

# DESIGN CALCULATIONS

Loo & Wai's Remodel

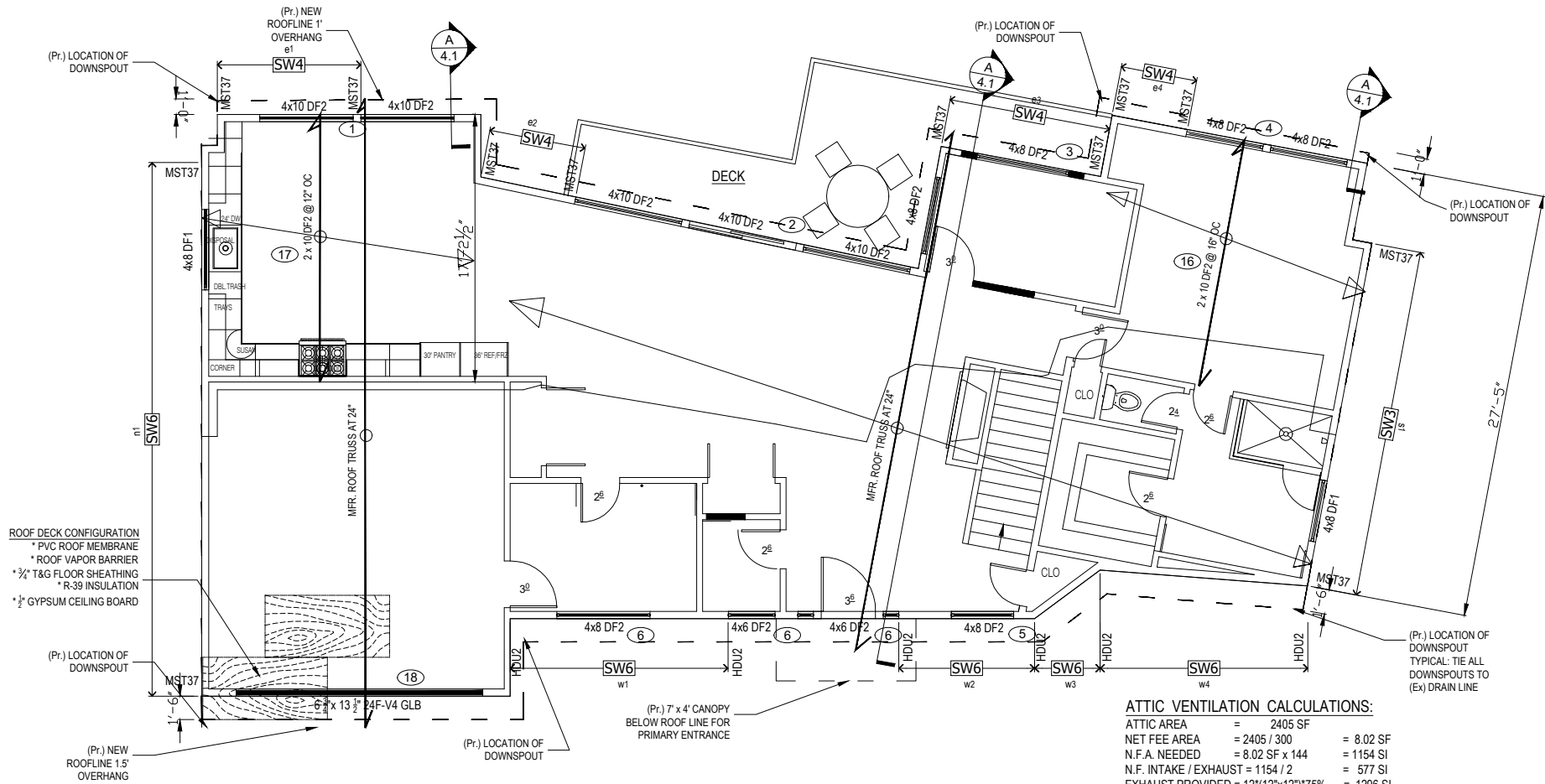
4124 94<sup>th</sup> PI SE

Mercer Island WA 98040



01/08/22

# Gravity Analysis



ROOF DECK CONFIGURATION  
 \* PVC ROOF MEMBRANE  
 \* ROOF VAPOR BARRIER  
 \* 3/4" T&G FLOOR SHEATHING  
 \* R-39 INSULATION  
 \* 1/2" GYPSUM CEILING BOARD

(Pr) ROOF & MAIN FLOOR FRAMING PLAN SCALE 1/4" = 1'-0"

**ATTIC VENTILATION CALCULATIONS:**

ATTIC AREA	=	2405 SF	
NET FEE AREA	=	2405 / 300	= 8.02 SF
N.F.A. NEEDED	=	8.02 SF x 144	= 1154 SI
N.F. INTAKE / EXHAUST	=	1154 / 2	= 577 SI
EXHAUST PROVIDED	=	12*(12"x12")*75%	= 1296 SI
USED TOTAL (12) AT ROOF RIDGE			
EACH 2 1/2" Ø VENT HOLE AREA	=	4.9 SI	
SIDE ELEV. INTAKE w/(3) HOLES @ 60 SPACES	=	882 SI	
BOTH ELEV. = 2" (882)*75%	=	1323 SI	

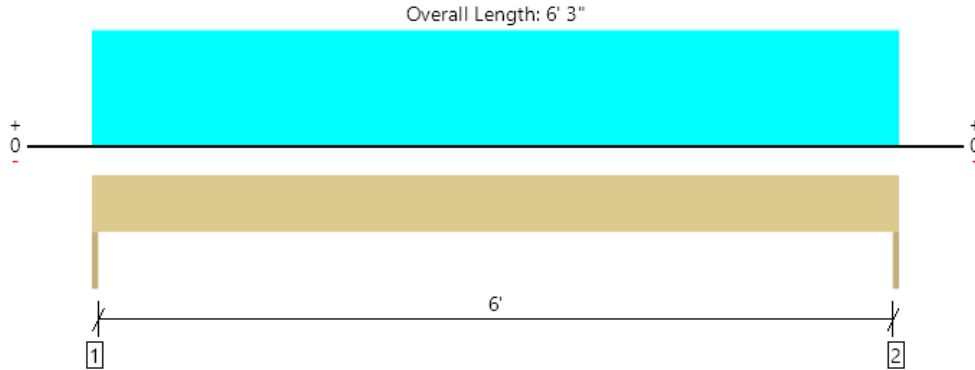


Calc #			
Member Name	Results	Current Solution	Comments
#1 Wall: Header Kitchen	Passed	1 piece(s) 4 x 10 DF No.2	
#2 Wall: Header Living Room	Passed	1 piece(s) 4 x 10 DF No.2	
#3 Wall: Header Office	Passed	1 piece(s) 4 x 8 DF No.2	
#4 Wall: Header M. Bed	Passed	1 piece(s) 4 x 8 DF No.2	
#5 Wall: Header Entry Window	Passed	1 piece(s) 4 x 8 DF No.2	
#6 Wall: Header Entry Door	Passed	1 piece(s) 4 x 6 DF No.2	
#7 Wall: Header Powder	Passed	1 piece(s) 4 x 6 DF No.2	
#8 Wall: Header Laundry	Passed	1 piece(s) 4 x 8 DF No.2	
#9 Wall: Header Bedroom 2	Passed	1 piece(s) 4 x 10 DF No.2	
#10 Wall: Header Storage	Passed	1 piece(s) 4 x 6 DF No.2	
#11 Wall: Header BR3	Passed	1 piece(s) 4 x 10 DF No.2	
#12 Wall: Header Living 2	Passed	1 piece(s) 4 x 10 DF No.2	
#13 Wall: Header Living 3	Passed	1 piece(s) 4 x 12 DF No.2	
#14 Wall: Header BR4 & Gym	Passed	1 piece(s) 4 x 10 DF No.2	
#15 Floor: Drop Beam Entertainment	Passed	1 piece(s) 8 3/4" x 13 1/2" 24F-V4 DF Glulam	
#15 Floor: Drop Beam Entertainment	Passed	1 piece(s) W8X31 (A992) ASTM Steel	
#16 Floor: Joist M. Bed	Passed	1 piece(s) 2 x 10 DF No.2 @ 16" OC	
#17 Floor: Joist Kitchen	Passed	1 piece(s) 2 x 10 DF No.2 @ 12" OC	
#18 Wall: Header Garage	Passed	1 piece(s) 6 3/4" x 13 1/2" 24F-V4 DF Glulam	

ForteWEB Software Operator	Job Notes
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Calc #, #1 Wall: Header Kitchen  
1 piece(s) 4 x 10 DF 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)	2051 @ 0	3281 (1.50")	Passed (63%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1463 @ 10 3/4"	4468	Passed (33%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3205 @ 3' 1 1/2"	5166	Passed (62%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.043 @ 3' 1 1/2"	0.156	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.061 @ 3' 1 1/2"	0.313	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/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	Snow	Total	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	606	1445	2051	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	606	1445	2051	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 3" o/c	
Bottom Edge (Lu)	6' 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 6' 3"	N/A	8.2	--	
1 - Uniform (PSF)	0 to 6' 3"	18' 6"	10.0	25.0	Default Load

**Weyerhaeuser Notes**

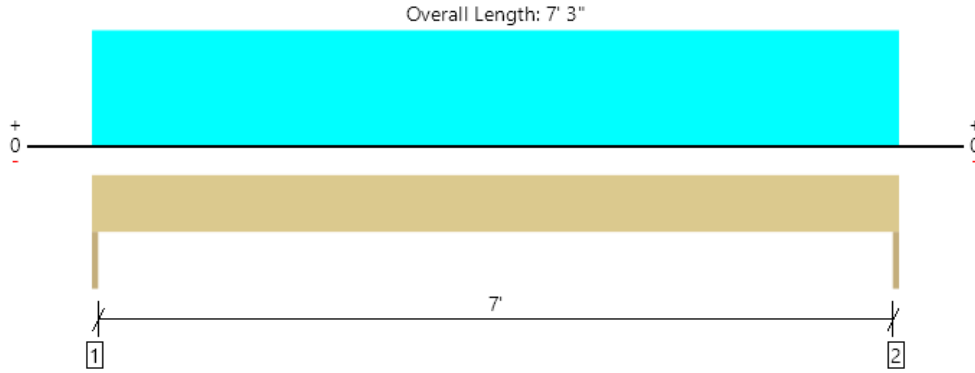
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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Calc #, #2 Wall: Header Living Room  
1 piece(s) 4 x 10 DF 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)	1808 @ 0	3281 (1.50")	Passed (55%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1361 @ 10 3/4"	4468	Passed (30%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3277 @ 3' 7 1/2"	5166	Passed (63%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.059 @ 3' 7 1/2"	0.181	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.084 @ 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/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	Snow	Total	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	539	1269	1808	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	539	1269	1808	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	8.2	--	
1 - Uniform (PSF)	0 to 7' 3"	14'	10.0	25.0	Default Load

