	Hanger[1]	1.76"	2814	1939	4753	See note [1]
2 - Hanger on 16" SPF beam	3.50"	Hanger[1]	1.79"	2799	1976	4776	See note [1]

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 2" o/c	
Bottom Edge (Lu)	18' 1" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Top Mount Hanger	HWPH3.56/16	3.25"	4-16d	8-16d	12-10dx1.5	
2 - Face Mount Hanger	HGUS412	4.00"	N/A	56-10d	20-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	3 1/2" to 18' 4 1/2"	N/A	16.3	--	
1 - Uniform (PSF)	0 to 11' 11" (Front)	4' 2"	37.0	40.0	Default Load
2 - Uniform (PLF)	0 to 18' 8" (Front)	N/A	100.0	-	
3 - Uniform (PSF)	11' 11" to 18' 8" (Front)	2' 3"	37.0	40.0	
4 - Point (lb)	11' 11" (Front)	N/A	1052	1322	Linked from: K12, Support 1

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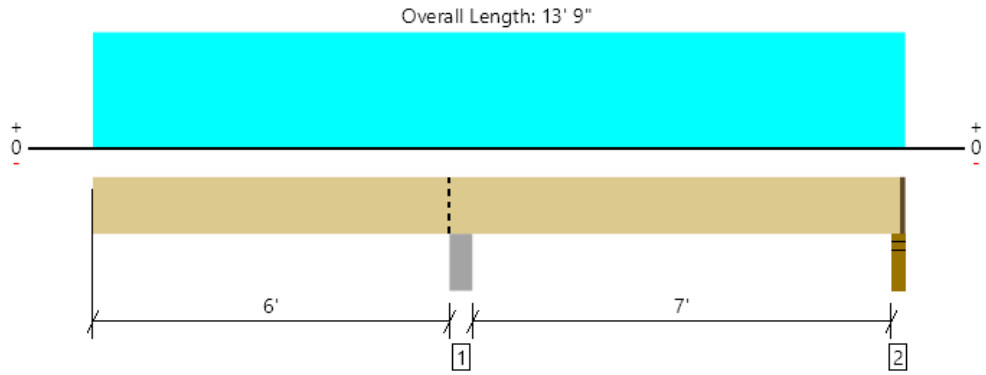
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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

Weyerhaeuser

Upper Floor, U1
1 piece(s) 4 x 16 DF No.1 @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1630 @ 6' 2 3/4"	12031 (5.50")	Passed (14%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	625 @ 7' 8 3/4"	7366	Passed (8%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-2522 @ 6' 2 3/4"	14951	Passed (17%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.021 @ 0	0.415	Passed (2L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.051 @ 0	0.623	Passed (2L/999+)	--	1.0 D + 1.0 S (Alt Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Left cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- 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.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Plate - steel	5.50"	5.50"	1.50"	1003	627	1630	Blocking
2 - Stud wall - SPF	3.50"	2.25"	1.50"	97	127/-33	224	1 1/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- Steel plate supports are only used to determine the bearing length for supported member(s). Additional consideration is required to determine steel plate specifications.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	13' 8" o/c	
Bottom Edge (Lu)	13' 8" 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 13' 9"	24"	40.0	25.0	Default Load

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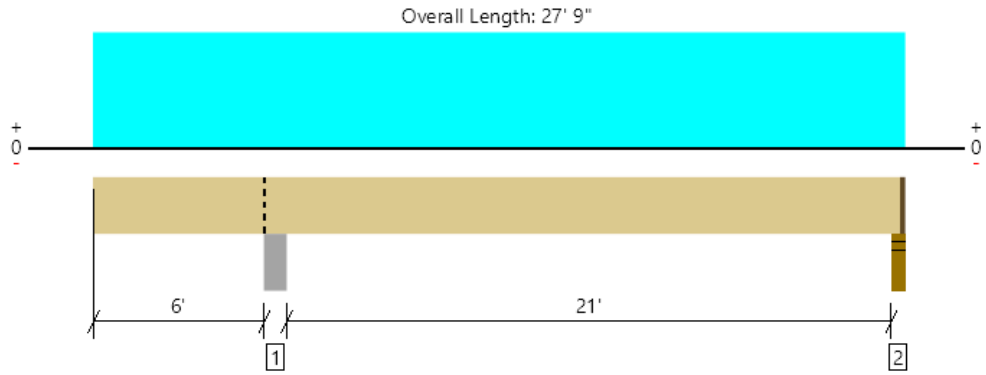
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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

Weyerhaeuser

Upper Floor, U2
1 piece(s) 4 x 16 DF No.1 @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1303 @ 27' 6 1/2"	3347 (2.25")	Passed (39%)	--	1.0 D + 1.0 S (Alt Spans)
Shear (lbs)	1309 @ 7' 8 3/4"	7366	Passed (18%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	6398 @ 17' 7 7/16"	14951	Passed (43%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	0.118 @ 17' 5/8"	0.710	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.287 @ 17' 2"	1.066	Passed (L/892)	--	1.0 D + 1.0 S (Alt Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- 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.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Plate - steel	5.50"	5.50"	1.50"	1424	890	2313	Blocking
2 - Stud wall - SPF	3.50"	2.25"	1.50"	796	520	1317	1 1/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- Steel plate supports are only used to determine the bearing length for supported member(s). Additional consideration is required to determine steel plate specifications.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	27' 8" o/c	
Bottom Edge (Lu)	27' 8" 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 27' 9"	24"	40.0	25.0	Default Load

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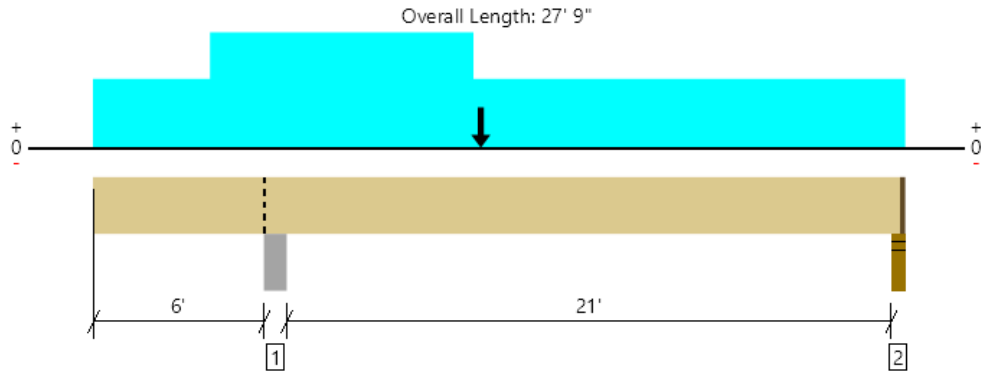
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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

Weyerhaeuser

Upper Floor, U3
1 piece(s) 4 x 16 DF No.1 @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1437 @ 27' 6 1/2"	3347 (2.25")	Passed (43%)	--	1.0 D + 1.0 L (Alt Spans)
Shear (lbs)	1567 @ 7' 8 3/4"	6405	Passed (24%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	7788 @ 16' 7 1/8"	13001	Passed (60%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.235 @ 16' 9 1/16"	0.710	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.358 @ 16' 10 5/8"	1.066	Passed (L/714)	--	1.0 D + 1.0 L (Alt Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- 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.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Plate - steel	5.50"	5.50"	1.50"	1152	1362	642	2654	Blocking
2 - Stud wall - SPF	3.50"	2.25"	1.50"	538	912/-6	31/-19	1450	1 1/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- Steel plate supports are only used to determine the bearing length for supported member(s). Additional consideration is required to determine steel plate specifications.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	27' 8" o/c	
Bottom Edge (Lu)	27' 8" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 4'	24"	40.0	-	25.0	Default Load
2 - Uniform (PSF)	4' to 13'	24"	24.0	60.0	25.0	
3 - Uniform (PSF)	13' to 27' 9"	24"	25.0	40.0	-	
4 - Point (PLF)	13' 3"	24"	100.0	-	-	

Weyerhaeuser Notes

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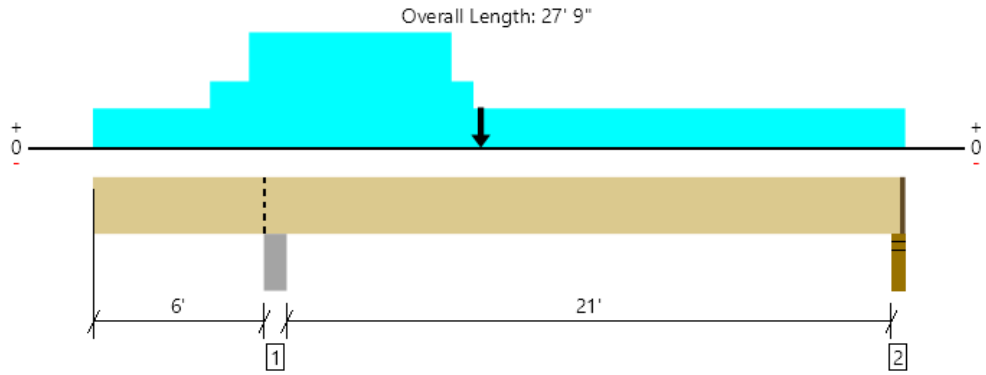
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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

Weyerhaeuser

Upper Floor, U3 - hot tub
1 piece(s) 4 x 16 DF No.1 @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1724 @ 27' 6 1/2"	3347 (2.25")	Passed (52%)	--	1.0 D + 1.0 L (Alt Spans)
Shear (lbs)	2470 @ 7' 8 3/4"	6405	Passed (39%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	13004 @ 13' 3"	14951	Passed (87%)	1.15	1.0 D + 0.75 L + 0.75 S (Alt Spans)
Live Load Defl. (in)	0.359 @ 16' 3 1/4"	0.710	Passed (L/712)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.560 @ 16' 5"	1.066	Passed (L/457)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- 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.
- Upward deflection on left cantilever exceeds 0.4".
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Plate - steel	5.50"	5.50"	1.90"	1470	2335	1238	4150	Blocking
2 - Stud wall - SPF	3.50"	2.25"	1.50"	690	1048/-9	324	1738	1 1/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- Steel plate supports are only used to determine the bearing length for supported member(s). Additional consideration is required to determine steel plate specifications.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	17' 7" o/c	
Bottom Edge (Lu)	27' 8" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 4'	24"	40.0	-	25.0	Default Load
2 - Uniform (PSF)	4' to 5' 4"	24"	24.0	60.0	25.0	
3 - Uniform (PSF)	5' 4" to 12' 3"	24"	25.0	140.0	25.0	
4 - Uniform (PSF)	12' 3" to 13'	24"	24.0	60.0	25.0	
5 - Uniform (PSF)	13' to 27' 9"	24"	25.0	40.0	-	
6 - Point (PLF)	13' 3"	24"	108.0	-	224.5	Linked from: R1, Support 1
7 - Point (PLF)	13' 3"	24"	100.0	-	-	
8 - Point (lb)	13' 3"	N/A	240	-	440	

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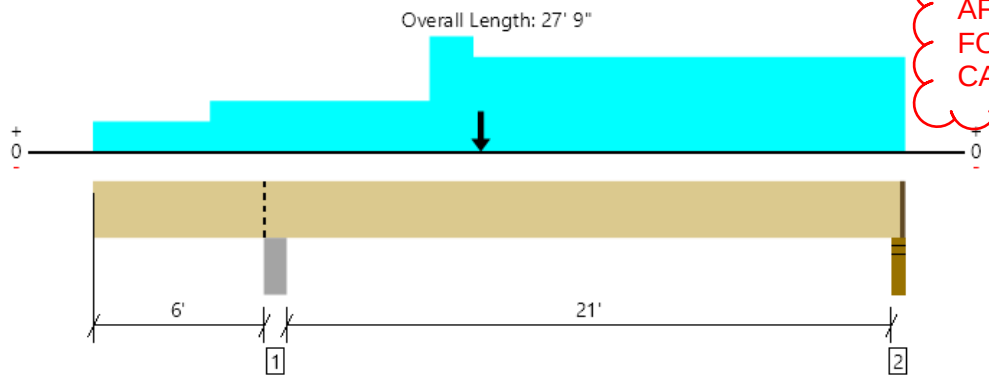
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

FAILED
BEAM ACTUALLY A 4x18, SEE 4X18 CAPACITY CALC AFTER ALL FORTEWEB CALCS. BEAM OK

Upper Floor, U3 - south wall
1 piece(s) 4 x 16 DF No.1 @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2692 @ 27' 6 1/2"	3347 (2.25")	Passed (80%)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
Shear (lbs)	2266 @ 7' 8 3/4"	6405	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	13522 @ 17' 3/16"	13001	Failed (104%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.288 @ 16' 7 3/16"	0.710	Passed (L/889)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.672 @ 16' 10 11/16"	1.066	Passed (L/381)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- 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.
- Upward deflection on left cantilever exceeds 0.4".
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Plate - steel	5.50"	5.50"	1.69"	1851	1362	1094	3692	Blocking
2 - Stud wall - SPF	3.50"	2.25"	1.81"	1707	912/-6	434	2717	1 1/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- Steel plate supports are only used to determine the bearing length for supported member(s). Additional consideration is required to determine steel plate specifications.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 6" o/c	
Bottom Edge (Lu)	27' 8" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 4'	24"	40.0	-	25.0	Default Load
2 - Uniform (PSF)	4' to 13'	24"	24.0	60.0	25.0	
3 - Uniform (PSF)	13' to 27' 9"	24"	25.0	40.0	-	
4 - Uniform (PLF)	11' 6" to 27' 9"	N/A	114.0	-	25.0	
5 - Point (PLF)	13' 3"	24"	108.0	-	224.5	Linked from: R1, Support 1

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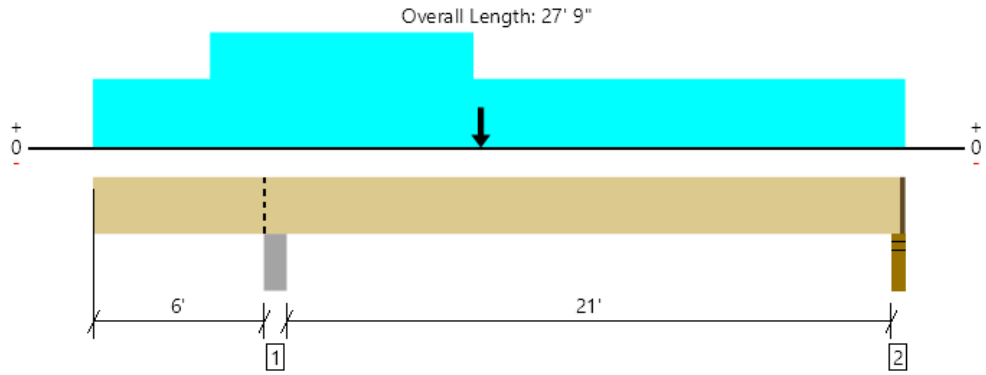
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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

Weyerhaeuser

Upper Floor, U3 - north point load
1 piece(s) 4 x 16 DF No.1 @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1756 @ 27' 6 1/2"	3347 (2.25")	Passed (52%)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
Shear (lbs)	2592 @ 7' 8 3/4"	7366	Passed (35%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	13694 @ 13' 3"	14951	Passed (92%)	1.15	1.0 D + 0.75 L + 0.75 S (Alt Spans)
Live Load Defl. (in)	0.345 @ 16' 4 3/16"	0.710	Passed (L/742)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.578 @ 16' 5 1/4"	1.066	Passed (L/442)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- 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.
- Upward deflection on left cantilever exceeds 0.4".
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Plate - steel	5.50"	5.50"	1.70"	1593	1362	1470	3717	Blocking
2 - Stud wall - SPF	3.50"	2.25"	1.50"	755	912/-6	438	1767	1 1/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- Steel plate supports are only used to determine the bearing length for supported member(s). Additional consideration is required to determine steel plate specifications.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	14' o/c	
Bottom Edge (Lu)	27' 8" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 4'	24"	40.0	-	25.0	Default Load
2 - Uniform (PSF)	4' to 13'	24"	24.0	60.0	25.0	
3 - Uniform (PSF)	13' to 27' 9"	24"	25.0	40.0	-	
4 - Point (PLF)	13' 3"	24"	100.0	-	-	
5 - Point (lb)	13' 3"	N/A	658	-	1235	half of R5 and half of R6, psl at base of wall will distribute load

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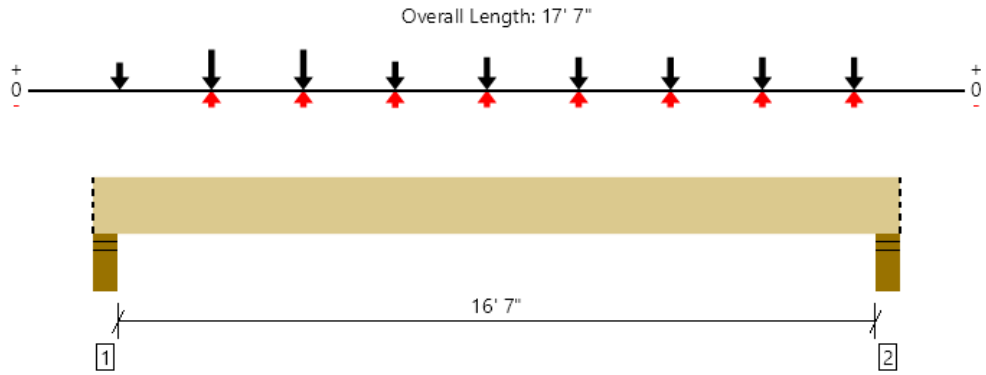
Upper Floor, U4 - no steel
1 piece(s) 5 1/4" x 18" 2.0E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern) [Group]
Member Reaction (lbs)	8976 @ 4 1/2"	13388 (6.00")	Passed (67%)	--	1.0 D + 0.75 L + 0.75 S (All Spans) [1]
Shear (lbs)	7778 @ 2'	18270	Passed (43%)	1.00	1.0 D + 1.0 L (All Spans) [1]
Moment (Ft-lbs)	33952 @ 8' 7"	65497	Passed (52%)	1.00	1.0 D + 1.0 L (All Spans) [1]
Live Load Defl. (in)	0.197 @ 8' 10 3/16"	0.421	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans) [1]
Total Load Defl. (in)	0.381 @ 8' 7"	0.842	Passed (L/530)	--	1.0 D + 1.0 L (All Spans) [1]

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Stud wall - SPF	6.00"	6.00"	4.02"	5097	3492/-26	1681	8976	Blocking
2 - Stud wall - SPF	6.00"	6.00"	3.63"	3621	4484/-37	1358	8105	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)	17' 7" o/c	
Bottom Edge (Lu)	17' 7" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 17' 7"	N/A	29.5	--	--	
1 - Point (lb)	7" (Front)	N/A	796	-	520	Linked from: U2, Support 2
2 - Point (lb)	2' 7" (Front)	N/A	1707	912/-6	434	Linked from: U3 - south wall, Support 2
3 - Point (lb)	4' 7" (Front)	N/A	1707	912/-6	434	Linked from: U3 - south wall, Support 2
4 - Point (lb)	6' 7" (Front)	N/A	538	912/-6	31/-19	Linked from: U3, Support 2
5 - Point (lb)	8' 7" (Front)	N/A	690	1048/-9	324	Linked from: U3 - hot tub, Support 2
6 - Point (lb)	10' 7" (Front)	N/A	690	1048/-9	324	Linked from: U3 - hot tub, Support 2
7 - Point (lb)	12' 7" (Front)	N/A	690	1048/-9	324	Linked from: U3 - hot tub, Support 2
8 - Point (lb)	14' 7" (Front)	N/A	690	1048/-9	324	Linked from: U3 - hot tub, Support 2
9 - Point (lb)	16' 7" (Front)	N/A	690	1048/-9	324	Linked from: U3 - hot tub, Support 2

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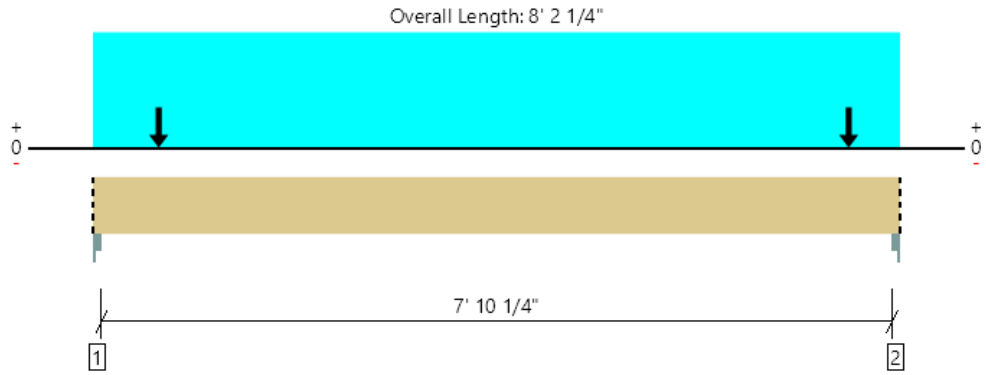
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Upper Floor, U5

2 piece(s) 1 3/4" x 18" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern) [Group]
Member Reaction (lbs)	4817 @ 8' 1 3/4"	5250 (2.00")	Passed (92%)	--	1.0 D + 0.75 L + 0.75 S (All Spans) [1]
Shear (lbs)	2208 @ 1' 8"	11970	Passed (18%)	1.00	1.0 D + 1.0 L (All Spans) [2]
Moment (Ft-lbs)	7067 @ 4' 15/16"	38753	Passed (18%)	1.00	1.0 D + 1.0 L (All Spans) [1]
Live Load Defl. (in)	0.022 @ 4' 1 1/16"	0.203	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans) [1]
Total Load Defl. (in)	0.038 @ 4' 1"	0.405	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans) [1]

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Column Cap - steel	2.00"	2.00"	1.81"	2045	2031	1573	4747	Blocking
2 - Column Cap - steel	2.00"	2.00"	1.83"	2073	2031	1628	4817	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)	8' 2" o/c	
Bottom Edge (Lu)	8' 2" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 8' 2 1/4"	N/A	18.4	--	--	
1 - Uniform (PSF)	0 to 8' 2 1/4" (Front)	1'	25.0	40.0	-	
2 - Point (lb)	8" (Front)	N/A	780	-	1537	Linked from: R8, Support 1
3 - Point (lb)	7' 8" (Front)	N/A	780	-	1537	Linked from: R8, Support 1
4 - Uniform (PLF)	0 to 8' 2 1/4" (Front)	N/A	269.0	456.0/-3.0	15.5/-9.5	Linked from: U3, Support 2

