



**LONGITUDE**  
**ONE TWENTY°**  
ENGINEERING & DESIGN

*Structural Package for:*

# *Eadie Residence*

5411 96th Ave SE  
Mercer Island, WA 98040

Project No: S240119-2

July 3, 2024



**BDC Related Material:**  
Pages 75-84 (Pile Calcs)

This calculations package contains 127  
pages, no more, no less

**STRUCTURAL ENGINEER**  
L120 ENGINEERING & DESIGN  
13150 91ST PL NE  
KIRKLAND, WA 98034  
CONTACT: MANS THURFJELL, PE  
PHONE: 425-636-3313  
MTHURFJELL@L120ENGINEERING.COM

☎ (425) 636 3313  
✉ L120Engineering.com

Project Number: <b>S220425-3</b>	Plan Name: <b>Eadie Remodel</b>	Sheet Number: <b>DC</b>
Engineer: <b>HK</b>	Specifics: <b>Design Criteria</b>	Date: <b>3/6/2024</b>

**Gravity Criteria:**

Code: IBC 2018

<b>ROOF SYSTEM</b>			
<b>Live Load:</b>			
Snow	25.0	psf	
<b>Dead Load:</b>			
Composite Roofing	2.0	psf	
19/32" Plywood Sheathing	2.5	psf	
Trusses at 24" o.c.	3.0	psf	
Insulation	1.8	psf	
(2) Layers 5/8" GWB	4.4	psf	
Misc/Mech	1.3	psf	
<b>Total</b>	<b>15.0</b>	<b>psf</b>	

<b>FLOOR SYSTEM</b>			
<b>Live Load:</b>			
Residential	40.0	psf	
<b>Dead Load:</b>			
Flooring	3.0	psf	
3/4" T & G Plywood	2.5	psf	
Floor Joists at 16" o.c.	2.5	psf	
Insulation	0.5	psf	
(1) Layers 5/8" GWB	2.2	psf	
Miscellaneous	4.3	psf	
<b>Total</b>	<b>15.0</b>	<b>psf</b>	

<b>EXTERIOR WALL SYSTEM</b>			
2x6 at 16" o.c.	1.7	psf	
Insulation	1.0	psf	
1/2" Plywood Sheathing	1.5	psf	
(2) layers 5/8" GWB	4.4	psf	
Misc	3.4	psf	
<b>Total</b>	<b>12.0</b>	<b>psf</b>	
Inclu. thinset stone veneer	5.0	psf	
<b>Total</b>	<b>17.0</b>	<b>psf</b>	

<b>INTERIOR WALL SYSTEM</b>			
2x4 at 16" o.c.	1.1	psf	
Insulation	0.5	psf	
(2) Layers 5/8" GWB	4.4	psf	
Misc	2.0	psf	
<b>Total</b>	<b>8.0</b>	<b>psf</b>	

**SEISMIC PARAMETERS:**

Code Reference: ASCE 7-16

R = **6.5** Bearing Wall System, Wood Structural Panel Walls

Mapped Spectral Acceleration, S<sub>s</sub> = **1.44**

Mapped Spectral Acceleration, S<sub>1</sub> = **0.5**

Soil Site Class = **D**

**WIND PARAMETERS:**

Code Reference: ASCE 7-16

Basic Wind Speed (3 second Gust) = **100** mph

Exposure : **C**

K<sub>zt</sub> = **1.00**

**SOIL PARAMETERS:**

Soil Bearing Pressure = **1,500** psf competent native soil or structural fill  
1/3 increase for short-term wind or seismic loading is acceptable

Frost Depth = **18** in

Lateral Wall Pressures:

Unrestrained Active Pressure = **35** pcf Cantilevered walls

Restrained Active Pressure = **55** pcf Plate Wall Design/Tank Walls

Passive Pressure = **250** pcf \*Ignore top 2 ft

Soil Friction Coeff. = **0.4**



**Site Soil Class:** D - Stiff Soil

**Results:**

$S_s$ :	1.44	$S_{D1}$ :	N/A
$S_1$ :	0.5	$T_L$ :	6
$F_a$ :	1	PGA :	0.616
$F_v$ :	N/A	PGA <sub>M</sub> :	0.678
$S_{MS}$ :	1.44	$F_{PGA}$ :	1.1
$S_{M1}$ :	N/A	$I_e$ :	1
$S_{DS}$ :	0.96	$C_v$ :	1.388

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

**Data Accessed:** Wed Feb 07 2024

**Date Source:** [USGS Seismic Design Maps](#)

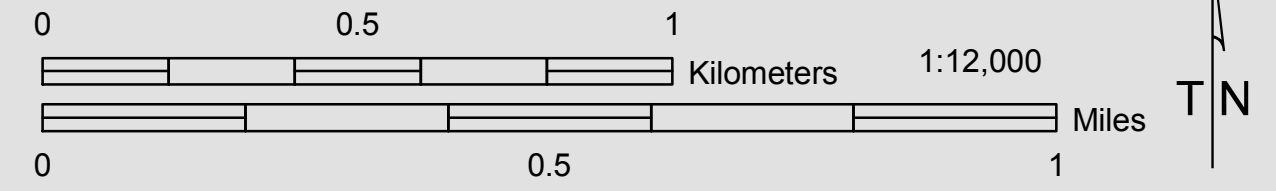
The ASCE Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 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.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE Hazard Tool.

# Mercer Island Wind Exposure and Wind Speed-Up (Topographic Effect)

by Development Services Group (DSG), City of Mercer Island  
April 2009



## WIND EXPOSURE CATEGORIES & WIND SPEED-UP FACTORS (ICC Section 1609 & ASCE 7-05 Chapter 6)

It is the responsibility of the Owner (or their Design Professional) to review site conditions and determine the  $K_{zt}$  factor to be utilized for each specific project. The  $K_{zt}$  factors and wind exposure categories indicated on this map are the minimum values accepted by the City of Mercer Island without requiring the design professional to submit additional calculations and supporting topographic documentation (to verify the values utilized in their wind load determination).

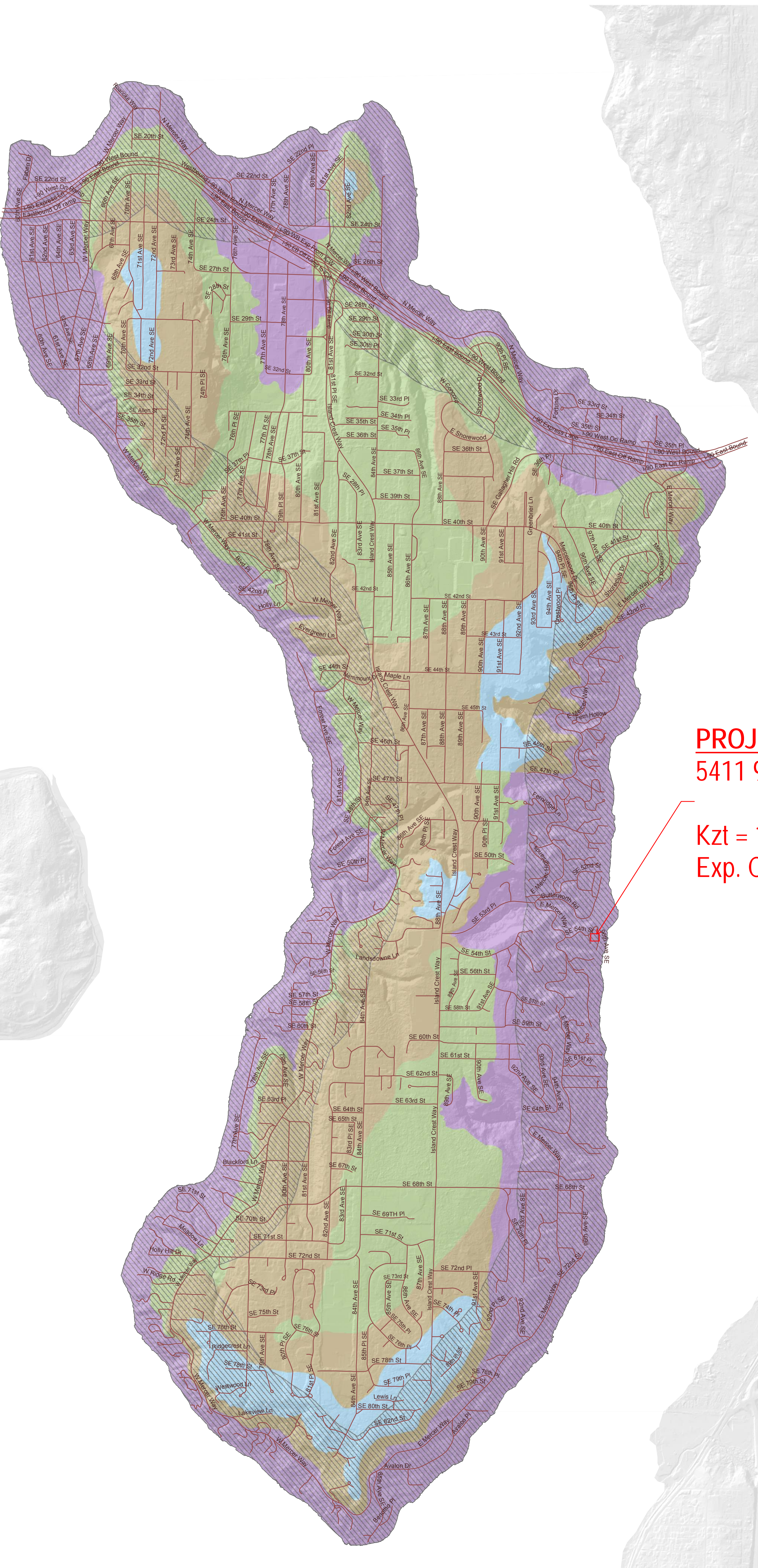
Please note – The  $K_{zt}$  values indicated on this map are approximations based upon periodic calculations of representative samplings around Mercer Island. These values are intended for City of Mercer Island's plan review purposes only.

### WIND EXPOSURE CATEGORIES:

Wind Exposure Category		Exposure 'C' (1500 feet from Lake)
		Exposure 'B' (all other areas)

### WIND SPEED-UP (TOPOGRAPHIC EFFECT) - $K_{zt}$ Factor :

$K_{zt}$ Factor		$K_{zt} = 1.0$
		$K_{zt} = 1.3$
		$K_{zt} = 1.6$
		$K_{zt} = 1.9$



**PROJECT LOCATION:**  
**5411 96TH AVE SE**

$K_{zt} = 1.0$   
Exp. Cat = C

### GENERAL NOTES FOR WIND EXPOSURE AND WIND SPEED-UP MAP

This map is the Wind Exposure Category and Wind Speed-up (Topographic Effects) Map for the City of Mercer Island. This map shows the minimum wind exposure category and the minimum wind speed-up, " $K_{zt}$ " factor, which will be accepted without site specific documentation and calculation.

Other wind speed phenomena may occur on Mercer Island that is not specifically identified on this map. It is the responsibility of the Owner (or their Design Professional) to review site conditions and determine the appropriate design wind speed and exposure category for their specific project and location.

This map is for the sole use of the staff of the City of Mercer Island's Development Services Group (DSG) for the purposes of permit application evaluation. This map provides DSG staff a general assessment of Wind Exposure Category and Wind Speed-up (Topographic Effects). All areas have not been specifically evaluated and there may be locations that are not correctly represented on this map. It is the responsibility of individual property owners and map users to evaluate risk associated with their proposed development. No site-specific assessment of risk is implied or otherwise indicated by the City of Mercer Island with this map.

Information about data used for the map, references, and data limitation are all described the associated "Read Me" document. The digital version of this map is accompanied by a meta data file containing pertinent information about map construction. This data map is available on the City of Mercer Island website.

The City of Mercer Island is using guidance provided within ICC Section 1609 & ASCE 7-05 Chapter 6 regarding definitions used when creating this map.

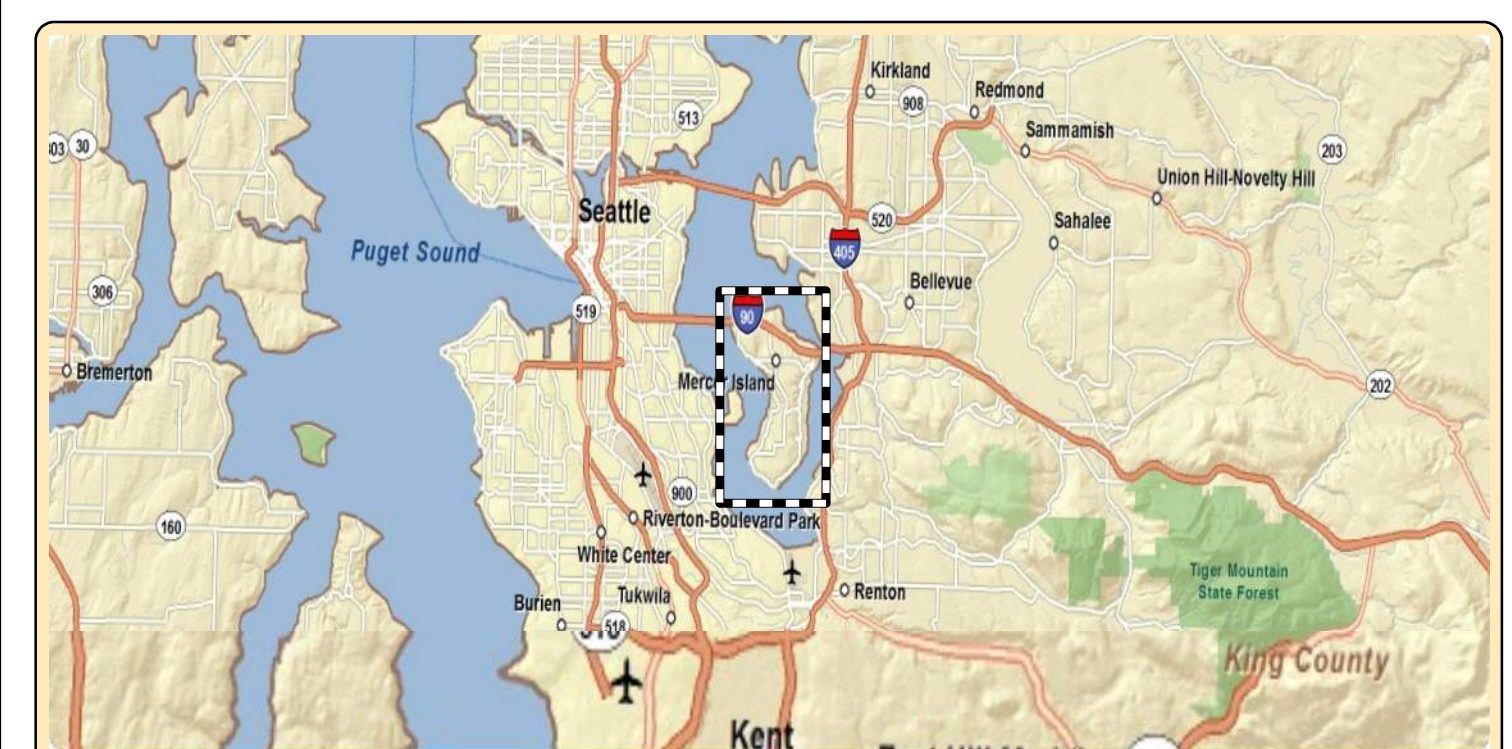
### DEFINITIONS:

**$K_{zt}$  factor:** The topographic effect of wind speed-up at isolated hills, ridges, and escarpments constituting abrupt changes in the general topography, located in any exposure category, that meet all of the conditions noted in ASCE 7-05 Minimum Design Loads for Buildings and Other Structures, Section 6.5.7.

**Exposure B:** The wind exposure category that applies where the site in question is located a minimum of 1500 feet from the shoreline and the mean roof height is less than or equal to 30 feet per IBC 2006 section 1609.4.3.

**Exposure C:** The wind exposure category that applies where the site in question is located within 1500 feet from the shoreline per IBC 2006 section 1609.4.3.

**Wind Speed:** Minimum 85 mph 3-second gust per IRC Figure R301.2(4)





**LONGITUDE**  
**ONE TWENTY°**  
ENGINEERING & DESIGN

# *FRAMING CALCULATIONS*

*BEAM REFERENCE PER PLAN*

Roof			
Member Name	Results (Max UTIL %)	Current Solution	Comments
RJ-1	Passed (85% ΔT)	2 piece(s) 2 x 10 DF No.2 @ 16" OC	
RJ-2	Passed (92% M)	1 piece(s) 2 x 8 DF No.2 @ 16" OC	
RJ-3	Passed (89% ΔT)	2 piece(s) 2 x 8 DF No.2 @ 16" OC	
RB-1	Passed (83% ΔT)	1 piece(s) 3 1/2" x 9" 24F-V4 DF Glulam	
RB-2	Passed (34% R)	1 piece(s) 3 1/2" x 7 1/2" 24F-V4 DF Glulam	
RB-3	Passed (89% R)	1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam	
RB-4	Passed (52% ΔT)	1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam	
RB-5	Passed (36% R)	1 piece(s) 3 1/2" x 12" 24F-V4 DF Glulam	
RB-6	Passed (29% M+)	1 piece(s) 3 1/2" x 7 1/2" 24F-V4 DF Glulam	
RB-7	Passed (33% R)	1 piece(s) 4 x 8 DF No.2	
RB-8	Passed (86% ΔT)	1 piece(s) 5 1/2" x 10 1/2" 24F-V4 DF Glulam	
RB-9	Passed (59% M)	1 piece(s) 4 x 8 DF No.2	
RB-10	Passed (17% M)	1 piece(s) 4 x 8 DF No.2	
2nd Floor			
Member Name	Results (Max UTIL %)	Current Solution	Comments
2H-1	Passed (28% R)	1 piece(s) 6 3/4" x 10 1/2" 24F-V4 DF Glulam	
2H-2	Passed (40% R)	1 piece(s) 4 x 6 DF No.2	
2H-3	Passed (11% R)	1 piece(s) 4 x 8 DF No.2	
2H-4	Passed (17% M)	2 piece(s) 2 x 8 DF No.2	
2H-5 (with RB-1 in place)	Passed (6% R)	1 piece(s) 4 x 8 DF No.2	
2H-5 (without RB-1 in place)	Passed (23% R)	1 piece(s) 4 x 8 DF No.2	
2J-1	Passed (59% M)	2 piece(s) 2 x 10 DF No.2 @ 16" OC	
2J-2	Passed (73% ΔL)	1 piece(s) 2 x 10 DF No.2 @ 12" OC	
2J-3 (Upper Deck Joist)	Passed (27% M)	1 piece(s) 2 x 8 DF No.2 @ 16" OC	
2J-4	Passed (66% M)	1 piece(s) 2 x 10 DF No.2 @ 16" OC	
2J-5	Passed (76% M)	1 piece(s) 2 x 10 DF No.2 @ 12" OC	
2J-6	Passed (73% M)	1 piece(s) 2 x 10 DF No.2 @ 16" OC	
2B-1	Passed (38% R)	2 piece(s) 2 x 8 DF No.2	
2B-2	Passed (98% ΔL)	1 piece(s) 5 1/4" x 9 1/2" 2.2E Parallam® PSL	
2B-3	Passed (37% R)	2 piece(s) 2 x 10 DF No.2	
2B-4	Passed (80% M+)	1 piece(s) 3 1/2" x 9" 24F-V4 DF Glulam	
2B-5	Passed (39% ΔL)	1 piece(s) 3 1/2" x 9" 24F-V4 DF Glulam	
2B-6	Passed (76% M+)	1 piece(s) 3 1/2" x 9" 24F-V4 DF Glulam	
2B-7	Passed (60% R)	2 piece(s) 2 x 10 DF No.2	
2B-8	Passed (85% ΔT)	2 piece(s) 1 3/4" x 9 1/4" 2.0E Microllam® LVL	
2B-9	Passed (90% R)	1 piece(s) 5 1/4" x 11 1/4" 2.2E Parallam® PSL	
2B-10	Failed (180% ΔL)	1 piece(s) 5 1/4" x 9 1/4" 2.2E Parallam® PSL	
2B-11	Passed (85% ΔL)	1 piece(s) 5 1/4" x 14" 2.2E Parallam® PSL	
2B-12	Passed (34% M+)	1 piece(s) 3 1/2" x 9" 24F-V4 DF Glulam	
2B-13	Passed (100% R)	2 piece(s) 1 3/4" x 9 1/4" 2.0E Microllam® LVL	
2B-14	Passed (59% R)	1 piece(s) 1 3/4" x 9 1/4" 2.0E Microllam® LVL	
2B-15	Passed (68% R)	2 piece(s) 1 3/4" x 9 1/4" 2.0E Microllam® LVL	
2B-16	Passed (102% ΔL)	1 piece(s) 6 3/4" x 18" 24F-V4 DF Glulam	
2B-17	Passed (99% R)	2 piece(s) 1 3/4" x 9 1/4" 2.0E Microllam® LVL	
2B-18	Passed (95% ΔL)	1 piece(s) 5 1/4" x 14" 2.2E Parallam® PSL	

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkkliegl@l120engineering.com	



1st Floor			
Member Name	Results (Max UTIL %)	Current Solution	Comments
1H-1	Passed (72% ΔT)	1 piece(s) 5 1/2" x 15" 24F-V4 DF Glulam	
1H-2	Passed (54% M)	2 piece(s) 2 x 8 DF No.2	
1H-3	Passed (75% M+)	1 piece(s) 5 1/2" x 10 1/2" 24F-V4 DF Glulam	
1J-1	Passed (84% M)	1 piece(s) 2 x 10 DF No.2 @ 16" OC	
1B-1	Passed (100% R)	1 piece(s) 5 1/4" x 9 1/4" 2.2E Parallam® PSL	
1B-2	Passed (25% R)	1 piece(s) 5 1/4" x 9 1/4" 2.2E Parallam® PSL	
Basement			
Member Name	Results (Max UTIL %)	Current Solution	Comments
BH-1	Passed (43% R)	1 piece(s) 3 1/2" x 7 1/2" 24F-V4 DF Glulam	
BH-2	Passed (21% R)	2 piece(s) 2 x 8 DF No.2	
BH-3	Passed (52% R)	1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam	
BH-1	Passed (72% M)	1 piece(s) 4 x 10 DF No.2	

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	

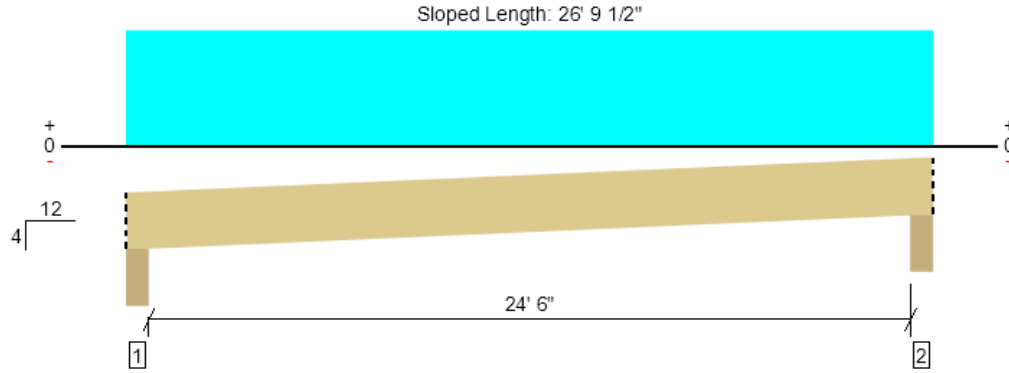


3/8/2024 3:48:36 AM UTC

ForteWEB v3.7

File Name: Eadie Remodel

Roof, RJ-1  
2 piece(s) 2 x 10 DF No.2 @ 16" OC



Drawing is Conceptual. 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)	638 @ 4' 1/2"	6683 (5.50")	Passed (10%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	578 @ 1' 2 1/4"	3830	Passed (15%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3818 @ 12' 8 1/2"	4668	Passed (82%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.974 @ 12' 8 1/2"	1.300	Passed (L/320)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	1.468 @ 12' 8 1/2"	1.733	Passed (L/213)	--	1.0 D + 1.0 S (All Spans)

Member Length : 27' 9/16"  
System : Roof  
Member Type : Joist  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD  
Member Pitch : 4/12

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Beveled Plate - HF	5.50"	5.50"	1.50"	214	424	638	Blocking
2 - Beveled Plate - HF	5.50"	5.50"	1.50"	214	424	638	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' 1" o/c	
Bottom Edge (Lu)	26' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 25' 5"	16"	12.0	25.0	Roof Load

**Weyerhaeuser Notes**

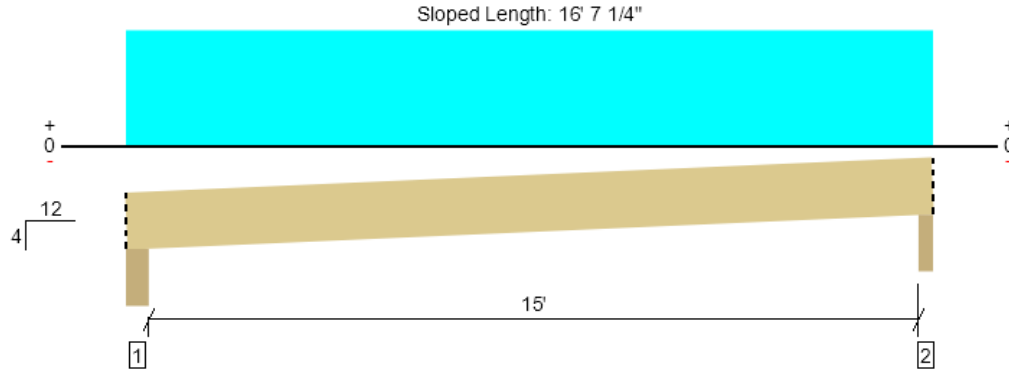
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



Roof, RJ-2  
1 piece(s) 2 x 8 DF No.2 @ 16" OC



Drawing is Conceptual. 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)	391 @ 15' 6 1/2"	2126 (3.50")	Passed (18%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	348 @ 1' 3/8"	1501	Passed (23%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1443 @ 7' 11 1/2"	1564	Passed (92%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.579 @ 7' 11 1/2"	0.799	Passed (L/332)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.871 @ 7' 11 1/2"	1.066	Passed (L/220)	--	1.0 D + 1.0 S (All Spans)

Member Length : 16' 9 5/8"  
System : Roof  
Member Type : Joist  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD  
Member Pitch : 4/12

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Beveled Plate - HF	5.50"	5.50"	1.50"	134	265	399	Blocking
2 - Beveled Plate - HF	3.50"	3.50"	1.50"	131	260	391	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' 2" o/c	
Bottom Edge (Lu)	16' 7" 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 15' 9"	16"	12.0	25.0	Roof Load

**Weyerhaeuser Notes**

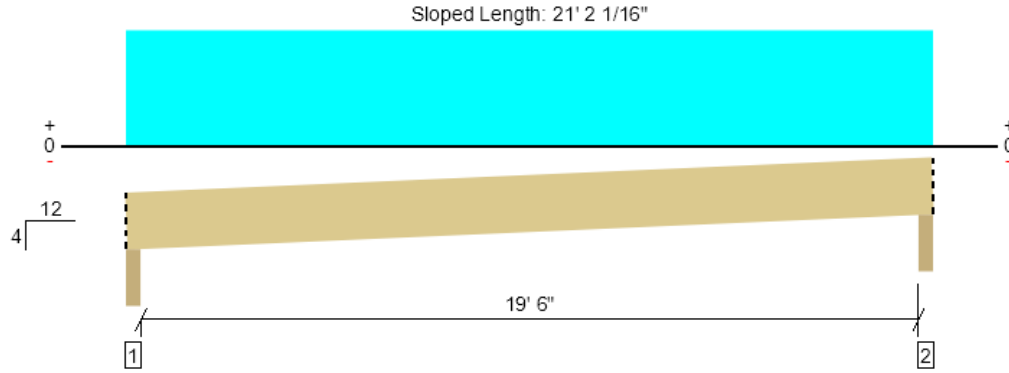
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



Roof, RJ-3  
2 piece(s) 2 x 8 DF No.2 @ 16" OC



Drawing is Conceptual. 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)	504 @ 2' 1/2"	4253 (3.50")	Passed (12%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	461 @ 10' 3/8"	3002	Passed (15%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2427 @ 10' 1/2"	3128	Passed (78%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.818 @ 10' 1/2"	1.037	Passed (L/304)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	1.232 @ 10' 1/2"	1.382	Passed (L/202)	--	1.0 D + 1.0 S (All Spans)

Member Length : 21' 4 7/16"  
System : Roof  
Member Type : Joist  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD  
Member Pitch : 4/12

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Beveled Plate - HF	3.50"	3.50"	1.50"	169	335	504	Blocking
2 - Beveled Plate - HF	3.50"	3.50"	1.50"	169	335	504	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' 11" o/c	
Bottom Edge (Lu)	21' 2" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 20' 1"	16"	12.0	25.0	Roof Load

**Weyerhaeuser Notes**

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

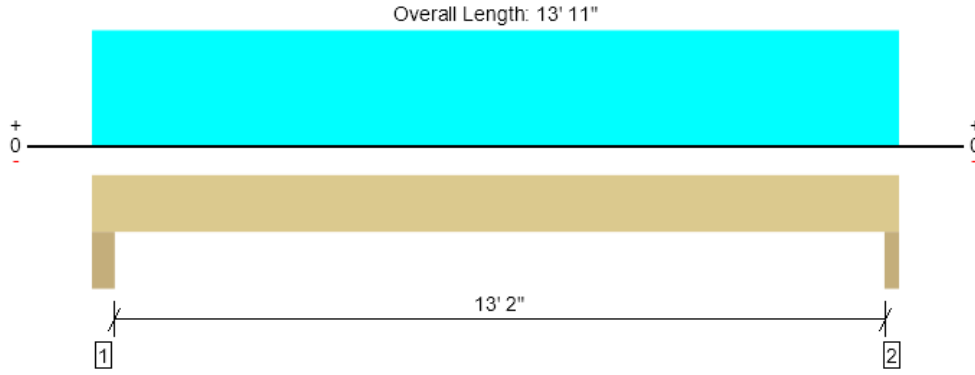
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



Roof, RB-1

1 piece(s) 3 1/2" x 9" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	2693 @ 13' 9"	7963 (3.50")	Passed (34%)	--	1.0 D + 1.0 Lr (All Spans)
Shear (lbs)	2285 @ 1' 2 1/2"	6956	Passed (33%)	1.25	1.0 D + 1.0 Lr (All Spans)
Pos Moment (Ft-lbs)	8813 @ 7' 1/2"	11813	Passed (75%)	1.25	1.0 D + 1.0 Lr (All Spans)
Live Load Defl. (in)	0.457 @ 7' 1/2"	0.671	Passed (L/352)	--	1.0 D + 1.0 Lr (All Spans)
Total Load Defl. (in)	0.746 @ 7' 1/2"	0.894	Passed (L/216)	--	1.0 D + 1.0 Lr (All Spans)

Member Length : 13' 11"  
 System : Roof  
 Member Type : Drop 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.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 13' 5".
- 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	Roof Live	Factored	
1 - Trimmer - HF	5.50"	5.50"	1.50"	1068	1690	2758	None
2 - Trimmer - HF	3.50"	3.50"	1.50"	1043	1650	2693	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	13' 11" o/c	
Bottom Edge (Lu)	13' 11" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (1.25)	Comments
0 - Self Weight (PLF)	0 to 13' 11"	N/A	7.7	--	
1 - Uniform (PSF)	0 to 13' 11" (Front)	12'	12.0	20.0	Roof Load

**Weyerhaeuser Notes**

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.woyehaeuser.com/woodproducts/document-library](http://www.woyehaeuser.com/woodproducts/document-library).

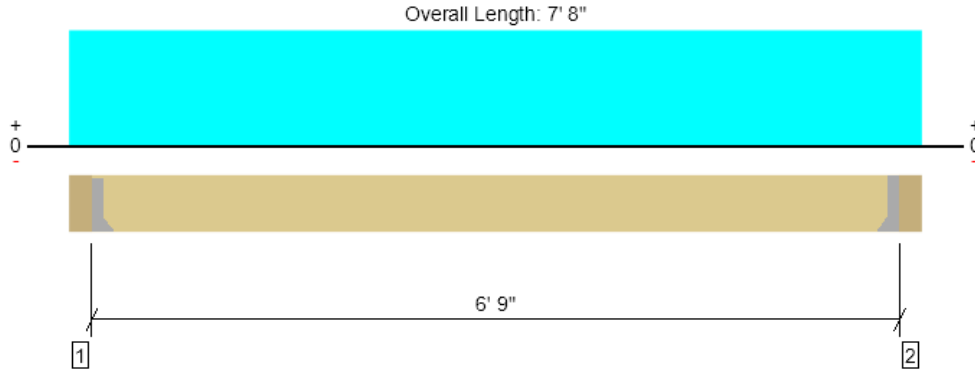
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



Roof, RB-2

1 piece(s) 3 1/2" x 7 1/2" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	1145 @ 5 1/2"	3413 (1.50")	Passed (34%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	933 @ 1' 1"	5333	Passed (17%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	1933 @ 3' 10"	7547	Passed (26%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.047 @ 3' 10"	0.338	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.072 @ 3' 10"	0.450	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 6' 9"  
 System : Roof  
 Member Type : Drop 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.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 6' 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	Snow	Factored	
1 - Hanger on 7 1/2" GLB beam	5.50"	Hanger <sup>1</sup>	1.50"	436	863	1298	See note <sup>1</sup>
2 - Hanger on 7 1/2" GLB beam	5.50"	Hanger <sup>1</sup>	1.50"	436	863	1298	See note <sup>1</sup>

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 9" o/c	
Bottom Edge (Lu)	6' 9" 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	LUS46	2.00"	N/A	4-16d	4-16d		
2 - Face Mount Hanger	LUS46	2.00"	N/A	4-16d	4-16d		

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	5 1/2" to 7' 2 1/2"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 7' 8" (Front)	9'	12.0	25.0	Roof Load

**Weyerhaeuser Notes**

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

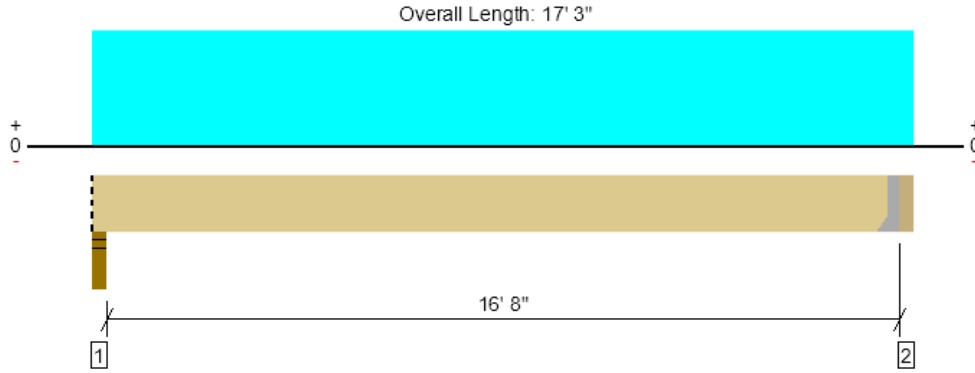
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



Roof, RB-3

1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	4794 @ 16' 11 1/2"	5363 (1.50")	Passed (89%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	4223 @ 15' 11 1/2"	13409	Passed (31%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	20126 @ 8' 6 3/4"	30360	Passed (66%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.471 @ 8' 6 3/4"	0.840	Passed (L/428)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.717 @ 8' 6 3/4"	1.119	Passed (L/281)	--	1.0 D + 1.0 S (All Spans)

Member Length : 16' 11 1/2"  
 System : Roof  
 Member Type : Drop 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.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 16' 9 1/2".
- 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	Factored	
1 - Stud wall - SPF	3.50"	3.50"	2.09"	1679	3211	4890	Blocking
2 - Hanger on 12" GLB beam	3.50"	Hanger <sup>1</sup>	1.50"	1698	3258	4956	See note <sup>1</sup>

- 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
- <sup>1</sup> See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	17' o/c	
Bottom Edge (Lu)	17' 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	
2 - Face Mount Hanger	HGUS5.50/10	4.00"	N/A	46-10d	16-10d		

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 16' 11 1/2"	N/A	16.0	--	
1 - Uniform (PSF)	0 to 17' 3" (Top)	15'	12.0	25.0	Roof Load

**Weyerhaeuser Notes**

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

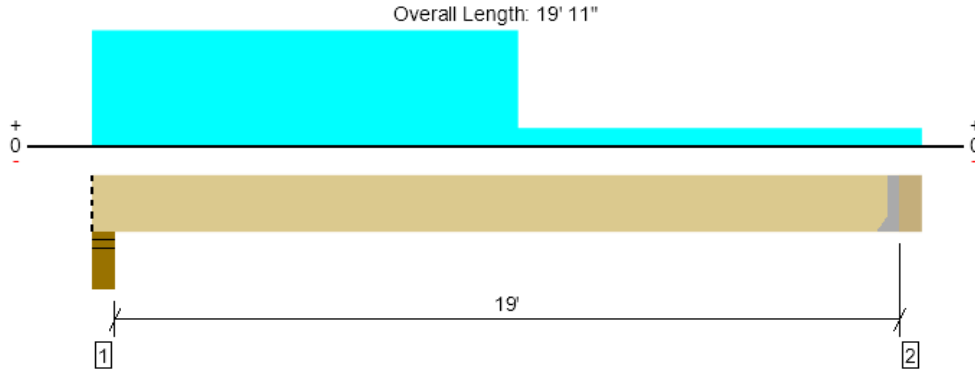
ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



3/8/2024 3:48:36 AM UTC  
 ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Eadie Remodel

Roof, RB-4  
1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	1961 @ 19' 5 1/2"	5363 (1.50")	Passed (37%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3340 @ 1' 5 1/2"	13409	Passed (25%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	15293 @ 8' 2 1/8"	30360	Passed (50%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.427 @ 9' 4 11/16"	0.956	Passed (L/538)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.665 @ 9' 5"	1.275	Passed (L/345)	--	1.0 D + 1.0 S (All Spans)

Member Length : 19' 5 1/2"  
System : Roof  
Member Type : Drop 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.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 19' 1 1/2".
- 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	Factored	
1 - Stud wall - HF	5.50"	5.50"	1.82"	1426	2639	4065	Blocking
2 - Hanger on 12" GLB beam	5.50"	Hanger <sup>1</sup>	1.50"	751	1244	1995	See note <sup>1</sup>

- 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
- <sup>1</sup> See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	19' 6" o/c	
Bottom Edge (Lu)	19' 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
2 - Face Mount Hanger	U610	2.00"	N/A	14-16d	6-10d	

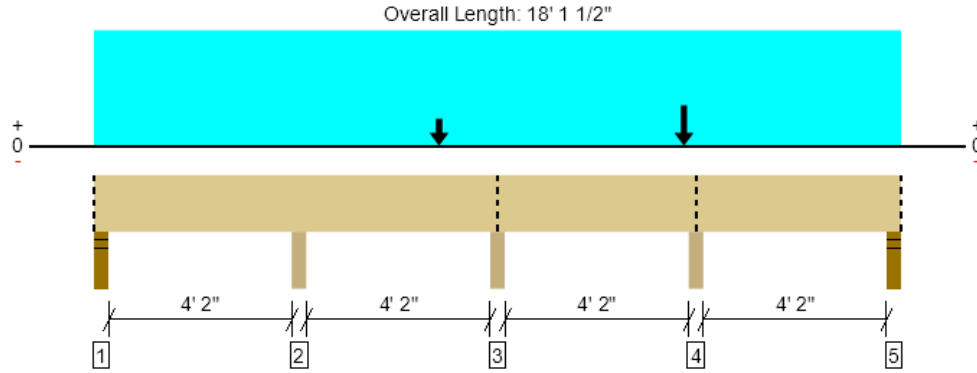
- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 19' 5 1/2"	N/A	16.0	--	
1 - Uniform (PSF)	0 to 19' 11" (Front)	1'	12.0	25.0	Roof Load
2 - Uniform (PSF)	10' 6" to 19' 11" (Front)	1'	12.0	25.0	Roof Load
3 - Uniform (PSF)	0 to 10' 6" (Back)	12'	12.0	25.0	Roof Load

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



Roof, RB-5  
1 piece(s) 3 1/2" x 12" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	2864 @ 13' 6 1/4"	7963 (3.50")	Passed (36%)	--	1.0 D + 1.0 S (Adj Spans)
Shear (lbs)	1197 @ 7' 11"	8533	Passed (14%)	1.15	1.0 D + 1.0 S (Adj Spans)
Pos Moment (Ft-lbs)	887 @ 7' 9"	19320	Passed (5%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-881 @ 9' 3/4"	14893	Passed (6%)	1.15	1.0 D + 1.0 S (Adj Spans)
Live Load Defl. (in)	0.002 @ 7' 7/16"	0.223	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.002 @ 7' 1/2"	0.297	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 18' 1 1/2"  
System : Roof  
Member Type : Drop 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.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 3' 3/16".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 2' 5 15/16".
- 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	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.50"	115	236	352	Blocking
2 - Column - DF	3.50"	3.50"	1.50"	480	913	1392	None
3 - Column - DF	3.50"	3.50"	1.50"	701	1376	2077	Blocking
4 - Column - DF	3.50"	3.50"	1.50"	1039	1824	2864	Blocking
5 - Stud wall - HF	3.50"	3.50"	1.50"	124	256	379	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)	18' 2" o/c	
Bottom Edge (Lu)	18' 2" o/c	

•Maximum allowable bracing intervals based on applied load.

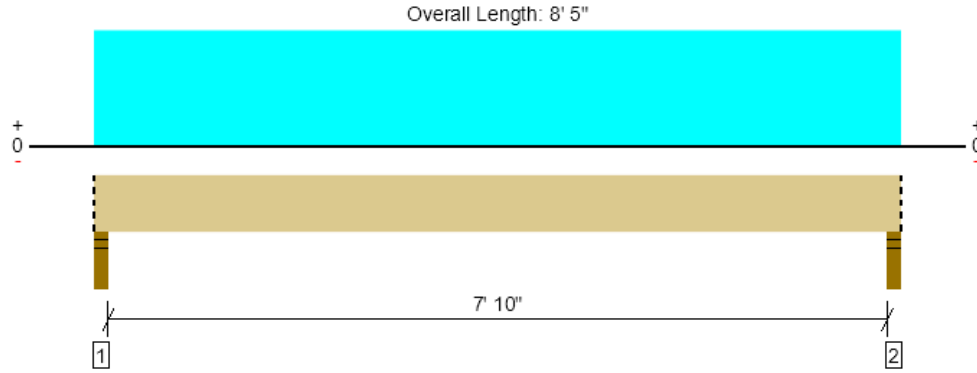
Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 18' 1 1/2"	N/A	10.2	--	
1 - Uniform (PSF)	0 to 18' 1 1/2" (Front)	5'	12.0	25.0	Roof Load
2 - Point (lb)	7' 9" (Front)	N/A	436	863	Linked from: RB-2, Support 2
3 - Point (lb)	13' 3" (Front)	N/A	751	1244	Linked from: RB-4, Support 2

ForteWEB Software Operator Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	Job Notes
--	-----------



Roof, RB-6

1 piece(s) 3 1/2" x 7 1/2" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	1109 @ 2"	5206 (3.50")	Passed (21%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	867 @ 11"	5333	Passed (16%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	2152 @ 4' 2 1/2"	7547	Passed (29%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.060 @ 4' 2 1/2"	0.404	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.114 @ 4' 2 1/2"	0.539	Passed (L/849)	--	1.0 D + 1.0 S (All Spans)

Member Length : 8' 5"  
 System : Roof  
 Member Type : Drop 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.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 8' 1".
- 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	Factored	
1 - Stud wall - SPF	3.50"	3.50"	1.50"	530	579	1109	Blocking
2 - Stud wall - SPF	3.50"	3.50"	1.50"	530	579	1109	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' 5" o/c	
Bottom Edge (Lu)	8' 5" o/c	

- Maximum allowable bracing intervals based on applied load.