**Weyerhaeuser Notes**

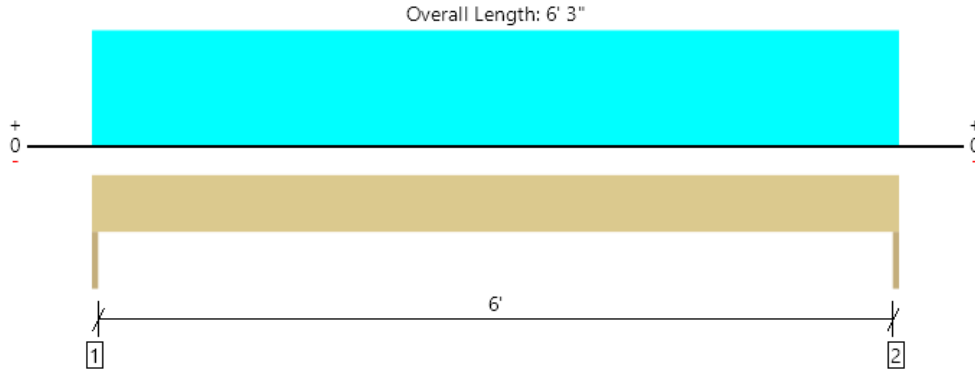
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Calc #, #3 Wall: Header Office  
1 piece(s) 4 x 8 DF No.2



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)	1662 @ 0	3281 (1.50")	Passed (51%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1274 @ 8 3/4"	3502	Passed (36%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2597 @ 3' 1 1/2"	3438	Passed (76%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.072 @ 3' 1 1/2"	0.156	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.103 @ 3' 1 1/2"	0.313	Passed (L/730)	--	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/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	Snow	Total	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	490	1172	1662	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	490	1172	1662	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 3" o/c	
Bottom Edge (Lu)	6' 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 6' 3"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 6' 3"	15'	10.0	25.0	Default Load

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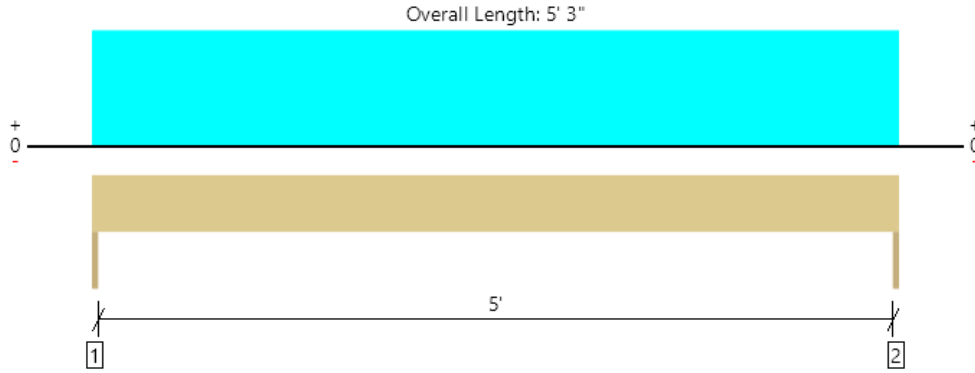
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Calc #, #4 Wall: Header M. Bed  
1 piece(s) 4 x 8 DF No.2



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)	1396 @ 0	3281 (1.50")	Passed (43%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1008 @ 8 3/4"	3502	Passed (29%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1833 @ 2' 7 1/2"	3438	Passed (53%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.036 @ 2' 7 1/2"	0.131	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.051 @ 2' 7 1/2"	0.262	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/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	Snow	Total	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	412	984	1396	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	412	984	1396	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 3" o/c	
Bottom Edge (Lu)	5' 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 5' 3"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 5' 3"	15'	10.0	25.0	Default Load

**Weyerhaeuser Notes**

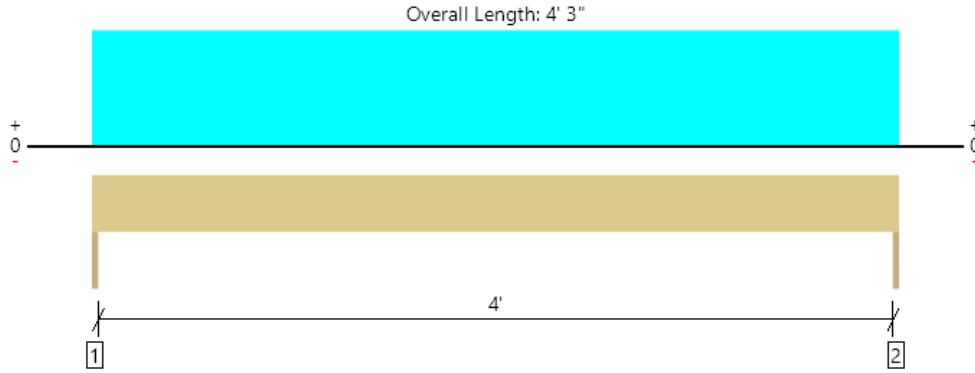
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Calc #, #5 Wall: Header Entry Window  
1 piece(s) 4 x 8 DF No.2



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)	1130 @ 0	3281 (1.50")	Passed (34%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	743 @ 8 3/4"	3502	Passed (21%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1201 @ 2' 1 1/2"	3438	Passed (35%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.015 @ 2' 1 1/2"	0.106	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.022 @ 2' 1 1/2"	0.213	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/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	Snow	Total	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	334	797	1131	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	334	797	1131	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 3" o/c	
Bottom Edge (Lu)	4' 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 4' 3"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 4' 3"	15'	10.0	25.0	Default Load

**Weyerhaeuser Notes**

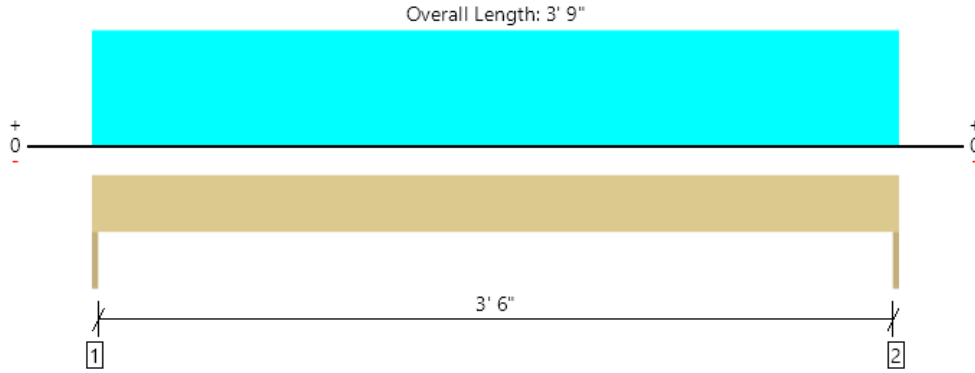
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Calc #, #6 Wall: Header Entry Door  
1 piece(s) 4 x 6 DF No.2



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)	863 @ 0	3281 (1.50")	Passed (26%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	595 @ 7"	2657	Passed (22%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	809 @ 1' 10 1/2"	1979	Passed (41%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.019 @ 1' 10 1/2"	0.094	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.026 @ 1' 10 1/2"	0.188	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/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	Snow	Total	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	254	609	863	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	254	609	863	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 9" o/c	
Bottom Edge (Lu)	3' 9" 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' 9"	N/A	4.9	--	
1 - Uniform (PSF)	0 to 3' 9"	13'	10.0	25.0	Default Load

**Weyerhaeuser Notes**

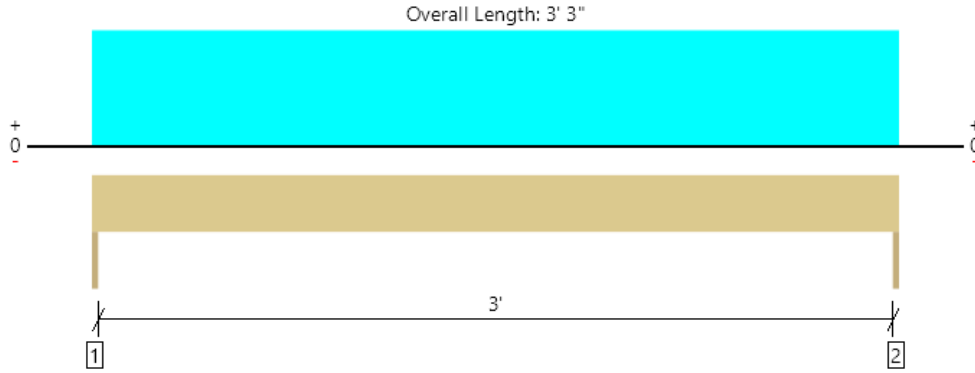
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Calc #, #7 Wall: Header Powder  
1 piece(s) 4 x 6 DF No.2



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)	748 @ 0	3281 (1.50")	Passed (23%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	480 @ 7"	2657	Passed (18%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	608 @ 1' 7 1/2"	1979	Passed (31%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.011 @ 1' 7 1/2"	0.081	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.015 @ 1' 7 1/2"	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/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	Snow	Total	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	220	528	748	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	220	528	748	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)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 3"	N/A	4.9	--	
1 - Uniform (PSF)	0 to 3' 3"	13'	10.0	25.0	Default Load

**Weyerhaeuser Notes**

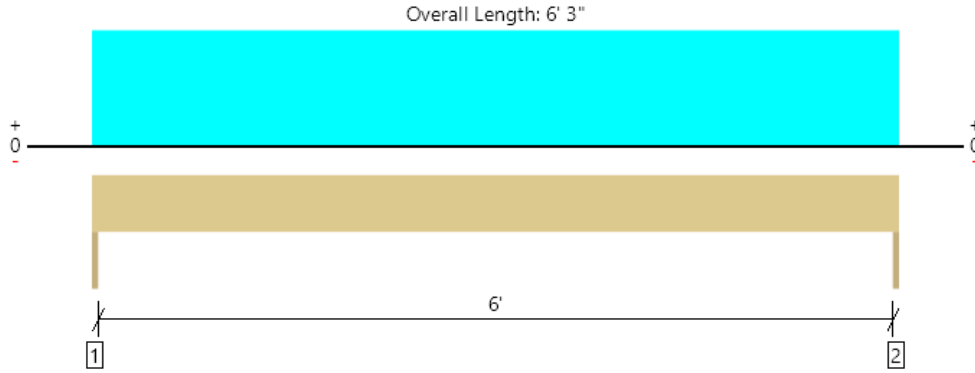
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ForteWEB Software Operator	Job Notes
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Calc #, #8 Wall: Header Laundry  
1 piece(s) 4 x 8 DF No.2



