



January 15, 2025

STRUCTURAL CALCULATIONS
(Permit Submittal)

FAUSER RESIDENCE REMODEL
9640 SE 61st PI
Mercer Island, WA 98040

Quantum Job Number: 24339.01

Prepared for:
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FAUSER RESIDENCE REMODEL

9640 SE 61st Pl

Mercer Island, WA 98040

Quantum Job Number: 24339.01

DESIGN CRITERIA

Structural Design Criteria

Building Code: 2021 International Building Code
Building Department: City of Mercer Island

Seismic Criteria

S_s :	1.45	I_e :	1.00
S_1 :	0.50	Seismic Soil Site Class:	D
S_{ds} :	1.16	Seismic Design Category:	D
S_{d1} :	0.60	C_s :	0.18
R:	6.50	Light-Framed Wood Walls Sheathed With Wood Structural Panels	

Wind Criteria

Wind Speed:	98 MPH
Risk Category:	II
Wind Exposure:	C
K_{zt} :	1.0

Geotechnical Criteria

Allowable Bearing Pressure	1500 PSF
Minimum Footing Width	Continuous: 18" min., Isolated: 24" min.
Frost Depth	18" min.
Active Soil Pressure (Restrained/Unrestrained)	50 PCF / 35 PCF
Seismic Surcharge Pressure (Restrained/Unrestrained)	8H PSF / 6H PSF
Passive Soil Pressure	350 PCF
Coefficient of Friction	0.35

Materials Criteria

Concrete (28 Day Strength):

Foundation/Slab on Grade	F'_c = 2,500 PSI
--------------------------	--------------------

Reinforcing Steel:

Grade 60 (#5 bar and larger)	F_y = 60,000 PSI
Grade 40 (#4 bar)	F_y = 40,000 PSI

Structural Steel:

Wide-Flange Sections: A-992	F_y = 50,000 PSI
Miscellaneous Sections: A-36	F_y = 36,000 PSI
Tube Sections: A-500 Grade C	F_y = 50,000 PSI
Pipe Sections: A-53 Grade B	F_y = 35,000 PSI
Welding	F_y = 70,000 PSI

Wood Framing:

2x, 3x & 4x Framing Members	HF#2 or DF#2
6x Framing Members	DF#1
Glulam Beams	24F-V4 (V8 @ Cont. and Cant. Members)
Parallam Beams	2.0 E PSL
LSL Members - Beams & Headers	1.55 E LSL
LSL Members - Studs & Columns	1.3 E LSL
LVL Members - Beams & Headers	1.9 E LVL
Wood Sheathing	APA RATED

Residential Building Loads

Snow Load	Roof	25 psf
Live Load	Residential	40 psf
	Residential exterior decks / balconies	60 psf

Assembly Loads

Roof Loads		Comments
Standard Roofing	4.0 psf		INCL W/ MISC FOR SEISMIC SL=25 psf
1/2" Ply. Sheathing	1.5 psf	
Joists @ 24" o.c.	2.1 psf	
R38 Insulation	1.0 psf	
5/8" GWB	2.8 psf	
Lights, ducts	0.5 psf	
PV Allowance	5.0 psf	
Miscellaneous	1.1 psf	
Total:	18.0 psf	

Upper Floor Loads		Comments
Flooring	3.0 psf		LL=40 psf
3/4" Ply. Sheathing	2.3 psf	
Floor Joists @ 16" o.c.	2.5 psf	
5/8" GWB	2.8 psf	
Lights, ducts	0.8 psf	
Miscellaneous	0.6 psf	
Partitons	-	
Total:	12.0 psf	

Deck Loads		Comments
Wood Decking/Ped.	4.0 psf		LL=60 PSF
Membrane Roofing	2.2 psf	
3/4" Ply. Sheathing	2.3 psf	
2x + Joists @ 16" o.c.	3.2 psf	
Wood Soffit	1.8 psf	
Miscellaneous	1.5 psf	
Total:	15.0 psf	

Interior Wall Framing	
5/8" GWB	2.8 psf
2x4 @ 16" o.c.	0.9 psf
5/8" GWB	2.8 psf
Mech./Elec.	0.5 psf
Misc.	1.0 psf
Total:	8.0 psf

Exterior Wood Stud Wall	
Siding	2.3 psf
1/2" Plywood	1.5 psf
2x6 studs @ 16" o.c.	1.7 psf
Insulation	0.5 psf
1/2" GWB	2.2 psf
Mech./Elec.	0.5 psf
Misc.	1.3 psf
Total:	10.0 psf

Deflection Criteria

Roof	Walls	Floor
Live Load: L/240	L/120 *flexible finishes	Live Load: L/360
Total Load: L/180	L/240 *brittle finish	Total Load: L/240
	L/240 *supporting glass	

⚠ This is a beta release of the new ATC Hazards by Location website. Please [contact us](#) with feedback.

ℹ The ATC Hazards by Location website will not be updated to support ASCE 7-22. [Find out why.](#)

ATC Hazards by Location

Search Information

Address:	9640 SE 61st Pl, Mercer Island, WA 98040, USA
Coordinates:	47.5483323, -122.210292
Elevation:	69 ft
Timestamp:	2024-10-01T16:29:00.483Z
Hazard Type:	Seismic
Reference Document:	ASCE7-16
Risk Category:	II
Site Class:	D-default



Basic Parameters

Name	Value	Description
S_S	1.448	MCE_R ground motion (period=0.2s)
S_1	0.502	MCE_R ground motion (period=1.0s)
S_{MS}	1.738	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	1.159	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA

* See Section 11.4.8

Additional Information

Name	Value	Description
SDC	* null	Seismic design category
F_a	1.2	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s
CR_S	0.902	Coefficient of risk (0.2s)
CR_1	0.899	Coefficient of risk (1.0s)

PGA	0.62	MCE _G peak ground acceleration
F _{PGA}	1.2	Site amplification factor at PGA
PGA _M	0.744	Site modified peak ground acceleration
T _L	6	Long-period transition period (s)
SsRT	1.448	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.606	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	4.281	Factored deterministic acceleration value (0.2s)
S1RT	0.502	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.559	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.645	Factored deterministic acceleration value (1.0s)
PGAd	1.425	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

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

Please note that the ATC Hazards by Location website will not be updated to support ASCE 7-22. [Find out why.](#)

Disclaimer

Hazard loads are provided by the U.S. Geological Survey [Seismic Design Web Services](#).

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ATC Hazards by Location

Search Information

Address: 9640 SE 61st Pl, Mercer Island, WA 98040, USA
Coordinates: 47.5483323, -122.210292
Elevation: 69 ft
Timestamp: 2024-10-01T16:28:34.197Z
Hazard Type: Wind



ASCE 7-16

MRI 10-Year 67 mph
 MRI 25-Year 73 mph
 MRI 50-Year 78 mph
 MRI 100-Year 83 mph
 Risk Category I 92 mph
 Risk Category II 98 mph
 Risk Category III 105 mph
 Risk Category IV 108 mph

ASCE 7-10

MRI 10-Year 72 mph
 MRI 25-Year 79 mph
 MRI 50-Year 85 mph
 MRI 100-Year 91 mph
 Risk Category I 100 mph
 Risk Category II 110 mph
 Risk Category III-IV 115 mph

ASCE 7-05

ASCE 7-05 Wind Speed 85 mph

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Disclaimer

Hazard loads are interpolated from data provided in ASCE 7 and rounded up to the nearest whole integer. Per ASCE 7, islands and coastal areas outside the last contour should use the last wind speed contour of the coastal area – in some cases, this website will extrapolate past the last wind speed contour and therefore, provide a wind speed that is slightly higher. NOTE: For queries near wind-borne debris region boundaries, the resulting determination is sensitive to rounding which may affect whether or not it is considered to be within a wind-borne debris region.

Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

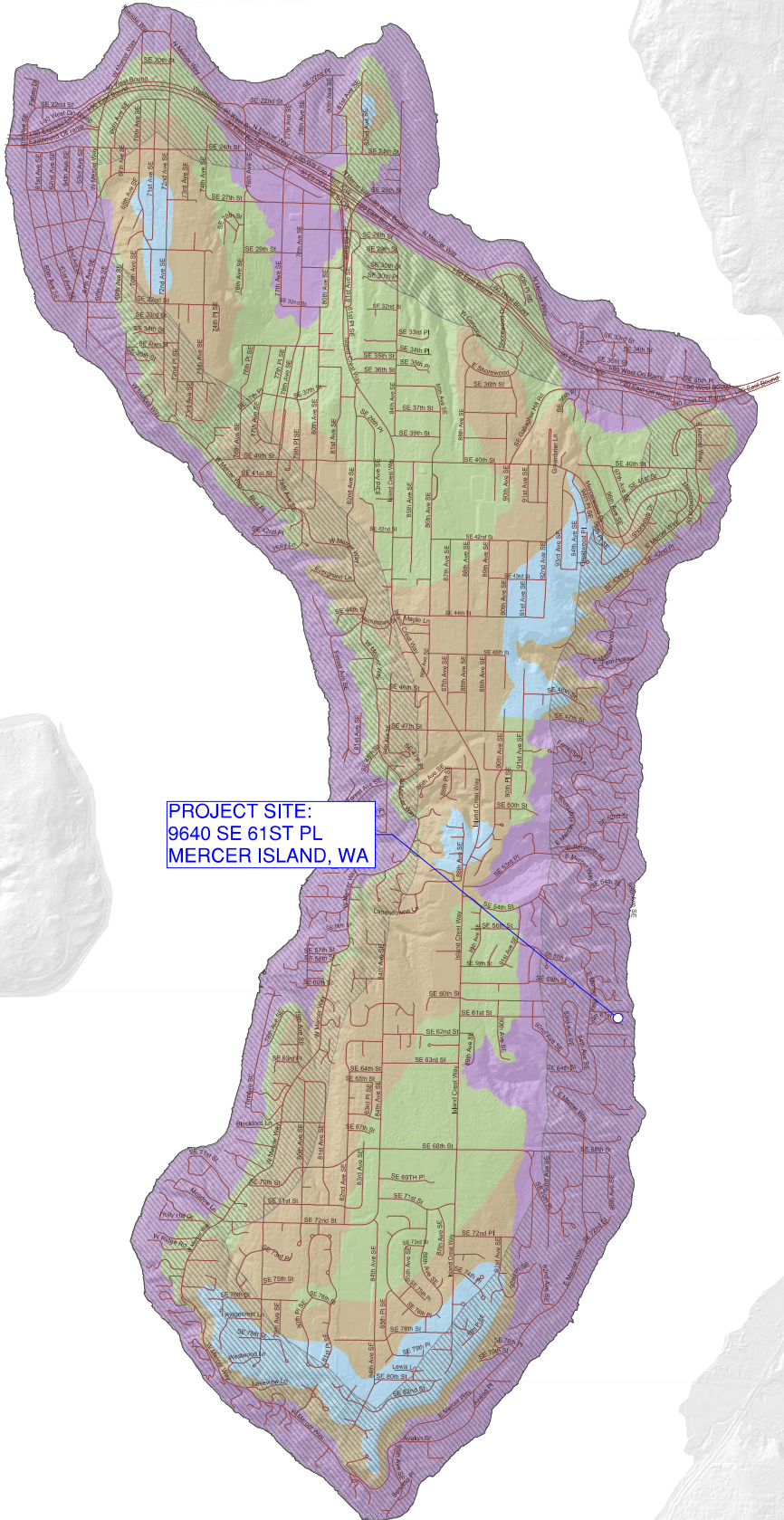
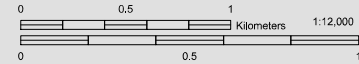
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Mercer Island Wind Exposure and Wind Speed-Up (Topographic Effect)

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



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PROJECT SITE:
9640 SE 61ST PL
MERCER ISLAND, WA

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 Kzt factor to be utilized for each specific project. The Kzt 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 Kzt 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_{z,t} Factor :

K _{z,t} Factor		K _{z,t} = 1.0
		K _{z,t} = 1.3
		K _{z,t} = 1.6
		K _{z,t} = 1.9

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_{z,t}" 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.

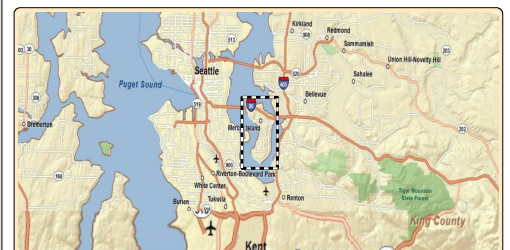
DEFINITIONS:

K_{z,t} 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 1608.4.3.

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 1608.4.3.

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



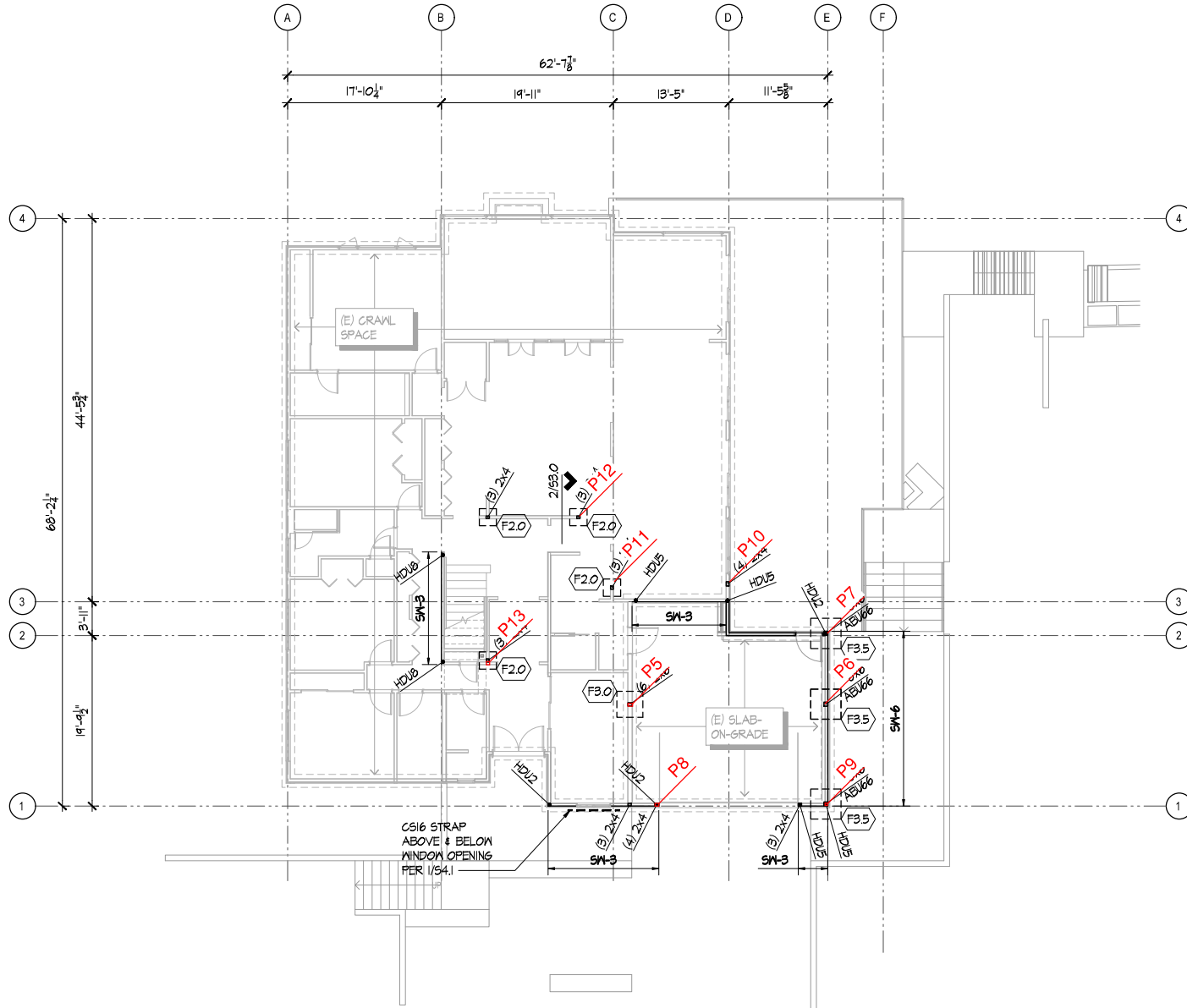
FAUSER RESIDENCE REMODEL

9640 SE 61st Pl

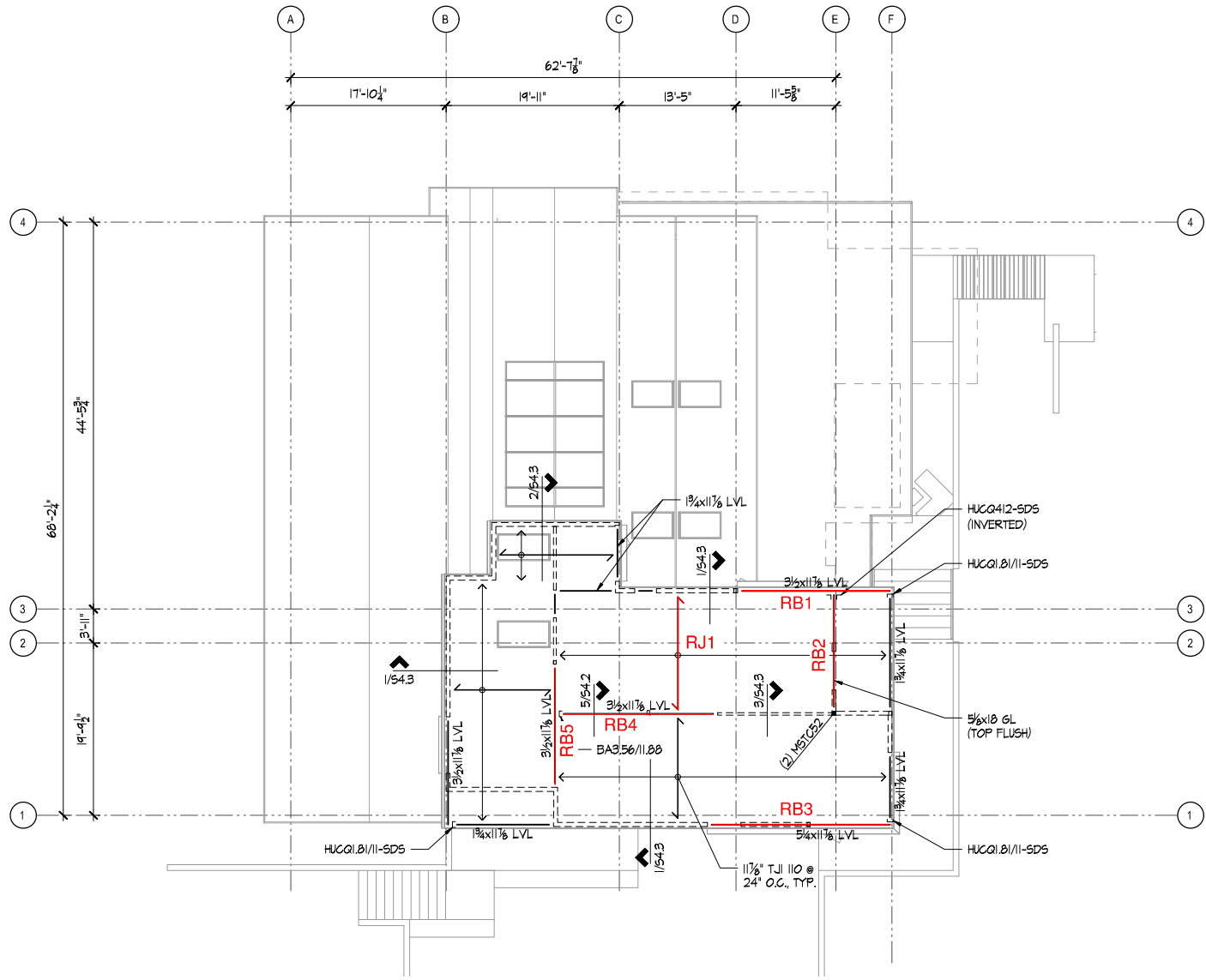
Mercer Island, WA 98040

Quantum Job Number: 24339.01

GRAVITY DESIGN



MAIN FLOOR GRAVITY FRAMING KEY PLAN



ROOF GRAVITY FRAMING KEY PLAN

Roof			
Member Name	Results (Max UTIL %)	Current Solution	Comments
RJ1 - Roof Joist at Bedroom	Passed (70% M)	1 piece(s) 2 x 12 HF No.2 @ 24" OC	
RB1 - North Cantilever Beam at Bedroom	Passed (90% R)	2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
RB2 - Grid E Roof Beam	Failed (63% ΔT)	1 piece(s) 5 1/8" x 18" 24F-V8 DF Glulam	SEE NOTES ON CALC PAGE An excessive uplift of -5435 lbs at support located at 13' 9 1/2" failed this product.
RB3 - South Cantilever Beam at Office	Passed(58% ΔL)	3 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
RB4 - Flush Beam at Office	Passed (72% R)	2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
RB5 - Flush Beam at Gym	Passed (76% M)	2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
2nd Floor			
Member Name	Results (Max UTIL %)	Current Solution	Comments
J1 - Office Floor Joist	Passed (42% R)	1 piece(s) 14" TJI@ 110 @ 16" OC	Web Stiffeners Required
J2 - Balcony Deck Joist	Passed (36% R)	1 piece(s) 2 x 10 HF No.2 @ 16" OC	
B1 - South Cantilever Beam at Deck	Passed (88% ΔL)	1 piece(s) 6 3/4" x 18" 24F-V8 DF Glulam	
B2 - North Cantilever Beam at Deck	Passed (78% ΔL)	3 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	
B3 - East Cantilever Beam at Deck	Failed (81% ΔL)	1 piece(s) 5 1/8" x 18" 24F-V8 DF Glulam	SEE NOTES ON CALC PAGE An excessive uplift of -2824 lbs at support located at 14' 6" failed this product.
B4 - East Rim Beam at Deck	Passed (87% ΔL)	1 piece(s) 6 x 10 HF No.1	
B5 - South Rim Beam at Office	Passed (100% R)	3 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	
B5 - South Rim Beam at Office (Overstrength)	Failed (100% R)	3 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	SEE NOTES ON CALC PAGE An excessive uplift of -2095 lbs at support located at 3 1/2" failed this product.
B6 - Cantilever Beam at Office	Failed (89% V)	3 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	SEE NOTES ON CALC PAGE An excessive uplift of -1400 lbs at support located at 2" failed this product.
B7 - Flush Beam at Gym	Passed (58% R)	2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	
B8 - Flush Beam at Stair	Passed (41% R)	2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	
B9 - Flush Beam at North Closet	Passed (55% R)	2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	
B9 - Flush Beam at North Closet (Overstrength)	Failed (75% R)	2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	SEE NOTES ON CALC PAGE Multiple Failures/Errors
B10 - Flush Beam over Kitchen	Passed (79% M)	2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	
B10 - Flush Beam over Kitchen (Overstrength)	Passed (80% R)	2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	
B11 - Flush Beam at Grid F	Passed (84% R)	2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	
B11 - Flush Beam at Grid F (Overstrength)	Failed (100% R)	2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL	SEE NOTES ON CALC PAGE Multiple Failures/Errors
P1 - Post	Passed (89% f _{cp})	1 piece(s) 4 x 6 HF No.2	
P2 - Post	Passed (10% f _{cp})	3 piece(s) 2 x 6 HF No.2	
P3 - Post	Passed (56% f _{cp})	3 piece(s) 2 x 4 HF No.2	
P4 - Post	Passed (39% f _c)	2 piece(s) 2 x 6 HF No.2	