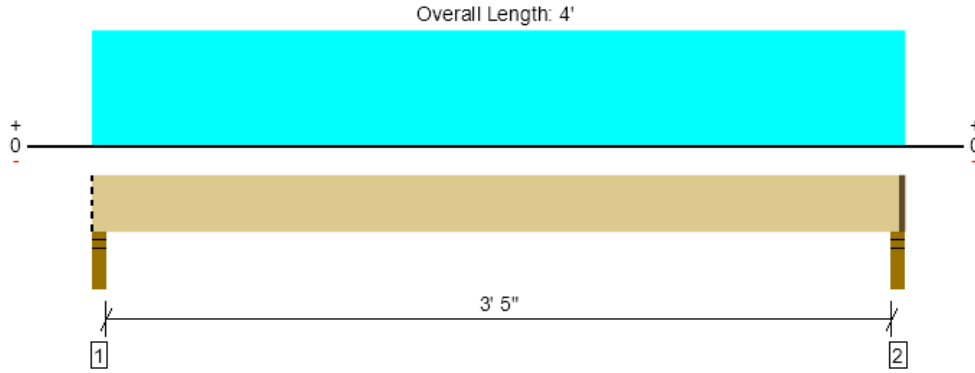
Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 8' 5"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 8' 5" (Front)	5' 6"	12.6	25.0	Roof Load
2 - Uniform (PLF)	0 to 8' 5" (Top)	N/A	50.0	-	Wall Load Above

**Weyerhaeuser Notes**  
 Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).  
 The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



Roof, RB-7  
1 piece(s) 4 x 8 DF No.2



Drawing is Conceptual. 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)	930 @ 3' 10"	2835 (2.00")	Passed (33%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	548 @ 10 3/4"	3502	Passed (16%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	833 @ 2'	3438	Passed (24%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.007 @ 2'	0.183	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.011 @ 2'	0.244	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 3' 10 1/2"  
System : Roof  
Member Type : Flush Beam  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD  
Member Pitch : 0/12

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.50"	342	650	992	Blocking
2 - Stud wall - HF	3.50"	2.00"	1.50"	341	650	991	1 1/2" 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)	3' 11" o/c	
Bottom Edge (Lu)	3' 11" 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)	0 to 3' 10 1/2"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 4' (Front)	13'	12.6	25.0	Roof Load

**Weyerhaeuser Notes**

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

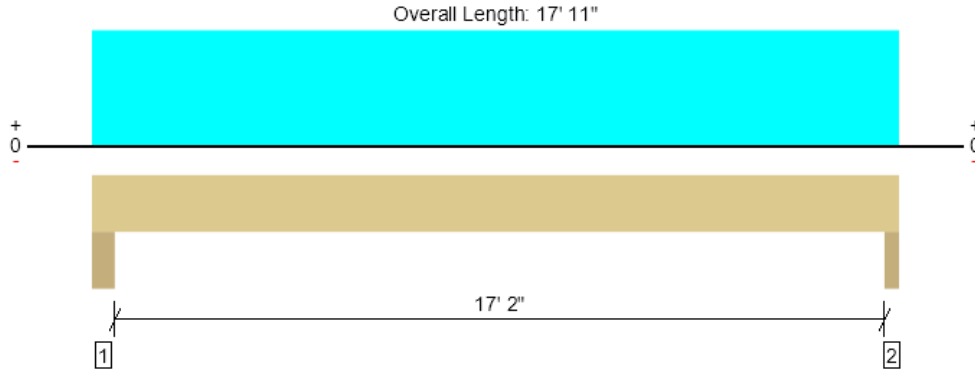
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



Roof, RB-8

1 piece(s) 5 1/2" x 10 1/2" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	4065 @ 17' 9"	12513 (3.50")	Passed (32%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3531 @ 1' 4"	11733	Passed (30%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	17368 @ 9' 1/2"	23244	Passed (75%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.650 @ 9' 1/2"	0.871	Passed (L/321)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.993 @ 9' 1/2"	1.161	Passed (L/210)	--	1.0 D + 1.0 S (All Spans)

Member Length : 17' 11"  
 System : Roof  
 Member Type : Drop 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.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 17' 5".
- 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	Factored	
1 - Trimmer - HF	5.50"	5.50"	1.50"	1429	2713	4141	None
2 - Trimmer - HF	3.50"	3.50"	1.50"	1403	2663	4065	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	17' 11" o/c	
Bottom Edge (Lu)	17' 11" 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)	0 to 17' 11"	N/A	14.0	--	
1 - Uniform (PSF)	0 to 17' 11" (Front)	12'	12.0	25.0	Roof Load

**Weyerhaeuser Notes**

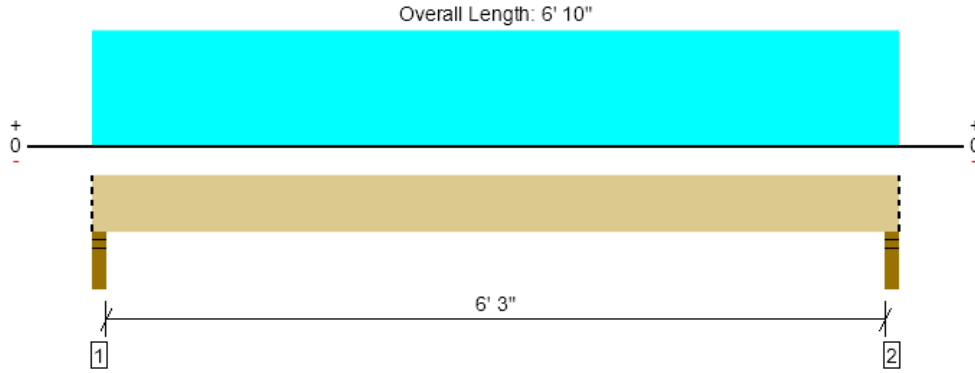
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



Roof, RB-9  
1 piece(s) 4 x 8 DF No.2



Drawing is Conceptual. 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)	1308 @ 2"	4961 (3.50")	Passed (26%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	965 @ 10 3/4"	3502	Passed (28%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2022 @ 3' 5"	3438	Passed (59%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.056 @ 3' 5"	0.325	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.086 @ 3' 5"	0.433	Passed (L/902)	--	1.0 D + 1.0 S (All Spans)

Member Length : 6' 10"  
System : Roof  
Member Type : Flush Beam  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD  
Member Pitch : 0/12

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.50"	454	854	1308	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.50"	454	854	1308	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)	6' 10" o/c	
Bottom Edge (Lu)	6' 10" 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)	0 to 6' 10"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 6' 10" (Front)	10'	12.6	25.0	Roof Load

**Weyerhaeuser Notes**

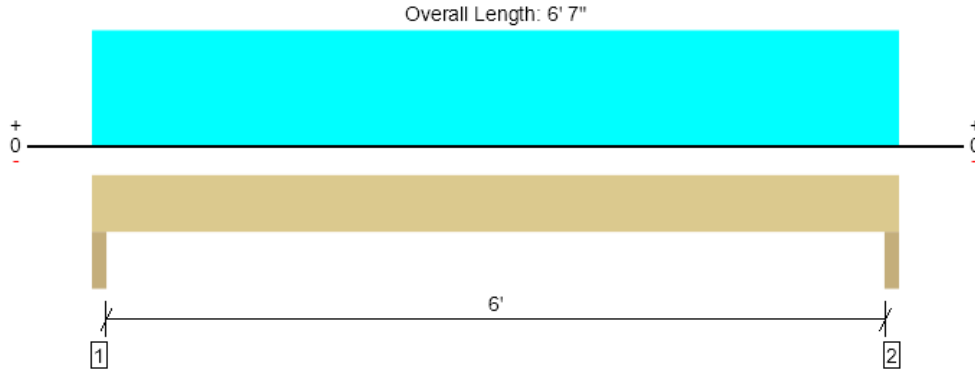
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.eyerhaeuser.com/woodproducts/document-library](http://www.eyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



Roof, RB-10  
1 piece(s) 4 x 8 DF No.2



Drawing is Conceptual. 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)	387 @ 2"	7656 (3.50")	Passed (5%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	281 @ 10 3/4"	3502	Passed (8%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	573 @ 3' 3 1/2"	3438	Passed (17%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.014 @ 3' 3 1/2"	0.313	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.023 @ 3' 3 1/2"	0.417	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 6' 7"  
System : Roof  
Member Type : Drop Beam  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD  
Member Pitch : 0/12

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Trimmer - HF	3.50"	3.50"	1.50"	140	247	387	None
2 - Trimmer - HF	3.50"	3.50"	1.50"	140	247	387	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 7" o/c	
Bottom Edge (Lu)	6' 7" 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)	0 to 6' 7"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 6' 7" (Top)	3'	12.0	25.0	Roof Load

**Weyerhaeuser Notes**

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

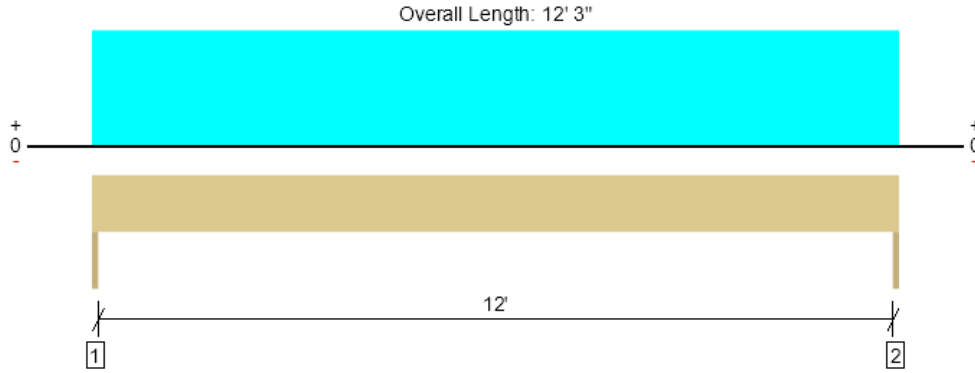
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2H-1

1 piece(s) 6 3/4" x 10 1/2" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	1835 @ 0	6581 (1.50")	Passed (28%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1535 @ 1'	14399	Passed (11%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	5620 @ 6' 1 1/2"	28278	Passed (20%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.081 @ 6' 1 1/2"	0.408	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.130 @ 6' 1 1/2"	0.613	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 12' 3"  
 System : Wall  
 Member Type : Header  
 Building Use : Residential  
 Building Code : IBC 2018  
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- A 0.9% decrease in the moment capacity has been added to account for lateral stability.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 12' 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	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	687	1148	1835	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	687	1148	1835	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 12' 3"	N/A	17.2	--	
1 - Uniform (PSF)	0 to 12' 3"	7' 6"	12.6	25.0	Roof Load

**Weyerhaeuser Notes**

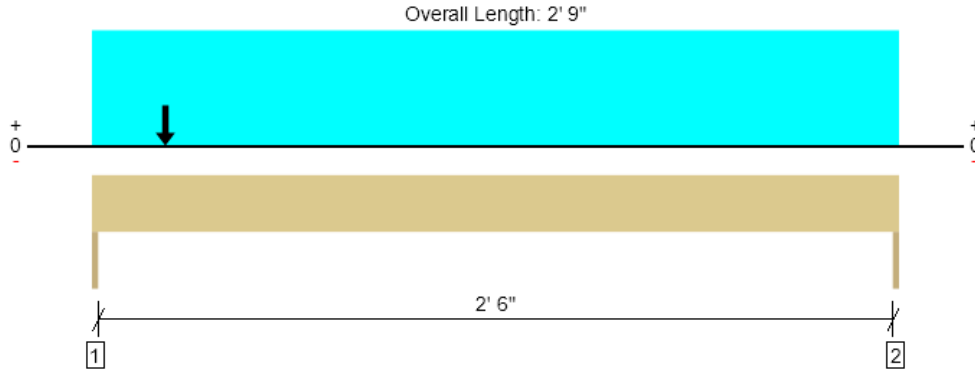
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2H-2  
1 piece(s) 4 x 6 DF No.2



Drawing is Conceptual. 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)	1298 @ 0	3281 (1.50")	Passed (40%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	387 @ 7"	2657	Passed (15%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	322 @ 3"	1972	Passed (16%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.003 @ 1' 3 1/4"	0.092	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.005 @ 1' 3 1/4"	0.138	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 2' 9"  
System : Wall  
Member Type : Header  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- A 0.3% decrease in the moment capacity has been added to account for lateral stability.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	452	845	1298	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	81	146	227	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 2' 9"	N/A	4.9	--	
1 - Uniform (PSF)	0 to 2' 9"	2'	12.0	25.0	Roof Load
2 - Point (lb)	3"	N/A	454	854	Linked from: RB-9, Support 1

**Weyerhaeuser Notes**

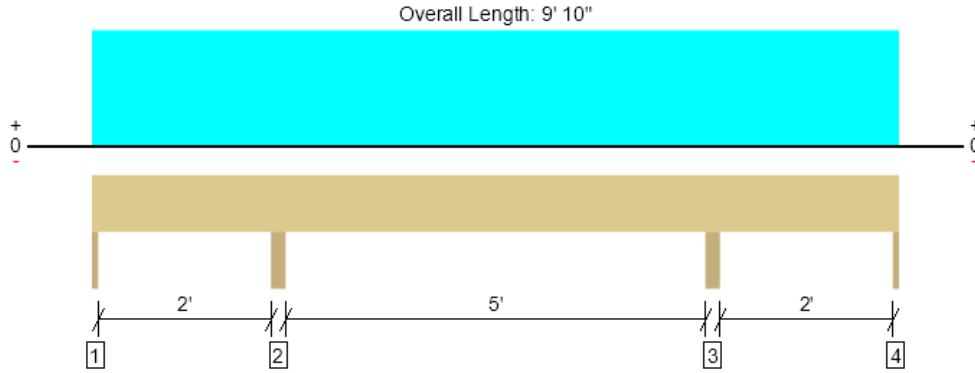
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.eyerhaeuser.com/woodproducts/document-library](http://www.eyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2H-3  
1 piece(s) 4 x 8 DF No.2



Drawing is Conceptual. 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)	879 @ 2' 3 1/4"	7656 (3.50")	Passed (11%)	--	1.0 D + 0.7 E (Adj Spans)
Shear (lbs)	361 @ 3' 1/4"	4872	Passed (7%)	1.60	1.0 D + 0.7 E (Adj Spans)
Moment (Ft-lbs)	-375 @ 7' 6 3/4"	4665	Passed (8%)	1.60	1.0 D + 0.7 E (Adj Spans)
Live Load Defl. (in)	0.000 @ 0	0.076	Passed (2L/999+)	--	1.0 D (All Spans)
Total Load Defl. (in)	0.003 @ 4' 11"	0.265	Passed (L/999+)	--	1.0 D (All Spans)

Member Length : 9' 10"  
System : Wall  
Member Type : Header  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- A 2.5% decrease in the moment capacity has been added to account for lateral stability.
- -268 lbs uplift at support located at 2' 3 1/4". Strapping or other restraint may be required.
- -268 lbs uplift at support located at 7' 6 3/4". Strapping or other restraint may be required.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Seismic	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	22	161/-161	135/-99	None
2 - Trimmer - HF	3.50"	3.50"	1.50"	382	710/-710	879/-268	None
3 - Trimmer - HF	3.50"	3.50"	1.50"	382	710/-710	879/-268	None
4 - Trimmer - HF	1.50"	1.50"	1.50"	22	161/-161	135/-99	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location	Tributary Width	Dead (0.90)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 9' 10"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 9' 10"	6'	12.6	25.0	Roof Load

**Weyerhaeuser Notes**

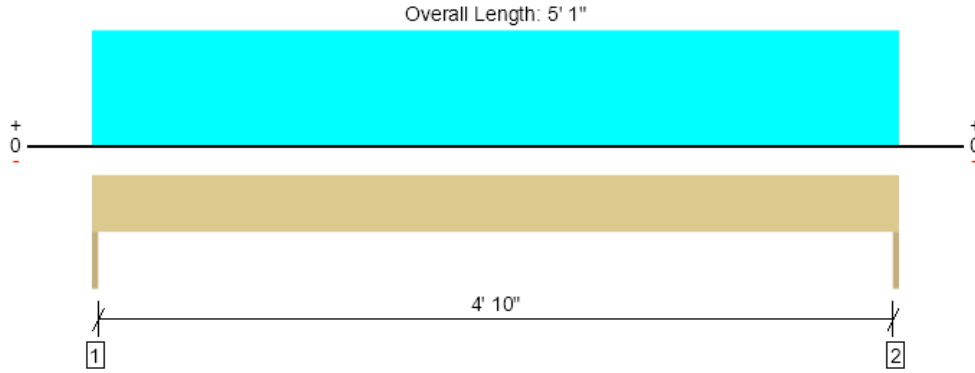
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2H-4  
2 piece(s) 2 x 8 DF No.2



Drawing is Conceptual. 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)	474 @ 0	2813 (1.50")	Passed (17%)	--	1.0 D + 0.7 E (All Spans)
Shear (lbs)	338 @ 8 3/4"	4176	Passed (8%)	1.60	1.0 D + 0.7 E (All Spans)
Moment (Ft-lbs)	602 @ 2' 6 1/2"	3547	Passed (17%)	1.60	1.0 D + 0.7 E (All Spans)
Live Load Defl. (in)	0.000 @ 0	0.169	Passed (2L/999+)	--	1.0 D (All Spans)
Total Load Defl. (in)	0.008 @ 2' 6 1/2"	0.254	Passed (L/999+)	--	1.0 D (All Spans)

Member Length : 5' 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).
- A 6.3% decrease in the moment capacity has been added to account for lateral stability.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Seismic	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	207	381/-381	474/-143	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	207	381/-381	474/-143	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location	Tributary Width	Dead (0.90)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 5' 1"	N/A	5.5	--	
1 - Uniform (PSF)	0 to 5' 1"	6'	12.6	25.0	Roof Load

**Weyerhaeuser Notes**

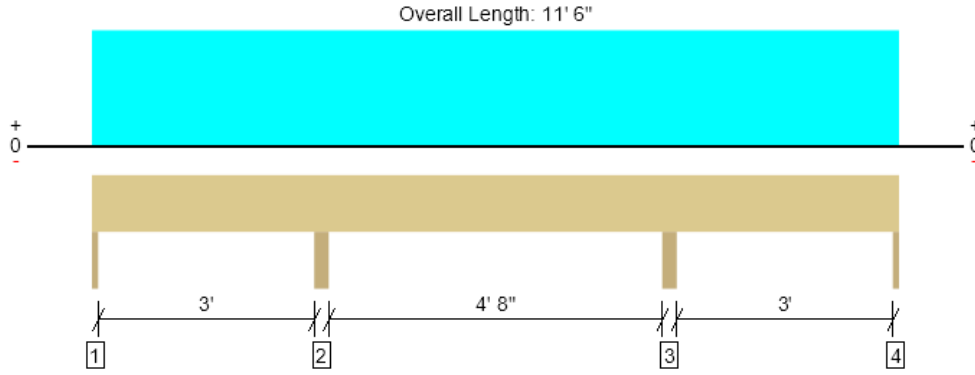
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.woyehaeuser.com/woodproducts/document-library](http://www.woyehaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2H-5 (with RB-1 in place)  
1 piece(s) 4 x 8 DF No.2



Drawing is Conceptual. 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)	464 @ 3' 3 1/4"	7656 (3.50")	Passed (6%)	--	1.0 D + 0.7 E (Adj Spans)
Shear (lbs)	176 @ 4' 1/4"	4872	Passed (4%)	1.60	1.0 D + 0.7 E (Adj Spans)
Moment (Ft-lbs)	-187 @ 3' 3 1/4"	4634	Passed (4%)	1.60	1.0 D + 0.7 E (Adj Spans)
Live Load Defl. (in)	0.000 @ 0	0.109	Passed (2L/999+)	--	1.0 D (All Spans)
Total Load Defl. (in)	0.001 @ 5' 9"	0.248	Passed (L/999+)	--	1.0 D (All Spans)

Member Length : 11' 6"  
System : Wall  
Member Type : Header  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- A 3.1% decrease in the moment capacity has been added to account for lateral stability.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Seismic	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	48	113/-113	127/-51	None
2 - Trimmer - HF	3.50"	3.50"	1.50"	207	366/-366	464/-132	None
3 - Trimmer - HF	3.50"	3.50"	1.50"	207	366/-366	464/-132	None
4 - Trimmer - HF	1.50"	1.50"	1.50"	48	113/-113	127/-51	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location	Tributary Width	Dead (0.90)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 11' 6"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 11' 6"	3'	12.6	25.0	Roof Load

**Weyerhaeuser Notes**

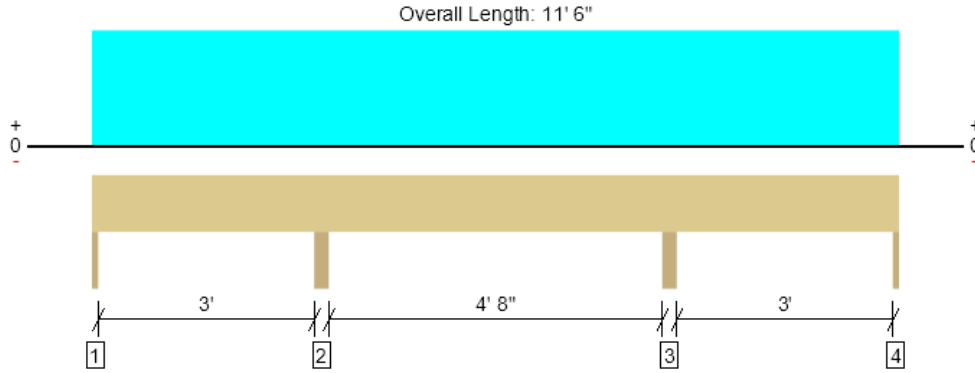
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2H-5 (without RB-1 in place)  
1 piece(s) 4 x 8 DF No.2



Drawing is Conceptual. 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)	1765 @ 3' 3 1/4"	7656 (3.50")	Passed (23%)	--	1.0 D + 0.7 E (Adj Spans)
Shear (lbs)	669 @ 4' 1/4"	4872	Passed (14%)	1.60	1.0 D + 0.7 E (Adj Spans)
Moment (Ft-lbs)	-711 @ 8' 2 3/4"	4634	Passed (15%)	1.60	1.0 D + 0.7 E (Adj Spans)
Live Load Defl. (in)	0.000 @ 0	0.109	Passed (2L/999+)	--	1.0 D (All Spans)
Total Load Defl. (in)	0.003 @ 5' 9"	0.248	Passed (L/999+)	--	1.0 D (All Spans)

Member Length : 11' 6"  
System : Wall  
Member Type : Header  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- A 3.1% decrease in the moment capacity has been added to account for lateral stability.
- -215 lbs uplift at support located at 0". Strapping or other restraint may be required.
- -581 lbs uplift at support located at 3' 3 1/4". Strapping or other restraint may be required.
- -581 lbs uplift at support located at 8' 2 3/4". Strapping or other restraint may be required.
- -215 lbs uplift at support located at 11' 6". Strapping or other restraint may be required.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Seismic	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	170	453/-453	487/-215	None
2 - Trimmer - HF	3.50"	3.50"	1.50"	740	1465/-1465	1765/-581	None
3 - Trimmer - HF	3.50"	3.50"	1.50"	740	1465/-1465	1765/-581	None
4 - Trimmer - HF	1.50"	1.50"	1.50"	170	453/-453	487/-215	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location	Tributary Width	Dead (0.90)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 11' 6"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 11' 6"	12'	12.6	25.0	Roof Load

**Weyerhaeuser Notes**

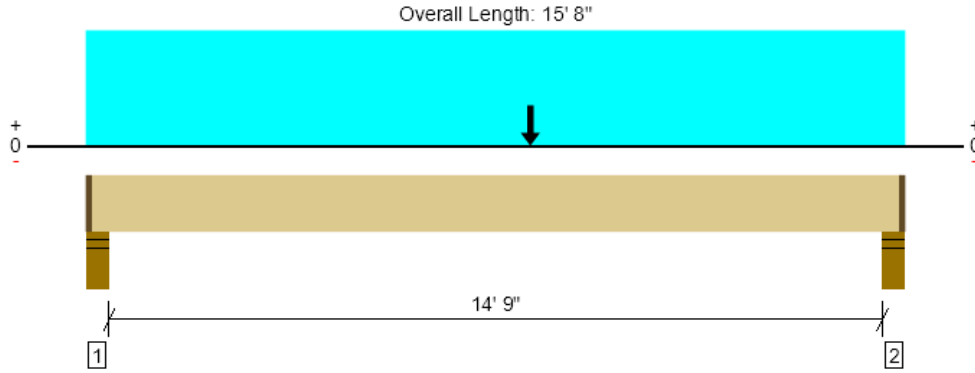
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2J-1  
2 piece(s) 2 x 10 DF No.2 @ 16" OC



Drawing is Conceptual. 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)	607 @ 15' 3 1/2"	7500 (4.00")	Passed (8%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	531 @ 14' 5 1/4"	3330	Passed (16%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2406 @ 8' 6"	4059	Passed (59%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.188 @ 7' 10"	0.373	Passed (L/954)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.294 @ 7' 10 3/8"	0.746	Passed (L/609)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

Member Length : 15' 5"  
System : Floor  
Member Type : Joist  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- 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 - Stud wall - DF	5.50"	4.00"	1.50"	186	418	604	1 1/2" Rim Board
2 - Stud wall - DF	5.50"	4.00"	1.50"	198	418	616	1 1/2" 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)	Continuous	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 15' 8"	16"	12.0	40.0	Floor Load
2 - Point (PLF)	8' 6"	16"	100.0	-	Wall Load Above
3 - Point (PLF)	0	16"	-	-	DL = 12psf * 13 = 156 SL = 25psf * 13 = 325

**Weyerhaeuser Notes**

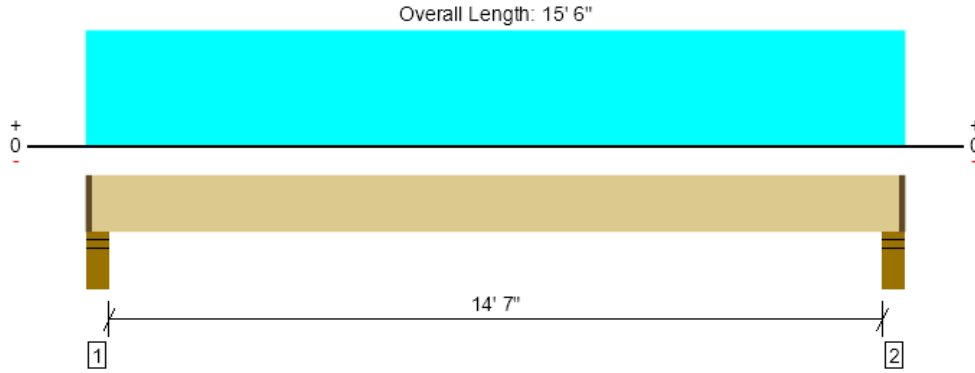
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2J-2  
1 piece(s) 2 x 10 DF No.2 @ 12" OC



Drawing is Conceptual. 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)	397 @ 4 1/2"	3750 (4.00")	Passed (11%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	339 @ 1' 2 3/4"	1665	Passed (20%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1414 @ 7' 9"	2029	Passed (70%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.269 @ 7' 9"	0.369	Passed (L/658)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.350 @ 7' 9"	0.738	Passed (L/506)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

Member Length : 15' 3"  
System : Floor  
Member Type : Joist  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- 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 - Stud wall - DF	5.50"	4.00"	1.50"	93	310	403	1 1/2" Rim Board
2 - Stud wall - DF	5.50"	4.00"	1.50"	93	310	403	1 1/2" 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)	Continuous	
Bottom Edge (Lu)	End Bearing Points	

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 15' 6"	12"	12.0	40.0	Floor Load

**Weyerhaeuser Notes**

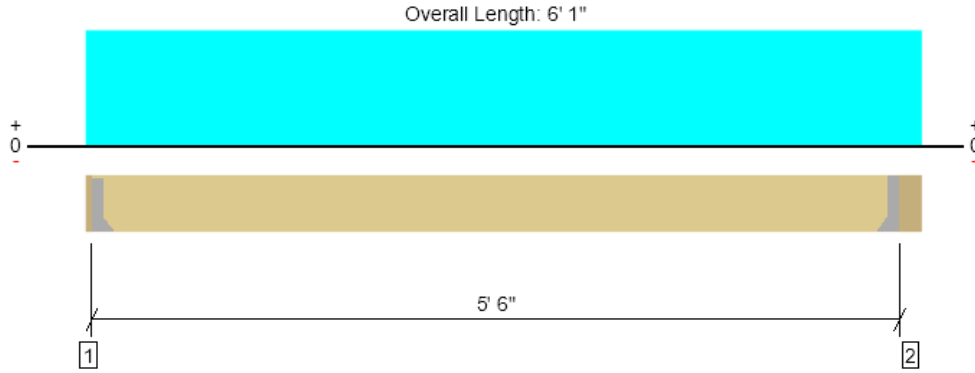
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2J-3 (Upper Deck Joist)  
1 piece(s) 2 x 8 DF No.2 @ 16" OC



Drawing is Conceptual. 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)	278 @ 1' 1/2"	1406 (1.50")	Passed (20%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	206 @ 8 3/4"	1305	Passed (16%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	363 @ 2' 10 1/2"	1360	Passed (27%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.023 @ 2' 10 1/2"	0.138	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.027 @ 2' 10 1/2"	0.275	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

Member Length : 5' 6"  
System : Floor  
Member Type : Joist  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- 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 - Hanger on 7 1/4" DF beam	1.50"	Hanger <sup>1</sup>	1.50"	46	230	96	290	See note <sup>1</sup>
2 - Hanger on 7 1/4" DF beam	5.50"	Hanger <sup>1</sup>	1.50"	51	257	107	324	See note <sup>1</sup>

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	Continuous	
Bottom Edge (Lu)	End Bearing Points	

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

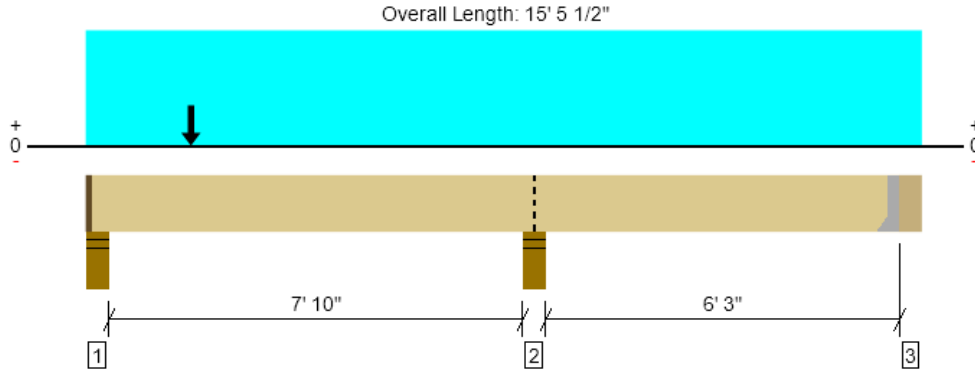
Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 6' 1"	16"	12.0	60.0	25.0	Deck Load

**Weyerhaeuser Notes**  
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.eyerhaeuser.com/woodproducts/document-library](http://www.eyerhaeuser.com/woodproducts/document-library).  
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2J-4  
1 piece(s) 2 x 10 DF No.2 @ 16" OC



Drawing is Conceptual. 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)	724 @ 8' 6 1/4"	3341 (5.50")	Passed (22%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	522 @ 1' 2 3/4"	1915	Passed (27%)	1.15	1.0 D + 0.75 L + 0.75 S (Alt Spans)
Moment (Ft-lbs)	-596 @ 8' 6 1/4"	899	Passed (66%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.029 @ 3' 11 9/16"	0.204	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.048 @ 3' 10 7/16"	0.407	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

Member Length : 14' 10 1/2"  
System : Floor  
Member Type : Joist  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- A 55.7% decrease in the moment capacity has been added to account for lateral stability.
- 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 - Stud wall - DF	5.50"	4.00"	1.50"	254	207/-9	243	591	1 1/2" Rim Board
2 - Stud wall - HF	5.50"	5.50"	1.50"	232	493	104	724	Blocking
3 - Hanger on 9 1/4" DF beam	5.50"	Hanger <sup>1</sup>	1.50"	24	178/-14	-22	202/-2	See note <sup>1</sup>

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	Continuous	
Bottom Edge (Lu)	End Bearing Points	

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

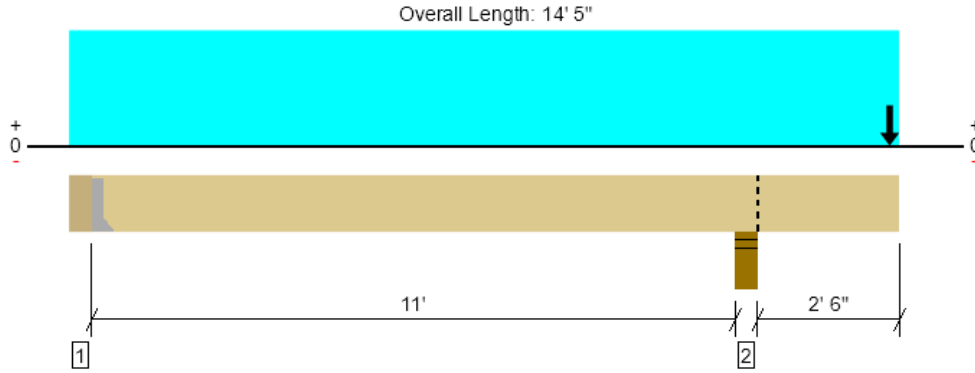
- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 15' 5 1/2"	16"	12.0	40.0	-	Floor Load
2 - Point (PLF)	2'	16"	197.0	-	244.0	DL = 12psf * 9.75ft + 80 plf SL = 25psf * 9.75ft

Forteweb Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2J-5  
1 piece(s) 2 x 10 DF No.2 @ 12" OC



Drawing is Conceptual. 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)	249 @ 5' 1/2"	1406 (1.50")	Passed (18%)	--	1.0 D + 1.0 L (Alt Spans)
Shear (lbs)	357 @ 12' 8 1/4"	1915	Passed (19%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	-885 @ 11' 8 1/4"	1160	Passed (76%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.090 @ 6' 7/8"	0.281	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.100 @ 14' 5"	0.273	Passed (2L/656)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

Member Length : 13' 11 1/2"  
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).
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- A 50.3% decrease in the moment capacity has been added to account for lateral stability.
- 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 - Hanger on 9 1/4" GLB beam	5.50"	Hanger <sup>1</sup>	1.50"	30	243	-34	273/-5	See note <sup>1</sup>
2 - Stud wall - DF	5.50"	5.50"	1.50"	315	347	184	714	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
- <sup>1</sup> See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	Continuous	
Bottom Edge (Lu)	End Bearing Points	

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	

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

Vertical Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 14' 5"	12"	12.0	40.0	-	Floor Load
2 - Point (PLF)	14' 3"	12"	172.0	-	150.0	DL = 100plf + 12psf * 6 SL = 25psf * 6

**Weyerhaeuser Notes**

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.eyerhaeuser.com/woodproducts/document-library](http://www.eyerhaeuser.com/woodproducts/document-library).

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

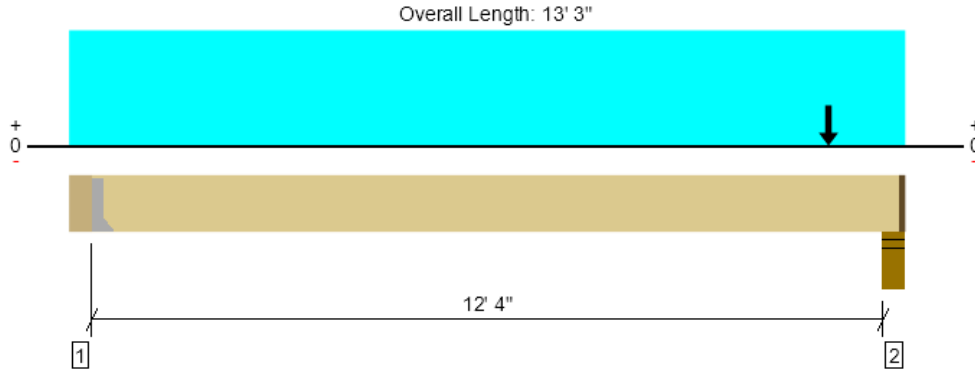
ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



3/8/2024 3:48:36 AM UTC  
ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0

File Name: Eadie Remodel

2nd Floor, 2J-6  
1 piece(s) 2 x 10 DF No.2 @ 16" OC



Drawing is Conceptual. 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)	943 @ 12' 10 1/2"	2430 (4.00")	Passed (39%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	881 @ 12' 1/4"	1915	Passed (46%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	1482 @ 6' 11 15/16"	2029	Passed (73%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.180 @ 6' 7 15/16"	0.310	Passed (L/827)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.264 @ 6' 9 1/8"	0.621	Passed (L/564)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

Member Length : 12' 8"  
System : Floor  
Member Type : Joist  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- 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 - Hanger on 9 1/4" GLB beam	5.50"	Hanger <sup>1</sup>	1.50"	130	356	28	485	See note <sup>1</sup>
2 - Stud wall - HF	5.50"	4.00"	1.55"	408	351	372	950	1 1/2" 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
- <sup>1</sup> See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	Continuous	
Bottom Edge (Lu)	End Bearing Points	

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		

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

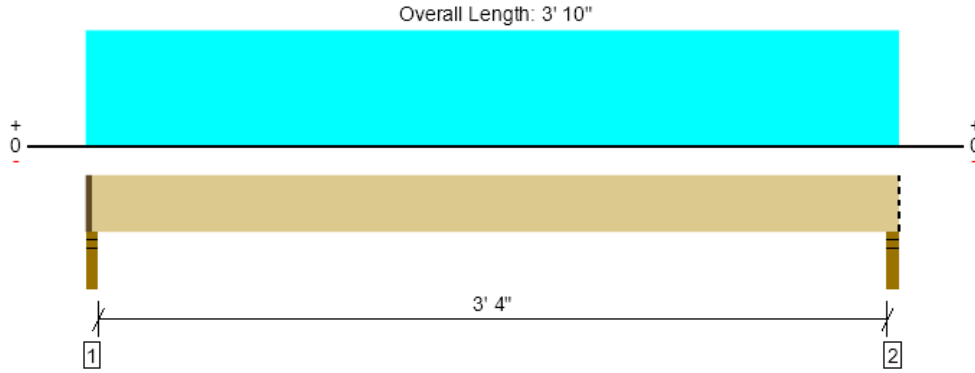
Vertical Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 13' 3"	16"	12.0	40.0	-	Floor Load
2 - Point (PLF)	12'	16"	244.0	-	300.0	DL = 12psf * 12ft + 100 SL = 25psf * 12ft

**Weyerhaeuser Notes**  
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).  
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2B-1  
2 piece(s) 2 x 8 DF No.2



Drawing is Conceptual. 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)	692 @ 1' 1/2"	1823 (1.50")	Passed (38%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	410 @ 10' 1/4"	3002	Passed (14%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	620 @ 1' 11"	2720	Passed (23%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.005 @ 1' 11"	0.090	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.009 @ 1' 11"	0.179	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 3' 8 1/2"  
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 - HF	3.00"	1.50"	1.50"	359	268	240	740	1 1/2" Rim Board
2 - Stud wall - HF	3.00"	3.00"	1.50"	359	268	240	740	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)	3' 9" o/c	
Bottom Edge (Lu)	3' 9" 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' 1/2" to 3' 10"	N/A	5.5	--	--	
1 - Uniform (PSF)	0 to 3' 10" (Front)	3' 6"	12.0	40.0	-	Floor Load
2 - Uniform (PLF)	0 to 3' 10" (Top)	N/A	80.0	-	-	Wall Load Above
3 - Uniform (PSF)	0 to 3' 10" (Front)	5'	12.0	-	25.0	Roof Load

**Weyerhaeuser Notes**

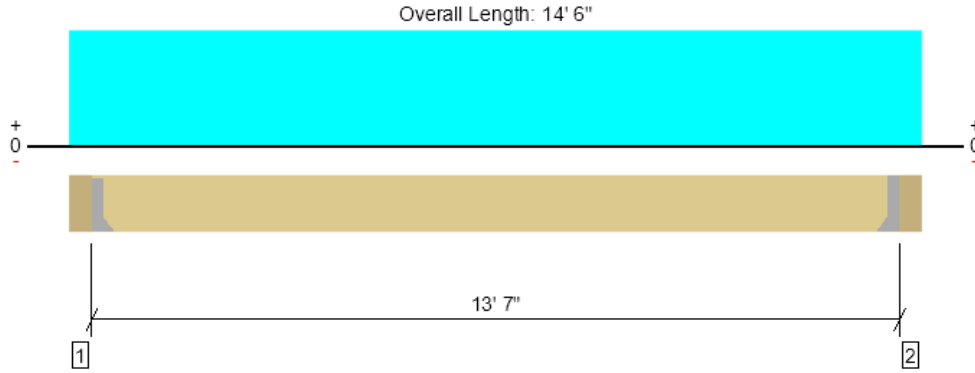
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2B-2  
1 piece(s) 5 1/4" x 9 1/2" 2.2E Parallam® PSL



Drawing is Conceptual. 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)	3108 @ 5 1/2"	4922 (1.50")	Passed (63%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2746 @ 1' 3"	9643	Passed (28%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	10553 @ 7' 3"	19585	Passed (54%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.332 @ 7' 3"	0.340	Passed (L/491)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.447 @ 7' 3"	0.679	Passed (L/365)	--	1.0 D + 1.0 L (All Spans)

Member Length : 13' 7"  
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 9 1/2" LVL beam	5.50"	Hanger <sup>1</sup>	1.50"	845	2465	3310	See note <sup>1</sup>
2 - Hanger on 9 1/2" LVL beam	5.50"	Hanger <sup>1</sup>	1.50"	845	2465	3310	See note <sup>1</sup>

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	13' 7" o/c	
Bottom Edge (Lu)	13' 7" 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	HU612	2.50"	N/A	22-16d	8-16d		
2 - Face Mount Hanger	HU612	2.50"	N/A	22-16d	8-16d		

- 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)	5 1/2" to 14' 1/2"	N/A	15.6	--	
1 - Uniform (PSF)	0 to 14' 6" (Front)	8' 6"	12.0	40.0	Floor Load

**Weyerhaeuser Notes**

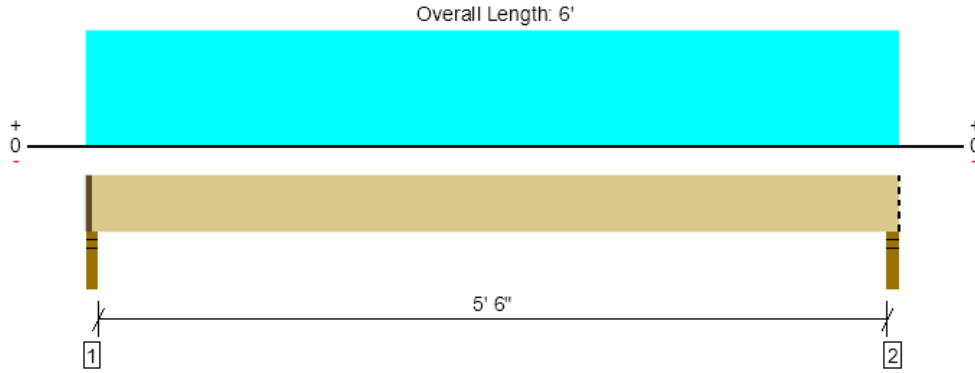
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2B-3  
2 piece(s) 2 x 10 DF No.2



Drawing is Conceptual. 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)	669 @ 1 1/2"	1823 (1.50")	Passed (37%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	426 @ 1' 1/4"	3330	Passed (13%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	889 @ 3'	3529	Passed (25%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.008 @ 3'	0.144	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.018 @ 3'	0.287	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 5' 10 1/2"  
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 - HF	3.00"	1.50"	1.50"	404	240	150	697	1 1/2" Rim Board
2 - Stud wall - HF	3.00"	3.00"	1.50"	405	240	150	698	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)	5' 11" o/c	
Bottom Edge (Lu)	5' 11" 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 1/2" to 6'	N/A	7.0	--	--	
1 - Uniform (PSF)	0 to 6' (Front)	2'	12.0	40.0	-	Floor Load
2 - Uniform (PLF)	0 to 6' (Top)	N/A	80.0	-	-	Wall Load Above
3 - Uniform (PSF)	0 to 6' (Front)	2'	12.0	-	25.0	Roof Load

**Weyerhaeuser Notes**

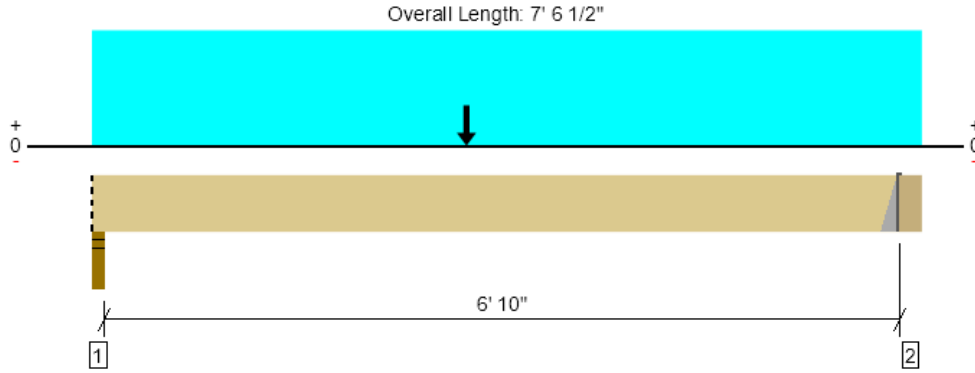
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2B-4  
1 piece(s) 3 1/2" x 9" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	2306 @ 7' 1"	3413 (1.50")	Passed (68%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2327 @ 1'	5565	Passed (42%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	7547 @ 3' 6"	9450	Passed (80%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.097 @ 3' 7"	0.174	Passed (L/864)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.141 @ 3' 7"	0.348	Passed (L/594)	--	1.0 D + 1.0 L (All Spans)

Member Length : 7' 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.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 6' 11 1/2".
- 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	Snow	Factored	
1 - Stud wall - HF	3.00"	3.00"	1.72"	757	1681	77	2439	Blocking
2 - Hanger on 9" GLB beam	5.50"	Hanger <sup>1</sup>	1.50"	727	1627	73	2354	See note <sup>1</sup>

- 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
- <sup>1</sup> See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	7' 1" o/c	
Bottom Edge (Lu)	7' 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	
2 - Top Mount Hanger	THA426	1.75"	4-16d	4-16d	6-16d		

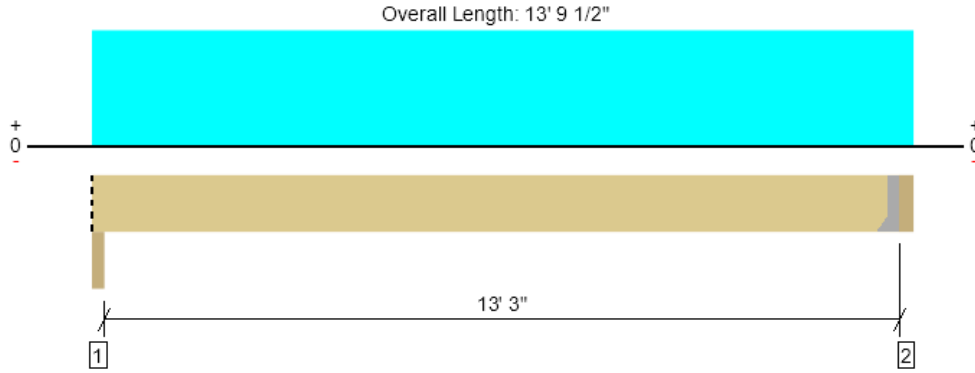
- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 7' 1"	N/A	7.7	--	--	
1 - Uniform (PSF)	0 to 7' 6 1/2" (Front)	2'	12.0	40.0	-	Floor Load
2 - Point (lb)	3' 6" (Back)	N/A	404	240	150	Linked from: 2B-3, Support 1
3 - Point (lb)	3' 6" (Front)	N/A	845	2465	-	Linked from: 2B-2, Support 2

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2B-5  
1 piece(s) 3 1/2" x 9" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	660 @ 13' 6"	3413 (1.50")	Passed (19%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	586 @ 12' 9"	5565	Passed (11%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	2206 @ 6' 9 3/4"	9450	Passed (23%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.132 @ 6' 9 3/4"	0.334	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.186 @ 6' 9 3/4"	0.669	Passed (L/865)	--	1.0 D + 1.0 L (All Spans)

Member Length : 13' 6"  
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.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 13' 4 1/2".
- 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	Factored	
1 - Column - HF	3.00"	3.00"	1.50"	195	477	672	Blocking
2 - Hanger on 9" GLB beam	3.50"	Hanger <sup>1</sup>	1.50"	198	489	686	See note <sup>1</sup>

- 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
- <sup>1</sup> See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	13' 6" o/c	
Bottom Edge (Lu)	13' 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	
2 - Face Mount Hanger	LUS48	2.00"	N/A	6-10dx1.5	4-10d		

- 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)	0 to 13' 6"	N/A	7.7	--	
1 - Uniform (PSF)	0 to 13' 9 1/2" (Front)	1' 9"	12.0	40.0	Floor Load