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)	1553 @ 0	3281 (1.50")	Passed (47%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1191 @ 8 3/4"	3502	Passed (34%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2426 @ 3' 1 1/2"	3438	Passed (71%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.068 @ 3' 1 1/2"	0.156	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.096 @ 3' 1 1/2"	0.313	Passed (L/782)	--	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/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	Snow	Total	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	459	1094	1553	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	459	1094	1553	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 3" o/c	
Bottom Edge (Lu)	6' 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 6' 3"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 6' 3"	14'	10.0	25.0	Default Load

**Weyerhaeuser Notes**

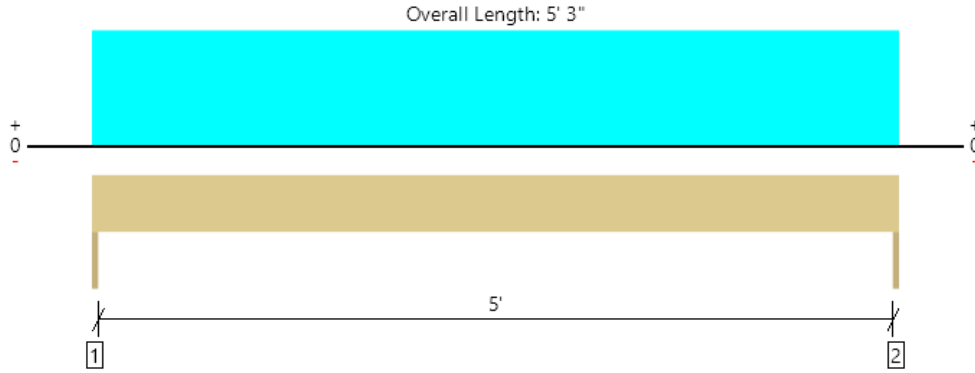
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ForteWEB Software Operator	Job Notes
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Calc #, #9 Wall: Header Bedroom 2  
1 piece(s) 4 x 10 DF No.2



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)	2484 @ 0	3281 (1.50")	Passed (76%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1636 @ 10 3/4"	4468	Passed (37%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	3260 @ 2' 7 1/2"	5166	Passed (63%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.030 @ 2' 7 1/2"	0.131	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.044 @ 2' 7 1/2"	0.262	Passed (L/999+)	--	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/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	Total	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	811	1050	1181	3042	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	811	1050	1181	3042	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 3" o/c	
Bottom Edge (Lu)	5' 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 5' 3"	N/A	8.2	--	--	
1 - Uniform (PSF)	0 to 5' 3"	18'	10.0	-	25.0	Roof
2 - Uniform (PSF)	0 to 5' 3"	10'	12.0	40.0	-	Main Floor

**Weyerhaeuser Notes**

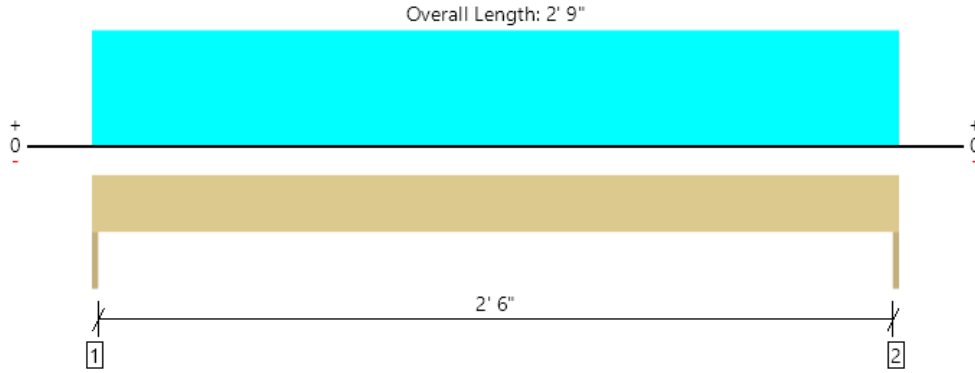
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ForteWEB Software Operator	Job Notes
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Calc #, #10 Wall: Header Storage  
1 piece(s) 4 x 6 DF No.2



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)	901 @ 0	3281 (1.50")	Passed (27%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	479 @ 7"	2310	Passed (21%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	572 @ 1' 4 1/2"	1720	Passed (33%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.007 @ 1' 4 1/2"	0.069	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.011 @ 1' 4 1/2"	0.138	Passed (L/999+)	--	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/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	Total	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	282	550	275	1107	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	282	550	275	1107	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	2' 9" o/c	
Bottom Edge (Lu)	2' 9" 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 2' 9"	N/A	4.9	--	--	
1 - Uniform (PSF)	0 to 2' 9"	8'	10.0	-	25.0	Roof
2 - Uniform (PSF)	0 to 2' 9"	10'	12.0	40.0	-	Main Floor

**Weyerhaeuser Notes**

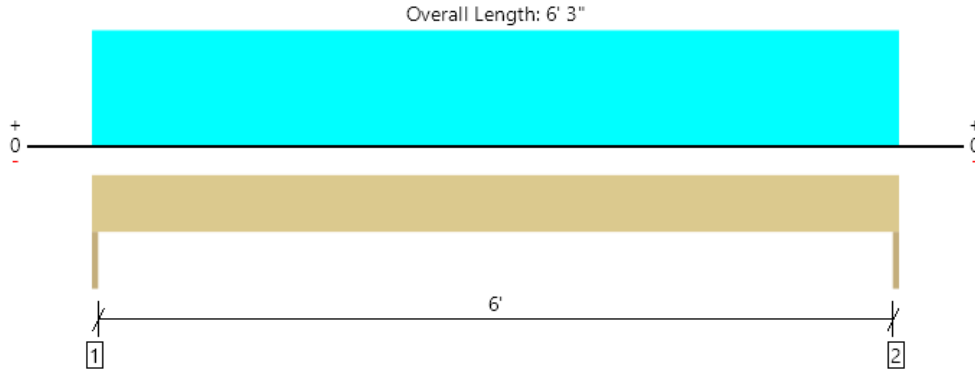
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Calc #, #11 Wall: Header BR3  
1 piece(s) 4 x 10 DF No.2



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)	2466 @ 0	3281 (1.50")	Passed (75%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1759 @ 10 3/4"	4468	Passed (39%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	3853 @ 3' 1 1/2"	5166	Passed (75%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.049 @ 3' 1 1/2"	0.156	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.073 @ 3' 1 1/2"	0.313	Passed (L/999+)	--	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/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	Total	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	802	1125	1094	3021	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	802	1125	1094	3021	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 3" o/c	
Bottom Edge (Lu)	6' 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 6' 3"	N/A	8.2	--	--	
1 - Uniform (PSF)	0 to 6' 3"	14'	10.0	-	25.0	Roof
2 - Uniform (PSF)	0 to 6' 3"	9'	12.0	40.0	-	Main Floor

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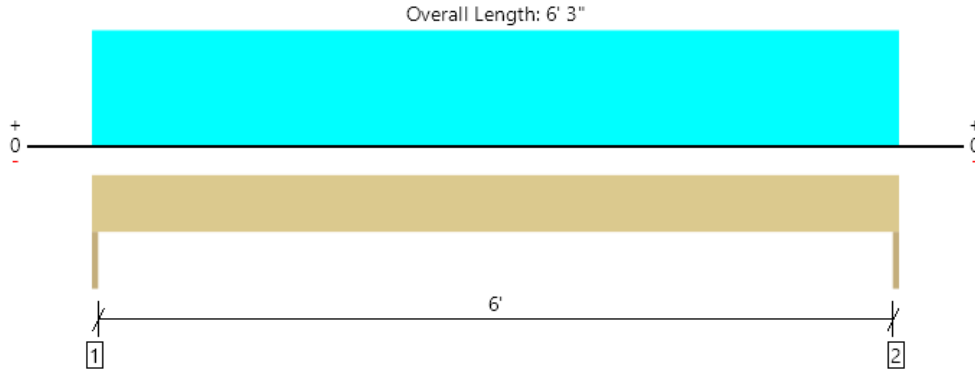
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Calc #, #12 Wall: Header Living 2  
1 piece(s) 4 x 10 DF No.2



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)	2466 @ 0	3281 (1.50")	Passed (75%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1759 @ 10 3/4"	4468	Passed (39%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	3853 @ 3' 1 1/2"	5166	Passed (75%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.049 @ 3' 1 1/2"	0.156	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.073 @ 3' 1 1/2"	0.313	Passed (L/999+)	--	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/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	Total	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	802	1125	1094	3021	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	802	1125	1094	3021	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 3" o/c	
Bottom Edge (Lu)	6' 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 6' 3"	N/A	8.2	--	--	
1 - Uniform (PSF)	0 to 6' 3"	14'	10.0	-	25.0	Roof
2 - Uniform (PSF)	0 to 6' 3"	9'	12.0	40.0	-	Main Floor

**Weyerhaeuser Notes**

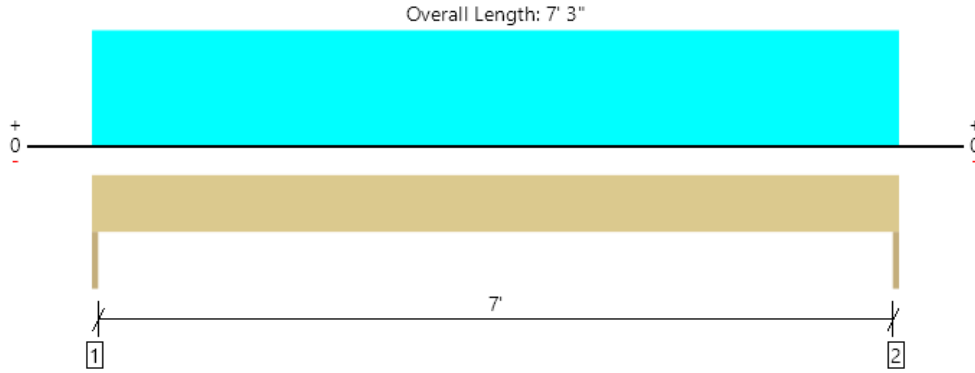
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Calc #, #13 Wall: Header Living 3  
1 piece(s) 4 x 12 DF No.2



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)	2867 @ 0	3281 (1.50")	Passed (87%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	2027 @ 1' 3/4"	5434	Passed (37%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	5197 @ 3' 7 1/2"	7004	Passed (74%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.050 @ 3' 7 1/2"	0.181	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.074 @ 3' 7 1/2"	0.363	Passed (L/999+)	--	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/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	Total	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	937	1305	1269	3511	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	937	1305	1269	3511	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)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 7' 3"	N/A	10.0	--	--	
1 - Uniform (PSF)	0 to 7' 3"	14'	10.0	-	25.0	Roof
2 - Uniform (PSF)	0 to 7' 3"	9'	12.0	40.0	-	Main Floor