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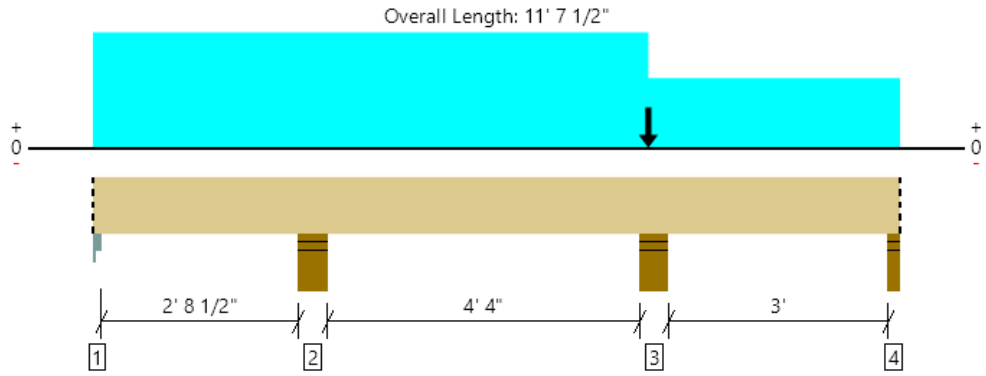
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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

Weyerhaeuser

Upper Floor, U6

1 piece(s) 3 1/2" x 9 1/4" 2.0E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern) [Group]
Member Reaction (lbs)	7188 @ 8' 1"	10413 (7.00")	Passed (69%)	--	1.0 D + 0.75 L + 0.75 S (Adj Spans) [1]
Shear (lbs)	1460 @ 4' 2 3/4"	6259	Passed (23%)	1.00	1.0 D + 1.0 L (Adj Spans) [1]
Moment (Ft-lbs)	-1862 @ 8' 1"	12416	Passed (15%)	1.00	1.0 D + 1.0 L (Adj Spans) [1]
Live Load Defl. (in)	0.012 @ 5' 7 11/16"	0.123	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans) [1]
Total Load Defl. (in)	0.022 @ 5' 7 5/8"	0.246	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans) [1]

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Column Cap - steel	2.00"	2.00"	1.50"	509	745/-227	246	1254	Blocking
2 - Stud wall - SPF	7.00"	7.00"	3.21"	2269	2380	970	4781	None
3 - Stud wall - SPF	7.00"	7.00"	4.83"	3757	2611	1963	7188	None
4 - Stud wall - SPF	3.00"	3.00"	1.50"	489	836/-198	-82	1325	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)	11' 8" o/c	
Bottom Edge (Lu)	11' 8" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 11' 7 1/2"	N/A	10.1	--	--	
1 - Uniform (PSF)	0 to 11' 7 1/2" (Front)	1'	25.0	40.0	-	
2 - Uniform (PLF)	0 to 8' (Front)	N/A	89.0	-	187.0	Linked from: R1, Support 2
3 - Point (lb)	8' (Front)	N/A	299	-	592	Linked from: R7, Support 1
4 - Uniform (PLF)	0 to 11' 7 1/2" (Front)	N/A	100.0	-	-	
5 - Point (lb)	8' (Front)	N/A	1308	172	782	Linked from: P11 - no floor load, Support 2
6 - Uniform (PLF)	0 to 11' 7 1/2" (Front)	N/A	269.0	456.0/-3.0	15.5/-9.5	Linked from: U3, Support 2

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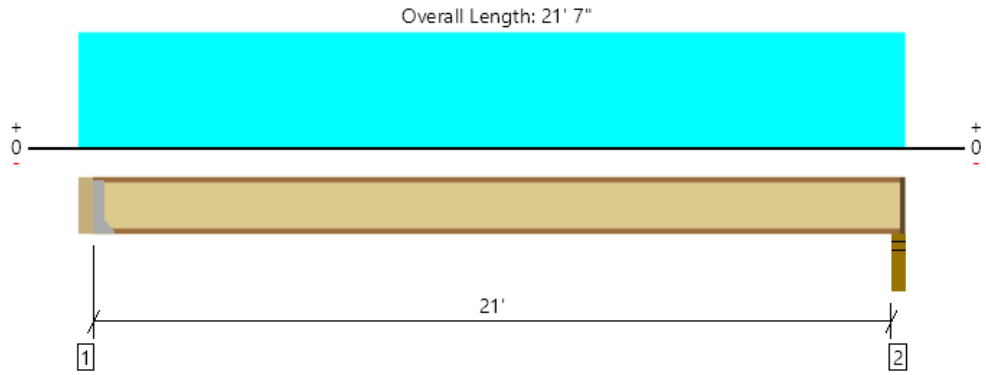
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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

Weyerhaeuser

Main Floor, M1

1 piece(s) 14" TJI® 560 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1377 @ 3 1/2"	1377 (2.18")	Passed (100%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1377 @ 3 1/2"	2390	Passed (58%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	7260 @ 10' 10"	11275	Passed (64%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.266 @ 10' 10"	0.527	Passed (L/951)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.652 @ 10' 10"	1.054	Passed (L/388)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	47	40	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Hanger on 14" SPF beam	3.50"	Hanger[1]	2.18" / - [2]	838	578	1416	See note [1]
2 - Stud wall - SPF	3.50"	2.25"	2.23"	831	573	1405	1 1/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.
- [2] Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	7' o/c	
Bottom Edge (Lu)	21' 2" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	MIU3.56/14	2.50"	N/A	22-10dx1.5	2-10dx1.5	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 21' 7"	16"	58.0	40.0	Default Load

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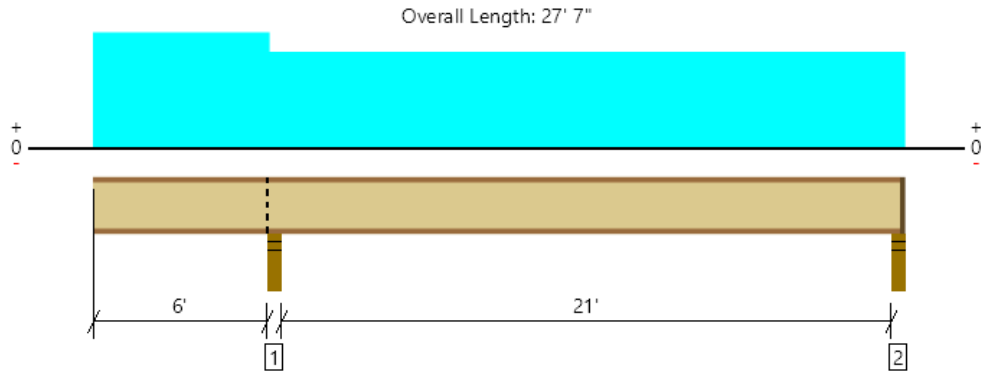
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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

Weyerhaeuser

Main Floor, M1a
1 piece(s) 16" TJI® 560 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1332 @ 27' 4 1/2"	1396 (2.25")	Passed (95%)	1.00	1.0 D + 1.0 L (Alt Spans)
Shear (lbs)	1407 @ 6' 3 1/2"	2710	Passed (52%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	6649 @ 17' 3 7/16"	12925	Passed (51%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.208 @ 16' 9 1/8"	0.531	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.459 @ 16' 11 7/16"	1.061	Passed (L/555)	--	1.0 D + 1.0 L (Alt Spans)
TJ-Pro™ Rating	50	40	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - SPF	3.50"	3.50"	3.50"	1365	1125	2490	Blocking
2 - Stud wall - SPF	3.50"	2.25"	2.00"	768	577/-66	1345	1 1/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- 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)	8' 1" o/c	
Bottom Edge (Lu)	12' 4" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	6' to 27' 7"	16"	58.0	40.0	Default Load
2 - Uniform (PSF)	0 to 6'	16"	58.0	60.0	

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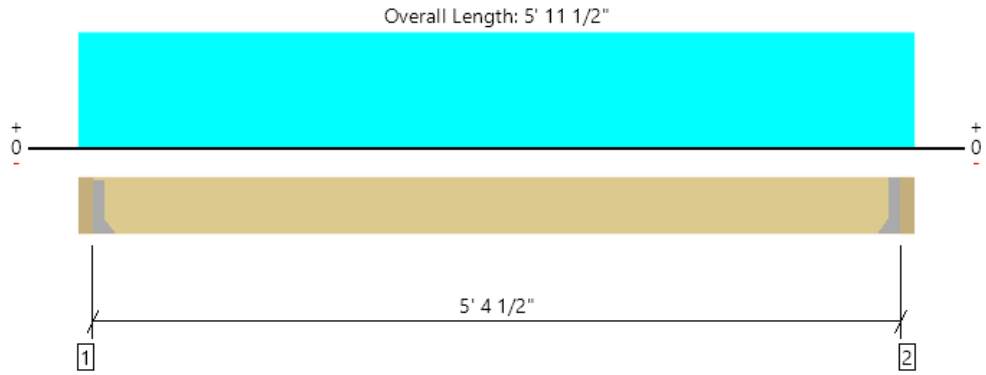
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Main Floor, M2

1 piece(s) 2 x 8 HF No.2 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	455 @ 3 1/2"	911 (1.50")	Passed (50%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	353 @ 10 3/4"	1088	Passed (32%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	612 @ 2' 11 3/4"	1284	Passed (48%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.024 @ 2' 11 3/4"	0.134	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.051 @ 2' 11 3/4"	0.269	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- 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.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Hanger on 7 1/4" SPF beam	3.50"	Hanger[1]	1.50"	266	238	504	See note [1]
2 - Hanger on 7 1/4" SPF beam	3.50"	Hanger[1]	1.50"	266	238	504	See note [1]

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

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

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	LU28	1.50"	N/A	8-10dx1.5	6-10dx1.5	
2 - Face Mount Hanger	LU26	1.50"	N/A	6-10dx1.5	4-10dx1.5	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 5' 11 1/2"	16"	67.0	60.0	Default Load

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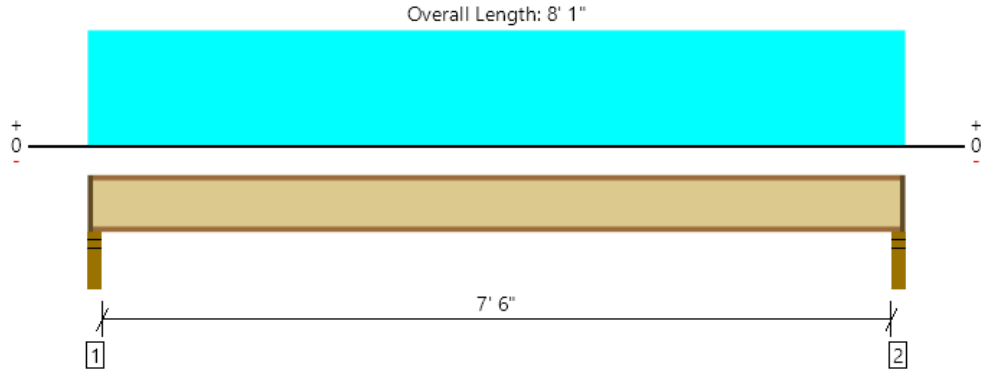
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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

Weyerhaeuser

Main Floor, M3

1 piece(s) 14" TJI® 560 @ 12" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	386 @ 2 1/2"	1396 (2.25")	Passed (28%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	368 @ 3 1/2"	2390	Passed (15%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	720 @ 4' 1/2"	11275	Passed (6%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.007 @ 4' 1/2"	0.192	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.017 @ 4' 1/2"	0.383	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	72	40	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - SPF	3.50"	2.25"	1.75"	234	162	396	1 1/4" Rim Board
2 - Stud wall - SPF	3.50"	2.25"	1.75"	234	162	396	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)	7' 11" o/c	
Bottom Edge (Lu)	7' 11" o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.
•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 8' 1"	12"	58.0	40.0	Default Load

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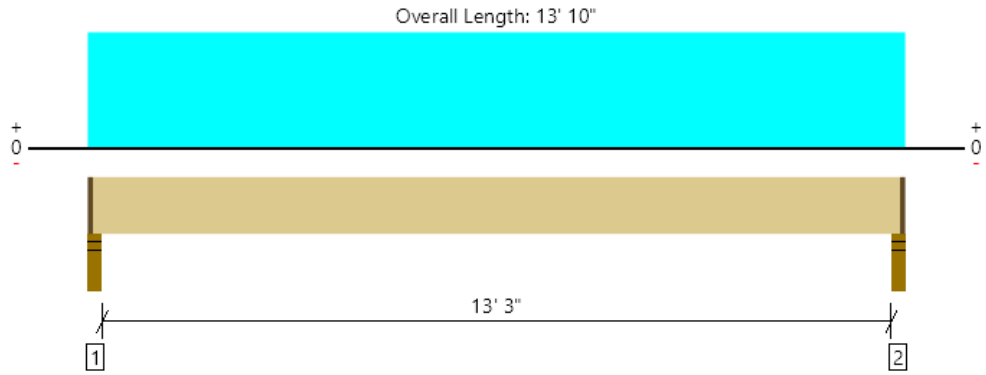
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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

Weyerhaeuser

Main Floor, M4

1 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1384 @ 2"	1673 (2.25")	Passed (83%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1109 @ 1' 5 1/2"	4655	Passed (24%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	4628 @ 6' 11"	12129	Passed (38%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.083 @ 6' 11"	0.338	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.211 @ 6' 11"	0.675	Passed (L/766)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - SPF	3.50"	2.25"	1.86"	851	553	1404	1 1/4" Rim Board
2 - Stud wall - SPF	3.50"	2.25"	1.86"	851	553	1404	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)	11' 2" o/c	
Bottom Edge (Lu)	13' 8" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 13' 8 3/4"	N/A	7.2	--	
1 - Uniform (PSF)	0 to 13' 10" (Front)	2'	58.0	40.0	Default Load

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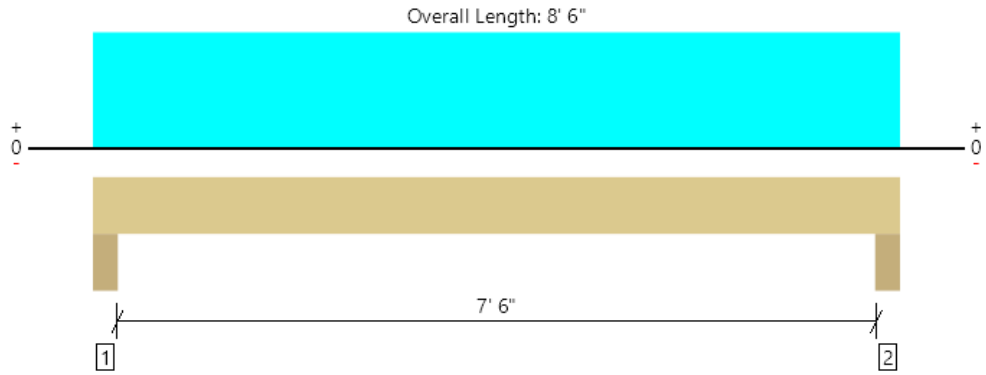
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Main Floor, M6

2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4574 @ 4 1/2"	15225 (6.00")	Passed (30%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2780 @ 1' 8"	9310	Passed (30%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	8081 @ 4' 3"	24258	Passed (33%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.030 @ 4' 3"	0.258	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.074 @ 4' 3"	0.387	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Trimmer - SPF	6.00"	6.00"	1.80"	2732	1842	4574	None
2 - Trimmer - SPF	6.00"	6.00"	1.80"	2732	1842	4574	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' 6" o/c	
Bottom Edge (Lu)	8' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 8' 6"	N/A	14.3	--	
1 - Uniform (PLF)	0 to 8' 6"	N/A	628.5	433.5	Linked from: M1, Support 1

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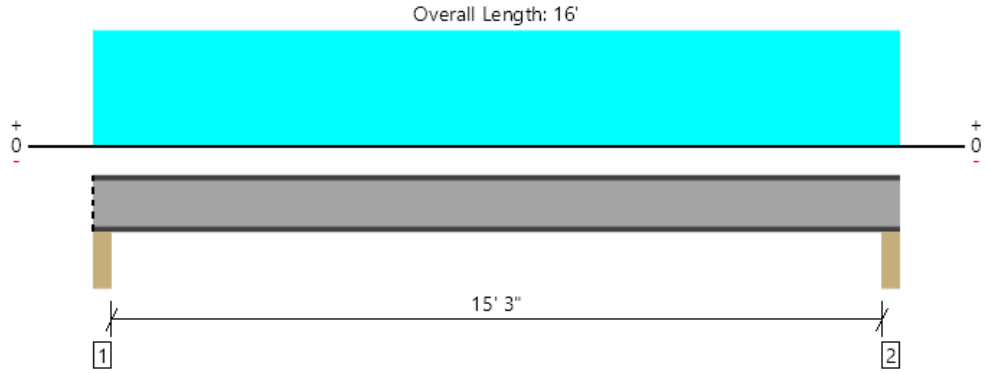
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Main Floor, M7

1 piece(s) W10X30 (A992) ASTM Steel



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	15180 @ 3"	18955 (4.50")	Passed (80%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	14468 @ 4 1/2"	63000	Passed (23%)	--	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	56984 @ 8'	91317	Passed (62%)	--	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.222 @ 8'	0.517	Passed (L/837)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.500 @ 8'	0.775	Passed (L/372)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Applicable calculations are based on ANSI/AISC 360-16.
- A lateral-torsional buckling factor (Cb) of 1.0 has been assumed.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Column - SPF	4.50"	4.50"	4.50"	8430	6750	15180	Blocking
2 - Column - SPF	4.50"	4.50"	4.50"	8430	6750	15180	None

• 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)	Continuous	
Bottom Edge (Lu)	Continuous	

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 16'	N/A	30.0	--	
1 - Uniform (PLF)	0 to 16'	N/A	1023.8	843.8	Linked from: M1a, Support 1

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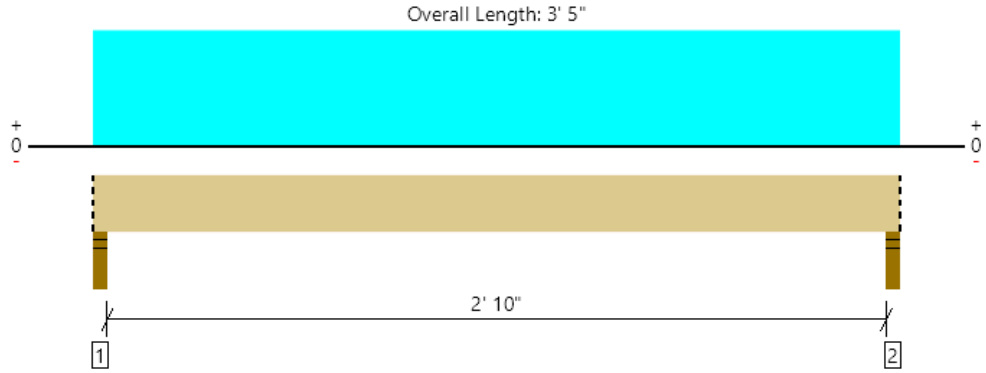
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Main Floor, M8
2 piece(s) 2 x 10 HF No.1



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2643 @ 2"	4253 (3.50")	Passed (62%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	999 @ 1' 3/4"	2775	Passed (36%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1838 @ 1' 8 1/2"	3824	Passed (48%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.004 @ 1' 8 1/2"	0.077	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.011 @ 1' 8 1/2"	0.154	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- 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	Floor Live	Factored	
1 - Stud wall - SPF	3.50"	3.50"	2.18"	1597	1046	2643	Blocking
2 - Stud wall - SPF	3.50"	3.50"	2.18"	1597	1046	2643	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)	3' 5" o/c	
Bottom Edge (Lu)	3' 5" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 3' 5"	N/A	7.0	--	
1 - Uniform (PLF)	0 to 3' 5" (Front)	N/A	100.0	-	Default Load
2 - Uniform (PLF)	0 to 3' 5" (Front)	N/A	628.5	433.5	Linked from: M1, Support 1
3 - Uniform (PLF)	0 to 3' 5" (Front)	N/A	199.5	178.5	Linked from: M2, Support 1

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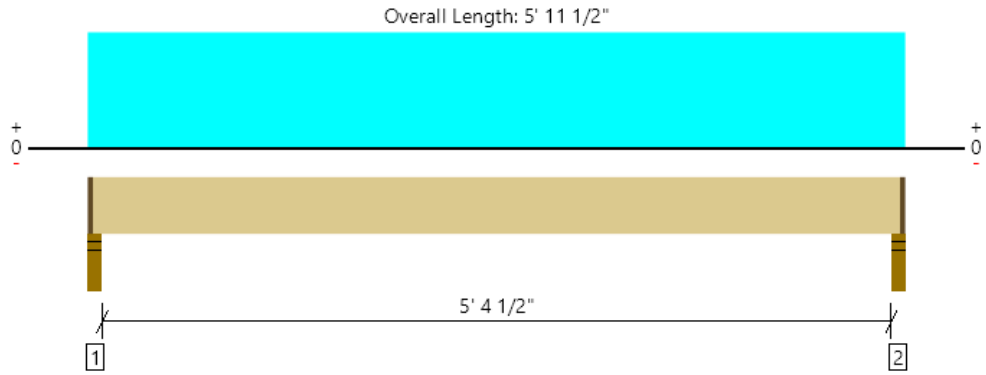
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

Main Floor, M9

2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1832 @ 2"	3347 (2.25")	Passed (55%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	969 @ 1' 5 1/2"	9310	Passed (10%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2521 @ 2' 11 3/4"	24258	Passed (10%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.005 @ 2' 11 3/4"	0.141	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.015 @ 2' 11 3/4"	0.281	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - SPF	3.50"	2.25"	1.50"	1236	661	1897	1 1/4" Rim Board
2 - Stud wall - SPF	3.50"	2.25"	1.50"	1236	661	1897	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)	5' 9" o/c	
Bottom Edge (Lu)	5' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 5' 10 1/4"	N/A	14.3	--	
1 - Uniform (PLF)	0 to 5' 11 1/2" (Front)	N/A	100.0	-	Default Load
2 - Uniform (PSF)	0 to 5' 11 1/2" (Front)	1'	67.0	60.0	
3 - Uniform (PLF)	0 to 5' 11 1/2" (Front)	N/A	234.0	162.0	Linked from: M3, Support 1

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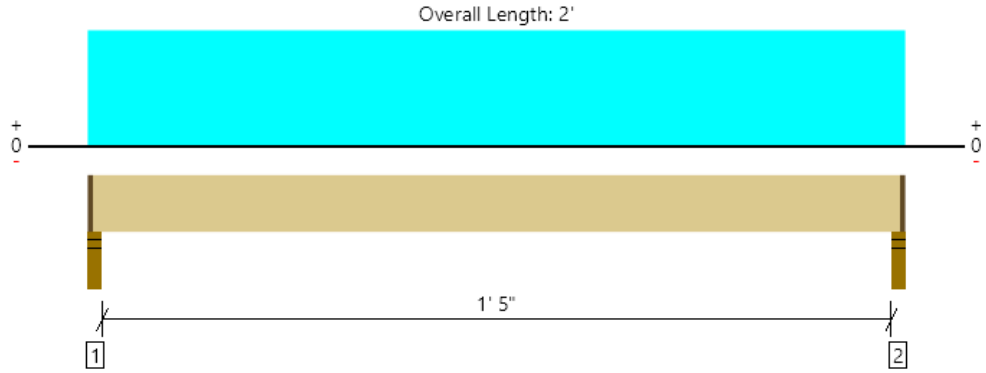
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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