ForteWEB Software Operator	Job Notes
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	



Main Floor			
Member Name	Results (Max UTIL %)	Current Solution	Comments
P5 - Post	Passed (97% f_{ep})	4 piece(s) 2 x 6 HF No.2	
P6 - Post	Passed (48% f_c)	1 piece(s) 6 x 6 DF No.1	
P7 - Post	Passed (61% f_c)	1 piece(s) 6 x 6 DF No.1	
P8 - Post	Passed (66% f_{ep})	3 piece(s) 2 x 6 HF No.2	
P9 - Post	Passed (55% f_c)	1 piece(s) 6 x 6 DF No.1	
P10 - Post	Passed (101% f_{ep})	3 piece(s) 2 x 4 HF No.2	
P11 - Post	Passed (76% f_{ep})	3 piece(s) 2 x 4 HF No.2	
P12 - Post	Passed (55% f_{ep})	3 piece(s) 2 x 4 HF No.2	
P13 - Post	Passed (32% f_{ep})	3 piece(s) 2 x 4 HF No.2	

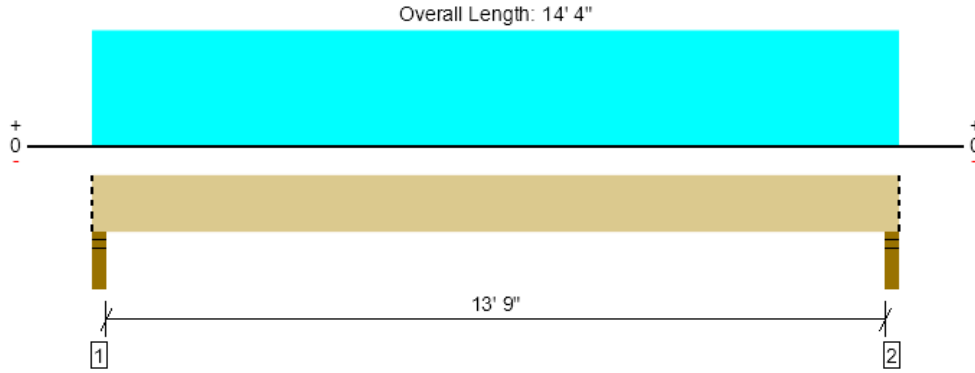
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ForteWEB Software Operator	Job Notes
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	



1/15/2025 7:55:08 PM UTC
ForteWEB v3.8
File Name: 24339 - Fauser Residence

Roof, RJ1 - Roof Joist at Bedroom
1 piece(s) 2 x 12 HF No.2 @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	616 @ 2 1/2"	2126 (3.50")	Passed (29%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	511 @ 1' 2 3/4"	1941	Passed (26%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2082 @ 7' 2"	2964	Passed (70%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.182 @ 7' 2"	0.696	Passed (L/916)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.314 @ 7' 2"	0.928	Passed (L/532)	--	1.0 D + 1.0 S (All Spans)

Member Length : 14' 4"
System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 0/12

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.50"	258	358	616	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.50"	258	358	616	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)	5' 2" o/c	
Bottom Edge (Lu)	14' 4" 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 14' 4"	24"	18.0	25.0	Roof

Weyerhaeuser Notes

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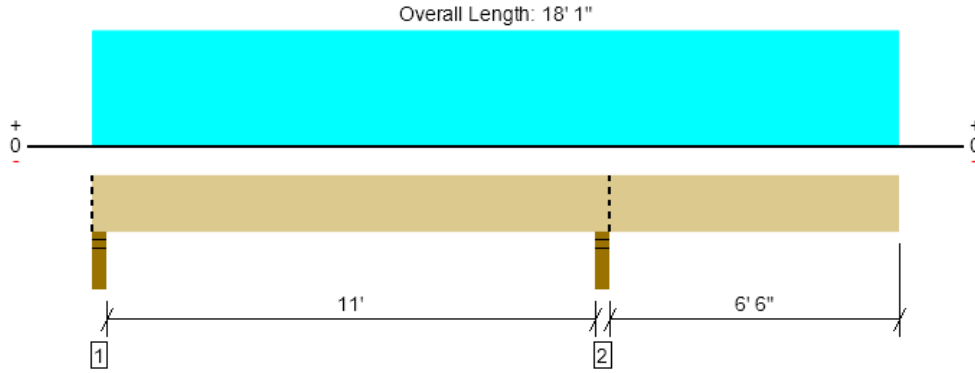
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	



1/15/2025 7:55:08 PM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 24339 - Fauser Residence

Roof, RB1 - North Cantilever Beam at Bedroom
2 piece(s) 1 3/4" x 11 7/8" 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)	4459 @ 11' 5 1/4"	4961 (3.50")	Passed (90%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2023 @ 10' 3 5/8"	9081	Passed (22%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-6915 @ 11' 5 1/4"	20525	Passed (34%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.196 @ 18' 1"	0.443	Passed (2L/816)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.301 @ 18' 1"	0.665	Passed (2L/530)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 18' 1"
System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Right cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - HF	3.50"	3.50"	1.50"	531	844	1375	Blocking
2 - Stud wall - HF	3.50"	3.50"	3.15"	1967	2492	4459	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' 1" o/c	
Bottom Edge (Lu)	18' 1" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 18' 1"	N/A	12.1	--	
1 - Uniform (PSF)	0 to 18' 1" (Top)	7'	18.0	25.0	Roof

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

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

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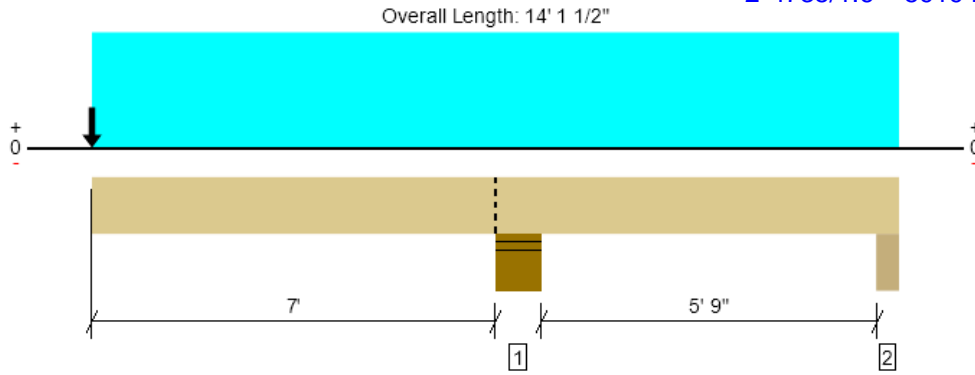
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File Name: 24339 - Fauser Residence

Roof, RB2 - Grid E Roof Beam
1 piece(s) 5 1/8" x 18" 24F-V8 DF Glulam

UPLIFT IS RESISTED BY (2) MSTC52 STRAPS AS SHOWN ON S2.2

An excessive uplift of -5435 lbs at support located at 13' 9 1/2" failed this product.

**ALLOWABLE TENSION:
 2*4735/1.6 = 5919 LB, OK**



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)	11338 @ 7' 5 1/2"	22832 (11.00")	Passed (50%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	5858 @ 9' 5"	18742	Passed (31%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	0 @ N/A	N/A	Passed (N/A)	--	N/A
Neg Moment (Ft-lbs)	-36272 @ 7' 5 1/2"	63653	Passed (57%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.261 @ 0	0.497	Passed (2L/686)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.471 @ 0	0.746	Passed (2L/380)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 14' 1 1/2"
 System : Roof
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD
 Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Left cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 13' 9 1/2".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - HF	11.00"	11.00"	5.46"	5161	6177	11338	Blocking
2 - Column - DF	5.50"	5.50"	1.50"	-2368	-3067	-5435	None

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	14' 2" o/c	
Bottom Edge (Lu)	14' 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 14' 1 1/2"	N/A	22.4	--	
1 - Uniform (PSF)	0 to 14' 1 1/2" (Top)	2'	18.0	25.0	Roof
2 - Point (lb)	0 (Front)	N/A	1967	2492	Linked from: RB1 - North Cantilever Beam at Bedroom, Support 2

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

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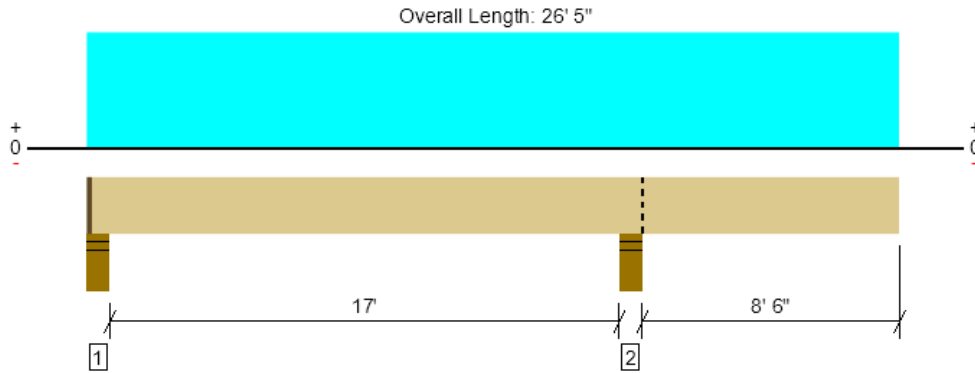
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 File Name: 24339 - Fauser Residence

Roof, RB3 - South Cantilever Beam at Office
3 piece(s) 1 3/4" x 11 7/8" 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)	5835 @ 17' 8 1/4"	11694 (5.50")	Passed (50%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2874 @ 16' 5 5/8"	13622	Passed (21%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-11342 @ 17' 8 1/4"	23091	Passed (49%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.337 @ 26' 5"	0.582	Passed (2L/622)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.466 @ 26' 5"	0.873	Passed (2L/450)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 26' 3 3/4"
 System : Roof
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD
 Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Moment capacity over cantilever support 2 has been reduced by 25% to lessen the effects of buckling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - HF	5.50"	4.25"	1.50"	919	1286	2205	1 1/4" Rim Board
2 - Stud wall - HF	5.50"	5.50"	2.74"	2650	3185	5835	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)	26' 4" o/c	
Bottom Edge (Lu)	26' 1" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	1 1/4" to 26' 5"	N/A	18.2	--	
1 - Uniform (PSF)	0 to 26' 5" (Top)	6' 6"	18.0	25.0	Roof

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

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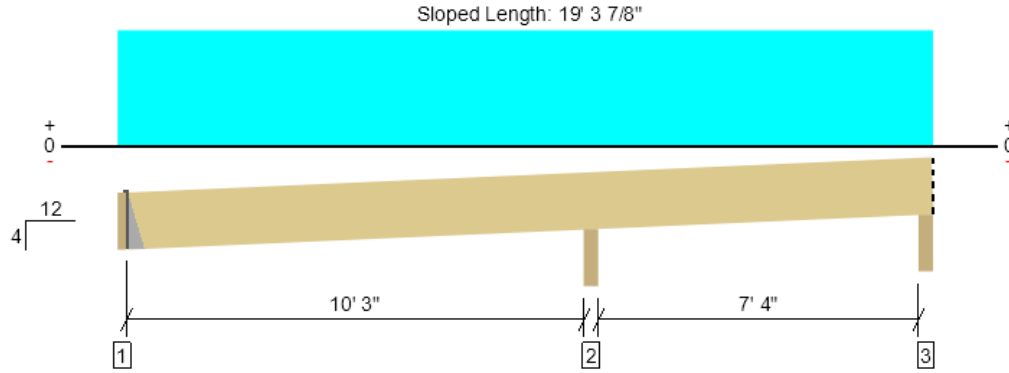
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Roof, RB4 - Flush Beam at Office

2 piece(s) 1 3/4" x 11 7/8" 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)	6957 @ 10' 6 3/4"	9684 (3.50")	Passed (72%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3128 @ 9' 5 3/4"	9081	Passed (34%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-6583 @ 10' 6 3/4"	20525	Passed (32%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.072 @ 4' 11 1/16"	0.548	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.125 @ 4' 10 1/2"	0.731	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 19' 5 3/4"
System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Hanger on 11 7/8" LVL beam	2.00"	Hanger ¹	1.50"	1158	1508	2665	See note ¹
2 - Column - DF	3.50"	3.50"	2.51"	3085	3872	6957	None
3 - Beveled Plate - HF	3.50"	3.50"	1.50"	683	1031	1714	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	19' 2" o/c	
Bottom Edge (Lu)	19' 2" o/c	

- Maximum allowable bracing intervals based on applied load.
- Dimensions for lateral bracing intervals are measured along the length of the member for sloped conditions.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Top Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	

- 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)	2" to 18' 4"	N/A	12.1	--	
1 - Uniform (PSF)	0 to 18' 4"	13' 6"	18.0	25.0	Roof

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

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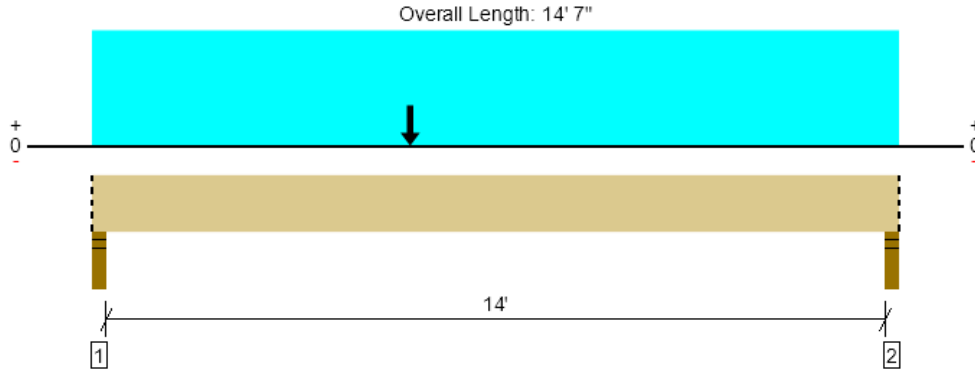
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Roof, RB5 - Flush Beam at Gym

2 piece(s) 1 3/4" x 11 7/8" 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)	3591 @ 2"	4961 (3.50")	Passed (72%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3245 @ 1' 3 3/8"	9081	Passed (36%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	15588 @ 5' 9"	20525	Passed (76%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.316 @ 7' 13/16"	0.712	Passed (L/542)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.563 @ 7' 7/8"	0.950	Passed (L/304)	--	1.0 D + 1.0 S (All Spans)

Member Length : 14' 7"
System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 0/12

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - HF	3.50"	3.50"	2.53"	1580	2011	3591	Blocking
2 - Stud wall - HF	3.50"	3.50"	2.13"	1330	1685	3014	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)	14' 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 14' 7"	N/A	12.1	--	
1 - Uniform (PSF)	0 to 14' 7" (Top)	6'	18.0	25.0	Roof
2 - Point (lb)	5' 9" (Front)	N/A	1158	1508	Linked from: RB4 - Flush Beam at Office, Support 1

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

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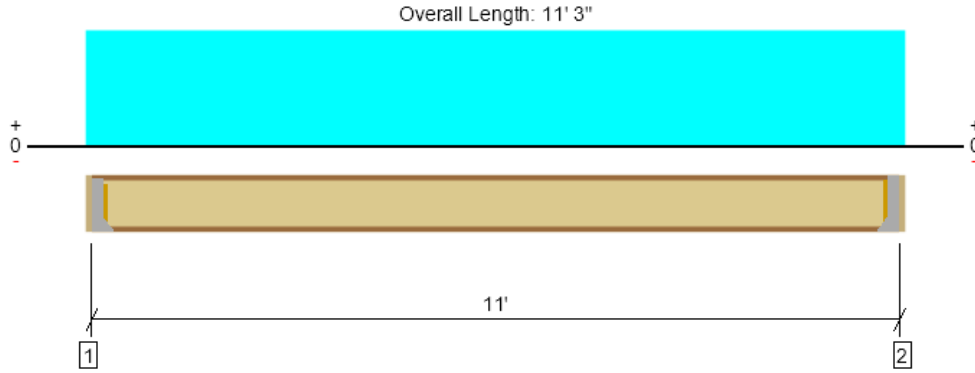
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2nd Floor, J1 - Office Floor Joist
1 piece(s) 14" TJI® 110 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	381 @ 1 1/2"	910 (1.75")	Passed (42%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	381 @ 1 1/2"	1860	Passed (21%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1049 @ 5' 7 1/2"	3740	Passed (28%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.048 @ 5' 7 1/2"	0.275	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.063 @ 5' 7 1/2"	0.550	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	61	45	Passed	--	--

Member Length : 11'
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Hanger on 14" GLB beam	1.50"	Hanger ¹	1.75" / - ²	90	300	390	See note ¹
2 - Hanger on 14" GLB beam	1.50"	Hanger ¹	1.75" / - ²	90	300	390	See note ¹

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 2" o/c	
Bottom Edge (Lu)	11' o/c	

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

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	IUS1.81/9.5	2.00"	N/A	8-10dx1.5	2-10dx1.5	Web Stiffeners
2 - Face Mount Hanger	IUS1.81/9.5	2.00"	N/A	8-10dx1.5	2-10dx1.5	Web Stiffeners

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

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 11' 3"	16"	12.0	40.0	Floor

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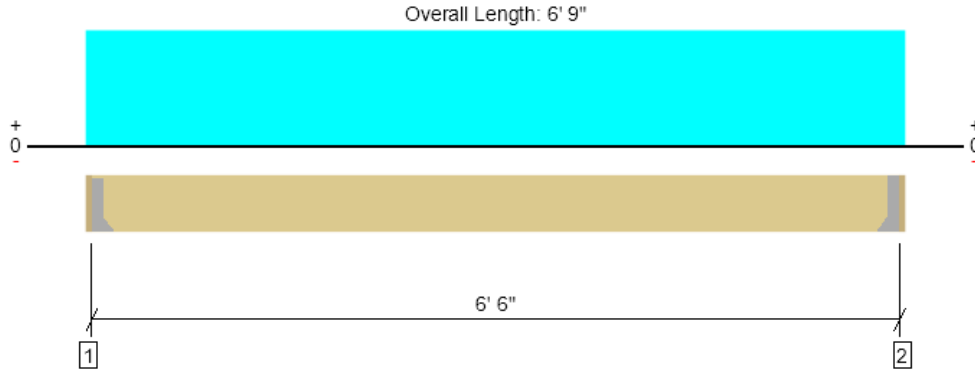
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2nd Floor, J2 - Balcony Deck Joist
1 piece(s) 2 x 10 HF No.2 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	325 @ 1 1/2"	911 (1.50")	Passed (36%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	248 @ 10 3/4"	1388	Passed (18%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	528 @ 3' 4 1/2"	1917	Passed (28%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.025 @ 3' 4 1/2"	0.162	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.031 @ 3' 4 1/2"	0.325	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

Member Length : 6' 6"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Hanger on 9 1/4" GLB beam	1.50"	Hanger ¹	1.50"	68	270	338	See note ¹
2 - Hanger on 9 1/4" GLB beam	1.50"	Hanger ¹	1.50"	68	270	338	See note ¹

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 6" o/c	
Bottom Edge (Lu)	6' 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	LU28	1.50"	N/A	8-10dx1.5	6-10dx1.5		
2 - 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 Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 6' 9"	16"	15.0	60.0	Deck

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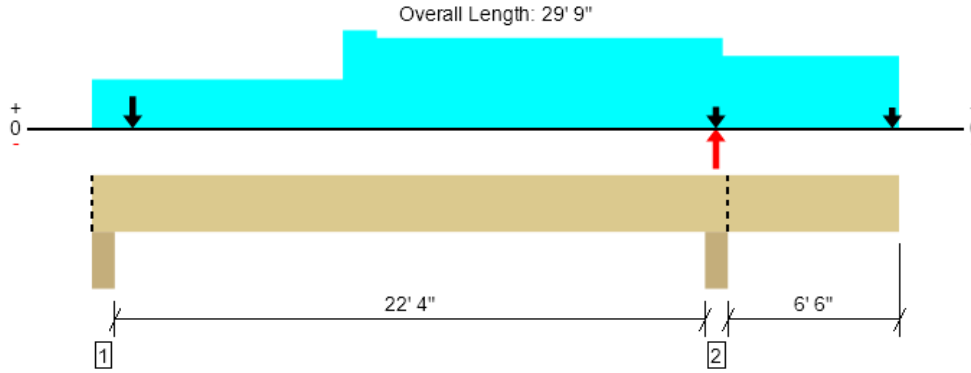
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	



1/15/2025 7:55:08 PM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 24339 - Fauser Residence

2nd Floor, B1 - South Cantilever Beam at Deck
1 piece(s) 6 3/4" x 18" 24F-V8 DF Glulam



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) [Group]
Member Reaction (lbs)	13210 @ 23' 1/4"	24131 (5.50")	Passed (55%)	--	1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans) [5]
Shear (lbs)	10260 @ 1' 11 1/2"	24685	Passed (42%)	1.15	1.0 D + 0.75 L + 0.75 S (Alt Spans) [5]
Pos Moment (Ft-lbs)	45054 @ 11' 2 11/16"	67918	Passed (66%)	1.00	1.0 D + 1.0 L (Alt Spans) [5]
Neg Moment (Ft-lbs)	-23229 @ 23' 1/4"	71881	Passed (32%)	1.00	1.0 D + 1.0 L (Alt Spans) [5]
Live Load Defl. (in)	0.498 @ 11' 7 13/16"	0.567	Passed (L/547)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans) [5]
Total Load Defl. (in)	0.766 @ 11' 6 5/16"	1.134	Passed (L/355)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans) [5]

Member Length : 29' 9"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Upward deflection on right cantilever exceeds overhang deflection criteria.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 0.93 that was calculated using length L = 21' 6 7/8".
- Critical negative moment adjusted by a volume/size factor of 0.99 that was calculated using length L = 12' 2 13/16".
- Upward deflection on right cantilever exceeds 0.4".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Wind	Seismic	Factored	
1 - Column - DF	5.50"	5.50"	2.96"	5431	5130/-588	4961	-	-	12999	Blocking
2 - Column - DF	5.50"	5.50"	3.01"	4121	8294	3558	-284	381/-381	13210	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)	29' 9" o/c	
Bottom Edge (Lu)	29' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