**Weyerhaeuser Notes**

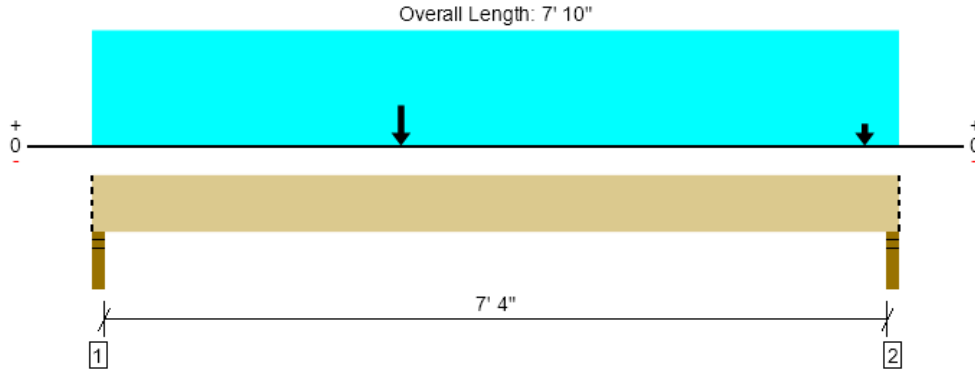
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2B-6  
1 piece(s) 3 1/2" x 9" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	2793 @ 1 1/2"	4253 (3.00")	Passed (66%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2610 @ 1'	5565	Passed (47%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	7206 @ 3'	9450	Passed (76%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.103 @ 3' 9"	0.190	Passed (L/885)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.163 @ 3' 9 1/4"	0.379	Passed (L/557)	--	1.0 D + 1.0 L (All Spans)

Member Length : 7' 10"  
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.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 7' 7".
- 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	Snow	Factored	
1 - Stud wall - HF	3.00"	3.00"	1.97"	1093	1701	196	2793	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.86"	1076	1567	196	2642	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' 10" o/c	
Bottom Edge (Lu)	7' 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)	0 to 7' 10"	N/A	7.7	--	--	
1 - Uniform (PSF)	0 to 7' 10" (Front)	1'	12.0	40.0	-	Floor Load
2 - Point (lb)	7' 6" (Front)	N/A	198	489	-	Linked from: 2B-5, Support 2
3 - Uniform (PLF)	0 to 7' 10" (Top)	N/A	100.0	-	-	Wall Load Above
4 - Uniform (PSF)	0 to 7' 10" (Top)	2'	12.0	-	25.0	Roof Load
5 - Point (lb)	3' (Front)	N/A	845	2465	-	Linked from: 2B-2, Support 1

**Weyerhaeuser Notes**

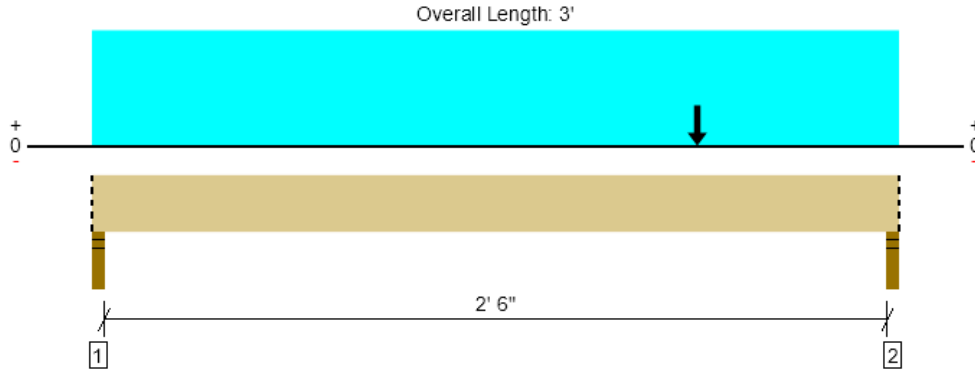
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.woodyproducts.com/document-library](http://www.woodyproducts.com/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2B-7  
2 piece(s) 2 x 10 DF No.2



Drawing is Conceptual. 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)	2178 @ 2' 10 1/2"	3645 (3.00")	Passed (60%)	--	1.0 D + 1.0 Lr (All Spans)
Shear (lbs)	1397 @ 1' 11 3/4"	4163	Passed (34%)	1.25	1.0 D + 1.0 Lr (All Spans)
Moment (Ft-lbs)	1353 @ 2' 3"	4412	Passed (31%)	1.25	1.0 D + 1.0 Lr (All Spans)
Live Load Defl. (in)	0.003 @ 1' 7"	0.069	Passed (L/999+)	--	1.0 D + 1.0 Lr (All Spans)
Total Load Defl. (in)	0.004 @ 1' 7"	0.138	Passed (L/999+)	--	1.0 D + 1.0 Lr (All Spans)

Member Length : 3'  
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	Roof Live	Factored	
1 - Stud wall - HF	3.00"	3.00"	1.50"	289	120	384	673	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.79"	872	120	1306	2178	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' o/c	
Bottom Edge (Lu)	3' o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (1.25)	Comments
0 - Self Weight (PLF)	0 to 3'	N/A	7.0	--	--	
1 - Uniform (PSF)	0 to 3' (Front)	2'	12.0	40.0	-	Floor Load
2 - Point (lb)	2' 3" (Top)	N/A	1068	-	1690	Linked from: RB-1, Support 1

**Weyerhaeuser Notes**

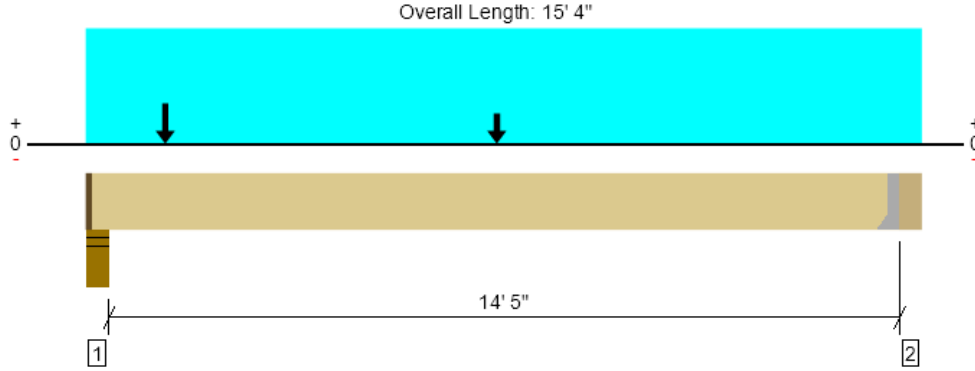
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2B-8  
 2 piece(s) 1 3/4" x 9 1/4" 2.0E Microllam® LVL



Drawing is Conceptual. 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)	2587 @ 4"	5670 (4.00")	Passed (46%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2453 @ 1' 2 3/4"	7074	Passed (35%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	7636 @ 7' 9"	12884	Passed (59%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.229 @ 7' 5 5/8"	0.364	Passed (L/763)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.618 @ 7' 6 3/16"	0.727	Passed (L/282)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 14' 9"  
 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 - HF	5.50"	4.00"	1.83"	1506	304	1096	2601	1 1/2" Rim Board
2 - Hanger on 9 1/4" LVL beam	5.50"	Hanger <sup>1</sup>	1.50"	1145	309	399	1676	See note <sup>1</sup>

- 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
- <sup>1</sup> See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	14' 9" o/c	
Bottom Edge (Lu)	14' 9" 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
2 - Face Mount Hanger	LUS410	2.00"	N/A	8-10d	6-10d	

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

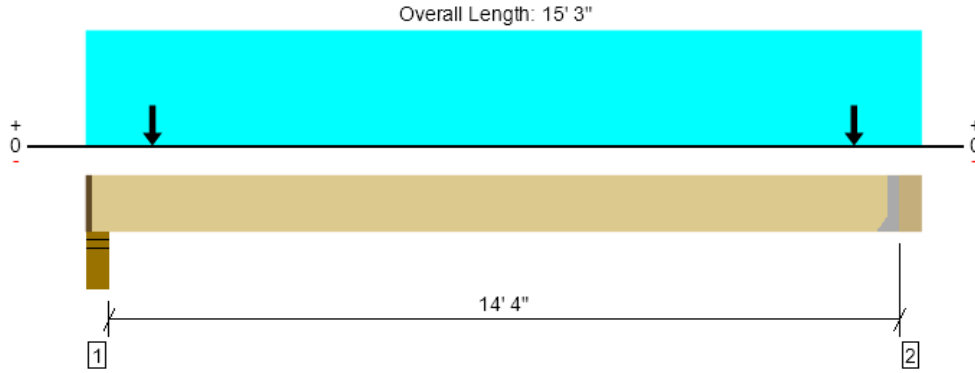
Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	1 1/2" to 14' 10 1/2"	N/A	9.4	--	--	
1 - Uniform (PSF)	0 to 15' 4" (Front)	1'	12.0	40.0	-	Floor Load
2 - Uniform (PLF)	0 to 15' 4" (Top)	N/A	100.0	-	-	Wall Load Above
3 - Point (lb)	1' 6" (Top)	N/A	452	-	845	Linked from: 2H-2, Support 1
4 - Point (lb)	7' 9" (Top)	N/A	342	-	650	Linked from: RB-7, Support 1

**Weyerhaeuser Notes**  
 Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.woyehaeuser.com/woodproducts/document-library](http://www.woyehaeuser.com/woodproducts/document-library).  
 The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2B-9  
1 piece(s) 5 1/4" x 11 1/4" 2.2E Parallam® PSL



Drawing is Conceptual. 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)	4415 @ 14' 9 1/2"	4922 (1.50")	Passed (90%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	3818 @ 13' 10 1/4"	13132	Passed (29%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	11678 @ 7' 6 9/16"	26955	Passed (43%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.251 @ 7' 6 11/16"	0.361	Passed (L/691)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.347 @ 7' 6 5/8"	0.723	Passed (L/500)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 14' 8"  
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 - HF	5.50"	4.00"	2.10"	1431	2458	1658	4518	1 1/2" Rim Board
2 - Hanger on 11 1/4" HF beam	5.50"	Hanger <sup>1</sup>	1.50"	1449	2498	1686	4588	See note <sup>1</sup>

- 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
- <sup>1</sup> See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	14' 8" o/c	
Bottom Edge (Lu)	14' 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
2 - Face Mount Hanger	HHUS5.50/10	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)	Snow (1.15)	Comments
0 - Self Weight (PLF)	1 1/2" to 14' 9 1/2"	N/A	18.5	--	--	
1 - Uniform (PSF)	0 to 15' 3" (Front)	4'	12.0	40.0	-	Floor Load
2 - Uniform (PSF)	0 to 15' 3" (Front)	2' 9"	12.0	60.0	25.0	Deck Load
3 - Point (lb)	1' 3" (Top)	N/A	687	-	1148	Linked from: 2H-1, Support 1
4 - Point (lb)	14' (Top)	N/A	687	-	1148	Linked from: 2H-1, Support 2

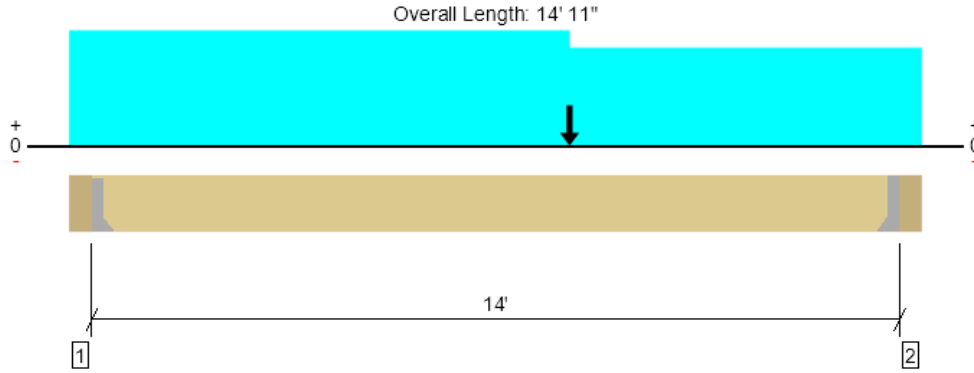
**Weyerhaeuser Notes**  
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.eyerhaeuser.com/woodproducts/document-library](http://www.eyerhaeuser.com/woodproducts/document-library).  
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2B-10  
 1 piece(s) 5 1/4" x 9 1/4" 2.2E Parallam® PSL

(2) Beams are provided per plan, effectively doubling the moment capacity. Beams per plan are ok



Drawing is Conceptual. 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)	4709 @ 14' 5 1/2"	4922 (1.50")	Passed (96%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	4086 @ 13' 8 1/4"	9389	Passed (44%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	20362 @ 8' 9"	18623	Failed (109%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.629 @ 7' 8 7/16"	0.350	Failed (L/267)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.958 @ 7' 7 15/16"	0.700	Failed (L/175)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 14'  
 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 - Hanger on 9 1/4" PSL beam	5.50"	Hanger <sup>1</sup>	1.50"	1617	2347	1136	4230	See note <sup>1</sup>
2 - Hanger on 9 1/4" PSL beam	5.50"	Hanger <sup>1</sup>	1.50"	1501	2885	1543	4822	See note <sup>1</sup>

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- <sup>1</sup> 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	HHUS5.50/10	3.00"	N/A	30-10d	10-10d	
2 - Face Mount Hanger	HHUS5.50/10	3.00"	N/A	30-10d	10-10d	

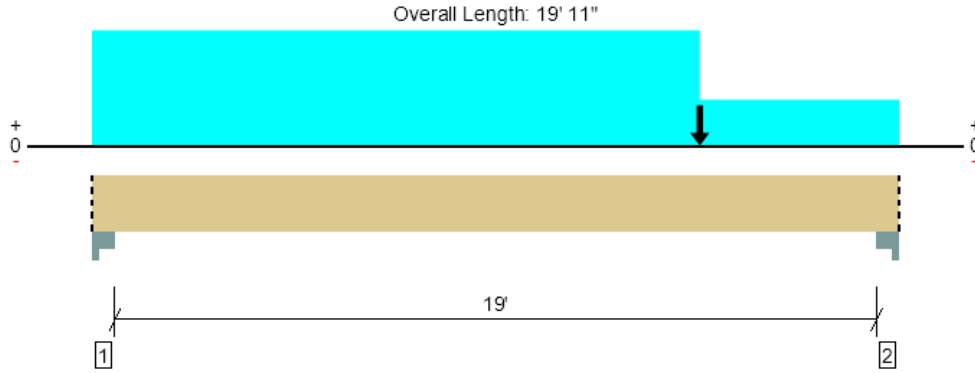
- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	5 1/2" to 14' 5 1/2"	N/A	15.2	--	--	
1 - Uniform (PSF)	0 to 14' 11" (Front)	2' 3"	12.0	60.0	25.0	Deck Load
2 - Uniform (PSF)	0 to 8' 9" (Back)	1'	12.0	40.0	-	Floor Load
3 - Uniform (PSF)	8' 9" to 14' 11" (Back)	1'	12.0	60.0	25.0	Deck Load
4 - Uniform (PLF)	0 to 8' 9" (Top)	N/A	100.0	-	-	Wall Load Above
5 - Point (lb)	8' 9" (Back)	N/A	1449	2498	1686	Linked from: 2B-9, Support 2

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2B-11  
1 piece(s) 5 1/4" x 14" 2.2E Parallam® PSL



Drawing is Conceptual. 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)	5292 @ 19' 7"	18047 (5.50")	Passed (29%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	4737 @ 18' 3 1/2"	14210	Passed (33%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	21277 @ 14' 9 3/4"	40743	Passed (52%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.408 @ 10' 6 3/8"	0.481	Passed (L/566)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.573 @ 10' 6 3/4"	0.962	Passed (L/403)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 19' 11"  
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	5.50"	5.50"	1.50"	875	2132	969	3201	Blocking
2 - Column Cap - steel	5.50"	5.50"	1.61"	1592	3298	1634	5292	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)	19' 11" o/c	
Bottom Edge (Lu)	19' 11" o/c	

- Maximum allowable bracing intervals based on applied load.

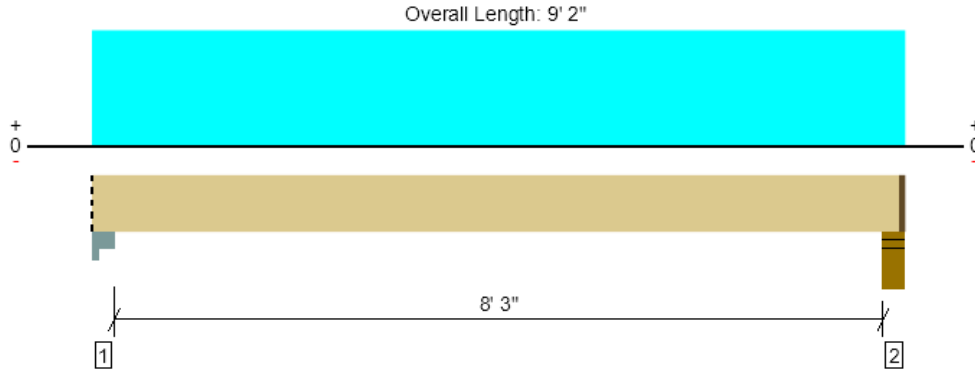
Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 19' 11"	N/A	23.0	--	--	
1 - Uniform (PSF)	0 to 15' (Front)	2' 6"	12.0	60.0	25.0	Deck Load
2 - Uniform (PSF)	15' to 19' 11" (Front)	1'	12.0	60.0	25.0	Deck Load
3 - Point (lb)	15' (Front)	N/A	1501	2885	1543	Linked from: 2B-10, Support 2

**Weyerhaeuser Notes**  
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).  
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2B-12  
1 piece(s) 3 1/2" x 9" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	1843 @ 8' 10"	5670 (4.00")	Passed (32%)	--	1.0 D + 0.75 L + 0.75 S (All Spans) [1]
Shear (lbs)	1395 @ 1' 2 1/2"	6400	Passed (22%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans) [1]
Pos Moment (Ft-lbs)	3732 @ 4' 7"	10868	Passed (34%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans) [1]
Live Load Defl. (in)	0.064 @ 4' 7"	0.213	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans) [1]
Total Load Defl. (in)	0.127 @ 4' 7"	0.425	Passed (L/804)	--	1.0 D + 0.75 L + 0.75 S (All Spans) [1]

Member Length : 9' 1/2"  
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.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 8' 6".
- 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	Snow	Factored	
1 - Column Cap - steel	5.50"	5.50"	1.50"	933	612/-48	669	1894	Blocking
2 - Stud wall - HF	5.50"	4.00"	1.50"	932	612/-48	671	1895	1 1/2" 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)	9' 1" o/c	
Bottom Edge (Lu)	9' 1" 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 9' 1/2"	N/A	7.7	--	--	
1 - Uniform (PLF)	0 to 9' 2" (Front)	N/A	18.0	133.5/-10.5	-16.5	Linked from: 2J-4, Support 3
2 - Uniform (PLF)	0 to 9' 2" (Top)	N/A	100.0	-	-	Wall Load Above
3 - Uniform (PSF)	0 to 9' 2" (Top)	6' 6"	12.0	-	25.0	Roof Load

**Weyerhaeuser Notes**

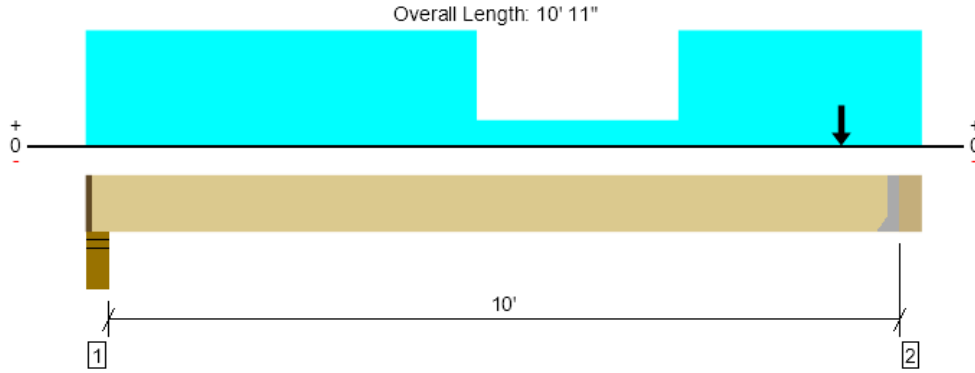
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2B-13  
 2 piece(s) 1 3/4" x 9 1/4" 2.0E Microllam® LVL



Drawing is Conceptual. 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)	4541 @ 10' 5 1/2"	4541 (1.73")	Passed (100%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	4076 @ 9' 8 1/4"	7074	Passed (58%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3430 @ 5' 1 3/4"	12884	Passed (27%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.065 @ 5' 9 3/8"	0.253	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.153 @ 5' 7 1/2"	0.506	Passed (L/796)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 10' 4"  
 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 - HF	5.50"	4.00"	1.50"	840	216	372	1281	1 1/2" Rim Board
2 - Hanger on 9 1/4" GLB beam	5.50"	Hanger <sup>1</sup>	1.73"	1987	221	2645	4631	See note <sup>1</sup>

- 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
- <sup>1</sup> See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	10' 4" o/c	
Bottom Edge (Lu)	10' 4" 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
2 - Face Mount Hanger	HHUS48	3.00"	N/A	22-16d	8-16d	

• 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)	1 1/2" to 10' 5 1/2"	N/A	9.4	--	--	
1 - Uniform (PSF)	0 to 10' 11" (Front)	1'	12.0	40.0	-	Floor Load
2 - Uniform (PLF)	0 to 5' 3" (Top)	N/A	142.0	-	42.0	DL = 12psf * 3.5ft + 100 SL = 25psf * 3.5ft
3 - Uniform (PLF)	7' 9" to 10' 11" (Top)	N/A	142.0	-	42.0	DL = 12psf * 3.5ft + 100 SL = 25psf * 3.5ft
4 - Point (lb)	9' 9" (Top)	N/A	1403	-	2663	Linked from: RB-8, Support 2

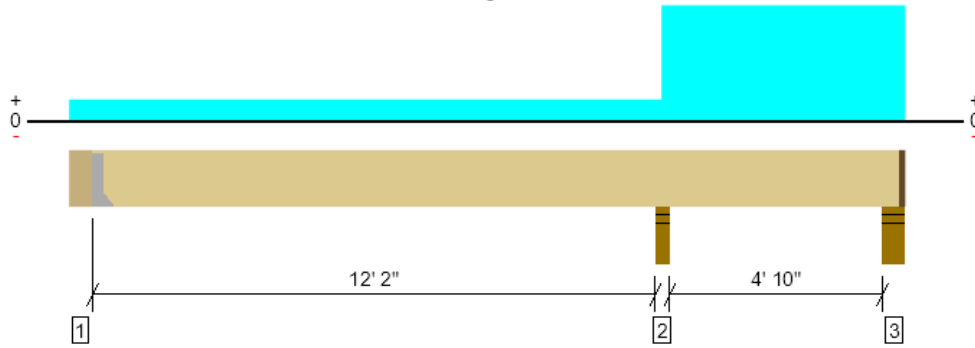
Forteweb Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2B-14

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

Overall Length: 18' 2 1/2"



Drawing is Conceptual. 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)	1529 @ 12' 9 1/4"	2603 (3.50")	Passed (59%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	761 @ 13' 8 1/4"	3537	Passed (22%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	-1221 @ 12' 9 1/4"	5602	Passed (22%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.077 @ 6' 1"	0.308	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.094 @ 5' 11"	0.616	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)

Member Length : 17' 7 1/2"  
 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 - Hanger on 9 1/4" HF beam	5.50"	Hanger <sup>1</sup>	1.50"	98	295	-11	393	See note <sup>1</sup>
2 - Stud wall - SPF	3.50"	3.50"	2.06"	730	677	389	1529	None
3 - Stud wall - HF	5.50"	4.00"	1.50"	449	144/-133	372	836	1 1/2" 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
- <sup>1</sup> See Connector grid below for additional information and/or requirements.

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

- 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)	5 1/2" to 18' 1"	N/A	4.7	--	--	
1 - Uniform (PSF)	0 to 18' 2 1/2" (Front)	1' 4"	12.0	40.0	-	Floor Load
2 - Uniform (PLF)	12' 9" to 18' 2 1/2" (Top)	N/A	166.0	-	138.0	DL = 12psf * 5.5ft +100 SL = 25psf * 5.5ft

**Weyerhaeuser Notes**

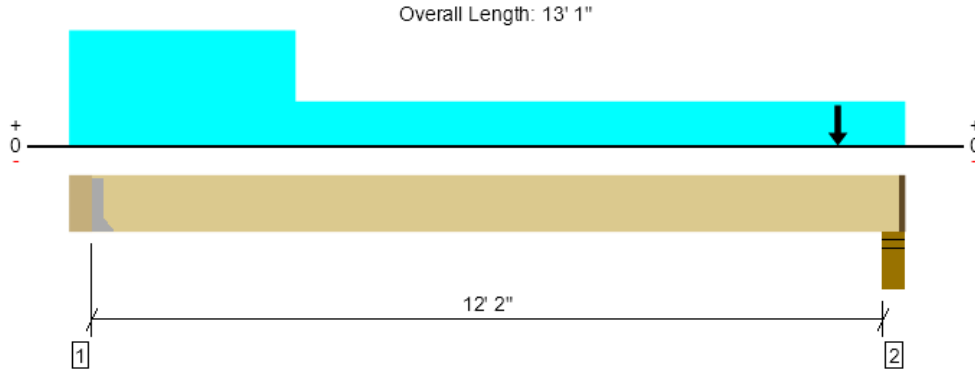
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.woyehaeuser.com/woodproducts/document-library](http://www.woyehaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2B-15  
2 piece(s) 1 3/4" x 9 1/4" 2.0E Microllam® LVL



Drawing is Conceptual. 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)	3832 @ 12' 9"	5670 (4.00")	Passed (68%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3117 @ 11' 10 1/4"	7074	Passed (44%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2960 @ 9' 3 1/16"	12884	Passed (23%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.094 @ 6' 10 5/8"	0.307	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.188 @ 7'	0.615	Passed (L/784)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 12' 6"  
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 - Hanger on 9 1/4" GLB beam	5.50"	Hanger <sup>1</sup>	1.50"	402	352	344	924	See note <sup>1</sup>
2 - Stud wall - HF	5.50"	4.00"	2.70"	2115	346	1718	3834	1 1/2" 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
- <sup>1</sup> See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	12' 6" o/c	
Bottom Edge (Lu)	12' 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	LUS48	2.00"	N/A	6-10dx1.5	4-10d	

- 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)	Snow (1.15)	Comments
0 - Self Weight (PLF)	5 1/2" to 12' 11 1/2"	N/A	9.4	--	--	
1 - Uniform (PSF)	0 to 13' 1" (Front)	1' 4"	12.0	40.0	-	Floor Load
2 - Point (PLF)	12' (Top)	12'	172.0	-	150.0	DL = 12psf*6ft+100 SL = 25psf*6ft
3 - Uniform (PSF)	0 to 3' 6" (Top)	3'	12.0	-	25.0	Roof Load

**Weyerhaeuser Notes**

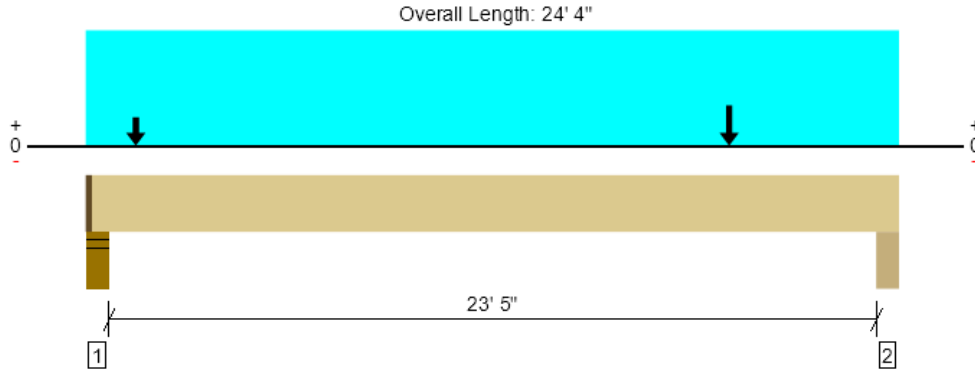
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2B-16  
1 piece(s) 6 3/4" x 18" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	10748 @ 4"	10935 (4.00")	Passed (98%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	9122 @ 22' 4 1/2"	21465	Passed (42%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	53970 @ 12' 11 3/8"	67292	Passed (80%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.603 @ 12' 2 11/16"	0.592	Passed (L/471)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.938 @ 12' 4 3/16"	1.183	Passed (L/303)	--	1.0 D + 1.0 L (All Spans)

Member Length : 24' 2 1/2"  
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.
- Critical positive moment adjusted by a volume/size factor of 0.92 that was calculated using length L = 23' 8".
- 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	Snow	Factored	
1 - Stud wall - HF	5.50"	4.00"	3.93"	3947	6190	2963	10811	1 1/2" Rim Board
2 - Trimmer - HF	5.50"	5.50"	2.44"	4091	6310	2512	10708	None

• 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)	24' 3" o/c	
Bottom Edge (Lu)	24' 3" 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 1/2" to 24' 4"	N/A	29.5	--	--	
1 - Uniform (PSF)	0 to 24' 4" (Front)	12'	12.0	40.0	-	Floor Load
2 - Point (lb)	19' 3" (Back)	N/A	402	352	344	Linked from: 2B-15, Support 1
3 - Point (lb)	19' 3" (Front)	N/A	1987	221	2645	Linked from: 2B-13, Support 2
4 - Point (lb)	1' 6" (Front)	N/A	1430	247	2486	Linked from: 2B-17, Support 1

**Weyerhaeuser Notes**

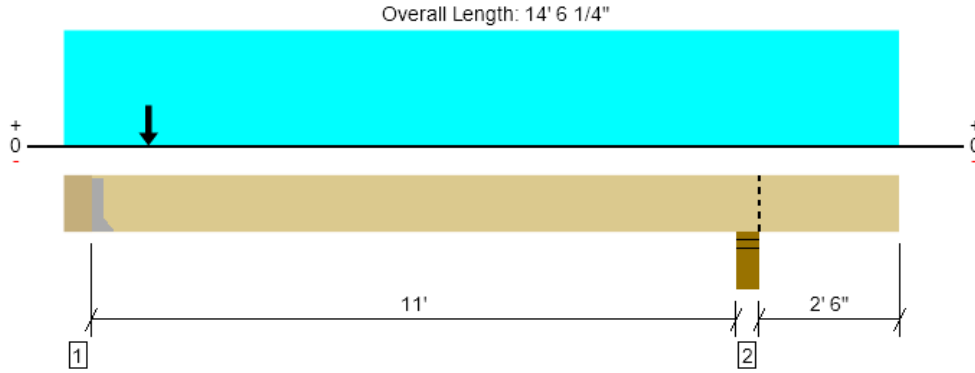
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.eyerhaeuser.com/woodproducts/document-library](http://www.eyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2B-17  
 2 piece(s) 1 3/4" x 9 1/4" 2.0E Microllam® LVL



Drawing is Conceptual. 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)	3909 @ 6 3/4"	3938 (1.50")	Passed (99%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3893 @ 1' 4"	7074	Passed (55%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3656 @ 1' 6"	12884	Passed (28%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.085 @ 5' 7 1/2"	0.281	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.143 @ 5' 7 1/4"	0.561	Passed (L/940)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)

Member Length : 13' 11 1/2"  
 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 - Hanger on 9 1/4" GLB beam	6.75"	Hanger <sup>1</sup>	1.50"	1430	247	2486	3916	See note <sup>1</sup>
2 - Stud wall - HF	5.50"	5.50"	1.50"	305	347	227	735	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
- <sup>1</sup> See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	14' 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	HHUS48	3.00"	N/A	22-10d	8-10d		

- 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)	Snow (1.15)	Comments
0 - Self Weight (PLF)	6 3/4" to 14' 6 1/4"	N/A	9.4	--	--	
1 - Uniform (PSF)	0 to 14' 6 1/4" (Front)	1'	12.0	40.0	-	Floor Load
2 - Point (lb)	1' 6" (Top)	N/A	1429	-	2713	Linked from: RB-8, Support 1

**Weyerhaeuser Notes**

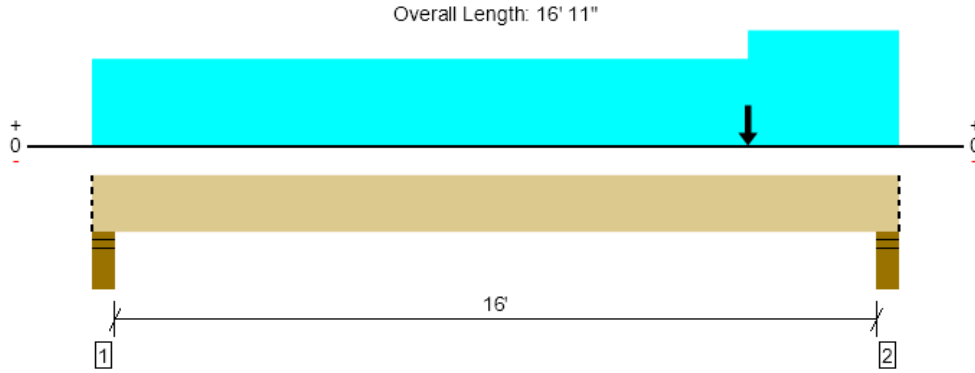
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



2nd Floor, 2B-18  
1 piece(s) 5 1/4" x 14" 2.2E Parallam® PSL



Drawing is Conceptual. 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)	9992 @ 16' 7"	11694 (5.50")	Passed (85%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	8915 @ 15' 3 1/2"	14210	Passed (63%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	29758 @ 9' 11 1/8"	40743	Passed (73%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.386 @ 8' 8 1/16"	0.406	Passed (L/505)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.587 @ 8' 9 1/4"	0.813	Passed (L/332)	--	1.0 D + 1.0 L (All Spans)

Member Length : 16' 11"  
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 - HF	5.50"	5.50"	3.02"	1927	4493	314	6421	Blocking
2 - Stud wall - HF	5.50"	5.50"	4.70"	4090	5903	1816	9992	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)	16' 11" o/c	
Bottom Edge (Lu)	16' 11" 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 16' 11"	N/A	23.0	--	--	
1 - Uniform (PSF)	0 to 13' 9" (Front)	12'	12.0	40.0	-	Floor Load
2 - Uniform (PSF)	13' 9" to 16' 11" (Front)	7' 6"	12.0	40.0	-	Floor Load
3 - Uniform (PSF)	13' 9" to 16' 11" (Back)	1'	12.0	60.0	25.0	Deck Load
4 - Uniform (PLF)	13' 9" to 16' 11" (Top)	N/A	178.0	-	163.0	DL= 12psf *6.5ft +100 SL= 25psf *6.5ft
5 - Point (lb)	13' 9" (Front)	N/A	1145	309	399	Linked from: 2B-8, Support 2
6 - Point (lb)	13' 9" (Back)	N/A	1617	2347	1136	Linked from: 2B-10, Support 1

**Weyerhaeuser Notes**

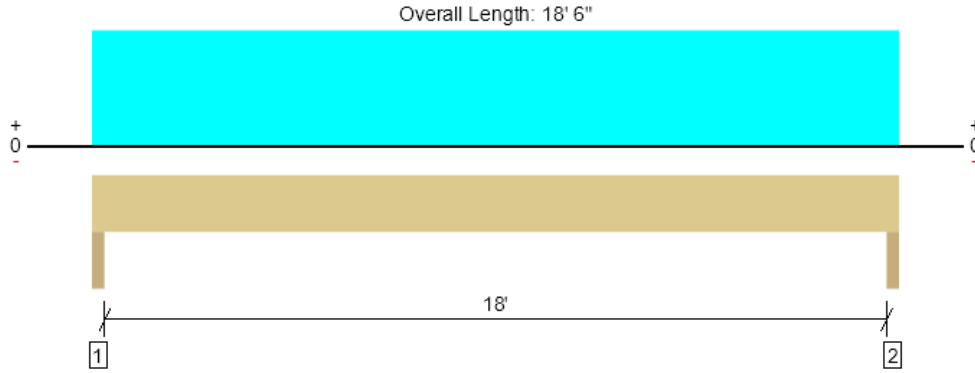
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



1st Floor, 1H-1  
1 piece(s) 5 1/2" x 15" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	6778 @ 1 1/2"	10725 (3.00")	Passed (63%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	5679 @ 1' 6"	16761	Passed (34%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Pos Moment (Ft-lbs)	30506 @ 9' 3"	45472	Passed (67%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.365 @ 9' 3"	0.608	Passed (L/601)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.657 @ 9' 3"	0.913	Passed (L/333)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 18' 6"  
System : Wall  
Member Type : Header  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- A 4.1% decrease in the moment capacity has been added to account for lateral stability.
- Critical positive moment adjusted by a volume/size factor of 0.98 that was calculated using length L = 18' 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	Floor Live	Snow	Factored	
1 - Trimmer - HF	3.00"	3.00"	1.90"	3016	2435	2581	6778	None
2 - Trimmer - HF	3.00"	3.00"	1.90"	3016	2435	2581	6778	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 18' 6"	N/A	20.0	--	--	
1 - Uniform (PLF)	0 to 18' 6"	N/A	306.0	263.3	279.0	Linked from: 2J-6, Support 2

**Weyerhaeuser Notes**

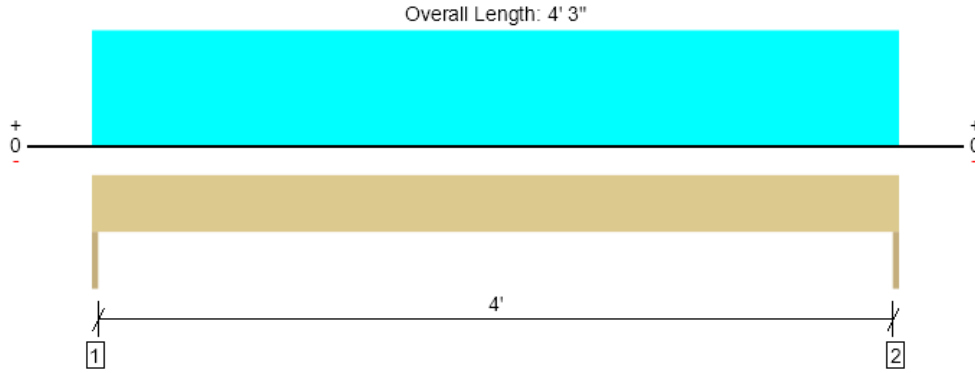
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.eyerhaeuser.com/woodproducts/document-library](http://www.eyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



1st Floor, 1H-2  
2 piece(s) 2 x 8 DF No.2



Drawing is Conceptual. 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)	1167 @ 0	2813 (1.50")	Passed (41%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	767 @ 8 3/4"	2610	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1240 @ 2' 1 1/2"	2310	Passed (54%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.018 @ 2' 1 1/2"	0.142	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.026 @ 2' 1 1/2"	0.213	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 4' 3"  
System : Wall  
Member Type : Header  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- A 2.3% decrease in the moment capacity has been added to account for lateral stability.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	381	786	166	1167	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	381	786	166	1167	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 4' 3"	N/A	5.5	--	--	
1 - Uniform (PLF)	0 to 4' 3"	N/A	174.0	369.8	78.0	Linked from: 2J-4, Support 2

**Weyerhaeuser Notes**

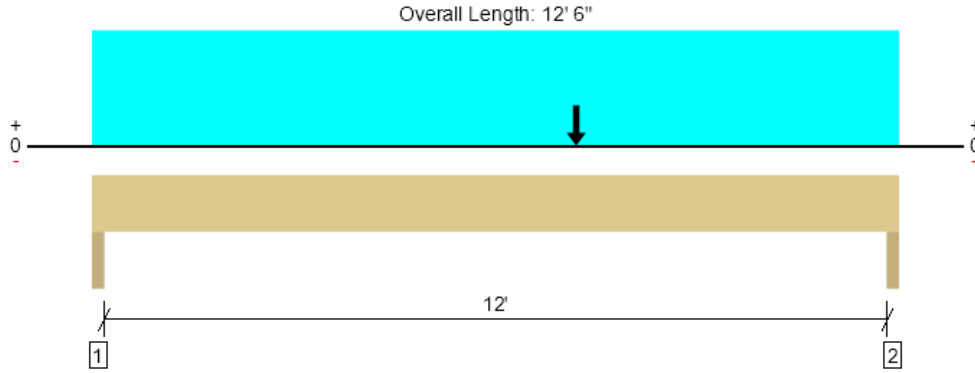
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



1st Floor, 1H-3  
1 piece(s) 5 1/2" x 10 1/2" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	4211 @ 12' 4 1/2"	10725 (3.00")	Passed (39%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	3858 @ 11' 4 1/2"	11733	Passed (33%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Pos Moment (Ft-lbs)	17253 @ 7' 6"	22913	Passed (75%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.232 @ 6' 6 7/16"	0.408	Passed (L/633)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.414 @ 6' 5 7/8"	0.613	Passed (L/355)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 12' 6"  
System : Wall  
Member Type : Header  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- A 1.4% decrease in the moment capacity has been added to account for lateral stability.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 12' 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	Floor Live	Snow	Seismic	Factored	
1 - Trimmer - HF	3.00"	3.00"	1.50"	1606	978	1129	195/-195	3289	None
2 - Trimmer - HF	3.00"	3.00"	1.50"	1898	1480	1467	195/-195	4211	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 12' 6"	N/A	14.0	--	--	--	
1 - Uniform (PSF)	0 to 12' 6"	1' 3"	12.6	-	-	25.0	Roof Load
2 - Point (lb)	7' 6"	N/A	1431	2458	1658	-	Linked from: 2B-9, Support 1
3 - Uniform (PLF)	0 to 12' 6"	N/A	100.0	-	-	-	Wall Load Above
4 - Uniform (PSF)	0 to 12' 6"	3'	12.0	-	25.0	-	Roof Load

**Weyerhaeuser Notes**

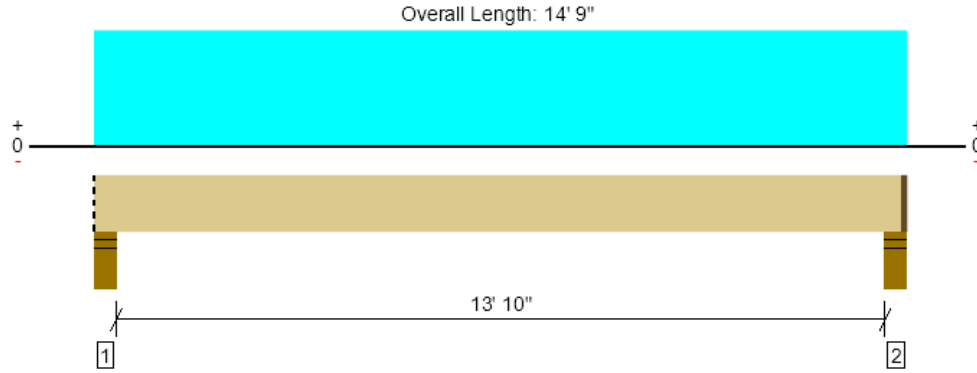
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



1st Floor, 1J-1  
1 piece(s) 2 x 10 DF No.2 @ 16" OC



Drawing is Conceptual. 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)	503 @ 14' 4 1/2"	3750 (4.00")	Passed (13%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	426 @ 1' 2 3/4"	1665	Passed (26%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1699 @ 7' 4 1/2"	2029	Passed (84%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.291 @ 7' 4 1/2"	0.350	Passed (L/577)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.379 @ 7' 4 1/2"	0.700	Passed (L/444)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

Member Length : 14' 7 1/2"  
System : Floor  
Member Type : Joist  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- 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 - Stud wall - DF	5.50"	5.50"	1.50"	118	393	511	Blocking
2 - Stud wall - DF	5.50"	4.00"	1.50"	118	393	511	1 1/2" 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)	Continuous	
Bottom Edge (Lu)	End Bearing Points	

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 14' 9"	16"	12.0	40.0	Floor Load

**Weyerhaeuser Notes**

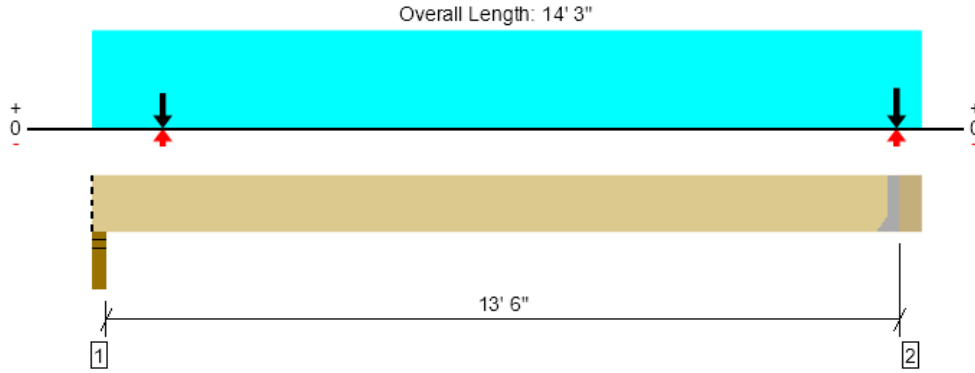
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



1st Floor, 1B-1  
1 piece(s) 5 1/4" x 9 1/4" 2.2E Parallam® PSL



Drawing is Conceptual. 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)	6660 @ 13' 9 1/2"	6660 (2.03")	Passed (100%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans) [1]
Shear (lbs)	4515 @ 1' 3/4"	9389	Passed (48%)	1.00	1.0 D + 1.0 L (All Spans) [8]
Moment (Ft-lbs)	9839 @ 6' 4 15/16"	18623	Passed (53%)	1.00	1.0 D + 1.0 L (All Spans) [1]
Live Load Defl. (in)	0.200 @ 6' 10 3/16"	0.341	Passed (L/818)	--	1.0 D + 1.0 L (All Spans) [1]
Total Load Defl. (in)	0.462 @ 6' 9 15/16"	0.681	Passed (L/354)	--	1.0 D + 1.0 L (All Spans) [8]

Member Length : 13' 9 1/2"  
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	Seismic	Factored	
1 - Stud wall - HF	3.50"	3.50"	2.48"	2882	2017	1039	179/-179	5269	Blocking
2 - Hanger on 9 1/4" PSL beam	5.50"	Hanger <sup>1</sup>	2.03"	3481	2721	1557	211/-211	6800	See note <sup>1</sup>

- 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
- <sup>1</sup> See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	13' 10" o/c	
Bottom Edge (Lu)	13' 10" 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
2 - Face Mount Hanger	HGUS5.50/8	4.00"	N/A	36-16d	12-16d	

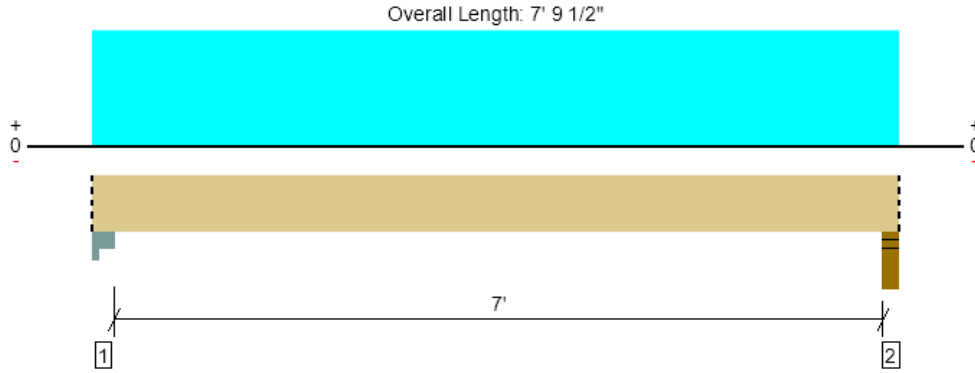
- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 13' 9 1/2"	N/A	15.2	--	--	--	
1 - Uniform (PSF)	0 to 14' 3" (Back)	1'	12.0	40.0	-	-	Floor Load
2 - Uniform (PSF)	0 to 14' 3" (Front)	2'	12.0	60.0	-	-	Covered Deck Load
3 - Uniform (PLF)	0 to 14' 3" (Top)	N/A	150.0	-	-	-	Wall Load Above
4 - Point (lb)	1' 3" (Top)	N/A	1606	978	1129	195/-195	Linked from: 1H-3, Support 1
5 - Point (lb)	13' 9" (Top)	N/A	1898	1480	1467	195/-195	Linked from: 1H-3, Support 2