Weyerhaeuser

Main Floor, LOADING AT NORTH END
2 piece(s) 2 x 4 DF No.1



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	427 @ 2"	2869 (2.25")	Passed (15%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	199 @ 7"	1260	Passed (16%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	165 @ 1'	766	Passed (22%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.001 @ 1'	0.042	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.005 @ 1'	0.083	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- 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	Floor Live	Snow	Factored	
1 - Stud wall - SPF	3.50"	2.25"	1.50"	330	147	25	476	1 1/4" Rim Board
2 - Stud wall - SPF	3.50"	2.25"	1.50"	330	147	25	476	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)	1' 10" o/c	
Bottom Edge (Lu)	1' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	1 1/4" to 1' 10 3/4"	N/A	2.7	--	--	
1 - Uniform (PSF)	0 to 2' (Front)	8"	58.0	40.0	-	Default Load
2 - Uniform (PLF)	0 to 2' (Front)	N/A	200.0	-	-	
3 - Uniform (PSF)	0 to 2' (Front)	3'	25.0	40.0	-	
4 - Uniform (PSF)	0 to 2' (Front)	1'	13.5	-	25.0	

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

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

Weyerhaeuser

WOOD COMBINED AXIAL AND FLEXURAL STRESSES

L =	6.00	ft	d =	17.25	in
Fc =	1.700	ksi	b =	3.5	in (braced dimension for le/d)
Fb =	1.350	ksi	I =	1497.11	in4
E =	1.90E+06	psi	A =	60.375	in2
Emin =	6.90E+05	psi	S =	173.58	in3

Bending

Cd =	1.00	
Cm =	1.00	
Ct =	1.00	
Cf =	1.00	
Cfu =	1.00	
Cr =	1.15	
Ci =	1.00	
Fb* =	1.553	(w/out CL)
lu =	6.00 ft	laterally unbraced
lu/d =	4.17	
le =	95.76	see table 3.3.3
Rb	11.612	
Fbe	16908	
Fbe/Fb* =	10.891	
CL =	0.995	
Fb =	1.545 ksi	
Ma =	22.344 k-ft	
FcE1 =	50680	
M =	13.52 k-ft	
fb =	0.93 ksi	
fb/Fb	0.61	
fc/Fce1 =	0.00	
Bend SR	0.61	NDS equation 3.9-3
Total S.R.	0.61	

compare EI of 4x16 DF#1 to 4x18 select structural

	EI
4x16 DF #1	1757800
4x18 Select Struct.	2844300
stiffness increase	162%

Envelope Only Solution

		SK - 1
		Jan 17, 2023 at 11:07 AM
	steel beam line, west side below upper floor	all window beams.r2d

Member Primary Data

	Label	I Joint	J Joint	Rotate(d...	Section/Sha...	Type	Design List	Material	Design Ru...
1	M1	N1	N2		W8x67	Beam	Wide Flange	A572 Gr.50	Typical
2	M2	N2	N3		W8x67	Beam	Wide Flange	A572 Gr.50	Typical
3	M3	N3	N4		W10x77	Beam	Wide Flange	A572 Gr.50	Typical
4	M4	N4	N5		W10x77	Beam	Wide Flange	A572 Gr.50	Typical
5	M5	N5	N6		W10x77	Beam	Wide Flange	A572 Gr.50	Typical

Member Point Loads (BLC 1 : dead)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Y	-1.003	1.25
2	M1	Y	-1.424	3.25
3	M2	Y	-1.851	1
4	M2	Y	-1.851	3
5	M2	Y	-1.152	5
6	M2	Y	-1.47	7
7	M3	Y	-1.47	1
8	M3	Y	-1.47	3
9	M3	Y	-1.47	5
10	M3	Y	-1.47	7
11	M4	Y	-1.47	1
12	M4	Y	-1.152	3
13	M4	Y	-1.152	5
14	M4	Y	-1.152	7
15	M5	Y	-1.152	1.25
16	M5	Y	-1.152	3.25
17	M5	Y	-1.593	5.25
18	M5	Y	-1.593	7.25

Member Point Loads (BLC 2 : live)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Y	-1.362	1
2	M2	Y	-1.362	3
3	M2	Y	-1.362	5
4	M2	Y	-2.335	7
5	M3	Y	-2.335	1
6	M3	Y	-2.335	3
7	M3	Y	-2.335	5
8	M3	Y	-2.335	7
9	M4	Y	-2.335	1
10	M4	Y	-1.362	3
11	M4	Y	-1.362	5
12	M4	Y	-1.362	7
13	M5	Y	-1.362	1.25
14	M5	Y	-1.362	3.25
15	M5	Y	-1.362	5.25
16	M5	Y	-1.362	7.25

Member Point Loads (BLC 3 : snow)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Y	-.627	1.25
2	M1	Y	-.89	3.25
3	M2	Y	-1.094	1
4	M2	Y	-1.094	3
5	M2	Y	-.642	5

Member Point Loads (BLC 3 : snow) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
6	M2	Y	-1.238	7
7	M3	Y	-1.238	1
8	M3	Y	-1.238	3
9	M3	Y	-1.238	5
10	M3	Y	-1.238	7
11	M4	Y	-1.238	1
12	M4	Y	-.642	3
13	M4	Y	-.642	5
14	M4	Y	-.642	7
15	M5	Y	-.642	1.25
16	M5	Y	-.642	3.25
17	M5	Y	-1.47	5.25
18	M5	Y	-1.47	7.25

Envelope Member Section Forces

	Member	Sec		Axial[k]	LC	Shear[k]	LC	Moment[k-ft]	LC
1	M1	1	max	0	1	0	1	0	1
2			min	0	1	0	1	0	1
3		2	max	0	1	0	1	.085	30
4			min	0	1	-1.362	2	0	1
5		3	max	0	1	-.602	25	2.438	7
6			min	0	1	-2.495	7	.527	25
7		4	max	0	1	-.602	25	5.089	7
8			min	0	1	-2.495	7	1.166	25
9		5	max	0	1	-1.362	30	9.831	7
10			min	0	1	-4.586	7	2.66	25
11	M2	1	max	0	1	7.389	7	9.831	7
12			min	0	1	2.207	30	2.66	25
13		2	max	0	1	4.717	7	.012	30
14			min	0	1	1.257	25	-2.509	4
15		3	max	0	1	1.09	2	-2.369	25
16			min	0	1	.147	25	-8.017	7
17		4	max	0	1	-.447	29	-1.971	25
18			min	0	1	-1.631	7	-7.411	7
19		5	max	0	1	-1.427	25	0	1
20			min	0	1	-5.78	7	0	1
21	M3	1	max	0	1	8.3	7	0	1
22			min	0	1	1.764	25	0	1
23		2	max	0	1	4.15	7	-2.646	25
24			min	0	1	.882	25	-12.449	7
25		3	max	0	1	0	1	-3.528	25
26			min	0	1	0	1	-16.599	7
27		4	max	0	1	-.882	25	-2.646	25
28			min	0	1	-4.15	7	-12.449	7
29		5	max	0	1	-1.764	25	0	1
30			min	0	1	-8.3	7	0	1
31	M4	1	max	0	1	12.287	7	0	1
32			min	0	1	3.01	25	0	1
33		2	max	0	1	8.137	7	-5.005	25
34			min	0	1	2.096	29	-19.915	7
35		3	max	0	1	5.482	7	-8.523	25
36			min	0	1	1.437	25	-33.358	7
37		4	max	0	1	2.827	7	-10.744	25
38			min	0	1	.745	25	-41.822	7
39		5	max	0	1	.26	4	-11.67	25

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	Shear[k]	LC	Moment[k-ft]	LC
40			min	0	1	-.061	30	-45.308	7
41	M5	1	max	0	1	.26	4	-11.67	25
42			min	0	1	-.061	30	-45.308	7
43		2	max	0	1	-.472	29	-11.22	25
44			min	0	1	-2.484	2	-43.506	7
45		3	max	0	1	-1.114	29	-9.302	25
46			min	0	1	-5.138	7	-36.062	7
47		4	max	0	1	-2.284	25	-5.666	25
48			min	0	1	-8.855	7	-21.98	7
49		5	max	0	1	-3.24	25	0	1
50			min	0	1	-12.572	7	0	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	L/y Ratio	LC
1	M1	1	max	0	1	0	1	NC	1
2			min	0	1	-.007	30	7685.876	30
3		2	max	0	1	0	4	NC	4
4			min	0	1	-.004	30	NC	30
5		3	max	0	1	0	4	NC	4
6			min	0	1	-.002	30	NC	30
7		4	max	0	1	.001	4	NC	4
8			min	0	1	0	30	NC	30
9		5	max	0	1	0	1	NC	1
10			min	0	1	0	1	NC	1
11	M2	1	max	0	1	0	1	NC	1
12			min	0	1	0	1	NC	1
13		2	max	0	1	-.002	30	NC	30
14			min	0	1	-.008	7	NC	7
15		3	max	0	1	-.004	25	NC	25
16			min	0	1	-.013	7	7113.266	7
17		4	max	0	1	-.003	25	NC	25
18			min	0	1	-.011	7	9012.912	7
19		5	max	0	1	0	1	NC	1
20			min	0	1	0	1	NC	1
21	M3	1	max	0	1	0	1	NC	1
22			min	0	1	0	1	NC	1
23		2	max	0	1	-.003	25	NC	25
24			min	0	1	-.013	7	7247.201	7
25		3	max	0	1	-.004	25	NC	25
26			min	0	1	-.019	7	5170.26	7
27		4	max	0	1	-.003	25	NC	25
28			min	0	1	-.013	7	7247.201	7
29		5	max	0	1	0	1	NC	1
30			min	0	1	0	1	NC	1
31	M4	1	max	0	1	0	1	NC	1
32			min	0	1	0	1	NC	1
33		2	max	0	1	-.02	25	NC	25
34			min	0	1	-.079	7	3627.804	7
35		3	max	0	1	-.037	25	9292.906	25
36			min	0	1	-.145	7	2372.795	7
37		4	max	0	1	-.049	25	NC	25
38			min	0	1	-.192	7	2872.115	7
39		5	max	0	1	-.055	25	NC	25
40			min	0	1	-.212	7	NC	7
41	M5	1	max	0	1	-.055	25	NC	25

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	L/y Ratio	LC
42			min	0	1	-.212	7	NC	7
43		2	max	0	1	-.051	25	9894.186	25
44			min	0	1	-.198	7	2551.679	7
45		3	max	0	1	-.04	25	8083.118	25
46			min	0	1	-.154	7	2084.641	7
47		4	max	0	1	-.022	25	NC	25
48			min	0	1	-.084	7	3165.441	7
49		5	max	0	1	0	1	NC	1
50			min	0	1	0	1	NC	1

Envelope Joint Reactions

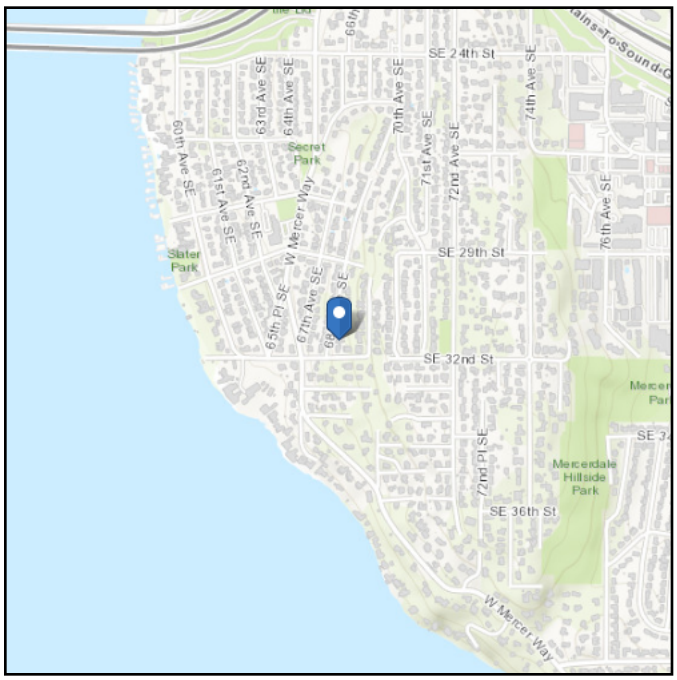
	Joint		X [k]	LC	Y [k]	LC	Moment [k-ft]	LC
1	N2	max	0	1	11.975	7	0	1
2		min	0	1	3.569	30	0	1
3	N3	max	0	1	14.08	7	0	1
4		min	0	1	3.191	25	0	1
5	N4	max	0	1	20.586	7	0	1
6		min	0	1	4.774	25	0	1
7	N6	max	0	1	12.572	7	0	1
8		min	0	1	3.24	25	0	1
9	Totals:	max	0	1	59.213	7		
10		min	0	1	15.028	25		

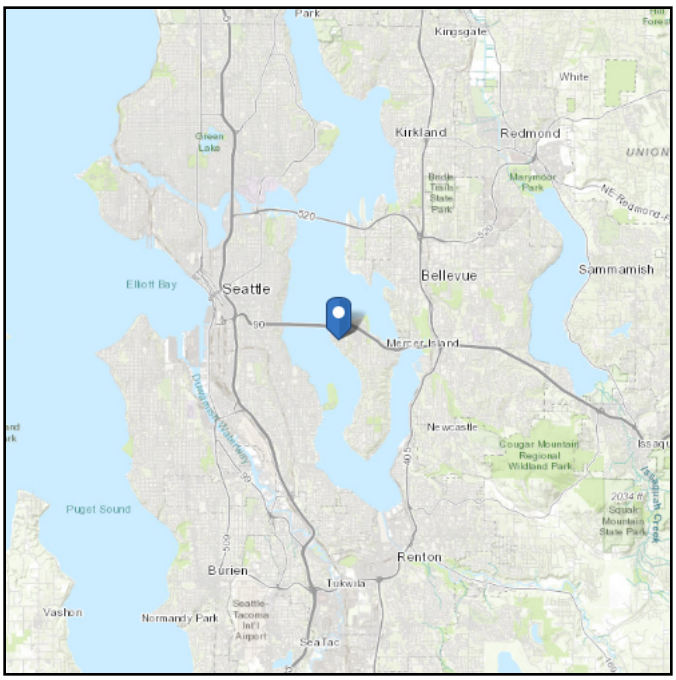
ASCE 7 Hazards Report

Address:
3064 68th Ave SE
Mercer Island, Washington
98040

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

Elevation: 135.67 ft (NAVD 88)
Latitude: 47.582269
Longitude: -122.247248





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: Tue Nov 01 2022

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.

Seismic

Site Soil Class: D - Stiff Soil

Results:

S_S :	1.408	S_{D1} :	N/A
S_1 :	0.49	T_L :	6
F_a :	1	PGA :	0.603
F_v :	N/A	PGA_M :	0.663
S_{MS} :	1.408	F_{PGA} :	1.1
S_{M1} :	N/A	I_e :	1
S_{DS} :	0.939	C_v :	1.382

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

Data Accessed: Tue Nov 01 2022

Date Source: USGS Seismic Design Maps

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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SEISMIC DESIGN

ASCE 7-16
Equivalent Lateral Force Procedure

Risk Category	II		Table 1.5-1
Seismic Design Category	D		More severe, Table 11.6-1 or Table 11.6-2*
Importance Factor	1.00		Table 1.5-2
Site Class	D		Table 20.3-1
S_S	140.80	%g	(from USGS Seismic Hazard Curves)
S_1	49.00	%g	(from USGS Seismic Hazard Curves)
F_a	1.00		Table 11.4-1
F_v	1.80		Table 11.4-2
C_t	0.02		Table 12.8-2
x	0.75		Table 12.8-2
h_n	30.10	feet	(height to highest level)
$S_{MS} = Fa*Ss$	1.4080		Eq. 11.4-1
$S_{M1} = Fv*S1$	0.8820		Eq. 11.4-2
$S_{DS} = (2/3)*S_{MS}$	0.9387	g	Eq. 11.4-3
$S_{D1} = (2/3)*S_{M1}$	0.5880	g	Eq. 11.4-4
Period $T_a = C_t*h_n\text{^}x$	0.2570	s	Eq. 12.8-7
T_o	0.1253	s	Eq. 11.4-5
T_S	0.6264	s	Eq 11.4-6
$1.5T_s$	0.9396		
T_L	6.0000		per figure 22-14
S_a	0.9387	g	Eq. 11.4-7
R	6.5		Table 12.2-1
Ωo	3		Table 12.2-1
C_d	4		Table 12.2-1
Section 12.6 ok?	Yes		Table 12.6-1

Site Class	D	
Is T <= 1.5Ts	yes - use eq. 12.8-2	
Ground Motion Hazard Analysis Required?	no, exception 2	section 11.4.8

Equivalent Lateral Force Procedure (section 12.8)

Cs	0.1444		Eq. 12.8-2
W, weight	218,767	lb	per table below
Q_E	31,592	lb	Eq. 12.8-1

Vertical Force Distribution (section 12.8.3)
k = 1.00

Level	Hx (ft)	Floor Area (ft2)	Floor Wt. (psf)	Floor Wt. (k)	Wall Length (ft)	Wall Wt. (k)	Total Wt. (k)	WxHx (k-ft)	Cvx (%)	(LRFD) Q_E (k)	(ASD) $0.7Q_E$ (k)
roof west	33.00	593	13.5	8.0	102	5.1	13.1	432.5	13.1	4.15	2.91
roof bridge	28.58	153	13.5	2.1	36	1.8	3.9	110.5	3.4	1.06	0.74
roof east	24.33	792	13.5	10.7	116	5.8	16.5	401.3	12.2	3.85	2.70
upper west floor	21.33	805	40	32.2	129	19.4	51.6	1101.2	33.5	10.58	7.40
upper bridge	15.75	157	25	3.9	36	4.5	8.4	132.7	4.0	1.27	0.89
upper east	11.83	794	25	19.9	116	14.5	34.4	406.4	12.4	3.90	2.73
west main	7.75	1288	58	74.7	128	16.2	90.9	704.5	21.4	6.77	4.74
							218.8	3288.9	100.0	31.59	22.11

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Wind Design

Asce7-16

Envelope Procedure, Part 2: Enclosed Simple Diaphragm Low Rise Buildings

$p_s = \lambda K_{zt} p_{s30}$

Risk Category =	II
ATC Council Wind Load =	98
Exposure (26.7) =	C
λ (adjustment factor) =	1.40
K_{zt} (topographic factor) =	1.00

$p_s =$ **1.40** p_{s30}

Partial Figure 28.6-1

Adjustment Factor for Buidling Height and Expsure, λ

Mean Roof	Exposure		
	B	C	D
15	1.00	1.21	1.47
20	1.00	1.29	1.55
25	1.00	1.35	1.61
30	1.00	1.40	1.66
35	1.00	1.45	1.70

Partial Figure 28.6-1

Simplified Design Wind Pressure, p_{s30} (psf)

Basic Wind Speed	Roof Angle	Roof Pitch	Horizontal Pressures			
			A (end wall)	B (end roof)	C (wall)	D (roof)
98	0 to 5	flat	14.9	-7.7	9.9	-4.6
	10	2	16.8	-7.0	11.2	-4.1
	15	3	18.8	-6.2	12.5	-3.6
	20	4	20.7	-5.4	13.8	-3.0
	25	6	18.8	3.0	13.6	3.1
	30 to 45	7 to 12	16.8	11.5	13.4	9.2

ASD Design Wind Pressures, p_s

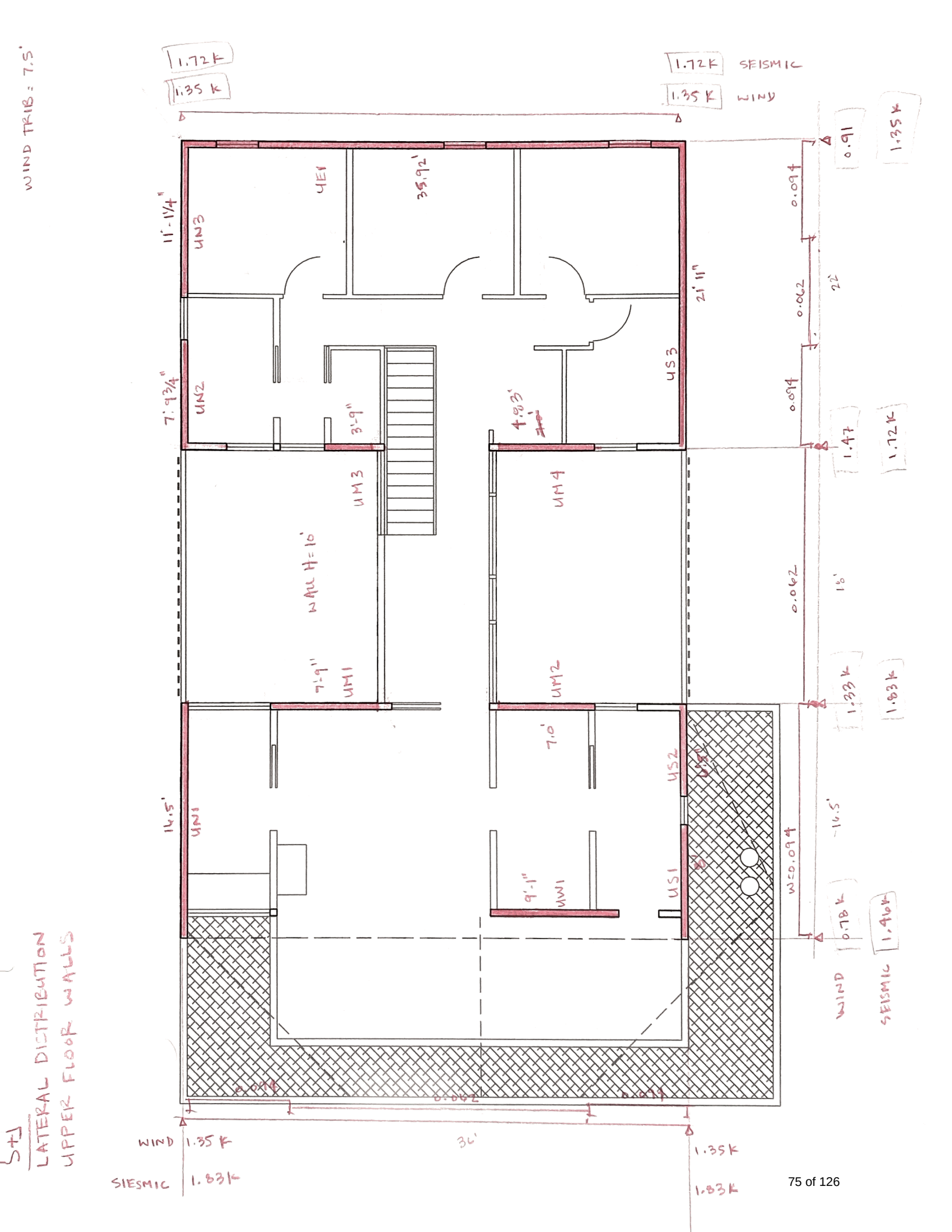
Basic Wind Speed	Roof Angle	Roof Pitch	Horizontal Pressures				
			A (end wall)	B (end roof)	C (wall)	D (roof)	
98	0 to 5	flat	**12.5**	**-6.5**	**8.3**	**-3.9**	<= Use this row
	10	0	14.1	-5.9	9.4	-3.4	
	15	3	15.8	-5.2	10.5	-3.0	
	20	4	17.4	-4.5	11.6	-2.5	
	25	6	15.8	2.5	11.4	2.6	
	30 to 45	7 to 12	14.1	9.7	11.3	7.7	