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Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 29' 9"	N/A	29.5	--	--	--	--	
1 - Uniform (PSF)	0 to 10' 6" (Top)	11' 6"	12.0	40.0	-	-	-	Floor
2 - Uniform (PSF)	10' 6" to 23' 3" (Top)	9' 9"	12.0	40.0	-	-	-	Floor
3 - Uniform (PSF)	23' 3" to 29' 9" (Top)	5' 6"	12.0	40.0	-	-	-	Floor
4 - Point (lb)	1' 6" (Top)	N/A	3085	-	3872	-	-	Linked from: RB4 - Flush Beam at Office, Support 2
5 - Uniform (PSF)	9' 3" to 29' 9" (Top)	14'	18.1	-	25.0	-	-	Roof
6 - Point (lb)	29' 6" (Front)	N/A	308	1290	-	-	-	Linked from: B4 - East Rim Beam at Deck, Support 1
7 - Point (lb)	23' (Front)	N/A	-67	875/-2757	772	-	-	Linked from: B3 - East Cantilever Beam at Deck, Support 2
8 - Point (lb)	23' (Top)	N/A	-2368	-	-3067	-	-	Linked from: RB2 - Grid E Roof Beam (No backspan), Support 2
9 - Point (lb)	23' (Back)	N/A	-838	-562	-408	-284	381/-381	Linked from: B6 - Cantilever Beam at Office, Support 1

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

Weyerhaeuser Notes

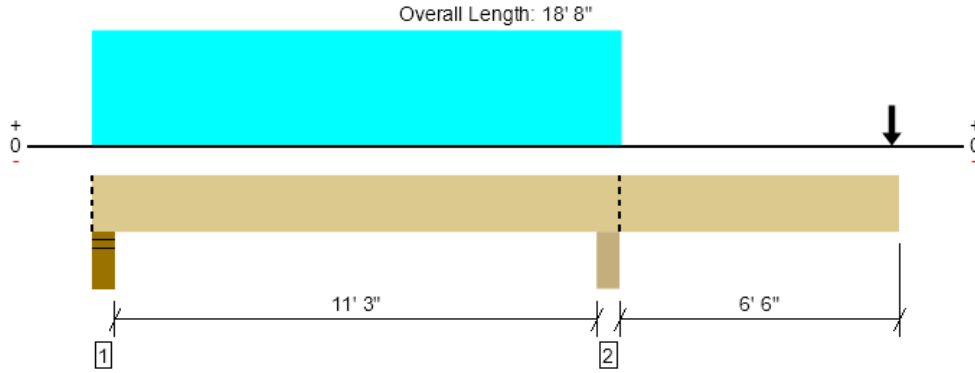
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ForteWEB Software Operator	Job Notes
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	



2nd Floor, B2 - North Cantilever Beam at Deck
3 piece(s) 1 3/4" x 14" 2.OE 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)	3767 @ 11' 11 1/4"	11694 (5.50")	Passed (32%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1728 @ 10' 6 1/2"	13965	Passed (12%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-10980 @ 11' 11 1/4"	36387	Passed (30%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.263 @ 18' 8"	0.336	Passed (2L/614)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.321 @ 18' 8"	0.673	Passed (2L/502)	--	1.0 D + 1.0 L (Alt Spans)

Member Length : 18' 8"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Right cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- -594 lbs uplift at support located at 4". Strapping or other restraint may be required.

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"	136	736/-730	872/-594	Blocking
2 - Beam - HF	5.50"	5.50"	1.77"	1013	2754	3767	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' 8" o/c	
Bottom Edge (Lu)	18' 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)	0 to 18' 8"	N/A	21.5	--	
1 - Uniform (PSF)	0 to 12' 3" (Front)	3'	12.0	40.0	Floor
2 - Point (lb)	18' 6" (Front)	N/A	308	1290	Linked from: B4 - East Rim Beam at Deck, Support 1

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

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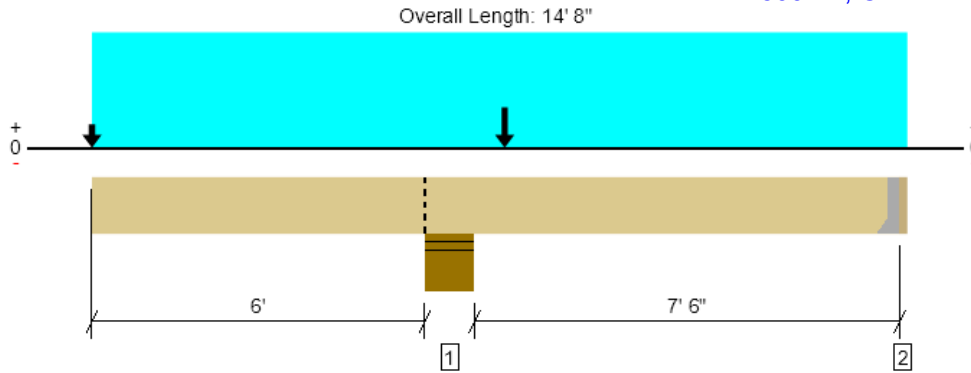
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ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 24339 - Fauser Residence

2nd Floor, B3 - East Cantilever Beam at Deck
1 piece(s) 5 1/8" x 18" 24F-V8 DF Glulam

UPLIFT IS RESISTED BY INVERTED HUCQ HANGER AS SHOWN ON S2.1

An excessive uplift of -2824 lbs at support located at 14' 6" failed this product.

**ALLOWABLE LOAD:
4500 LB, OK**



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)	17203 @ 6' 6"	24908 (12.00")	Passed (69%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	5888 @ 8' 6"	16298	Passed (36%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	3037 @ 7' 6"	63653	Passed (5%)	1.15	1.0 D + 1.0 S (All Spans)
Neg Moment (Ft-lbs)	-30504 @ 6' 6"	55156	Passed (55%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.264 @ 0	0.325	Passed (2L/590)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.329 @ 0	0.650	Passed (2L/474)	--	1.0 D + 1.0 L (Alt Spans)

Member Length : 14' 6"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Left cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 7' 3 1/4".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 14' 6".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- 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	12.00"	12.00"	8.29"	7336	7751	5405	17203	Blocking
2 - Hanger on 18" GLB beam	2.00"	Hanger ¹	1.50"	-67	875/-2757	772	1168/-2824	See note ¹

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	14' 6" o/c	
Bottom Edge (Lu)	14' 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	Connector not found	N/A	N/A	N/A	N/A	

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

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Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 14' 6"	N/A	22.4	--	--	
1 - Uniform (PSF)	0 to 14' 8" (Front)	3' 6"	15.0	60.0	-	Deck
2 - Point (lb)	0 (Top)	N/A	1013	2754	-	Linked from: North Cantilever Beam at Deck, Support 2
3 - Point (lb)	7' 6" (Top)	N/A	5161	-	6177	Linked from: RB2 - Grid E Roof Beam (No backspan), Support 1

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

Weyerhaeuser Notes

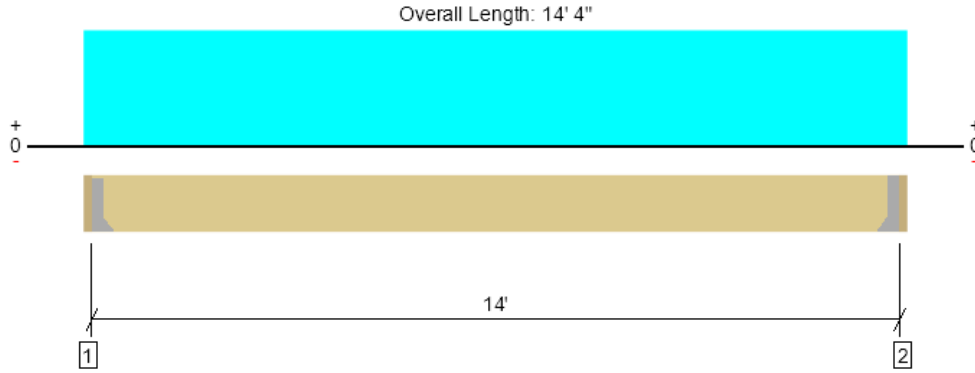
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Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	



2nd Floor, B4 - East Rim Beam at Deck
1 piece(s) 6 x 10 HF No.1



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)	1563 @ 2"	3341 (1.50")	Passed (47%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1386 @ 11 1/2"	4877	Passed (28%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	5469 @ 7' 2"	7239	Passed (76%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.305 @ 7' 2"	0.350	Passed (L/552)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.378 @ 7' 2"	0.700	Passed (L/445)	--	1.0 D + 1.0 L (All Spans)

Member Length : 14'
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Lumber grading provisions must be extended over the length of the member per NDS 4.2.5.5.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Hanger on 9 1/2" GLB beam	2.00"	Hanger ¹	1.50"	308	1290	1598	See note ¹
2 - Hanger on 9 1/2" GLB beam	2.00"	Hanger ¹	1.50"	308	1290	1598	See note ¹

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	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	HU68	2.50"	N/A	14-10d	6-10d	
2 - Face Mount Hanger	HU68	2.50"	N/A	14-10d	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)	Comments
0 - Self Weight (PLF)	2" to 14' 2"	N/A	13.2	--	
1 - Uniform (PSF)	0 to 14' 4" (Front)	3'	10.0	60.0	Deck

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

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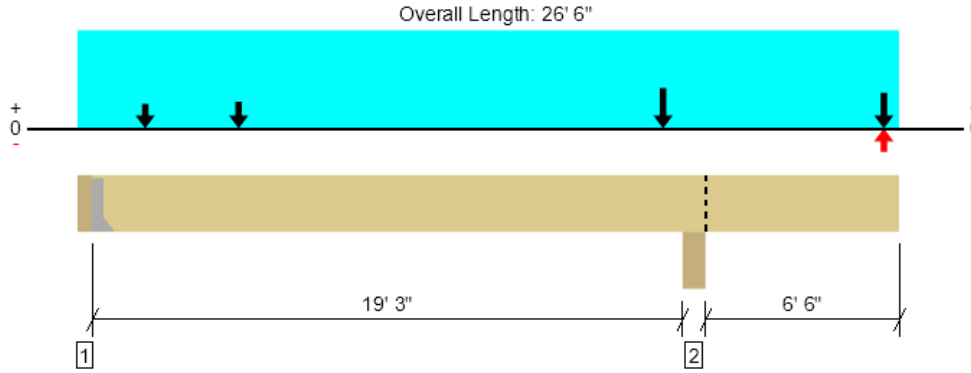
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ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 24339 - Fauser Residence

2nd Floor, B5 - South Rim Beam at Office
3 piece(s) 1 3/4" x 14" 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) [Group]
Member Reaction (lbs)	6259 @ 3 1/2"	6259 (1.59")	Passed (100%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans) [8]
Shear (lbs)	7716 @ 18' 4 1/2"	16060	Passed (48%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans) [1]
Moment (Ft-lbs)	19421 @ 8' 11 1/16"	36387	Passed (53%)	1.00	1.0 D + 1.0 L (Alt Spans) [1]
Live Load Defl. (in)	0.376 @ 26' 6"	0.449	Passed (2L/430)	--	1.0 D + 0.45 W + 0.75 L + 0.75 Lr (Alt Spans) [1]
Total Load Defl. (in)	0.434 @ 26' 6"	0.673	Passed (2L/372)	--	1.0 D + 0.45 W + 0.75 L + 0.75 Lr (Alt Spans) [1]

Member Length : 26' 2 1/2"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Wind	Seismic	Factored	
1 - Hanger on 14" GLB beam	3.50"	Hanger ¹	1.59"	2582	2608/-226	1317	645/-511	2082/-208 2	6374	See note ¹
2 - Beam - GLB	5.50"	5.50"	4.51"	7845	4584	3325	2314	3105/-310 5	15407	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	15' 8" o/c	
Bottom Edge (Lu)	14' 5" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HHUS5.50/10	3.00"	N/A	30-16d	10-16d	

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

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Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	



Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	3 1/2" to 26' 6"	N/A	21.5	--	--	--	--	
1 - Uniform (PSF)	0 to 26' 6" (Front)	6' 6"	12.0	40.0	-	-	-	Floor
2 - Uniform (PLF)	0 to 26' 6" (Top)	N/A	120.0	-	-	-	-	Wall
3 - Point (lb)	5' (Top)	N/A	-	-	-	850	1900	SW Reaction
4 - Point (lb)	18' 9" (Top)	N/A	2650	-	3185	-	-	Linked from: RB3 - South Cantilever Beam at Office, Support 2
5 - Point (lb)	2' (Top)	N/A	919	-	1286	-	-	Linked from: RB3 - South Cantilever Beam at Office, Support 1
6 - Point (lb)	26' (Front)	N/A	1049	-	147	1598	2005/-2005	Linked from: B11 - Flush Beam at Grid F, Support 2

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

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

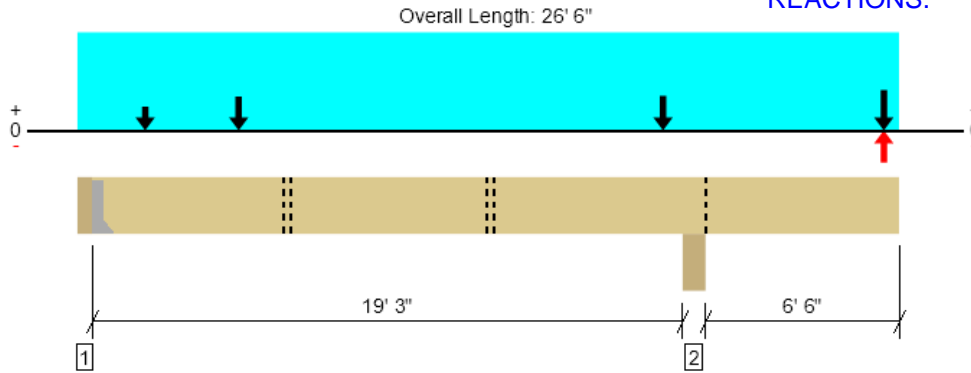
ForteWEB Software Operator	Job Notes
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	



2nd Floor, B5 - South Rim Beam at Office (Overstrength)
3 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL

CALCULATION IS ONLY FOR MEMBER STRENGTH USING SEISMIC LOADING WITH THE OVERSTRENGTH FACTOR APPLIED. SEE PREVIOUS PAGE FOR REACTIONS.

An excessive uplift of -2095 lbs at support located at 3 1/2" failed this product.



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) [Group]
Member Reaction (lbs)	7899 @ 3 1/2"	7899 (2.01")	Passed (100%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans) [8]
Shear (lbs)	7716 @ 18' 4 1/2"	16060	Passed (48%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans) [1]
Moment (Ft-lbs)	-33366 @ 19' 9 1/4"	43665	Passed (76%)	1.60	1.0 D + 0.7 E (All Spans) [1]
Live Load Defl. (in)	0.376 @ 26' 6"	0.449	Passed (2L/430)	--	1.0 D + 0.45 W + 0.75 L + 0.75 Lr (Alt Spans) [1]
Total Load Defl. (in)	0.434 @ 26' 6"	0.673	Passed (2L/372)	--	1.0 D + 0.45 W + 0.75 L + 0.75 Lr (Alt Spans) [1]

Member Length : 26' 2 1/2"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Moment capacity over cantilever support 2 has been reduced by 25% to lessen the effects of buckling.
- -729 lbs uplift at support located at 19' 9 1/4". Strapping or other restraint may be required.
- Permanent bracing at third points in the back span or a direct applied ceiling over the entire back span length is required at the right span of the member. See literature detail (PB1) For clarification.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Wind	Seismic	Factored	
1 - Hanger on 14" GLB beam	3.50"	Hanger ¹	2.01"	2582	2608/-226	1317	645/-511	5205/-5205	8014/-2095	See note ¹
2 - Beam - GLB	5.50"	5.50"	5.23"	7845	4584	3325	2314	7766/-7766	17854/-729	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	10' 5" o/c	
Bottom Edge (Lu)	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	HGUS5.50/10	4.00"	N/A	46-16d	16-16d	

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

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Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	3 1/2" to 26' 6"	N/A	21.5	--	--	--	--	
1 - Uniform (PSF)	0 to 26' 6" (Front)	6' 6"	12.0	40.0	-	-	-	Floor
2 - Uniform (PLF)	0 to 26' 6" (Top)	N/A	120.0	-	-	-	-	Wall
3 - Point (lb)	5' (Top)	N/A	-	-	-	850	4750	SW Reaction
4 - Point (lb)	18' 9" (Top)	N/A	2650	-	3185	-	-	Linked from: RB3 - South Cantilever Beam at Office, Support 2
5 - Point (lb)	2' (Top)	N/A	919	-	1286	-	-	Linked from: RB3 - South Cantilever Beam at Office, Support 1
6 - Point (lb)	26' (Front)	N/A	1049	-	147	1598	5014/-5014	Linked from: B11 - Flush Beam at Grid F (Overstrength), Support 2

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

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ForteWEB Software Operator	Job Notes
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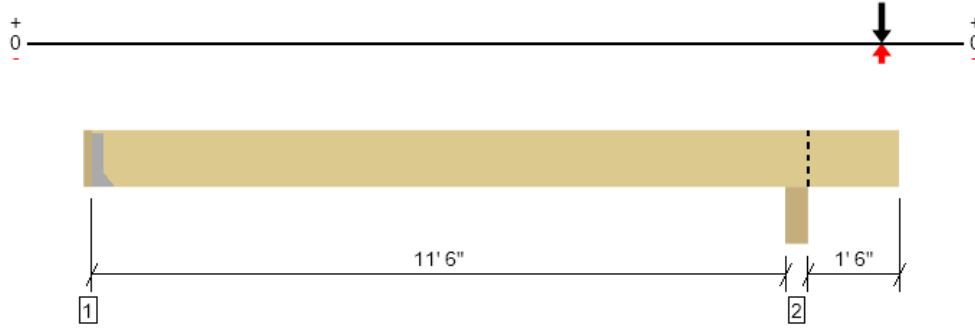
2nd Floor, B6 - Cantilever Beam at Office
3 piece(s) 1 3/4" x 14" 2.OE Microllam® LVL

UPLIFT IS RESISTED BY INVERTED HHUS HANGER AS SHOWN ON S2.1

An excessive uplift of -1400 lbs at support located at 2" failed this product.

**ALLOWABLE LOAD:
5635 LB, OK**

Overall Length: 13' 7 1/2"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern) [Group]
Member Reaction (lbs)	17461 @ 11' 10 3/4"	21656 (5.50")	Passed (81%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans) [1]
Shear (lbs)	12436 @ 13' 3 1/2"	13965	Passed (89%)	1.00	1.0 D + 1.0 L (All Spans) [1]
Moment (Ft-lbs)	-17899 @ 11' 10 3/4"	36387	Passed (49%)	1.00	1.0 D + 1.0 L (All Spans) [1]
Live Load Defl. (in)	0.071 @ 13' 7 1/2"	0.200	Passed (2L/584)	--	1.0 D + 0.45 W + 0.75 L + 0.75 S (All Spans) [1]
Total Load Defl. (in)	0.149 @ 13' 7 1/2"	0.200	Passed (2L/278)	--	1.0 D + 0.45 W + 0.75 L + 0.75 S (All Spans) [1]

Member Length : 13' 5 1/2"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (0.2") and TL (0.2").
- 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	Wind	Seismic	Factored	
1 - Hanger on 14" GLB beam	2.00"	Hanger ¹	1.50"	-838	-562	-408	-284	381/-381	-1765	See note ¹
2 - Column - DF	5.50"	5.50"	4.43"	8972	5146	3733	2598	3486/-3486	17461	Blocking

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

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
1 - 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)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	2" to 13' 7 1/2"	N/A	21.5	--	--	--	--	
1 - Point (lb)	13' 4" (Front)	N/A	7845	4584	3325	2314	3105/-3105	Linked from: B5 - South Rim Beam at Garage, Support 2

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

Forteweb Software Operator	Job Notes
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	



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 File Name: 24339 - Fauser Residence

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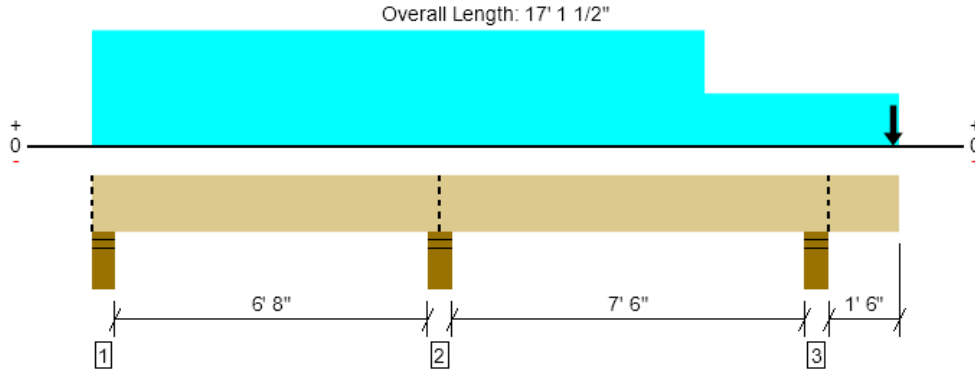
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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ForteWEB Software Operator	Job Notes
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2nd Floor, B7 - Flush Beam at Gym
2 piece(s) 1 3/4" x 14" 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)	4922 @ 7' 4 1/2"	8505 (6.00")	Passed (58%)	--	1.0 D + 1.0 L (Adj Spans)
Shear (lbs)	1679 @ 5' 11 1/2"	9310	Passed (18%)	1.00	1.0 D + 1.0 L (Adj Spans)
Moment (Ft-lbs)	-3524 @ 7' 4 1/2"	24258	Passed (15%)	1.00	1.0 D + 1.0 L (Adj Spans)
Live Load Defl. (in)	0.022 @ 11' 6 3/8"	0.200	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.017 @ 17' 1 1/2"	0.200	Passed (2L/999+)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)

Member Length : 17' 1 1/2"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (0.2") and TL (0.2").
- 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"	1.50"	444	1457/-230	48	1900	Blocking
2 - Stud wall - HF	6.00"	6.00"	3.47"	1086	3836	-247	4922	Blocking
3 - Stud wall - HF	6.00"	6.00"	2.06"	1148	1391	974	2922	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	17' 2" o/c	
Bottom Edge (Lu)	17' 2" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 17' 1 1/2"	N/A	14.3	--	--	
1 - Uniform (PSF)	0 to 13' (Front)	10' 6"	12.0	40.0	-	Floor
2 - Uniform (PSF)	13' to 17' 1 1/2" (Front)	4' 9"	12.0	40.0	-	Floor
3 - Point (lb)	17' (Front)	N/A	560	-	775	Roof