**Weyerhaeuser Notes**

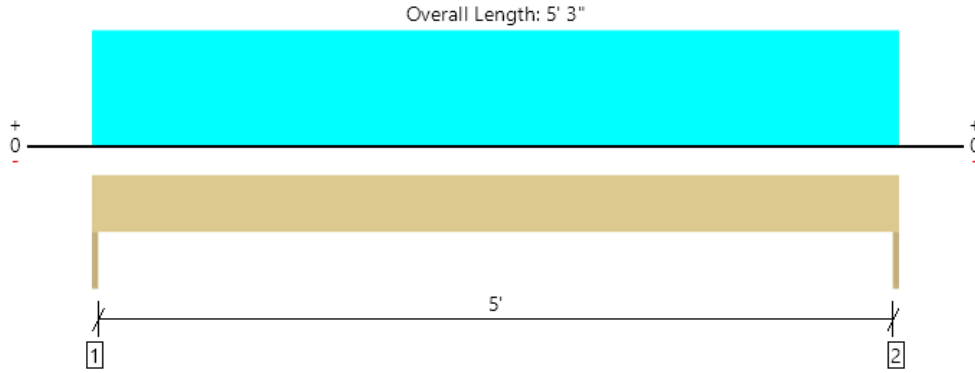
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Calc #, #14 Wall: Header BR4 & Gym  
1 piece(s) 4 x 10 DF No.2



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)	2257 @ 0	3281 (1.50")	Passed (69%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1487 @ 10 3/4"	4468	Passed (33%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	2963 @ 2' 7 1/2"	5166	Passed (57%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.027 @ 2' 7 1/2"	0.131	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.040 @ 2' 7 1/2"	0.262	Passed (L/999+)	--	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/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	Total	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	732	1050	984	2766	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	732	1050	984	2766	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 3" o/c	
Bottom Edge (Lu)	5' 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 5' 3"	N/A	8.2	--	--	
1 - Uniform (PSF)	0 to 5' 3"	15'	10.0	-	25.0	Roof
2 - Uniform (PSF)	0 to 5' 3"	10'	12.0	40.0	-	Main Floor

**Weyerhaeuser Notes**

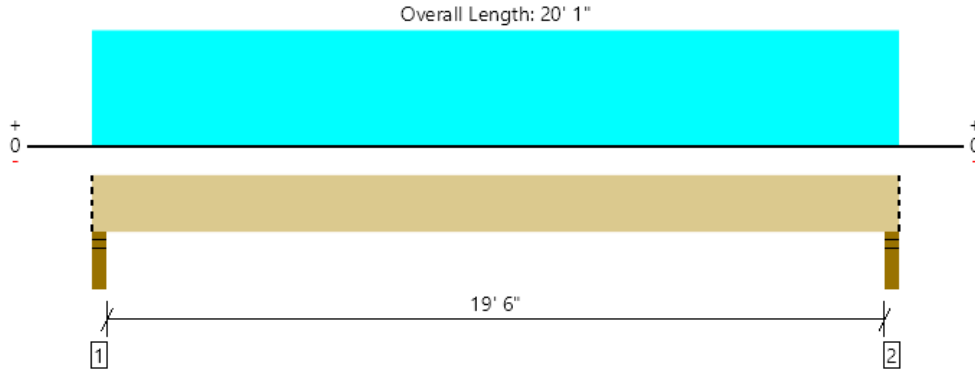
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Ken Nguyen NT Engineers (425) 891-5111 housedesign4u@outlook.com	



Calc #, #15 Floor: Drop Beam Entertainment  
 1 piece(s) 8 3/4" x 13 1/2" 24F-V4 DF Glulam



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)	4988 @ 2"	13016 (3.50")	Passed (38%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4284 @ 1' 5"	20869	Passed (21%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	24219 @ 10' 1/2"	50104	Passed (48%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.382 @ 10' 1/2"	0.494	Passed (L/621)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.527 @ 10' 1/2"	0.988	Passed (L/450)	--	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/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 0.94 that was calculated using length L = 19' 9".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - SPF	3.50"	3.50"	1.50"	1373	3615	4988	Blocking
2 - Stud wall - SPF	3.50"	3.50"	1.50"	1373	3615	4988	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)	20' 1" o/c	
Bottom Edge (Lu)	20' 1" 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 20' 1"	N/A	28.7	--	
1 - Uniform (PSF)	0 to 20' 1" (Front)	9'	12.0	40.0	Default Load

**Weyerhaeuser Notes**

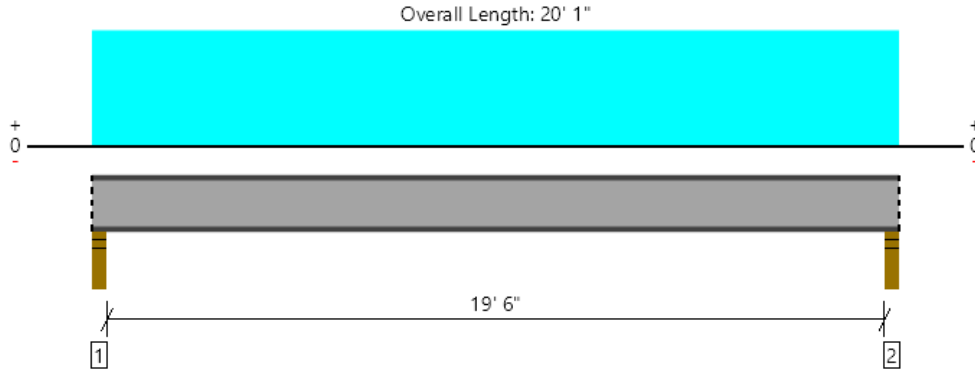
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ForteWEB Software Operator	Job Notes
Ken Nguyen NT Engineers (425) 891-5111 housedesign4u@outlook.com	



Calc #, #15 Floor: Drop Beam Entertainment  
1 piece(s) W8X31 (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)	5011 @ 2"	11900 (3.50")	Passed (42%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4865 @ 3 1/2"	45600	Passed (11%)	--	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	24330 @ 10' 1/2"	55964	Passed (43%)	--	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.386 @ 10' 1/2"	0.494	Passed (L/613)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.536 @ 10' 1/2"	0.988	Passed (L/443)	--	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/480) and TL (L/240).
- Applicable calculations are based on ANSI/AISC 360-16.
- A lateral-torsional buckling factor ( $C_b$ ) of 1.0 has been assumed.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - SPF	3.50"	3.50"	3.50"	1396	3615	5011	Blocking
2 - Stud wall - SPF	3.50"	3.50"	3.50"	1396	3615	5011	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)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 20' 1"	N/A	31.0	--	
1 - Uniform (PSF)	0 to 20' 1"	9'	12.0	40.0	Default Load

**Weyerhaeuser Notes**

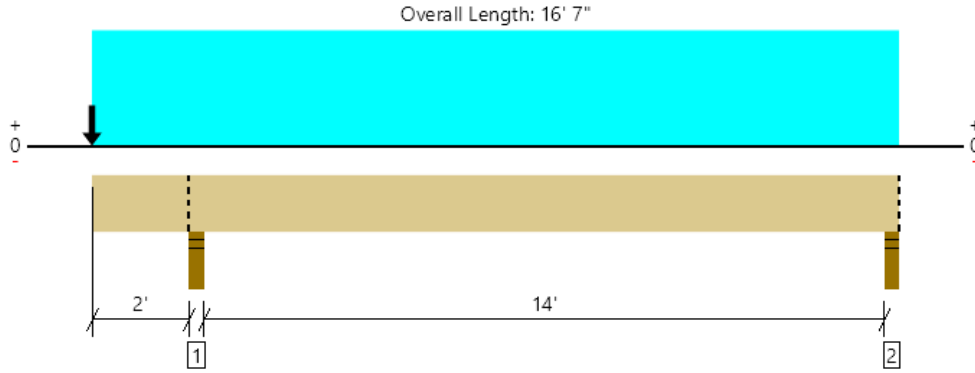
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Ken Nguyen NT Engineers (425) 891-5111 housedesign4u@outlook.com	



Calc #, #16 Floor: Joist M. Bed  
1 piece(s) 2 x 10 DF 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)	1189 @ 2' 1 3/4"	2231 (3.50")	Passed (53%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	720 @ 1' 2 3/4"	1915	Passed (38%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1529 @ 9' 8 13/16"	2029	Passed (75%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.311 @ 9' 3 1/8"	0.356	Passed (L/549)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.152 @ 0	0.215	Passed (2L/340)	--	1.0 D + 1.0 S (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).
- Overhang deflection criteria: LL (2L/480) 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	Total	
1 - Stud wall - SPF	3.50"	3.50"	1.87"	381	503	575	1459	Blocking
2 - Stud wall - SPF	3.50"	3.50"	1.50"	84	391/-9	-75	475/-84	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	7' 4" o/c	
Bottom Edge (Lu)	7' 9" 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 16' 7"	16"	12.0	40.0	-	Default Load
2 - Point (lb)	0	N/A	200	-	500	

**Weyerhaeuser Notes**

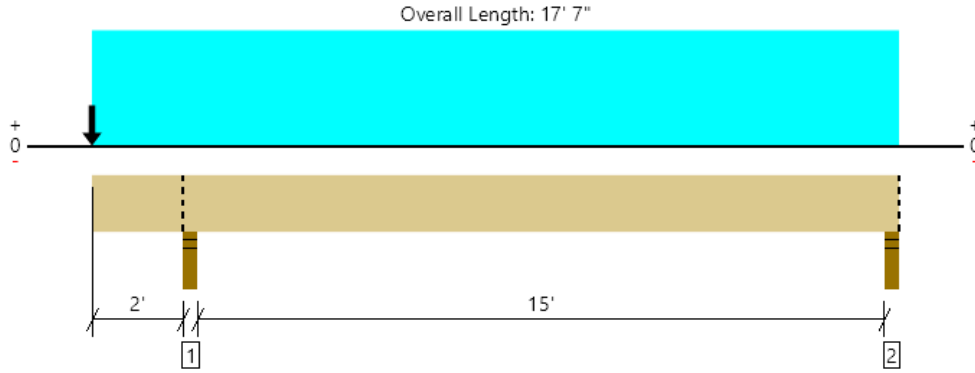
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ForteWEB Software Operator	Job Notes
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Calc #, #17 Floor: Joist Kitchen  
1 piece(s) 2 x 10 DF No.2 @ 12" OC