Forteweb Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



1st Floor, 1B-2  
1 piece(s) 5 1/4" x 9 1/4" 2.2E Parallam® PSL



Drawing is Conceptual. 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)	2105 @ 7' 7"	8505 (4.00")	Passed (25%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1499 @ 1' 2 3/4"	9389	Passed (16%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3608 @ 3' 11 1/2"	18623	Passed (19%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.019 @ 3' 11 1/2"	0.181	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.053 @ 3' 11 1/2"	0.363	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 7' 9 1/2"  
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	5.50"	5.50"	1.50"	1382	792	198	2174	Blocking
2 - Stud wall - HF	4.00"	4.00"	1.50"	1339	767	192	2105	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' 10" o/c	
Bottom Edge (Lu)	7' 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)	0 to 7' 9 1/2"	N/A	15.2	--	--	
1 - Uniform (PSF)	0 to 7' 9 1/2" (Front)	5'	12.0	40.0	-	Floor Load
2 - Uniform (PLF)	0 to 7' 9 1/2" (Top)	N/A	250.0	-	-	Wall Load Above
3 - Uniform (PSF)	0 to 7' 9 1/2" (Front)	2'	12.0	-	25.0	Roof Load

**Weyerhaeuser Notes**

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

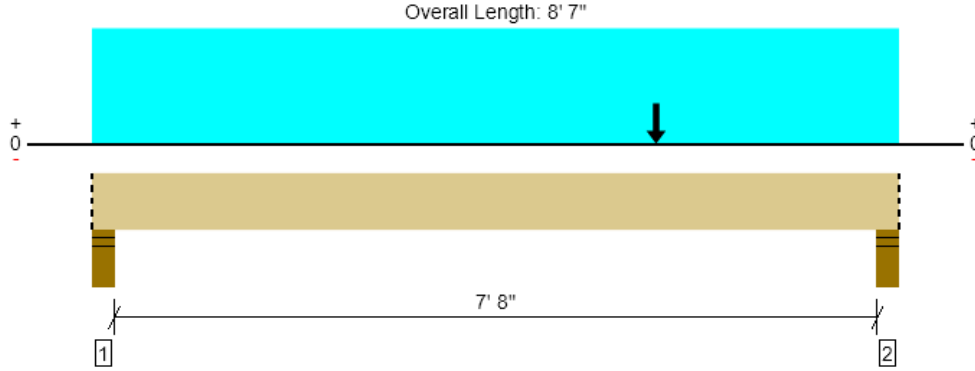
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



1st Floor, 1B-3

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



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3125 @ 8' 3"	7796 (5.50")	Passed (40%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2948 @ 7' 4 1/4"	6151	Passed (48%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	6558 @ 6'	11204	Passed (59%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.094 @ 4' 8"	0.198	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.151 @ 4' 7 1/2"	0.396	Passed (L/629)	--	1.0 D + 1.0 L (All Spans)

Member Length : 8' 7"  
 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 - HF	5.50"	5.50"	1.50"	732	882	1615	Blocking
2 - Stud wall - HF	5.50"	5.50"	2.20"	1164	1961	3125	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' 7" o/c	
Bottom Edge (Lu)	8' 7" 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 8' 7"	N/A	9.4	--	
1 - Uniform (PSF)	0 to 8' 7" (Front)	1'	15.0	40.0	Floor Load
2 - Uniform (PLF)	0 to 8' 7" (Top)	N/A	80.0	-	wall load above
3 - Point (lb)	6' (Top)	N/A	1000	2500	reaction from post above

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

**Weyerhaeuser Notes**

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

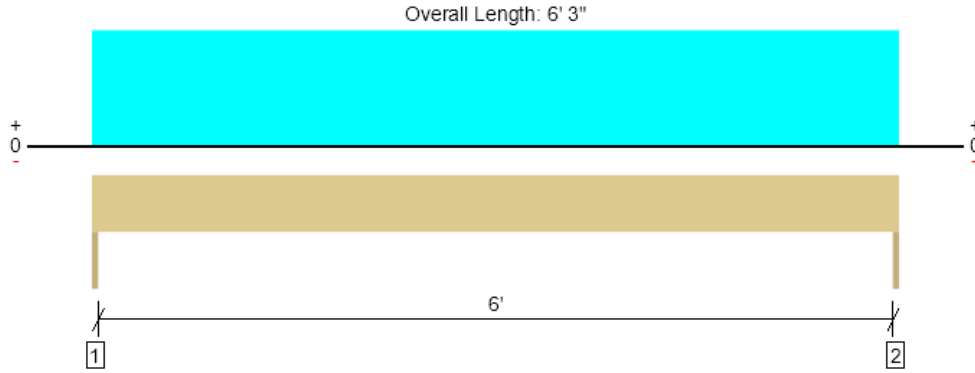
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



6/13/2024 11:37:42 PM UTC  
 ForteWEB v3.8, Engine: V8.4.1.22, Data: V8.1.6.2  
 File Name: Eadie Remodel

Basement, BH-1  
1 piece(s) 3 1/2" x 7 1/2" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	1482 @ 0	3413 (1.50")	Passed (43%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1127 @ 9"	4638	Passed (24%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	2316 @ 3' 1 1/2"	6489	Passed (36%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.056 @ 3' 1 1/2"	0.208	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.074 @ 3' 1 1/2"	0.313	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 6' 3"  
System : Wall  
Member Type : Header  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- A 1.1% decrease in the moment capacity has been added to account for lateral stability.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 6' 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	Floor Live	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	357	1125	1482	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	357	1125	1482	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 6' 3"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 6' 3"	9'	12.0	40.0	Floor Load

**Weyerhaeuser Notes**

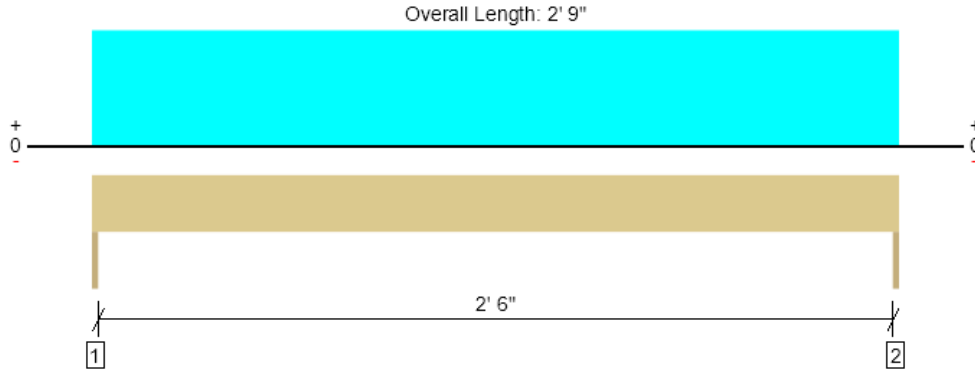
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



Basement, BH-2  
2 piece(s) 2 x 8 DF No.2



Drawing is Conceptual. 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)	580 @ 0	2813 (1.50")	Passed (21%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	272 @ 8 3/4"	2610	Passed (10%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	398 @ 1' 4 1/2"	2334	Passed (17%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.003 @ 1' 4 1/2"	0.092	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.004 @ 1' 4 1/2"	0.138	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 2' 9"  
System : Wall  
Member Type : Header  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- A 1.3% decrease in the moment capacity has been added to account for lateral stability.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	140	440	580	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	140	440	580	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 2' 9"	N/A	5.5	--	
1 - Uniform (PSF)	0 to 2' 9"	8'	12.0	40.0	Floor Load

**Weyerhaeuser Notes**

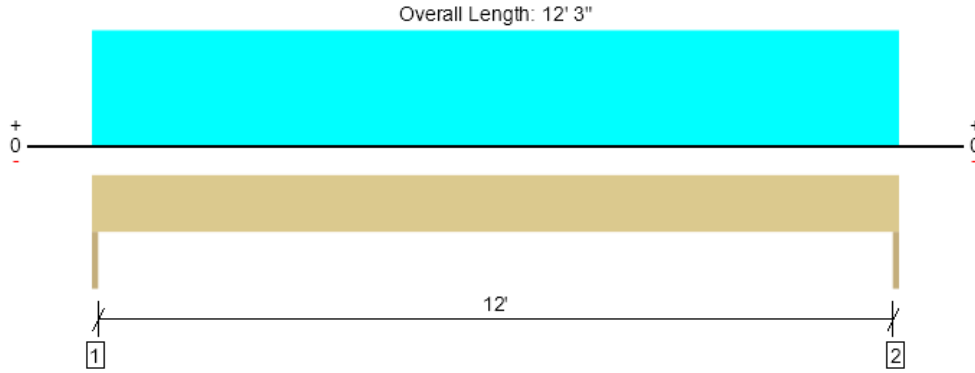
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.woyehaeuser.com/woodproducts/document-library](http://www.woyehaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



Basement, BH-3  
1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam



Drawing is Conceptual. 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)	2772 @ 0	5363 (1.50")	Passed (52%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	2000 @ 1' 1 1/2"	11660	Passed (17%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	7504 @ 6' 1 1/2"	26018	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.104 @ 6' 1 1/2"	0.408	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.161 @ 6' 1 1/2"	0.613	Passed (L/914)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

Member Length : 12' 3"  
System : Wall  
Member Type : Header  
Building Use : Residential  
Building Code : IBC 2018  
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- A 1.4% decrease in the moment capacity has been added to account for lateral stability.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 12' 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	Floor Live	Snow	Factored	
1 - Trimmer - HF	1.50"	1.50"	1.50"	980	1470	919	2772	None
2 - Trimmer - HF	1.50"	1.50"	1.50"	980	1470	919	2772	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 12' 3"	N/A	16.0	--	--	
1 - Uniform (PSF)	0 to 12' 3"	6'	12.0	40.0	-	Floor Load
2 - Uniform (PSF)	0 to 12' 3"	6'	12.0	-	25.0	Roof Load

**Weyerhaeuser Notes**

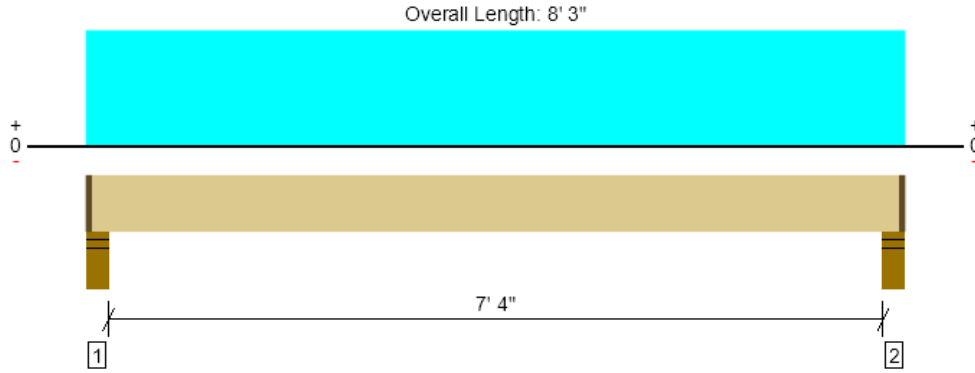
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	



Basement, BH-1  
1 piece(s) 4 x 10 DF No.2



Drawing is Conceptual. 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)	1801 @ 4"	5670 (4.00")	Passed (32%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1304 @ 1' 2 3/4"	3885	Passed (34%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3236 @ 4' 1 1/2"	4492	Passed (72%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.068 @ 4' 1 1/2"	0.190	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.091 @ 4' 1 1/2"	0.379	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 8'  
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 - HF	5.50"	4.00"	1.50"	454	1403	1856	1 1/2" Rim Board
2 - Stud wall - HF	5.50"	4.00"	1.50"	454	1403	1856	1 1/2" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' o/c	
Bottom Edge (Lu)	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 1/2" to 8' 1 1/2"	N/A	8.2	--	
1 - Uniform (PSF)	0 to 8' 3" (Front)	8' 6"	12.0	40.0	Floor Load

**Weyerhaeuser Notes**

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to [www.weyerhaeuser.com/woodproducts/document-library](http://www.weyerhaeuser.com/woodproducts/document-library).

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

ForteWEB Software Operator	Job Notes
Harrison Kliegl L120 Engineering (425) 636-3313 hkliegl@l120engineering.com	





**LONGITUDE**  
**ONE TWENTY°**  
ENGINEERING & DESIGN

# *LATERAL CALCULATIONS*

Project Number: <b>S220425-3</b>	Plan Name: <b>Eadie Remodel</b>	Sheet Number: <b>DC</b>
Engineer: <b>HK</b>	Specifics: <b>Design Criteria</b>	Date: <b>3/6/2024</b>

**Gravity Criteria:**

Code: IBC 2018

ROOF SYSTEM			
<b>Live Load:</b>			
Snow	25.0	psf	
<b>Dead Load:</b>			
Composite Roofing	2.0	psf	
19/32" Plywood Sheathing	2.5	psf	
Trusses at 24" o.c.	3.0	psf	
Insulation	1.8	psf	
(2) Layers 5/8" GWB	4.4	psf	
Misc/Mech	1.3	psf	
<b>Total</b>	<b>15.0</b>	<b>psf</b>	

FLOOR SYSTEM			
<b>Live Load:</b>			
Residential	40.0	psf	
<b>Dead Load:</b>			
Flooring	3.0	psf	
3/4" T & G Plywood	2.5	psf	
Floor Joists at 16" o.c.	2.5	psf	
Insulation	0.5	psf	
(1) Layers 5/8" GWB	2.2	psf	
Miscellaneous	4.3	psf	
<b>Total</b>	<b>15.0</b>	<b>psf</b>	

EXTERIOR WALL SYSTEM			
2x6 at 16" o.c.	1.7	psf	
Insulation	1.0	psf	
1/2" Plywood Sheathing	1.5	psf	
(2) layers 5/8" GWB	4.4	psf	
Misc	3.4	psf	
<b>Total</b>	<b>12.0</b>	<b>psf</b>	
Inclu. thinset stone veneer	5.0	psf	
<b>Total</b>	<b>17.0</b>	<b>psf</b>	

INTERIOR WALL SYSTEM			
2x4 at 16" o.c.	1.1	psf	
Insulation	0.5	psf	
(2) Layers 5/8" GWB	4.4	psf	
Misc	2.0	psf	
<b>Total</b>	<b>8.0</b>	<b>psf</b>	

**SEISMIC PARAMETERS:**

Code Reference: ASCE 7-16

R = **6.5** Bearing Wall System, Wood Structural Panel Walls  
 Mapped Spectral Acceleration, S<sub>s</sub> = **1.44**  
 Mapped Spectral Acceleration, S<sub>1</sub> = **0.5**  
 Soil Site Class = **D**

**WIND PARAMETERS:**

Code Reference: ASCE 7-16

Basic Wind Speed (3 second Gust) = **100** mph  
 Exposure : **C**  
 K<sub>zt</sub> = **1.00**

**SOIL PARAMETERS:**

Soil Bearing Pressure = **1,500** psf competent native soil or structural fill  
 1/3 increase for short-term wind or seismic loading is acceptable  
 Frost Depth = **18** in

Lateral Wall Pressures:

Unrestrained Active Pressure = **35** pcf Cantilevered walls  
 Restrained Active Pressure = **55** pcf Plate Wall Design/Tank Walls  
 Passive Pressure = **250** pcf \*Ignore top 2 ft  
 Soil Friction Coeff. = **0.4**

Project Number: <b>S220425-3</b>	Plan: <b>Eadie Remodel</b>	Sheet Number: <b>L1</b>
Engineer: <b>HK</b>	Specifics: <b>WIND FORCES</b>	Date: <b>3/6/2024</b>

IBC 2018 Section 1609 → ASCE 7-16 Section 28.5 - Simplified Procedure → Main Wind-Force Resisting System

**LOAD CRITERIA:**

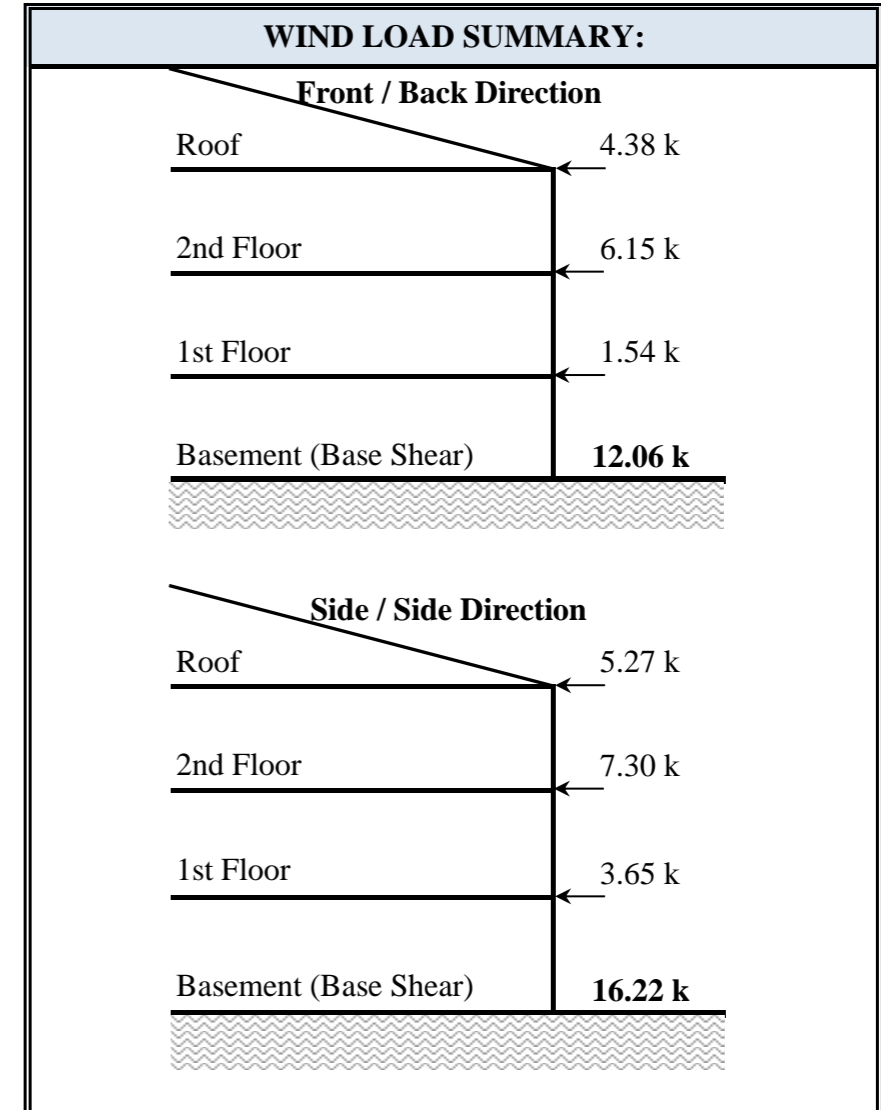
Basic Wind Speed,  $V_s = 100$  mph (ASCE 7-16, Section 26.5)  
 Exposure = **C** (ASCE 7-16, Section 26.7)

**BUILDING GEOMETRY:**

Roof Slope = **1.00 :12** = 4.76 degrees  
 Loads From Front/Back - Width (ft) = **54.00** ft Roof: **Hip**  
 Loads From Side - Width (ft) = **65.00** ft Roof: **Hip**  
 Average Eave Height = **23.00** ft  
 Mean Roof Ht.,  $h = 29.00$  ft (ASCE 7-16, Figure 27.5-2)  
 Edge Strip Width,  $a = 5.4$  ft (ASCE 7-16, Figure 28.5-1)  
 End Zone Width,  $2a = 10.80$  ft (ASCE 7-16, Figure 28.5-1)

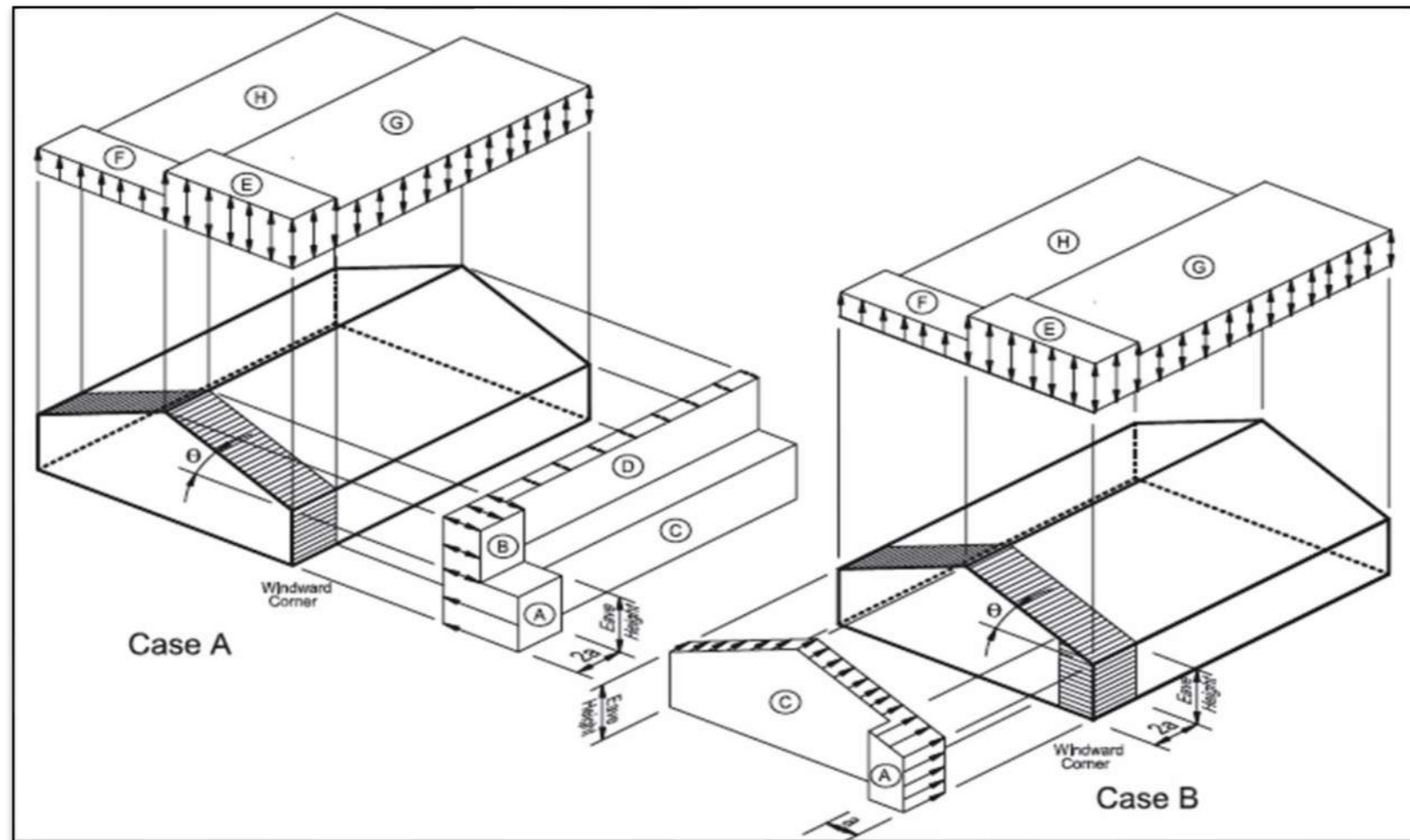
**DESIGN:**

Topographic Factor,  $K_{zt} = 1.00$  (ASCE 7-16, Section 26.8)  
 Adjustment Factor,  $\lambda = 1.40$  (ASCE 7-16, Figure 28.5-1)



SIMPLIFIED DESIGN WIND PRESSURE, $P_{s30}$ (psf)												
(Exposure B at $h = 30$ ft.)												
Basic Wind Speed, $V_s$ (mph)	Roof Angle (Degrees)	Load Case	ZONES*									
			Horizontal Pressure				Vertical Pressure				Overhang	
			A	B	C	D	E	F	G	H	$E_{OH}$	$G_{OH}$
100	4.76	A	15.90	-8.20	10.50	-4.90	-19.10	-10.80	-13.30	-8.40	-26.70	-20.90

\* Values Interpolated from Figure 28.5-1 ASCE 7 - 16



Project Number: <b>S220425-3</b>	Plan: <b>Eadie Remodel</b>	Sheet Number: <b>L1</b>
Engineer: <b>HK</b>	Specifics: <b>WIND FORCES</b>	Date: <b>3/6/2024</b>

IBC 2018 Section 1609 → ASCE 7-16 Section 28.5 - Simplified Procedure → Main Wind-Force Resisting System

HORIZONTAL LOADS (psf)				MIN. LOADS (psf)	
$p_s = \lambda * K_z t * P_s 30$				Per ASCE 7-16, 28.6.3	
End zone		Interior zone		Roof	Wall
A (Wall)	B (Roof)	C (Wall)	D (Roof)		
22.26	-11.48	14.70	-6.86	8.0	16.0

Full Impact at Basement? **NO** (No = 1/4 Impact)

ASD WIND FORCES: FRONT / BACK LOADING DIRECTION										
Location	Width (ft)	Height (ft)	Plane	End Zone		Interior zone		Force 0.6 ω*W (kips)	Min Force 0.6 ω*W (kips)	
				Length (ft)	Pressure (W) (psf)	Length (ft)	Pressure (W) (psf)			
<b>ROOF</b>	"Height" of Roof to Plate (see note)	54.0	4.00	(roof)	10.8	-11.48	43.2	-6.86	0.00	1.35
	Plate to Mid 2nd LVL	54.0	4.50	(wall)	10.8	22.26	43.2	14.70	3.07	3.03
							Σ =	3.07	4.38	
<b>2nd FLOOR</b>	Mid 2nd LVL to Floor	54.0	4.50	(wall)	10.8	22.26	43.2	14.70	3.07	3.03
	"Height" Low-Roof to Plate (see note)	0.0	0.00	(roof)	10.8	-11.48	-10.8	-6.86	0.00	0.00
	Floor to Mid 1st LVL	54.0	4.50	(wall)	10.8	22.26	43.2	14.70	3.07	3.03
							Σ =	6.15	6.07	
<b>1st FLOOR</b>	Mid 1st LVL to Floor	54.0	4.50	(wall)	10.8	22.26	43.2	14.70	3.07	3.03
	"Height" Low-Roof to Plate (see note)	0.0	0.00	(roof)	10.8	-11.48	-10.8	-6.86	0.00	0.00
	Floor to Mid Basement LVL	54.0	4.50	(wall)	10.8	22.26	43.2	14.70	3.07	3.03
							Σ =	1.54	1.52	
Total Wind Base Shear (kips)								10.75	11.96	

Full Impact at Basement? **YES** (No = 1/4 Impact)

ASD WIND FORCES: SIDE / SIDE LOADING DIRECTION										
Location	Width (ft)	Height (ft)	Plane	End Zone		Interior zone		Force 0.6 ω*W (kips)	Min Force 0.6 ω*W (kips)	
				Length (ft)	Pressure (W) (psf)	Length (ft)	Pressure (W) (psf)			
<b>ROOF</b>	"Height" of Roof to Plate (see note)	65.0	4.00	(roof)	10.8	-11.48	54.2	-6.86	0.00	1.62
	Plate to Mid 2nd LVL	65.0	4.50	(wall)	10.8	22.26	54.2	14.70	3.64	3.65
							Σ =	3.64	5.27	
<b>2nd FLOOR</b>	Mid 2nd LVL to Floor	65.0	4.50	(wall)	10.8	22.26	54.2	14.70	3.64	3.65
	"Height" Low-Roof to Plate (see note)	0.0	0.00	(roof)	10.8	-11.48	-10.8	-6.86	0.00	0.00
	Floor to Mid 1st LVL	65.0	4.50	(wall)	10.8	22.26	54.2	14.70	3.64	3.65
							Σ =	7.28	7.30	
<b>1st FLOOR</b>	Mid 1st LVL to Floor	65.0	4.50	(wall)	10.8	22.26	54.2	14.70	3.64	3.65
	"Height" Low-Roof to Plate (see note)	0.0	0.00	(roof)	10.8	-11.48	-10.8	-6.86	0.00	0.00
	Floor to Mid Basement LVL	65.0	4.50	(wall)	10.8	22.26	54.2	14.70	3.64	3.65
							Σ =	3.64	3.65	
Total Wind Base Shear (kips)								14.56	16.22	

Project Number: <b>S220425-3</b>	Plan Name: <b>Eadie Remodel</b>	Sheet Number: <b>L2</b>
Engineer: <b>HK</b>	Specifics: <b>SEISMIC WEIGHTS</b>	Date: <b>3/6/2024</b>

<b>Unit Weights (psf)</b>			<u>Seismic Weights include: (REF §12.7)</u>
Roof:	15	psf	25% of storage Live loads
Floor:	15	psf	Actual partition weight or 10 psf min if applicable
Exterior Wall:	12	psf	Operating weight of permanent equipment
Ext Wall w/Stone Veneer:	0	psf	20% of uniform design snow loads for areas where Pf > 30 psf
Interior Wall:	8	psf	

LEVEL	ITEM	AREA / LENGTH	HEIGHT (ft)	UNIT WEIGHT (psf)		Item Total Weight. (lbs)	Level Sub-Total (kips)	Average Pressure (psf)
<b>ROOF:</b>								
	Roof	1,860	1.02	15	=	28,387		
	Ext. Wall Below	240	4.50	12	=	12,960		
	Corridor Wall Below	150	4.50	8	=	5,400		
							<b>47</b>	<b>25</b>
<b>2nd FLOOR:</b>								
	Floor	1,780	1.00	15	=	26,700		
	Low Roof	400	1.02	15	=	6,105		
	Ext. Wall Above	240	4.50	12	=	12,960		
	Corridor Wall Above	150	4.50	8	=	5,400		
	Ext. Wall Below	256	4.50	12	=	13,824		
	Ext. Wall w/Stone Veneer Below	0	0.00	0	=	0		
	Corridor Wall Below	200	4.50	8	=	7,200		
							<b>72</b>	<b>33</b>
<b>1st FLOOR:</b>								
	Floor	1,670	1.00	15	=	25,050		
	Low Roof	0	1.02	15	=	0		
	Ext. Wall Above	256	4.50	12	=	13,824		
	Ext. Wall w/Stone Veneer Above	0	0.00	0	=	0		
	Corridor Wall Above	200	4.50	8	=	7,200		
	Ext. Wall Below	153	4.50	12	=	8,262		
	Ext. Wall w/Stone Veneer Below	0	0.00	0	=	0		
	Corridor Wall Below	115	4.50	8	=	4,140		
							<b>58</b>	<b>35</b>
<b>BASEMENT:</b>								
	Ext. Wall Above	153	4.50	12	=	8,262		
	Ext. Wall w/Stone Veneer Above	0	0.00	0	=	0		
	Corridor Wall Above	115	4.50	8	=	4,140		
							<b>12</b>	

**STRUCTURE WEIGHT FOR SEISMIC BASE SHEAR: 177 kips**

**TOTAL WEIGHT OF STRUCTURE: 190 kips**  
(Includes Basement Dead Load)

Project Number: <b>S220425-3</b>	Plan Name: <b>Eadie Remodel</b>	Sheet Number: <b>L3</b>
Engineer: <b>HK</b>	Specifics: <b>SEISMIC FORCES</b>	Date: <b>3/6/2024</b>

Equivelant Lateral Force Analysis per IBC 2018 1613.1 →ASCE 7-16 Table 12.6-1 →Sec 12.8

Data generated by: [Seismic Design Values for Buildings](#) "Java Ground Motion Parameter Calculation"

$S_1 = 0.5$  Maps  
 $S_{DS} = 0.96$  (ASCE 7 EQ 11.4.-3)  
 $S_{D1} = 0.60702$  (ASCE 7 EQ 11.4.-4)  
 Seismic Importance Factor = 1.00 (ASCE 7 Table 11.5-1)  
 Seismic Design Category = D (ASCE 7 Table 11.6-1 & 11.6.2)  
 Response Modification Factor, R = 6.5 (ASCE 7 Table 12.2-1)  
 Seismic Force-Resisting System Description = [A.13 - light framed walls](#)

Building Height,  $h_n = 31.0$  ft  
 Building Period Coefficient,  $C_T = 0.020$  (ASCE 7 Table 12.8.-2)  
 Approx. Fundamental Period,  $T_a = 0.263$  ( $C_T \cdot (h_n^{0.75})$ ) (ASCE 7 EQ 12.8.-7)  
 Approx. Fundamental Period,  $T_L = 6.0$  sec (ASCE 7 11.4.6)

**Seismic Response Coefficient**

$C_s = S_{DS}/(R/I)$   $C_s = 0.148$  (ASCE 7 EQ 12.8.-2)

**Seismic Response Coefficient, Maximum**

$C_{s,MAX} = S_{D1}/(T \cdot R/I)$   $C_{s,MAX} = 0.355$   $T \leq T_L$  (ASCE 7 EQ 12.8.-3)

$C_{s,MAX} = S_{D1} T_L/(T^2 \cdot R/I)$   $C_{s,MAX} = NA$   $T > T_L$  (ASCE 7 EQ 12.8.-4)

**Seismic Response Coefficient, Minimum**

$C_{s,MIN} = 0.01$   $C_{s,MIN} = 0.010$  (ASCE 7 EQ 12.8.-5)

$C_{s,MIN} = 0.5 S_1 / (R/I)$   $C_{s,MIN} = NA$  if  $S_1 > 0.6$  (ASCE 7 EQ 12.8.-6)

**$C_s = 0.148$**

Dead Load  $W = 177$  kips

$V = C_s W = 26.2$  kips (ASCE 7 EQ 12.8.-1)

$Q_E = V = 26.2$  kips (ASCE 7 EQ 12.4-3)

$\rho = 1.0$  (ASCE 7 12.3.4.2)

$E_H = \rho Q_E = 26.2$  kips (ASCE 7 EQ 12.4-3)

$Ev = .2 S_{DS} D = 0.19$  x D kips

Factor for Alternate Basic Load combinations - 2018 IBC

**$E_H/1.4 = 18.7$  kips** IBC 2018 1605.3.2

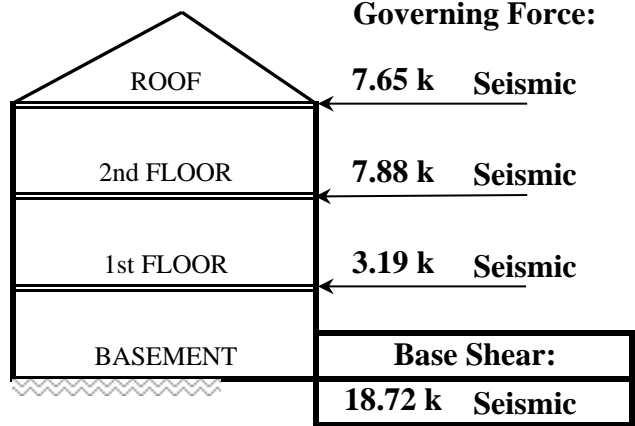
$k = 1$  (ASCE 7 12.8.3)

VERTICAL DISTRIBUTION (Per ASCE 7 - 12.8.3)								
Floor	Area (ft <sup>2</sup> )	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> <sup>k</sup> (k-ft)	Vert Dist Factor C <sub>v</sub>	Story Force F <sub>x</sub> (kips)	Factored Story Force (ASD) F <sub>x</sub> ρ/1.4 = E <sub>H</sub> /1.4 (kips)
Roof	1,860	9.00	27.00	47	1,262	0.41	10.7	7.7
2nd	1,780	9.00	18.00	72	1,299	0.42	11.0	7.9
1st	1,670	9.00	9.00	58	526	0.17	4.5	3.2
				Sum =	3,088	1.000	26.2	18.7

Project Number: <b>S220425-3</b>	Plan Name: <b>Eadie Remodel</b>	Sheet Number: <b>L4</b>
Engineer: <b>HK</b>	Specifics: <b>DESIGN LOADS</b>	Date: <b>3/6/2024</b>

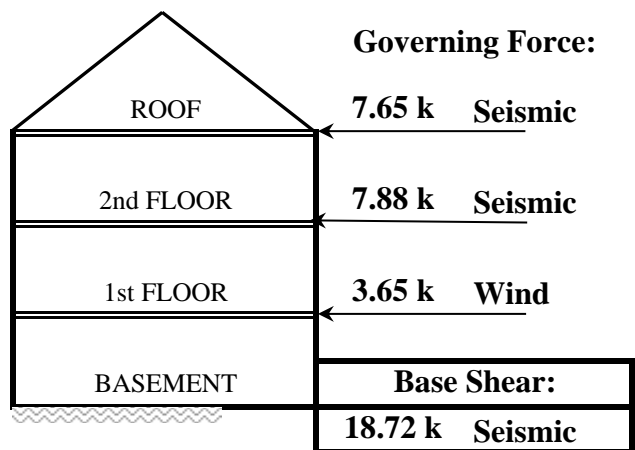
**FRONT / BACK DIRECTION**

Wind Force <i>0.6 ω * W<sub>F/B</sub> (kips)</i>		Seismic Force <i>E/1.4 (kips)</i>	
Per Level	Sum	Per Level	Sum
4.38		7.65	
	4.38	7.88	7.65
6.15		3.19	
	10.53		15.53
1.54			
	12.06		18.72



**SIDE / SIDE DIRECTION**

Wind Force <i>0.6 ω * W<sub>S</sub> (kips)</i>		Seismic Force <i>E/1.4 (kips)</i>	
Per Level	Sum	Per Level	Sum
5.27		7.65	
	5.27	7.88	7.65
7.30		3.19	
	12.57		15.53
3.65			
	16.22		18.72



Project Number: <b>S220425-3</b>	Plan Name: <b>Eadie Remodel</b>	Sheet Number: <b>L5</b>
Engineer: <b>HK</b>	Specifics: <b>Shear walls (front/back)</b>	Date: <b>3/6/2024</b>

**Notes:**

- \* All walls designed with Force-Transfer should meet a minimum height to width ratio of 2:1 at Pier (SDPWS 2018, Table 4.3.4)
- \* Maximum allowed height to width ratio 3.5:1 for walls w/o openings (increased shear design values per SDPWS 2018, Table 4.3.4)
- \* Shear panel height is height to underside of roof or floor framing.

**RED** = Update Formula as required - Important  
**BLUE** = Review and update as required - Typical Input

**2nd Story Walls (Front - Back Direction)**

Stud Species **HF**

Story shear(kips) = **7.65**  
 Story height (ft) = **9.00**  
 Shear Panel height (ft) = **9.00**  
**Total Diaphragm Area (sq ft) = 1860.00**

**100% story shear YES**

Governing Force (F/B Direction) = **Seismic**  
 Dead load factor (F/B Direction) = **0.90**  
 Shear panel capacity (Wind or Seismic) = **Seismic**

IBC 2018 Equation 16-22

load balance check = **all loads do not match story shear**



**2nd Story Walls (Front - Back Direction)**  
**Hold downs and window straps**

Story	Wall Mark	Wall L(ft)	Opening Width (ft)	Opening Height (ft)	Opening (max) to Edge (ft)	Plate to Opening (ft)	Effective Length (ft)	Trib. Area (sq ft)	Percent Sharing (%)	Effective Trib. Area	Story V(kips)	Sum V(kips)	Panel Shear (plf)	Height/Width Reduction (%) R = 2*L/H	Design Panel Shear (plf)	Wall Type	Roof DL Trib(ft)	Sum DL(klf)	Sum DL(klf)	OTM (k-ft)	RM (k-ft)	Resultant HD(kips)	HD TYPE	HD/Strap to DF or HF?	HD location Edge/Interior?	Resultant HD	Force at Window (Kips)	Window Strap
2	1.1	4.83					4.83	260.00	0.50	130.00	0.53	0.53	111	1.00	111	SW6	2.00	0.18	0.18	4.8	1.9	0.67	flr-flr	HF	Edge	MST37	0.00	No strap
2	1.2	4.83					4.83	260.00	0.50	130.00	0.53	0.53	111	1.00	111	SW6	2.00	0.18	0.18	4.8	1.9	0.67	flr-beam	HF	Edge	MSTC48B3	0.00	No strap
2	2.1	6.00					6.00	810.00	0.45	366.79	1.51	1.51	251	1.00	251	SW4	2.00	0.18	0.18	13.6	3.0	1.93	flr-beam	HF	Edge	MSTC48B3	0.00	No strap
2	2.2	7.25					7.25	810.00	0.55	443.21	1.82	1.82	251	1.00	251	SW4	2.00	0.18	0.18	16.4	4.3	1.79	flr-flr	HF	Edge	MST37	0.00	No strap
2	3.1	10.50					10.50	845.00	1.00	845.00	3.48	3.48	331	1.00	331	SW4	2.00	0.18	0.18	31.3	9.1	2.22	flr-flr	HF	Edge	MST37	0.00	No strap

S = 33.41

Total OSB wall length = 22.91 (feet)

S = 1915.00

7.88 **Warning-Wall H**

Total OSB Capacity (kips)

7.65

**1st Story Walls (Front - Back Direction)**

Shear panel capacity (Wind or Seismic) = **Seismic**

Story shear(kips) = **7.88**  
 Story height (ft) = **9.00**  
 Shear Panel height (ft) = **9.00**  
**Total Diaphragm Area (sq ft) = 1780.00**

Accumulated Shear = **15.53**  
 load balance check = **OK**

**1st Story Walls (Front - Back Direction)**  
**Hold downs and window straps**

Story	Wall Mark	Wall L(ft)	Opening Width (ft)	Opening Height (ft)	Opening (max) to Edge (ft)	Plate to Opening (ft)	Effective Length (ft)	Trib. Area (sq ft)	Percent Sharing (%)	Effective Trib. Width	Story V(kips)	Sum V(kips)	Panel Shear (plf)	Height/Width Reduction (%) R = 2*L/H	Design Panel Shear (plf)	Wall Type	Floor DL Trib(ft)	Story DL(klf)	Walls/DL Stacks?	Sum DL(klf)	OTM (k-ft)	RM (k-ft)	Resultant HD(kips)	HD TYPE	HD/Strap to DF or HF?	HD location Edge/Interior?	Resultant HD	Force at Window (Kips)	Window Strap
1	1.1	23.00					23.00	400.00	1.00	400.00	1.77	2.84	123	1.00	123	SW6	2.00	0.18	NO	0.18	25.6	43.6	-0.80	flr-conc	HF	Edge	No HD	0.00	No strap
1	2.1	10.00	3.00	3.50	3.00	1.50	7.00	780.00	0.28	218.40	0.97	1.90	271	1.00	271	SW4	6.00	0.24	NO	0.24	17.1	10.9	0.65	flr-beam	HF	Edge	HDU2	1.76	CS14
1	2.2	18.00					18.00	780.00	0.72	561.60	2.48	4.88	271	1.00	271	SW4	6.00	0.24	NO	0.24	44.0	35.4	0.49	flr-flr	HF	Edge	No HD	0.00	No strap
1	3.1	13.83					13.83	590.00	0.68	401.36	1.78	4.14	299	1.00	299	SW4	6.00	0.24	NO	0.24	37.3	20.9	1.23	flr-beam	HF	Edge	HDU2	0.00	No strap
1	3.2	10.50	4.00	3.67	2.50	1.50	6.50	590.00	0.32	188.64	0.83	1.95	299	1.00	299	SW4	6.00	0.24	NO	0.24	17.5	12.1	0.55	flr-conc	HF	Edge	HDU2	1.66	CS16

S = 75.33

Total OSB wall length = 68.33 (feet)

S = 1770.00

15.71 **OK**

Total OSB Capacity (kips)

7.88

**Basement Walls (Front - Back Direction)**

**Basement Walls (Front - Back Direction)**  
**Hold downs and window straps**

Story shear(kips) = **3.19**  
 Story height (ft) = **9.00**  
 Shear Panel height (ft) = **9.00**  
**Total Diaphragm Area (sq ft) = 1670.00**

Accumulated Shear = **18.72**  
 load balance check = **OK**  
**The rest of the story shear from above has been transferred into foundation**

Story	Wall Mark	Wall L(ft)	Opening Width (ft)	Opening Height (ft)	Opening (max) to Edge (ft)	Plate to Opening (ft)	Effective Length (ft)	Trib. Area (sq ft)	Percent Sharing (%)	Effective Trib. Width	Story V(kips)	Sum V(kips)	Panel Shear (plf)	Height/Width Reduction (%) R = 2*L/H	Design Panel Shear (plf)	Wall Type	Story DL(klf)	Sum DL(klf)	OTM (k-ft)	RM (k-ft)	Resultant HD(kips)	HD TYPE	HD location Edge/Interior?	Resultant HD	Force at Window (Kips)	Window Strap			
B	1.0	20.00					20.00	0.00	1.00	0.00	0.00	2.84	142	1.00	CONCRETE FOUNDATION											CONCRETE FOUNDATION			
B	2.0	20.00					20.00	440.00	1.00	440.00	0.84	7.62	381	1.00	CONCRETE FOUNDATION											CONCRETE FOUNDATION			
B	3.1	8.25					8.25	450.00	0.44	198.00	0.38	4.52	548	1.00	548	SW2	4.00	0.21	NO	0.21	40.7	6.5	4.41	flr-conc	HF	Edge	HDU8	0.00	No strap
B	3.2	10.50					10.50	450.00	0.56	252.00	0.48	2.43	231	1.00	CONCRETE FOUNDATION										CONCRETE FOUNDATION				
B	4.1	12.00	5.00	3.75	2.00	1.50	7.00	775.00	0.52	401.85	0.77	0.77	110	1.00	110	SW6	5.00	0.23	NO	0.23	6.9	14.8	-0.68	flr-conc	HF	Edge	No HD	0.49	CS16
B	4.2	12.50	6.00	6.00	2.00	1.25	6.50	775.00	0.48	373.15	0.71	0.71	110	1.00	110	SW6	5.00	0.23	NO	0.23	6.4	16.0	-0.80	flr-conc	HF	Edge	No HD	0.75	CS16

S = 83.25

S = 1665.00

3.18 **18.89 OK**

Project Number: <b>S220425-3</b>	Plan Name: <b>Eadie Remodel</b>	Sheet Number: <b>L6</b>
Engineer: <b>HK</b>	Specifics: <b>Shear walls (side/side)</b>	Date: <b>3/6/2024</b>

Notes:  
 \* All walls designed with Force-Transfer should meet a minimum height to width ratio of 2:1 at Pier (SDPWS 2018, Table 4.3.4)  
 \* Maximum allowed height to width ratio 3.5:1 for walls w/o openings (increased shear design values per SDPWS 2018, Table 4.3.4)  
 \* Shear panel height is height to underside of roof or floor framing.