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

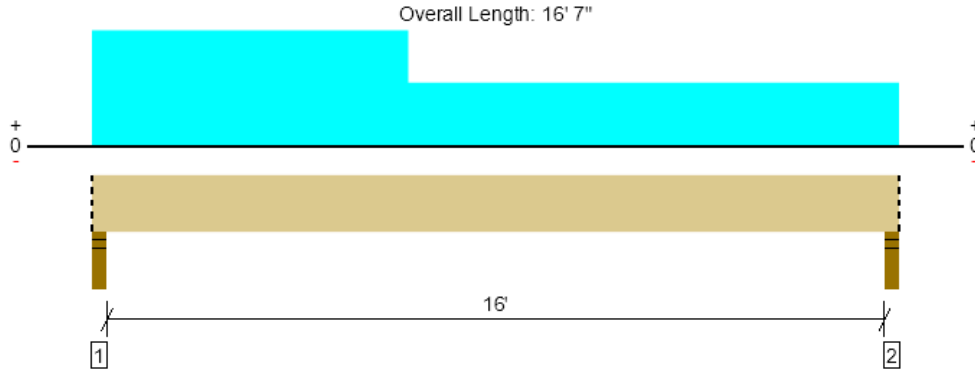
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File Name: 24339 - Fauser Residence

2nd Floor, B8 - Flush Beam at Stair
2 piece(s) 1 3/4" x 14" 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)	2025 @ 2"	4961 (3.50")	Passed (41%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1589 @ 1' 5 1/2"	9310	Passed (17%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	7147 @ 7' 10 5/8"	24258	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.148 @ 8' 3 1/2"	0.406	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.230 @ 8' 2 1/2"	0.813	Passed (L/848)	--	1.0 D + 1.0 L (All Spans)

Member Length : 16' 7"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
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	3.50"	3.50"	1.50"	809	1161	461	2025	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.50"	547	1161	108	1708	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' 7" o/c	
Bottom Edge (Lu)	16' 7" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 16' 7"	N/A	14.3	--	--	
1 - Uniform (PSF)	0 to 16' 7" (Front)	3' 6"	12.0	40.0	-	Floor
2 - Uniform (PSF)	0 to 6' 6" (Top)	3' 6"	18.6	-	25.0	Roof
3 - Point (lb)	6' 6" (Back)	N/A	-	-	-	Low Ridge Beam

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

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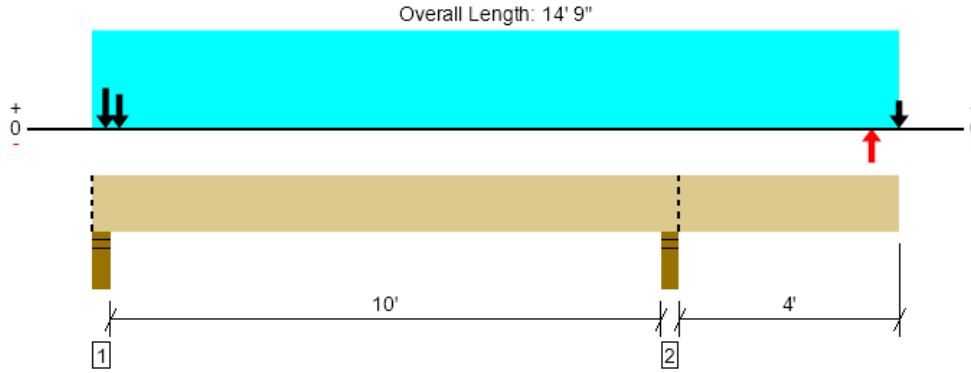
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Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	



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File Name: 24339 - Fauser Residence

2nd Floor, B9 - Flush Beam at North Closet
2 piece(s) 1 3/4" x 14" 2.OE 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)	3532 @ 10' 6 3/4"	6379 (4.50")	Passed (55%)	--	1.0 D - 0.525 E + 0.75 L + 0.75 S (Alt Spans)
Shear (lbs)	1284 @ 11' 11"	9310	Passed (14%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-5022 @ 10' 6 3/4"	24258	Passed (21%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.067 @ 14' 9"	0.209	Passed (2L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.109 @ 14' 9"	0.419	Passed (2L/926)	--	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 2021
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.
- -415 lbs uplift at support located at 3". Strapping or other restraint may be required.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Wind	Seismic	Factored	
1 - Stud wall - HF	4.50"	4.50"	2.07"	1159	1161/-219	392	933	1587/-1587	2941/-415	Blocking
2 - Stud wall - HF	4.50"	4.50"	2.49"	1756	759	478	17/-950	1616/-1616	3532/-77	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)	14' 9" o/c	
Bottom Edge (Lu)	14' 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)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 14' 9"	N/A	14.3	--	--	--	--	
1 - Point (lb)	14' 9" (Back)	N/A	170	540	-	-	-	Floor Beam
2 - Point (lb)	3" (Front)	N/A	809	1161	461	-	-	Linked from: B8 - Flush Beam at Stair, Support 1
3 - Point (lb)	14' 9" (Back)	N/A	250	-	340	-	-	Roof Beam
4 - Uniform (PLF)	0 to 14' 9" (Top)	N/A	100.0	-	-	-	-	Wall
5 - Point (lb)	6" (Top)	N/A	-	-	-	700	1190	SW Reaction
6 - Point (lb)	14' 3" (Top)	N/A	-	-	-	-700	-1190	SW Reaction

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

ForteWEB Software Operator	Job Notes
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	



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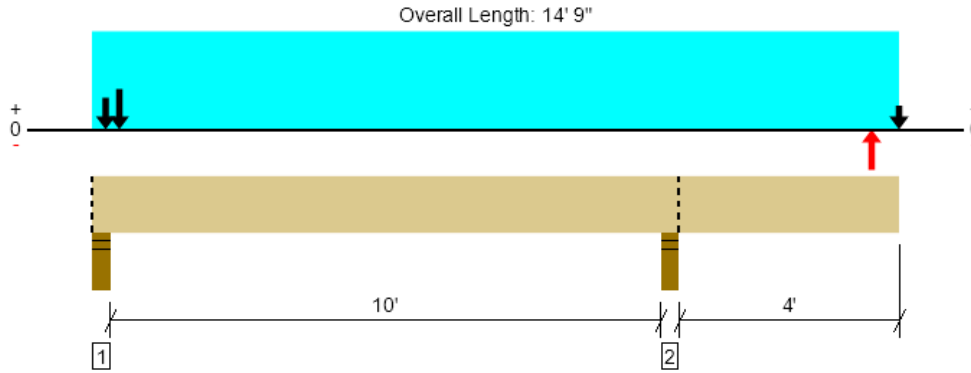


2nd Floor, B9 - Flush Beam at North Closet (Overstrength)
2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL

CALCULATION IS ONLY FOR MEMBER STRENGTH USING SEISMIC LOADING WITH THE OVERSTRENGTH FACTOR APPLIED. SEE PREVIOUS PAGE FOR REACTIONS.

An excessive uplift of -2081 lbs at support located at 3" failed this product.

An excessive uplift of -1774 lbs at support located at 10' 6 3/4" failed this product.



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)	4804 @ 10' 6 3/4"	6379 (4.50")	Passed (75%)	--	1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	2966 @ 11' 11"	14896	Passed (20%)	1.60	1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	-11284 @ 10' 6 3/4"	38813	Passed (29%)	1.60	1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.067 @ 14' 9"	0.209	Passed (2L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.109 @ 14' 9"	0.419	Passed (2L/926)	--	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 2021
 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	Wind	Seismic	Factored	
1 - Stud wall - HF	4.50"	4.50"	2.96"	1159	1161/-219	392	933	3967/-3967	4190/-2081	Blocking
2 - Stud wall - HF	4.50"	4.50"	3.39"	1756	759	478	17/-950	4039/-4039	4804/-1774	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)	14' 9" o/c	
Bottom Edge (Lu)	14' 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)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 14' 9"	N/A	14.3	--	--	--	--	
1 - Point (lb)	14' 9" (Back)	N/A	170	540	-	-	-	Floor Beam
2 - Point (lb)	3" (Front)	N/A	809	1161	461	-	-	Linked from: B8 - Flush Beam at Stair, Support 1
3 - Point (lb)	14' 9" (Back)	N/A	250	-	340	-	-	Roof Beam
4 - Uniform (PLF)	0 to 14' 9" (Top)	N/A	100.0	-	-	-	-	Wall
5 - Point (lb)	6" (Top)	N/A	-	-	-	700	2975	SW Reaction
6 - Point (lb)	14' 3" (Top)	N/A	-	-	-	-700	-2975	SW Reaction

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

ForteWEB Software Operator	Job Notes
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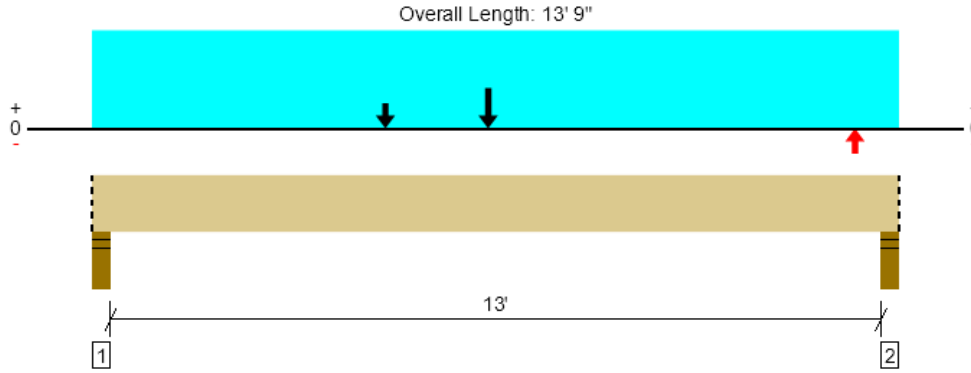
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File Name: 24339 - Fauser Residence

2nd Floor, B10 - Flush Beam over Kitchen
2 piece(s) 1 3/4" x 14" 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)	4876 @ 3"	6379 (4.50")	Passed (76%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	4230 @ 1' 6 1/2"	10707	Passed (40%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	22159 @ 6' 9"	27897	Passed (79%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.232 @ 6' 9"	0.331	Passed (L/685)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.438 @ 6' 9"	0.663	Passed (L/363)	--	1.0 D + 1.0 S (All Spans)

Member Length : 13' 9"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
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	Snow	Wind	Seismic	Factored	
1 - Stud wall - HF	4.50"	4.50"	3.44"	2425	2451	380	649/-649	4876	Blocking
2 - Stud wall - HF	4.50"	4.50"	3.39"	2397	2405	-380	649/-649	4802	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' 1" o/c	
Bottom Edge (Lu)	13' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 13' 9"	N/A	14.3	--	--	--	
1 - Uniform (PSF)	0 to 13' 9" (Top)	7'	18.6	25.0	-	-	Roof
2 - Uniform (PLF)	0 to 13' 9" (Top)	N/A	100.0	-	-	-	Wall
3 - Point (lb)	6' 9" (Front)	N/A	1465	2450	-	-	Kitchen Ridge Beam
4 - Point (lb)	5' (Top)	N/A	-	-	630	1075	SW Reaction
5 - Point (lb)	13' (Top)	N/A	-	-	-630	-1075	SW Reaction

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

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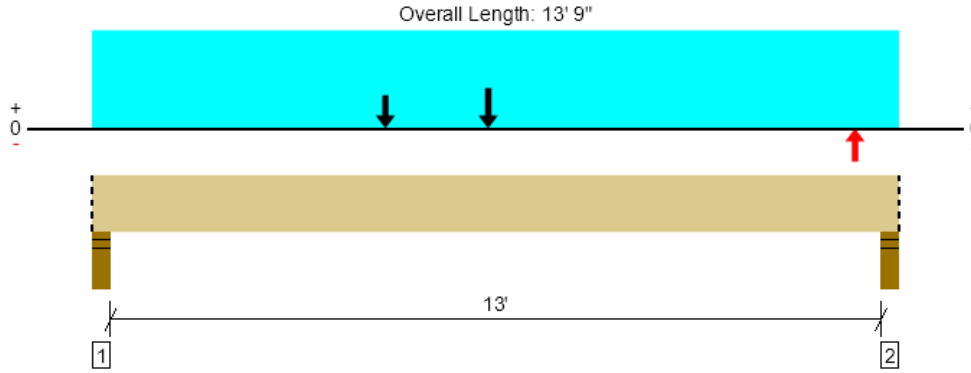
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File Name: 24339 - Fauser Residence

2nd Floor, B10 - Flush Beam over Kitchen (Overstrength)
2 piece(s) 1 3/4" x 14" 2.OE 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)	5116 @ 3"	6379 (4.50")	Passed (80%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	4230 @ 1' 6 1/2"	10707	Passed (40%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	22159 @ 6' 9"	27897	Passed (79%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.232 @ 6' 9"	0.331	Passed (L/685)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.438 @ 6' 9"	0.663	Passed (L/363)	--	1.0 D + 1.0 S (All Spans)

Member Length : 13' 9"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
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	Snow	Wind	Seismic	Factored	
1 - Stud wall - HF	4.50"	4.50"	3.61"	2425	2451	380	1624/-1624	5116	Blocking
2 - Stud wall - HF	4.50"	4.50"	3.57"	2397	2405	-380	1624/-1624	5054	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' 1" o/c	
Bottom Edge (Lu)	13' 9" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 13' 9"	N/A	14.3	--	--	--	
1 - Uniform (PSF)	0 to 13' 9" (Top)	7'	18.6	25.0	-	-	Roof
2 - Uniform (PLF)	0 to 13' 9" (Top)	N/A	100.0	-	-	-	Wall
3 - Point (lb)	6' 9" (Front)	N/A	1465	2450	-	-	Kitchen Ridge Beam
4 - Point (lb)	5' (Top)	N/A	-	-	630	2690	SW Reaction
5 - Point (lb)	13' (Top)	N/A	-	-	-630	-2690	SW Reaction

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

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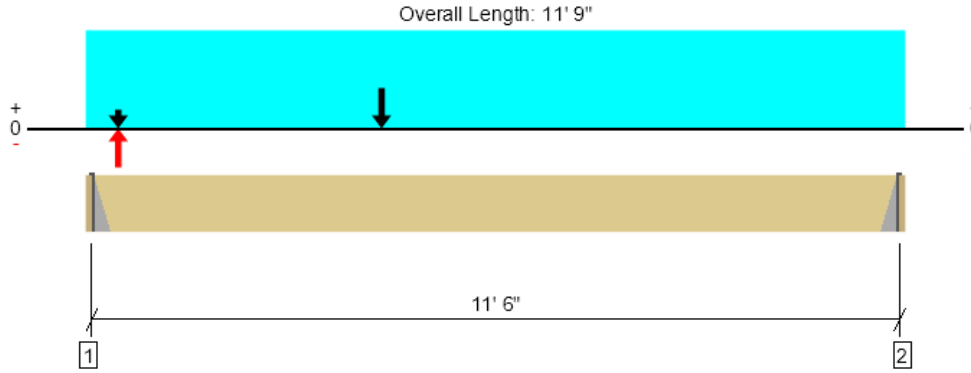
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Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	



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File Name: 24339 - Fauser Residence

2nd Floor, B11 - Flush Beam at Grid F
2 piece(s) 1 3/4" x 14" 2.OE 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)	3291 @ 1' 1/2"	3938 (1.50")	Passed (84%)	--	1.0 D - 0.7 E (All Spans)
Shear (lbs)	2695 @ 1' 3 1/2"	14896	Passed (18%)	1.60	1.0 D + 0.7 E (All Spans)
Moment (Ft-lbs)	14385 @ 4' 3"	38813	Passed (37%)	1.60	1.0 D + 0.7 E (All Spans)
Live Load Defl. (in)	0.094 @ 5' 5 15/16"	0.287	Passed (L/999+)	--	1.0 D + 0.6 W (All Spans)
Total Load Defl. (in)	0.159 @ 5' 6 3/4"	0.575	Passed (L/866)	--	1.0 D + 0.6 W (All Spans)

Member Length : 11' 6"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- -263 lbs uplift at support located at 1' 1/2". Strapping or other restraint may be required.
- -774 lbs uplift at support located at 11' 7 1/2". Strapping or other restraint may be required.

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Snow	Wind	Seismic	Factored	
1 - Hanger on 14" GLB beam	1.50"	Hanger ¹	1.50"	1902	147	-1598	2005/-2005	3305/-263	See note ¹
2 - Hanger on 14" LVL beam	1.50"	Hanger ¹	1.50"	1049	147	1598	2005/-2005	2453/-774	See note ¹

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	11' 6" o/c	
Bottom Edge (Lu)	11' 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 - Top Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	
2 - Top Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	

- 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)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	1' 1/2" to 11' 7 1/2"	N/A	14.3	--	--	--	
1 - Uniform (PLF)	0 to 11' 9" (Top)	N/A	100.0	-	-	-	Wall
2 - Uniform (PSF)	0 to 11' 9" (Top)	1'	18.0	25.0	-	-	Roof
3 - Point (lb)	6" (Top)	N/A	700	-	-4900	-6150	SW Reaction
4 - Point (lb)	4' 3" (Top)	N/A	700	-	4900	6150	SW Reaction

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

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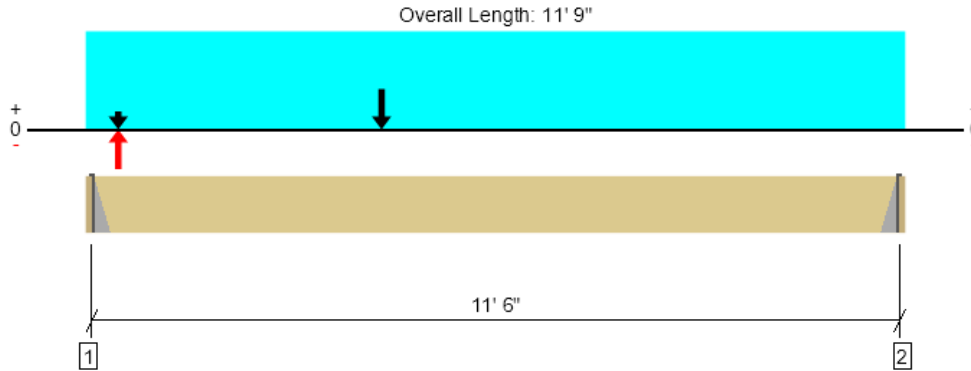


2nd Floor, B11 - Flush Beam at Grid F (Overstrength)
2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL

CALCULATION IS ONLY FOR MEMBER STRENGTH USING SEISMIC LOADING WITH THE OVERSTRENGTH FACTOR APPLIED. SEE PREVIOUS PAGE FOR REACTIONS.

An excessive uplift of -2369 lbs at support located at 1 1/2" failed this product.

An excessive uplift of -2880 lbs at support located at 11' 7 1/2" failed this product.



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)	5396 @ 1 1/2"	5396 (2.06")	Passed (100%)	--	1.0 D - 0.7 E (All Spans)
Shear (lbs)	4828 @ 1' 3 1/2"	14896	Passed (32%)	1.60	1.0 D + 0.7 E (All Spans)
Moment (Ft-lbs)	29915 @ 4' 3"	38813	Passed (77%)	1.60	1.0 D + 0.7 E (All Spans)
Live Load Defl. (in)	0.094 @ 5' 5 15/16"	0.287	Passed (L/999+)	--	1.0 D + 0.6 W (All Spans)
Total Load Defl. (in)	0.159 @ 5' 6 3/4"	0.575	Passed (L/866)	--	1.0 D + 0.6 W (All Spans)

Member Length : 11' 6"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 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	Snow	Wind	Seismic	Factored	
1 - Hanger on 14" GLB beam	1.50"	Hanger ¹	2.06"	1902	147	-1598	5014/-5014	5411/-2369	See note ¹
2 - Hanger on 14" LVL beam	1.50"	Hanger ¹	1.73"	1049	147	1598	5014/-5014	4559/-2880	See note ¹

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 7" o/c	
Bottom Edge (Lu)	6' 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	
1 - Top Mount Hanger	Connector not found	N/A	N/A	N/A	N/A		
2 - Top Mount Hanger	Connector not found	N/A	N/A	N/A	N/A		

- 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)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	1 1/2" to 11' 7 1/2"	N/A	14.3	--	--	--	
1 - Uniform (PLF)	0 to 11' 9" (Top)	N/A	100.0	-	-	-	Wall
2 - Uniform (PSF)	0 to 11' 9" (Top)	1'	18.0	25.0	-	-	Roof
3 - Point (lb)	6" (Top)	N/A	700	-	-4900	-15375	SW Reaction
4 - Point (lb)	4' 3" (Top)	N/A	700	-	4900	15375	SW Reaction

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

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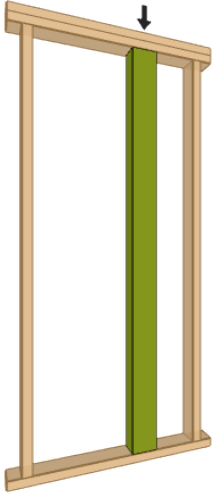


2nd Floor, P1 - Post
1 piece(s) 4 x 6 HF No.2

Wall Height: 9' 3"

Member Height: 8' 10 1/2"

Tributary Width: 1'



Drawing is Conceptual

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	27	50	Passed (55%)	--	--
Compression (lbs)	6957	9143	Passed (76%)	1.15	1.0 D + 1.0 S
Plate Bearing (lbs)	6957	7796	Passed (89%)	--	1.0 D + 1.0 S
Lateral Reaction (lbs)	0	--	--	--	N/A
Lateral Shear (lbs)	0	N/A	Passed (N/A)	--	N/A
Lateral Moment (ft-lbs)	0 @ mid-span	N/A	Passed (N/A)	--	N/A
Total Deflection (in)	0.00 @ mid-span	N/A	Passed (N/A)	--	N/A
Bending/Compression	N/A	1	Passed (N/A)	--	N/A

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for the design is zero
- Applicable calculations are based on NDS.
- Bearing shall be on a metal plate or strap, or on other equivalently durable, rigid, homogeneous material with sufficient stiffness to distribute applied load.