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)	1072 @ 2' 1 3/4"	2231 (3.50")	Passed (48%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	715 @ 1' 2 3/4"	1915	Passed (37%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-1530 @ 2' 1 3/4"	2334	Passed (66%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.306 @ 9' 9 1/8"	0.381	Passed (L/598)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.166 @ 0	0.215	Passed (2L/310)	--	1.0 D + 1.0 S (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).
- Overhang deflection criteria: LL (2L/480) 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	Total	
1 - Stud wall - SPF	3.50"	3.50"	1.68"	347	396	570	1313	Blocking
2 - Stud wall - SPF	3.50"	3.50"	1.50"	64	313/-6	-70	377/-76	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)	9' 7" o/c	
Bottom Edge (Lu)	7' 9" 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 17' 7"	12"	12.0	40.0	-	Default Load
2 - Point (lb)	0	N/A	200	-	500	

**Weyerhaeuser Notes**

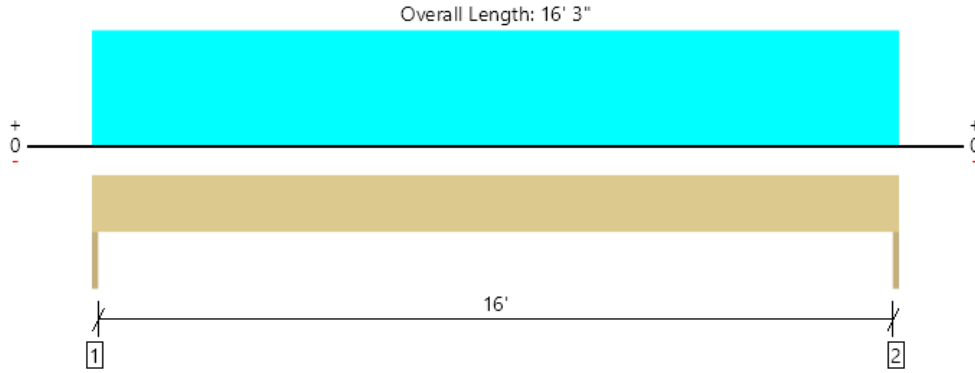
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Calc #, #18 Wall: Header Garage  
 1 piece(s) 6 3/4" x 13 1/2" 24F-V4 DF Glulam



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)	5494 @ 0	6581 (1.50")	Passed (83%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	4648 @ 1' 3"	18514	Passed (25%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	22318 @ 8' 1 1/2"	46517	Passed (48%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.294 @ 8' 1 1/2"	0.406	Passed (L/663)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.426 @ 8' 1 1/2"	0.813	Passed (L/458)	--	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/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 0.99 that was calculated using length L = 16' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	1702	3792	5494	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	1702	3792	5494	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	16' 3" o/c	
Bottom Edge (Lu)	16' 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 16' 3"	N/A	22.1	--	
1 - Uniform (PSF)	0 to 16' 3"	18' 8"	10.0	25.0	Default Load

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## Floor Joist Sistering Connection

$$\text{ROOF WIDTH} = 30'$$

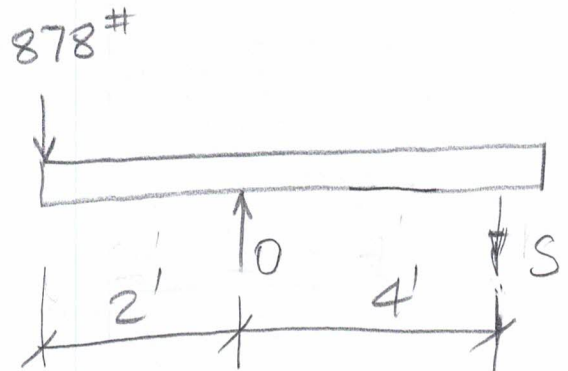
$$\text{ROOF OVERHANG} = 2'$$

$$\text{ROOF} = \frac{30'}{2} + 2' = 17'$$

$$\text{ROOF DL} = 10 \text{ PSF} (17') \frac{16''}{12} = 227\#$$

$$\text{ROOF LL} = 25 \text{ PSF} = 567\#$$

$$\text{WALL DL} = 7 \text{ PSF} (9') \frac{16''}{12} = \frac{84\#}{878\#}$$



$$M_0 = 0 = (-878\# \times 2') + (S \times 4')$$

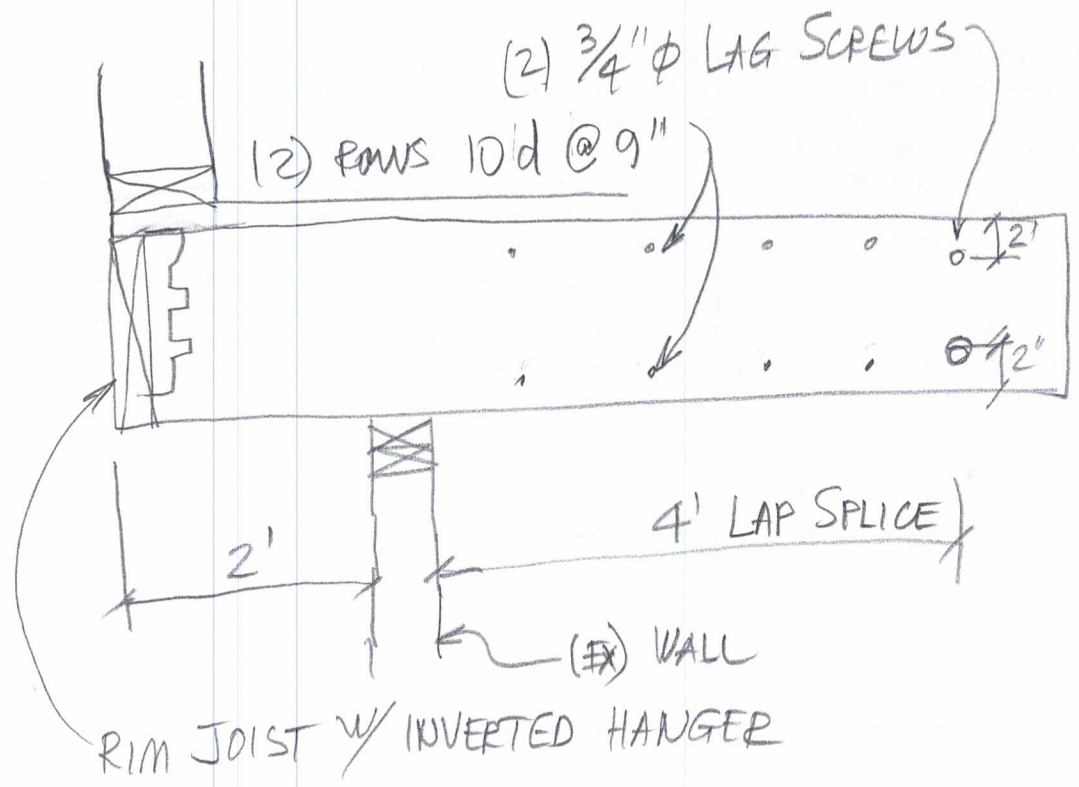
$$S = \frac{878\# \times 2'}{4'} = 439\#$$

TABLE 11J FOR  $\frac{3}{4}'' \phi$  LAG SCREW PROVIDE 330#  
SHEAR CAPACITY

TRY (2)  $\frac{3}{4}'' \phi$  LAG SCREWS

$$Z' = Z \times C_D \times C_M \times C_t$$

$$= (330 \times 2) \times 0.9 \times (1.0) \times 1.0 = 594\# > 439\# \text{ OK.}$$



FOOTING AT N-E SIDE

4124 94TH PL SE  
MERGER ISLAND 98040

$$\text{ROOF}_{DL} = 10.0 \text{ PSF}$$

$$\text{SPAN} = 34.5' / 2 + 2' = 19.25'$$

$$W_{DL} = 10.0 \text{ PSF} (19.25') = 192.5 \# / 1$$

$$\text{ROOF}_{LL} = 25 \text{ PSF}$$

$$W_{LL} = 25 \text{ PSF} / 2 (19.25') = \frac{240 \# / 1}{433 \# / 1}$$

$$\text{FLOOR}_{DL} = 10.0 \text{ PSF}$$

$$\text{SPAN} = 14.25' / 2 = 7.2'$$

$$W_{F-DL} = 10 \text{ PSF} (7.2') = 72.5 \# / 1$$

$$W_{F-LL} = 40 \text{ PSF} = \frac{288 \# / 1}{360 \# / 1}$$

$$\text{TOTAL} = 433 \# / 1 + 360 \# / 1 = 793 \# / 1$$

$$\text{ALLOWABLE SOIL PRESSURE} = 1500 \text{ PSF}$$

$$F_{\text{WIDTH}} = 16'' / 12 = 1.33'$$

$$F_A = 1500 \text{ PSF} (1.33') = 2000 \# / 1 > 793 \# / 1$$

OK

EXISTING FOOTING AT N-E SIDE IS ADEQUATE

## FOOTING AT S-E SIDE

$$\text{SPAN} = 27.5' / 2 + 2' = 15.75'$$

$$W_{DL} = 10 \text{ PSF} (15.75') = 157.5 \# / 1$$

$$W_{LL} = 25 \text{ PSF} = \frac{437.5}{595 \# / 1}$$

$$\text{FLOOR}_{DL} = 10 \text{ PSF} (15.75') = 157.5 \# / 1$$

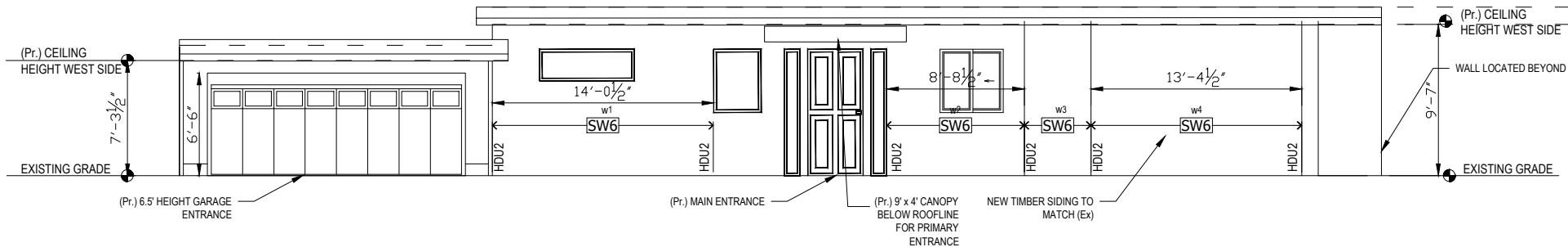
$$\text{FLOOR}_{LL} = 40 \text{ PSF} = \frac{630}{788 \# / 1}$$