**RED** = Update Formula as required - Important  
**BLUE** = Review and update as required - Typical Input

**2nd Story Walls (Side / Side Direction)**

Stud Species HF

Story shear(kips) = **7.65**  
 Story height (ft) = **9.00**  
 Shear Panel height (ft) = **9.00**  
 Total Diaphragm Area (sq ft) = **1860.00**

Governing Force (F/B Direction) = **Seismic**  
 Dead load factor (F/B Direction) = **0.90**  
 Shear panel capacity (Wind or Seismic) = **Seismic**

IBC 2018 Equation 16-22

load balance check = **Warning-Wall loads do not match story shear**

**100% story shear YES**

Story	Wall Mark	Wall L(ft)	Opening Width (ft)	Opening Height (ft)	Opening (max) to Edge (ft)	Plate to Opening (ft)	Effective Length (ft)	Trib. Area (sq ft)	Percent Sharing (%)	Effective Trib. Area	Story V(kips)	Sum V(kips)	Panel Shear (plf)	Height/Width Reduction (%) R = 2*L/H	Design Panel Shear (plf)	Wall Type	Wall Mark	Floor DL Trib(ft)	Story DL(klf)	Walls/DL Stacks?	Sum DL(klf)	OTM (k-ft)	RM (k-ft)	Resultant HD(kips)	HD TYPE	HD/Strap to DF or HF?	HD location Edge/Interior?	Resultant HD	Force at Window (Kips)	Window Strap
2	B1	7.83					7.83	360.00	1.00	360.00	1.48	1.48	189	1.00	189	SW6	B1	7.00	0.26	NO	0.26	13.3	7.1	0.85	flr-flr	HF	Edge	MST37	0.00	No strap
2	C1	23.75					23.75	460.00	1.00	460.00	1.89	1.89	80	1.00	80	SW6	C1	14.00	0.36	NO	0.36	17.0	92.1	-3.23	flr-beam	HF	Edge	No HD	0.00	No strap
2	D1	6.25					6.25	630.00	0.58	366.28	1.51	1.51	241	1.00	241	SW4	D1	2.00	0.18	NO	0.18	13.6	3.2	1.80	flr-beam	HF	Edge	MSTC48B3	0.00	No strap
2	D2	8.50	4.00	4.50	2.00	2.00	4.50	630.00	0.42	263.72	1.08	1.08	241	1.00	241	SW4	D2	2.00	0.18	NO	0.18	9.8	5.9	0.48	flr-flr	HF	Edge	No HD	1.02	CS16
2	E1	14.00	9.50	4.00	2.00	2.00	4.50	400.00	0.38	153.19	0.63	0.63	140	1.00	140	SW6	E1	8.00	0.27	NO	0.27	5.7	24.1	-1.36	flr-flr	HF	Edge	No HD	0.56	CS16
2	E2	7.25					7.25	400.00	0.62	246.81	1.02	1.02	140	1.00	140	SW6	E2	2.00	0.18	NO	0.18	9.1	4.3	0.71	flr-beam	HF	Edge	MSTC48B3	0.00	No strap
S =		67.58	Total OSB wall length = (feet)		42.33	S =		1850.00	5.96	5.96	Warning-Wall	Total OSB Capacity (kips)		7.65																

**2nd Story Walls (Side / Side Direction)**  
**Hold downs and window straps**

**1st Story Walls (Side / Side Direction)**

Shear panel capacity (Wind or Seismic) = **Seismic**

Story shear(kips) = **7.88**  
 Story height (ft) = **9.00**  
 Shear Panel height (ft) = **9.00**  
 Total Diaphragm Area (sq ft) = **1780.00**

Accumulated Shear = **15.53**

load balance check = **Warning-Wall loads do not match story shear**

**1st Story Walls (Side / Side Direction)**  
**Hold downs and window straps**

Story	Wall Mark	Wall L(ft)	Opening Width (ft)	Opening Height (ft)	Opening (max) to Edge (ft)	Plate to Opening (ft)	Effective Length (ft)	Trib. Area (sq ft)	Percent Sharing (%)	Effective Trib. Area	Story V(kips)	Sum V(kips)	Panel Shear (plf)	Height/Width Reduction (%) R = 2*L/H	Design Panel Shear (plf)	Wall Type	Wall Mark	Floor DL Trib(ft)	Story DL(klf)	Walls/DL Stacks?	Sum DL(klf)	OTM (k-ft)	RM (k-ft)	Resultant HD(kips)	HD TYPE	HD/Strap to DF or HF?	HD location Edge/Interior?	Resultant HD	Force at Window (Kips)	Window Strap
1	B1	3.25					3.25	215.00	0.45	96.38	0.43	1.09	335	0.72	464	SW2	B1	4.00	0.19	YES	0.45	9.8	2.1	2.79	flr-beam	HF	Edge	MSTC48B3	0.00	No strap
1	B2	4.00					4.00	215.00	0.55	118.62	0.52	1.34	335	0.89	377	SW3	B2	4.00	0.19	YES	0.56	12.1	4.0	2.30	flr-flr	HF	Edge	MST37	0.00	No strap
1	C1	5.67					5.67	320.00	1.00	320.00	1.42	3.31	583	1.00	583	SW2	C1	3.00	0.18	YES	0.36	29.8	5.2	4.75	flr-beam	HF	Edge	HU8	0.00	No strap
1	D1	4.00					4.00	485.00	1.00	485.00	2.15	3.44	860	0.89	968	2W2	D1	8.00	0.25	NO	0.25	31.0	1.8	8.33	flr-conc	DF-L	Edge	HD12	0.00	No strap
2	D.5	6.83					6.83	420.00	1.00	420.00	1.86	3.15	462	1.00	462	SW2	D.5	2.00	0.16	NO	0.16	28.4	3.4	3.94	flr-conc	HF	Edge	HU5	0.00	No strap
1	E1	18.50					18.50	320.00	0.64	204.14	0.90	1.53	83	1.00	83	SW6	E1	5.00	0.21	NO	0.21	13.8	32.2	-1.02	flr-beam	HF	Edge	No HD	0.00	No strap
1	E2	13.50	3.00	4.00	3.00	1.50	10.50	320.00	0.36	115.86	0.51	1.53	146	1.00	146	SW6	E2	5.00	0.21	NO	0.21	13.7	17.1	-0.26	flr-conc	HF	Edge	No HD	1.02	CS16
S =		55.75	Total OSB wall length = (feet)		12.92	S =		1760.00	2.37	15.40	Warning-Wall	Total OSB Capacity (kips)		7.88																

**Basement Walls (Side / Side Direction)**

Shear panel capacity (Wind or Seismic) = **Wind**

Story shear(kips) = **3.65**  
 Story height (ft) = **9.00**  
 Shear Panel height (ft) = **9.00**  
 Total Diaphragm Area (sq ft) = **1670.00**

Accumulated Shear = **19.18**

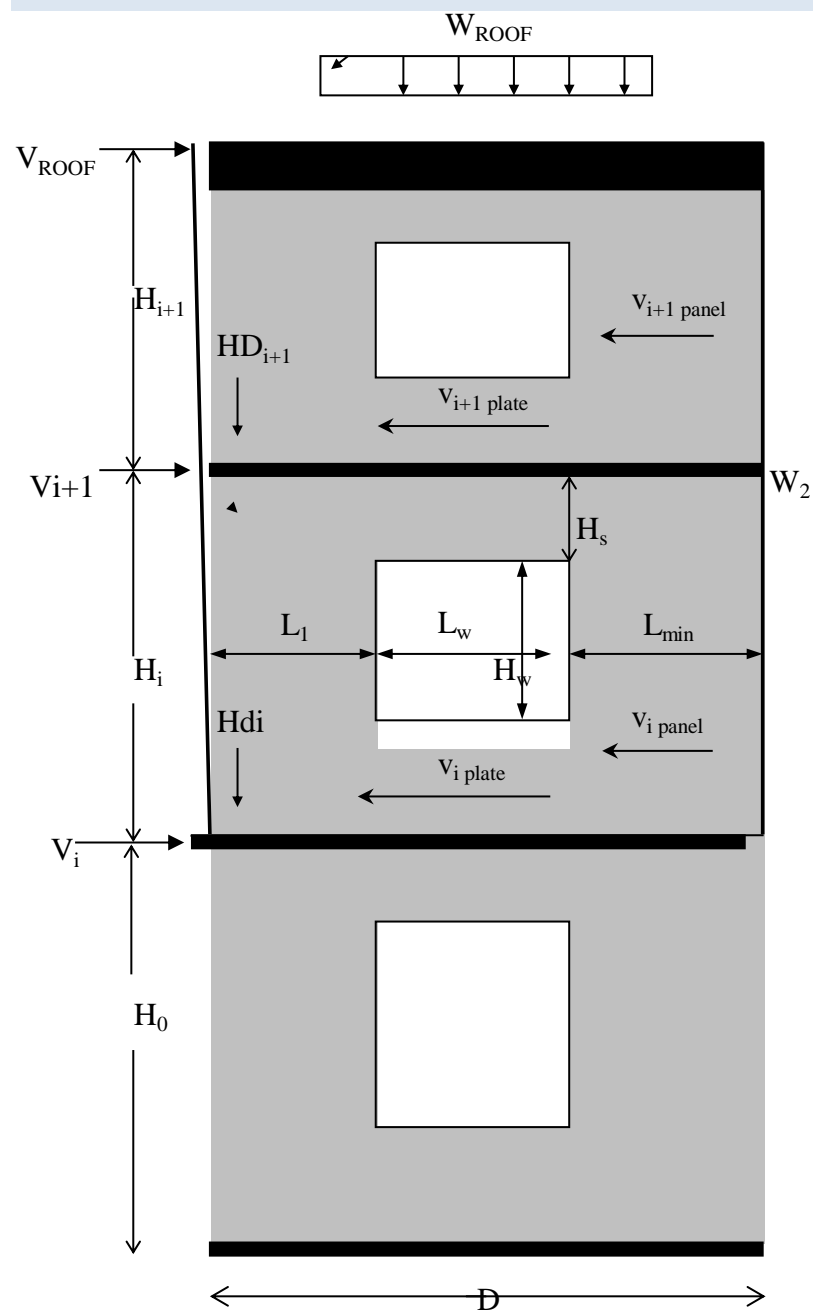
load balance check = **OK** **The rest of the story shear from above has been transferred into foundation**

**Basement Walls (Side / Side Direction)**  
**Hold downs and window straps**

Story	Wall Mark	Wall L(ft)	Opening Width (ft)	Opening Height (ft)	Opening (max) to Edge (ft)	Plate to Opening (ft)	Effective Length (ft)	Trib. Area (sq ft)	Percent Sharing (%)	Effective Trib. Width	Story V(kips)	Sum V(kips)	Panel Shear (plf)	Height/Width Reduction (%) R = 2*L/H	Design Panel Shear (plf)	Wall Type	Wall Mark	Floor DL Trib(ft)	Story DL(klf)	Walls/DL Stacks?	Sum DL(klf)	OTM (k-ft)	RM (k-ft)	Resultant HD(kips)	HD TYPE	HD/Strap to DF or HF?	HD location Edge/Interior?	Resultant HD	Force at Window (Kips)	Window Strap	
B	A1	12.00					12.00	270.00	1.00	270.00	0.59	0.59	49	1.00	49	SW6	A1	2.00	0.16	NO	0.16	5.3	10.6	-0.46	flr-conc	HF	Edge	No HD	0.00	No strap	
B	B1	6.50					6.50	500.00	0.43	216.67	0.47	1.53	235	1.00	235	SW6	B1	2.00	0.16	NO	0.16	13.7	3.1	1.77	flr-conc	HF	Edge	STHD14	0.00	No strap	
B	B2	8.50					8.50	500.00	0.57	283.33	0.62	2.00	235	1.00	235	SW6	B2	2.00	0.16	NO	0.16	18.0	5.3	1.58	flr-conc	HF	Edge	STHD14	0.00	No strap	
B	C	7.10					7.10	275.00	1.00	275.00	0.60	3.91	551	1.00	551	SW2	C	10.00	0.28	NO	0.28	35.2	6.4	4.35	flr-conc	HF	Edge	HU8	0.00	No strap	
B	D	20.00					20.00	400.00	1.00	400.00	0.87	4.32	216	1.00	216	SW6	D	11.00	0.30	NO	0.30	38.8	53.8	-0.77	flr-conc	HF	Edge	No HD	0.00	No strap	
B	D.5	7.00					7.00	210.00	1.00	210.00	0.46	3.61	516	1.00	516	SW2	D.5	12.00	0.31	NO	0.31	32.5	6.9	3.94	flr-conc	HF	Edge	HU5	0.00	No strap	
B	E	20.00					20.00	20.00	1.00	20.00	0.04	3.10	155	1.00	155	<b>CONCRETE FOUNDATION</b>										<b>CONCRETE FOUNDATION</b>					
S =		81.10	Total OSB wall length = (feet)		18.50	S =		1675.00	3.66	19.06	OK	Total OSB Capacity (kips)		3.65																	

Project	<b>Eadie Remodel</b>	Sheet number:	<b>L7</b>
Subject	<b>SHEAR WALL EQUATION DIAGRAM</b>	Date	<b>3/6/2024</b>

### SHEAR WALL WITH WINDOW BASED ON SHEAR TRANSFER:



Where:

- $V_i$  = Story Shear
- $W_i$  = Story Dead Load
- $HD_i$  = Story Holddown
- $M_{OTi}$  = Story Over Turning Moment
- $M_{Ri}$  = Story Resisting Moment

$$M_{OT\ ROOF} = V_{ROOF} \times H_{i+1}$$

$$M_{R\ ROOF} = 0.6 \times W_{ROOF} \times D^2/2$$

$$HD_{i+1} = (M_{OT\ ROOF} - M_{R\ ROOF}) / (D - 6")$$

$$V_{i+1\ panel} = V_{ROOF} / (L_1 + L_{max})$$

$$V_{i+1\ plate} = V_{ROOF} / D$$

$$M_{OTi} = [(V_{i+1} + V_{ROOF}) \times H_i] + M_{OT\ ROOF}$$

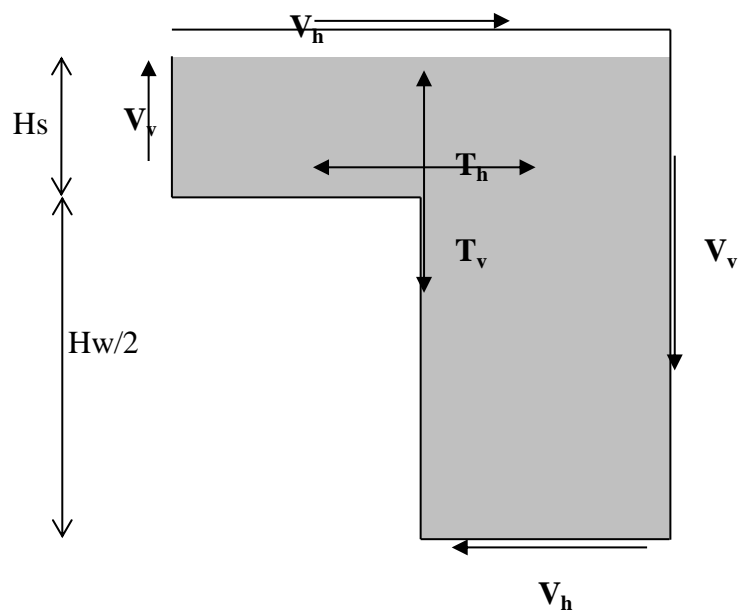
$$M_{Ri} = 0.6 \times (W_{i+1} + W_{ROOF}) \times D^2/2$$

$$HD_i = (M_{OTi} - M_{Ri}) / (D - 6")$$

$$V_{i\ panel} = (V_{ROOF} + V_{i+1}) / (L_1 + L_{max})$$

$$V_{i\ plate} = (V_{ROOF} + V_{i+1}) / D$$

### FORCE TRANSFER AROUND WINDOW CALCULATION (CANTILEVER PIER METHOD)



$$V_h = v_{i\ panel} \times L_{max}$$

$$V_v = HD_i$$

$$T_h = V_h (H_w / 2 + H_s) / H_s$$

$T_v$  = Is resisted by the continuous stud adjacent to the window.



**LONGITUDE**  
**ONE TWENTY°**  
ENGINEERING & DESIGN

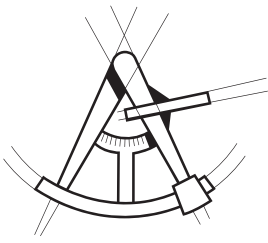
# *FOUNDATION CALCULATIONS*

*FOOTING REFERENCE PER PLAN*



**LONGITUDE**  
**ONE TWENTY°**  
ENGINEERING & DESIGN

# Foundation Stabilization & Pile Design



**LONGITUDE**  
**ONE TWENTY°**  
 ENGINEERING & DESIGN

PROJECT NO.	SHEET NO.
S240119-2	

PROJECT 4511 96th Ave SE, Mercer Island, WA  
 SUBJECT Foundation Stabilization/Jacking  
 BY CMH DATE 6/13/24

**Structural Summary:**

- The foundation of the residence consists of an existing continuous cast-in-place concrete stem wall and concrete strip footings, isolated concrete pad footings, and newly proposed concrete stem wall and concrete strip footings. Additional loading to the existing conditions based on the remodel scope of work and new framing above. Below the footings, piles are to be spaced at a distance no larger than the minimum required spacing as noted on the plans.
- End piles are to be placed as close to corners as possible and shall not exceed a max corner offset distance of 3'-0".
- A maximum allowable loading of 2,250 plf was utilized in this analysis. This was determined through inspection of building geometry and conservative span/tributary loading assumptions based on standard construction practices
- The following load values represent the maximum expected pile loads for the indicated spacing. Third party pile installers/contractors shall provide pile and equipment assemblies with capacities equal to or greater than the indicated load values.

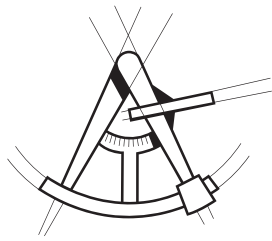
**PILE SPACING & LOAD REQUIREMENTS TABLE**

PILE #	PILE TYPE	MAX O.C. SPACING, ft		MIN VERTICAL CAPACITY, kips	PROOF TESTING LOAD, kips	LOCATION
		BTWN PILES	END OFFSET			
1-7	HELICAL	6'-0"	PER PLAN	14.0 k/PILE	28.0 k/PILE	EXTERIOR
8	HELICAL	N/A	N/A	17.0 k/PILE	34.0 k/PILE	HDU
9	HELICAL	N/A	N/A	20.0 k/PILE	40.0 k/PILE	HDU
10	HELICAL	N/A	N/A	15.0 k/PILE	30.0 k/PILE	HDU
11-14	HELICAL	6'-0"	PER PLAN	11.0 k/PILE	22.0 k/PILE	EXTERIOR
15	HELICAL	PER PLAN	N/A	24.0 k/PILE	48.0 k/PILE	INTERIOR
16	HELICAL	PER PLAN	N/A	13.0 k/PILE	26.0 k/PILE	EXTERIOR
17-18	HELICAL	N/A	N/A	17.0 k/PILE	34.0 k/PILE	HDU
19-22	HELICAL	6'-0"	PER PLAN	11.0 k/PILE	22.0 k/PILE	EXTERIOR
23-37	HELICAL	4'-0"	PER PLAN	6.0 k/PILE	12.0 k/PILE	INTERIOR
38	HELICAL	N/A	N/A	10.0 k/PILE	20.0 k/PILE	HDU
39-40	HELICAL	N/A	N/A	12.0 k/PILE	24.0 k/PILE	HDU
41-46	HELICAL	PER PLAN	PER PLAN	6.0 k/PILE	12.0 k/PILE	EXTERIOR
47-58	HELICAL	PER PLAN	N/A	4.0 k/PILE	8.0 k/PILE	EXTERIOR
1-3	HELICAL W/ CAP	PER PLAN	N/A	18.0 k/PILE	36.0 k/PILE	EXTERIOR
1-9	PIN	5'-0"	PER PLAN	10.0 k/PILE	20.0 k/PILE	EXT/INT
10-13	PIN	7'-0"	PER PLAN	10.0 k/PILE	20.0 k/PILE	EXTERIOR

Structural recommendations contained in this package are based on the geotechnical report, dated February 13, 2024 by Geotech Consultants Inc. Attached are the recommended allowable capacities for the 3 and 4 in pin piles. As noted in report, Helical Piles may vary in allowable loading based on helix diam. and shall be determined per client/manuf. all loading has been specified on plan.

INSIDE PILE DIAMETER	FINAL DRIVING RATE (850-pound hammer)	FINAL DRIVING RATE (1,100-pound hammer)	FINAL DRIVING RATE (2,000-pound hammer)	ALLOWABLE COMPRESSIVE CAPACITY
3 inches	10 sec/inch	6 sec/inch	2 sec/inch	6 tons
4 inches	16 sec/inch	10 sec/inch	4 sec/inch	10 tons

Please inform L120 of site-specific conditions that were unconsidered by, may conflict with, or otherwise compromise the recommendations contained within this package, including, but not limited to, water drainage, slope stability, existing structural damage, or existing subsurface obstructions. In this instance, the structural assumptions, recommendations, and scope for this project will need to be revisited to consider and address the new findings



**LONGITUDE**  
**ONE TWENTY**<sup>°</sup>  
 ENGINEERING & DESIGN

PROJECT NO.	SHEET NO.

PROJECT \_\_\_\_\_

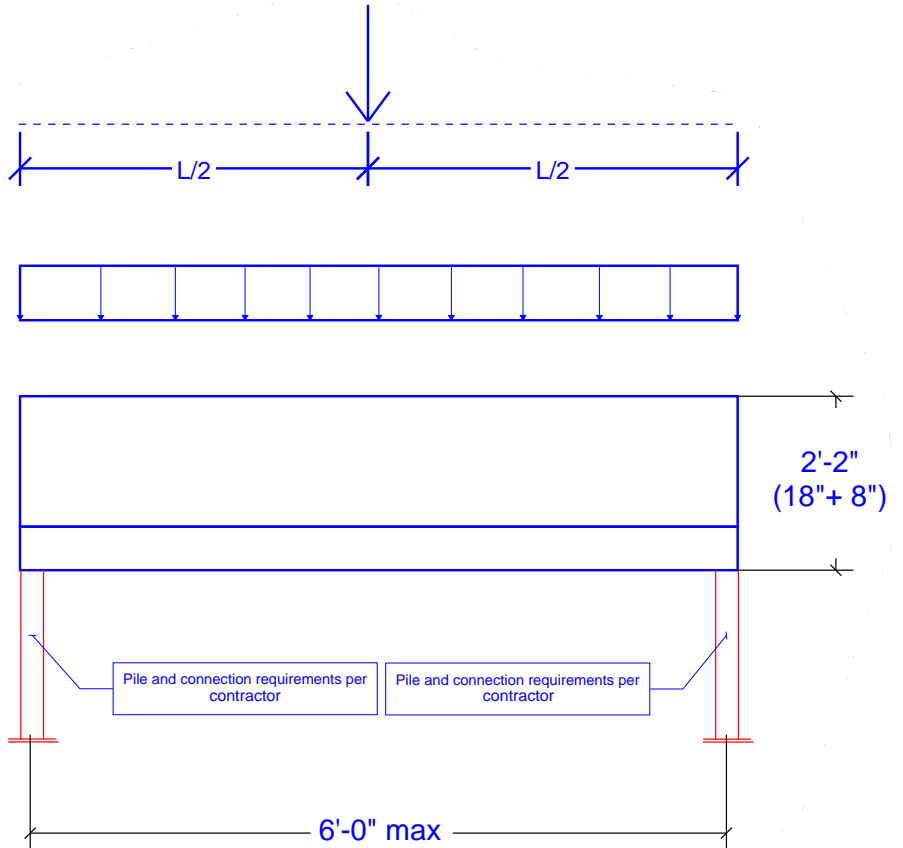
SUBJECT \_\_\_\_\_

BY \_\_\_\_\_ DATE \_\_\_\_\_

**LOAD ANALYSIS: IBC 2021**

Roof LL (snow ground): 25 psf  
 Floor LL: 40psf  
 Floor/Roof DL: 15psf  
 Wall DL: 10psf  
 Footing + Stem DL = 550 plf (8" thick stem + ftg)

Reference the attached KEY PLAN with loading requirements determined by framing above.



	DL	LL	SL	TW	W <sub>u</sub>
Roof	15	0	25	10	150 (D) + 250(L)
Floor	15	40	0	10	150 (D) + 400(L)

	DL	LL	SL	TW	W <sub>u</sub>
Roof	15	0	25	10	150 (D) + 250(S)
2nd Floor	15	40	0	2	30 (D) + 80(L)
1st Floor	15	40	0	10	150 (D) + 400(L)
Deck	12	60	25	5	60 (D) + 300(L) + 125(S)

**Loading Legend:**

Applied vertical loading onto stem wall:

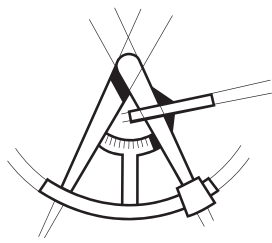
- DL = 250 PLF LL = 400 PLF SL = 75 PLF
- DL = 450 PLF LL = 400 PLF SL = 250 PLF
- DL = 500 PLF LL = 780 PLF SL = 375 PLF

**Applied governing point loads:**

- Pu = 4 kips
- DL = 6.52k, LL = 6.77k, SL = 3.63k
- DL = 4.1k, LL = 6.3k, SL = 2.5k

**NOTES:**

- Both uniform and point loads analyzed in the following calculations. Uniform loads are assumed to be standard due to load distribution from bearing walls, however, the additional point load is conservatively considered here for any major beam supports from above.
- Maximum loading on the grade beam was determined by inspection of the building geometry and through conservative assumptions regarding span lengths and support wall/foundation. All concrete walls assumed full tributary span of floor and roof members.



**LONGITUDE**  
**ONE TWENTY**<sup>°</sup>  
 ENGINEERING & DESIGN

PROJECT NO.	SHEET NO.

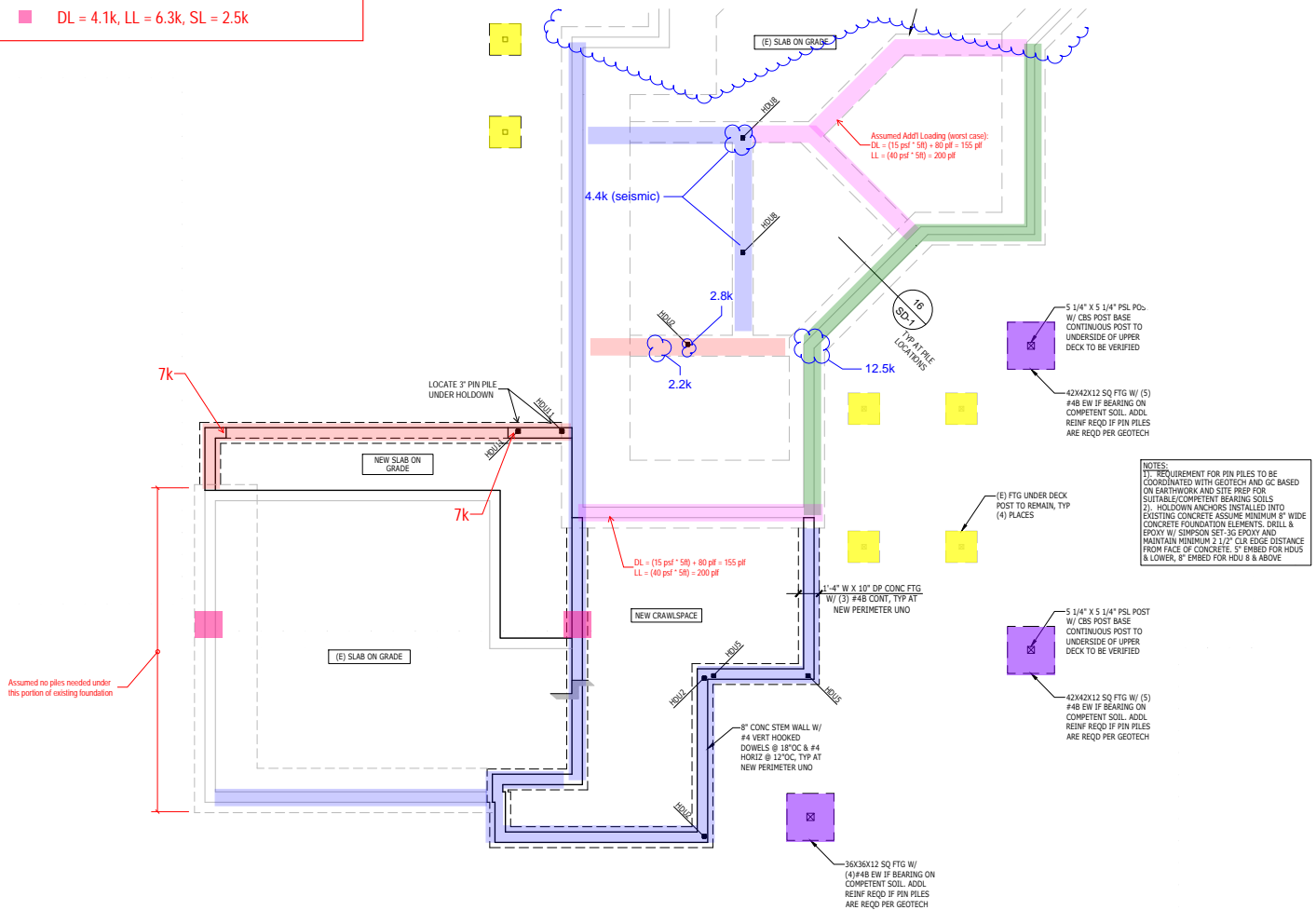
PROJECT \_\_\_\_\_  
 SUBJECT \_\_\_\_\_  
 BY \_\_\_\_\_ DATE \_\_\_\_\_

**Loading Legend:**  
 Applied vertical loading onto stem wall:

- DL = 250 PLF LL = 400 PLF SL = 75 PLF
- DL = 450 PLF LL = 400 PLF SL = 250 PLF
- DL = 500 PLF LL = 780 PLF SL = 375 PLF

**Applied governing point loads:**

- Pu = 4 kips
- DL = 6.52k, LL = 6.77k, SL = 3.63k
- DL = 4.1k, LL = 6.3k, SL = 2.5k



Project Number:	Plan Name: <b>Eadie Residence</b>	Sheet Number:
Engineer: <b>KJ</b>	Subject: <b>26" Unreinforced Conc Beam</b>	Date: <b>2/20/2023</b>

### DEMAND CALCULATION

number of stories	#	2 stories	
span	L	5.5 ft	[max on-center pile spacing]
concrete area	A	216 in <sup>2</sup>	*see attached
concrete self weight	SW	225 plf	[Includes total height w/o ACI14 §14.5.1.7 redux]
w DL	DL	1050 plf	[2-story loading]
w LL	LL	780 plf	[2-story loading]
w LLr	LLr	375 plf	[2-story loading]

\*\*Assuming a single span between 2 piles - in reality continuous spans between piles will have reduced moments\*\*

moment from DL	M <sub>DL</sub>	4,821 lb-ft	57.9 k-in	
moment from LL	M <sub>LL</sub>	2,949 lb-ft	35.4 k-in	$M_{max} = \frac{1}{8}wL^2$
moment from SL	M <sub>LLr</sub>	1,418 lb-ft	17.0 k-in	
shear from DL	V <sub>DL</sub>	3,506 lb	3.51 k	
shear from LL	V <sub>LL</sub>	2,145 lb	2.15 k	$V_{max} = \frac{1}{2}wL$
shear from SL	V <sub>LLr</sub>	1,031 lb	1.03 k	
factored moment	M <sub>LRFD</sub>	81.0 k-in	1.4DL	
	M <sub>LRFD</sub>	134.6 k-in	1.2DL + 1.6LL + 0.5SL	
	M <sub>LRFD</sub>	132.0 k-in	1.2DL + 1.6SL + LL	
controlling factored moment	<b>M<sub>u</sub></b>	<b>134.6 k-in</b>		
factored shear	V <sub>LRFD</sub>	4.9 k	1.4DL	
	V <sub>LRFD</sub>	8.2 k	1.2DL + 1.6LL + 0.5SL	
	V <sub>LRFD</sub>	8.0 k	1.2DL + 1.6SL + LL	
controlling factored shear	<b>V<sub>u</sub></b>	<b>8.2 k</b>		
controlling factored bearing	<b>B<sub>u</sub></b>	<b>8.2 k</b>	$B_{max} = V_{max}$	

### STRENGTH CALCULATION

concrete strength	f <sub>c</sub>	2.5 ksi	assumed	
light wt concrete mod. factor	λ	1	normal weight concrete	
flexure strength red. factor	φ <sub>flex</sub>	0.6		ACI 318-14 [Table 21.2.1]
shear strength red. factor	φ <sub>shear</sub>	0.6		ACI 318-14 [Table 21.2.1]
bearing strength red. factor	φ <sub>bearing</sub>	0.6		ACI 318-14 [Table 21.2.1]
*Note that per ACI 318-14 Ch. 27.3.2 a phi factor of 0.8 can be used if dimensions and material properties are confirmed.				
moment of inertia	I <sub>xx</sub>	11,016 in <sup>4</sup>		*see attached
elastic section modulus	S <sub>m</sub>	1,001 in <sup>3</sup>		*see attached
tens fiber to NA	c	13.0 in		*see attached
nom flexure strength (T controls)	M <sub>n</sub>	250.3 k-in	$M_n = 5λ\sqrt{f'_c}S_m$	CONTROLS ACI 318-14 [Eq. 14.5.2.1a]
nom flexure strength (C controls)	M <sub>n</sub>	2,127.1 k-in	$M_n = 0.85f'_cS_m$	ACI 318-14 [Eq. 14.5.2.1b]
RESIDENTIAL CONCRETE	M <sub>n</sub>	375.4 k-in	$M_n = 7.55λ\sqrt{f'_c}S_m$	X ACI 332-14 [Eq. 8.2.1.1] - not utilized
flexure strength	<b>φM<sub>n</sub></b>	<b>150.2 k-in</b>	<b>&gt; Mu OK</b>	D/C= 89.62%
nom shear strength	V <sub>n</sub>	14.4 k	$V_n = \frac{4}{3}λ\sqrt{f'_c} * A$	ACI14 [Table 14.5.5.1 (a)]
shear strength	<b>φV<sub>n</sub></b>	<b>8.6 k</b>	<b>&gt; Vu OK</b>	D/C= 94.39%
loaded bearing area	A <sub>1</sub>	74 in <sup>2</sup>		[IDEAL 2-7/8" Tru-Force Underpinning Bracket]
supporting surface bearing area	A <sub>2</sub>	74 in <sup>2</sup>		[If the supporting surface is > than loaded area]
nom bearing strength	B <sub>n</sub>	156.6 k	$0.85f'_cA_1$	ACI14 [Table 14.5.6.1 (c)]
bearing strength	<b>φB<sub>n</sub></b>	<b>94.0 k</b>	<b>&gt; Bu OK</b>	D/C= 8.68%

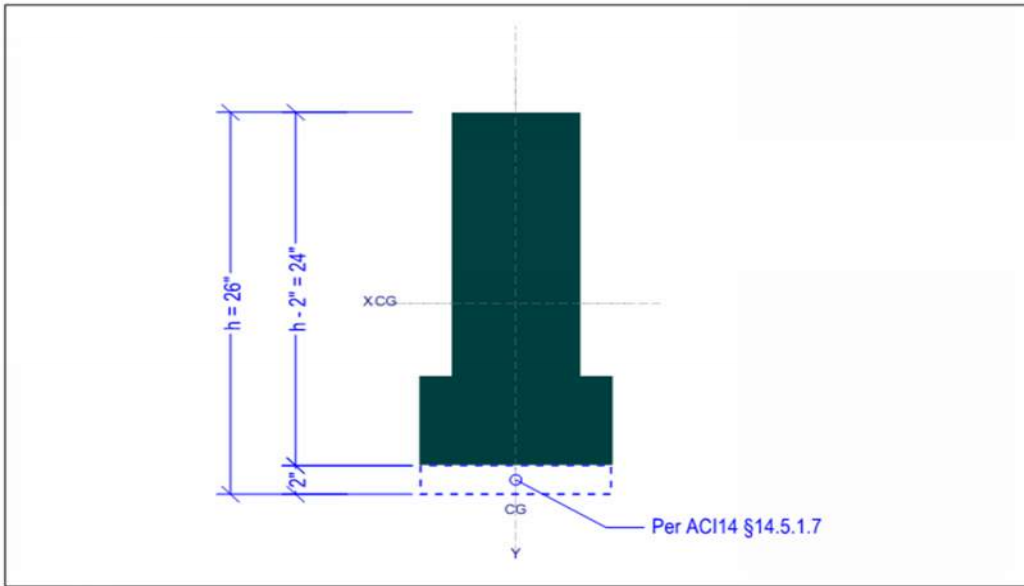
### Additional Verification Calc:

max concrete tensile strength	f <sub>r</sub>	375 psi	$f_r = 7.5λ\sqrt{f'_c}$	ACI 318-14 [Eq. 19.2.3.1]
max beam tensile stress	F <sub>t</sub>	159 psi	$F_t = \frac{(M * c)}{I_{xx}}$	
	<b>f<sub>r</sub></b>	<b>&gt; Ft OK</b>		

Project Number: <b>0</b>	Plan Name: <b>Eadie Residence</b>	Sheet Number:
Engineer: <b>KJ</b>	Subject: <b>26" Unreinforced Conc Beam</b>	Date: <b>2/20/2023</b>

**Final Section Properties**

Total Area :	216.0 in <sup>2</sup>	Ixx :	11,016.0 in <sup>4</sup>	Sxx : - Y :	1,001.45 in <sup>3</sup>
Calculated final C.G. distance from Datum :		Iyy :	1,631.93 in <sup>4</sup>	Sxx : + Y :	847.38 in <sup>3</sup>
X cg Dist. :	0.0 in	Zxx :	1,349.99 in <sup>3</sup>	Syy : - X :	271.988 in <sup>3</sup>
Y cg Dist. :	0.0 in	Zyy :	504.0 in <sup>3</sup>	Syy : + X :	271.988 in <sup>3</sup>
Edge Distances from CG. :				r xx :	7.141 in
+X :	6.0 in	+Y :	13.0 in	r yy :	2.749 in
-X :	-6.0 in	-Y :	in		
Rotation of All Components @ : 0.00 deg CCW					



**General Shapes**

I : #1	Xcg = 0.000 in	Ycg = 0.000 in	Rotation = 0 deg CCW
Top Flange Width = 8.000in	Top Flange Thick = 8.000in	Web Thickness = 8.000in	
Bottom Flange Wid = 12.000in	Bottom Flange Thi = 6.000in	Top Height = 24.000in	

Project Number: <b>S200402-3</b>	Plan Name: <b>Eadie Residence</b>	Sheet Number:
Engineer:	Subject: <b>16" Unreinforced Conc Beam</b>	Date: <b>2/20/2023</b>

### DEMAND CALCULATION

number of stories	#	2 stories	
span	L	4.0 ft	[max on-center pile spacing]
concrete area	A	136 in <sup>2</sup>	*see attached
concrete self weight	SW	142 plf	[Includes total height w/o ACI14 §14.5.1.7 redux]
w DL	DL	750 plf	[2-story loading]
w LL	LL	400 plf	[2-story loading]
w LLr	LLr	75 plf	[2-story loading]

\*\*Assuming a single span between 2 piles - in reality continuous spans between piles will have reduced moments\*\*

moment from DL	M <sub>DL</sub>	1,783 lb-ft	21.4 k-in	
moment from LL	M <sub>LL</sub>	800 lb-ft	9.6 k-in	$M_{max} = \frac{1}{8}wL^2$
moment from SL	M <sub>LLr</sub>	150 lb-ft	1.8 k-in	
shear from DL	V <sub>DL</sub>	1,783 lb	1.78 k	
shear from LL	V <sub>LL</sub>	800 lb	0.80 k	$V_{max} = \frac{1}{2}wL$
shear from SL	V <sub>LLr</sub>	150 lb	0.15 k	
factored moment	M <sub>LRFD</sub>	30.0 k-in	1.4DL	
	M <sub>LRFD</sub>	41.9 k-in	1.2DL + 1.6LL + 0.5SL	
	M <sub>LRFD</sub>	38.2 k-in	1.2DL + 1.6SL + LL	
controlling factored moment	<b>M<sub>u</sub></b>	<b>41.9 k-in</b>		
factored shear	V <sub>LRFD</sub>	2.5 k	1.4DL	
	V <sub>LRFD</sub>	3.5 k	1.2DL + 1.6LL + 0.5SL	
	V <sub>LRFD</sub>	3.2 k	1.2DL + 1.6SL + LL	
controlling factored shear	<b>V<sub>u</sub></b>	<b>3.5 k</b>		
controlling factored bearing	<b>B<sub>u</sub></b>	<b>3.5 k</b>	$B_{max} = V_{max}$	

### STRENGTH CALCULATION

concrete strength	f <sub>c</sub>	2.5 ksi	assumed	
light wt concrete mod. factor	λ	1	normal weight concrete	
flexure strength red. factor	φ <sub>flex</sub>	0.6		ACI 318-14 [Table 21.2.1]
shear strength red. factor	φ <sub>shear</sub>	0.6		ACI 318-14 [Table 21.2.1]
bearing strength red. factor	φ <sub>bearing</sub>	0.6		ACI 318-14 [Table 21.2.1]
*Note that per ACI 318-14 Ch. 27.3.2 a phi factor of 0.8 can be used if dimensions and material properties are confirmed.				
moment of inertia	I <sub>xx</sub>	2,217 in <sup>4</sup>		*see attached
elastic section modulus	S <sub>m</sub>	353 in <sup>3</sup>		*see attached
tens fiber to NA	c	7.7 in		*see attached
nom flexure strength (T controls)	M <sub>n</sub>	88.3 k-in	$M_n = 5λ\sqrt{f'_c}S_m$	CONTROLS ACI 318-14 [Eq. 14.5.2.1a]
nom flexure strength (C controls)	M <sub>n</sub>	750.1 k-in	$M_n = 0.85f'_cS_m$	ACI 318-14 [Eq. 14.5.2.1b]
RESIDENTIAL CONCRETE	M <sub>n</sub>	132.4 k-in	$M_n = 7.55λ\sqrt{f'_c}S_m$	X ACI 332-14 [Eq. 8.2.1.1] - not utilized
flexure strength	<b>φM<sub>n</sub></b>	<b>53.0 k-in</b>	<b>&gt; Mu OK</b>	D/C= 79.21%
nom shear strength	V <sub>n</sub>	9.1 k	$V_n = \frac{4}{3}λ\sqrt{f'_c} * A$	ACI14 [Table 14.5.5.1 (a)]
shear strength	<b>φV<sub>n</sub></b>	<b>5.4 k</b>	<b>&gt; Vu OK</b>	D/C= 64.25%
loaded bearing area	A <sub>1</sub>	74 in <sup>2</sup>		[IDEAL 2-7/8" Tru-Force Underpinning Bracket]
supporting surface bearing area	A <sub>2</sub>	74 in <sup>2</sup>		[If the supporting surface is > than loaded area]
nom bearing strength	B <sub>n</sub>	156.6 k	$0.85f'_cA_1$	ACI14 [Table 14.5.6.1 (c)]
bearing strength	<b>φB<sub>n</sub></b>	<b>94.0 k</b>	<b>&gt; Bu OK</b>	D/C= 3.72%

### Additional Verification Calc:

max concrete tensile strength	f <sub>r</sub>	375 psi	$f_r = 7.5λ\sqrt{f'_c}$	ACI 318-14 [Eq. 19.2.3.1]
max beam tensile stress	F <sub>t</sub>	146 psi	$F_t = \frac{(M * c)}{I_{xx}}$	
	<b>f<sub>r</sub></b>	<b>&gt; Ft OK</b>		

Project Number: <b>S200402-3</b>	Plan Name: <b>Eadie Residence</b>	Sheet Number:
Engineer: <b>0</b>	Subject: <b>16" Unreinforced Conc Beam</b>	Date: <b>2/20/2023</b>

**General Section Property Calculator**

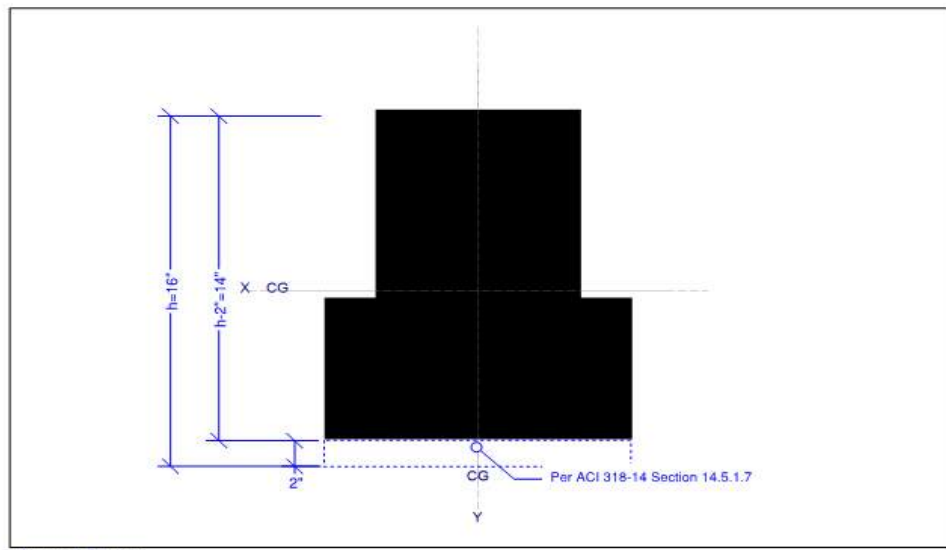
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.5.15  
L120 Engineering and Design

DESCRIPTION 16 inch Tall Concrete Stem Wall

**Final Section Properties**

Total Area :	136.0 in^2	Ixx :	2,217.52 in^4	Sxx : - Y :	352.316 in^3
Calculated final C.G. distance from Datum :		Iyy :	1,205.28 in^4	Sxx : +Y :	287.770 in^3
X cg Dist. :	0.0 in	Zxx :	470.660 in^3	Syy : - X :	200.880 in^3
Y cg Dist. :	0.0 in	Zyy :	344.0 in^3	Syy : +X :	200.880 in^3
Edge Distances from CG.:				r xx :	4.038 in
+X :	6.0 in	+Y :	7.706 in	r yy :	2.977 in
-X :	-6.0 in	-Y :	in		

Rotation of All Components @ 0.00 deg CCW



**General Shapes**

I : #1	Xcg = 0.000 in	Ycg = 0.000 in	Rotation = 0 deg CCW
Top Flange Width = 8.000in	Top Flange Thick = 12.000in	Web Thickness = 8.000in	
Bottom Flange Wid = 12.000in	Bottom Flange Thi = 6.000in	Top Height = 14.000in	



**LONGITUDE**  
**ONE TWENTY°**  
ENGINEERING & DESIGN

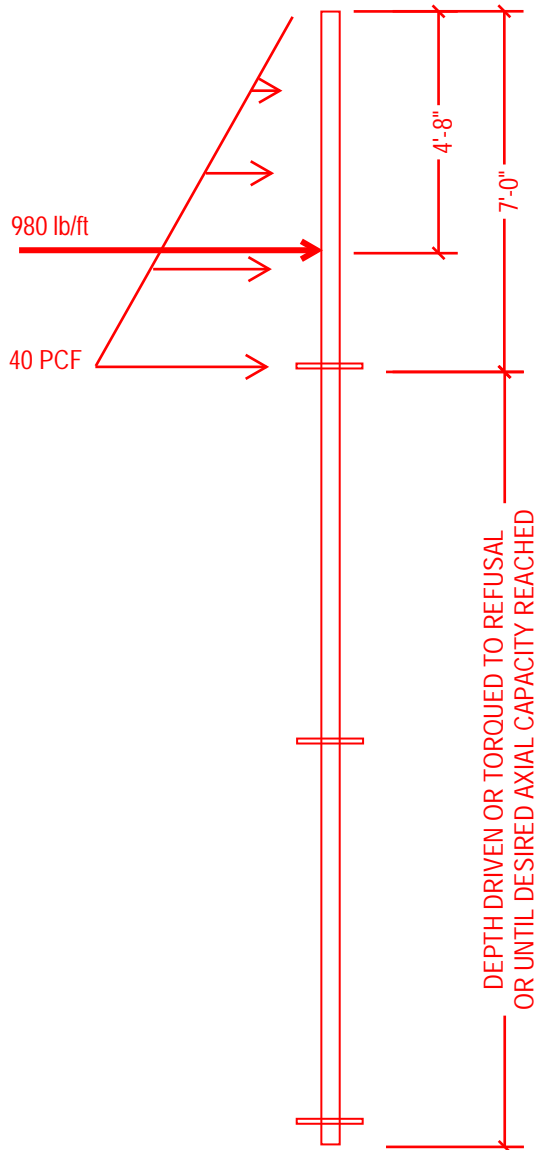
# Lateral Design

## HELICAL ANCHORS



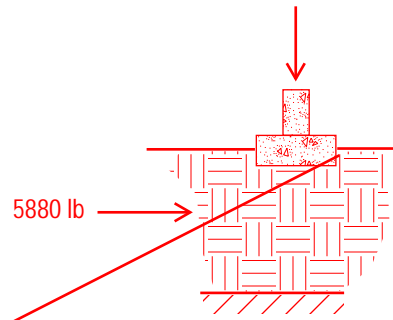
Helical anchors consist of single or multiple helixes that are rotated into the ground on the end of round or square metal shafts. The minimum diameter of a single helix anchor is 8 inches. The ultimate capacity of the anchor in tension or compression can be estimated roughly by multiplying the installation torque by 10. We recommend that the uppermost helix be installed at least 5 feet behind the grade beam and into the very dense soils that comprise the core of the site. A typical anchor capacity for a single 8- to 10-inch helix is 10 to 15 kips, but multiple options for the number of helixes and capacity are available. The anchors should be installed by a specialty contractor familiar with the design and installation of helical anchor systems. The anchor contractor can assist with refining the anchor design and details and estimating capacities for different soil and anchor conditions. All anchors should be installed to a torque rate that is estimated to be at least 200 percent of the estimated design capacity. We also recommend that at least one of the anchors be load tested to 200 percent of its design capacity.