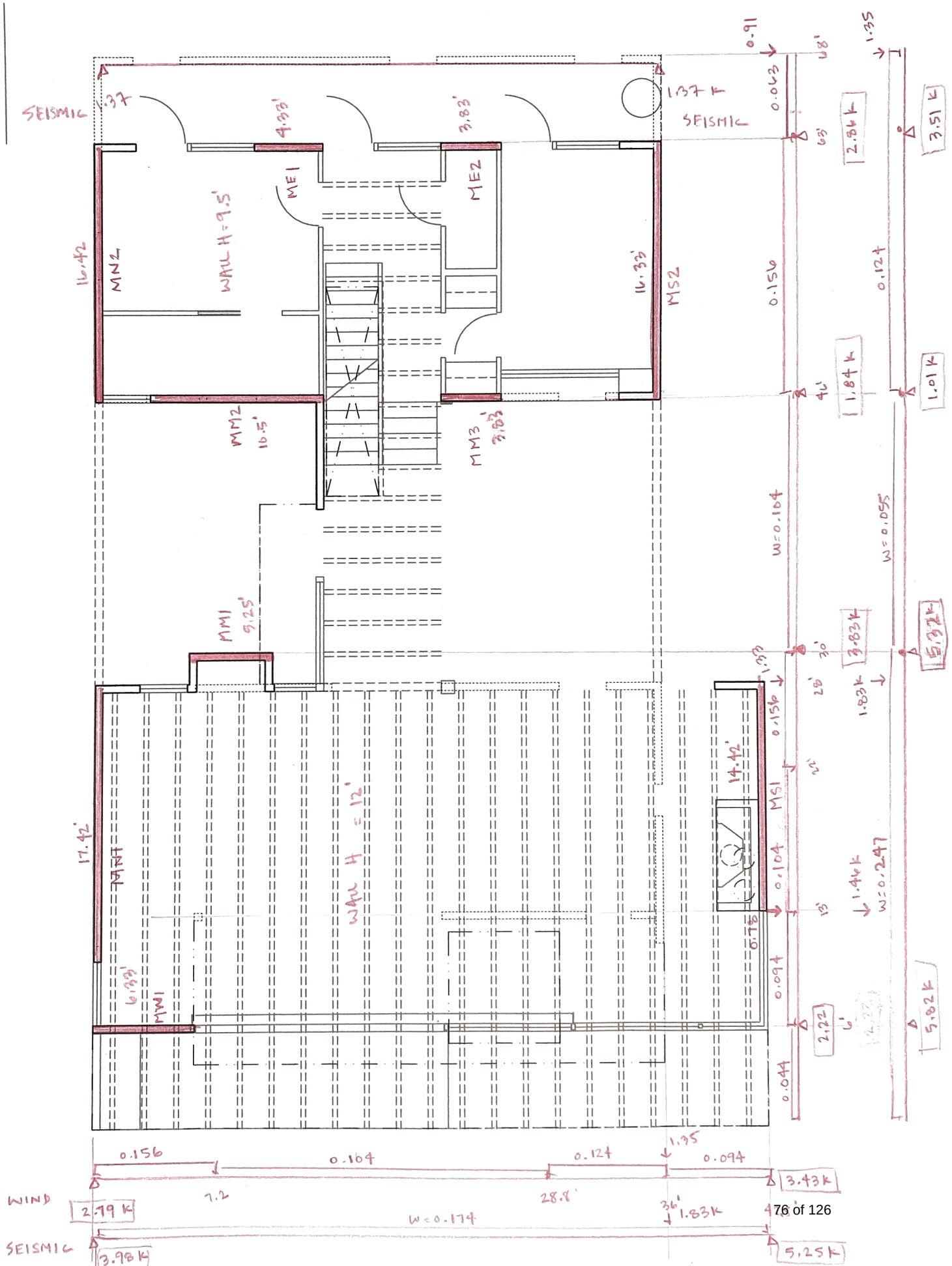
End Zone Computation (Figure 28.6-1, footnote 9)

Least horizontal dimension (W_L)= 36.0 ft

Mean roof height (H) = 30.0 ft

a =>	$0.1W_L$	3.60		
	0.4H	12.00	a =	3.6 ft
	$0.04W_L$	1.44	End Zone (2a) =	**7.2** ft
	>= 3'	3.00		

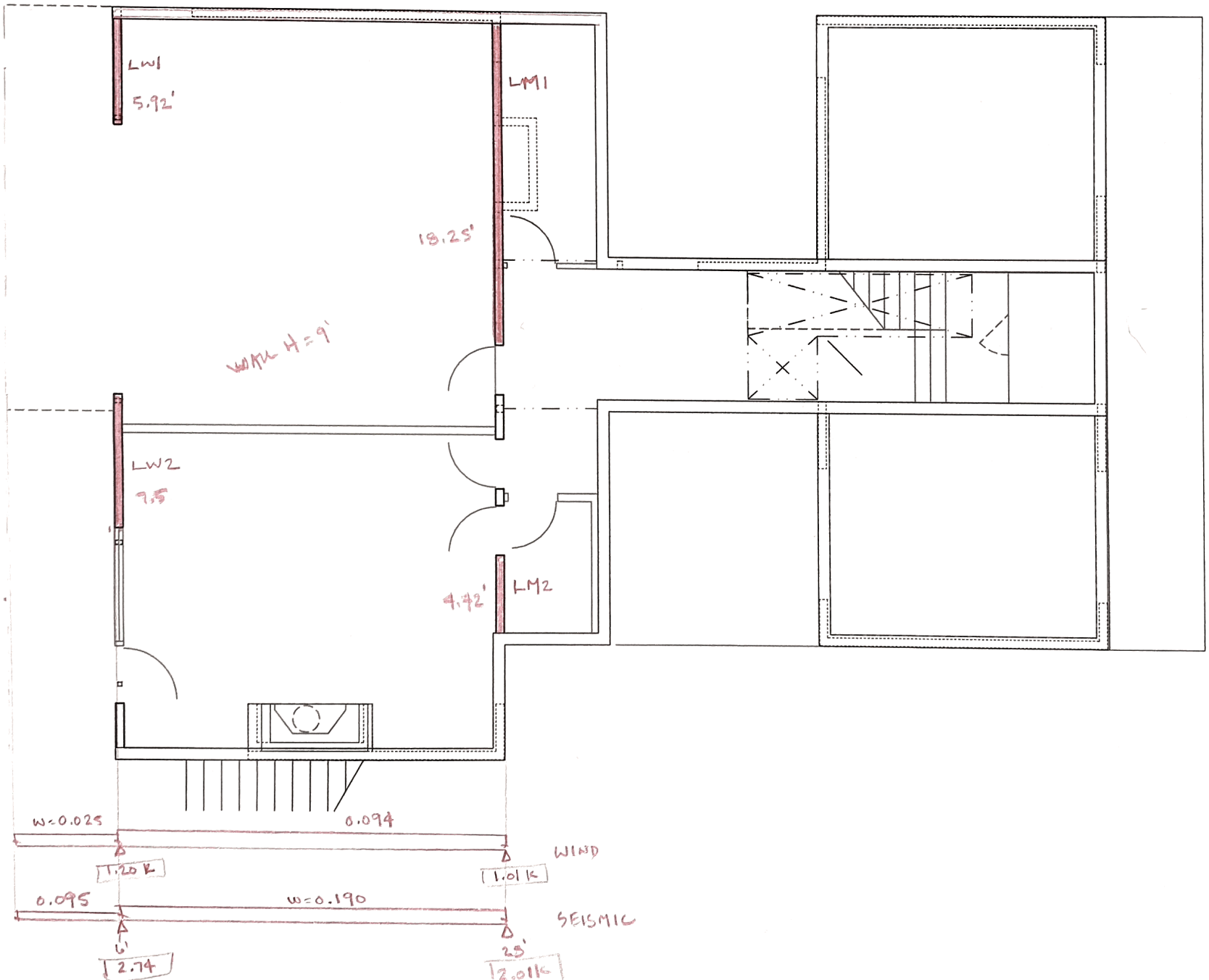

WIND TRIB: 7.5'
1.72K
1.35 K
1.72K SEISMIC
1.35 K WIND
11'-11/4"
UN3
4E1
35.92'
21' 11"
US3
7'-9 3/4"
UN2
3'-9"
4.83'
UM3
UM4
WALL H=10'
7'-9"
UM1
UM2
7.0'
US2
14.5'
UN1
9'-1"
UW1
US1
0.091
0.094
0.062
0.094
1.35K
22'
1.47
1.72K
0.062
18'
1.33K
1.83K
14.5'
W=0.094
0.78K
1.46K
WIND
SEISMIC
0.094
0.062
0.094
WIND 1.35K
SIESMIC 1.83K
36'
1.35K
1.83K
5+J
LATERAL DISTRIBUTION
UPPER FLOOR WALLS


WIND TRIB = 12.5'
SAM + JUNE
LATERAL DISTRIBUTION
MAIN FLOOR WALLS
SEISMIC
WIND
SEISMIC
MW1
MW2
ME1
ME2
MM1
MM2
MM3
MS1
MS2
WALL H = 9.5'
WALL H = 12'
16.42'
17.42'
14.42'
16.33'
4.33'
3.83'
9.25'
10.5'
6.33'
0.156
0.104
0.124
0.094
0.044
0.176
0.0043
W=0.104
W=0.055
W=0.247
W=0.174
7.2'
28.8'
36'
2.79 K
3.98 K
1.83K
3.43K
5.25K
2.84K
3.51K
1.84K
1.01K
3.83K
5.32K
1.4K
5.02K
2.22
1.83K
137 K
SEISMIC

SAM + JUNE

LATERAL DISTRIBUTION
LOWER FLOOR

WIND TRIB: 7.5'



Sam + June - lateral force distribution

wind

max shearwall aspect ratio w/out reduction = 2.0
max shearwall aspect ratio with reduction = 3.5

Shearwall Schedule

SW1	241 lbs/ft	(CDX,HEM-FIR,15/32" SHEATHING, 1-1/2" NAIL PEN., 8D @ 6"OC)
SW2	353 lbs/ft	(CDX,HEM-FIR,15/32" SHEATHING, 1-1/2" NAIL PEN., 8D @ 4"OC)
SW3	595 lbs/ft	(CDX,HEM-FIR,15/32" SHEATHING, 1-1/2" NAIL PEN., 8D @ 2"OC)
SW4	1190 lbs/ft	(DOUBLE SIDED CDX,HEM-FIR,15/32" SHEATHING, 1-1/2" NAIL PEN., 8D @ 2"OC)

WALLS BELOW ROOF

	F (lb)	V (above)	V (total)	L (ft)	h (ft)	aspect ratio	Aspect reduct.	rho	(rho)v (plf)	SW	M ot (lbft)	M ot (above)	M ot (total)	OT (lb)	TL1 (lb)	TL2 (lb)	T1 (lb)	T2 (lb)	HD1/HD2	C1 (lb)	C2 (lb)	POST
UN1	1830	0	1830	16.50	10.00	0.61	1.00	1.00	111	SW1	18300	0	18300	1109	0	890	547	360	NONE	1109	1999	(2)2x6
UN2	708	0	708	7.75	10.00	1.29	1.00	1.00	91	SW1	7079	0	7079	913	0	0	650	650	NONE	913	913	(2)2x6
UN3	1012	0	1012	11.08	10.00	0.90	1.00	1.00	91	SW1	10121	0	10121	913	0	0	536	536	NONE	913	913	(2)2x6
US1	1010	0	1010	8.00	10.00	1.25	1.00	1.00	126	SW1	10097	0	10097	1262	0	0	990	990	CSHP20	1262	1262	(2)2x6
US2	820	0	820	6.50	10.00	1.54	1.00	1.00	126	SW1	8203	0	8203	1262	0	0	1041	1041	CSHP20	1262	1262	(2)2x6
US3	1720	0	1720	21.92	10.00	0.46	1.00	1.00	78	SW1	17200	0	17200	785	0	0	38	38	NONE	785	785	(2)2x6
UW1	1460	0	1460	9.01	10.00	1.11	1.00	1.00	162	SW1	14600	0	14600	1621	520	2720	926	463	CSHP20/NONE	2141	4341	(2)2x6
UM1	962	0	962	7.75	10.00	1.29	1.00	1.00	124	SW1	9615	0	9615	1241	2330	890	392	695	NONE/CSHP20	3571	2131	(2)2x6
UM2	868	0	868	7.00	10.00	1.43	1.00	1.00	124	SW1	8685	0	8685	1241	490	2330	814	427	CSHP20/NONE	1731	3571	(2)2x6
UM3	752	0	752	3.75	10.00	2.67	0.75	1.00	200	SW1	7517	0	7517	2005	3080	790	1229	1711	CS16	5085	2795	(2)2x6
UM4	968	0	968	4.83	10.00	2.07	0.97	1.00	200	SW1	9683	0	9683	2005	720	3080	1689	1192	CS16	2725	5085	(2)2x6
UE1	675	0	675	13.25	10.00	0.75	1.00	1.00	51	SW1	6750	0	6750	509	0	0	-452	-452	NONE	509	509	(2)2x6
UE2	675	0	675	13.25	10.00	0.75	1.00	2.00	51	SW2	6750	1	6751	510	0	0	-451	-451	NONE	510	510	(2)2x7

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Sam + June - lateral force distribution

wind

max shearwall aspect ratio w/out reduction = 2.0
max shearwall aspect ratio with reduction = 3.5

Shearwall Schedule

SW1	241 lbs/ft	(CDX,HEM-FIR,15/32" SHEATHING, 1-1/2" NAIL PEN., 8D @ 6"OC)
SW2	353 lbs/ft	(CDX,HEM-FIR,15/32" SHEATHING, 1-1/2" NAIL PEN., 8D @ 4"OC)

WALLS BELOW UPPER FLOOR

	F (lb)	V (above)	V (total)	L (ft)	h (ft)	aspect ratio	Aspect reduct.	rho	(rho)v (plf)	SW	M ot (lbft)	M ot (above)	M ot (total)	OT (lb)	TL1 (lb)	TL2 (lb)	T1 (lb)	T2 (lb)	HD1/HD2	C1 (lb)	C2 (lb)	POST
MN1	3980	1830	5810	17.42	12.50	0.72	1.00	1.00	334	SW2	72625	18300	90925	5220	670	690	3776	3771	HDU5	5890	5910	(3)2x6
MN2	1370	1720	3090	16.42	9.50	0.58	1.00	1.00	188	SW1	29355	10121	39476	2404	1400	3090	1064	754	DTT2Z	3804	5494	(2)2x6
MS1	5250	0	5250	14.42	12.00	0.83	1.00	1.00	364	SW3	63000	0	63000	4369	243	0	3373	3417	HDU5	4612	4369	(2)2x6
MS2	1370	1720	3090	16.33	9.50	0.58	1.00	1.00	189	SW1	29355	17200	46555	2851	0	0	1870	1870	DTT2Z	2851	2851	(2)2x6
MW1	5820	0	5820	6.33	12.50	1.97	1.00	1.30	1195	SW4	94575	0	94575	14941	11950	1160	10404	13524	STL COL	26891	16101	STL COL
MM1	2660	0	2660	2.00	12.50	6.25	N.G.	1.30	1729	SW4	43225	0	43225	21613	0	0	21538	21538	STL COL	21613	21613	STL COL
MM1	2660	0	2660	2.00	12.50	6.25	N.G.	1.30	1729	SW4	43225	0	43225	21613	0	0	21538	21538	STL COL	21613	21613	STL COL
MM2	740	1260	2000	10.50	9.50	0.90	1.00	1.00	191	SW1	19003	7517	26521	2526	4720	2500	769	1176	DTT2Z	7246	5026	(3)/(2)2x6
MM3	270	460	730	3.83	9.50	2.48	0.81	1.00	191	SW1	6932	9683	16614	4338	3440	10600	3382	2069	HDU5	7778	14938	(3)/(5)2x6
ME1	1863	0	1863	4.33	9.50	2.19	0.91	1.30	559	SW3	23002	0	23002	5312	9150	6320	1102	1102	DTT2Z	14462	11632	(3) LSL 1-3/4x5.5
ME2	1647	0	1647	3.83	9.50	2.48	0.81	1.30	559	SW3	20346	0	20346	5312	6320	9560	1245	1245	DTT2Z	11632	14872	(3) LSL 1-3/4x5.5

WALLS BELOW MAIN FLOOR

	F (lb)	V (above)	V (total)	L (ft)	h (ft)	aspect ratio	Aspect reduct.	rho	(rho)v (plf)	SW	M ot (lbft)	M ot (above)	M ot (total)	OT (lb)	TL1 (lb)	TL2 (lb)	T1 (lb)	T2 (lb)	HD1/HD2	C1 (lb)	C2 (lb)	POST
LW1	1209	2567	3776	5.92	9.00	1.52	1.00	1.00	638	SW4	33985	94575	128560	21716	27130	0	11347	19738	STL COL	48846	21716	STL COL
LW2	1531	3253	4784	7.50	9.00	1.20	1.00	1.00	638	SW4	43055	0	43055	5741	17300	44630	-1697	-7956	NONE	23041	50371	STL COL
LM1	1618	4283	5901	18.25	9.00	0.49	1.00	1.00	323	SW4	53108	0	53108	2910	2640	0	-1220	-736	NONE	5550	2910	(2)2x6
LM2	392	1037	1429	4.42	9.00	2.04	0.98	1.00	323	SW4	12862	0	12862	2910	0	2640	2027	1543	HDU5	2910	5550	(2)2x6

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Sam + June - lateral force distribution

wind

max shearwall aspect ratio w/out reduction = 3.5
max shearwall aspect ratio with reduction = na

Shearwall Schedule

SW1	241	lbs/ft	(CDX,HEM-FIR,15/32" SHEATHING, 1-1/2" NAIL PEN., 8D @ 6"OC)
SW2	353	lbs/ft	(CDX,HEM-FIR,15/32" SHEATHING, 1-1/2" NAIL PEN., 8D @ 4"OC)

WALLS BELOW ROOF

	F (lb)	V (above)	V (total)	L (ft)	h (ft)	aspect ratio	Aspect reduct.	(rho)v (plf)	SW	M ot (lbft)	M ot (above)	M ot (total)	OT (lb)	TL1 (lb)	TL2 (lb)	T1 (lb)	T2 (lb)	HD1/HD2	C1 (lb)	C2 (lb)	POST
UN1	1350	0	1350	16.50	10.00	0.61	1.00	82	SW1	13500	0	13500	818	0	890	256	69		818	1708	(2)2x6
UN2	556	0	556	7.75	10.00	1.29	1.00	72	SW1	5556	0	5556	717	0	0	453	453		717	717	(2)2x6
UN3	794	0	794	11.08	10.00	0.90	1.00	72	SW1	7944	0	7944	717	0	0	340	340		717	717	(2)2x6
US1	745	0	745	8.00	10.00	1.25	1.00	93	SW1	7448	0	7448	931	0	0	659	659		931	931	(2)2x6
US2	605	0	605	6.50	10.00	1.54	1.00	93	SW1	6052	0	6052	931	0	0	710	710		931	931	(2)2x6
US3	1350	0	1350	21.92	10.00	0.46	1.00	62	SW1	13500	0	13500	616	0	0	-131	-131		616	616	(2)2x6
UW1	780	0	780	9.01	10.00	1.11	1.00	87	SW1	7800	0	7800	866	520	2720	171	-292		1386	3586	(2)2x6
UM1	699	0	699	7.75	10.00	1.29	1.00	90	SW1	6988	0	6988	902	2330	890	53	356		3232	1792	(2)2x6
UM2	631	0	631	7.00	10.00	1.43	1.00	90	SW1	6312	0	6312	902	490	2330	475	88		1392	3232	(2)2x6
UM3	513	0	513	3.75	10.00	2.67	1.00	137	SW1	5128	0	5128	1367	3080	790	592	1074		4447	2157	(2)2x6
UM4	957	0	957	7.00	10.00	1.43	1.00	137	SW1	9572	0	9572	1367	720	3080	978	481		2087	4447	(2)2x6
UE1	910	0	910	35.92	10.00	0.28	1.00	25	SW1	9100	0	9100	253	0	0	-2352	-2352		253	253	(2)2x6

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SMITHLUBKE
STRUCTURAL DESIGN

Sam + June - lateral force distribution

wind

max shearwall aspect ratio w/out reduction = 3.5
max shearwall aspect ratio with reduction = na

Shearwall Schedule

SW1	241 lbs/ft	(CDX,HEM-FIR,15/32" SHEATHING, 1-1/2" NAIL PEN., 8D @ 6"OC)
SW2	353 lbs/ft	(CDX,HEM-FIR,15/32" SHEATHING, 1-1/2" NAIL PEN., 8D @ 4"OC)