$$\text{TOTAL} = 595 \# / 1 + 788 = 1383 \# / 1 < 2000 \# / 1$$

OK

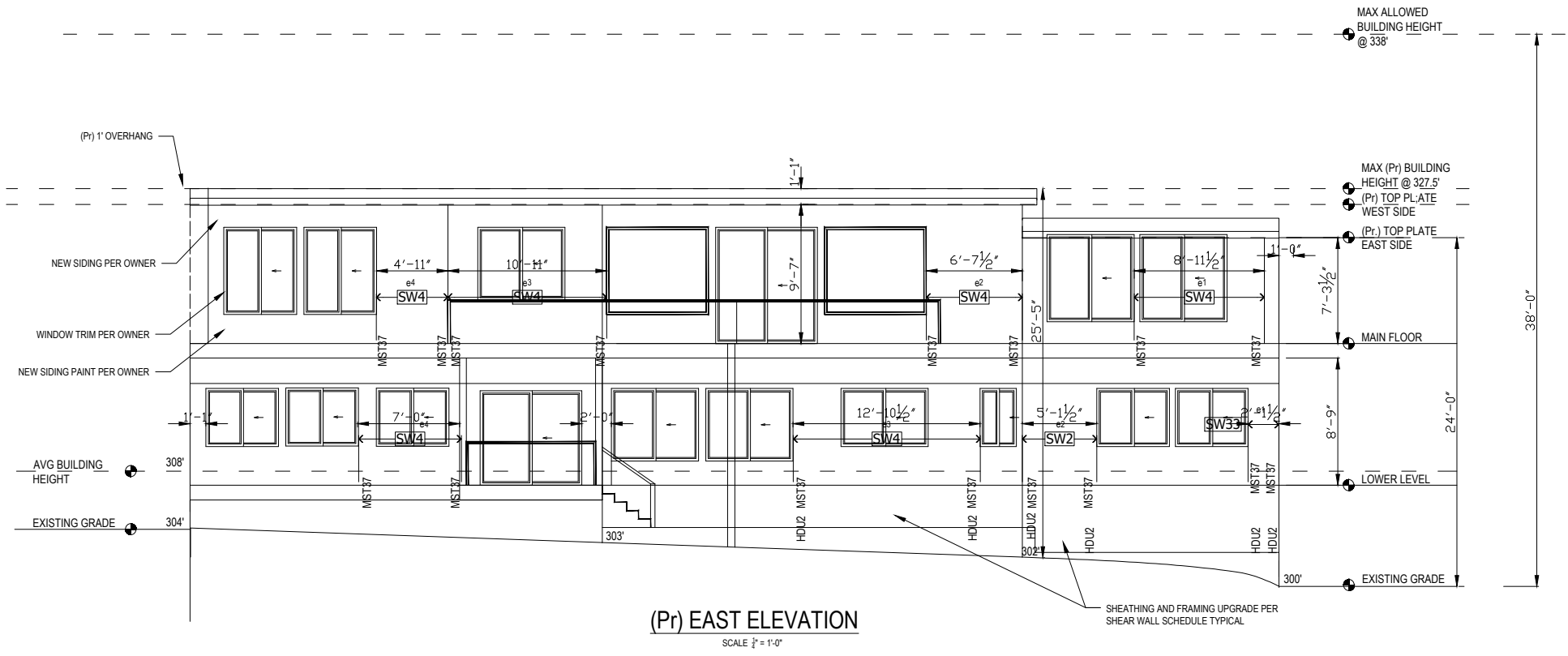
EXISTING FOOTING AT S-E SIDE IS ADEQUATE FOR THE PROPOSED REMODEL.

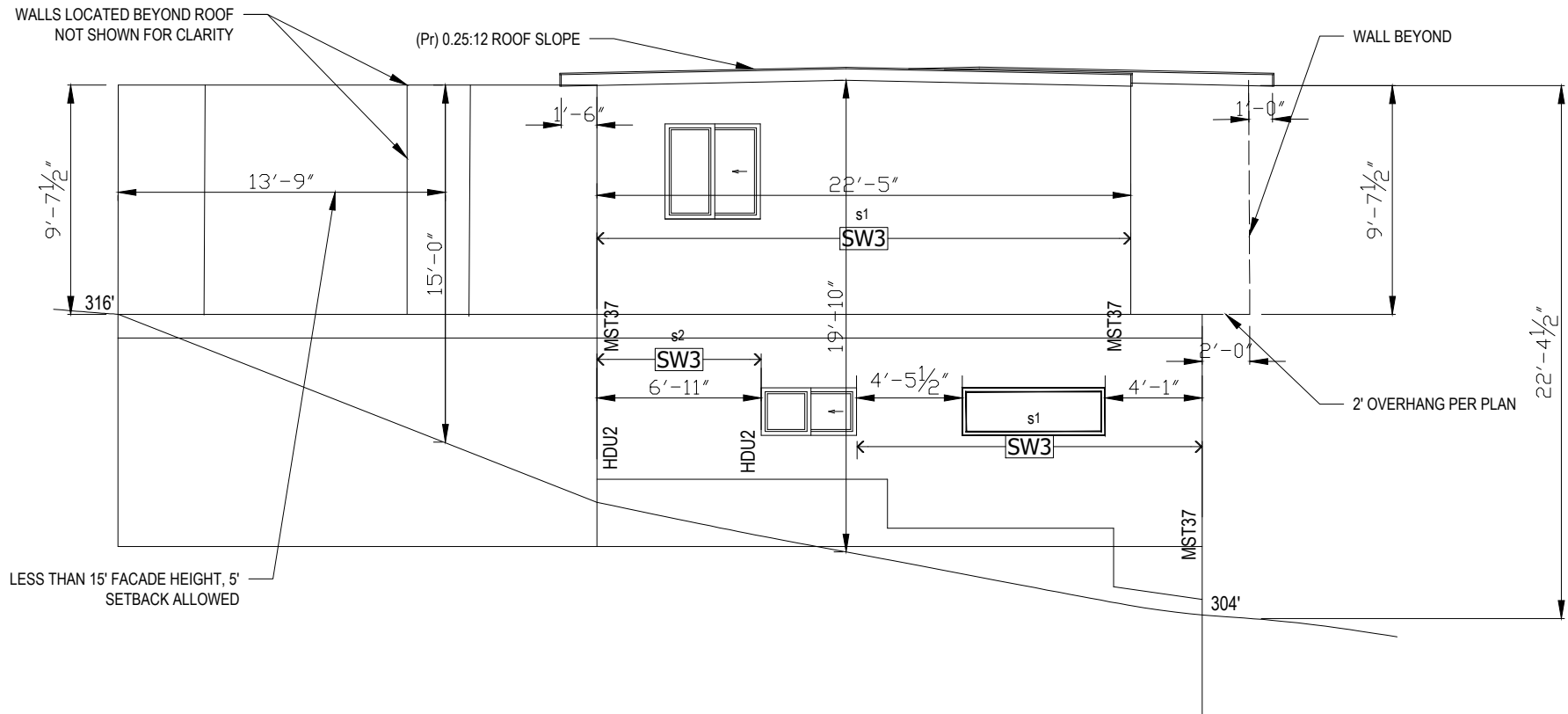
# Lateral Analysis



**(Pr) WEST ELEVATION**

SCALE  $\frac{1}{4}'' = 1'-0''$

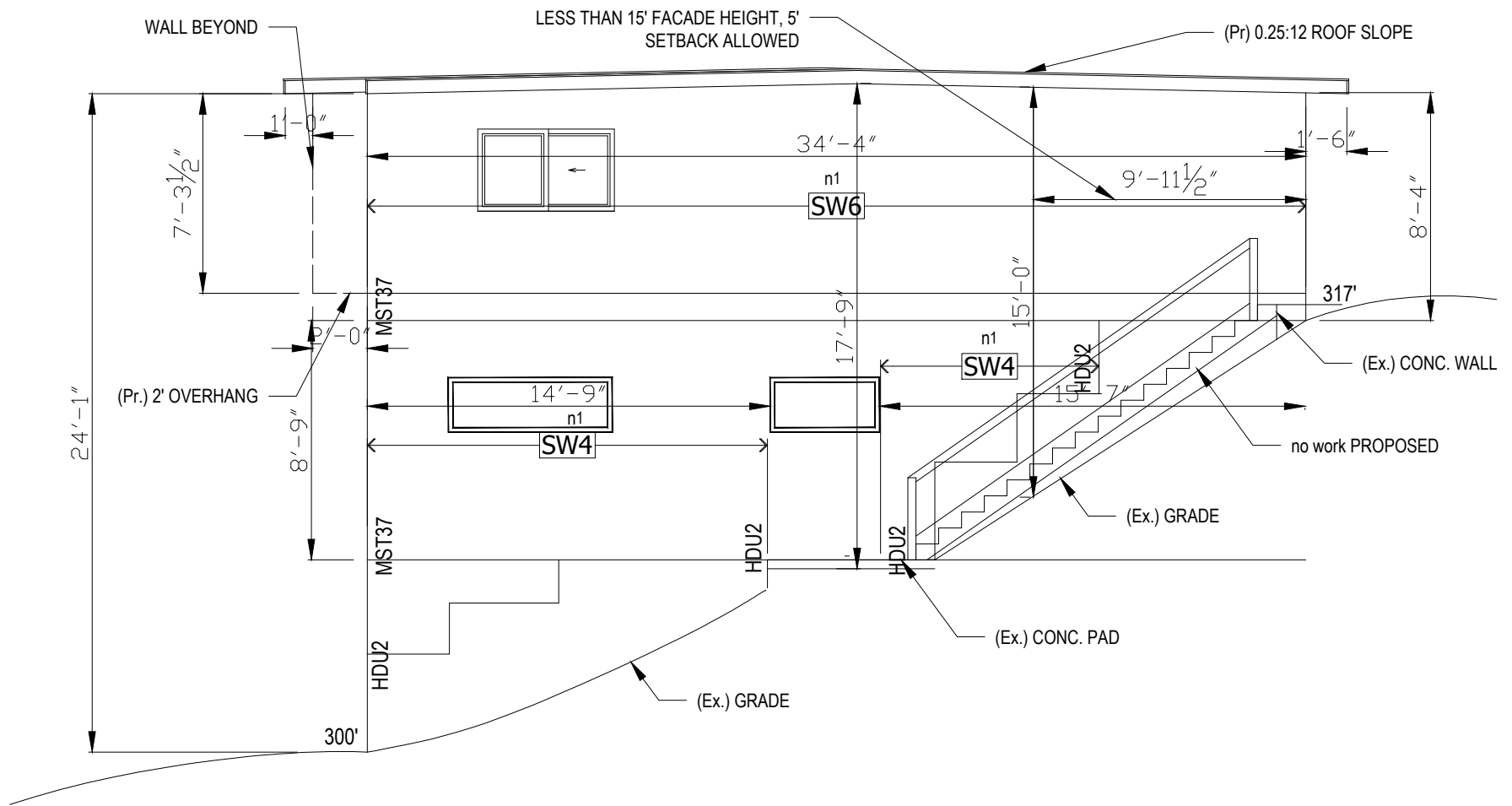




**(Pr) SOUTH ELEVATION**

SCALE 3/4" = 1'-0"