Supports	Type	Material
Top	Dbl 2X	Hem Fir
Base	2X	Hem Fir

System : Wall
Member Type : Column
Building Code : IBC 2021
Design Methodology : ASD

Max Unbraced Length	Comments
8'	

Vertical Load	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
1 - Point (lb)	N/A	3085	3872	Linked from: RB4 - Flush Beam at Office, Support 2

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ForteWEB Software Operator	Job Notes
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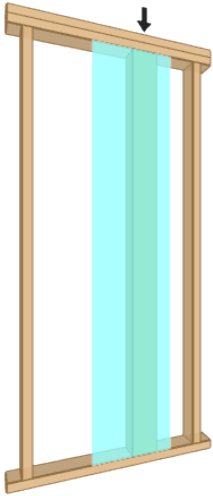


2nd Floor, P2 - Post
3 piece(s) 2 x 6 HF No.2

Wall Height: 11'

Member Height: 10' 7 1/2"

Tributary Width: 1'



Drawing is Conceptual

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	23	50	Passed (46%)	--	--
Compression (lbs)	1050	10865	Passed (10%)	1.15	1.0 D + 1.0 S
Plate Bearing (lbs)	1050	10024	Passed (10%)	--	1.0 D + 1.0 S
Lateral Reaction (lbs)	108	--	--	1.60	1.0 D + 0.6 W
Lateral Shear (lbs)	99	3960	Passed (2%)	1.60	1.0 D + 0.6 W
Lateral Moment (ft-lbs)	288 @ mid-span	3314	Passed (9%)	1.60	1.0 D + 0.6 W
Total Deflection (in)	0.05 @ mid-span	1.06	Passed (L/2527)	--	1.0 D + 0.6 W
Bending/Compression	0.09	1	Passed (9%)	1.60	1.0 D + 0.6 W

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for the design is zero
- Applicable calculations are based on NDS.
- The column stability factor (Kf = 0.6) applied to this design assumes nailed built-up columns per NDS section 15.3.3. For Weyerhaeuser ELP products refer to the U.S. Wall Guide for multiple-member connection requirements.

Supports	Type	Material
Top	Dbl 2X	Hem Fir
Base	2X	Hem Fir

System : Wall
Member Type : Column
Building Code : IBC 2021
Design Methodology : ASD

Max Unbraced Length	Comments
8'	

Lateral Connections				
Supports	Connector	Type/Model	Quantity	Connector Nailing
Top	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A
Base	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A

- Nailed connection at the top of the member is assumed to be nailed through the bottom 2x plate prior to placement of the top 2x of the double top plate assembly.

Vertical Load	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
1 - Point (lb)	N/A	450	600	Roof

Lateral Load	Location	Tributary Width	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	1'	34.0	

- ASCE/SEI 7 Sec. 30.4: Exposure Category (C), Mean Roof Height (33'), Topographic Factor (1.0), Wind Directionality Factor (0.85), Basic Wind Speed (115), Risk Category(II), Wind Zone (4), GCpi (+/- 0.18), Effective Wind Area determined using full member span and trib. width.
- IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.

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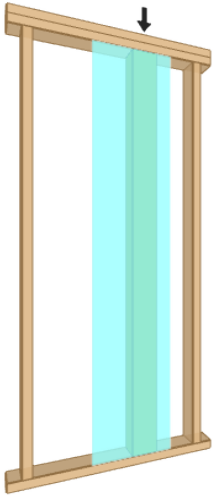


2nd Floor, P3 - Post
3 piece(s) 2 x 4 HF No.2

Wall Height: 8' 9"

Member Height: 8' 4 1/2"

Tributary Width: 1'



Drawing is Conceptual

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	29	50	Passed (57%)	--	--
Compression (lbs)	3591	6907	Passed (52%)	1.15	1.0 D + 1.0 S
Plate Bearing (lbs)	3591	6379	Passed (56%)	--	1.0 D + 1.0 S
Lateral Reaction (lbs)	88	--	--	1.60	1.0 D + 0.6 W
Lateral Shear (lbs)	82	2520	Passed (3%)	1.60	1.0 D + 0.6 W
Lateral Moment (ft-lbs)	184 @ mid-span	1552	Passed (12%)	1.60	1.0 D + 0.6 W
Total Deflection (in)	0.08 @ mid-span	0.84	Passed (L/1290)	--	1.0 D + 0.6 W
Bending/Compression	0.34	1	Passed (34%)	1.60	1.0 D + 0.45 W + 0.75 L + 0.75 S

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for the design is zero
- Applicable calculations are based on NDS.
- The column stability factor (Kf = 0.6) applied to this design assumes nailed built-up columns per NDS section 15.3.3. For Weyerhaeuser ELP products refer to the U.S. Wall Guide for multiple-member connection requirements.

Supports	Type	Material
Top	Dbl 2X	Hem Fir
Base	2X	Hem Fir

System : Wall
Member Type : Column
Building Code : IBC 2021
Design Methodology : ASD

Max Unbraced Length	Comments
8'	

Lateral Connections

Supports	Connector	Type/Model	Quantity	Connector Nailing
Top	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A
Base	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A

- Nailed connection at the top of the member is assumed to be nailed through the bottom 2x plate prior to placement of the top 2x of the double top plate assembly.

Vertical Load	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
1 - Point (lb)	N/A	1580	2011	Linked from: RB5 - Flush Beam at Gym, Support 1

Lateral Load	Location	Tributary Width	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	1'	35.0	

- ASCE/SEI 7 Sec. 30.4: Exposure Category (C), Mean Roof Height (33'), Topographic Factor (1.0), Wind Directionality Factor (0.85), Basic Wind Speed (115), Risk Category(II), Wind Zone (4), GCpi (+/- 0.18), Effective Wind Area determined using full member span and trib. width.
- IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.

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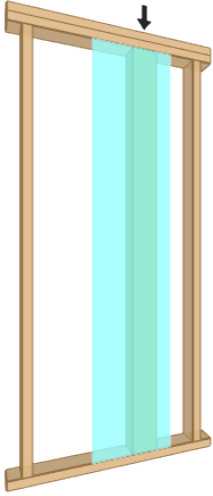


2nd Floor, P4 - Post
2 piece(s) 2 x 6 HF No.2

Wall Height: 9' 8"

Member Height: 9' 3 1/2"

Tributary Width: 1'



Drawing is Conceptual

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	32	50	Passed (64%)	--	--
Compression (lbs)	1375	3539	Passed (39%)	1.15	1.0 D + 1.0 S
Plate Bearing (lbs)	1375	6683	Passed (21%)	--	1.0 D + 1.0 S
Lateral Reaction (lbs)	96	--	--	1.60	1.0 D + 0.6 W
Lateral Shear (lbs)	87	2640	Passed (3%)	1.60	1.0 D + 0.6 W
Lateral Moment (ft-lbs)	224 @ mid-span	2175	Passed (10%)	1.60	1.0 D + 0.6 W
Total Deflection (in)	0.05 @ mid-span	0.93	Passed (L/2475)	--	1.0 D + 0.6 W
Bending/Compression	0.19	1	Passed (19%)	1.60	1.0 D + 0.45 W + 0.75 L + 0.75 S

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for the design is zero
- Applicable calculations are based on NDS.
- The column stability factor (Kf = 0.6) applied to this design assumes nailed built-up columns per NDS section 15.3.3. For Weyerhaeuser ELP products refer to the U.S. Wall Guide for multiple-member connection requirements.

Supports	Type	Material
Top	Dbl 2X	Hem Fir
Base	2X	Hem Fir

System : Wall
Member Type : Column
Building Code : IBC 2021
Design Methodology : ASD

Max Unbraced Length	Comments
8'	

Lateral Connections

Supports	Connector	Type/Model	Quantity	Connector Nailing
Top	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A
Base	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A

- Nailed connection at the top of the member is assumed to be nailed through the bottom 2x plate prior to placement of the top 2x of the double top plate assembly.

Vertical Load	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
1 - Point (lb)	N/A	531	844	Linked from: RB1 - North Cantilever Beam at Bedroom, Support 1

Lateral Load	Location	Tributary Width	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	1'	34.6	

- ASCE/SEI 7 Sec. 30.4: Exposure Category (C), Mean Roof Height (33'), Topographic Factor (1.0), Wind Directionality Factor (0.85), Basic Wind Speed (115), Risk Category(II), Wind Zone (4), GCpi (+/- 0.18), Effective Wind Area determined using full member span and trib. width.
- IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.

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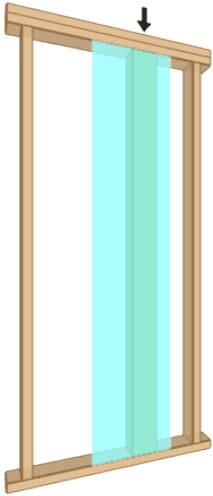


Main Floor, P5 - Post
4 piece(s) 2 x 6 HF No.2

Wall Height: 7' 6"

Member Height: 7' 1 1/2"

Tributary Width: 1'



Drawing is Conceptual

Design Results	Actual	Allowed	Result	LDF	Load: Combination [Load Group]
Slenderness	16	50	Passed (31%)	--	--
Compression (lbs)	12999	24058	Passed (54%)	1.15	1.0 D + 0.75 L + 0.75 S [1]
Plate Bearing (lbs)	12999	13365	Passed (97%)	--	1.0 D + 0.75 L + 0.75 S [1]
Lateral Reaction (lbs)	76	--	--	1.60	1.0 D + 0.6 W [1]
Lateral Shear (lbs)	67	5280	Passed (1%)	1.60	1.0 D + 0.6 W [1]
Lateral Moment (ft-lbs)	136 @ mid-span	4439	Passed (3%)	1.60	1.0 D + 0.6 W [1]
Total Deflection (in)	0.01 @ mid-span	0.71	Passed (L/10619)	--	1.0 D + 0.6 W [1]
Bending/Compression	0.24	1	Passed (24%)	1.60	1.0 D + 0.45 W + 0.75 L + 0.75 S [1]

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for the design is zero
- Applicable calculations are based on NDS.
- Bearing shall be on a metal plate or strap, or on other equivalently durable, rigid, homogeneous material with sufficient stiffness to distribute applied load.
- The column stability factor (Kf = 0.6) applied to this design assumes nailed built-up columns per NDS section 15.3.3. For Weyerhaeuser ELP products refer to the U.S. Wall Guide for multiple-member connection requirements.

Supports	Type	Material
Top	Dbf 2X	Hem Fir
Base	2X	Hem Fir

System : Wall
Member Type : Column
Building Code : IBC 2021
Design Methodology : ASD

Max Unbraced Length	Comments
7' 1 1/2"	

Lateral Connections				
Supports	Connector	Type/Model	Quantity	Connector Nailing
Top	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A
Base	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A

- Nailed connection at the top of the member is assumed to be nailed through the bottom 2x plate prior to placement of the top 2x of the double top plate assembly.

Vertical Load	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Point (lb)	N/A	5431	5130/588	4961	Linked from: B1 - South Cantilever Beam at Deck, Support 1

Lateral Load	Location	Tributary Width	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	1'	35.8	

- ASCE/SEI 7 Sec. 30.4: Exposure Category (C), Mean Roof Height (33'), Topographic Factor (1.0), Wind Directionality Factor (0.85), Basic Wind Speed (115), Risk Category(II), Wind Zone (4), GCpi (+/- 0.18), Effective Wind Area determined using full member span and trib. width.
- IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.

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Main Floor, P6 - Post
1 piece(s) 6 x 6 DF No.1

Post Height: 7' 6"



Design Results	Actual	Allowed	Result	LDF	Load: Combination [Load Group]
Slenderness	16	50	Passed (33%)	--	--
Compression (lbs)	12415	25608	Passed (48%)	1.00	1.0 D + 1.0 L [1]
Base Bearing (lbs)	13210	898425	Passed (1%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S [1]
Bending/Compression	N/A	1	Passed (N/A)	--	N/A

- Input axial load eccentricity for the design is zero
- Applicable calculations are based on NDS.

Supports	Type	Material
Base	Plate	Steel

Member Type : Free Standing Post
Building Code : IBC 2021
Design Methodology : ASD

Max Unbraced Length	Comments
Full Member Length	No bracing assumed.

Drawing is Conceptual

Vertical Load	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
1 - Point (lb)	4121	8294	3558	-284	381/-381	Linked from: B1 - South Cantilever Beam at Deck, Support 2

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Main Floor, P7 - Post
1 piece(s) 6 x 6 DF No.1

Post Height: 7' 6"



Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	16	50	Passed (33%)	--	--
Compression (lbs)	17203	28431	Passed (61%)	1.15	1.0 D + 0.75 L + 0.75 S
Base Bearing (lbs)	17203	898425	Passed (2%)	--	1.0 D + 0.75 L + 0.75 S
Bending/Compression	N/A	1	Passed (N/A)	--	N/A

- Input axial load eccentricity for the design is zero
- Applicable calculations are based on NDS.

Supports	Type	Material
Base	Plate	Steel

Member Type : Free Standing Post
Building Code : IBC 2021
Design Methodology : ASD

Max Unbraced Length	Comments
Full Member Length	No bracing assumed.

Drawing is Conceptual

Vertical Load	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Point (lb)	7336	7751	5405	Linked from: B3 - East Cantilever Beam at Deck, Support 1

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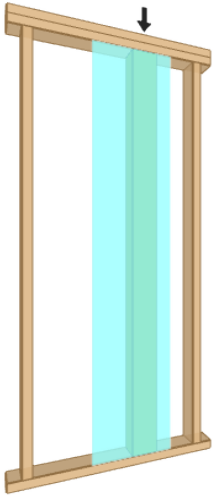
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Wall Height: 8'

Member Height: 7' 7 1/2"

Tributary Width: 1'



Drawing is Conceptual

Design Results	Actual	Allowed	Result	LDF	Load: Combination [Load Group]
Slenderness	20	50	Passed (41%)	--	--
Compression (lbs)	6619	12440	Passed (53%)	1.60	1.0 D - 0.525 E + 0.75 L + 0.75 S [5]
Plate Bearing (lbs)	6619	10024	Passed (66%)	--	1.0 D - 0.525 E + 0.75 L + 0.75 S [5]
Lateral Reaction (lbs)	81	--	--	1.60	1.0 D + 0.6 W [5]
Lateral Shear (lbs)	71	3960	Passed (2%)	1.60	1.0 D + 0.6 W [5]
Lateral Moment (ft-lbs)	155 @ mid-span	3315	Passed (5%)	1.60	1.0 D + 0.6 W [5]
Total Deflection (in)	0.01 @ mid-span	0.76	Passed (L/6553)	--	1.0 D + 0.6 W [5]
Bending/Compression	0.22	1	Passed (22%)	1.60	1.0 D + 0.45 W + 0.75 L + 0.75 S [5]

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for the design is zero
- Applicable calculations are based on NDS.
- The column stability factor (Kf = 0.6) applied to this design assumes nailed built-up columns per NDS section 15.3.3. For Weyerhaeuser ELP products refer to the U.S. Wall Guide for multiple-member connection requirements.

Supports	Type	Material
Top	Dbl 2X	Hem Fir
Base	2X	Hem Fir

System : Wall
Member Type : Column
Building Code : IBC 2021
Design Methodology : ASD

Max Unbraced Length	Comments
7' 7 1/2"	

Lateral Connections

Supports	Connector	Type/Model	Quantity	Connector Nailing
Top	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A
Base	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A

- Nailed connection at the top of the member is assumed to be nailed through the bottom 2x plate prior to placement of the top 2x of the double top plate assembly.

Vertical Load	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
1 - Point (lb)	N/A	2582	2608/-226	1317	645/-511	2082/-2082	Linked from: B5 - South Rim Beam at Office, Support 1

Lateral Load	Location	Tributary Width	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	1'	35.5	

- ASCE/SEI 7 Sec. 30.4: Exposure Category (C), Mean Roof Height (33'), Topographic Factor (1.0), Wind Directionality Factor (0.85), Basic Wind Speed (115), Risk Category(II), Wind Zone (4), GCpi (+/- 0.18), Effective Wind Area determined using full member span and trib. width.
- IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.

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Main Floor, P9 - Post
1 piece(s) 6 x 6 DF No.1

Post Height: 7' 6"



Design Results	Actual	Allowed	Result	LDF	Load: Combination [Load Group]
Slenderness	16	50	Passed (33%)	--	--
Compression (lbs)	14118	25608	Passed (55%)	1.00	1.0 D + 1.0 L [1]
Base Bearing (lbs)	17461	898425	Passed (2%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S [1]
Bending/Compression	N/A	1	Passed (N/A)	--	N/A

- Input axial load eccentricity for the design is zero
- Applicable calculations are based on NDS.

Supports	Type	Material
Base	Plate	Steel

Member Type : Free Standing Post
Building Code : IBC 2021
Design Methodology : ASD

Max Unbraced Length	Comments
Full Member Length	No bracing assumed.

Drawing is Conceptual

Vertical Load	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
1 - Point (lb)	8972	5146	3733	2598	3486/-3486	Linked from: B6 - Cantilever Beam at Office, Support 2

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

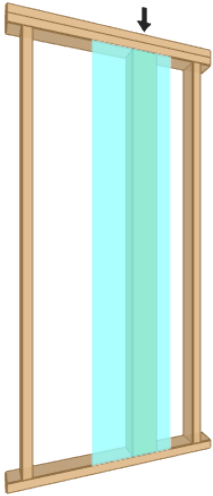
ForteWEB Software Operator	Job Notes
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	



Wall Height: 8'

Member Height: 7' 7 1/2"

Tributary Width: 1'



Drawing is Conceptual

Design Results	Actual	Allowed	Result	LDF	Load: Combination [Load Group]
Slenderness	26	50	Passed (52%)	--	--
Compression (lbs)	6338	7530	Passed (84%)	1.15	1.0 D + 1.0 S [5]
Plate Bearing (lbs)	6417	6379	Passed (101%)	--	1.0 D - 0.525 E + 0.75 L + 0.75 S [5]
Lateral Reaction (lbs)	81	--	--	1.60	1.0 D + 0.6 W [5]
Lateral Shear (lbs)	75	2520	Passed (3%)	1.60	1.0 D + 0.6 W [5]
Lateral Moment (ft-lbs)	155 @ mid-span	1553	Passed (10%)	1.60	1.0 D + 0.6 W [5]
Total Deflection (in)	0.05 @ mid-span	0.76	Passed (L/1689)	--	1.0 D + 0.6 W [5]
Bending/Compression	0.77	1	Passed (77%)	1.60	1.0 D + 0.45 W + 0.75 L + 0.75 S [5]

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for the design is zero
- Applicable calculations are based on NDS.
- Bearing shall be on a metal plate or strap, or on other equivalently durable, rigid, homogeneous material with sufficient stiffness to distribute applied load.
- The column stability factor (Kf = 0.6) applied to this design assumes nailed built-up columns per NDS section 15.3.3. For Weyerhaeuser ELP products refer to the U.S. Wall Guide for multiple-member connection requirements.

Supports	Type	Material
Top	Dbl 2X	Hem Fir
Base	2X	Hem Fir

System : Wall
Member Type : Column
Building Code : IBC 2021
Design Methodology : ASD

Max Unbraced Length	Comments
7' 7 1/2"	

Lateral Connections

Supports	Connector	Type/Model	Quantity	Connector Nailing
Top	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A
Base	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A

- Nailed connection at the top of the member is assumed to be nailed through the bottom 2x plate prior to placement of the top 2x of the double top plate assembly.

Vertical Loads	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
1 - Point (lb)	N/A	550	-	850	-	-	P4 Post
2 - Point (lb)	N/A	2397	-	2405	-380	649/-649	Linked from: B10 - Flush Beam over Kitchen, Support 2
3 - Point (lb)	N/A	136	736/-730	-	-	-	Linked from: B2 - North Cantilever Beam at Deck, Support 1

Lateral Load	Location	Tributary Width	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	1'	35.5	

- ASCE/SEI 7 Sec. 30.4: Exposure Category (C), Mean Roof Height (33'), Topographic Factor (1.0), Wind Directionality Factor (0.85), Basic Wind Speed (115), Risk Category(II), Wind Zone (4), GCpi (+/- 0.18), Effective Wind Area determined using full member span and trib. width.
- IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.

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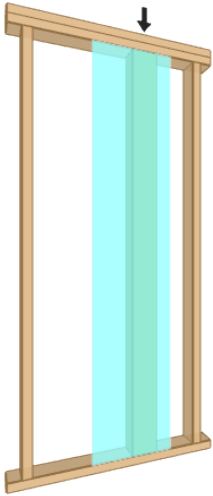
ForteWEB Software Operator	Job Notes
Maxwell Skotheim Quantum Consulting Engineers (206) 957-3906 MSkotheim@quantumce.com	



Wall Height: 8'

Member Height: 7' 7 1/2"

Tributary Width: 1'



Drawing is Conceptual

Design Results	Actual	Allowed	Result	LDF	Load: Combination [Load Group]
Slenderness	26	50	Passed (52%)	--	--
Compression (lbs)	4876	7530	Passed (65%)	1.15	1.0 D + 1.0 S [1]
Plate Bearing (lbs)	4876	6379	Passed (76%)	--	1.0 D + 1.0 S [1]
Lateral Reaction (lbs)	81	--	--	1.60	1.0 D + 0.6 W [1]
Lateral Shear (lbs)	75	2520	Passed (3%)	1.60	1.0 D + 0.6 W [1]
Lateral Moment (ft-lbs)	155 @ mid-span	1553	Passed (10%)	1.60	1.0 D + 0.6 W [1]
Total Deflection (in)	0.05 @ mid-span	0.76	Passed (L/1689)	--	1.0 D + 0.6 W [1]
Bending/Compression	0.46	1	Passed (46%)	1.60	1.0 D + 0.45 W + 0.75 L + 0.75 S [1]

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for the design is zero
- Applicable calculations are based on NDS.
- Bearing shall be on a metal plate or strap, or on other equivalently durable, rigid, homogeneous material with sufficient stiffness to distribute applied load.
- The column stability factor (Kf = 0.6) applied to this design assumes nailed built-up columns per NDS section 15.3.3. For Weyerhaeuser ELP products refer to the U.S. Wall Guide for multiple-member connection requirements.

Supports	Type	Material
Top	Dbl 2X	Hem Fir
Base	2X	Hem Fir

System : Wall
 Member Type : Column
 Building Code : IBC 2021
 Design Methodology : ASD

Max Unbraced Length	Comments
7' 7 1/2"	

Lateral Connections				
Supports	Connector	Type/Model	Quantity	Connector Nailing
Top	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A
Base	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A

- Nailed connection at the top of the member is assumed to be nailed through the bottom 2x plate prior to placement of the top 2x of the double top plate assembly.

Vertical Load	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
1 - Point (lb)	N/A	2425	2451	380	649/-649	Linked from: B10 - Flush Beam over Kitchen, Support 1

Lateral Load	Location	Tributary Width	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	1'	35.5	

- ASCE/SEI 7 Sec. 30.4: Exposure Category (C), Mean Roof Height (33'), Topographic Factor (1.0), Wind Directionality Factor (0.85), Basic Wind Speed (115), Risk Category(II), Wind Zone (4), GCpi (+/- 0.18), Effective Wind Area determined using full member span and trib. width.
- IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.