WALLS BELOW UPPER FLOOR

	F (lb)	V (above)	V (total)	L (ft)	h (ft)	aspect ratio	Aspect reduct.	(rho)v (plf)	SW	M ot (lbft)	M ot (above)	M ot (total)	OT (lb)	TL1 (lb)	TL2 (lb)	T1 (lb)	T2 (lb)	HD1/HD2	C1 (lb)	C2 (lb)	POST
MN1	2790	1350	4140	17.42	12.00	0.69	1.00	238	SW1	49680	13500	63180	3627	670	690	2209	2205		4297	4317	(3)2x6
MN2	2790	1350	4140	16.42	9.50	0.58	1.00	252	SW1	39330	7944	47274	2879	1400	3090	1539	1229		4279	5969	(2)2x6
MS1	3430	0	3430	14.42	12.00	0.83	1.00	238	SW1	41160	0	41160	2854	243	0	1858	1903		3097	2854	(2)2x6
MS2	2790	1350	4140	16.33	9.50	0.58	1.00	254	SW1	39330	13500	52830	3235	0	0	2255	2255		3235	3235	(2)2x6
MW1	2220	0	2220	6.33	12.50	1.97	1.00	351	SW2	27750	0	27750	4384	11950	1160	-153	2967		16334	5544	(2)2x6
MM1	3830	0	3830	5.25	12.50	2.38	1.00	730	SW2	47875	0	47875	9119	0	0	8922	8922		9119	9119	(2)2x6
MM2	1348	1077	2425	10.50	9.50	0.90	1.00	231	SW1	23041	5128	28169	2683	2500	4720	1333	926		5183	7403	(2)2x6
MM3	492	393	885	3.83	9.50	2.48	1.00	231	SW1	8404	9572	17976	4694	3440	10600	3738	2425		8134	15294	(2)2x6
ME1	1518	990	2508	4.33	9.50	2.19	1.00	579	SW1	23822	0	23822	5502	9150	6320	1292	1292		14652	11822	(2)2x6
ME2	1342	990	2332	3.83	9.50	2.48	1.00	609	SW1	22158	0	22158	5785	6320	9560	1718	1718		12105	15345	(2)2x6

WALLS BELOW MAIN FLOOR

	F (lb)	V (above)	V (total)	L (ft)	h (ft)	aspect ratio	Aspect reduct.	(rho)v (plf)	SW	M ot (lbft)	M ot (above)	M ot (total)	OT (lb)	TL1 (lb)	TL2 (lb)	T1 (lb)	T2 (lb)	HD1/HD2	C1 (lb)	C2 (lb)	POST
LW1	529	980	1510	5.92	9.00	1.52	1.00	255	SW1	13586	27750	41336	6982	27130	0	-3387	5004		34112	6982	(3)2x6
LW2	671	1242	1912	7.50	9.00	1.20	1.00	255	SW1	17212	0	17212	2295	17300	44630	-5143	-11402		19595	46925	(3)2x6
LM1	813	3083	3896	18.25	9.00	0.49	1.00	213	SW1	35067	0	35067	1921	2640	0	-2209	-1725		4561	1921	(2)2x6
LM2	197	747	944	4.42	9.00	2.04	1.00	213	SW1	8493	0	8493	1921	0	2640	1038	554		1921	4561	(2)2x6

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STRUCTURAL DESIGN

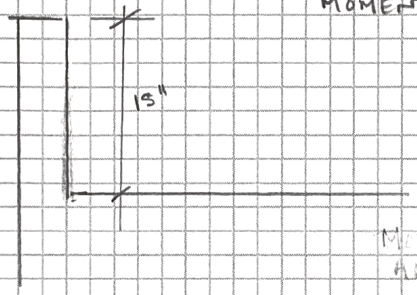
SAM + JUNE

PARAPET C+C, Zone 5 A_{eff} = 10 ; P_{net30} = 24.1

λ = 1.40

P_{net} = 24.1 - 1.40 = 33.74

ASD P_{net} = 0.6 · 33.74 = 20.24



PARAPET MOMENT $(20.24\ PSF \cdot 15/12) \cdot 15/2/12$ =

= 25.3 PLF · 7.5/12

= 15.81 K-FT/FT

31.63 K FT/2 FT

126.5 K-FT/8 FT

MOMENT ARM 12"

T = C 126.5 K

Building Code Information

Governing Code : IBC 2018, ASCE 7-16, CBC 2019, AISC 360-16, NDS 2018, ACI 318-14, TMS 402-16
City Jurisdiction : Mercer Island
Contact Name : Julie Lubke
Alternate Contact :
Building Official :
Address : , , ;
Phone : 206-852-1536 Fax : eMail : julie@smithlubke.com
Notes :

Project Information

Project Title : Sam + June Residence

Description :

I.D. :

Address : , ,

Project Leader :

Phone : Fax : eMail :

Project Notes

Project Title: Sam + June Residence
Engineer:
Project ID:
Project Descr:

Restrained Retaining Wall

Project File: SamJuneWalls.ec6

DESCRIPTION: stair hall

Code Reference

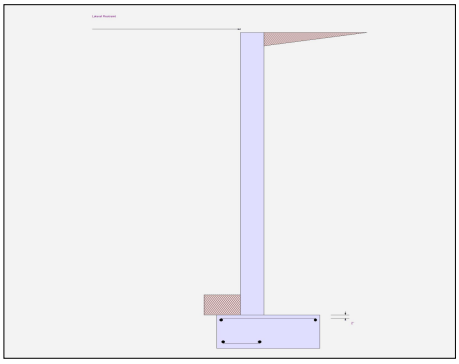
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	14.0 ft
Wall height above soil	=	0 ft
Total Wall Height	=	14.0 ft
Top Support Height	=	14.0 ft
Slope Behind Wall	=	0
Height of Soil over Toe	=	12.0 in

Soil Data

Allow Soil Bearing	=	2000 psf
Equivalent Fluid Pressure Method		
At-Rest Heel Pressure	=	32.0 psf/ft
	=	0.0 psf/ft
Passive Pressure	=	250.0 psf/ft
Soil Density	=	110 pcf
Footing||Soil Frictior	=	0.4 psf
Soil height to ignore for passive pressure	=	12 in



Surcharge Loads

Surcharge Over Heel	=	0 psf
>>>Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0 lbs
Axial Live Load	=	0 lbs
Axial Load Eccentricity	=	0 in

Earth Pressure Seismic Load

Uniform Lateral Load Applied to Stem

Lateral Load	=	0 #/ft
...Height to Top	=	0 ft
...Height to Bottom	=	0 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	0.00 psf (Strength Level)

Wind acts left-to-right toward retention side.

Adjacent Footing Load

Adjacent Footing Load	=	0 lbs
Footing Width	=	0 ft
Eccentricity	=	0 in
Wall to Ftg CL Dist	=	0 ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	0 ft
Poisson's Ratio	=	0.3

K_h Soil Density Multiplier = 0.2 g Added seismic per unit area = 0.0 psf

Design Summary

Total Bearing Load	=	6,196.67 lbs	
...resultant ecc.	=	0.0 in	
Soil Pressure @ Toe	=	1,549.17 psf	OK
Soil Pressure @ Heel	=	1,549.17 psf	OK
Allowable	=	0 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	1,859.0 psf	
ACI Factored @ Heel	=	1,859.0 psf	
Footing Shear @ Toe	=	0.8182 psi	OK
Footing Shear @ Heel	=	-2.982 psi	OK
Allowable	=	82.158 psi	
Reaction at Top	=	626.14 lbs	
Reaction at Bottom	=	3,299.92 lbs	

Sliding Calcs
Lateral Sliding Force = 3,299.92 lbs

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Concrete Stem Construction

Thickness = 10.00 in
Wall Weight = 125.0 psf
Stem is FIXED to top of footing

		@ Top Support	Mmax Between Top & Base	@ Base of Wall
		Stem OK	As < Min %	As < Min %
Design Height Above Ftg	=	14.0 ft	0.05623 ft	0.00 ft
Rebar Size	=	# 5	# 5	# 5
Rebar Spacing	=	16.00 in	16.00 in	16.00 in
Rebar Placed at	=	Edge	Edge	Edge
Rebar Depth 'd'	=	7.50 in	8.0 in	7.50 in
Design Data				
fb/FB + fa/Fa	=		1.000	1.000
Moment....Actual	=	0.0 ft-#	9,366.38 ft-#	9,366.38 ft-#
Moment.....Allowable	=	7,607.68 ft-#	8,130.80 ft-#	7,607.68 ft-#
Shear Force @ this height	=	1,003.51 lbs		4,014.09 lbs
Shear.....Actual	=	11.150 psi		44.601 psi
Shear.....Allowable	=	82.158 psi		82.158 psi

Project Title: Sam + June Residence
Engineer:
Project ID:
Project Descr:

Restrained Retaining Wall

Project File: SamJuneWalls.ec6

LIC# : KW-06018769, Build:20.22.12.28 | Smith Lubke Structural Design | (c) ENERCALC INC 1983-2022

DESCRIPTION: stair hall

Footing Strengths & Dimensions

Toe Width	=	1 ft
Heel Width	=	3
Total Footing Width	=	4.0
Footing Thickness	=	20 in
Key Width	=	0 in
Key Depth	=	0 in
Key Distance from Toe	=	0 ft

f'c = 3,000 psi Fy = 60000 psi
Footing Concrete Density = 150 pcf
Min. As % = 0.0018
Cover @ Top = 2 in @ Btm.= 3 in

Footing Design Results

		Toe	Heel	
Factored Pressure	=	1,859.0	1,859.0	psf
Mu' : Upward	=	929.50	0	ft-#
Mu' : Downward	=	216.0	0	ft-#
Mu: Design	=	714	678	ft-#
Actual 1-Way Shear	=	0.8182	0	psi
Allow 1-Way Shear	=	82.158	82.158	psi

Other Acceptable Sizes & Spacings:

Toe: # 7 @ 18.00 in	-or-	#4@ 5.55 in, #5@ 8.61 in, #6@ 12.22 in, #7@ 16.6
Heel:# 6 @ 18.00 in	-or-	#4@ 5.55 in, #5@ 8.61 in, #6@ 12.22 in, #7@ 16.6
Key: # 0 @ 0.00 in	-or-	No key defined

Min footing T&S reinf Area 1.73 in2
Min footing T&S reinf Area per foot 0.43 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 5.56 in	#4@ 11.11 in
#5@ 8.61 in	#5@ 17.22 in
#6@ 12.22 in	#6@ 24.44 in

Summary of Forces on Footing : Slab is NOT providing sliding, stem is FIXED at footing

Forces acting on footing for sliding & soil pressure....

Sliding Forces

Stem Shear @ Top of Footing	=	2,508.81 lbs
Heel Active Pressure	=	791.11
Sliding Force	=	**3,299.92 lbs**

Stem is specified to be fixed to footing, and top restraint is assumed to react out any tendency for moment at the footing/soil interface, so uniform soil pressure is assumed.

Load & Moment Summary For Footing : For Soil Pressure Calcs

Moment @ Top of Footing Applied from Stem			=	-5,853.99 ft-#
Surcharge Over Heel		0.0	0.0	0.0
Adjacent Footing Load	=	0.0 lbs	0.0 ft	0.0 ft-#
Axial Dead Load on Stem	=	0.0 lbs	0.0 ft	0.0 ft-#
Soil Over Toe	=	110.0 lbs	0.50 ft	55.0 ft-#
Surcharge Over Toe	=	0.0 lbs	0.0 ft	0.0 ft-#
Stem Weight	=	1,750.0 lbs	1.417 ft	2,479.17 ft-#
Soil Over Heel	=	3,336.67 lbs	2.917 ft	9,731.94 ft-#
Footing Weight	=	1,000.0 lbs	2.0 ft	2,000.0 ft-#
Total Vertical Force	≣	6,196.67 lbs	Base Moment =	8,412.13 ft-#

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

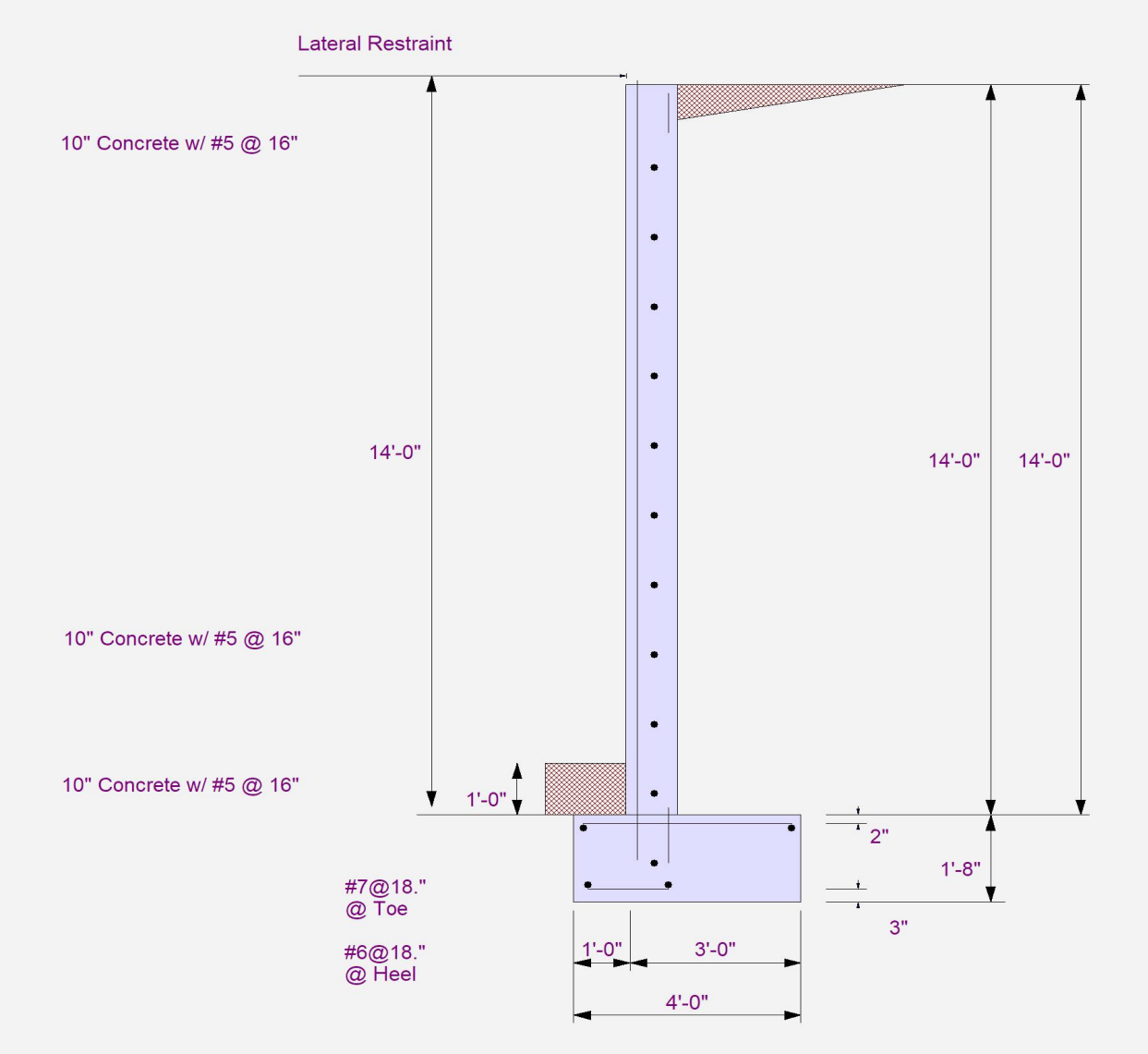
Restrained Retaining Wall

DESCRIPTION: stair hall

Rebar Lap & Embedment Lengths Information

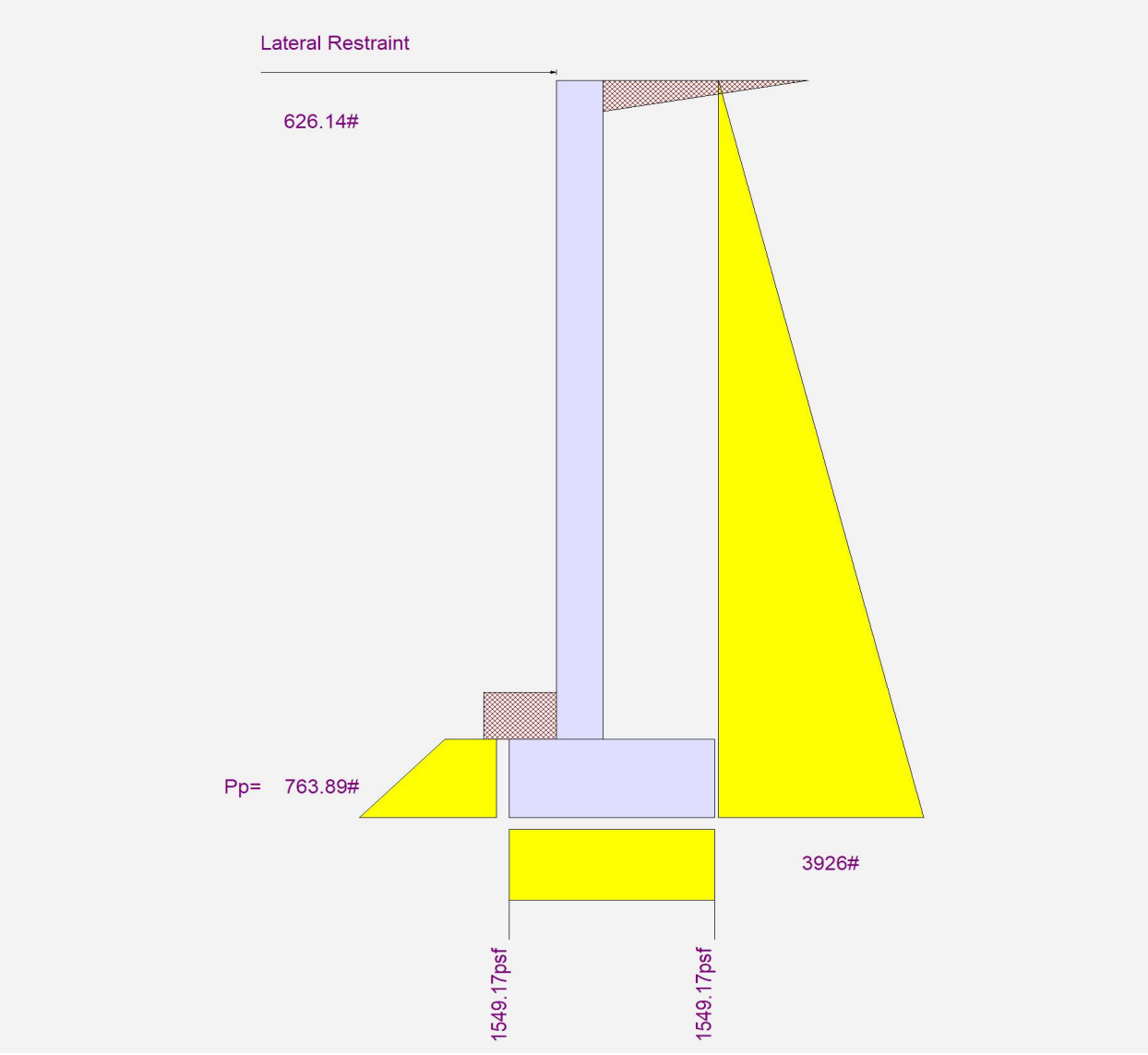
Restrained Retaining Wall

DESCRIPTION: stair hall



Restrained Retaining Wall

DESCRIPTION: stair hall



Project Title: Sam + June Residence
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: samjunewalls.ec6

DESCRIPTION: 14' CANT

Code Reference

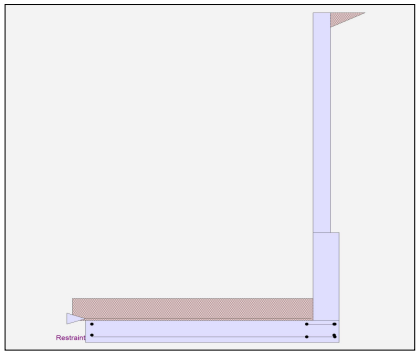
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	14.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	350.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Strength Level)	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Project Title: Sam + June Residence
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: samjunewalls.ec6

DESCRIPTION: 14' CANT

Design Summary

Wall Stability Ratios

Overturning	=	1.52	OK
Slab Resists All Sliding !			
Global Stability	=	3.78	
Total Bearing Load	=	4,442 lbs	
...resultant ecc.	=	30.73 in	
Eccentricity outside middle third			
Soil Pressure @ Toe	=	1,279 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	3,000 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	1,791 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	31.0 psi	OK
Footing Shear @ Heel	=	0.0 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	3,937.5 lbs

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

		2nd	Bottom			
		Stem OK	Stem OK			
Design Height Above Ftg	ft =	4.00	0.00			
Wall Material Above "Ht"	=	Concrete	Concrete			
Design Method	=	SD	SD	SD	SD	SD
Thickness	=	8.00	12.00			
Rebar Size	=	# 4	# 6			
Rebar Spacing	=	6.00	6.00			
Rebar Placed at	=	Edge	Edge			
Design Data						
fb/FB + fa/Fa	=	**0.885**	**0.753**			
Total Force @ Section						
Service Level	lbs =					
Strength Level	lbs =	2,800.0	5,488.0			
Moment....Actual						
Service Level	ft-# =					
Strength Level	ft-# =	9,333.3	25,610.7			
Moment.....Allowable	ft-# =	10,542.0	34,002.9			
Shear.....Actual						
Service Level	psi =					
Strength Level	psi =	37.3	47.5			
Shear.....Allowable	psi =	82.2	75.0			
Anet (Masonry)	in2 =					
Wall Weight	psf =	100.0	150.0			
Rebar Depth 'd'	in =	6.25	9.63			

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	3,000.0	2,500.0
Fy	psi =	60,000.0	60,000.0

Cantilevered Retaining Wall

LIC# : KW-06018769, Build:20.22.12.28 Smith Lubke Structural Design (c) ENERCALC INC 1983-2022

DESCRIPTION: 14' CANT

Concrete Stem Rebar Area Details

2nd Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.3497 in2/ft		
(4/3) * As :	0.4662 in2/ft	Min Stem T&S Reinf Area 1.920 in2	
200bd/fy : 200(12)(6.25)/60000 :	0.25 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.3497 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.4 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	1.016 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.6116 in2/ft		
(4/3) * As :	0.8154 in2/ft	Min Stem T&S Reinf Area 1.152 in2	
200bd/fy : 200(12)(9.625)/60000 :	0.385 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.288 in2/ft	
0.0018bh : 0.0018(12)(12) :	0.2592 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.6116 in2/ft	#4@ 8.33 in	#4@ 16.67 in
Provided Area :	0.88 in2/ft	#5@ 12.92 in	#5@ 25.83 in
Maximum Area :	1.3039 in2/ft	#6@ 18.33 in	#6@ 36.67 in

Footing Data

Toe Width	=	8.75 ft
Heel Width	=	1.00
Total Footing Width	=	9.75
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 3,000 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel	
Factored Pressure	=	1,791	0	psf
Mu' : Upward	=	40,019	0	ft-#
Mu' : Downward	=	12,633	0	ft-#
Mu: Design	=	27,386 OK	0	ft-# OK
phiMn	=	30,739	OK - Flush	
Actual 1-Way Shear	=	31.00	0.00	psi
Allow 1-Way Shear	=	82.16	0.00	psi

Toe Reinforcing = # 6 @ 6.00 in
Heel Reinforcing = Flush heel condition. No reinforcing required.
Key Reinforcing = None Spec'd
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, phi Tu = 0.00 ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 3.22 in, #5@ 5.00 in, #6@ 7.09 in, #7@ 9.67 in, #8@ 12.74 in, #9@ 16.13 in, #10@ 20.48 in

Heel: Flush heel condition. No reinforcing required.