The anchors need to restrain lateral pressures of the potential movement of the looser upper soils. The lateral pressure can be calculated by applying an active earth pressure of 40 pounds per cubic foot (pcf) over a depth of 7 feet measured from the existing grade. A safety factor of 1.5 should be applied in determining the necessary capacity of the anchors needed to mitigate the forces of this potential movement.



ASSUME WORST CASE PILE SPACING = 6 ft

LATERAL LOADING ONTO PILE = 980 lb \* 6 ft = 5880 lb



RESULTANT AXIAL/TENSION LOAD INTO PILE =  
 $\text{COS}(30)^{-1}(5880 \text{ lb}) = 6789 \text{ lb}$   
 $\text{COS}(45)^{-1}(5880 \text{ lb}) = 8315 \text{ lb}$

Project: Foundation calculations - 1500 psf

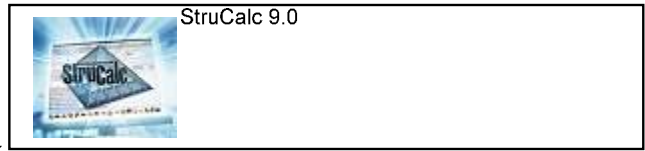
Location: 16" continuous footing (max loading) - bearing  
Footing

Footing Size: 16.0 IN Wide x 8.0 IN Deep Continuous Footing With 8.0 IN Thick x 18.0 IN Tall Stemwall

Longitudinal Reinforcement: (2) Continuous #4 Bars

Transverse Reinforcement: #4 Bars @ 12.00 IN. O.C. (unnecessary)

Section Footing Design Adequate



FOOTING PROPERTIES	
Allowable Soil Bearing Pressure:	Qs = 1500 psf
Concrete Compressive Strength:	F'c = 2500 psi
Reinforcing Steel Yield Strength:	Fy = 40000 psi
Concrete Reinforcement Cover:	c = 3 in

FOOTING SIZE	
Width:	W = 16 in
Depth:	Depth = 8 in
Effective Depth to Top Layer of Steel:	d = 4.25 in

STEMWALL SIZE	
Stemwall Width:	8 in
Stemwall Height:	18 in
Stemwall Weight:	150 pcf

**FOOTING CALCULATIONS**

**Bearing Calculations:**

Ultimate Bearing Pressure:	Qu = 1388 psf
Effective Allowable Soil Bearing Pressure:	Qe = 1400 psf
Width Required:	Wreq = 1.32 ft

**Beam Shear Calculations (One Way Shear):**

Beam Shear:	Vu1 = 0 lb
Allowable Beam Shear:	Vc1 = 3825 lb

Transverse Direction:

**Bending Calculations:**

Factored Moment:	Mu = 1310 in-lb
Nominal Moment Strength:	Mn = 0 in-lb

**Reinforcement Calculations:**

Concrete Compressive Block Depth:	a = 0.30 in
Steel Required Based on Moment:	As(1) = 0.01 in <sup>2</sup>
Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4):	As(2) = 0.19 in <sup>2</sup>
Controlling Reinforcing Steel:	As-reqd = 0.19 in <sup>2</sup>
Selected Reinforcement:	Trans: #4's @ 12.0 in. o.c.
Reinforcement Area Provided:	As = 0.19 in <sup>2</sup>

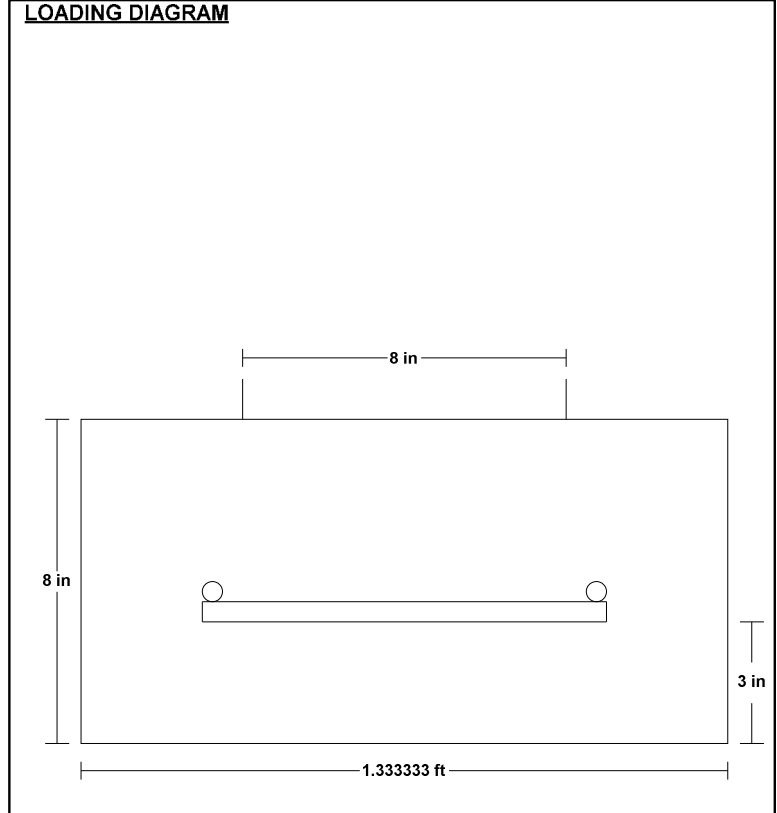
**Development Length Calculations:**

Development Length Required:	Ld = 15 in
Development Length Supplied:	Ld-sup = 1 in

Longitudinal Direction:

**Reinforcement Calculations:**

Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4):	As(2) = 0.26 in <sup>2</sup>
Controlling Reinforcing Steel:	As-reqd = 0.26 in <sup>2</sup>
Selected Reinforcement:	Longitudinal: (2) Cont. #4 Bars
Reinforcement Area Provided:	As = 0.39 in <sup>2</sup>



**FOOTING LOADING**

Live Load:	PL = 1000 plf
Dead Load:	PD = 700 plf
Total Load:	PT = 1850 plf
Ultimate Factored Load:	Pu = 2620 plf

**Loading Demand on Existing Footing:**

Roof = (15 psf \* 12ft)D + (25 psf \* 12 ft)S

Wall Load = 100 plf D

$W_{TOT (ASD)} = (280 PLF)D + (300 PLF)S$

$W_{TOT (LRF)} = 1.2(280) + 1.6(300)S = 816 PLF < 2620 PLF$

DCR = 0.31, THEREFORE EXISTING FOOTING DESIGN OK ASSUMING 16"W X 8" DP

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

## General Footing

LIC# : KW-06011993, Build:20.22.1.5

L120 Engineering and Design

(c) ENERCALC INC 1983-2021

**DESCRIPTION:** 16" (non retaining) stemwall footing - max point load (1500psf)

### Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16  
 Load Combinations Used : IBC 2018

### General Information

#### Material Properties

$f_c$ : Concrete 28 day strength	=	2.5 ksi
$f_y$ : Rebar Yield	=	60.0 ksi
$E_c$ : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
$\phi$ Values Flexure	=	0.90
Shear	=	0.750

#### Soil Design Values

Allowable Soil Bearing	=	1.50 ksf
Soil Density	=	110.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

#### Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

#### Increases based on footing Depth

Footing base depth below soil surface	=	1.0 ft
Allow press. increase per foot of depth when footing base is below	=	ksf ft

#### Increases based on footing plan dimension

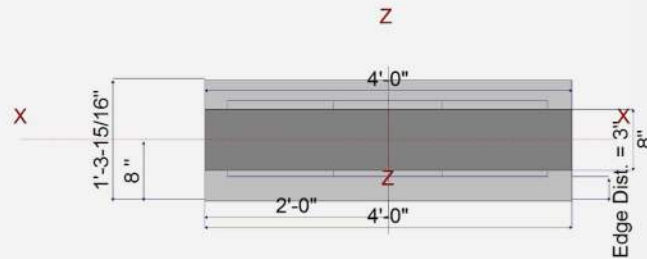
Allowable pressure increase per foot of depth when max. length or width is greater than	=	ksf ft
---	---	-----------

### Dimensions

Width parallel to X-X Axis	=	4.0 ft
Length parallel to Z-Z Axis	=	1.330 ft
Footing Thickness	=	8.0 in

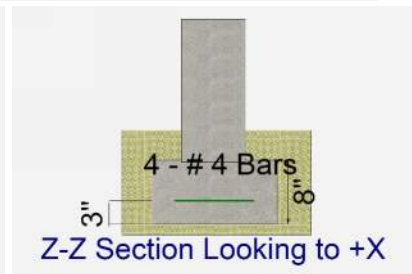
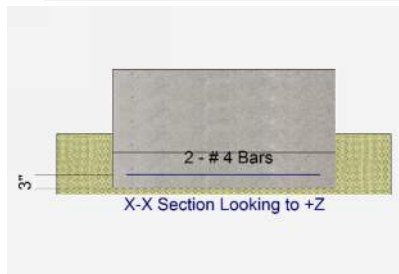
#### Pedestal dimensions...

px : parallel to X-X Axis	=	48.0 in
pz : parallel to Z-Z Axis	=	8.0 in
Height	=	18.0 in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



### Reinforcing

Bars parallel to X-X Axis	=	2.0
Number of Bars	=	# 4
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis	=	4.0
Number of Bars	=	# 4
Reinforcing Bar Size	=	# 4
<b>Bandwidth Distribution Check (ACI 15.4.4.2)</b>		
Direction Requiring Closer Separation		
Bars along Z-Z Axis		
# Bars required within zone	=	49.9 %
# Bars required on each side of zone	=	50.1 %



### Applied Loads

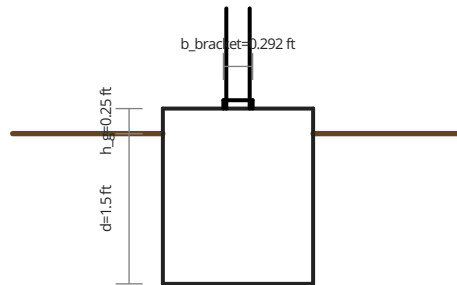
	D	Lr	L	S	W	E	H
P : Column Load	=	3.0	4.30				k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k



& O L H Q W	' D W H Jun 3, 2022
\$ X W K R U Harrison Kliegl	- R E
3 U R M H F W Footing Checks	6 X E M H F W S V I 6 R Q R W X E H <span style="border: 1px solid green; border-radius: 50%; padding: 2px;">3 \$ 6 \$</span>
5 H I H U H Q F H V	IBC 2021, ACI 318-19

Summary

Lateral Soil Stress at 1/3 of Embedment Depth	$S'_1 = 0$ psf	IBC 2021, CI 1807.3.2.1
<input type="checkbox"/> Allowable Lateral Soil Stress	$S_a = 50$ psf	
Gross Vertical Bearing Pressure	$q_s = 1500$ psf	
<input type="checkbox"/> Allowable Vertical Bearing Pressure	$q_a = 1500$ psf	
<input type="checkbox"/> Pier Compression and Bending Capacity	$Int = 0.0135$	ACI 318-19, CI 14.5.4.1
Shear Demand	$V_u = 0$ lb	
<input type="checkbox"/> Pier Shear Strength	$\phi V_n = 11\,500$ lb	ACI 318-19, CI 14.5.5
Ultimate Bearing Load	$P_u = 3090$ lb	
<input type="checkbox"/> Pier Bearing Capacity	$\phi B_n = 31\,200$ lb	



Pier Properties

Pier Diameter	$b = 18$ in	
Embedment Depth	$d = 1.5$ ft	
Height of Pier Above Ground	$h_g = 0.25$ ft	
Total Pier Length	$L_{pier} = 1$ ft, 9 in	
Lateral Constraint at Ground Surface	Nonconstrained	IBC 2021, CI 1807.3.2

Concrete Properties

Concrete Strength	$f'_c = 2500$ psi	ACI 318-19 Table 19.2.1.1
Concrete Weight Classification	Normalweight	ACI 318-19, CI 19.2.4.2 and CI 19.2.4.3

Post Properties

Post and Connection Type	Post + Bracket / Bearing Plate
--------------------------	--------------------------------

Bracket Bearing Width  $b_{\text{bracket}} = 3.5$  in  
 Bracket Bearing Length  $\ell_{\text{bracket}} = 3.5$  in  
 Bearing Area Diagonal Length  $\ell_{\text{diag}} = 4.95$  in

Soil Properties

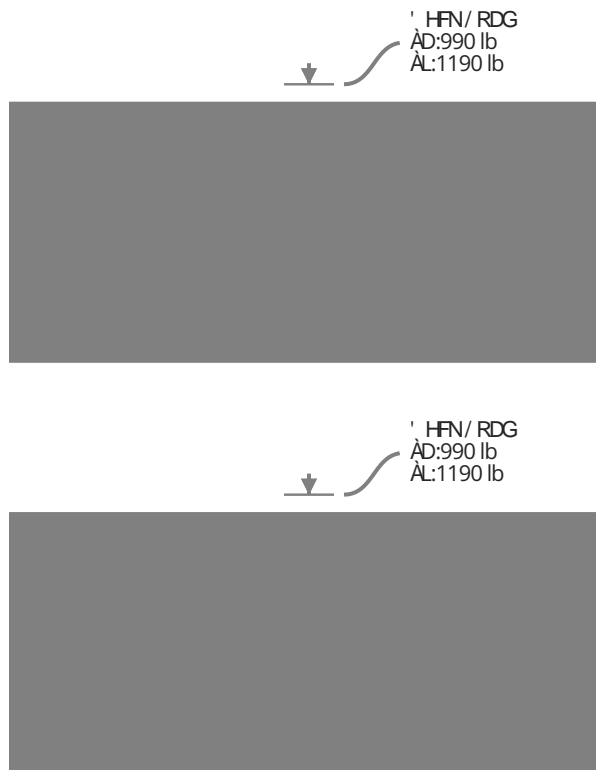
Allowable Soil Gross Bearing Capacity  $q_a = 1500$  psf IBC 2021, CI 1806.2  
 Allowable Lateral Pressure per Unit Depth  $S = 100$  psf/ft IBC 2021, CI 1806.1 and 1806.2

Applied Loads

Height Above Ground of Lateral Load Application  $h = 0.25$  ft

Axial, Shear, & Moment Loads about X-axis  $V, P, M =$

Label	Location $z$ (ft)	Axial Eccentricity $y$ (ft)	Load Magnitudes $V, P, M$
Deck Load	0	0	D: 0 lb, 990 lb, 0 lb ft, L: 0 lb, 1190 lb, 0 lb ft



Use Reduced Companion Live Load? No ASCE 7-16 2.3.1.1  
 Consider Self Weight? Yes

Design Criteria

Design Code for Load Combinations International Building Code (IBC) 2018  
 Design Standard Edition Note Note that this calculation is using a newer edition of the concrete design standard (ACI 318-19, while the code only requires an older edition)

Total Unfactored Loads

Unfactored Loads

$Loads =$

Load Type	Axial Load $P$ (lb)	Lateral Load $V$ (lb)	Moment Load $M$ (lb · ft)
D	990	0	0
L	1190	0	0

ASD Load Combinations (ASCE 7-16, Ch. 2)

Service (ASD) Load Combinations

$$LC_{ASD} =$$

IBC 2021, CI 1605.2

Load Combination	Axial Load $P$ (lb)	Lateral Load $V$ (lb)	Pure Moment Load $M$ (lb · ft)
D+F	1450	0	0
D+H+F + L	2640	0	0
D+H+F + L <sub>r</sub>	1450	0	0
D+H+F + S	1450	0	0
D+H+F + R	1450	0	0
D+H+F + 0.75L + 0.75 L <sub>r</sub>	2350	0	0
D+H+F + 0.75L + 0.75 S	2350	0	0
D+H+F + 0.75L + 0.75 R	2350	0	0
D+H+F + 0.6W <sub>dn</sub>	1450	0	0
D+H+F + 0.7E	1450	0	0
D+H+F + 0.45W <sub>dn</sub> + 0.75L + 0.75L <sub>r</sub>	2350	0	0
D+H+F + 0.45W <sub>dn</sub> + 0.75L + 0.75S	2350	0	0
D+H+F + 0.45W <sub>dn</sub> + 0.75L + 0.75R	2350	0	0
D+H+F + 0.525E + 0.75L + 0.75S	2350	0	0
0.6D + 0.6W <sub>up</sub> + H	872	0	0
0.6(D+F) - 0.7E <sub>v</sub> + 0.7E <sub>h</sub> + H	872	0	0

Governing ASD Axial Load

$$P_s = 2640 \text{ lb}$$

LRFD Load Combinations (ASCE 7-16, Ch. 2 and ACI 318-19, Ch. 13)

Strength Load Combinations

$$LC_{str} =$$

Load Combination	Factored Axial Load $P_u$ (lb)	Ultimate Shear $V_u$ (lb)	Ultimate Moment $M_u$ (lb · ft)
1.4(D+F)	1390	0	0
1.2(D+F) + 1.6(L+H) + 0.5L <sub>r</sub>	3090	0	0
1.2(D+F) + 1.6(L+H) + 0.5S	3090	0	0
1.2(D+F) + 1.6(L+H) + 0.5R	3090	0	0
1.2(D+F) + 1.6L <sub>r</sub> + 1.6H + f <sub>1L</sub>	2380	0	0
1.2(D+F) + 1.6L <sub>r</sub> + 1.6H + 0.5W <sub>dn</sub>	1190	0	0
1.2(D+F) + 1.6S + 1.6H + f <sub>1L</sub>	2380	0	0
1.2(D+F) + 1.6S + 1.6H + 0.5W <sub>dn</sub>	1190	0	0
1.2(D+F) + 1.6R + 1.6H + f <sub>1L</sub>	2380	0	0
1.2(D+F) + 1.6R + 1.6H + 0.5W <sub>dn</sub>	1190	0	0
1.2(D+F) + 1.0W <sub>dn</sub> + f <sub>1L</sub> + 0.5L <sub>r</sub>	2380	0	0
1.2(D+F) + 1.0W <sub>dn</sub> + f <sub>1L</sub> + 0.5S	2380	0	0
1.2(D+F) + 1.0W <sub>dn</sub> + f <sub>1L</sub> + 0.5R	2380	0	0
1.2(D+F) + 1.0E <sub>v</sub> + 1.0E <sub>h</sub> + f <sub>1L</sub> + 1.6H + f <sub>2S</sub>	2380	0	0
0.9D + 1.0W <sub>up</sub> + 1.6H	891	0	0
0.9(D+F) - 1.0E <sub>v</sub> + 1.0E <sub>h</sub> + 1.6H	891	0	0

Maximum Ultimate Axial Load

$$P_{umax} = 3090 \text{ lb}$$

Maximum Ultimate Shear Load

$$V_{umax} = 0 \text{ lb}$$

Maximum Ultimate Moment Load

$$M_{umax} = 0 \text{ lb · ft}$$

Pier Capacity (ACI 318-19, Ch. 21)



Pier Moment Capacity (Tension Face)

$$\phi M_{n,t} = 7160 \text{ lb · ft}$$

ACI 318-19, CI 14.5.2.1



Pier Moment Capacity (Compression Face)

$$\phi M_{n,c} = 60\,800 \text{ lb · ft}$$

ACI 318-19, CI 14.5.2.1



Pier Compression Capacity

$$\phi P_n = 229\,000 \text{ lb}$$

ACI 318-19, CI 14.5.3.1

---

Pier Embedment (IBC 2021, Ch. 18)

Solved Minimum Embedment Depth

$$d_{\text{min,solved}} = 1 \text{ ft, } 6 \text{ in}$$

IBC 2021, Eq. 18-1 and 18-2

Lateral Soil Stress at Designated Depth

$$S' = 0 \text{ psf}$$

IBC 2021, Eq. 18-1 and 18-2

---

Comments

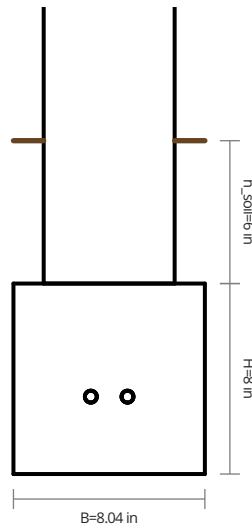
---



& O L H Q W	' D W H Jun 3, 2022
\$ X W K R U Harrison Kliegl	- R E
3 U R M H F W Footing Checks	6 X E M H F W (G J H & K H F N) 7 K L F N H Q H G 6 3 \$ 6 \$
5 H I H U H Q F H V	ACI 318-19

Summary

Service Soil Bearing Stress	$q_s = 981$ psf	
<input type="checkbox"/> Allowable Gross Soil Bearing Stress	$q_a = 1500$ psf	ACI318-19, CI 13.3.1.1
Moment Demand	$M_u = 6.82$ lb · ft/ft	ACI 318-19, CI 13.2.7.1
<input type="checkbox"/> Factored Moment Capacity	$\phi M_n = 900$ lb · ft/ft	ACI 318-19, 8.5.1.1a
Shear Demand	$V_u = 0$ plf	ACI 318-19, CI 7.4.3.2
<input type="checkbox"/> Factored One-Way Shear Capacity	$\phi V_n = 2880$ plf	ACI 318-19, CI 7.5.1.1
Stability	Status = Footing in Total Compression	



Footing Properties

Footing Width	$B = 0.67$ ft	
Footing Thickness	$H = 8$ in	ACI 318-19, CI 14.3.2.1 IBC 2021, CI 1809.8 IRC 2021, CI R403.1.1
Wall Type	Concrete	
Wall Width	$b = 5.5$ in	
Concrete Strength	$f'_c = 2500$ psi	ACI 318-19, Table 19.2.1.1
Concrete Weight Classification	Normalweight	ACI 318-19, CI 19.2.4.2

Soil Properties

Allowable Soil Gross Bearing Capacity	$q_a = 1500$ psf	IBC 2021, CI 1806.2
Depth of Soil Over Footing	$h_{soil} = 0.5$ ft	IBC 2021, CI 1809.5
Unit Weight of Soil	$\gamma_s = 100$ pcf	
Lateral Sliding Coefficient of Friction	$\mu = 0.3$	

Bottom Reinforcement

Include Transverse Reinforcement?	No
-----------------------------------	----

Concrete Cover

cover = 3 in

ACI 318-19, Table 20.5.1.3.1

Reinforcement Yield Strength

$f_y = 60\,000$  psi

ACI 318-19, Table 20.2.2.4a

Longitudinal Reinforcement

Include Longitudinal Reinforcement?

Yes

ACI 318-19, CI 14.1.4

Shrinkage/Temperature Reinforcement Size

#4

Number of Shrinkage/Temperature Bars

$n_\ell = 2$

ACI 318-19, CI 7.7.2.3

Required Number of Shrinkage/Temperature Bars

$n_{\ell, reqd} = 2$

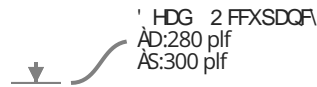
ACI 318-19, CI 7.7.2.3

Applied Loads

Axial, Shear, & Moment Loads about X-axis

$V, P, M =$

Label	Location $z$ (ft)	Axial Eccentricity $y$ (ft)	Load Magnitudes $V, P, M$
Dead + Occupancy	0	0	D: 0 plf, 280 plf, 0 (lb ft) / ft, S: 0 plf, 300 plf, 0 (lb ft) / ft



Use Reduced Companion Live Load?

No

ASCE 7-16 2.3.1.1

Self Weight of Concrete Footing

$SW = 67$  plf

Weight of Soil above Footing

$W_{soil} = 10.6$  plf

Design Criteria

Design Code for Load Combinations

International Building Code (IBC) 2018

Design Standard Edition Note

Note that this calculation is using a newer edition of the concrete design standard (ACI 318-19, while the code only requires an older edition)

Sliding and Overturning Minimum Factor of Safety

$FS_{min} = 1.5$

Total Loads

Unfactored Loads

Loads =

Load Type	Vertical Load $P$ (plf)	Lateral Shear $V_x$ (plf)	Moment $M_x$ (lb · ft/ft)
D	280	0	0
S	300	0	0

ASD Load Combinations

$$LC_{str,ASD} =$$

Load Combination	Axial Load $P$ (plf)	Lateral Load $V$ (plf)	Moment Load $M$ (lb · ft/ft)	Foundation Weight $W_f$ (plf)	Eccentricity $e$ (ft)
D+F	280	0	0	77.6	0
D+H+F + L	280	0	0	77.6	0
D+H+F + L <sub>r</sub>	280	0	0	77.6	0
D+H+F + S	580	0	0	77.6	0
D+H+F + R	280	0	0	77.6	0
D+H+F + 0.75L + 0.75 L <sub>r</sub>	280	0	0	77.6	0
D+H+F + 0.75L + 0.75 S	505	0	0	77.6	0
D+H+F + 0.75L + 0.75 R	280	0	0	77.6	0
D+H+F + 0.6W, dn	280	0	0	77.6	0
D+H+F + 0.7E	280	0	0	77.6	0
D+H+F + 0.45W <sub>dn</sub> + 0.75L + 0.75L <sub>r</sub>	280	0	0	77.6	0
D+H+F + 0.45W <sub>dn</sub> + 0.75L + 0.75S	505	0	0	77.6	0
D+H+F + 0.45W <sub>dn</sub> + 0.75L + 0.75R	280	0	0	77.6	0
D+H+F + 0.525E + 0.75L + 0.75S	505	0	0	77.6	0
0.6D + 0.6W, up + H	168	0	0	46.6	0
0.6(D+F) - 0.7Ev + 0.7Eh + H	168	0	0	46.6	0

Bearing Pressure

$$\% 3=$$

Combination	Eccentricity $e$ (ft)	Maximum Bearing Pressure $q_{max}$ (psf)	Sliding Factor of Safety $F S_s$	Overturning Factor of Safety $F S_o$
D+F	0	534	99	▲
D+H+F + L	0	534	99	▲
D+H+F + L <sub>r</sub>	0	534	99	▲
D+H+F + S	0	981	99	▲
D+H+F + R	0	534	99	▲
D+H+F + 0.75L + 0.75 L <sub>r</sub>	0	534	99	▲
D+H+F + 0.75L + 0.75 S	0	870	99	▲
D+H+F + 0.75L + 0.75 R	0	534	99	▲
D+H+F + 0.6W, dn	0	534	99	▲
D+H+F + 0.7E	0	534	99	▲
D+H+F + 0.45W <sub>dn</sub> + 0.75L + 0.75L <sub>r</sub>	0	534	99	▲
D+H+F + 0.45W <sub>dn</sub> + 0.75L + 0.75S	0	870	99	▲
D+H+F + 0.45W <sub>dn</sub> + 0.75L + 0.75R	0	534	99	▲
D+H+F + 0.525E + 0.75L + 0.75S	0	870	99	▲
0.6D + 0.6W, up + H	0	320	99	▲
0.6(D+F) - 0.7Ev + 0.7Eh + H	0	320	99	▲

Governing ASD Axial Load

$$P_s = 658 \text{ plf}$$

LRFD Strength Load Combinations

$$LC_{str,LRFD} =$$

Load Combination	Factored Axial Load $P_u$ (plf)	Factored Moment Load $M_u$ (lb · ft/ft)	Factored Foundation Weight $W_{uf}$ (plf)	Eccentricity $e$ (ft)
1.4(D+F)	392	0	109	0
1.2(D+F) + 1.6(L+H) + 0.5L <sub>r</sub>	336	0	93.1	0
1.2(D+F) + 1.6(L+H) + 0.5S	486	0	93.1	0
1.2(D+F) + 1.6(L+H) + 0.5R	336	0	93.1	0
1.2(D+F) + 1.6L <sub>r</sub> + 1.6H + f <sub>1L</sub>	336	0	93.1	0
1.2(D+F) + 1.6L <sub>r</sub> + 1.6H + 0.5W <sub>dn</sub>	336	0	93.1	0
1.2(D+F) + 1.6S + 1.6H + f <sub>1L</sub>	816	0	93.1	0
1.2(D+F) + 1.6S + 1.6H + 0.5W <sub>dn</sub>	816	0	93.1	0
1.2(D+F) + 1.6R + 1.6H + f <sub>1L</sub>	336	0	93.1	0
1.2(D+F) + 1.6R + 1.6H + 0.5W <sub>dn</sub>	336	0	93.1	0
1.2(D+F) + 1.0W <sub>dn</sub> + f <sub>1L</sub> + 0.5L <sub>r</sub>	336	0	93.1	0
1.2(D+F) + 1.0W <sub>dn</sub> + f <sub>1L</sub> + 0.5S	486	0	93.1	0
1.2(D+F) + 1.0W <sub>dn</sub> + f <sub>1L</sub> + 0.5R	336	0	93.1	0
1.2(D+F) + 1.0E <sub>v</sub> + 1.0E <sub>h</sub> + f <sub>1L</sub> + 1.6H + f <sub>2S</sub>	396	0	93.1	0
0.9D + 1.0W <sub>up</sub> + 1.6H	252	0	69.8	0
0.9(D+F) - 1.0E <sub>v</sub> + 1.0E <sub>h</sub> + 1.6H	252	0	69.8	0

LRFD Footing Loads (Shear)

$$) / =$$

Combination	Eccentricity $e$ (ft)	Max Bearing Pressure $q_{umax}$ (psf)	Bearing Pressure at Column Face $q_{uCol}$ (psf)	Bearing Pressure at Critical Shear Section $q_{uV}$ (psf)	Ultimate Shear at Critical Section $V_u$ (plf)
1.4(D+F)	0	747	747	1040	439
1.2(D+F) + 1.6(L+H) + 0.5L <sub>r</sub>	0	640	640	892	377
1.2(D+F) + 1.6(L+H) + 0.5S	0	864	864	1200	489
1.2(D+F) + 1.6(L+H) + 0.5R	0	640	640	892	377
1.2(D+F) + 1.6L <sub>r</sub> + 1.6H + f <sub>1L</sub>	0	640	640	892	377
1.2(D+F) + 1.6L <sub>r</sub> + 1.6H + 0.5W <sub>dn</sub>	0	640	640	892	377
1.2(D+F) + 1.6S + 1.6H + f <sub>1L</sub>	0	1360	1360	1890	737
1.2(D+F) + 1.6S + 1.6H + 0.5W <sub>dn</sub>	0	1360	1360	1890	737
1.2(D+F) + 1.6R + 1.6H + f <sub>1L</sub>	0	640	640	892	377
1.2(D+F) + 1.6R + 1.6H + 0.5W <sub>dn</sub>	0	640	640	892	377
1.2(D+F) + 1.0W <sub>dn</sub> + f <sub>1L</sub> + 0.5L <sub>r</sub>	0	640	640	892	377
1.2(D+F) + 1.0W <sub>dn</sub> + f <sub>1L</sub> + 0.5S	0	864	864	1200	489
1.2(D+F) + 1.0W <sub>dn</sub> + f <sub>1L</sub> + 0.5R	0	640	640	892	377
1.2(D+F) + 1.0E <sub>v</sub> + 1.0E <sub>h</sub> + f <sub>1L</sub> + 1.6H + f <sub>2S</sub>	0	730	730	1020	422
0.9D + 1.0W <sub>up</sub> + 1.6H	0	480	480	669	282
0.9(D+F) - 1.0E <sub>v</sub> + 1.0E <sub>h</sub> + 1.6H	0	480	480	669	282

## LRFD Footing Loads (Moment)

) /  $m =$ 

Combination	Eccentricity $e$ (ft)	Max Bearing Pressure $q_{umax}$ (psf)	Bearing Pressure at Column Face $q_{uCol}$ (psf)	Ultimate Moment at Column Face $M_u$ (lb · ft/ft)
1.4(D+F)	0	747	747	3.28
1.2(D+F) + 1.6(L+H) + 0.5L <sub>r</sub>	0	640	640	2.81
1.2(D+F) + 1.6(L+H) + 0.5S	0	864	864	4.06
1.2(D+F) + 1.6(L+H) + 0.5R	0	640	640	2.81
1.2(D+F) + 1.6L <sub>r</sub> + 1.6H + f <sub>1L</sub>	0	640	640	2.81
1.2(D+F) + 1.6L <sub>r</sub> + 1.6H + 0.5W <sub>dn</sub>	0	640	640	2.81
1.2(D+F) + 1.6S + 1.6H + f <sub>1L</sub>	0	1360	1360	6.82
1.2(D+F) + 1.6S + 1.6H + 0.5W <sub>dn</sub>	0	1360	1360	6.82
1.2(D+F) + 1.6R + 1.6H + f <sub>1L</sub>	0	640	640	2.81
1.2(D+F) + 1.6R + 1.6H + 0.5W <sub>dn</sub>	0	640	640	2.81
1.2(D+F) + 1.0W <sub>dn</sub> + f <sub>1L</sub> + 0.5L <sub>r</sub>	0	640	640	2.81
1.2(D+F) + 1.0W <sub>dn</sub> + f <sub>1L</sub> + 0.5S	0	864	864	4.06
1.2(D+F) + 1.0W <sub>dn</sub> + f <sub>1L</sub> + 0.5R	0	640	640	2.81
1.2(D+F) + 1.0E <sub>v</sub> + 1.0E <sub>h</sub> + f <sub>1L</sub> + 1.6H + f <sub>2S</sub>	0	730	730	3.31
0.9D + 1.0W <sub>up</sub> + 1.6H	0	480	480	2.11
0.9(D+F) - 1.0E <sub>v</sub> + 1.0E <sub>h</sub> + 1.6H	0	480	480	2.11

Governing Axial Load

$$P_u = 816 \text{ plf}$$

Maximum Ultimate Net Bearing Pressure

$$q_{nu} = 1220 \text{ psf}$$

## Flexural Analysis (ACI 318-19, CI 22.2)

Resistance Factor in Bending

$$\phi_b = 0.6$$

ACI 318-19, Table 21.2.2

Moment Capacity

$$M_n = 1500 \text{ lb} \cdot \text{ft/ft}$$

ACI 318-19, CI 22.3.1.1 and 14.5.2.1 (plain concrete)

Factored Moment Capacity

$$\phi M_n = 900 \text{ lb} \cdot \text{ft/ft}$$

ACI 318-19, CI 8.5.1.1(a)

Ultimate Moment at Critical Section

$$M_u = 6.82 \text{ lb} \cdot \text{ft/ft}$$

ACI 318-19, CI 13.2.7.1

## One-Way Shear (ACI 318-19, CI 22.5)

Resistance Factor in Shear

$$\phi_v = 0.6$$

ACI 318-19, Table 21.2.1

Concrete Shear Strength

$$V_c = 4800 \text{ plf}$$

ACI 318-19, CI 22.5.5.1 and 14.5.5.1 (plain concrete)

Factored One-Way Shear Capacity

$$\phi V_n = 2880 \text{ plf}$$

ACI 318-19, CI 7.5.1.1

Ultimate Shear at Critical Section

$$V_u = 0 \text{ plf}$$

ACI 318-19, CI 7.4.3.2 and CI 22.5.1.2 for crushing strength

## Comments

## General Footing

LIC# : KW-06011993, Build:20.22.1.5

L120 Engineering and Design

(c) ENERCALC INC 1983-2021

**DESCRIPTION: 16" (non retaining) stemwall footing - max point load (1500psf)**

### DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9913	Soil Bearing	1.487 ksf	1.50 ksf	+D+L about Z-Z axis
PASS	n/a	Overturing - X-X	0.0 k-ft	0.0 k-ft	No Overturing
PASS	n/a	Overturing - Z-Z	0.0 k-ft	0.0 k-ft	No Overturing
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.0	Z Flexure (+X)	0.0 k-ft/ft	0.0 k-ft/ft	No Moment
PASS	0.0	Z Flexure (-X)	0.0 k-ft/ft	0.0 k-ft/ft	No Moment
PASS	0.02530	X Flexure (+Z)	0.1071 k-ft/ft	4.235 k-ft/ft	+1.20D+1.60L
PASS	0.02530	X Flexure (-Z)	0.1071 k-ft/ft	4.235 k-ft/ft	+1.20D+1.60L
PASS	n/a	1-way Shear (+X)	0.0 psi	67.082 psi	n/a
PASS	n/a	1-way Shear (-X)	0.0 psi	67.082 psi	n/a
PASS	n/a	1-way Shear (+Z)	0.0 psi	67.082 psi	n/a
PASS	n/a	1-way Shear (-Z)	0.0 psi	67.082 psi	n/a
PASS	n/a	2-way Punching	0.0 psi	67.082 psi	n/a

### Detailed Results

#### Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xeccc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	1.50	n/a	0.0	0.6789	0.6789	n/a	n/a	0.453
X-X, +D+L	1.50	n/a	0.0	1.487	1.487	n/a	n/a	0.991
X-X, +D+0.750L	1.50	n/a	0.0	1.285	1.285	n/a	n/a	0.857
X-X, +0.60D	1.50	n/a	0.0	0.4073	0.4073	n/a	n/a	0.272
Z-Z, D Only	1.50	0.0	n/a	n/a	n/a	0.6789	0.6789	0.453
Z-Z, +D+L	1.50	0.0	n/a	n/a	n/a	1.487	1.487	0.991
Z-Z, +D+0.750L	1.50	0.0	n/a	n/a	n/a	1.285	1.285	0.857
Z-Z, +0.60D	1.50	0.0	n/a	n/a	n/a	0.4073	0.4073	0.272

#### Overturing Stability

Rotation Axis & Load Combination...	Overturing Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturing				

All units k

#### Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
Footing Has NO Sliding				

#### Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.04201	+Z	Bottom	0.1728	AsMin	0.20	4.235	OK
X-X, +1.40D	0.04201	-Z	Bottom	0.1728	AsMin	0.20	4.235	OK
X-X, +1.20D+1.60L	0.1071	+Z	Bottom	0.1728	AsMin	0.20	4.235	OK
X-X, +1.20D+1.60L	0.1071	-Z	Bottom	0.1728	AsMin	0.20	4.235	OK
X-X, +1.20D+0.50L	0.05823	+Z	Bottom	0.1728	AsMin	0.20	4.235	OK
X-X, +1.20D+0.50L	0.05823	-Z	Bottom	0.1728	AsMin	0.20	4.235	OK
X-X, +1.20D	0.03601	+Z	Bottom	0.1728	AsMin	0.20	4.235	OK
X-X, +1.20D	0.03601	-Z	Bottom	0.1728	AsMin	0.20	4.235	OK
X-X, +0.90D	0.0270	+Z	Bottom	0.1728	AsMin	0.20	4.235	OK
X-X, +0.90D	0.0270	-Z	Bottom	0.1728	AsMin	0.20	4.235	OK
Z-Z, +1.40D	0.0	-X	Top	0.1728	AsMin	0.3008	6.168	OK
Z-Z, +1.40D	0.0	+X	Top	0.1728	AsMin	0.3008	6.168	OK
Z-Z, +1.20D+1.60L	0.0	-X	Top	0.1728	AsMin	0.3008	6.168	OK
Z-Z, +1.20D+1.60L	0.0	+X	Top	0.1728	AsMin	0.3008	6.168	OK
Z-Z, +1.20D+0.50L	0.0	-X	Top	0.1728	AsMin	0.3008	6.168	OK
Z-Z, +1.20D+0.50L	0.0	+X	Top	0.1728	AsMin	0.3008	6.168	OK
Z-Z, +1.20D	0.0	-X	Top	0.1728	AsMin	0.3008	6.168	OK

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

## General Footing

LIC# : KW-06011993, Build:20.22.1.5

L120 Engineering and Design

(c) ENERCALC INC 1983-2021

**DESCRIPTION: 16" (non retaining) stemwall footing - max point load (1500psf)**

### Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z, +1.20D	0.0	+X	Top	0.1728	AsMin	0.3008	6.168	OK
Z-Z, +0.90D	0.0	-X	Top	0.1728	AsMin	0.3008	6.168	OK
Z-Z, +0.90D	0.0	+X	Top	0.1728	AsMin	0.3008	6.168	OK

### One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	0.00 psi	0.00 psi	0.00 psi	0.00 psi	0.00 psi	67.08 psi	0.00	OK
+1.20D+1.60L	0.00 psi	0.00 psi	0.00 psi	0.00 psi	0.00 psi	67.08 psi	0.00	OK
+1.20D+0.50L	0.00 psi	0.00 psi	0.00 psi	0.00 psi	0.00 psi	67.08 psi	0.00	OK
+1.20D	0.00 psi	0.00 psi	0.00 psi	0.00 psi	0.00 psi	67.08 psi	0.00	OK
+0.90D	0.00 psi	0.00 psi	0.00 psi	0.00 psi	0.00 psi	67.08 psi	0.00	OK

### Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	0.00 psi	89.44 psi	0	OK
+1.20D+1.60L	0.00 psi	89.44 psi	0	OK
+1.20D+0.50L	0.00 psi	89.44 psi	0	OK
+1.20D	0.00 psi	89.44 psi	0	OK
+0.90D	0.00 psi	89.44 psi	0	OK



**LONGITUDE**  
**ONE TWENTY°**  
ENGINEERING & DESIGN

# ***SUPPLEMENTAL CALCULATIONS***

*Post Installed Hold-Down Anchors  
Ledger Calculations*



Company:	L120 Engineering & Design	Date:	3/18/2022
Engineer:		Page:	1/5
Project:			
Address:			
Phone:			
E-mail:			

**1. Project information**

Customer company:  
 Customer contact name:  
 Customer e-mail:  
 Comment:

Project description:  
 Location:  
 Fastening description:

**2. Input Data & Anchor Parameters**

**General**

Design method: ACI 318-14  
 Units: Imperial units

**Anchor Information:**

Anchor type: Bonded anchor  
 Material: F1554 Grade 36  
 Diameter (inch): 0.625  
 Effective Embedment depth,  $h_{ef}$  (inch): 10.000  
 Code report: ICC-ES ESR-4057  
 Anchor category: -  
 Anchor ductility: Yes  
 $h_{min}$  (inch): 11.38  
 $c_{ac}$  (inch): 22.57  
 $C_{min}$  (inch): 1.75  
 $S_{min}$  (inch): 3.00

**Base Material**

Concrete: Normal-weight  
 Concrete thickness, h (inch): 18.00  
 State: Cracked  
 Compressive strength,  $f'_c$  (psi): 2500  
 $\Psi_{c,v}$ : 1.0  
 Reinforcement condition: B tension, B shear  
 Supplemental reinforcement: Not applicable  
 Reinforcement provided at corners: No  
 Ignore concrete breakout in tension: No  
 Ignore concrete breakout in shear: No  
 Hole condition: Dry concrete  
 Inspection: Continuous  
 Temperature range, Short/Long: 150/110°F  
 Ignore 6do requirement: Not applicable  
 Build-up grout pad: No

**Recommended Anchor**

Anchor Name: SET-3G - SET-3G w/ 5/8"Ø F1554 Gr. 36  
 Code Report: ICC-ES ESR-4057



**Post Installed HDU 5 Uplift Capacity  
 (Wind Controlled)**



Company:	L120 Engineering & Design	Date:	3/18/2022
Engineer:		Page:	2/5
Project:			
Address:			
Phone:			
E-mail:			