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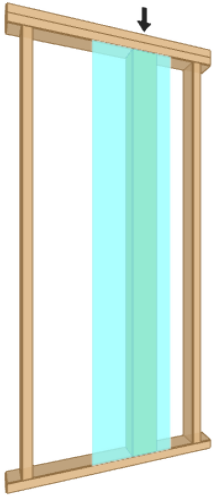
Main Floor, P12 - Post

3 piece(s) 2 x 4 HF No.2

Wall Height: 8'

Member Height: 7' 7 1/2"

Tributary Width: 1'



Drawing is Conceptual

Design Results	Actual	Allowed	Result	LDF	Load: Combination [Load Group]
Slenderness	26	50	Passed (52%)	--	--
Compression (lbs)	3532	7964	Passed (44%)	1.60	1.0 D + 0.525 E + 0.75 L + 0.75 S [1]
Plate Bearing (lbs)	3532	6379	Passed (55%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S [1]
Lateral Reaction (lbs)	81	--	--	1.60	1.0 D + 0.6 W [1]
Lateral Shear (lbs)	75	2520	Passed (3%)	1.60	1.0 D + 0.6 W [1]
Lateral Moment (ft-lbs)	155 @ mid-span	1553	Passed (10%)	1.60	1.0 D + 0.6 W [1]
Total Deflection (in)	0.05 @ mid-span	0.76	Passed (L/1689)	--	1.0 D + 0.6 W [1]
Bending/Compression	0.22	1	Passed (22%)	1.60	1.0 D + 0.45 W + 0.75 L + 0.75 S [1]

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for the design is zero
- Applicable calculations are based on NDS.
- The column stability factor (Kf = 0.6) applied to this design assumes nailed built-up columns per NDS section 15.3.3. For Weyerhaeuser ELP products refer to the U.S. Wall Guide for multiple-member connection requirements.

Supports	Type	Material
Top	Dbl 2X	Hem Fir
Base	2X	Hem Fir

System : Wall
Member Type : Column
Building Code : IBC 2021
Design Methodology : ASD

Max Unbraced Length	Comments
7' 7 1/2"	

Lateral Connections

Supports	Connector	Type/Model	Quantity	Connector Nailing
Top	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A
Base	Nails	8d (0.113" x 2 1/2") (Toe)	2	N/A

- Nailed connection at the top of the member is assumed to be nailed through the bottom 2x plate prior to placement of the top 2x of the double top plate assembly.

Vertical Load	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
1 - Point (lb)	N/A	1756	759	478	17/-950	1616/-1616	Linked from: B9 - Flush Beam at North Closet, Support 2

Lateral Load	Location	Tributary Width	Wind (1.60)	Comments
1 - Uniform (PSF)	Full Length	1'	35.5	

- ASCE/SEI 7 Sec. 30.4: Exposure Category (C), Mean Roof Height (33'), Topographic Factor (1.0), Wind Directionality Factor (0.85), Basic Wind Speed (115), Risk Category(II), Wind Zone (4), GCpi (+/- 0.18), Effective Wind Area determined using full member span and trib. width.
- IBC Table 1604.3, footnote f: Deflection checks are performed using 42% of this lateral wind load.

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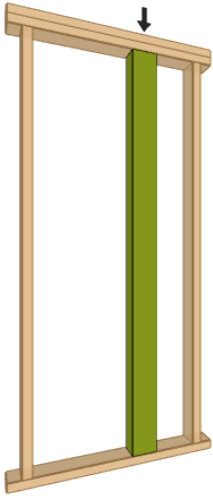
Main Floor, P13 - Post

3 piece(s) 2 x 4 HF No.2

Wall Height: 8'

Member Height: 7' 7 1/2"

Tributary Width: 1'



Drawing is Conceptual

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	26	50	Passed (52%)	--	--
Compression (lbs)	1970	7282	Passed (27%)	1.00	1.0 D + 1.0 L
Plate Bearing (lbs)	2026	6379	Passed (32%)	--	1.0 D + 0.75 L + 0.75 S
Lateral Reaction (lbs)	0	--	--	--	N/A
Lateral Shear (lbs)	0	N/A	Passed (N/A)	--	N/A
Lateral Moment (ft-lbs)	0 @ mid-span	N/A	Passed (N/A)	--	N/A
Total Deflection (in)	0.00 @ mid-span	N/A	Passed (N/A)	--	N/A
Bending/Compression	N/A	1	Passed (N/A)	--	N/A

- Lateral deflection criteria: Wind (L/120)
- Input axial load eccentricity for the design is zero
- Applicable calculations are based on NDS.
- The column stability factor (Kf = 0.6) applied to this design assumes nailed built-up columns per NDS section 15.3.3. For Weyerhaeuser ELP products refer to the U.S. Wall Guide for multiple-member connection requirements.

Supports	Type	Material
Top	Dbl 2X	Hem Fir
Base	2X	Hem Fir

System : Wall
Member Type : Column
Building Code : IBC 2021
Design Methodology : ASD

Max Unbraced Length	Comments
7' 7 1/2"	

Vertical Load	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Point (lb)	N/A	809	1161	461	Linked from: B8 - Flush Beam at Stair, Support 1

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Spread Footing Schedule Design

Per IBC 2021 & ACI 318-19

Typical Properties:

Allowable Soil Bearing Pressure: **1.5** ksf
 Ultimate Factor, F (1.25<F<1.6): **1.4**
 Minimum Thickness: **10** inches
 f'c: **2.5** ksi
 fy: **40** ksi

Design:

Footing	Column Size		Allowable Soil Load kips	Pu kips	Min. d in	Minimum Ftg Th. in	Ftg. Th. Input in	As(ult) in^2	As (min) in^2	Rebar Size	Rebar Quantity	Rebar Spacing in
	B in	H in										
F- 2	6	6	6.0	8	6	10	10	0.07	0.43	#4	3	9.8
F- 2.5	6	6	9.4	13	6	10	10	0.15	0.54	#4	3	12.8
F- 3	6	6	13.5	19	6	10	12	0.21	0.78	#4	4	10.5
F- 3.5	6	6	18.4	26	6	10	12	0.35	0.91	#4	5	9.4
F- 4	6	6	24.0	34	6	10	12	0.54	1.04	#4	6	8.7
F- 4.5	6	6	30.4	43	6	10	12	0.80	1.17	#4	6	9.9
F- 5	6	6	37.5	53	8	12	12	1.13	1.30	#4	7	9.3
F-			0.0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#5	#DIV/0!	#DIV/0!
F-			0.0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#5	#DIV/0!	#DIV/0!
F-			0.0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#6	#DIV/0!	#DIV/0!
F-			0.0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#6	#DIV/0!	#DIV/0!
F-			0.0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#6	#DIV/0!	#DIV/0!
F-			0.0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#6	#DIV/0!	#DIV/0!
F-			0.0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#6	#DIV/0!	#DIV/0!
F-			0.0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#6	#DIV/0!	#DIV/0!
F-			0.0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#6	#DIV/0!	#DIV/0!
F-			0.0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#6	#DIV/0!	#DIV/0!

Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 4ft

Code Reference

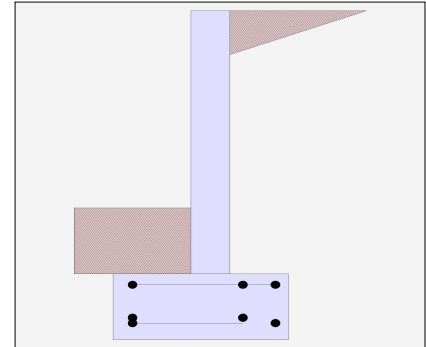
Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

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

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.350
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

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

Axial Load Applied to Stem

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

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 4ft

Design Summary

Wall Stability Ratios

Overturning	=	0.00	OK
Sliding	=	0.00	OK
Global Stability	=	2.15	
Total Bearing Load	=	0 lbs	
...resultant ecc.	=	0.00 in	
Soil Pressure @ Toe	=	0 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	0 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	0.0 psi	OK
Footing Shear @ Heel	=	0.0 psi	OK
Allowable	=	0.0 psi	

Sliding Calcs

Lateral Sliding Force	=	1,417.5 lbs	
less 100% Passive Force	=	0.0 lbs	
less 100% Friction Force	=	0.0 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

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

Load Factors

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

Stem Construction

Design Height Above Ftc

Wall Material Above "Ht"	=	Concrete
Design Method	=	SD
Thickness	=	6.00
Rebar Size	=	# 4
Rebar Spacing	=	16.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa = 0.000

Total Force @ Section

Service Level	lbs =
Strength Level	lbs =

Moment....Actual

Service Level	ft-# =
Strength Level	ft-# =

Moment.....Allowable = 0.0

Shear.....Actual

Service Level	psi =
Strength Level	psi =

Shear.....Allowable psi = 0.0

Anet (Masonry)

Wall Weight psf = 0.0

Rebar Depth 'd' in = 0.00

Masonry Data

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

Concrete Data

f'c	psi = 2,500.0
Fy	psi = 40,000.0

Bottom

Bar Lap/Emb

ft = 0.00

SD SD SD SD

Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 4ft

Concrete Stem Rebar Area Details

Bottom Stem	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>	
As (based on applied moment) :	0 in2/ft		
0.0018bh : 0.0018(12)(6) :	0.1296 in2/ft	Horizontal Reinforcing Options :	
	=====	<u>One layer of :</u> <u>Two layers of :</u>	
Required Area :	0.1296 in2/ft	#4@ 18.52 in	#4@ 37.04 in
Provided Area :	0.15 in2/ft	#5@ 28.70 in	#5@ 57.41 in
Maximum Area :	0 in2/ft	#6@ 40.74 in	#6@ 81.48 in

Footing Data

Toe Width	=	1.00 ft
Heel Width	=	1.25
Total Footing Width	=	0.00
Footing Thickness	=	12.00 in
f'c =	2,500 psi	Fy = 40,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	0	0	psf
Mu' : Upward	=	0	0	ft-#
Mu' : Downward	=	0	0	ft-#
Mu: Design	=	1,692	2,223	ft-#
φ Mn	=	7,853	7,432	ft-#
Actual 1-Way Shear	=	0.00	0.00	psi
Allow 1-Way Shear	=	0.00	0.00	psi
Toe Reinforcing	=	# 8 @ 12.00 in		
Heel Reinforcing	=	# 4 @ 9.25 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00	ft-lbs
Footing Allow. Torsion, φ Tn	=		0.00	ft-lbs

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

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area	0.00	in2
Min footing T&S reinf Area per foot	0.00	in2 /ft

If one layer of horizontal bars:

#4@ 0.00 in
 #5@ 0.00 in
 #6@ 0.00 in

If two layers of horizontal bars:

#4@ 0.00 in
 #5@ 0.00 in
 #6@ 0.00 in

Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 4ft

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....				.....RESISTING.....		
	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	1,417.5	3.00	4,252.5	Soil Over HL (ab. water tbl)	2,493.3	3.58	
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.58	
Hydrostatic Force				Water Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =			
				Surcharge Over Toe =			
				Stem Weight(s) =			
				Earth @ Stem Transitions =			
Total =		O.T.M. =		Footing Weight =			
				Key Weight =			
Resisting/Overturning Ratio =				Vert. Component =			
Vertical Loads used for Soil Pressure =			lbs	Total =	lbs	R.M.=	

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

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

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

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

Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 4ft

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.4a) =	15.60 in
Development length for #4 bar specified in this stem design segment =	12.00 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =	6.00 in
As Provided =	0.1500 in ² /ft
As Required =	0.1296 in ² /ft

Cantilevered Retaining Wall

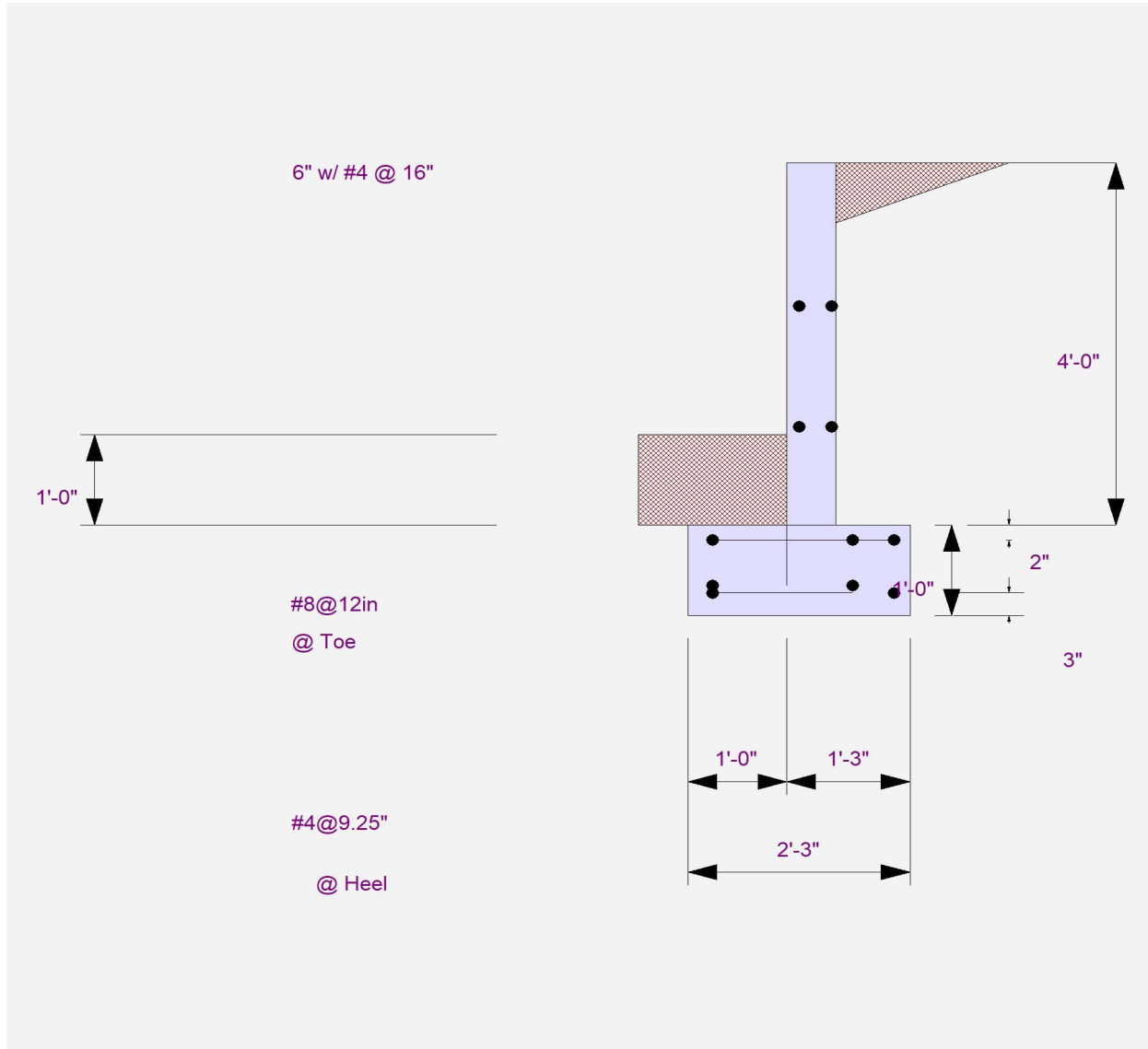
Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 4ft



Cantilevered Retaining Wall

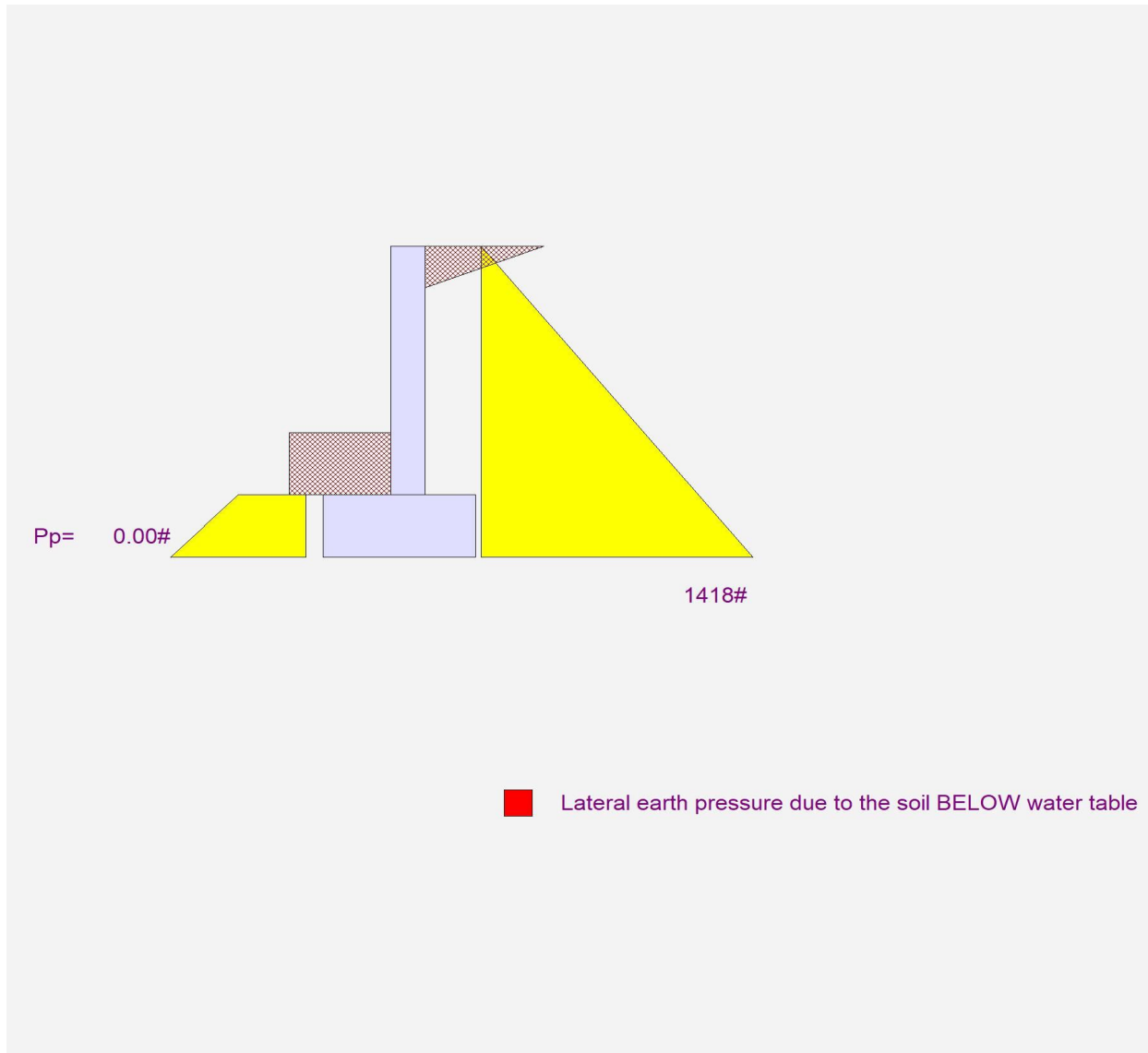
Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

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DESCRIPTION: Site Retaining Wall, 4ft



Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 5ft

Code Reference

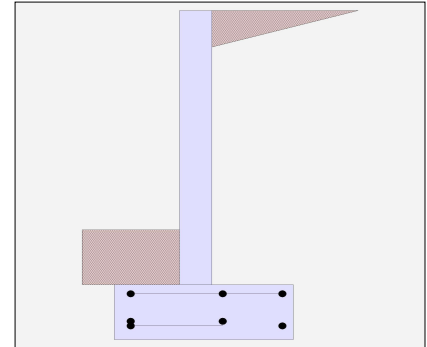
Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	5.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.350
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

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

Axial Load Applied to Stem

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

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 5ft

Design Summary

Wall Stability Ratios

Overturning	=	0.00	OK
Sliding	=	0.00	OK
Global Stability	=	2.15	
Total Bearing Load	=	0 lbs	
...resultant ecc.	=	0.00 in	
Soil Pressure @ Toe	=	0 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	0 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	0.0 psi	OK
Footing Shear @ Heel	=	0.0 psi	OK
Allowable	=	0.0 psi	

Sliding Calcs

Lateral Sliding Force	=	1,417.5 lbs	
less 100% Passive Force	-	0.0 lbs	
less 100% Friction Force	= -	0.0 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

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

Load Factors

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

Stem Construction

Design Height Above Ftc

Wall Material Above "Ht"	=	Concrete
Design Method	=	SD
Thickness	=	6.00
Rebar Size	=	# 4
Rebar Spacing	=	16.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.000
---------------	---	-------

Total Force @ Section

Service Level	lbs =
Strength Level	lbs =

Moment....Actual

Service Level	ft-# =
Strength Level	ft-# =

Moment.....Allowable	=	0.0
----------------------	---	-----

Shear.....Actual

Service Level	psi =
Strength Level	psi =

Shear.....Allowable	psi =	0.0
---------------------	-------	-----

Anet (Masonry)	in2 =
----------------	-------

Wall Weight	psf =	0.0
-------------	-------	-----

Rebar Depth 'd'	in =	0.00
-----------------	------	------

Masonry Data

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

Concrete Data

f'c	psi =	2,500.0
Fy	psi =	40,000.0

Bottom

Bar Lap/Emb

ft = 0.00

Concrete

SD

6.00

4

16.00

Edge

0.000

lbs =

lbs =

ft-# =

ft-# =

0.0

psi =

psi =

0.0

in2 =

0.0

in =

0.00

Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 5ft

Concrete Stem Rebar Area Details

Bottom Stem	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>	
As (based on applied moment) :	0 in2/ft		
0.0018bh : 0.0018(12)(6) :	0.1296 in2/ft	Horizontal Reinforcing Options :	
	=====	<u>One layer of :</u> <u>Two layers of :</u>	
Required Area :	0.1296 in2/ft	#4@ 18.52 in	#4@ 37.04 in
Provided Area :	0.15 in2/ft	#5@ 28.70 in	#5@ 57.41 in
Maximum Area :	0 in2/ft	#6@ 40.74 in	#6@ 81.48 in

Footing Data

Toe Width	=	1.00 ft
Heel Width	=	1.75
Total Footing Width	=	0.00
Footing Thickness	=	12.00 in
f'c =	2,500 psi	Fy = 40,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	0	0	psf
Mu' : Upward	=	0	0	ft-#
Mu' : Downward	=	0	0	ft-#
Mu: Design	=	1,692	2,223	ft-#
φ Mn	=	7,853	7,432	ft-#
Actual 1-Way Shear	=	0.00	0.00	psi
Allow 1-Way Shear	=	0.00	0.00	psi
Toe Reinforcing	=	# 4 @ 9.26 in		
Heel Reinforcing	=	# 4 @ 9.25 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00	ft-lbs
Footing Allow. Torsion, φ Tn	=		0.00	ft-lbs