Key: No key defined

Min footing T&S reinf Area	2.53	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 9.26 in	#4@ 18.52 in
#5@ 14.35 in	#5@ 28.70 in
#6@ 20.37 in	#6@ 40.74 in

Project Title: Sam + June Residence
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: samjunewalls.ec6

DESCRIPTION: 14' CANT

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#	.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	3,937.5	5.00	19,687.5			
HL Act Pres (be water tbl)						
Hydrostatic Force						
Buoyant Force =						
Surcharge over Heel =						
Surcharge Over Toe =						
Adjacent Footing Load =						
Added Lateral Load =						
Load @ Stem Above Soil =						
=						
Soil Over HL (ab. water tbl)						
Soil Over HL (bel. water tbl)						
Water Table						
Sloped Soil Over Heel =						
Surcharge Over Heel =						
Adjacent Footing Load =						
Axial Dead Load on Stem =						
* Axial Live Load on Stem =						
Soil Over Toe =				962.5	4.38	4,210.9
Surcharge Over Toe =						
Stem Weight(s) =				1,600.0	9.15	14,633.3
Earth @ Stem Transitions =				416.7	9.58	3,993.1
Footing Weight =				1,462.5	4.88	7,129.7
Key Weight =						
Vert. Component =						
Total =	3,937.5	**O.T.M.** =	19,687.5	**Total =** 4,441.7 lbs	**R.M.=**	29,967.0

Resisting/Overturning Ratio = **1.52**

Vertical Loads used for Soil Pressure = 4,441.7 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.051	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

DESCRIPTION: 14' CANT

Rebar Lap & Embedment Lengths Information

Stem Design Segment: 2nd
Stem Design Height: 4.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.3a) =	17.09 in
Development length for #4 bar specified in this stem design segment =	13.15 in

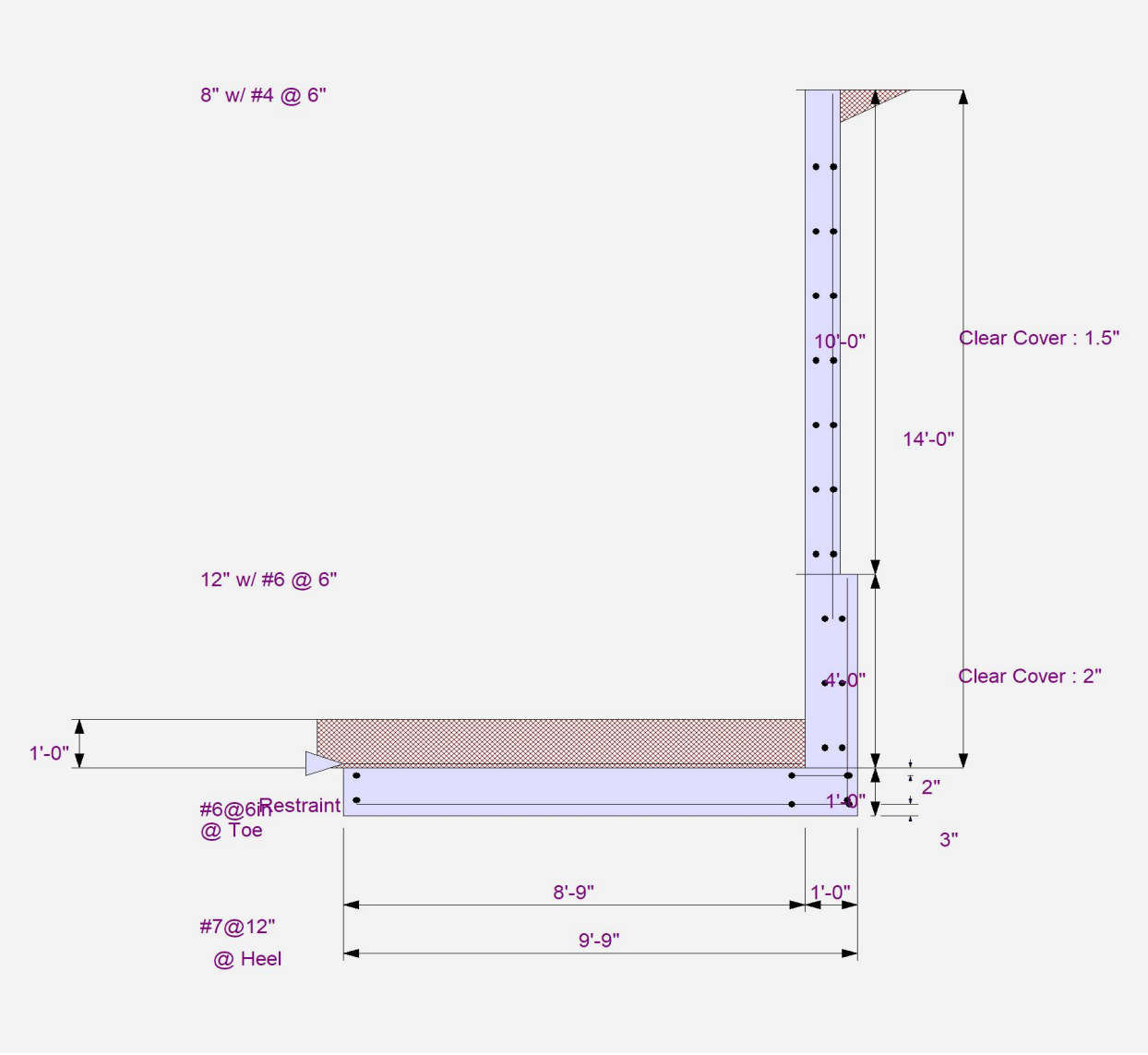
---

Stem Design Segment: Bottom
Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #6 bar specified in this stem design segment (25.4.2.3a) =	28.08 in
Development length for #6 bar specified in this stem design segment =	21.60 in
Hooked embedment length into footing for #6 bar specified in this stem design segment =	7.99 in
As Provided =	0.8800 in2/ft
As Required =	0.6116 in2/ft

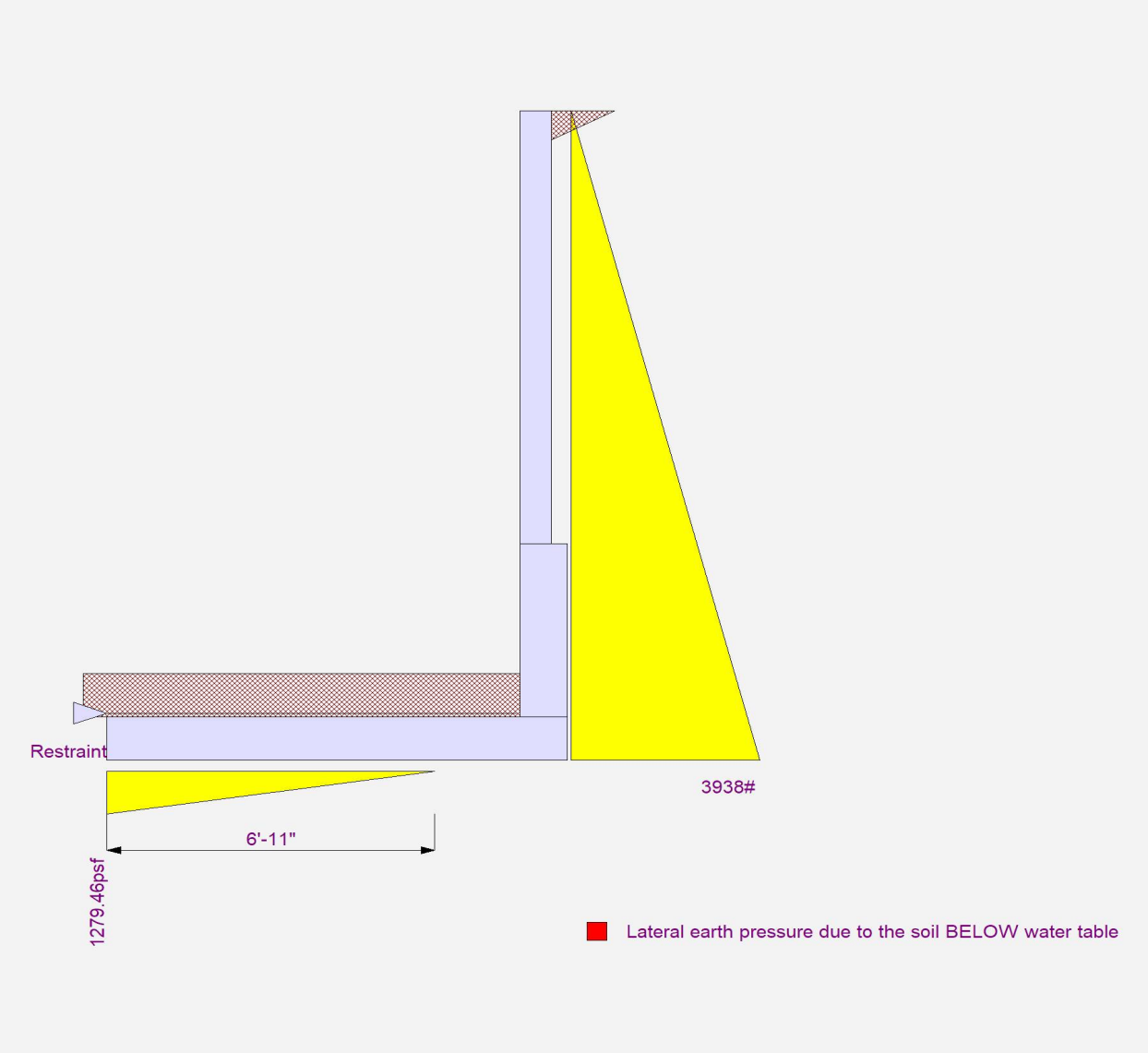
Cantilevered Retaining Wall

DESCRIPTION: 14' CANT



Cantilevered Retaining Wall

DESCRIPTION: 14' CANT



Project Title: Sam + June Residence
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: samjunewalls.ec6

DESCRIPTION: 11.5' CANT - WEST

Code Reference

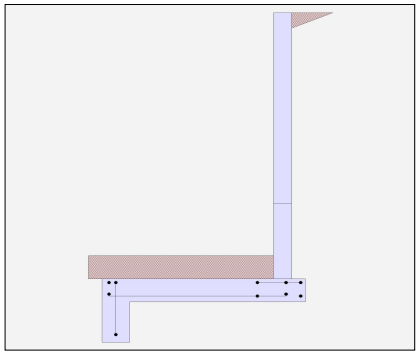
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	11.50 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	350.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.350
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Strength Level)	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Axial Load Applied to Stem

Axial Dead Load	=	1,423.0 lbs
Axial Live Load	=	1,245.0 lbs
Axial Load Eccentricity	=	0.0 in

Project Title: Sam + June Residence
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: samjunewalls.ec6

DESCRIPTION: 11.5' CANT - WEST

Design Summary

Wall Stability Ratios

Overturning	=	2.50	OK
Sliding	=	1.52	OK
Global Stability	=	1.00	

Total Bearing Load	=	6,600	lbs
...resultant ecc.	=	1.50	in

Eccentricity within middle third

Soil Pressure @ Toe	=	800 psf	OK
Soil Pressure @ Heel	=	980 psf	OK
Allowable	=	3,000 psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	1,119 psf	
ACI Factored @ Heel	=	1,372 psf	
Footing Shear @ Toe	=	45.3 psi	OK
Footing Shear @ Heel	=	2.4 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	2,734.4	lbs
less 100% Passive Force	-	2,285.9	lbs
less 100% Friction Force	-	1,874.2	lbs
Added Force Req'd	=	0.0	lbs OK
....for 1.5 Stability	=	0.0	lbs OK

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

		2nd	Bottom			
		Stem OK	Stem OK			
Design Height Above Ftg	ft =	3.25	0.00			
Wall Material Above "Ht"	=	Concrete	Concrete			
Design Method	=	SD	SD	SD	SD	SD
Thickness	=	8.00	8.00			
Rebar Size	=	# 4	# 6			
Rebar Spacing	=	12.00	6.00			
Rebar Placed at	=	Edge	Edge			
Design Data						
fb/FB + fa/Fa	=	**0.961**	**0.753**			
Total Force @ Section						
Service Level	lbs =					
Strength Level	lbs =	1,905.8	3,703.0			
Moment....Actual						
Service Level	ft-# =					
Strength Level	ft-# =	5,240.8	14,194.8			
Moment.....Allowable	ft-# =	5,448.0	18,848.3			
Shear.....Actual						
Service Level	psi =					
Strength Level	psi =	25.4	54.9			
Shear.....Allowable	psi =	82.2	82.2			
Anet (Masonry)	in2 =					
Wall Weight	psf =	100.0	100.0			
Rebar Depth 'd'	in =	6.25	5.63			

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	3,000.0	3,000.0
Fy	psi =	60,000.0	60,000.0

Cantilevered Retaining Wall

DESCRIPTION: 11.5' CANT - WEST

Concrete Stem Rebar Area Details

2nd Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1964 in2/ft		
(4/3) * As :	0.2618 in2/ft	Min Stem T&S Reinf Area 1.584 in2	
200bd/fy : 200(12)(6.25)/60000 :	0.25 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.25 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.2 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	1.016 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.5945 in2/ft		
(4/3) * As :	0.7926 in2/ft	Min Stem T&S Reinf Area 0.624 in2	
200bd/fy : 200(12)(5.625)/60000 :	0.225 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.5945 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.88 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	0.9144 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Footing Data

Toe Width	=	6.25 ft
Heel Width	=	1.17
Total Footing Width	=	7.42
Footing Thickness	=	12.00 in
Key Width	=	12.00 in
Key Depth	=	21.00 in
Key Distance from Toe	=	0.00 ft

f'c = 3,000 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel	
Factored Pressure	=	1,119	1,372 psf	
Mu' : Upward	=	23,250	187 ft-#	
Mu' : Downward	=	6,445	238 ft-#	
Mu: Design	=	16,805 OK	51 ft-#	OK
phiMn	=	30,739	24,231 ft-#	
Actual 1-Way Shear	=	45.30	2.38 psi	
Allow 1-Way Shear	=	82.16	82.16 psi	

Toe Reinforcing = # 6 @ 6.00 in
Heel Reinforcing = # 7 @ 12.00 in
Key Reinforcing = # 4 @ 9.26 in
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, phi Tu = 0.00 ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 5.25 in, #5@ 8.14 in, #6@ 11.56 in, #7@ 15.77 in, #8@ 20.76 in, #9@ 26.28 in, #10@ 33.38 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 20.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46.29 in, #10@ 58.79 in

Key: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18

Min footing T&S reinf Area	1.92	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 9.26 in	#4@ 18.52 in
#5@ 14.35 in	#5@ 28.70 in
#6@ 20.37 in	#6@ 40.74 in

Project Title: Sam + June Residence
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: samjunewalls.ec6

DESCRIPTION: 11.5' CANT - WEST

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		2,734.4	4.17	11,393.2	Soil Over HL (ab. water tbl)	719.2	7.17	5,154.6
HL Act Pres (be water tbl)					Soil Over HL (bel. water tbl)		7.17	5,154.6
Hydrostatic Force					Water Table			
Buoyant Force	=				Sloped Soil Over Heel	=		
Surcharge over Heel	=				Surcharge Over Heel	=		
Surcharge Over Toe	=				Adjacent Footing Load	=		
Adjacent Footing Load	=				Axial Dead Load on Stem	= 1,423.0	6.58	9,368.1
Added Lateral Load	=				* Axial Live Load on Stem	= 1,245.0	6.58	8,196.3
Load @ Stem Above Soil	=				Soil Over Toe	= 687.5	3.13	2,148.4
	=				Surcharge Over Toe	=		
					Stem Weight(s)	= 1,150.0	6.58	7,570.8
					Earth @ Stem Transitions	=		
					Footing Weight	= 1,112.6	3.71	4,125.9
					Key Weight	= 262.5	0.50	131.3
					Vert. Component	=		
Total	=	2,734.4	**O.T.M.** =	11,393.2	**Total =**	5,354.8 lbs	**R.M.=**	28,499.1

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Resisting/Overturning Ratio = **2.50**

Vertical Loads used for Soil Pressure = 6,599.8 lbs

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.000	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

DESCRIPTION: 11.5' CANT - WEST

Rebar Lap & Embedment Lengths Information

Stem Design Segment: 2nd
Stem Design Height: 3.25 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.3a) =	17.09 in
Development length for #4 bar specified in this stem design segment =	13.15 in

---

Stem Design Segment: Bottom
Stem Design Height: 0.00 ft above top of footing

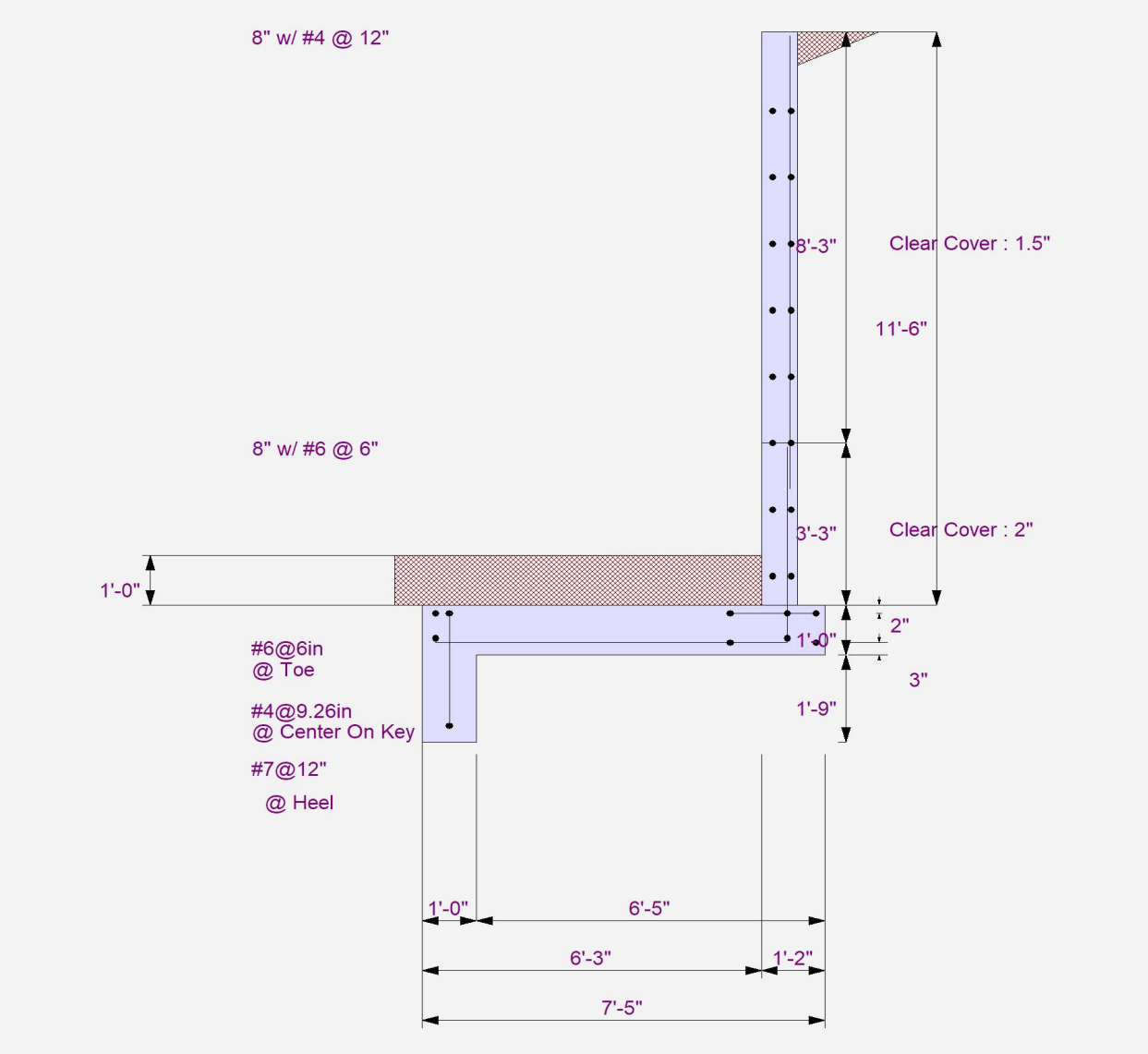
Lap Splice length for #6 bar specified in this stem design segment (25.4.2.3a) =	25.63 in
Development length for #6 bar specified in this stem design segment =	19.72 in
Hooked embedment length into footing for #6 bar specified in this stem design segment =	7.77 in
As Provided =	0.8800 in2/ft
As Required =	0.5945 in2/ft

Project Title: Sam + June Residence
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: samjunewalls.ec6