**Load and Geometry**

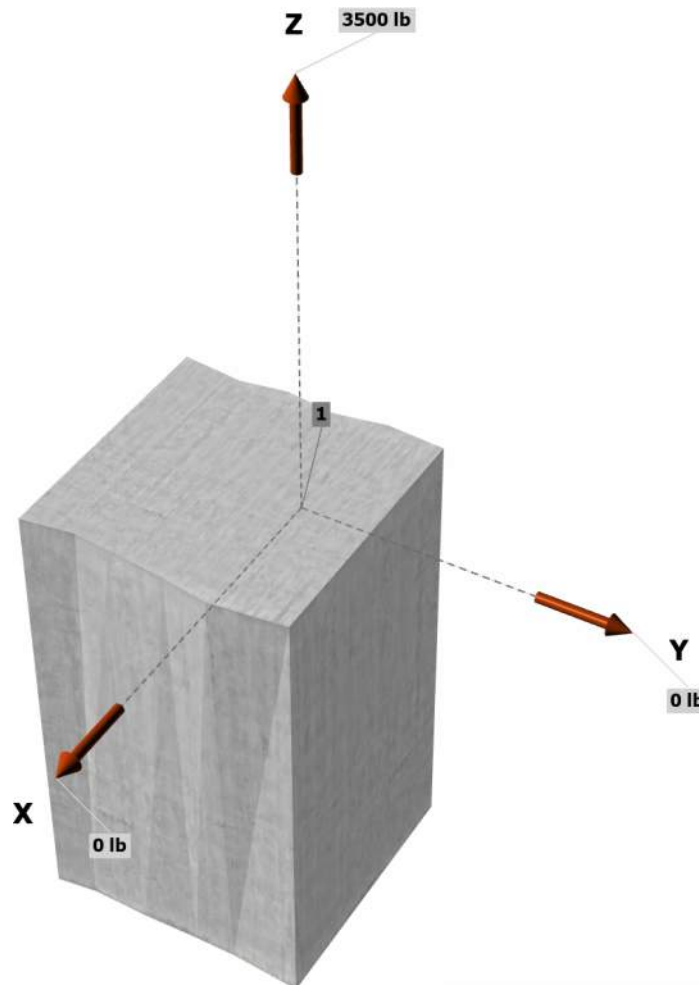
Load factor source: ACI 318 Section 5.3  
Load combination: not set  
Seismic design: No  
Anchors subjected to sustained tension: No  
Apply entire shear load at front row: No  
Anchors only resisting wind and/or seismic loads: Yes

Strength level loads:

$N_{ua}$  [lb]: 3500  
 $V_{uax}$  [lb]: 0  
 $V_{uay}$  [lb]: 0

<Figure 1>

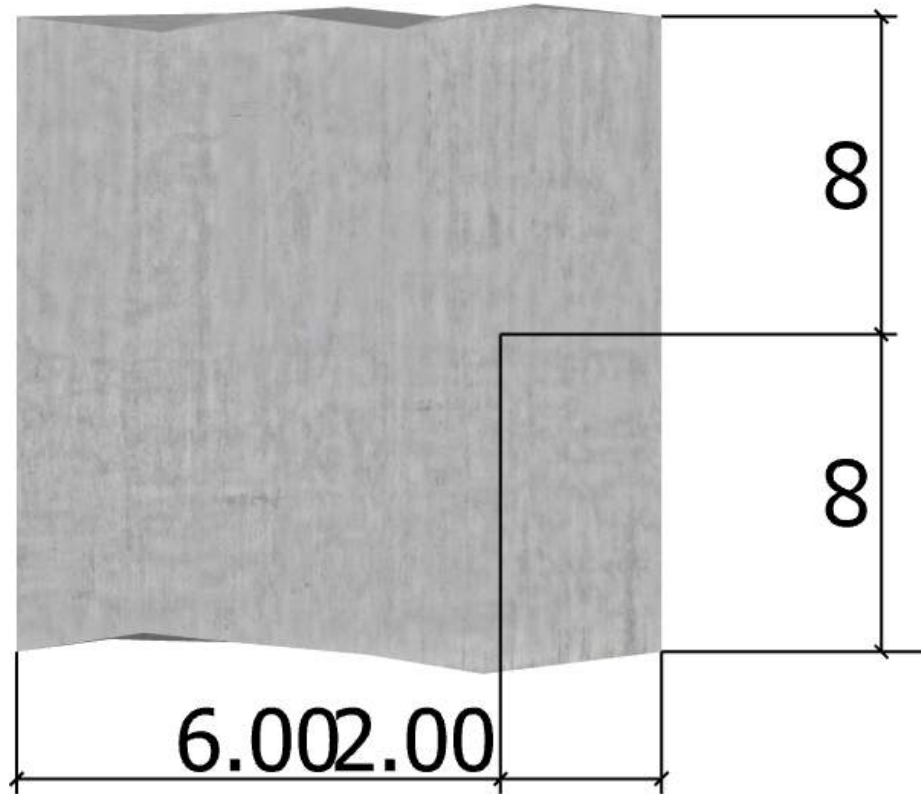
Post Installed HDU 5 Uplift Capacity  
(Wind Controlled)





Company:	L120 Engineering & Design	Date:	3/18/2022
Engineer:		Page:	3/5
Project:			
Address:			
Phone:			
E-mail:			

<Figure 2>





Anchor Designer™  
Software  
Version 3.0.7947.2

Company:	L120 Engineering & Design	Date:	3/18/2022
Engineer:		Page:	4/5
Project:			
Address:			
Phone:			
E-mail:			

### 3. Resulting Anchor Forces

Anchor	Tension load, N <sub>ua</sub> (lb)	Shear load x, V <sub>uax</sub> (lb)	Shear load y, V <sub>uay</sub> (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	3500.0	0.0	0.0	0.0
Sum	3500.0	0.0	0.0	0.0

Maximum concrete compression strain (%): 0.00  
 Maximum concrete compression stress (psi): 0  
 Resultant tension force (lb): 3500  
 Resultant compression force (lb): 0  
 Eccentricity of resultant tension forces in x-axis, e'<sub>Nx</sub> (inch): 0.00  
 Eccentricity of resultant tension forces in y-axis, e'<sub>Ny</sub> (inch): 0.00

### 4. Steel Strength of Anchor in Tension (Sec. 17.4.1)

N <sub>sa</sub> (lb)	φ	φN <sub>sa</sub> (lb)
13110	0.75	9833

### 5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.4.2)

$$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5} \text{ (Eq. 17.4.2.2a)}$$

k <sub>c</sub>	λ <sub>a</sub>	f' <sub>c</sub> (psi)	h <sub>ef</sub> (in)	N <sub>b</sub> (lb)
17.0	1.00	2500	10.000	26879

$$\phi N_{cb} = \phi (A_{Nc} / A_{Nco}) \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b \text{ (Sec. 17.3.1 \& Eq. 17.4.2.1a)}$$

A <sub>Nc</sub> (in <sup>2</sup> )	A <sub>Nco</sub> (in <sup>2</sup> )	c <sub>a,min</sub> (in)	Ψ <sub>ed,N</sub>	Ψ <sub>c,N</sub>	Ψ <sub>cp,N</sub>	N <sub>b</sub> (lb)	φ	φN <sub>cb</sub> (lb)
240.00	900.00	2.00	0.740	1.00	1.000	26879	0.65	3448

### 6. Adhesive Strength of Anchor in Tension (Sec. 17.4.5)

$$\tau_{k,cr} = \tau_{k,cr} f_{short-term} K_{sat} (f'_c / 2,500)^n$$

τ <sub>k,cr</sub> (psi)	f <sub>short-term</sub>	K <sub>sat</sub>	f' <sub>c</sub> (psi)	n	τ <sub>k,cr</sub> (psi)
1356	1.00	1.00	2500	0.24	1356

$$N_{ba} = \lambda_a \tau_{cr} \pi d_a h_{ef} \text{ (Eq. 17.4.5.2)}$$

λ <sub>a</sub>	τ <sub>cr</sub> (psi)	d <sub>a</sub> (in)	h <sub>ef</sub> (in)	N <sub>ba</sub> (lb)
1.00	1356	0.63	10.000	26625

$$\phi N_a = \phi (A_{Na} / A_{Na0}) \Psi_{ed,Na} \Psi_{cp,Na} N_{ba} \text{ (Sec. 17.3.1 \& Eq. 17.4.5.1a)}$$

A <sub>Na</sub> (in <sup>2</sup> )	A <sub>Na0</sub> (in <sup>2</sup> )	c <sub>Na</sub> (in)	c <sub>a,min</sub> (in)	Ψ <sub>ed,Na</sub>	Ψ <sub>cp,Na</sub>	N <sub>ba</sub> (lb)	φ	φN <sub>a</sub> (lb)
140.19	307.10	8.76	2.00	0.768	1.000	26625	0.65	6071

Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.



Company:	L120 Engineering & Design	Date:	3/18/2022
Engineer:		Page:	5/5
Project:			
Address:			
Phone:			
E-mail:			

## 11. Results

### 11. Interaction of Tensile and Shear Forces (Sec. D.7)?

Tension	Factored Load, $N_{ua}$ (lb)	Design Strength, $\phi N_n$ (lb)	Ratio	Status
Steel	3500	9833	0.36	Pass
<b>Concrete breakout</b>	<b>3500</b>	<b>3448</b>	<b>1.02</b>	<b>Fail (Governs)</b>
Adhesive	3500	6071	0.58	Pass

**FAIL! Selected anchor type and embedment do not meet the selected design criteria.**

## 12. Warnings

- Designer must exercise own judgement to determine if this design is suitable.
- Refer to manufacturer's product literature for hole cleaning and installation instructions.



Company:		Date:	9/14/2022
Engineer:		Page:	1/5
Project:			
Address:			
Phone:			
E-mail:			

**1. Project information**

Customer company:  
Customer contact name:  
Customer e-mail:  
Comment:

Project description:  
Location:  
Fastening description:

**2. Input Data & Anchor Parameters**

**General**

Design method: ACI 318-14  
Units: Imperial units

**Anchor Information:**

Anchor type: Bonded anchor  
Material: F1554 Grade 36  
Diameter (inch): 1.000  
Effective Embedment depth,  $h_{ef}$  (inch): 12.000  
Code report: ICC-ES ESR-4057  
Anchor category: -  
Anchor ductility: Yes  
 $h_{min}$  (inch): 14.25  
 $c_{ac}$  (inch): 28.14  
 $C_{min}$  (inch): 1.75  
 $S_{min}$  (inch): 3.00

**Base Material**

Concrete: Normal-weight  
Concrete thickness, h (inch): 15.00  
State: Cracked  
Compressive strength,  $f'_c$  (psi): 2500  
 $\Psi_{c,v}$ : 1.0  
Reinforcement condition: A tension, B shear  
Supplemental reinforcement: Not applicable  
Reinforcement provided at corners: No  
Ignore concrete breakout in tension: No  
Ignore concrete breakout in shear: No  
Hole condition: Dry concrete  
Inspection: Continuous  
Temperature range, Short/Long: 150/110°F  
Ignore 6do requirement: Not applicable  
Build-up grout pad: No

**Recommended Anchor**

Anchor Name: SET-3G - SET-3G w/ 1"Ø F1554 Gr. 36  
Code Report: ICC-ES ESR-4057



Post Installed HDU 8 Uplift Capacity  
(Wind Controlled)



Company:		Date:	9/14/2022
Engineer:		Page:	2/5
Project:			
Address:			
Phone:			
E-mail:			

**Load and Geometry**

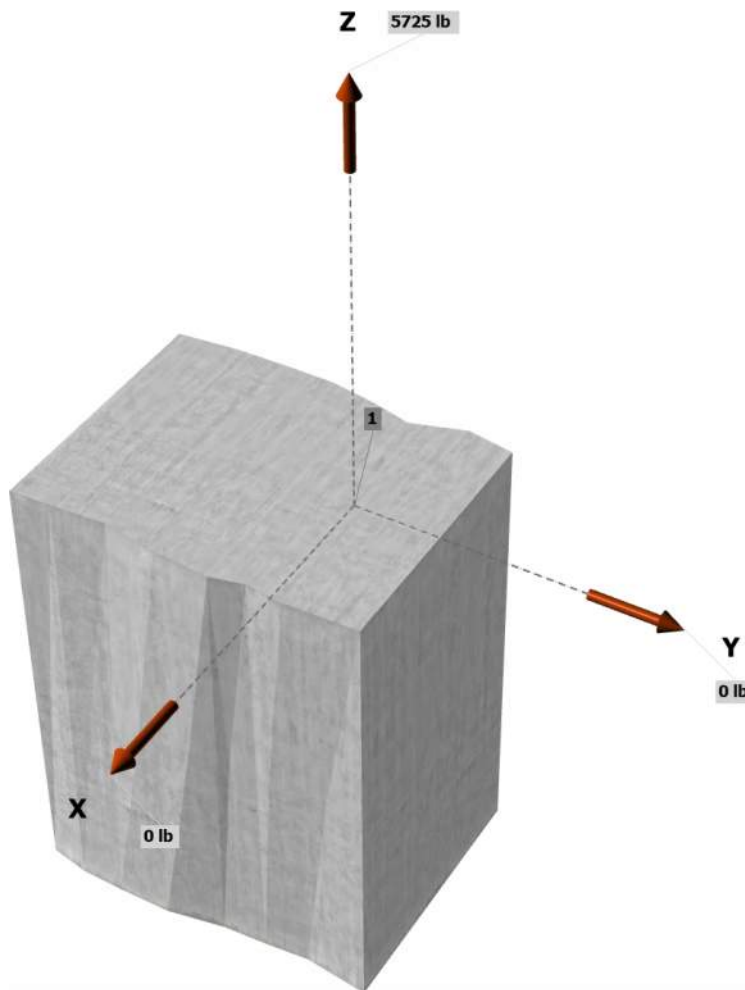
Load factor source: ACI 318 Section 5.3  
Load combination: not set  
Seismic design: No  
Anchors subjected to sustained tension: No  
Apply entire shear load at front row: No  
Anchors only resisting wind and/or seismic loads: Yes

Strength level loads:

$N_{ua}$  [lb]: 5725  
 $V_{uax}$  [lb]: 0  
 $V_{uay}$  [lb]: 0

<Figure 1>

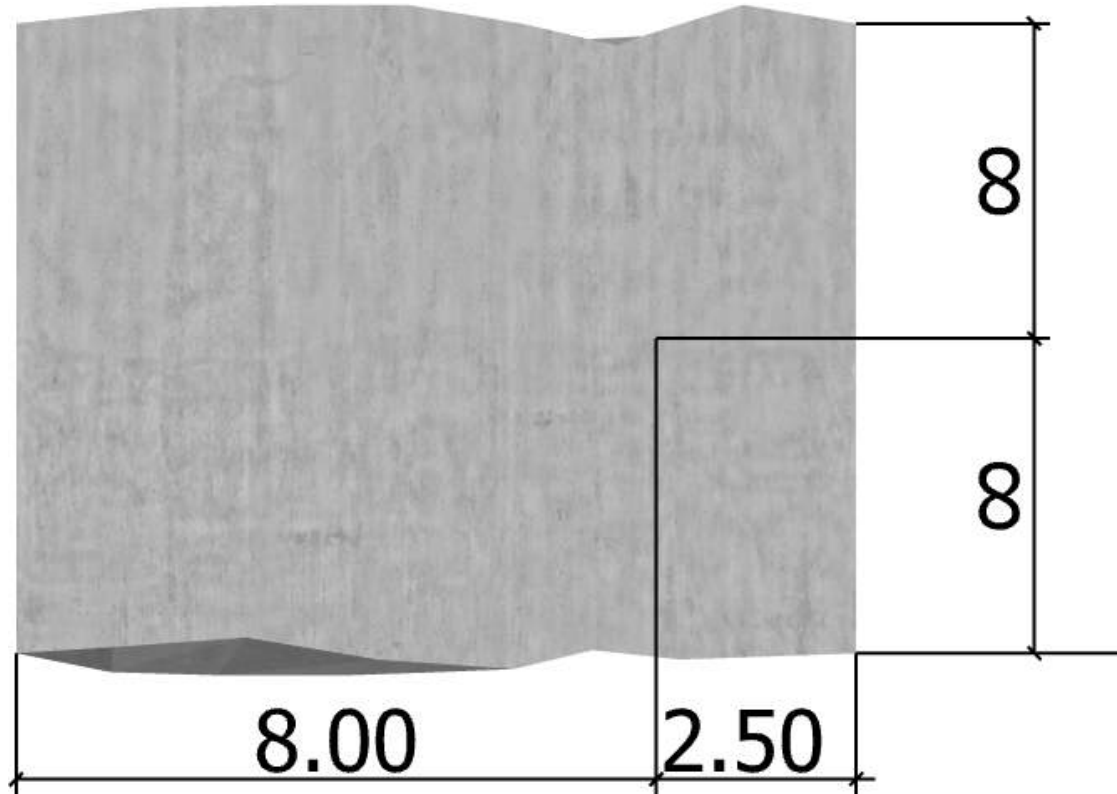
Post Installed HDU 8 Uplift Capacity  
(Wind Controlled)





Company:		Date:	9/14/2022
Engineer:		Page:	3/5
Project:			
Address:			
Phone:			
E-mail:			

<Figure 2>





Company:		Date:	9/14/2022
Engineer:		Page:	4/5
Project:			
Address:			
Phone:			
E-mail:			

### 3. Resulting Anchor Forces

Anchor	Tension load, $N_{ua}$ (lb)	Shear load x, $V_{uax}$ (lb)	Shear load y, $V_{uay}$ (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	5725.0	0.0	0.0	0.0
Sum	5725.0	0.0	0.0	0.0

Maximum concrete compression strain (%): 0.00  
 Maximum concrete compression stress (psi): 0  
 Resultant tension force (lb): 5725  
 Resultant compression force (lb): 0  
 Eccentricity of resultant tension forces in x-axis,  $e'_{Nx}$  (inch): 0.00  
 Eccentricity of resultant tension forces in y-axis,  $e'_{Ny}$  (inch): 0.00

### 4. Steel Strength of Anchor in Tension (Sec. 17.4.1)

$N_{sa}$ (lb)	$\phi$	$\phi N_{sa}$ (lb)
35150	0.75	26363

### 5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.4.2)

$$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5} \text{ (Eq. 17.4.2.2a)}$$

$k_c$	$\lambda_a$	$f'_c$ (psi)	$h_{ef}$ (in)	$N_b$ (lb)
17.0	1.00	2500	12.000	35334

$$\phi N_{cb} = \phi (A_{Nc} / A_{Nco}) \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b \text{ (Sec. 17.3.1 \& Eq. 17.4.2.1a)}$$

$A_{Nc}$ (in <sup>2</sup> )	$A_{Nco}$ (in <sup>2</sup> )	$c_{a,min}$ (in)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	$N_b$ (lb)	$\phi$	$\phi N_{cb}$ (lb)
378.00	1296.00	2.50	0.742	1.00	1.000	35334	0.75	5733

### 6. Adhesive Strength of Anchor in Tension (Sec. 17.4.5)

$$\tau_{k,cr} = \tau_{k,cr} f_{short-term} K_{sat} (f'_c / 2,500)^n$$

$\tau_{k,cr}$ (psi)	$f_{short-term}$	$K_{sat}$	$f'_c$ (psi)	$n$	$\tau_{k,cr}$ (psi)
1219	1.00	1.00	2500	0.24	1219

$$N_{ba} = \lambda_a \tau_{cr} \pi d_a h_{ef} \text{ (Eq. 17.4.5.2)}$$

$\lambda_a$	$\tau_{cr}$ (psi)	$d_a$ (in)	$h_{ef}$ (in)	$N_{ba}$ (lb)
1.00	1219	1.00	12.000	45955

$$\phi N_a = \phi (A_{Na} / A_{Na0}) \Psi_{ed,Na} \Psi_{cp,Na} N_{ba} \text{ (Sec. 17.3.1 \& Eq. 17.4.5.1a)}$$

$A_{Na}$ (in <sup>2</sup> )	$A_{Na0}$ (in <sup>2</sup> )	$c_{Na}$ (in)	$c_{a,min}$ (in)	$\Psi_{ed,Na}$	$\Psi_{cp,Na}$	$N_{ba}$ (lb)	$\phi$	$\phi N_a$ (lb)
273.66	679.27	13.03	2.50	0.758	1.000	45955	0.65	9117



Company:		Date:	9/14/2022
Engineer:		Page:	5/5
Project:			
Address:			
Phone:			
E-mail:			

### 11. Results

#### 11. Interaction of Tensile and Shear Forces (Sec. D.7)?

Tension	Factored Load, $N_{ua}$ (lb)	Design Strength, $\phi N_n$ (lb)	Ratio	Status
Steel	5725	26363	0.22	Pass
<b>Concrete breakout</b>	<b>5725</b>	<b>5733</b>	<b>1.00</b>	<b>Pass (Governs)</b>
Adhesive	5725	9117	0.63	Pass

SET-3G w/ 1"Ø F1554 Gr. 36 with hef = 12.000 inch meets the selected design criteria.

### 12. Warnings

- Designer must exercise own judgement to determine if this design is suitable.
- Refer to manufacturer's product literature for hole cleaning and installation instructions.

# Structural and General Fastening

## Strong-Drive® SDWS TIMBER Screw

Structural Wood-to-Wood Connections Including Ledgers, Indoor/Outdoor Projects

Designed to provide an easy-to-install, high-strength alternative to through-bolting and traditional lag screws.

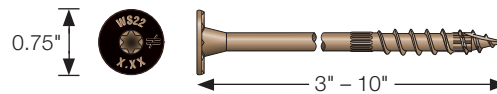
The Strong-Drive SDWS Timber screws are ideal for the contractor and do-it-yourselfer alike.

*Double-barrier coating provides corrosion resistance equivalent to hot-dip galvanization, making it suitable for certain exterior and preservative-treated wood applications, as described in the evaluation report.*

**Codes/Standards:** IAPMO-UES ER-192, State of Florida FL13975

US Patent 9,523,383

For more information, see p. 53, C-F-2019 Fastening Systems Catalog



### SDWS Timber Screw — Allowable Shear Loads — Douglas Fir-Larch and Southern Pine Lumber

Size Dia. x L (in.)	Model No.	Thread Length (in.)	Reference DFL/SP Allowable Shear Loads (lb.)									
			Wood Side Member Thickness (in.)									
			1.5	2	2.5	3	3.5	4	4.5	6	8	
0.22 x 3	SDWS22300DB	1½	255	—	—	—	—	—	—	—	—	—
0.22 x 4	SDWS22400DB	2¾	405	405	305	—	—	—	—	—	—	—
0.22 x 5	SDWS22500DB	2¾	405	405	360	360	325	—	—	—	—	—
0.22 x 6	SDWS22600DB	2¾	405	405	405	405	365	365	355	—	—	—
0.22 x 8	SDWS22800DB	2¾	405	405	405	405	395	395	395	395	—	—
0.22 x 10	SDWS221000DB	2¾	405	405	405	405	395	395	395	395	395	395

See footnotes below.

### SDWS Timber Screw — Allowable Shear Loads — Spruce-Pine-Fir and Hem-Fir Lumber

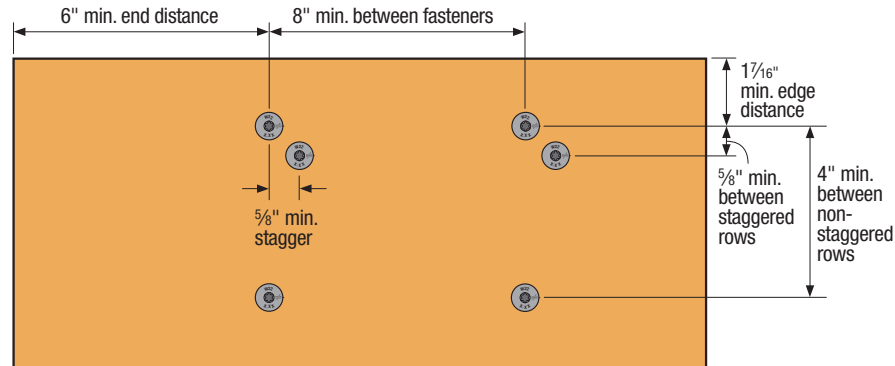
Size Dia. x L (in.)	Model No.	Thread Length (in.)	Reference SPF/HF Allowable Shear Loads (lb.)									
			Wood Side Member Thickness (in.)									
			1.5	2	2.5	3	3.5	4	4.5	6	8	
0.22 x 3	SDWS22300DB	1½	190	—	—	—	—	—	—	—	—	—
0.22 x 4	SDWS22400DB	2¾	385	285	215	—	—	—	—	—	—	—
0.22 x 5	SDWS22500DB	2¾	405	290	290	290	195	—	—	—	—	—
0.22 x 6	SDWS22600DB	2¾	405	365	365	365	310	310	210	—	—	—
0.22 x 8	SDWS22800DB	2¾	405	365	365	365	310	310	280	280	—	—
0.22 x 10	SDWS221000DB	2¾	405	365	365	365	310	310	280	280	280	280

- All applications are based on full penetration into the main member. Full penetration is the screw length minus the side member thickness.
- Allowable loads are shown at the wood load duration factor of  $C_D = 1.0$ . Loads may be increased for load duration per the building code up to a  $C_D = 1.6$ . Tabulated values must be multiplied by all applicable adjustment factors per the NDS.
- Minimum fastener spacing requirements to achieve table loads: 6" end distance, 1⅞" edge distance, 5" between staggered rows of fasteners, 4" between non-staggered rows of fasteners and 8" between fasteners in a row.
- For in-service moisture content greater than 19%, use  $C_M = 0.7$ .
- Loads are based on installation into the side grain of the wood with the screw axis perpendicular to the face of the member.

## Structural and General Fastening

# Strong-Drive®

## SDWS TIMBER Screw (cont.)



SDWS Timber Screw Spacing Requirements

### SDWS Timber Screw — Allowable Withdrawal Loads — Douglas Fir-Larch, Southern Pine, Spruce-Pine-Fir and Hem-Fir Lumber

Model No.	Fastener Length (in.)	Thread Length (in.)	Reference Withdrawal Design Value, W (lb./in.)		Max. Reference Withdrawal Design Value, W <sub>max</sub> (lb.)	
			DFL and SP Main Member	HF and SPF Main Member	DFL and SP Main Member	HF and SPF Main Member
SDWS22300DB	3	1½	164	151	245	225
SDWS22400DB	4	2¾	179	160	425	380
SDWS22500DB	5	2¾	214	187	590	495
SDWS22600DB	6	2¾	214	187	590	495
SDWS22800DB	8	2¾	214	187	590	495
SDWS221000DB	10	2¾	214	187	590	495

1. The tabulated reference withdrawal design value, W, is in pounds per inch of the thread penetration into the side grain of the main member.
2. The tabulated reference withdrawal design value, W<sub>Max</sub>, is in pounds where the entire thread length must penetrate into the side grain of the main member.
3. Tabulated reference withdrawal design values, W and W<sub>Max</sub>, are shown at a C<sub>D</sub> = 1.0. Loads may be increased for load duration per the building code up to a C<sub>D</sub> = 1.6. Tabulated values must be multiplied by all applicable adjustment factors from the NDS as referenced in the IBC or IRC.
4. Embedded thread length is that portion held in the main member including the screw tip.
5. Values are based on the lesser of withdrawal from the main member or pull-through of a 1½" side member.
6. For in-service moisture content greater than 19%, use C<sub>M</sub> = 0.7.

## Structural and General Fastening

### Strong-Drive® SDWS TIMBER Screw with Gypsum Board Interlayer(s)

The Strong-Drive SDWS Timber screw may be installed with one or two layers of 5/8" gypsum board. This layer of gypsum is to be located between the side member and main member for a standard connection. See the tables below for the required screw lengths and allowable loads for these applications. Loads are derived from assembly testing based on ICC-ES AC233.

#### SDWS Timber Screw — Douglas Fir–Larch and Southern Pine Lumber Allowable Single Shear Loads with One Layer of 5/8" Gypsum Board

Size (in.)	Model No.	Thread Length (in.)	Reference DFL/SP Allowable Shear Loads (lb.)									
			Wood Side Member Thickness (in.)									
			1.5	2.0	2.5	3.0	3.5	4.0	4.5	6.0	8.0	
0.22 x 4	SDWS22400DB	2.375	265	—	—	—	—	—	—	—	—	—
0.22 x 5	SDWS22500DB	2.75	265	265	235	—	—	—	—	—	—	—
0.22 x 6	SDWS22600DB	2.75	265	265	265	265	235	—	—	—	—	—
0.22 x 8	SDWS22800DB	2.75	265	265	265	265	255	255	255	—	—	—
0.22 x 10	SDWS221000DB	2.75	265	265	265	265	255	255	255	255	—	—

See footnotes on next page.

#### SDWS Timber Screw — Douglas Fir–Larch and Southern Pine Lumber Allowable Single Shear Loads with Two Layers of 5/8" Gypsum Board

Size (in.)	Model No.	Thread Length (in.)	Reference DFL/SP Allowable Shear Loads (lb.)									
			Wood Side Member Thickness (in.)									
			1.5	2.0	2.5	3.0	3.5	4.0	4.5	6.0	8.0	
0.22 x 4	SDWS22400DB	2.375	—	—	—	—	—	—	—	—	—	—
0.22 x 5	SDWS22500DB	2.75	265	265	—	—	—	—	—	—	—	—
0.22 x 6	SDWS22600DB	2.75	265	265	265	265	—	—	—	—	—	—
0.22 x 8	SDWS22800DB	2.75	265	265	265	265	255	255	255	—	—	—
0.22 x 10	SDWS221000DB	2.75	265	265	265	265	255	255	255	255	—	—

See footnotes on next page.

## Structural and General Fastening

## Strong-Drive® SDWS TIMBER Screw with Gypsum Board Interlayer(s) (cont.)

SDWS Timber Screw — Spruce-Pine-Fir and Hem-Fir Lumber  
Allowable Single Shear Loads with One Layer of 5/8" Gypsum Board

Size (in.)	Model No.	Thread Length (in.)	Reference SPF/HF Allowable Shear Loads (lb.)									
			Wood Side Member Thickness (in.)									
			1.5	2.0	2.5	3.0	3.5	4.0	4.5	6.0	8.0	
0.22 x 4	SDWS22400DB	2.375	250	—	—	—	—	—	—	—	—	—
0.22 x 5	SDWS22500DB	2.75	260	190	190	—	—	—	—	—	—	—
0.22 x 6	SDWS22600DB	2.75	260	235	235	235	200	—	—	—	—	—
0.22 x 8	SDWS22800DB	2.75	260	235	235	235	200	200	180	—	—	—
0.22 x 10	SDWS221000DB	2.75	260	235	235	235	200	200	180	180	—	—

See notes below.

SDWS Timber Screw — Spruce-Pine-Fir and Hem-Fir Lumber  
Allowable Single Shear Loads with Two Layers of 5/8" Gypsum Board

Size (in.)	Model No.	Thread Length (in.)	Reference SPF/HF Allowable Shear Loads (lb.)									
			Wood Side Member Thickness (in.)									
			1.5	2.0	2.5	3.0	3.5	4.0	4.5	6.0	8.0	
0.22 x 4	SDWS22400DB	2.375	—	—	—	—	—	—	—	—	—	—
0.22 x 5	SDWS22500DB	2.75	260	190	—	—	—	—	—	—	—	—
0.22 x 6	SDWS22600DB	2.75	260	235	235	235	—	—	—	—	—	—
0.22 x 8	SDWS22800DB	2.75	260	235	235	235	200	200	180	—	—	—
0.22 x 10	SDWS221000DB	2.75	260	235	235	235	200	200	180	180	—	—

- All applications are based on full penetration which equals fastener length minus side member thickness.
- Allowable loads are shown at the wood load duration factor of  $C_D = 1.0$ . Loads may be increased for load duration per the building code up to a  $C_D = 1.6$ . Tabulated values must be multiplied by all applicable adjustment factors per the NDS.
- Minimum fastener spacing requirements: 6" end distance, 1 7/8" edge distance, 5/8" between staggered rows of fasteners, 4" between non-staggered rows of fasteners and 8" between fasteners in a row. Refer to SDWS Spacing Requirements figure on p. 23.
- For in-service moisture content greater than 19% use  $C_M = 0.7$ .
- Gypsum board must be attached as required per the building code.

## Ledger Structural Fastening Applications

# Strong-Drive® SDWS TIMBER Screw in Ledger-to-Stud Applications

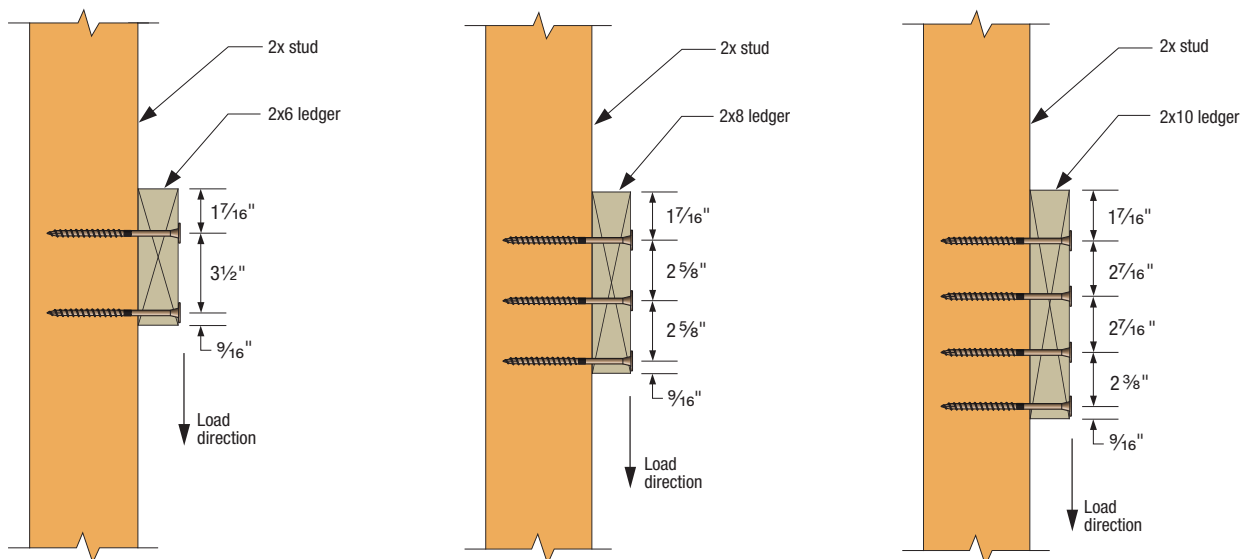
Strong-Drive SDWS Timber screws may be used to attach a ledger to the narrow face of nominal 2x lumber studs according to the following table. Tests and analyses were performed in accordance with ICC-ES Acceptance Criteria AC233.

For more information, see p. 53, C-F-2019 Fastening Systems Catalog

## SDWS Timber Screw — Allowable Shear Loads for Ledger to Studs

Size (in.)	Model No.	Ledger Nominal Size (in.)	Number of Screws per Stud	Reference Allowable Shear Load (lb.)		
				SP	DFL	SPF/HF
0.22 x 4	SDWS22400DB	2x6	2	785	630	565
		2x8	3	1,060	890	855
		2x10	4	—	1,040	1,040

- Allowable loads shall be limited to parallel-to-grain loaded solid sawn main members (minimum 2" nominal). Wood side members shall be loaded perpendicular to grain.
- Allowable loads are based on DFL, SPF/HF, and SP wood members having a minimum specific gravity of 0.50, 0.42, and 0.55, respectively. Where the side and main members have different specific gravities, the lower values shall be used.
- Allowable loads are shown at the wood load duration factor of  $C_D = 1.00$ . Loads may be increased for load duration as permitted by the building code up to a  $C_D = 1.60$ . All adjustment factors shall be applied per the 2012 National Design Specification (NDS). For in-service moisture content greater than 19%, use  $C_M = 0.70$ .
- Fasteners shall be centered in the stud and spaced as shown in the figure. The stud minimum end distance is 6" when loaded toward the end and 2½" when loaded away from the end. The ledger end distance is 6" for full values. For ledger end distances between 2" and 6" use 50% of the table loads. For end distances between 2" and 4", predrill using a ⅜" bit for SDWS.
- Screws may be installed with an intermediate layer of wood structural panel between the side and main member provided the wood structural panel is fastened to the main member per code and the minimum screw penetration of 2½" into the main member (excluding the wood structural panel) is met. Longer lengths of the screw series may be used.
- For LRFD values, the reference connection design values shall be adjusted in accordance with the NDS-2018, section 11.3.
- For 2x10 SP ledgers, use the number of screws and allowable loads of the 2x8 SP ledger.
- For 2x8 ledgers with two screws, use 2x6 values. For 2x10 ledgers with three screws, use 2x8 values. Spacings and edge distances shown in the figure are minimum dimensions.
- For loads in the opposite direction from that shown in the figure, use the table values multiplied by: 0.50 for two-screw connections, 0.67 for three-screw connections, and 0.75 for four-screw connections.



# Ledger Structural Fastening Applications

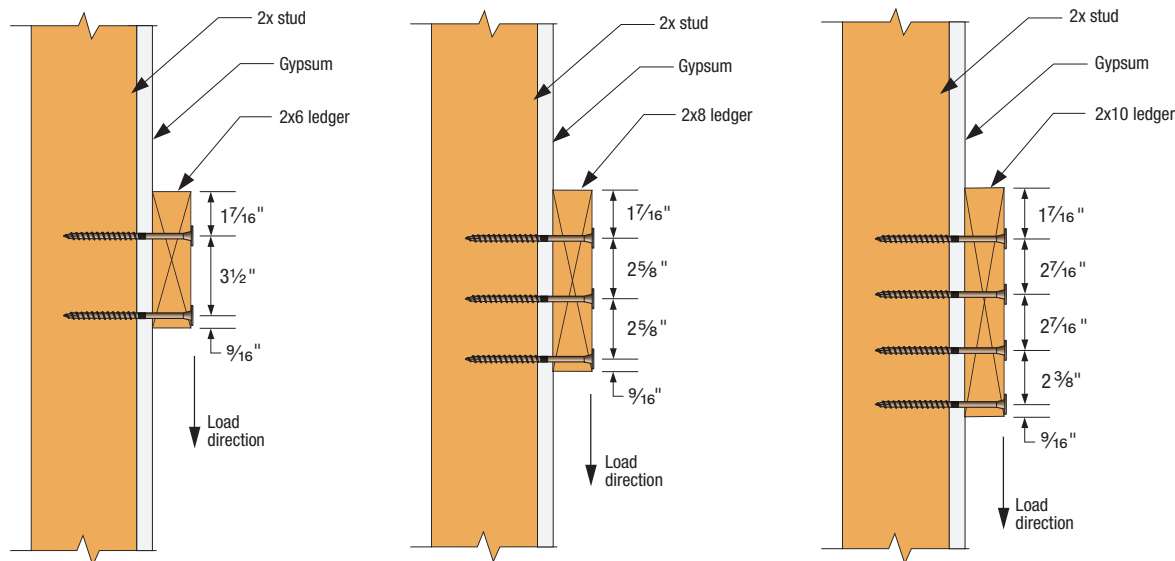
## Strong-Drive®

### SDWS TIMBER Screw with Gypsum Board Interlayer(s) (cont.)

#### SDWS Timber Screw — Allowable Shear Loads for Ledger Attachment to Studs with One or Two Layers of Gypsum Board

Size (in.)	Model No.	Ledger Size	Number of Screws per Stud	Reference Allowable Shear Load (lb.)		
				SP	DFL	SPF/HF
0.22 x 6	SDWS22600DB	2x6	2	510	410	365
		2x8	3	690	580	555
		2x10	4	—	675	675

- Allowable loads shall be limited to parallel-to-grain loaded solid sawn main members (minimum 2" nominal). Wood side members shall be loaded perpendicular to grain.
- Allowable loads are based on DFL, SPF/HF, and SP wood members having a minimum specific gravity of 0.50, 0.42, and 0.55, respectively. Where the side and main members have different specific gravities, the lower values shall be used.
- Allowable loads are shown at the wood load duration factor of  $C_D = 1.00$ . Loads may be increased for load duration as permitted by the building code up to a  $C_D = 1.60$ . All adjustment factors shall be applied per the National Design Specification (NDS). For in-service moisture content greater than 19%, use  $C_M = 0.70$ .
- Fasteners shall be centered in the stud and spaced as shown in the figure. The ledger minimum end distance is 6". The stud minimum end distance is 6" when the load is toward the end and 2½" when the load is away from the end.
- Screws may be installed with an interlayer of wood structural panel (WSP) between the framing and the gypsum panel(s). When a WSP is present, it shall be a maximum of ½" thick, adjacent to the framing and fastened directly to the framing per code. Minimum screw penetration into the framing of 2½" shall be required; longer screw lengths shall be used to achieve the required penetration.
- For LRFD values, the reference connection design values shall be adjusted in accordance with NDS-18, section 11.3.
- For 2x10 SP ledgers, use the number of screws and allowable loads of the 2x8 SP ledger.
- For 2x8 ledgers with two screws, use 2x6 values. For 2x10 ledgers with three screws, use 2x8 values. Spacings and edge distances shown in the figure are minimum dimensions.
- For loads in the opposite direction from that shown in the figure, use the table values multiplied by: 0.50 for two-screw connections, 0.67 for three-screw connections, and 0.75 for four-screw connections.
- Gypsum board must be attached as required per the building code.
- For ledger end distances between 2" and 6", use 50% of load and predrill with ⅜" drill bit.



**Note:** Minimum stud dimension is nominal 2 x 6.

#### Notes to Installer Regarding the Attachment of Ledgers to Studs:

The screws must be installed into the middle of the stud with a tolerance of ⅜" either side of center. Various methods can be used to ensure proper placement of the screws in the stud including snapping a chalk line, using a stud finder or prerocking (attaching only a strip of gypsum at the ledger location until the ledger is fastened to the studs). If proper screw placement into the stud cannot be achieved in the field, blocking should be installed between studs to receive and support the ledger screws.

# Ledger Structural Fastening Applications

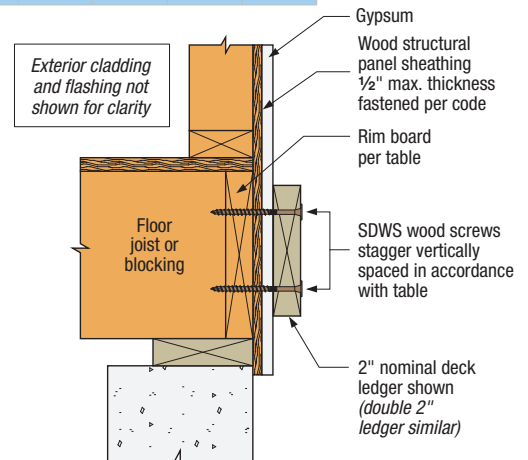
## Strong-Drive®

### SDWS TIMBER Screw with Gypsum Board Interlayer(s) (cont.)

SDWS Timber Screw — 2015 and 2018 IRC Compliant Spacing for a Sawn Lumber Ledger to Rim Board with One or Two Layers of 5/8" Gypsum Board

Loading Condition	Nominal Ledger Thickness (in.)	Model No.	Rim Board Material and Minimum Size	Maximum Deck Joist Span						
				Up to 6 ft.	Up to 8 ft.	Up to 10 ft.	Up to 12 ft.	Up to 14 ft.	Up to 16 ft.	Up to 18 ft.
40 psf Live 10 psf Dead	2x	For one layer of gypsum board use: SDWS22400DB	1" OSB 1" LVL	13	10	8	6	6	5	4
			1 1/8" OSB 1 5/16" LVL 1 1/4" LSL	15	11	9	8	7	6	5
			2x SP, DFL 2x SPF, HF	20	15	12	10	9	8	7
100 psf Live 10 psf Dead	2x	For one layer of gypsum board use: SDWS22400DB	1" OSB 1" LVL	6	4	4	—	—	—	—
			1 1/8" OSB 1 5/16" LVL 1 1/4" LSL	8	6	5	4	—	—	—
			2x SP, DFL 2x SPF, HF	9	7	5	5	4	—	—
100 psf Live 10 psf Dead	(2) 2x	For one layer of gypsum board use: SDWS22600DB	1" OSB 1" LVL	7	5	4	—	—	—	—
			1 1/8" OSB 1 5/16" LVL 1 1/4" LSL	7	5	4	—	—	—	—
			2x SP, DFL 2x SPF, HF	7	5	4	—	—	—	—
60 psf Live 10 psf Dead	2x	For one layer of gypsum board use: SDWS22400DB	1" OSB 1" LVL	9	7	6	5	4	—	—
			1 1/8" OSB 1 5/16" LVL 1 1/4" LSL	11	8	7	5	5	4	4
			2x SP, DFL 2x SPF, HF	14	11	9	7	6	5	5
40 psf Live 10 psf Dead	(2) 2x	For one layer of gypsum board use: SDWS22600DB	1" OSB 1" LVL	14	11	9	7	6	5	5
			1 1/8" OSB 1 5/16" LVL 1 1/4" LSL	15	11	9	8	7	6	5
			2x SP, DFL 2x SPF, HF	15	11	9	8	7	6	5
60 psf Live 10 psf Dead	(2) 2x	For one layer of gypsum board use: SDWS22600DB	1" OSB 1" LVL	10	8	6	5	5	4	—
			1 1/8" OSB 1 5/16" LVL 1 1/4" LSL	11	8	6	5	5	4	4
			2x SP, DFL 2x SPF, HF	11	8	6	5	5	4	4

- Sawn rim board shall be spruce-pine-fir, hem-fir, Douglas fir-larch, or southern pine species. Ledger shall be hem-fir, Douglas fir-larch, or southern pine species.
- Fastener spacings are based on the lesser of single fastener ICC-ES AC233 testing of the Strong-Drive® SDWS screw with a safety factor of 5.0 or ledger assembly testing based on ICC-ES AC13 with a factor of safety of 3.0. Spacing does NOT include NDS wet service factor adjustment.
- Multiple ledger plies shall be fastened together per code independent of the SDWS screws.
- SDWS screw spacing values are equivalent to 2018 IRC Table R507.9.1.3(1) and 2012/2015 IRC Table R507.2. The table also provides SDWS screw spacing for a wider range of materials commonly used for rim boards, and an alternate loading condition as required by some jurisdictions.
- Rows of screws shall be vertically offset and evenly staggered. Screws shall be placed 1 1/2" to 2" from the top and bottom of the ledger or rim board with 3" minimum and 6" maximum between rows and spaced per the table. End screws shall be located 6" from the end and at 1 1/2" to 2" from the bottom of the ledger. For screws located at least 2" but less than 6" from the end, use 50% of the load per screw and 50% of the table spacing between the end screw and the adjacent screw, and for screws located between 2" and 4" from the end, predrill using a 5/32" drill.
- The design installation permits a wood structural panel (WSP) interlayer in addition to one or two layers of gypsum board. If present, the WSP shall be a maximum of 1/2" thick, adjacent to the framing and fastened directly to the framing per the code.
- Gypsum board must be attached as required per the building code.