**(Pr) NORTH ELEVATION**

SCALE 1/4" = 1'-0"

**Search Information**

**Address:** 4124 94th PI SE, Mercer Island, WA 98040, USA

**Coordinates:** 47.5723124, -122.213217

**Elevation:** 299 ft

**Timestamp:** 2022-01-09T15:56:22.457Z

**Hazard Type:** Seismic

**Reference Document:** ASCE7-16

**Risk Category:** II

**Site Class:** D



**Basic Parameters**

Name	Value	Description
S <sub>S</sub>	1.409	MCE <sub>R</sub> ground motion (period=0.2s)
S <sub>1</sub>	0.49	MCE <sub>R</sub> ground motion (period=1.0s)
S <sub>MS</sub>	1.409	Site-modified spectral acceleration value
S <sub>M1</sub>	* null	Site-modified spectral acceleration value
S <sub>DS</sub>	0.939	Numeric seismic design value at 0.2s SA
S <sub>D1</sub>	* null	Numeric seismic design value at 1.0s SA

\* See Section 11.4.8

**Additional Information**

Name	Value	Description
SDC	* null	Seismic design category
F <sub>a</sub>	1	Site amplification factor at 0.2s
F <sub>v</sub>	* null	Site amplification factor at 1.0s
CR <sub>S</sub>	0.903	Coefficient of risk (0.2s)
CR <sub>1</sub>	0.898	Coefficient of risk (1.0s)
PGA	0.603	MCE <sub>G</sub> peak ground acceleration
F <sub>PGA</sub>	1.1	Site amplification factor at PGA
PGA <sub>M</sub>	0.663	Site modified peak ground acceleration

T <sub>L</sub>	6	Long-period transition period (s)
SsRT	1.409	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.561	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	3.674	Factored deterministic acceleration value (0.2s)
S1RT	0.49	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.546	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.463	Factored deterministic acceleration value (1.0s)
PGAd	1.25	Factored deterministic acceleration value (PGA)

\* See Section 11.4.8

*The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.*

## Disclaimer

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<b>NT Engineers</b>		Date:	1/8/22
<b>17614 NE 29th St - Redmond, WA 98052</b>	Tel: 425-891-5111	Email:	housedesign4u@outlook.com
Project Name: Loo & Wai's Remodel	Description: <b>Design Criteria</b>		

**Design Criteria:**

Code:

International Building Code, 2018 edition

**IBC 2018**

National Design Specification for Wood Construction 2010 edition

**NDS, 2010**

American Concrete Institute, 318-14 editor.

**ACI-318, 2014**

American Society of Civil Engineers, 7-16 editor.

**ASCE 7-16**

**Project Site:**

**4124 94th PI SE**

Latitude = 47.7754952

*Mercer Island WA 98040*

Longitude = -122.221938

**Seismic:**

*R = 6.5 Bearing wall system, Wood structural panel walls*

*Mapped Spectral Acceleration, S<sub>s</sub> = 1.409*

(See attached print out)

*Mapped Spectral Acceleration, S<sub>1</sub> = 0.49*

*Soil Site Class = D*

**Wind:**

*Exposure : B*

*Basic Wind Speed = 115 mph*

*Speed Up Factor K<sub>zt</sub> = 1*

**Live Loads:**

*Roof = 25 psf (Snow)*

*Floor*

*Residential = 40 psf*

*Stair = 100 psf*

*Deck /Balcony = 60 psf*

**Soils:**

**Values Assumed by Owner:**

*Soil Bearing = 1,500 psf (Assumed)*

*Active Soil Pressure = 35 pcf*

*Passive Soil Pressure = 250 pcf*

*IBC Soil Profile Type = S a*

*Frost Depth = 12 inches*

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17614 NE 29th St - Redmond, WA 98052	Tel: 425-891-5111	Email: housedesign4u@outlook.com			
Project Name: Loo & Wai's Remodel	Description: Design Criteria - Dead Loads				

**Roof Assembly**

Dead Load:

Roof Material	1.5 psf		
3/4" Plywood Sheathing.....	2.5 psf		
Wood Trusses at 24" o.c.....	3.0 psf		
Insulation	0.1 psf		
(1) Layers of 1/2" GWB.....	2.0 psf		
Miscellaneous .....	0.5 psf		
Total .....	<u>9.6 psf</u>	Use DL =	10.0 psf

**Floor Assembly**

Dead Load:

Flooring .....	1.0 psf		
3/4" T & G Plywood .....	2.5 psf		
Floor Joist at 16" o.c.....	3.0 psf		
1/2" Gypsum Ceiling Board	2.5 psf		
Miscellaneous .....	1.0 psf		
Total .....	<u>10.0 psf</u>	Use DL =	10.0 psf

Deck Dead Load:

Decking.....	4.0 psf		
Miscellaneous .....	2.0 psf		
Total.....	<u>6.0 psf</u>	Use DL =	6.0 psf

**Exterior Wall Assembly**

Siding	1.0 psf		
2x6 at 16" o.c.....	1.7 psf		
Insulation	0.5 psf		
7/16" Plywood Sheathing.....	1.5 psf		
(1) Layers of 1/2" GWB .....	2.3 psf		
Miscellaneous .....	0.5 psf		
Total .....	<u>7.5 psf</u>	Use DL =	8.0 psf

**Interior Wall Assembly**

(2) Layers of 1/2" GWB .....	4.4 psf		
2x4 at 16" o.c.....	1.6 psf		
Miscellaneous .....	0.5 psf		
Total .....	<u>6.5 psf</u>	Use DL =	7.0 psf

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	Tel: 425-891-5111	Email: housedesign4u@outlook.com
Project Name: Loo & Wai's Remodel	Description:	<b>Wind Base Shear</b>

IBC 2018

Basic Wind Speed,  $V_3s$  = 115 mph (ASCE 7-16 Fig. 26.5-1A)  
 Exposure = B  
 Risk Category = II  
 Roof Slope = 0.5 :12 = 2.39 degrees  
 Loads Front/Back - Width (ft) = 76.0 ft Roof Profile : Gable  
 Loads Side - Width (ft) = 37.0 ft Roof Profile : Gable  
 Eave Height = 19.0  
 Mean Roof Ht. = 17.0 ft  
 Edge Strip Width,  $a$  = 3.7 ft (Figure 1609.6.2.1 note 10)  
 End Zone Widths = 7.40 ft ( $2*a$ )  
 Wind Speed Up  $K_{zt}$  = 1.00

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	Tel: 425-891-5111	Email: housedesign4u@outlook.com
Project Name: Loo & Wai's Remodel	Description: <b>Seismic Weights</b>	

**DEAD LOAD WEIGHTS FOR SEISMIC CALCULATIONS:**

Unit Roof Weight: 10.0 psf  
Unit Floor Weight: 10.0 psf  
Unit Exterior Wall Wt: 8.0 psf  
Unit Interior Wall Wt: 7.0 psf

LOCATION	LENGTH	HEIGHT	UNIT WT.	Total Wt.	Sub-Total
<b>ROOF LEVEL</b>				(lbs)	(kips)
Roof Area =	2812	1.000	10.0	= 28,120	
Ext. Wall Above	226	2.0	8.0	= 3,616	
Ext. Wall Below	226	5.0	8.0	= 9,040	
Int. Wall Below	187	5.0	7.0	= 6,545	
					47.3 Kips
<b>4th</b>					
Floor Area =	2812	1	10.0	= 28,120	
Low Roof Area =	0	1	10.0	= 0	
Ext. Wall Above	226	4.0	8.0	= 7,232	
Int. Wall Above	187	4.0	7.0	= 5,236	
Ext. Wall Below	226	0	8.0	= 0	
Int. Wall Below	60	0	7.0	= 0	
					40.6 Kips
<b>3rd</b>					
Floor Area =	2812	0	10.0	= 0	
Low Roof Area =	0	0	10.0	= 0	
Ext. Wall Above	226	0	8.0	= 0	
Int. Wall Above	60	0	7.0	= 0	
Ext. Wall Below	226	0	8.0	= 0	
Int. Wall Below	10	0	7.0	= 0	
					0.0 Kips
<b>2nd</b>					
Floor Area =	2812	0	10.0	= 0	
Low Roof Area =	0	0	10.0	= 0	
Ext. Wall Above	226	0	8.0	= 0	
Int. Wall Above	10	0	7.0	= 0	
Ext. Wall Below	90	0.0	8.0	= 0	
Int. Wall Below	25	0.0	7.0	= 0	
					0.0 Kips
<b>1st</b>					
Ext. Wall Above	90	0.0	8.0	= 0	
Int. Wall Above	25	0.0	7.0	= 0	
					0.0 Kips

STRUCTURE WEIGHT FOR SEISMIC BASE SHEAR: 87.9 Kips

TOTAL WEIGHT OF STRUCTURE: 87.9 Kips

NT Engineers 17614 NE 29th St - Redmond, WA 98052		Date: 1/8/22
Project Name: Loo & Wai's Remodel		Description: Seismic Story Shear
Tel: 425-891-5111		Email: housedesign4u@outlook.com

Equivalent Lateral Force Analysis ASCE7 12.8

Risk Category = II  
Site Classification = D

**Refer to attached sheet for Map specified variables**

$S_s = 1.4090$        $F_a = 1.000$       From attached sheet  
 $S_1 = 0.4900$        $F_v = 1.505$       From attached sheet  
 $SDS = 0.939 = 0.67 \cdot F_a \cdot S_s$       ASCE 7 Eq 11.4-3  
 $SD_1 = 0.492 = 0.67 \cdot F_v \cdot S_1$       ASCE 7 Eq 11.4-4  
 Building Height,  $h_n = 21.0$  ft  
 Building Period Coefficient,  $CT = 0.020$       ASCE 7-16, Table 12.8-2  
 Approx. Fundamental Period = 0.196 ( $CT \cdot (h_n)^{0.75}$ )      ASCE 7-16, EQ 12.8-7  
  
 Response Modification Factor,  $R = 6.5$       ASCE7-16 Table 12.2-1  
 Occupancy Importance Factor,  $IE = 1.0$       ASCE 7-16 Table 1.5-2  
 Seismic Design Category = D      ASCE 7-16 Table 11.6-1  
 Rho Factor ( $\rho$ ) = (front/back) (side/side)      ASCE 7-16 12.3.4.2  
    1.30      1.30

**Seismic Response Coefficient**

$C_s = SDS/R/I$        $C_s = 0.145$       ASCE 7-16, EQ 12.8-2  
  
 $C_{s, MAX} = SD_1/T(R/I)$        $C_{s, MAX} = 0.386$       ASCE 7-16, EQ 12.8-3  
  
 $C_{s, MIN} = 0.044SDS \cdot I$        $C_{s, MIN} = 0.041$       ASCE 7-16, EQ 12.8-5  
  