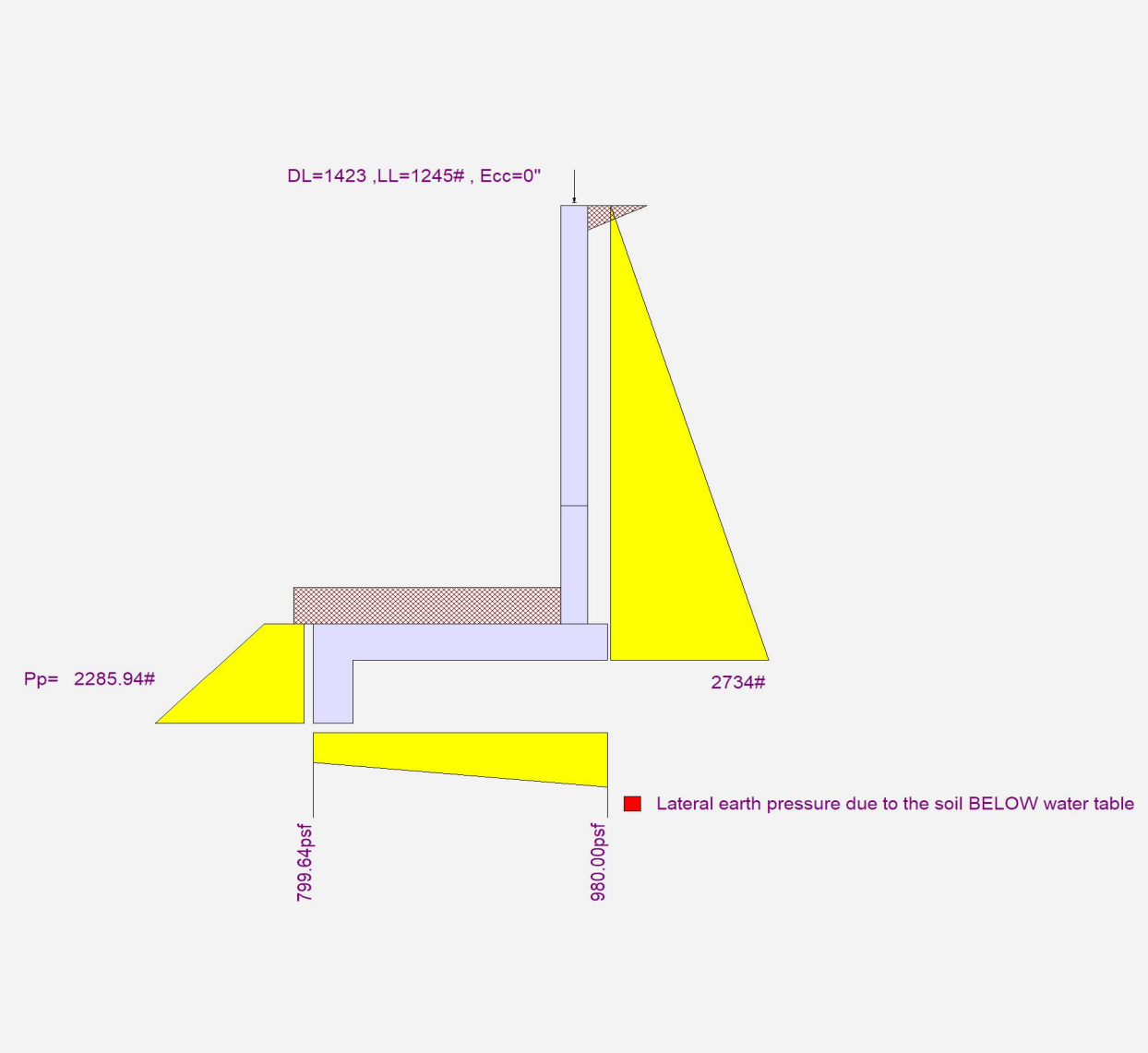
DESCRIPTION: 11.5' CANT - WEST



Cantilevered Retaining Wall

LIC# : KW-06018769, Build:20.22.12.28 Smith Lubke Structural Design

DESCRIPTION: 11.5' CANT - WEST



Project Title: Sam + June Residence
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: samjunewalls.ec6

DESCRIPTION: 10' RETAINING

Code Reference

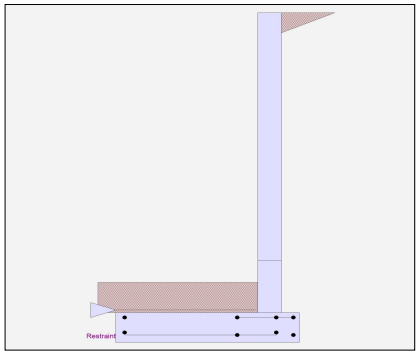
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	10.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	350.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	330.0 lbs
Axial Live Load	=	172.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Strength Level)	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Project Title: Sam + June Residence
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: samjunewalls.ec6

LIC# : KW-06018769, Build:20.22.12.28 | Smith Lubke Structural Design | (c) ENERCALC INC 1983-2022

DESCRIPTION: 10' RETAINING

Design Summary

Wall Stability Ratios

Overturning	=	1.51	OK
Slab Resists All Sliding !			
Global Stability	=	1.16	

Total Bearing Load	=	3,342	lbs
...resultant ecc.	=	14.12	in
Eccentricity outside middle third			
Soil Pressure @ Toe	=	1,584	psf OK
Soil Pressure @ Heel	=	0	psf OK
Allowable	=	3,000	psf
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	2,218	psf
ACI Factored @ Heel	=	0	psf
Footing Shear @ Toe	=	31.4	psi OK
Footing Shear @ Heel	=	7.4	psi OK
Allowable	=	82.2	psi

Sliding Calcs

Lateral Sliding Force	=	2,117.5	lbs

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

		2nd	Bottom			
		Stem OK	Stem OK			
Design Height Above Ftg	ft =	1.75	0.00			
Wall Material Above "Ht"	=	Concrete	Concrete			
Design Method	=	SD	SD	SD	SD	SD
Thickness	=	8.00	8.00			
Rebar Size	=	# 4	# 4			
Rebar Spacing	=	12.00	6.00			
Rebar Placed at	=	Edge	Edge			
Design Data						
fb/FB + fa/Fa	=	**0.961**	**0.885**			
Total Force @ Section						
Service Level	lbs =					
Strength Level	lbs =	1,905.8	2,800.0			
Moment....Actual						
Service Level	ft-# =					
Strength Level	ft-# =	5,240.8	9,333.3			
Moment.....Allowable	ft-# =	5,448.0	10,542.0			
Shear.....Actual						
Service Level	psi =					
Strength Level	psi =	25.4	37.3			
Shear.....Allowable	psi =	82.2	82.2			
Anet (Masonry)	in2 =					
Wall Weight	psf =	100.0	100.0			
Rebar Depth 'd'	in =	6.25	6.25			

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	3,000.0	3,000.0
Fy	psi =	60,000.0	60,000.0

Cantilevered Retaining Wall

DESCRIPTION: 10' RETAINING

Concrete Stem Rebar Area Details

2nd Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1964 in2/ft		
(4/3) * As :	0.2618 in2/ft	Min Stem T&S Reinf Area 1.584 in2	
200bd/fy : 200(12)(6.25)/60000 :	0.25 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.25 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.2 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	1.016 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.3497 in2/ft		
(4/3) * As :	0.4662 in2/ft	Min Stem T&S Reinf Area 0.336 in2	
200bd/fy : 200(12)(6.25)/60000 :	0.25 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.3497 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.4 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	1.016 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Footing Data

Toe Width	=	4.00 ft
Heel Width	=	1.17
Total Footing Width	=	5.17
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 3,000 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel	
Factored Pressure	=	2,218	0	psf
Mu' : Upward	=	12,136	0	ft-#
Mu' : Downward	=	2,640	210	ft-#
Mu: Design	=	9,496 OK	210	ft-# OK
phiMn	=	30,739	24,231	ft-#
Actual 1-Way Shear	=	31.39	7.37	psi
Allow 1-Way Shear	=	82.16	82.16	psi

Toe Reinforcing = # 6 @ 6.00 in
Heel Reinforcing = # 7 @ 12.00 in
Key Reinforcing = None Spec'd
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, phi Tu = 0.00 ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 7.05 in, #5@ 10.94 in, #6@ 15.52 in, #7@ 21.17 in, #8@ 27.88 in, #9@ 35.29 in, #10@ 44.82 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 20.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46.29 in, #10@ 58.79 in

Key: No key defined

Min footing T&S reinf Area 1.34 in2
Min footing T&S reinf Area per foot 0.26 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 9.26 in	#4@ 18.52 in
#5@ 14.35 in	#5@ 28.70 in
#6@ 20.37 in	#6@ 40.74 in

Project Title: Sam + June Residence
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: samjunewalls.ec6

DESCRIPTION: 10' RETAINING

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		2,117.5	3.67	7,764.2	Soil Over HL (ab. water tbl)	625.4	4.92	3,075.1
HL Act Pres (be water tbl)					Soil Over HL (bel. water tbl)		4.92	3,075.1
Hydrostatic Force					Water Table			
Buoyant Force	=				Sloped Soil Over Heel	=		
Surcharge over Heel	=				Surcharge Over Heel	=		
Surcharge Over Toe	=				Adjacent Footing Load	=		
Adjacent Footing Load	=				Axial Dead Load on Stem	= 330.0	4.33	1,430.0
Added Lateral Load	=				* Axial Live Load on Stem	= 172.0	4.33	745.3
Load @ Stem Above Soil	=				Soil Over Toe	= 440.0	2.00	880.0
	=				Surcharge Over Toe	=		
					Stem Weight(s)	= 1,000.0	4.33	4,333.3
					Earth @ Stem Transitions	=		
					Footing Weight	= 775.1	2.58	2,002.3
					Key Weight	=		
					Vert. Component	=		
Total	=	2,117.5	**O.T.M.** =	7,764.2	**Total =**	3,170.5 lbs	**R.M.=**	11,720.7

Resisting/Overturning Ratio = **1.51**

Vertical Loads used for Soil Pressure = 3,342.5 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.085	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

DESCRIPTION: 10' RETAINING

Rebar Lap & Embedment Lengths Information

Stem Design Segment: 2nd
Stem Design Height: 1.75 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.3a) =	17.09 in
Development length for #4 bar specified in this stem design segment =	13.15 in

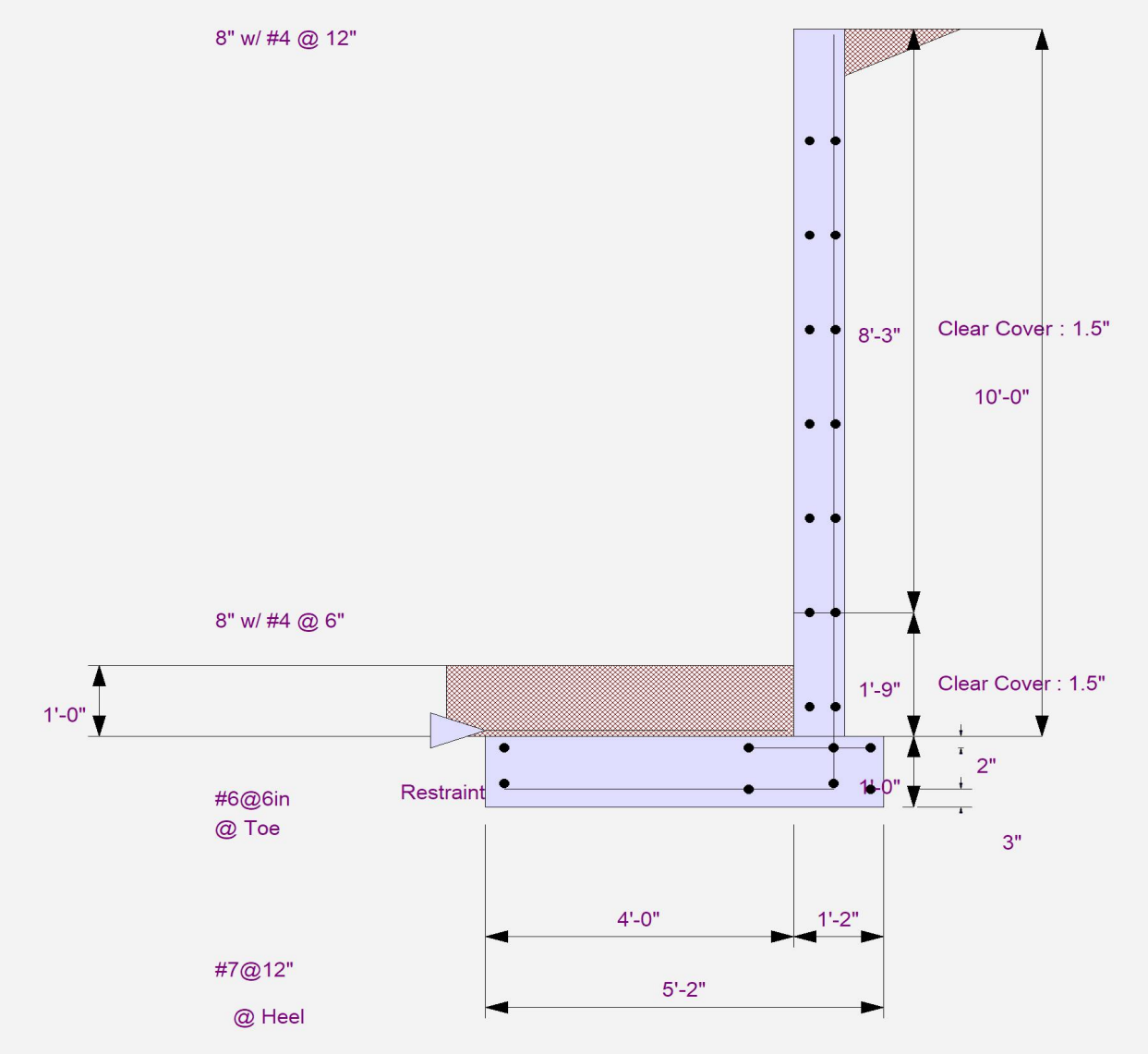
---

Stem Design Segment: Bottom
Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.3a) =	17.09 in
Development length for #4 bar specified in this stem design segment =	13.15 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =	6.70 in
As Provided =	0.4000 in2/ft
As Required =	0.3497 in2/ft

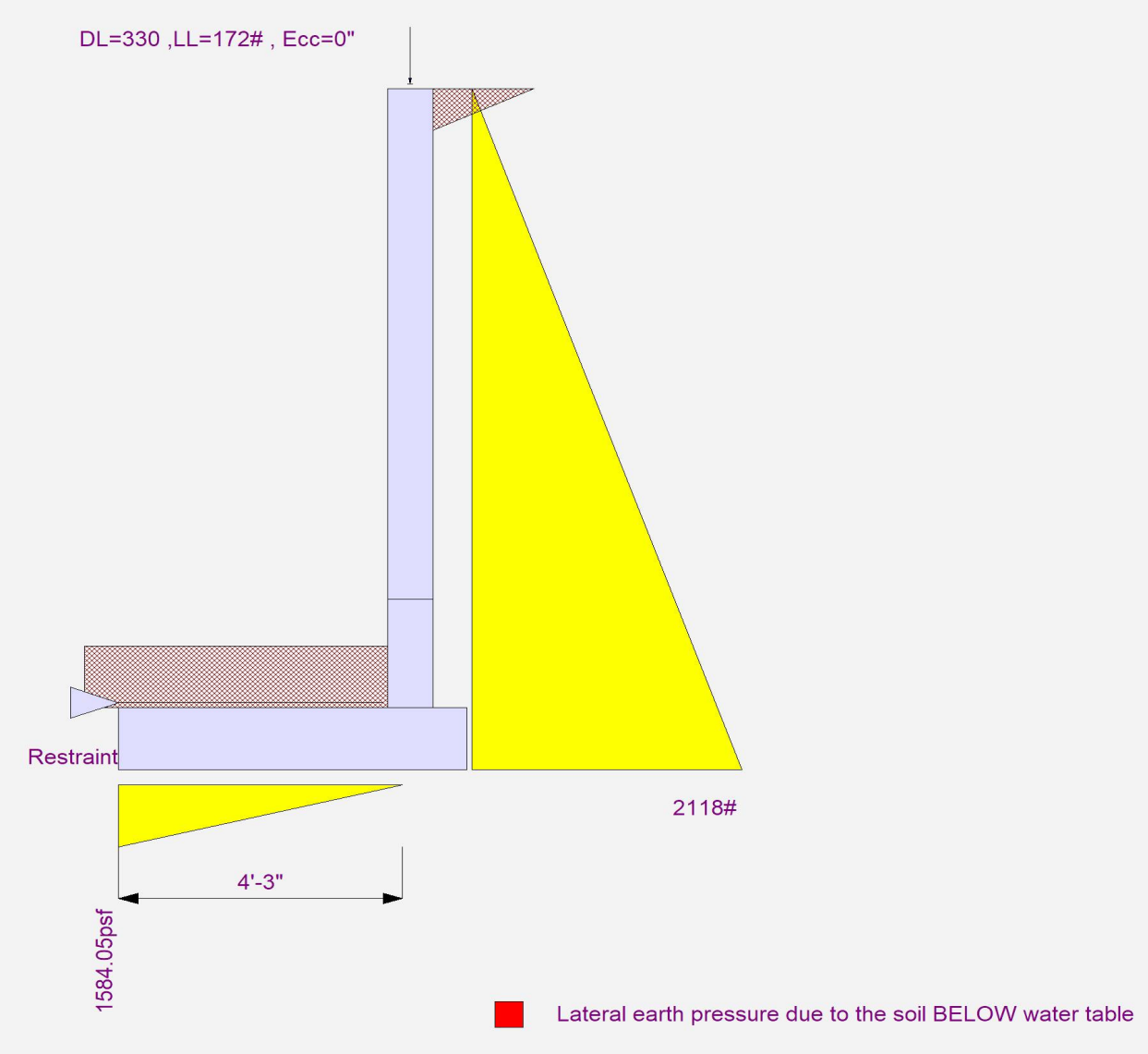
Cantilevered Retaining Wall

DESCRIPTION: 10' RETAINING



Cantilevered Retaining Wall

DESCRIPTION: 10' RETAINING



Project Title: Sam + June Residence
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: samjunewalls.ec6

DESCRIPTION: 4" RETAINING W/ TALL CONCRETE WALL

Code Reference

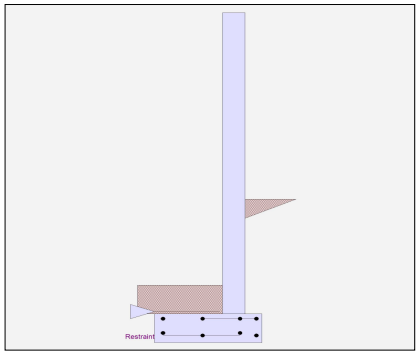
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	4.00 ft
Wall height above soil	=	6.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	350.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	330.0 lbs
Axial Live Load	=	172.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Strength Level)	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Project Title: Sam + June Residence
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: samjunewalls.ec6

DESCRIPTION: 4" RETAINING W/ TALL CONCRETE WALL

Design Summary

Wall Stability Ratios

Overturning	=	6.75	OK
Slab Resists All Sliding !			
Global Stability	=	2.02	
Total Bearing Load	=	2,497 lbs	
...resultant ecc.	=	3.07 in	
Eccentricity within middle third			
Soil Pressure @ Toe	=	406 psf	OK
Soil Pressure @ Heel	=	1,171 psf	OK
Allowable	=	3,000 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	568 psf	
ACI Factored @ Heel	=	1,640 psf	
Footing Shear @ Toe	=	5.1 psi	OK
Footing Shear @ Heel	=	3.4 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	437.5 lbs

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

		Bottom				
		Stem OK				
Design Height Above Ftg	ft =	0.00				
Wall Material Above "Ht"	=	Concrete				
Design Method	=	SD	SD	SD	SD	SD
Thickness	=	8.00				
Rebar Size	=	# 4				
Rebar Spacing	=	18.00				
Rebar Placed at	=	Edge				
Design Data						
fb/FB + fa/Fa	=	**0.162**				
Total Force @ Section						
Service Level	lbs =					
Strength Level	lbs =	448.0				
Moment....Actual						
Service Level	ft-# =					
Strength Level	ft-# =	597.3				
Moment.....Allowable	=	3,671.3				
Shear.....Actual						
Service Level	psi =					
Strength Level	psi =	6.0				
Shear.....Allowable	psi =	82.2				
Anet (Masonry)	in2 =					
Wall Weight	psf =	100.0				
Rebar Depth 'd'	in =	6.25				

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	3,000.0
Fy	psi =	60,000.0

Project Title: Sam + June Residence
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: samjunewalls.ec6

DESCRIPTION: 4" RETAINING W/ TALL CONCRETE WALL

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.0224 in2/ft		
(4/3) * As :	0.0298 in2/ft	Min Stem T&S Reinf Area 2.016 in2	
200bd/fy : 200(12)(6.25)/60000 :	0.25 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.1728 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.1333 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	1.016 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Footing Data

Toe Width	=	2.00 ft
Heel Width	=	1.17
Total Footing Width	=	3.17
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 3,000 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel	
Factored Pressure	=	568	1,640	psf
Mu' : Upward	=	1,587	241	ft-#
Mu' : Downward	=	660	98	ft-#
Mu: Design	=	927 OK	-143	ft-#
phiMn	=	15,044	24,231	ft-#
Actual 1-Way Shear	=	5.15	3.40	psi
Allow 1-Way Shear	=	82.16	82.16	psi

Toe Reinforcing = # 4 @ 6.00 in
Heel Reinforcing = # 7 @ 12.00 in
Key Reinforcing = None Spec'd
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, phi Tu = 0.00 ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 20.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46.29 in, #10@ 58.79 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 20.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46.29 in, #10@ 58.79 in

Key: No key defined

Min footing T&S reinf Area 0.82 in2
Min footing T&S reinf Area per foot 0.26 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 9.26 in	#4@ 18.52 in
#5@ 14.35 in	#5@ 28.70 in
#6@ 20.37 in	#6@ 40.74 in

Project Title: Sam + June Residence
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: samjunewalls.ec6

DESCRIPTION: 4" RETAINING W/ TALL CONCRETE WALL

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#	.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	437.5	1.67	729.2			
HL Act Pres (be water tbl)						
Hydrostatic Force						
Buoyant Force =						
Surcharge over Heel =						
Surcharge Over Toe =						
Adjacent Footing Load =						
Added Lateral Load =						
Load @ Stem Above Soil =						
=						
				Soil Over HL (ab. water tbl)	250.2	2.92	729.7
				Soil Over HL (bel. water tbl)		2.92	729.7
				Water Table			
				Sloped Soil Over Heel =			
				Surcharge Over Heel =			
				Adjacent Footing Load =			
				Axial Dead Load on Stem =	330.0	2.33	770.0
				* Axial Live Load on Stem =	172.0	2.33	401.3
				Soil Over Toe =	220.0	1.00	220.0
				Surcharge Over Toe =			
				Stem Weight(s) =	1,050.0	2.33	2,450.0
				Earth @ Stem Transitions =			
				Footing Weight =	475.1	1.58	752.2
				Key Weight =			
				Vert. Component =			
Total =	437.5	**O.T.M.** =	729.2	**Total =**	2,325.2 lbs	**R.M.=**	4,921.9

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Resisting/Overturning Ratio = **6.75**
Vertical Loads used for Soil Pressure = 2,497.2 lbs

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.000	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