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

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area	0.00	in2
Min footing T&S reinf Area per foot	0.00	in2 /ft

If one layer of horizontal bars:

- #4@ 0.00 in
- #5@ 0.00 in
- #6@ 0.00 in

If two layers of horizontal bars:

- #4@ 0.00 in
- #5@ 0.00 in
- #6@ 0.00 in

Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 5ft

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....				.....RESISTING.....		
	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	1,417.5	3.00	4,252.5	Soil Over HL (ab. water tbl)	2,493.3	3.58	
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.58	
Hydrostatic Force				Water Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =			
				Surcharge Over Toe =			
				Stem Weight(s) =			
				Earth @ Stem Transitions =			
				Footing Weight =			
				Key Weight =			
				Vert. Component =			
Total	=	O.T.M.	=	Total	=	lbs	R.M.=
Resisting/Overturning Ratio		=					
Vertical Loads used for Soil Pressure =			lbs				

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

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

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

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

Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 5ft

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.4a) =	15.60 in
Development length for #4 bar specified in this stem design segment =	12.00 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =	6.00 in
As Provided =	0.1500 in ² /ft
As Required =	0.1296 in ² /ft

Cantilevered Retaining Wall

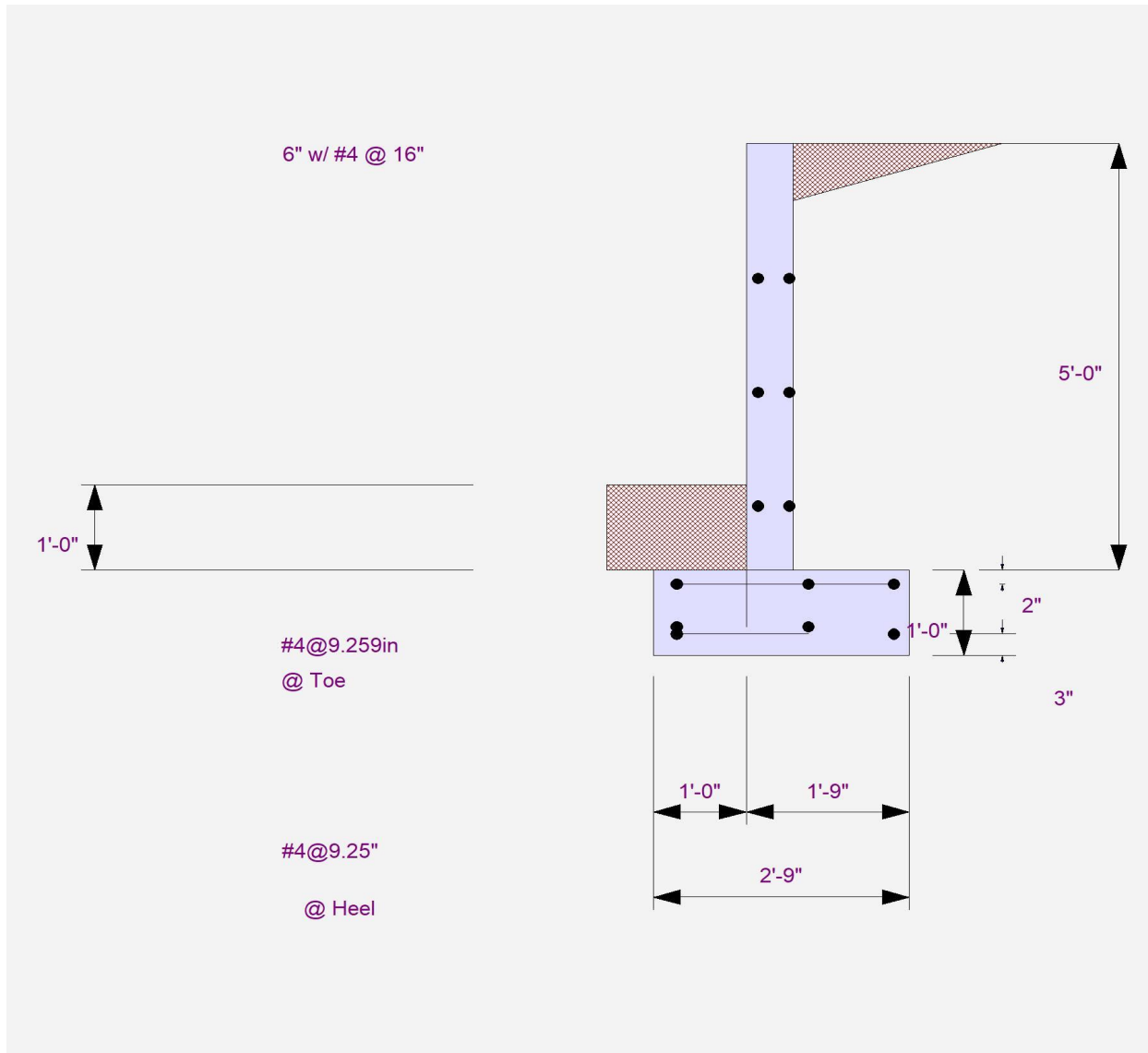
Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 5ft



Cantilevered Retaining Wall

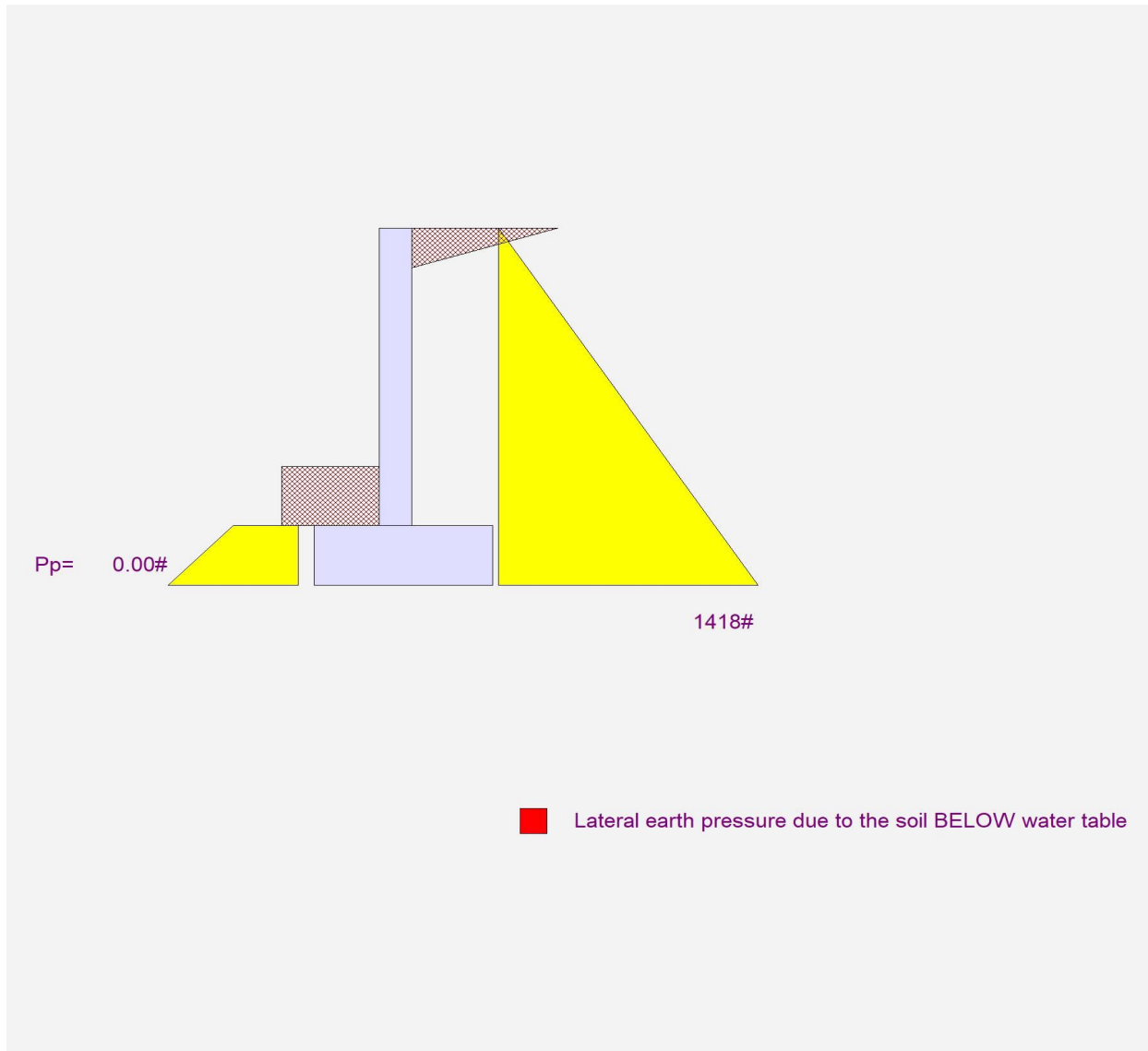
Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

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DESCRIPTION: Site Retaining Wall, 5ft



Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 6ft

Code Reference

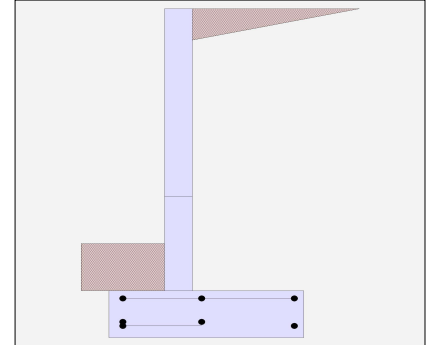
Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	6.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.525
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

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

Axial Load Applied to Stem

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

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 6ft

Design Summary

Wall Stability Ratios

Overturning	=	0.00	OK
Sliding	=	0.00	OK
Global Stability	=	2.15	
Total Bearing Load	=	0 lbs	
...resultant ecc.	=	0.00 in	
Soil Pressure @ Toe	=	0 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	0 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	0.0 psi	OK
Footing Shear @ Heel	=	0.0 psi	OK
Allowable	=	0.0 psi	

Sliding Calcs

Lateral Sliding Force	=	1,417.5 lbs	
less 100% Passive Force	-	0.0 lbs	
less 100% Friction Force	= -	0.0 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

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

Load Factors

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

Stem Construction

		2nd	Bottom		
Design Height Above Ftc	ft =	Bar Lap/Emb 2.00	Bar Lap/Emb 0.00		
Wall Material Above "Ht"	=	Concrete	Concrete		
Design Method	=	SD	SD	SD	SD
Thickness	=	6.00	6.00		
Rebar Size	=	# 4	# 5		
Rebar Spacing	=	16.00	16.00		
Rebar Placed at	=	Edge	Edge		

Design Data

fb/FB + fa/Fa = 0.000 0.000

Total Force @ Section

Service Level lbs =
 Strength Level lbs =

Moment....Actual

Service Level ft-# =
 Strength Level ft-# =

Moment....Allowable ft-# = 0.0 0.0

Shear....Actual

Service Level psi =
 Strength Level psi =

Shear....Allowable psi = 0.0 0.0

Anet (Masonry)

Wall Weight psf = 0.0 0.0

Rebar Depth 'd' in = 0.00 0.00

Masonry Data

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

Concrete Data

f'c psi = 2,500.0 2,500.0
 Fy psi = 40,000.0 60,000.0

Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 6ft

Concrete Stem Rebar Area Details

2nd Stem	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>
As (based on applied moment) :	0 in2/ft	
0.0018bh : 0.0018(12)(6) :	0.1296 in2/ft	Horizontal Reinforcing Options :
	=====	<u>One layer of :</u> <u>Two layers of :</u>
Required Area :	0.1296 in2/ft	#4@ 18.52 in #4@ 37.04 in
Provided Area :	0.15 in2/ft	#5@ 28.70 in #5@ 57.41 in
Maximum Area :	0 in2/ft	#6@ 40.74 in #6@ 81.48 in

Bottom Stem	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>
As (based on applied moment) :	0 in2/ft	
0.0018bh : 0.0018(12)(6) :	0.1296 in2/ft	Horizontal Reinforcing Options :
	=====	<u>One layer of :</u> <u>Two layers of :</u>
Required Area :	0.1296 in2/ft	#4@ 18.52 in #4@ 37.04 in
Provided Area :	0.2325 in2/ft	#5@ 28.70 in #5@ 57.41 in
Maximum Area :	0 in2/ft	#6@ 40.74 in #6@ 81.48 in

Footing Data

Toe Width	=	1.00 ft
Heel Width	=	2.50
Total Footing Width	=	0.00
Footing Thickness	=	12.00 in

f'c =	2,500 psi	Fy =	40,000 psi
Footing Concrete Density	=	150.00 pcf	
Min. As %	=	0.0018	
Cover @ Top	2.00	@ Btm.=	3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	0	0	psf
Mu' : Upward	=	0	0	ft-#
Mu' : Downward	=	0	0	ft-#
Mu: Design	=	1,692	2,223	ft-#
φ Mn	=	7,853	7,432	ft-#
Actual 1-Way Shear	=	0.00	0.00	psi
Allow 1-Way Shear	=	0.00	0.00	psi
Toe Reinforcing	=	# 4 @ 9.26 in		
Heel Reinforcing	=	# 4 @ 9.25 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00	ft-lbs
Footing Allow. Torsion, φ Tn	=		0.00	ft-lbs

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

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area	0.00	in2
Min footing T&S reinf Area per foot	0.00	in2 /ft

If one layer of horizontal bars: If two layers of horizontal bars:

#4@ 0.00 in	#4@ 0.00 in
#5@ 0.00 in	#5@ 0.00 in
#6@ 0.00 in	#6@ 0.00 in

Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 6ft

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....				.....RESISTING.....		
	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	1,417.5	3.00	4,252.5	Soil Over HL (ab. water tbl)	2,493.3	3.58	
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.58	
Hydrostatic Force				Water Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =			
				Surcharge Over Toe =			
				Stem Weight(s) =			
				Earth @ Stem Transitions =			
				Footing Weight =			
				Key Weight =			
				Vert. Component =			
Total	=	O.T.M.	=	Total	=	lbs	R.M.=
Resisting/Overturning Ratio		=					
Vertical Loads used for Soil Pressure =			lbs				

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

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

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

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

Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 6ft

Rebar Lap & Embedment Lengths Information

Stem Design Segment: 2nd

Stem Design Height: 2.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.4a) = 15.60 in
Development length for #4 bar specified in this stem design segment = 12.00 in

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment (25.4.2.4a) = 23.40 in
Development length for #5 bar specified in this stem design segment = 18.00 in

Hooked embedment length into footing for #5 bar specified in this stem design segment = 8.27 in
As Provided = 0.2325 in²/ft
As Required = 0.1296 in²/ft

Cantilevered Retaining Wall

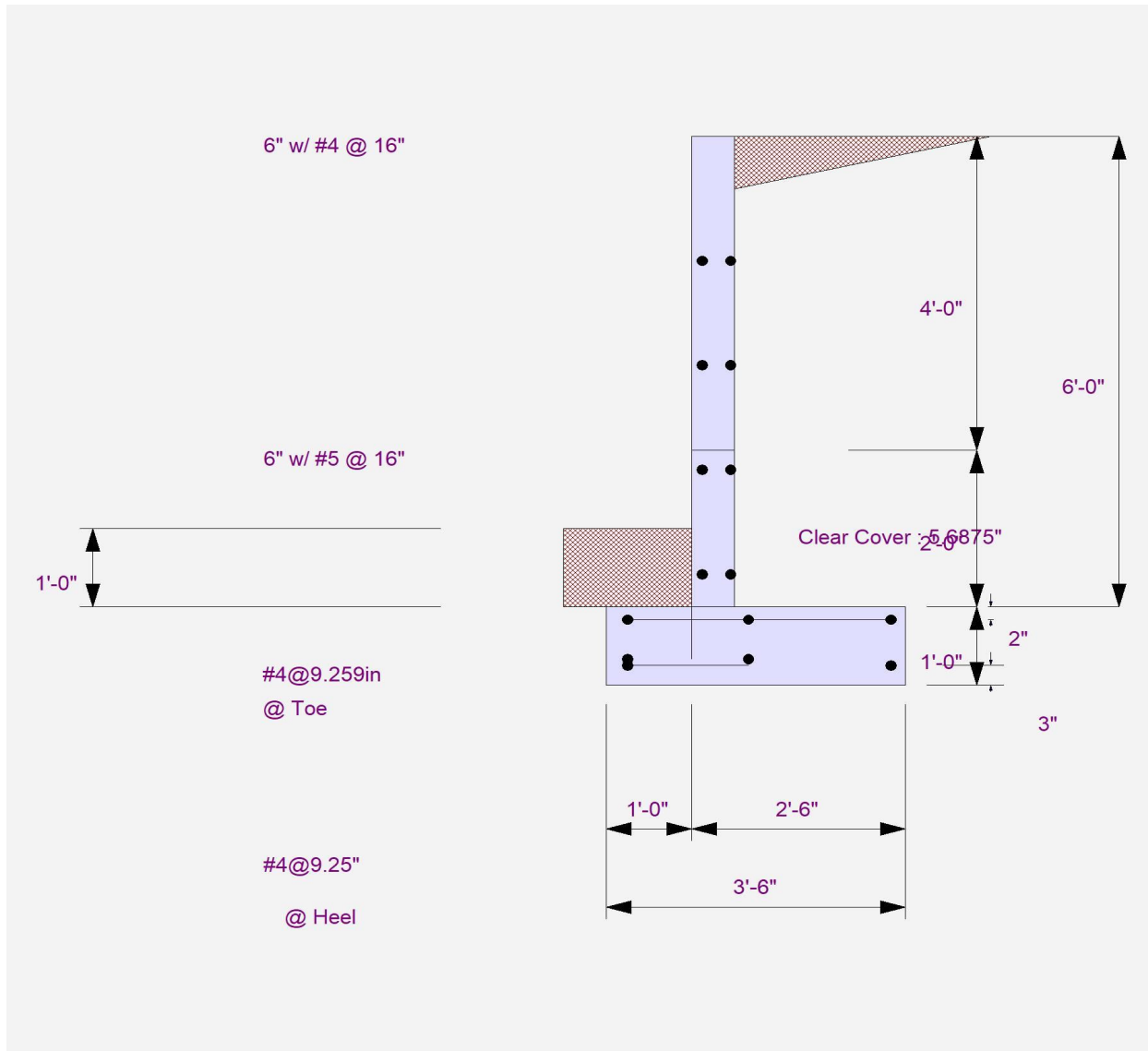
Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 6ft



Cantilevered Retaining Wall

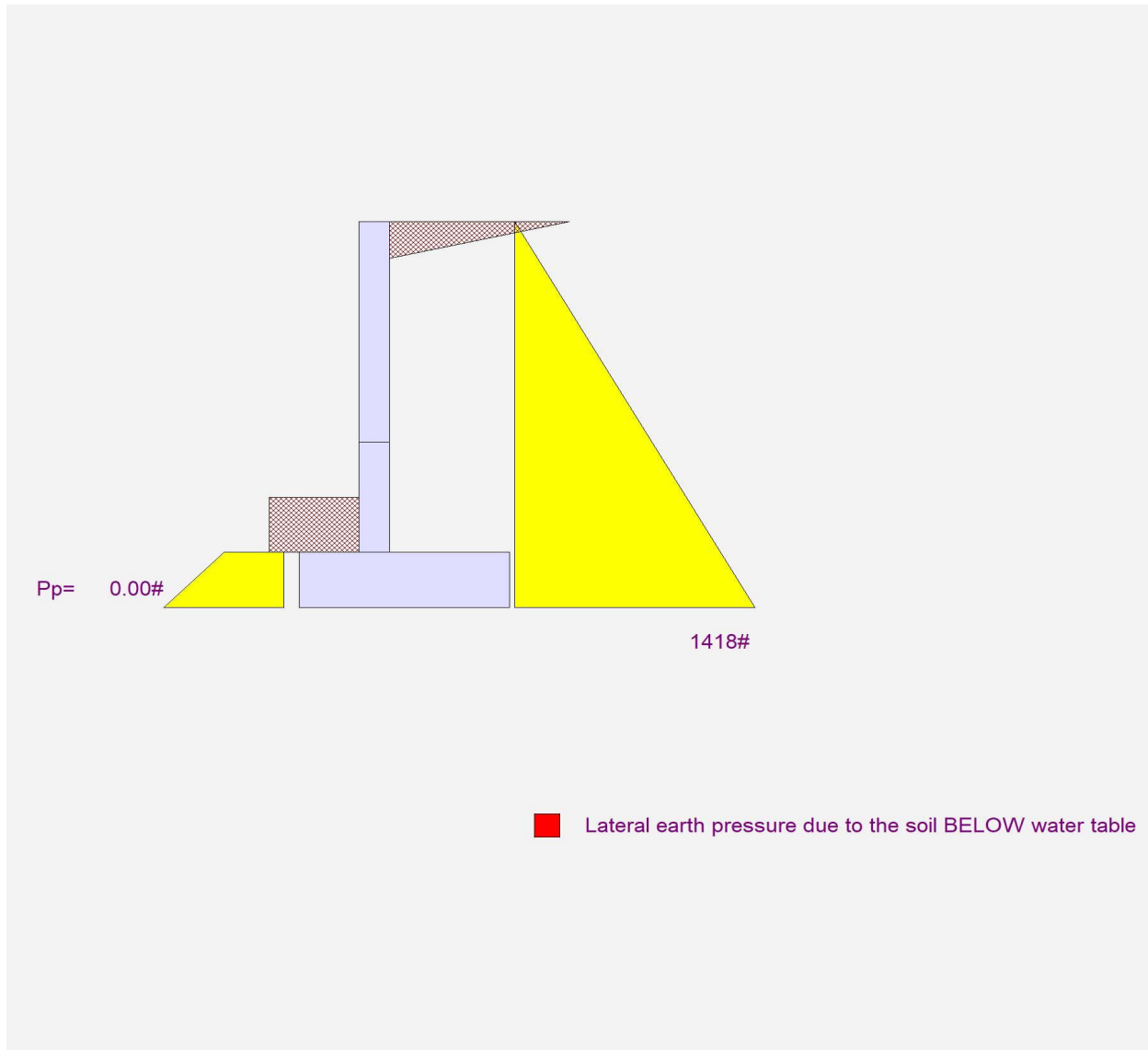
Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

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DESCRIPTION: Site Retaining Wall, 6ft



Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 7ft

Code Reference

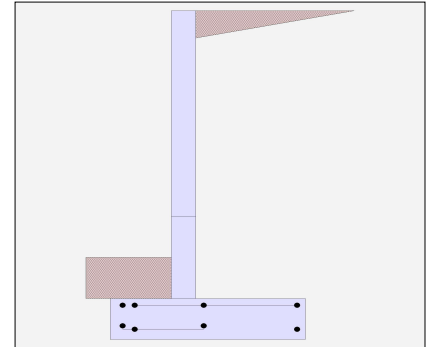
Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	7.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.525
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