 $C_s = 0.145$   
 Seismic Base Shear,  $V = 0.145 W$       ASCE 7-16, EQ 12.8-1  
 Dead Load  $W = 87.9$  kips  
 $V = 12.7$  kips  
  
    (front/back) (side/side)      19%  
 $E = rV = 16.5$       16.5      kips      ASCE 7-16, EQ 12.4-3

Vertical Distribution per ASCE7 – 12.8.3

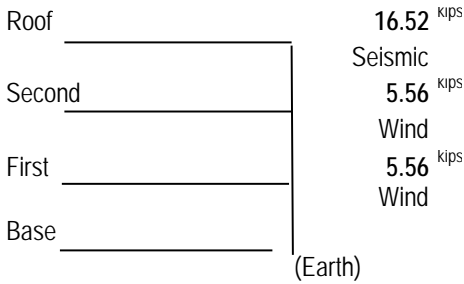
Floor	Story Height H (ft)	Total Height h <sub>x</sub> (ft)	Story Weight w <sub>x</sub> (kips)	w <sub>x</sub> h <sub>x</sub> (k-ft)	Front/Back Story Force F <sub>i</sub> (kips)	Side/Side Story Force F <sub>i</sub> (kips)	Front/Back Story Shear E (kips)	Side/Side Story Shear E (kips)
Roof	8.00	8.00	47.3	379	16.52	16.52	16.52	16.52
4th	0.00	0.00	40.6	0	0.00	0.00	16.52	16.52
3rd	0.00	0.00	0.0	0	0.00	0.00	16.52	16.52
2nd	0.00	0.00	0.0	0	0.00	0.00	16.52	16.52
1st	0.00	0.00	0.0	0	0.00	0.00	16.5	16.5
sum			87.9	379	16.5	16.5		

k = 1.0

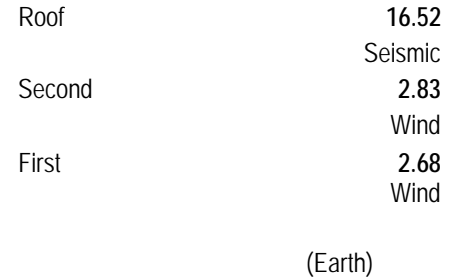


<b>NT Engineers</b>		Date: 01/08/22
<b>17614 NE 29th St - Redmond, WA 98052</b>		Tel: 425-891-5111
Project Name: Loo & Wai's Remodel		Email: housedesign4u@outlook.com
IBC 2018		Description: <b>Lateral Design Loads</b>

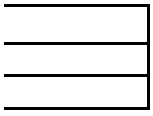
Level	Front/Back Forces				Side Forces			
	Wind WF/B(kips)	Seismic E(kips)	Governing Force	Story Force	Wind WS(kips)	Seismic E(kips)	Governing Force	Story Force
Roof	8.34	16.52	Seismic	<b>16.52</b>	5.23	16.52	Seismic	<b>16.52</b>
Second	5.56	0.00	Wind	<b>5.56</b>	2.83	0.00	Wind	<b>2.83</b>
First	5.56	0.0	Wind	<b>5.56</b>	2.68	0.0	Wind	<b>2.68</b>
Base Shear	19.46	16.52		<b>27.64</b>	10.74	16.52		<b>22.03</b>



Front/Back Direction



Side Direction

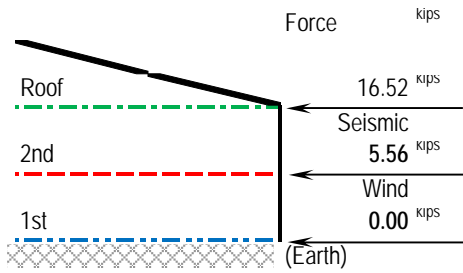


kips

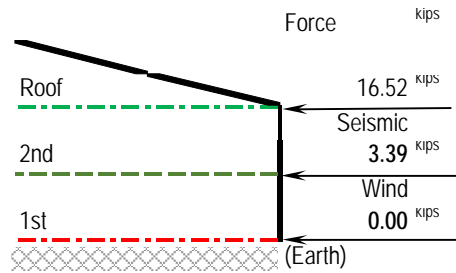
kips

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Description:		<b>Lateral Design Loads</b>

Level	Front/Back Forces				Side Forces			
	Wind WF/B(kips)	Seismic E(kips)	Governing Force	Story Force	Wind WS(kips)	Seismic E(kips)	Governing Force	Story Force
Roof	8.34	16.52	Seismic	<b>16.52</b>	5.23	16.52	Seismic	<b>16.52</b>
4	5.56	0.00	Wind	<b>5.56</b>	3.39	0.00	Wind	<b>3.39</b>
3	0.00	0.00	Wind	<b>0.00</b>	0.00	0.00	Wind	<b>0.00</b>
2	5.56	0.00	Wind	<b>5.56</b>	2.83	0.00	Wind	<b>2.83</b>
Base Shear	19.46	16.52		<b>27.64</b>	11.45	16.52		<b>22.73</b>



Front/Back Direction



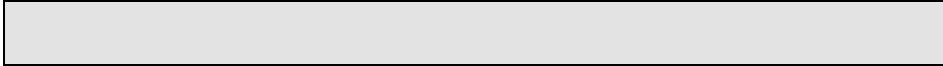
Side Direction



<b>NT Engineers</b>		Date: 01/08/22
7614 NE 29th St - Redmond, WA 98052	Tel: 425-891-5111	Email: housedesign4u@outlook.com
Project Name: Loo & Wai's Remodel	Description: Side Directic Shear Wall Design	

Roof - 2nd Floor Shearwalls (Force Travels Front/Back)

Side Walls



Story shear(kips) = 16.52  
 Story height (ft) = 9.00  
 Total Width(ft) = 76.00  
 Lateral Controlling F/B : Wind 0.67

Story	Wall	Wall D(ft)	Opening Width (ft)	rmax IBC 1617.2.2	Opening Height (ft)	Opening (max) to Edge (ft)	Plate to Opening (ft)	Trib.Width (ft)	%Sharing	Story V(kips)	Sum V(kips)	Height/Width		Panel Shear (plf)	Reduction (#) R = 2*w/H	Design Panel Shear (plf)	Sum OTM(k-ft)	RM (k-ft)	Resultant HD(kips)	Strap Type	Force at Window (k)	Wall Type	
												Story DL(klf)	Sum DL(klf)										
2	n1	34.00	0.00	0.06	0.00	0.00	0.00	38.00	0.4356	3.60	3.60	0.25	0.25	106	1.00	106	32.37	96.82	-1.93	N/A	N/A	SW-6	
2	o	0.00	0.00	1.00	0.00	0.00	0.00	38.00	0.5644	4.66	4.66	0.25	0.25	46605812	N/A	N/A	41.95	0.00	-69.92	N/A	N/A	REVISE	
2	o	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.00	0.00	0.25	0.25	0	N/A	N/A	0.00	0.00	0.00	N/A	N/A	REVISE	
2	o	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.00	0.00	0.25	0.25	0	N/A	N/A	0.00	0.00	0.00	N/A	N/A	REVISE	
2	s1	22.50	0.00	0.22	0.00	0.00	0.00	38.00	1.0000	8.26	8.26	0.25	0.25	367	1.00	367	74.32	42.40	1.46	MST37	N/A	SW-3	
2	z	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.00	0.00	0.25	0.25	0	N/A	N/A	0.00	0.00	0.00	N/A	N/A	REVISE	
2	z	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.00	0.00	0.25	0.25	0	N/A	N/A	0.00	0.00	0.00	N/A	N/A	REVISE	
2	z	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.00	0.00	0.25	0.25	0	N/A	N/A	0.00	0.00	0.00	N/A	N/A	REVISE	
2	z	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.00	0.00	0.25	0.25	0	N/A	N/A	0.00	0.00	0.00	N/A	N/A	REVISE	
S		56.50	rmax = 1.00					76.00	1.00	16.52	16.52												

2nd - 1st Floor Shearwalls (Force Travels Front/Back)

Side Walls

Story shear(kips) = 5.56  
 Story height (ft) = 8.00  
 Total Width(Ft) = 76.00  
 Accumulated shear(kips) = 22.08  
 Lateral Controlling F/B : Wind 0.67

Story	Wall	Wall D(ft)	Opening Width (ft)	rmax IBC 1617.2.2	Opening Height (ft)	Opening (max) to Edge (ft)	Plate to Opening (ft)	Trib.Width (ft)	%Sharing	Story V(kips)	Sum V(kips)	Height/Width		Panel Shear (plf)	Reduction (#) R = 2*w/H	Design Panel Shear (plf)	Sum OTM(k-ft)	RM (k-ft)	Resultant HD(kips)	Allow. Type	HD Type	of wall (inches)	Force at Window (k)	Wall Type	Anchor Bolts
												Story DL(klf)	Sum DL(klf)												
1	n1	15.00	0.00	0.20	0.00	0.00	0.00	38.00	0.5000	1.39	4.99	0.24	0.49	332	1.00	332	72.27	110.70	-2.65	Both	N/A	N/A	N/A	SW-4	32-OC, 2x
1	n2	15.00	0.00	0.24	0.00	0.00	0.00	38.00	0.5000	1.39	6.05	0.24	0.49	403	1.00	403	90.35	110.70	-1.40	Both	N/A	N/A	N/A	SW-3	16-OC, 2x
1	o	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.00	0.00	0.24	0.49	0	N/A	N/A	0.00	0.00	0.00	Both	N/A	N/A	N/A	REVISE	REVISE
1	o	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.00	0.00	0.24	0.49	0	N/A	N/A	0.00	0.00	0.00	Both	N/A	N/A	N/A	REVISE	REVISE
1	s1	14.00	0.00	0.44	0.00	0.00	0.00	38.00	0.6667	1.85	10.11	0.24	0.49	722	1.00	722	155.21	96.43	4.35	Both	STHD10	4.50	N/A	SW-33	16-OC, 3x
1	s2	7.00	0.00	0.08	0.00	0.00	0.00	38.00	0.3333	0.93	0.93	0.24	0.49	132	1.00	132	7.41	24.11	-2.57	Both	N/A	4.50	N/A	SW-6	48-OC, 2x
1	z	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.00	0.00	0.24	0.49	0	N/A	N/A	0.00	0.00	0.00	Both	N/A	3.00	N/A	REVISE	REVISE
1	z	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.00	0.00	0.24	0.49	0	N/A	N/A	0.00	0.00	0.00	Both	N/A	N/A	N/A	REVISE	REVISE
1	z	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.00	0.00	0.24	0.49	0	N/A	N/A	0.00	0.00	0.00	Both	N/A	N/A	N/A	REVISE	REVISE
S		51.00	rmax = 0.44					76.00		5.56	22.08														