DESCRIPTION: 4" RETAINING W/ TALL CONCRETE WALL

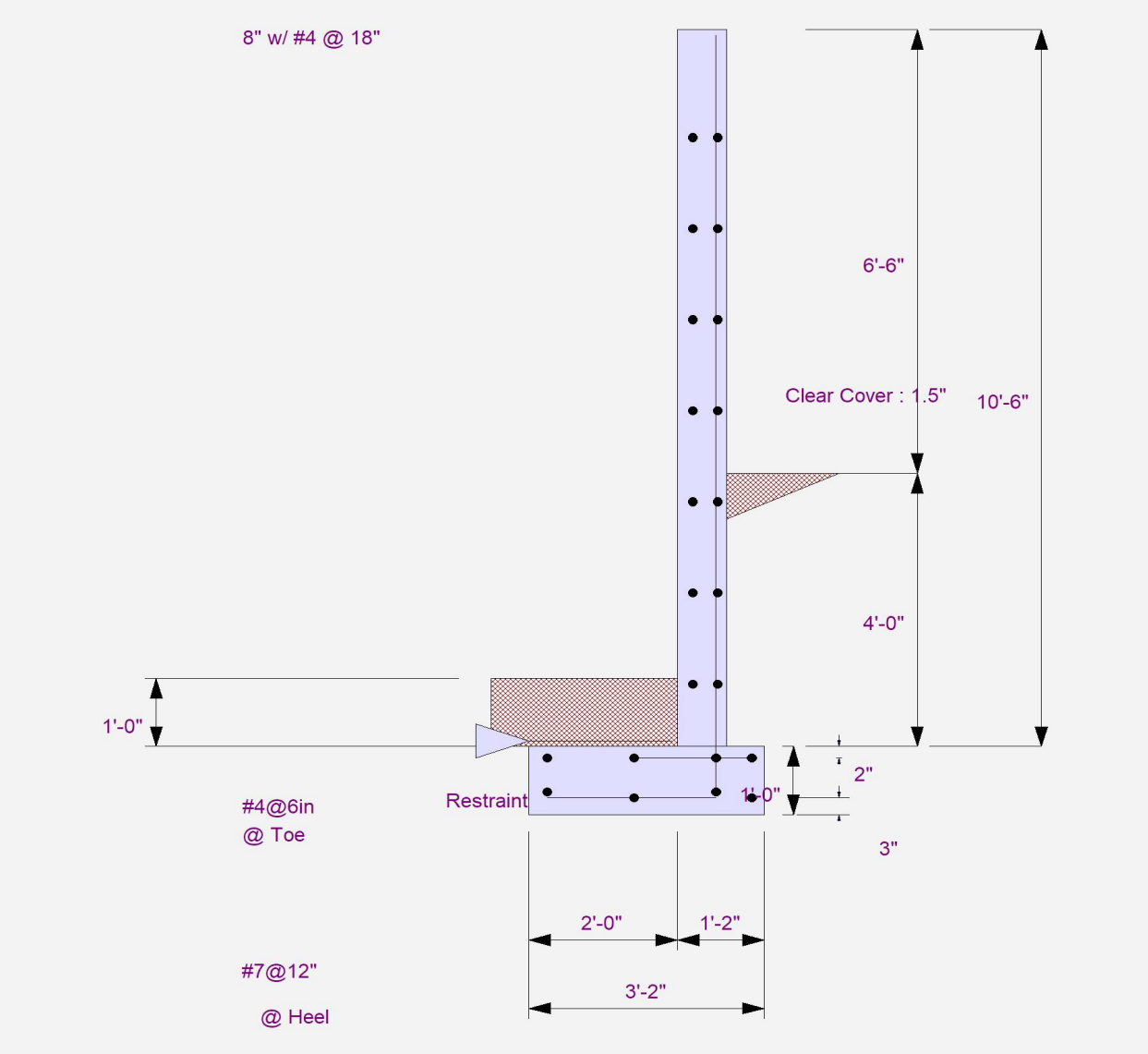
Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom
Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.3a) =	17.09 in
Development length for #4 bar specified in this stem design segment =	13.15 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =	7.67 in
As Provided =	0.1333 in2/ft
As Required =	0.1728 in2/ft

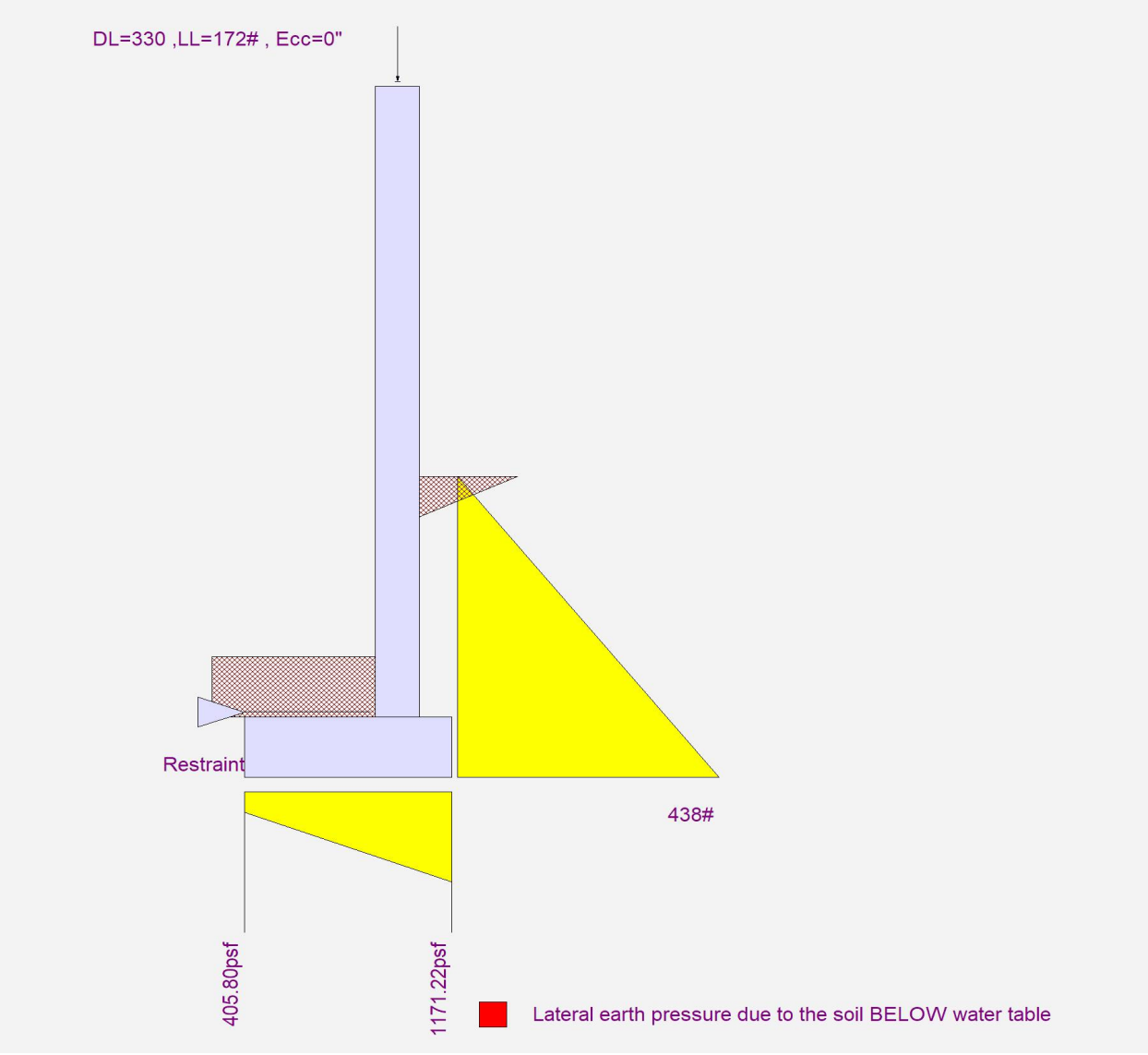
Cantilevered Retaining Wall

DESCRIPTION: 4" RETAINING W/ TALL CONCRETE WALL



Cantilevered Retaining Wall

DESCRIPTION: 4" RETAINING W/ TALL CONCRETE WALL



Project Title: Sam + June Residence
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: samjunewalls.ec6

DESCRIPTION: 4" RETAINING

Code Reference

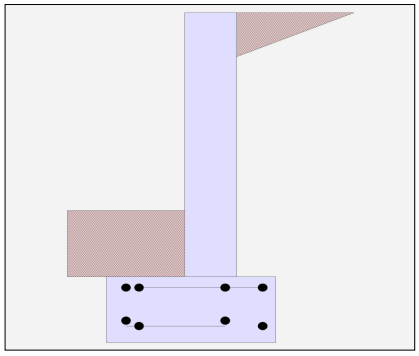
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	4.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	350.0 psf/ft
Soil Density, Heel	=	125.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Strength Level)	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Axial Load Applied to Stem

Axial Dead Load	=	330.0 lbs
Axial Live Load	=	172.0 lbs
Axial Load Eccentricity	=	0.0 in

Project Title: Sam + June Residence
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: samjunewalls.ec6

DESCRIPTION: 4" RETAINING

Design Summary

Wall Stability Ratios

Overturning	=	2.55	OK
Sliding	=	2.49	OK
Global Stability	=	2.95	

Total Bearing Load	=	1,587	lbs
...resultant ecc.	=	2.72	in
Eccentricity within middle third			
Soil Pressure @ Toe	=	1,192	psf OK
Soil Pressure @ Heel	=	273	psf OK
Allowable	=	3,000	psf
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	1,669	psf
ACI Factored @ Heel	=	382	psf
Footing Shear @ Toe	=	3.4	psi OK
Footing Shear @ Heel	=	1.1	psi OK
Allowable	=	82.2	psi

Sliding Calcs

Lateral Sliding Force	=	437.5	lbs
less 100% Passive Force	-	525.0	lbs
less 100% Friction Force	-	566.1	lbs
Added Force Req'd	=	0.0	lbs OK
....for 1.5 Stability	=	0.0	lbs OK

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

		Bottom				
		Stem OK				
Design Height Above Ftg	ft =	0.00				
Wall Material Above "Ht"	=	Concrete				
Design Method	=	SD	SD	SD	SD	SD
Thickness	=	8.00				
Rebar Size	=	# 4				
Rebar Spacing	=	18.00				
Rebar Placed at	=	Edge				
Design Data						
fb/FB + fa/Fa	=	**0.162**				
Total Force @ Section						
Service Level	lbs =					
Strength Level	lbs =	448.0				
Moment....Actual						
Service Level	ft-# =					
Strength Level	ft-# =	597.3				
Moment.....Allowable	=	3,671.3				
Shear.....Actual						
Service Level	psi =					
Strength Level	psi =	6.0				
Shear.....Allowable	psi =	82.2				
Anet (Masonry)	in2 =					
Wall Weight	psf =	100.0				
Rebar Depth 'd'	in =	6.25				

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	3,000.0
Fy	psi =	60,000.0

Project Title: Sam + June Residence
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: samjunewalls.ec6

DESCRIPTION: 4" RETAINING

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.0224 in2/ft		
(4/3) * As :	0.0298 in2/ft	Min Stem T&S Reinf Area 0.768 in2	
200bd/fy : 200(12)(6.25)/60000 :	0.25 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.1728 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.1333 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	1.016 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Footing Data

Toe Width	=	1.00 ft
Heel Width	=	1.17
Total Footing Width	=	2.17
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 3,000 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel	
Factored Pressure	=	1,669	382	psf
Mu' : Upward	=	735	60	ft-#
Mu' : Downward	=	165	98	ft-#
Mu: Design	=	570 OK	37 ft-#	OK
phiMn	=	15,044	24,231	ft-#
Actual 1-Way Shear	=	3.44	1.09	psi
Allow 1-Way Shear	=	82.16	82.16	psi

Toe Reinforcing = # 4 @ 6.00 in
Heel Reinforcing = # 7 @ 12.00 in
Key Reinforcing = None Spec'd
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, phi Tu = 0.00 ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 20.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46.29 in, #10@ 58.79 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 20.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46.29 in, #10@ 58.79 in

Key: No key defined

Min footing T&S reinf Area 0.56 in2
Min footing T&S reinf Area per foot 0.26 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 9.26 in	#4@ 18.52 in
#5@ 14.35 in	#5@ 28.70 in
#6@ 20.37 in	#6@ 40.74 in

Project Title: Sam + June Residence
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: samjunewalls.ec6

DESCRIPTION: 4" RETAINING

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		437.5	1.67	729.2	Soil Over HL (ab. water tbl)	250.2	1.92	479.5
HL Act Pres (be water tbl)					Soil Over HL (bel. water tbl)		1.92	479.5
Hydrostatic Force					Water Table			
Buoyant Force	=				Sloped Soil Over Heel	=		
Surcharge over Heel	=				Surcharge Over Heel	=		
Surcharge Over Toe	=				Adjacent Footing Load	=		
Adjacent Footing Load	=				Axial Dead Load on Stem	=	330.0	1.33	440.0
Added Lateral Load	=				* Axial Live Load on Stem	=	172.0	1.33	229.3
Load @ Stem Above Soil	=				Soil Over Toe	=	110.0	0.50	55.0
	=				Surcharge Over Toe	=			
					Stem Weight(s)	=	400.0	1.33	533.3
					Earth @ Stem Transitions	=			
					Footing Weight	=	325.1	1.08	352.2
					Key Weight	=			
					Vert. Component	=			
Total	=	437.5	**O.T.M.** =	729.2	**Total =**		1,415.2 lbs	**R.M.=**	1,860.1

Resisting/Overturning Ratio = **2.55**

Vertical Loads used for Soil Pressure = 1,587.2 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.061	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

DESCRIPTION: 4" RETAINING

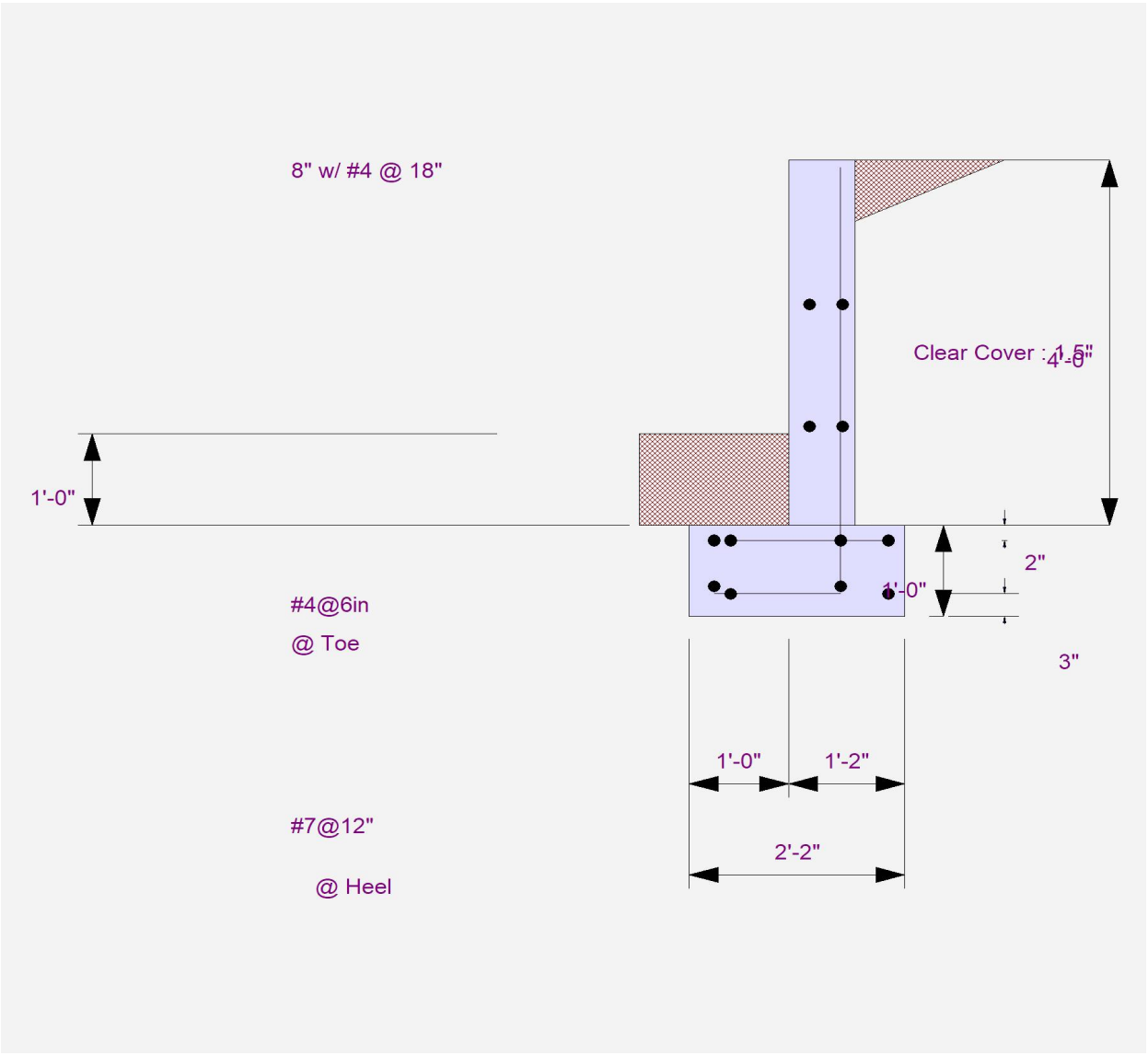
Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom
Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.3a) =	17.09 in
Development length for #4 bar specified in this stem design segment =	13.15 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =	7.67 in
As Provided =	0.1333 in2/ft
As Required =	0.1728 in2/ft

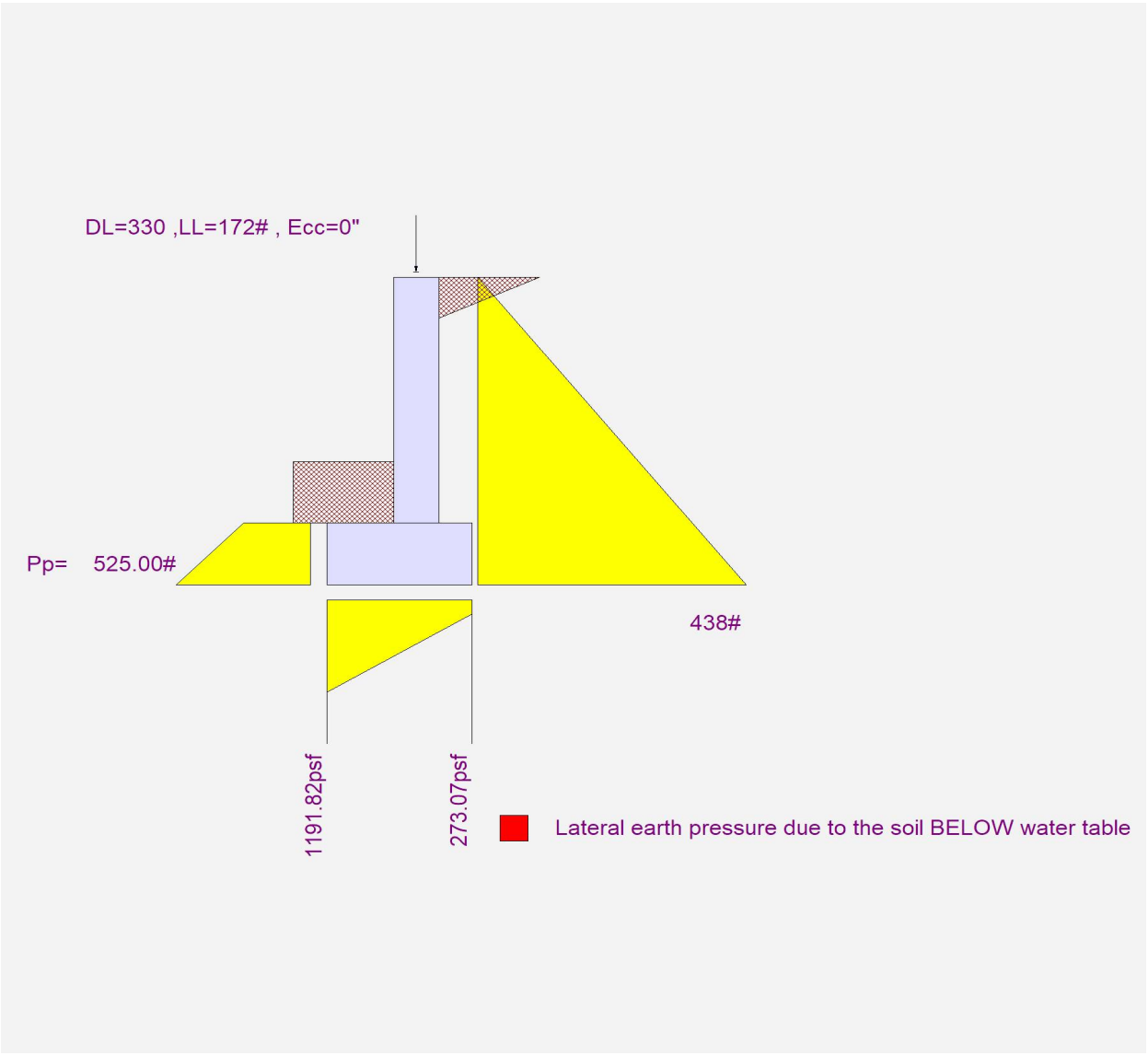
Cantilevered Retaining Wall

DESCRIPTION: 4" RETAINING



Cantilevered Retaining Wall

DESCRIPTION: 4" RETAINING

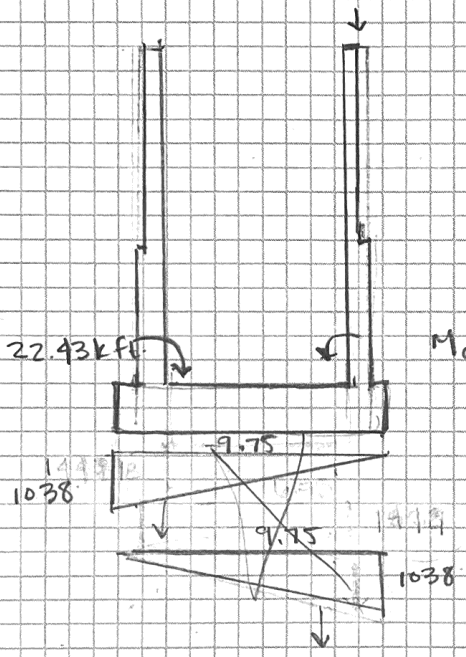


LSL STUD 4385

SMITHLUBKE
STRUCTURAL DESIGN

SAM + JUNE

EAST RETAINING WALLS



M_{OT} = 22.43 k ft

@ 14' RETAINING

3230 lbs/ft

2" ϕ @ 12" oc

EACH SIDE

@ 11.5' RETAINING

2875 lbs/ft

2" ϕ PINS - 6000 lbs/pin

11.5 FOOTING @ BACK OF BASEMENT

M @ BASE 19,149 lb ft.

MOMENT ARM = 5' 11"

T + C = 3234 lbs/ft

LOAD ABOVE. w = 1540 lbs/ft

4774 lbs/ft

6000 lb/pin ≈ 15' o.c.

@ SMTH END 9.1k POINT LOAD ABOVE

≈ # 3320 lbs/ft @ WALL

+

3320 lbs/ft @ TOE

SMITHLUBKE
STRUCTURAL DESIGN

10' RETAINING WALL

W/ OUT ADDITIONAL LOAD 2957 lbs/ft
@ TOE
@ 1'4" FROM
EDGE OF TOE

@ NORTH END W/
LOADS ABOVE 3448.5
@ 1.83' FROM
EDGE

USE 2"ϕ @ 18"
@ 1'-4" FROM EDGE.

@ 4' RETAINING.

W/ NO ADD'L LOAD

TOE HAS 874 lbs/ft. PILES @ 6.86' oc

W/ ADD'L LOAD HEEL HAS 1553 lbs/ft @ 3.86' oc