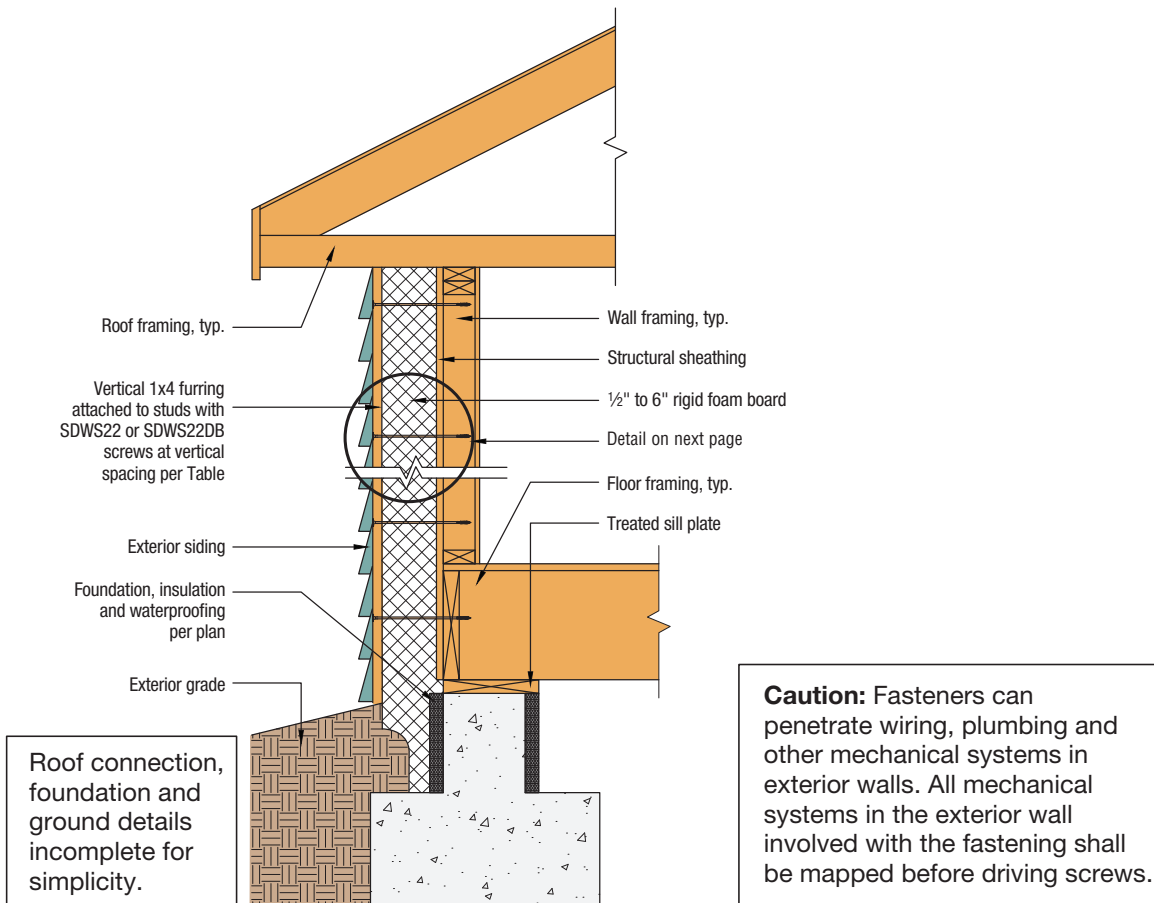
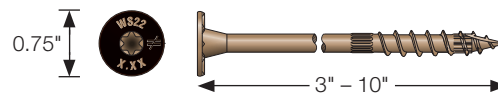
**Ledger-to-Rim Board Assembly**  
(wood-framed lower floor acceptable, concrete wall shown for illustration purposes)

# Exterior Foam-to-Wood Fastening

## **Strong-Drive®** **SDWS TIMBER Screw** for Attaching Exterior Foam Insulation

Simpson Strong-Tie® Strong-Drive SDWS Timber screws may be used for installing exterior rigid-foam board insulation over wood structural panel (WSP) sheathing. Each fastener installs through furring strips, rigid-foam board and WSP sheathing into the wood wall stud framing. The fasteners do not typically require predrilling. Preservative-treated wood suitable for dry-service (AWPA UC1, UC2, UC3A) and untreated wood may be used depending on the protection needs of the construction. The SDWS products with "DB" in the model number have a double-barrier coating that provides corrosion resistance equivalent to hot-dip galvanization, while the products without "DB" in the model number can only be used in conditions with dry-service and no wood treatment chemicals. The table on p. 53 provides recommended spacing for fastening to vertical furring strips through ½" to 6" of rigid foam insulation board into each wall stud. The SDWS22DB and SDWS22 screws were evaluated as alternate threaded fasteners using ICC-ES AC233 and are the subject of IAPMO-UES ER-192. The Strong-Drive SDWS22DB Structural Wood screws were evaluated for corrosion resistance using ICC-ES AC257.

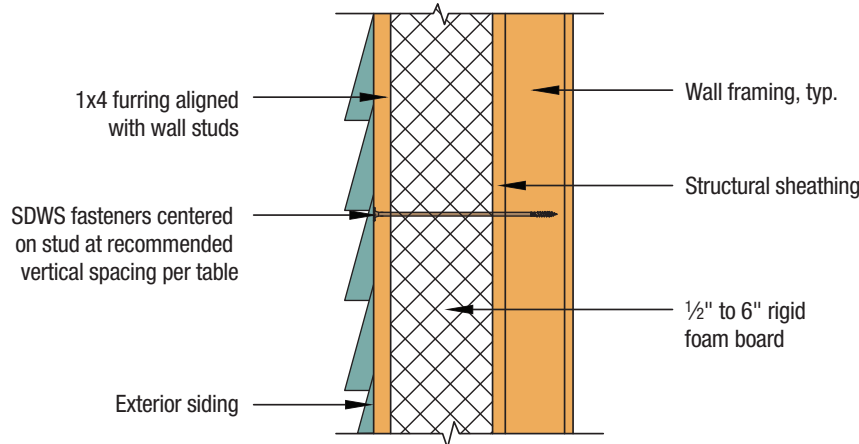
For more information, see p. 53, C-F-2019 Fastening Systems Catalog



**Wall Cross-Section**

# Exterior Foam-to-Wood Fastening

## **Strong-Drive®** **SDWS TIMBER** Screw for Attaching Exterior Foam Insulation (cont.)



**Furring and Rigid Foam Attachment Detail**

### Recommended Vertical Fastener Spacing

Size (in.)	Model No.	Foam Thickness (in.)	Stud Spacing (in.)	Maximum Allowable Cladding Weight to be Supported (psf)		
				≤ 20	25	30
0.220 x 4	SDWS22400DB	½	16	24" o.c.	24" o.c.	24" o.c.
			24			
0.220 x 5	SDWS22500DB	1 to 1½	16			
			24			
0.220 x 6	SDWS22600DB	2	16			
			24			
0.220 x 8	SDWS22800DB SDWS22800	4	16			
			24			
0.220 x 10	SDWS221000DB SDWS221000	6	16			
			24			

1. Caution: Fasteners can penetrate wiring, plumbing and other mechanical systems in exterior walls. All mechanical systems in the exterior wall involved with the fastening shall be mapped before driving screws.
2. Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with ASTM C578 or ASTM C1289.
3. Wood wall framing (studs) shall be a minimum of 2" nominal thickness. Wood framing and furring shall be a minimum spruce-pine-fir species with specific gravity of 0.42 or greater. Table assumes furring strip thickness of ¾" and full thread embedment in the framing member.
4. Wood framing, furring and WSP sheathing shall meet the design requirements in accordance with the applicable building codes. WSP sheathing shall be fastened to the framing as required by the applicable building code.
5. Each fastener is capable of resisting 172 lb. of out-of-plane wind loading ( $C_D = 1.60$ ) with no further increase allowed.
6. Spacing recommendations are based on a loading that produced 0.015" of assembly movement with 6"-thick rigid foam board insulation.
7. Maximum allowable cladding weight shall be the additive weight of furring, cladding including foam insulation, environmental effects (i.e. ice) and other supported materials.
8. Metal fasteners conduct heat, and it is recommended that exposed screw heads are covered with foam and sealed.
9. Screws shall be installed such that they close gaps between connected components. Furring and sheathing shall provide the required thickness and performance for siding manufacturer installation instructions.

C-F-2019TECHSUP ©2019 SIMPSON STRONG-TIE COMPANY INC.

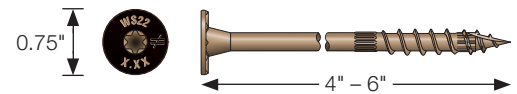
Wood and Engineered-Wood Fastening

# Sole / Top Plate-to-Rim Fastening

## Strong-Drive® SDWS TIMBER Screw

### Sole-to-Rim Connections

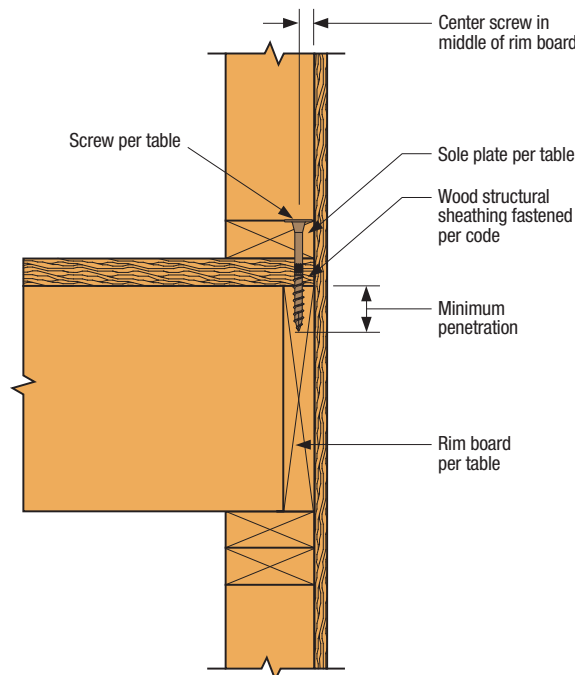
For more information, see p. 53, C-F-2019 Fastening Systems Catalog



### SDWS Timber Screw — Allowable Shear Loads for Sole-to-Rim Connections

Size (in.)	Model No.	Sole Plate Nominal Thickness (in.)	Minimum Penetration into Rim Board (in.)	Reference Allowable Loads (lb.) per Screw							
				2x DFL/SP Rim Board		2x SPF/HF Rim Board		1 1/4" Min. LVL Rim Board		1 1/4" Min. LSL Rim Board	
				DFL/SP Sole Plate	SPF/HF Sole Plate	DFL/SP Sole Plate	SPF/HF Sole Plate	DFL/SP Sole Plate	SPF/HF Sole Plate	DFL/SP Sole Plate	SPF/HF Sole Plate
0.22 x 4	SDWS22400DB	2x	1.75	345	295	295	295	275	275	275	275
0.22 x 5	SDWS22500DB	2x	2	345	295	295	295	275	275	275	275
0.22 x 6	SDWS22600DB	2x, 3x, (2)-2x	2	345	295	295	295	275	275	275	275

1. Allowable loads are based on testing per ICC-ES AC233 and are limited to parallel-to-grain loading.
2. Allowable loads are shown at the wood load duration factor of  $C_D = 1.00$ . Loads may be increased for load duration by the building code up to a  $C_D = 1.60$ .
3. Minimum spacing of the SDWS is 6" o.c., minimum end distance is 6", and minimum edge distance is 5/8".
4. Wood structural panel up to 1 1/8" thick (2 3/8" for SDWS22400DB) is permitted between the sole plate and rim board provided it is fastened to the rim board per code and the minimum penetration of the screw into the rim board is met.
5. A double 2x sole plate/top plate is permitted provided it is independently fastened per the code and the minimum screw penetration per the table is met.
6. Minimum rim board height shall be 9 1/4" when using SDWS screws for sole and top plate fastening.
7. Sole-to-rim loads can be achieved without a wall below.



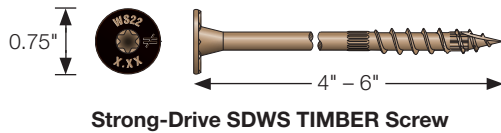
**Sole-to-Rim Board Assembly**  
(Other fasteners not shown for clarity)

# Sole / Top Plate-to-Rim Fastening

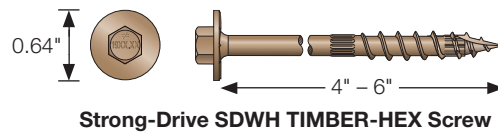
## **Strong-Drive®** SDWS TIMBER Screw and SDWH TIMBER-HEX Screw

### Sole Plate/Top Plate to Rim/Blocking Shear Load Transfer with Reduced Fastener Spacing

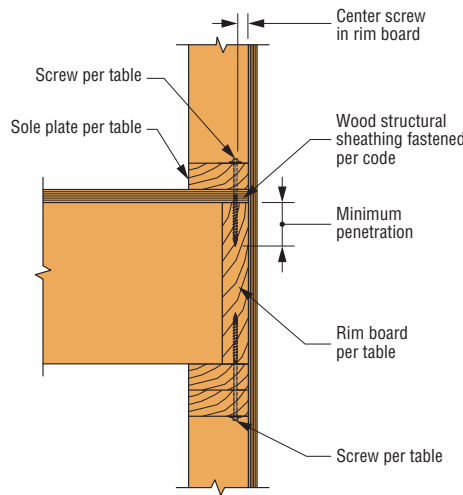
Strong-Drive SDWS Timber and Strong-Drive SDWH Timber-Hex structural screws may be used to attach a sole plate or top plate to a rim board and blocking material according to the following details and loading information. Allowable loads are based on testing per ICC-ES AC233 and are limited to parallel-to-grain or in-plane-shear loading. Each test assembly consisted of multiple fasteners, a sole plate, sheathing and a rim board or blocking material. Please see the following for allowable load tables.



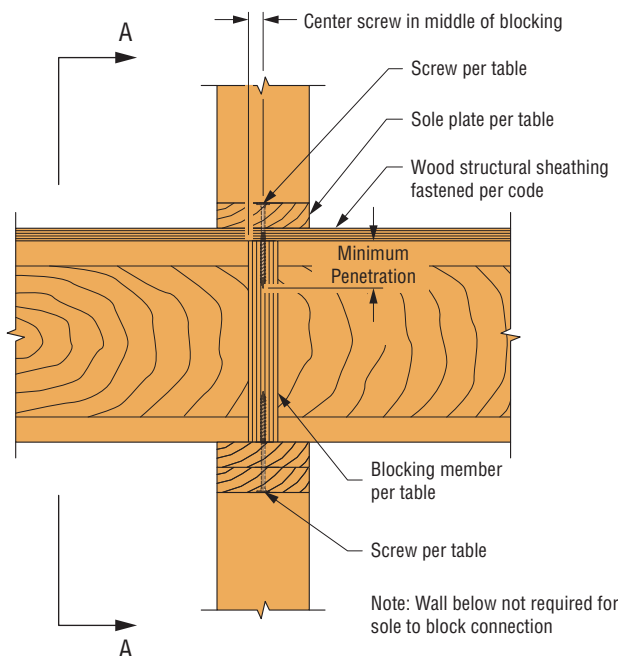
**Strong-Drive SDWS TIMBER Screw**



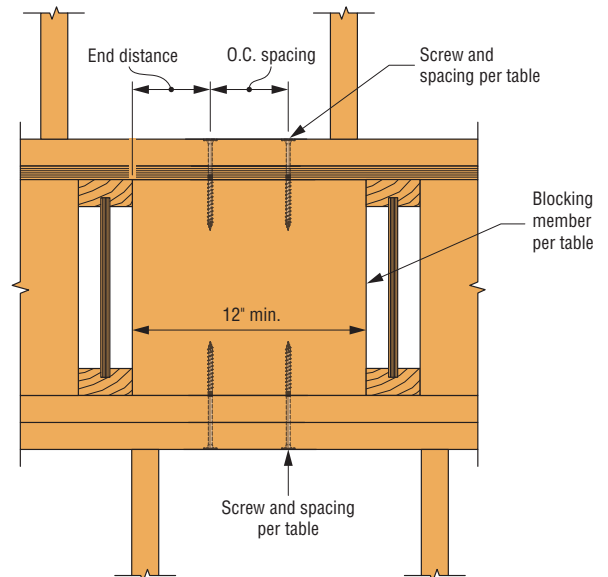
**Strong-Drive SDWH TIMBER-HEX Screw**



**Sole-to-Rim and Top Plate-to-Rim Connection**



**Sole-to-Block and Top Plate-to-Block Connection**



**Sole-to-Block and Top Plate-to-Block Connection**

## Sole/Top Plate-to-Rim Fastening

### Strong-Drive® SDWS TIMBER Screw and SDWH TIMBER-HEX Screw (cont.)

SDWS Timber/SDWH Timber-Hex Single-Fastener, Allowable Loads for Sole-to-Rim (or Blocking) and Top Plate-to-Rim (or Blocking) Connection

Min. Screw Length (in.)	Sole Plate or Top Plate Nominal Thickness	Model No.	Min. Penetration into Rim or Block (in.)	Reference Allowable Shear Loads (lb.) per Screw DFL/SP Sole Plate and Top Plate					
				Rim and Blocking Material					
				2x Min. DFL/SP		1 ¼" Min. LVL	1 ¼" Min. LVL	1 ¼" Min. LSL	1 ¼" Min. LSL
				6" O.C. 6" End Distance	3" O.C. 3" End Distance	6" O.C. 6" End Distance	4" O.C. 4" End Distance	6" O.C. 6" End Distance	4" O.C. 4" End Distance
4	Sole Plate	2x SDWH19400DB	1.75	315	220	255	260	275	230
4		2x SDWS22400DB	1.75	345	240	275	305	275	350
5		2x SDWS22500DB	2	345	240	275	360	275	345
6		3x SDWH19600DB	2	315	225	255	260	275	230
6		3x SDWS22600DB	2	345	240	275	360	275	345
6		(2) 2x SDWH19600DB	1.75	315	220	255	260	275	230
6		(2) 2x SDWS22600DB	1.75	345	240	275	305	275	350
8		(2) 2x SDWH19800DB	2	315	225	255	260	275	230
8		(2) 2x SDWS22800DB	2	345	240	275	360	275	345
5		Top Plate	(2) 2x SDWS22500DB	2	345	240	275	360	275
6	(2) 2x SDWH19600DB		2	315	225	255	260	275	230
6	(2) 2x SDWS22600DB		2	345	240	275	360	275	345

- Allowable loads are shown at the wood load duration factor of  $C_D = 1.00$ . Loads may be increased for load duration by the building code up to a  $C_D = 1.60$ .
- For 2x solid sawn members and 1 ¼" LVL or LSL members the minimum edge distance is 5/8". For 1 ¾" LVL or LSL members the minimum edge distance is 7/8".
- Wood structural panel up to 1 ½" thick (2 ¾" for 4" fasteners) is permitted between sole plate and rim board provided it is fastened to the rim board per code and the minimum penetration of the screw into the rim/block is met.
- Double sole plate and top plate fastened minimum per code.
- Minimum rim height is 9 ¼" when using fasteners on the top and bottom. Sole to blocking loads can be achieved with or without a wall below.
- For assemblies using SPF/HF lumber for the sole plate, top plate, or rim/blocking members, multiply table values by 0.86.

### Spacing for Multiple Rows of Fasteners

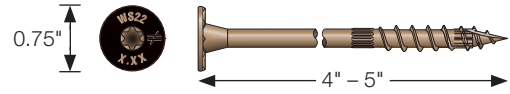
Material	O.C. Spacing/End Distance Spacing (in.)	Row Offset (in.)	Row Stagger (in.)
Solid Sawn	3	1 ¼	1 ¼
	6		
LVL or LSL	4	1 ¼	1 ¼
	6	1 ¼	1 ¼

- The material must be wide enough to accommodate minimum edge distance, row offset and row stagger.

# Deck Construction — Ledgers

## Strong-Drive® SDWS TIMBER Screw

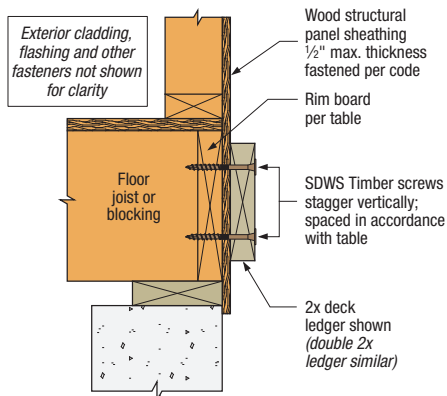
For more information, see p. 53, C-F-2019 Fastening Systems Catalog



### SDWS Timber Screw — 2015 and 2018 IRC Compliant Spacing for a Sawn Lumber Deck Ledger-to-Rim Board

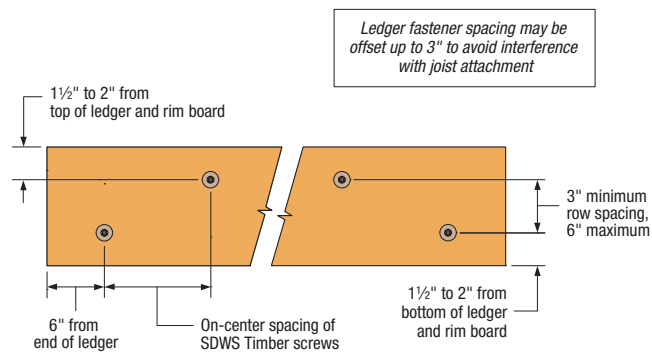
Loading Condition	Nominal Ledger Size (in.)	Size (in.)	Model No.	Rim Board Material and Minimum Size	Maximum Deck Joist Span						
					Up to 6 ft.	Up to 8 ft.	Up to 10 ft.	Up to 12 ft.	Up to 14 ft.	Up to 16 ft.	Up to 18 ft.
					Maximum On-Center Spacing of Fasteners (in.)						
40 psf Live 10 psf Dead	2x	0.22 x 4	SDWS22400DB	1" OSB	14	10	8	7	6	5	5
				1" LVL							
				1 1/8" OSB	16	12	10	8	7	6	5
				1 3/16" LVL							
				1 1/4" LSL							
2x SP, DFL — 2x SPF, HF	22	16	13	11	9	8	7				
60 psf Live 10 psf Dead	2x	0.22 x 4	SDWS22400DB	1" OSB	10	7	6	5	4	4	—
				1" LVL							
				1 1/8" OSB	12	9	7	6	5	4	4
				1 3/16" LVL							
				1 1/4" LSL							
2x SP, DFL — 2x SPF, HF	15	12	9	8	7	6	5				
40 psf Live 10 psf Dead	(2) 2x	0.22 x 5	SDWS22500DB	1" OSB	15	12	9	8	7	6	5
				1" LVL							
				1 1/8" OSB	16	12	10	8	7	6	5
				1 3/16" LVL							
				1 1/4" LSL							
2x SP, DFL — 2x SPF, HF	16	12	10	8	7	6	5				
60 psf Live 10 psf Dead	(2) 2x	0.22 x 5	SDWS22500DB	1" OSB	11	8	7	6	5	4	4
				1" LVL							
				1 1/8" OSB	12	9	7	6	5	4	4
				1 3/16" LVL							
				1 1/4" LSL							
2x SP, DFL — 2x SPF, HF	12	9	7	6	5	4	4				

- SDWS screw spacing values are equivalent to 2018 IRC Table R507.9.1.3(1) and 2015 IRC Table R507.2. The table above also provides SDWS screw spacing for a wide range of materials commonly used for rim board, and an alternate loading condition as required by some jurisdictions.
- Sawn lumber rim board shall be spruce-pine-fir, hem-fir, Douglas fir-larch, or southern pine species. Ledger shall be hem-fir, Douglas fir-larch, or southern pine species.
- Fastener spacings are based on the lesser of single fastener ICC-ES AC233 testing of the Strong-Drive SDWS Timber screw with a safety factor of 5.0 or ICC-ES AC13 assembly testing with a factor of safety of 5.0. Spacing includes NDS wet service factor adjustment.
- Multiple ledger plies shall be fastened together per code independent of the SDWS screws.
- Rows of screws shall be vertically offset and evenly staggered. Screws shall be placed 1 1/2" to 2" from the top and bottom of the ledger or rim board with 3" minimum and 6" maximum between rows and spaced per the table. End screws shall be located 6" from the end and at 1 1/2" to 2" from the bottom of the ledger. For screws located at least 2" but less than 6" from the end, use 50% of the load per screw and 50% of the table spacing between the end screw and the adjacent screw, and for screws located between 2" and 4" from the end, predrill using a 5/16" drill.
- Structural sheathing between the ledger and rim board shall be a maximum of 1/2" thick and fastened per code.
- See pp. 109–110 for ledger-to-rim attachment with 1/2" gap.



**Ledger-to-Rim Board Assembly**

(wood-framed lower floor acceptable, concrete wall shown for illustration purposes; other fasteners not shown for clarity.)



**SDWS Timber Screw Spacing Detail for Ledgers**

# Deck Construction — Ledgers

## **Strong-Drive®** SDWH **TIMBER-HEX** and SDWS **TIMBER** Screw

2015 and 2018 IRC Compliant Spacing and Allowable Shear Loads  
for Fastening a Sawn Lumber Deck Ledger-to-Rim Board with 1/2" Gap

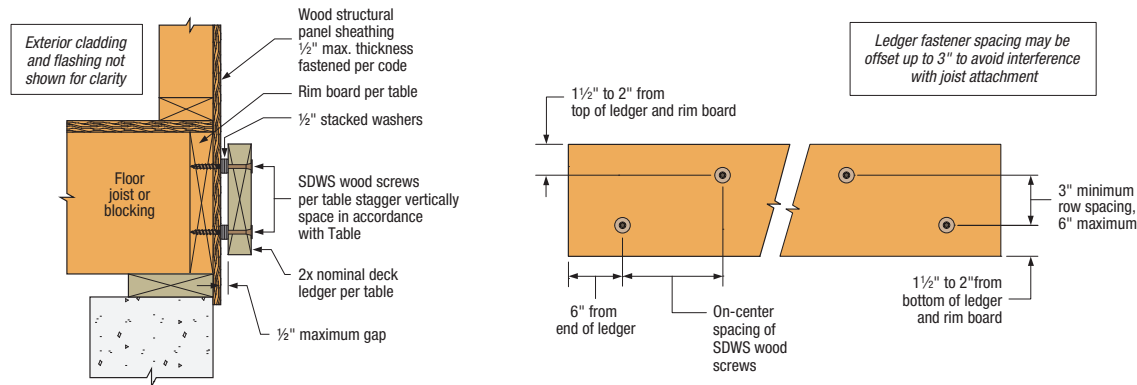


Table below lists the allowable shear loads for SDWS Timber screws and SDWH Timber-Hex screws when attaching a 2x ledger with up to 1/2" thickness of stacked washers to the listed rim board.

### Single-Fastener Allowable Shear Loads for Fastening a Sawn Lumber Deck Ledger-to-Rim Board with 1/2" Gap

Nominal Ledger Size (in.)	Rim Board	Size (in.)	Model No.	Reference Allowable Load (lb.)
2x	2x SPF, DFL, SP #2	0.220 x 4	SDWS22400DB	270
		0.195 x 4	SDWH19400DB	260
	1 1/8" LSL	0.220 x 4	SDWS22400DB	255
		0.195 x 4	SDWH19400DB	245
	1 3/4" LVL	0.220 x 4	SDWS22400DB	290
		0.195 x 4	SDWH19400DB	255

- Sawn Lumber 2x ledger shall have a minimum specific gravity of 0.42 (HF or SPF) and be grade No. 2 or better.
- Rim board is to be dry lumber (specific gravity at least 0.42) or EWP rim board product (equivalent specific gravity of at least 0.42 for nails and screws installed in the face orientation).
- Fastener spacings are based on the lesser of single fastener testing following ICC-ES AC233 or ledger assembly testing following ICC-ES AC13 using a safety factor of 5.0.
- Screws shall be placed 1 1/2" to 2" from the top and bottom of the ledger board or rim board, 6" from the end of the ledger with 3" minimum and 6" maximum between rows. Minimum on-center spacing is 4".
- Wood structural panel sheathing between the ledger and rim board shall be a maximum of 1/2" thick and fastened per code.
- Screws shall be tightened such that the washer stack is tightly compressed between the ledger and the rim board.
- Maximum 1/2" gap created by stacked hot-dip galvanized or stainless-steel 5/16" Type A plain washers (N-narrow) with an outside diameter equal to 0.688" and inside diameter equal to 0.344".
- Allowable loads are shown at the wood load duration factor of  $C_D = 1.0$ . Loads may be increased for load duration per the building code up to a  $C_D = 1.6$ . Tabulated values must be multiplied by all applicable adjustment factors per the NDS, including wet service factor.

C-F-201919TECHSUP ©2019 SIMPSON STRONG-TIE COMPANY INC.

Deck Applications

## Deck Construction — Ledgers

### Strong-Drive® SDWH TIMBER-HEX and SDWS TIMBER Screw (cont.)

#### 2015 and 2018 IRC Compliant Spacing and Allowable Shear Loads for Fastening a Sawn Lumber Deck Ledger-to-Rim Board with ½" Gap

Strong-Drive® SDWS Timber screws and SDWH Timber-Hex screws are suitable for installing ledgers with up to ½" drainage gap between the ledger and the rim board. These fasteners do not require predrilling and have a double-barrier coating providing corrosion resistance equivalent to hot-dip galvanization. The gap is formed by stacking hot-dip galvanized or stainless-steel ⅝" Type A plain washers (0.688" outside diameter, 0.344" inside diameter) on the shank of the screws between the ledger and the rim board. Weather proofing shall be the responsibility of the installer. The table below lists the maximum on-center spacing of SDWS Timber screws and SDWH Timber-Hex screws when attaching a 2x ledger to the listed rim board of various widths with a maximum ½" gap between them.

#### Loading Condition: 40 PSF Live Load and 10 PSF Dead Load

Ledger Nominal Size (in.)	Rim Board Material (in.)	Size (in.)	Model No.	Maximum Deck Joist Span						
				Up to 6 ft.	Up to 8 ft.	Up to 10 ft.	Up to 12 ft.	Up to 14 ft.	Up to 16 ft.	Up to 18 ft.
				Maximum On-Center Spacing of Fasteners (in.)						
2x	2x DFL, SP, SPF #2	0.220 x 4	SDWS22400DB	15	11	9	7	6	5	5
		0.195 x 4	SDWH19400DB	14	11	8	7	6	5	4
	1.125" LSL	0.220 x 4	SDWS22400DB	14	10	8	7	6	5	4
		0.195 x 4	SDWH19400DB	13	10	8	6	5	5	4
	1.75" LVL	0.220 x 4	SDWS22400DB	16	12	9	8	7	6	5
		0.195 x 4	SDWH19400DB	14	10	8	7	6	5	4

- Sawn lumber ledger shall have minimum specific gravity of 0.42 (HF or SPF) and shall be grade No. 2 or better. Rim board is to be dry lumber (specific gravity at least 0.42) or EWP rim board product (equivalent specific gravity of at least 0.42 for nails and screws installed in the face orientation).
- Fastener spacings are based on the lesser of single fastener testing following ICC-ES AC233 or ledger assembly testing following ICC-ES AC13 using a safety factor of 5.0. Spacing includes NDS wet service factor adjustment.
- Screws shall be placed 1½" to 2" from the top and bottom of the ledger board or rim board, 6" from the end of the ledger with 3" minimum and 6" maximum between rows. End screws shall be located near the bottom of the ledger. See figure on the following page.
- Wood structural panel sheathing between the ledger and rim board shall be a maximum of ½" thick and fastened per code.
- Screws shall be tightened such that the washer stacks are tightly compressed between the ledger and the rim board.
- Maximum ½" gap formed by stacked hot-dip galvanized or stainless-steel ⅝" Type A plain washers (N-narrow) with a nominal outside diameter of 0.688" and inside diameter of 0.344".
- The fastener specifications in this table meet the prescriptive deck ledger attachment solutions and loading requirements per 2018 IRC Table R507.9.1.3(1) and Table R507.2 of the 2012 and 2015 IRC.

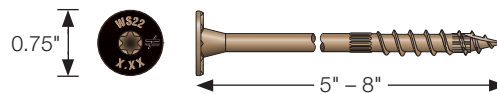
## Deck Construction — Guard Posts

# Strong-Drive® SDWS TIMBER Screw for Guard Post Installations

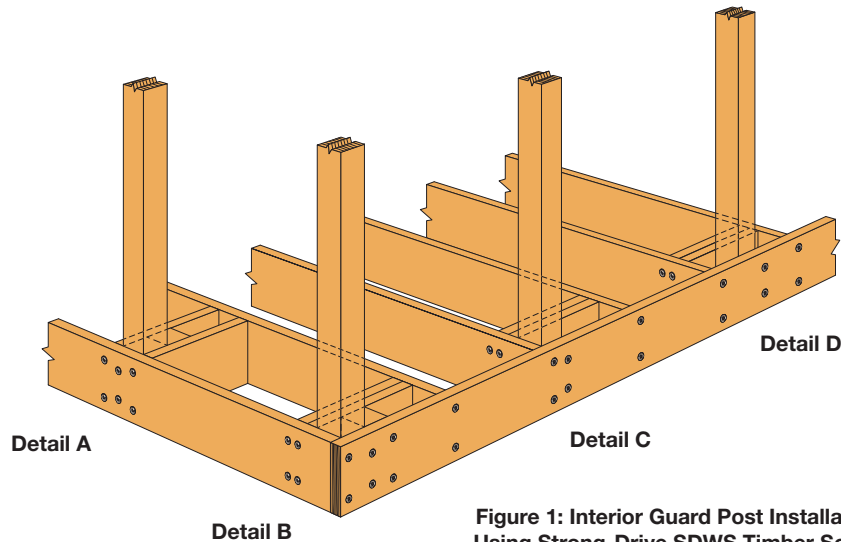
For more information, see p. 52, C-F-2019 Fastening Systems Catalog

Framed guard post installations fastened with SDWS Timber screws were tested in accordance with ICC-ES AC273 and met the 600 lb. concentrated ultimate load applied at the top of a single post in an outward direction and the post deflection limit at the 200 lb. design level. For a required uniform load of 150 plf in AC273 for guard and handrail systems, the screw was not tested as excepted for one- and two-family dwellings in IBC 2015 Section 1607.8.1. The following details were tested:

- Detail A: Interior Post on Rim Board
- Detail B: Interior Post at Corner
- Detail C: Interior Post on Rim Joist with Adjacent Joist
- Detail D: Interior Post on Rim Joist between Joists



The SDWS Timber screws are the subject of IAPMO-UES ER-192. The following table lists the SDWS Timber screw information and total quantity of fasteners required for each guard post detail. The guard post details are shown on pp. 116–118.



**Figure 1: Interior Guard Post Installations Using Strong-Drive SDWS Timber Screws**

### Code-Compliant Guard Post Connection Details

Installation Scope:

For 36" Guard Post Height  
(above deck surface, refer to T-F-GRDPSTRL)

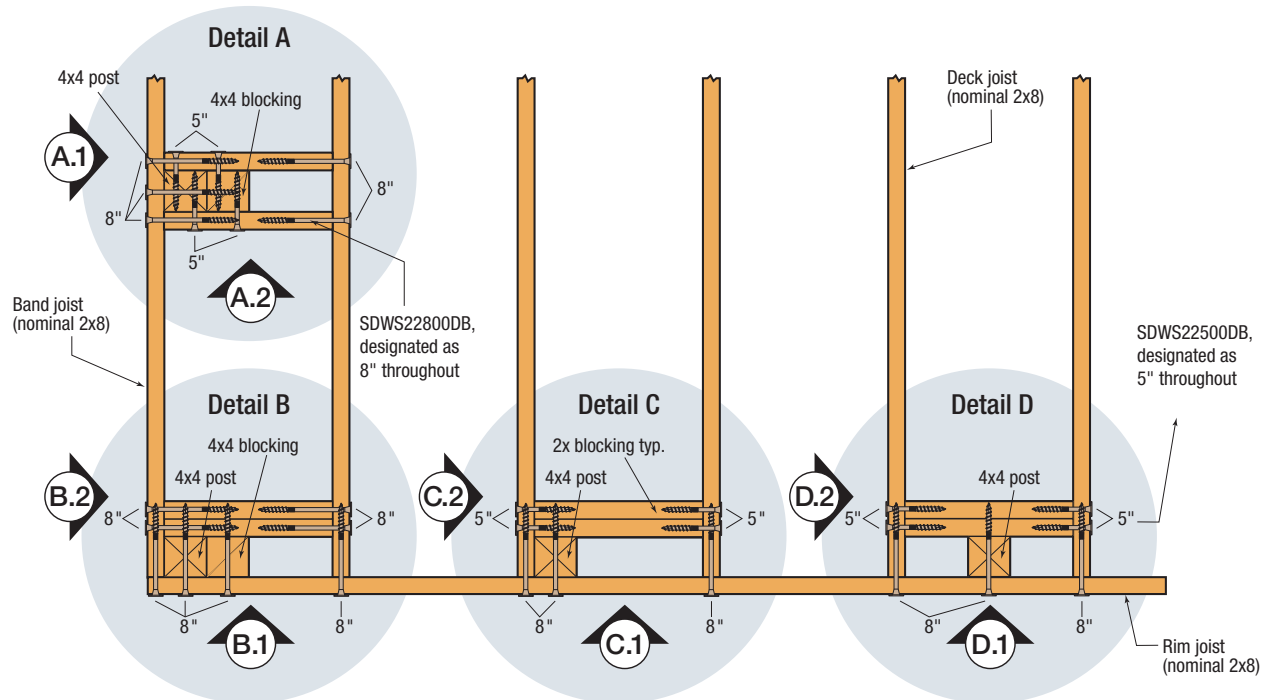
- Use Nominal 4" x 4" guard post
- Use Nominal 2" x 8" rim board/rim joist, 2x blocking and 4x blocking
- Framing lumber should be HF, DFL or SP, pressure treated with chemical retention not greater than UC4A
- Full-depth blocking required
- Interior post installation (post positioned inside the rim board, rim joist)
- Fastener position tolerance:  $\pm 1/16$ "

For 42" Guard Post Height  
(above deck surface, refer to L-F-SDWS42GRD)

- Use Nominal 4" x 4" guard post
- Use Nominal 2" x 8" rim board/rim joist, 2x blocking and 4x blocking
- Framing lumber should be DFL (No. 2 grade, minimum) or SP (Construction grade, minimum), pressure treated with chemical retention not greater than UC4A
- Full-depth blocking required
- Interior post installation (post positioned inside the rim board, rim joist)
- Fastener position tolerance:  $\pm 1/16$ "

# Deck Construction — Guard Posts

## Strong-Drive® SDWS TIMBER Screw for Guard Post Installations (cont.)



Plan View Showing Details of Four Guard Post Connections  
Using Strong-Drive SDWS Timber Screws

### SDWS22DB Screw Information for Guard Post Details

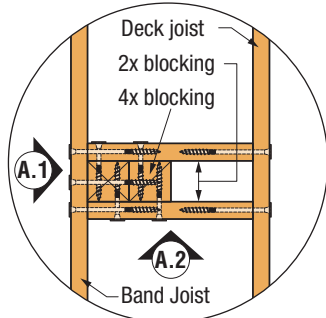
Detail	Size (in.)	Model No.	Quantity Required
A	0.220 x 5	SDWS22500DB	4
	0.220 x 8	SDWS22800DB	10
B	0.220 x 8	SDWS22800DB	16
C	0.220 x 5	SDWS22500DB	8
	0.220 x 8	SDWS22800DB	6
D	0.220 x 5	SDWS22500DB	8
	0.220 x 8	SDWS22800DB	6

- SDWS Timber screws install best with a low-speed ½" drill and a T-40 6-lobe bit. The matched bit included with the screws is recommended for best results.
- Predrilling is typically not required. Where predrilling is necessary, use a ⅝" drill bit for Strong-Drive SDWS Timber screws.
- Screw heads that are countersunk flush to the wood surface are acceptable if the screw has not spun out.
- Deck joists shall be fastened to rim joist and ledger as required by the code. See p. 118 for rim joist connection.

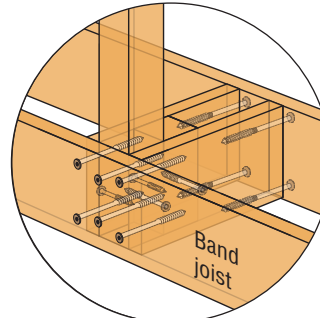
# Deck Construction — Guard Posts

## Strong-Drive® SDWS TIMBER Screw for Guard Post Installations (cont.)

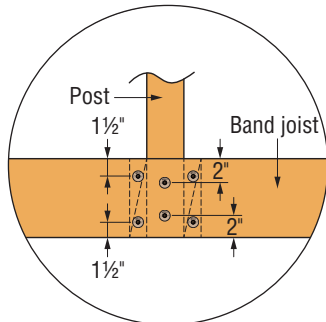
### Detail A — Interior Post on Rim Board



Detail A Plan View

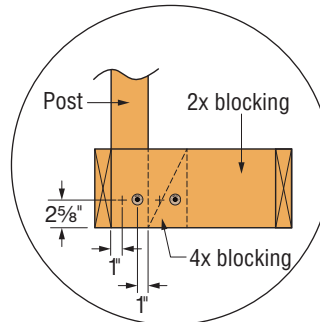


Detail A Isometric View



Detail A.1 Front Elevation

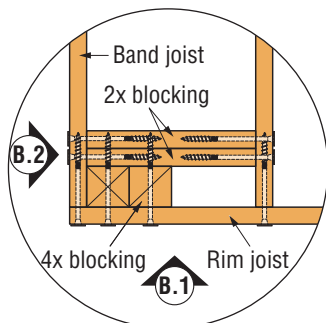
1. Rim board to 2x blocking 1 1/2" from top and bottom edges using 8" SDWS22800DB.
2. Rim board to post and 4x blocking 2" from top and bottom edges using 8" SDWS22800DB.



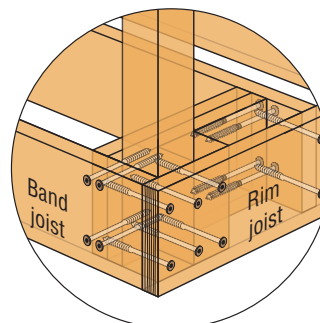
Detail A.2 Side Elevation

1. 2x blocking to post — opposing screws 1" from outer edges of post, 2 5/8" from bottom edge of 2x blocking using 5" SDWS22500DB.
2. 2x blocking to 4x blocking — opposing screws 1" from outer edges of 4x blocking, 2 5/8" from bottom edge of 2x blocking using 5" SDWS22500DB.

### Detail B — Interior Post on Corner

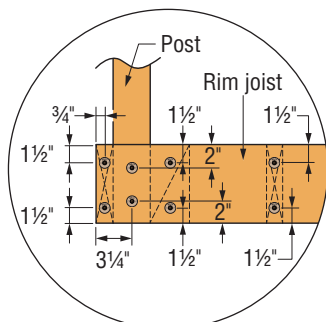


Detail B Plan View



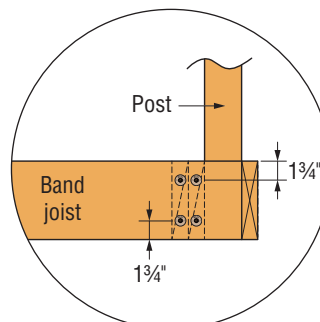
Detail B Isometric View

**Note:** For fastening rim joist to rim board and deck joists, predrilling for the SDWS22800DB screws is recommended using a 5/8" drill bit.



Detail B.1 Front Elevation

1. Rim joist to rim board or deck joists 1 1/2" from top and bottom edges, 3/4" from side edge using 8" SDWS22800DB.
2. Rim joist to post and 2x blocking 2" from top and bottom edges, centered on post using 8" SDWS22800DB.
3. Rim joist to 4x blocking and 2x blocking 1 1/2" from top and bottom edges centered on 4x blocking using 8" SDWS22800DB.



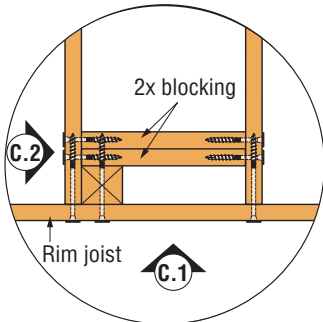
Detail B.2 Side Elevation

1. Rim board to 2x blocking 1 3/4" from top and bottom edges using 8" SDWS22800DB.

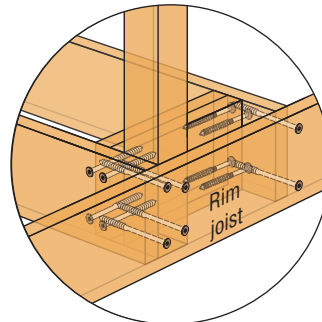
# Deck Construction — Guard Posts

## Strong-Drive® SDWS TIMBER Screw for Guard Post Installations (cont.)

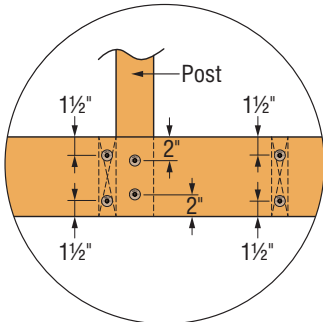
### Detail C — Interior Post on Rim Joist with Adjacent Joist



Detail C Plan View

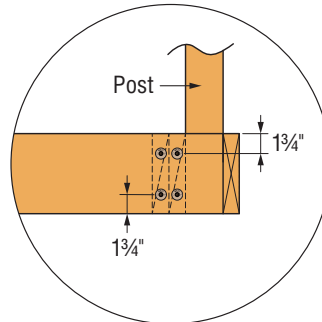


Detail C Isometric View



Detail C.1 Front Elevation

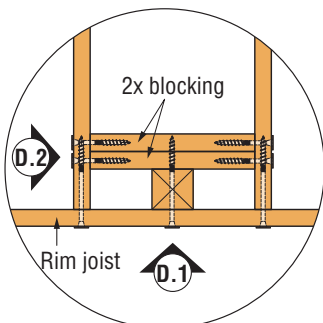
1. Rim joist to deck joist 1 1/2" from top and bottom edges using 8" SDWS22800DB.
2. Rim joist to post and 2x blocking 2" from top and bottom edges using 8" SDWS22800DB.



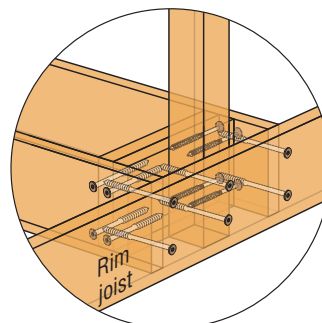
Detail C.2 Side Elevation

1. Deck joist to 2x blocking 1 3/4" from top and bottom edges using 5" SDWS22500DB.

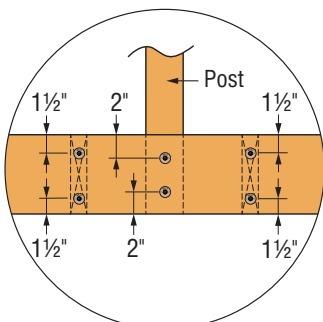
### Detail D — Interior Post on Rim Joist Between Joists



Detail D Plan View

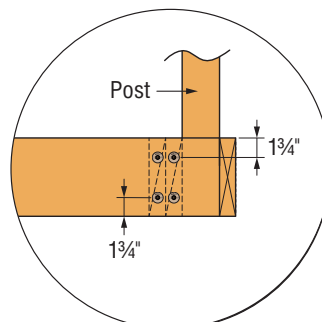


Detail D Isometric View



Detail D.1 Front Elevation

1. Rim joist to deck joists 1 1/2" from top and bottom edges using 8" SDWS22800DB.
2. Rim joist to post and 2x blocking 2" from top and bottom edges using 8" SDWS22800DB.



Detail D.2 Side Elevation

1. Deck joist to 2x blocking 1 3/4" from top and bottom edges using 5" SDWS22500DB.