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

Axial Load Applied to Stem

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

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 7ft

Design Summary

Wall Stability Ratios

Overturning	=	0.00	OK
Sliding	=	0.00	OK
Global Stability	=	2.15	
Total Bearing Load	=	0 lbs	
...resultant ecc.	=	0.00 in	
Soil Pressure @ Toe	=	0 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	0 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	0.0 psi	OK
Footing Shear @ Heel	=	0.0 psi	OK
Allowable	=	0.0 psi	

Sliding Calcs

Lateral Sliding Force	=	1,417.5 lbs	
less 100% Passive Force	-	0.0 lbs	
less 100% Friction Force	= -	0.0 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

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

Load Factors

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

Stem Construction

		2nd	Bottom		
Design Height Above Ftc	ft =	Bar Lap/Emb 2.00	Bar Lap/Emb 0.00		
Wall Material Above "Ht"	=	Concrete	Concrete		
Design Method	=	SD	SD	SD	SD
Thickness	=	6.00	6.00		
Rebar Size	=	# 4	# 5		
Rebar Spacing	=	16.00	16.00		
Rebar Placed at	=	Edge	Edge		

Design Data

fb/FB + fa/Fa	=	0.000	0.000
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Total Force @ Section

Service Level	lbs =
Strength Level	lbs =

Moment....Actual

Service Level	ft-# =
Strength Level	ft-# =

Moment....Allowable	ft-# =	0.0	0.0
---------------------	--------	-----	-----

Shear....Actual

Service Level	psi =
Strength Level	psi =

Shear....Allowable	psi =	0.0	0.0
--------------------	-------	-----	-----

Anet (Masonry)

Wall Weight	psf =	0.0	0.0
Rebar Depth 'd'	in =	0.00	0.00

Masonry Data

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

Concrete Data

f'c	psi =	2,500.0	2,500.0
Fy	psi =	40,000.0	60,000.0

Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 7ft

Concrete Stem Rebar Area Details

2nd Stem	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>	
As (based on applied moment) :	0 in2/ft	Horizontal Reinforcing Options :	
0.0018bh : 0.0018(12)(6) :	0.1296 in2/ft	<u>One layer of :</u> <u>Two layers of :</u>	
	=====	#4@ 18.52 in	#4@ 37.04 in
Required Area :	0.1296 in2/ft	#5@ 28.70 in	#5@ 57.41 in
Provided Area :	0.15 in2/ft	#6@ 40.74 in	#6@ 81.48 in
Maximum Area :	0 in2/ft		

Bottom Stem	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>	
As (based on applied moment) :	0 in2/ft	Horizontal Reinforcing Options :	
0.0018bh : 0.0018(12)(6) :	0.1296 in2/ft	<u>One layer of :</u> <u>Two layers of :</u>	
	=====	#4@ 18.52 in	#4@ 37.04 in
Required Area :	0.1296 in2/ft	#5@ 28.70 in	#5@ 57.41 in
Provided Area :	0.2325 in2/ft	#6@ 40.74 in	#6@ 81.48 in
Maximum Area :	0 in2/ft		

Footing Data

Toe Width	=	1.25 ft
Heel Width	=	2.75
Total Footing Width	=	0.00
Footing Thickness	=	12.00 in

f'c =	2,500 psi	Fy =	40,000 psi
Footing Concrete Density	=	150.00 pcf	
Min. As %	=	0.0018	
Cover @ Top	2.00	@ Btm.=	3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	0	0	psf
Mu' : Upward	=	0	0	ft-#
Mu' : Downward	=	0	0	ft-#
Mu: Design	=	1,692	2,223	ft-#
φ Mn	=	7,853	7,432	ft-#
Actual 1-Way Shear	=	0.00	0.00	psi
Allow 1-Way Shear	=	0.00	0.00	psi
Toe Reinforcing	=	# 4 @ 9.26 in		
Heel Reinforcing	=	# 4 @ 9.25 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00	ft-lbs
Footing Allow. Torsion, φ Tn	=		0.00	ft-lbs

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

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area	0.00	in2
Min footing T&S reinf Area per foot	0.00	in2 /ft

If one layer of horizontal bars: If two layers of horizontal bars:

#4@ 0.00 in	#4@ 0.00 in
#5@ 0.00 in	#5@ 0.00 in
#6@ 0.00 in	#6@ 0.00 in

Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 7ft

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....				.....RESISTING.....		
	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	1,417.5	3.00	4,252.5	Soil Over HL (ab. water tbl)	2,493.3	3.58	
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.58	
Hydrostatic Force				Water Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =			
				Surcharge Over Toe =			
				Stem Weight(s) =			
				Earth @ Stem Transitions =			
				Footing Weight =			
				Key Weight =			
				Vert. Component =			
Total	=	O.T.M.	=	Total	=	lbs	R.M.=
Resisting/Overturning Ratio		=					
Vertical Loads used for Soil Pressure =			lbs				

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

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

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

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

Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 7ft

Rebar Lap & Embedment Lengths Information

Stem Design Segment: 2nd

Stem Design Height: 2.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.4a) = 15.60 in
Development length for #4 bar specified in this stem design segment = 12.00 in

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment (25.4.2.4a) = 23.40 in
Development length for #5 bar specified in this stem design segment = 18.00 in

Hooked embedment length into footing for #5 bar specified in this stem design segment = 8.27 in
As Provided = 0.2325 in²/ft
As Required = 0.1296 in²/ft

Cantilevered Retaining Wall

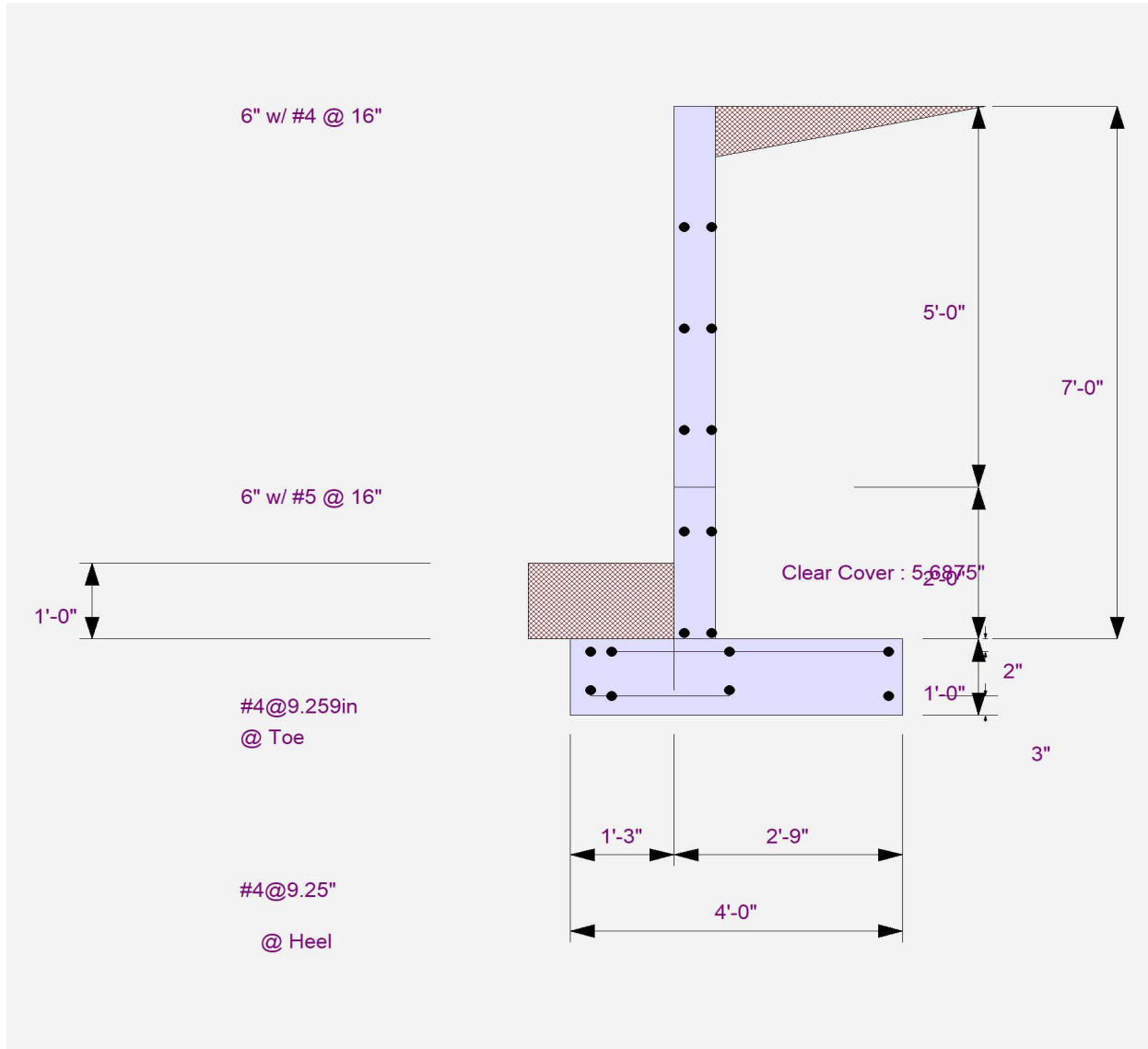
Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

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DESCRIPTION: Site Retaining Wall, 7ft



Cantilevered Retaining Wall

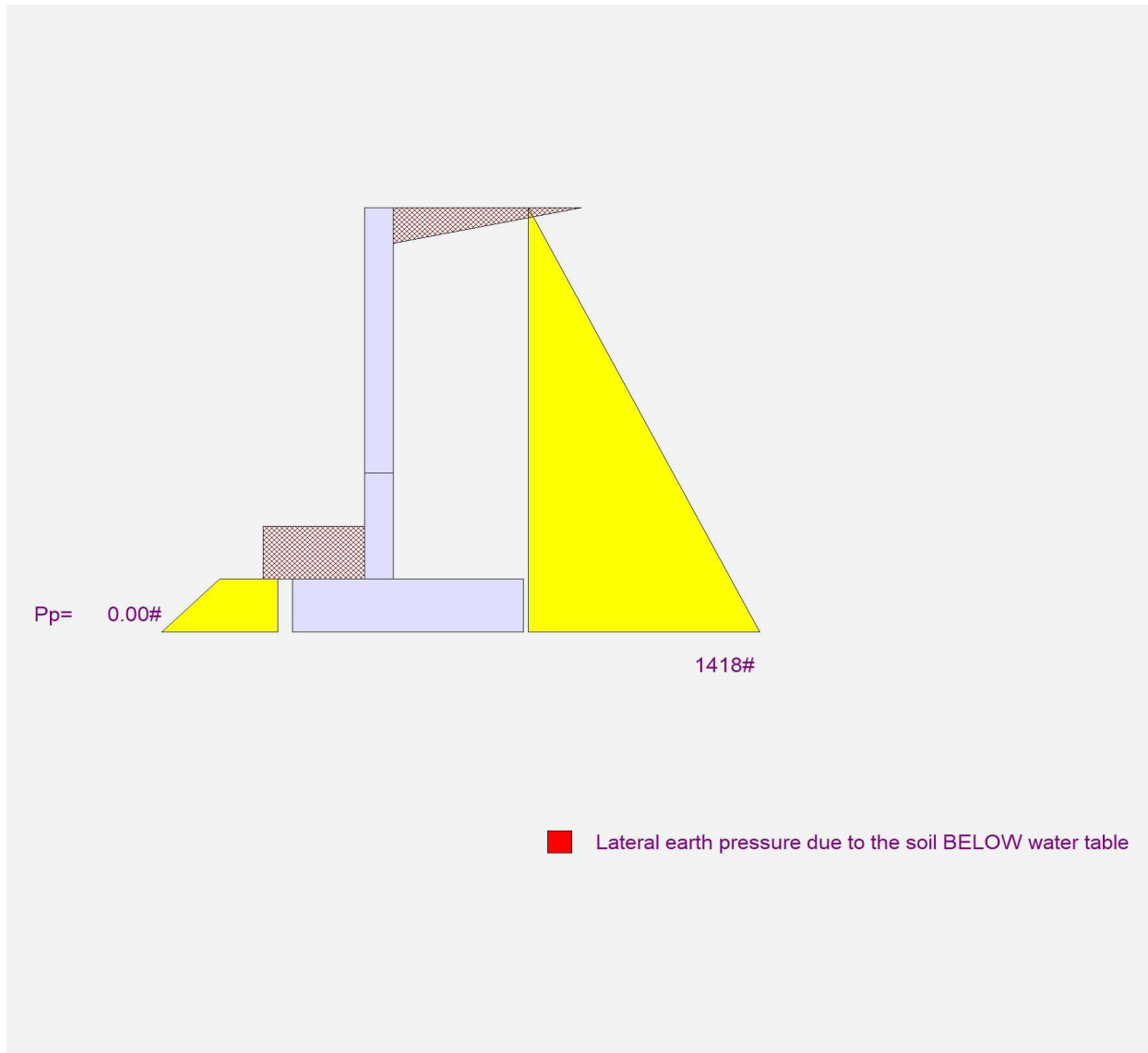
Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

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DESCRIPTION: Site Retaining Wall, 7ft



Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

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DESCRIPTION: Site Retaining Wall, 8ft

Code Reference

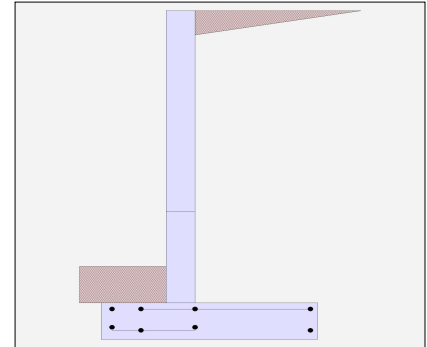
Calculations per IBC 2021, ACI 318-19, TMS 402-16

Criteria

Retained Height	=	8.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.525
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

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

Axial Load Applied to Stem

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

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 8ft

Design Summary

Wall Stability Ratios

Overturning	=	0.00	OK
Sliding	=	0.00	OK
Global Stability	=	2.15	
Total Bearing Load	=	0 lbs	
...resultant ecc.	=	0.00 in	
Soil Pressure @ Toe	=	0 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	0 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	0.0 psi	OK
Footing Shear @ Heel	=	0.0 psi	OK
Allowable	=	0.0 psi	

Sliding Calcs

Lateral Sliding Force	=	1,417.5 lbs	
less 100% Passive Force	=	0.0 lbs	
less 100% Friction Force	=	0.0 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

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

Load Factors

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

Stem Construction

		2nd	Bottom		
Design Height Above Ftc	ft =	Bar Lap/Emb 2.50	Bar Lap/Emb 0.00		
Wall Material Above "Ht"	=	Concrete	Concrete		
Design Method	=	SD	SD	SD	SD
Thickness	=	8.00	8.00		
Rebar Size	=	# 4	# 5		
Rebar Spacing	=	12.00	12.00		
Rebar Placed at	=	Edge	Edge		

Design Data

fb/FB + fa/Fa	=	0.000	0.000
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Total Force @ Section

Service Level	lbs =
Strength Level	lbs =

Moment....Actual

Service Level	ft-# =
Strength Level	ft-# =

Moment....Allowable	ft-# =	0.0	0.0
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Shear....Actual

Service Level	psi =
Strength Level	psi =

Shear....Allowable	psi =	0.0	0.0
--------------------	-------	-----	-----

Anet (Masonry)

Wall Weight	psf =	0.0	0.0
Rebar Depth 'd'	in =	0.00	0.00

Masonry Data

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

Concrete Data

f'c	psi =	2,500.0	2,500.0
Fy	psi =	40,000.0	60,000.0

Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 8ft

Concrete Stem Rebar Area Details

2nd Stem	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>
As (based on applied moment) :	0 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :
	=====	<u>One layer of :</u> <u>Two layers of :</u>
Required Area :	0.1728 in2/ft	#4@ 13.89 in #4@ 27.78 in
Provided Area :	0.2 in2/ft	#5@ 21.53 in #5@ 43.06 in
Maximum Area :	0 in2/ft	#6@ 30.56 in #6@ 61.11 in

Bottom Stem	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>
As (based on applied moment) :	0 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :
	=====	<u>One layer of :</u> <u>Two layers of :</u>
Required Area :	0.1728 in2/ft	#4@ 13.89 in #4@ 27.78 in
Provided Area :	0.31 in2/ft	#5@ 21.53 in #5@ 43.06 in
Maximum Area :	0 in2/ft	#6@ 30.56 in #6@ 61.11 in

Footing Data

Toe Width	=	1.50 ft
Heel Width	=	3.50
Total Footing Width	=	0.00
Footing Thickness	=	12.00 in

f'c =	2,500 psi	Fy =	40,000 psi
Footing Concrete Density	=	150.00 pcf	
Min. As %	=	0.0018	
Cover @ Top	2.00	@ Btm.=	3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	0	0	psf
Mu' : Upward	=	0	0	ft-#
Mu' : Downward	=	0	0	ft-#
Mu: Design	=	1,692	2,223	ft-#
φ Mn	=	7,853	7,432	ft-#
Actual 1-Way Shear	=	0.00	0.00	psi
Allow 1-Way Shear	=	0.00	0.00	psi
Toe Reinforcing	=	# 5 @ 12.00 in		
Heel Reinforcing	=	# 4 @ 9.25 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00	ft-lbs
Footing Allow. Torsion, φ Tn	=		0.00	ft-lbs

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

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area	0.00	in2
Min footing T&S reinf Area per foot	0.00	in2 /ft

If one layer of horizontal bars: If two layers of horizontal bars:

#4@ 0.00 in	#4@ 0.00 in
#5@ 0.00 in	#5@ 0.00 in
#6@ 0.00 in	#6@ 0.00 in

Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 8ft

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....				.....RESISTING.....		
	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	1,417.5	3.00	4,252.5	Soil Over HL (ab. water tbl)	2,493.3	3.58	
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.58	
Hydrostatic Force				Water Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =			
				Surcharge Over Toe =			
				Stem Weight(s) =			
				Earth @ Stem Transitions =			
				Footing Weight =			
				Key Weight =			
				Vert. Component =			
Total	=	O.T.M.	=	Total	=	lbs	R.M.=
Resisting/Overturning Ratio		=					
Vertical Loads used for Soil Pressure =			lbs				

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

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

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

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

Cantilevered Retaining Wall

Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 8ft

Rebar Lap & Embedment Lengths Information

Stem Design Segment: 2nd

Stem Design Height: 2.50 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.4a) = 15.60 in
Development length for #4 bar specified in this stem design segment = 12.00 in

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment (25.4.2.4a) = 23.40 in
Development length for #5 bar specified in this stem design segment = 18.00 in

Hooked embedment length into footing for #5 bar specified in this stem design segment = 8.27 in
As Provided = 0.3100 in²/ft
As Required = 0.1728 in²/ft

Cantilevered Retaining Wall

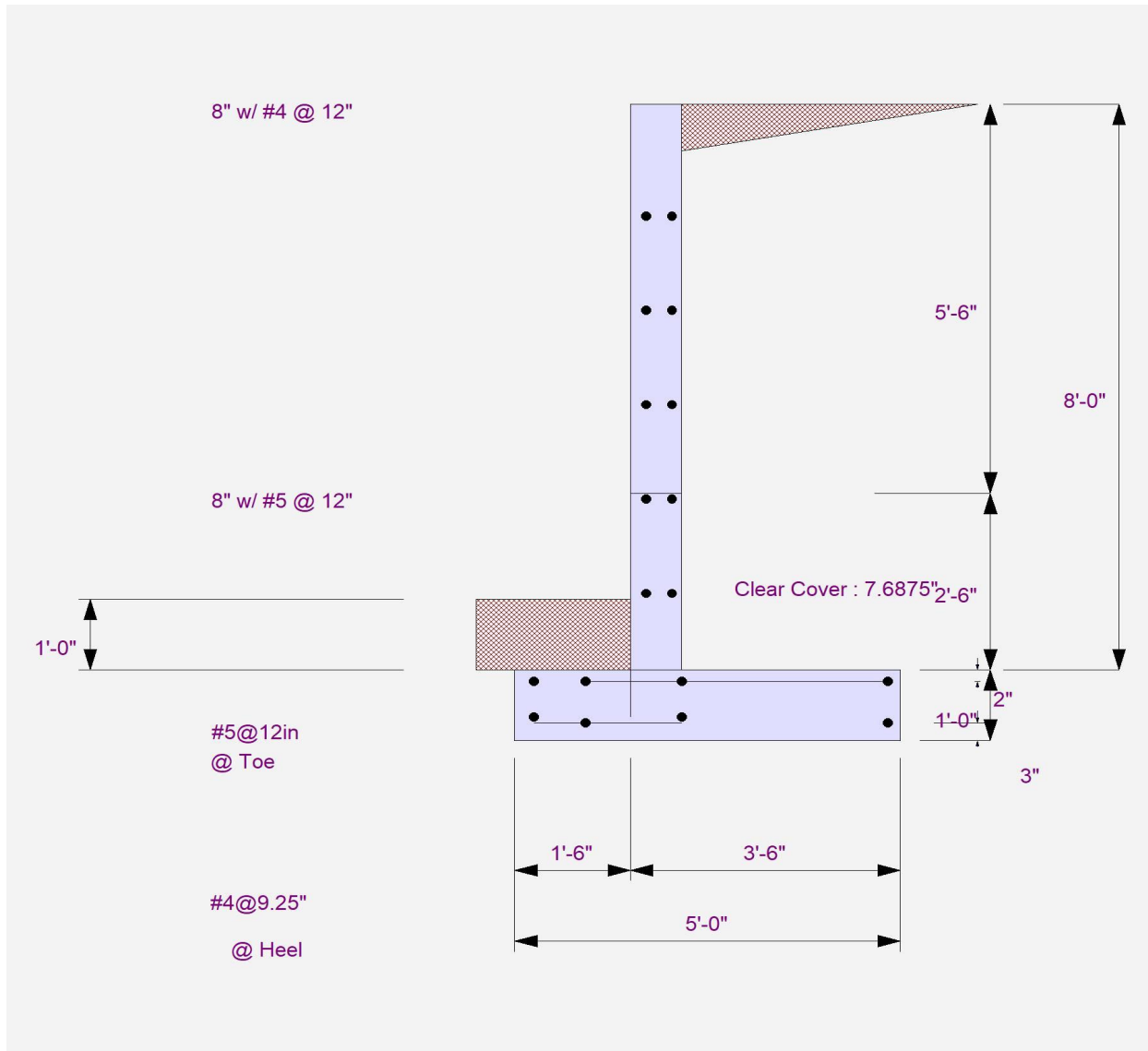
Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

(c) ENERCALC, LLC 1982-2025

DESCRIPTION: Site Retaining Wall, 8ft



Cantilevered Retaining Wall

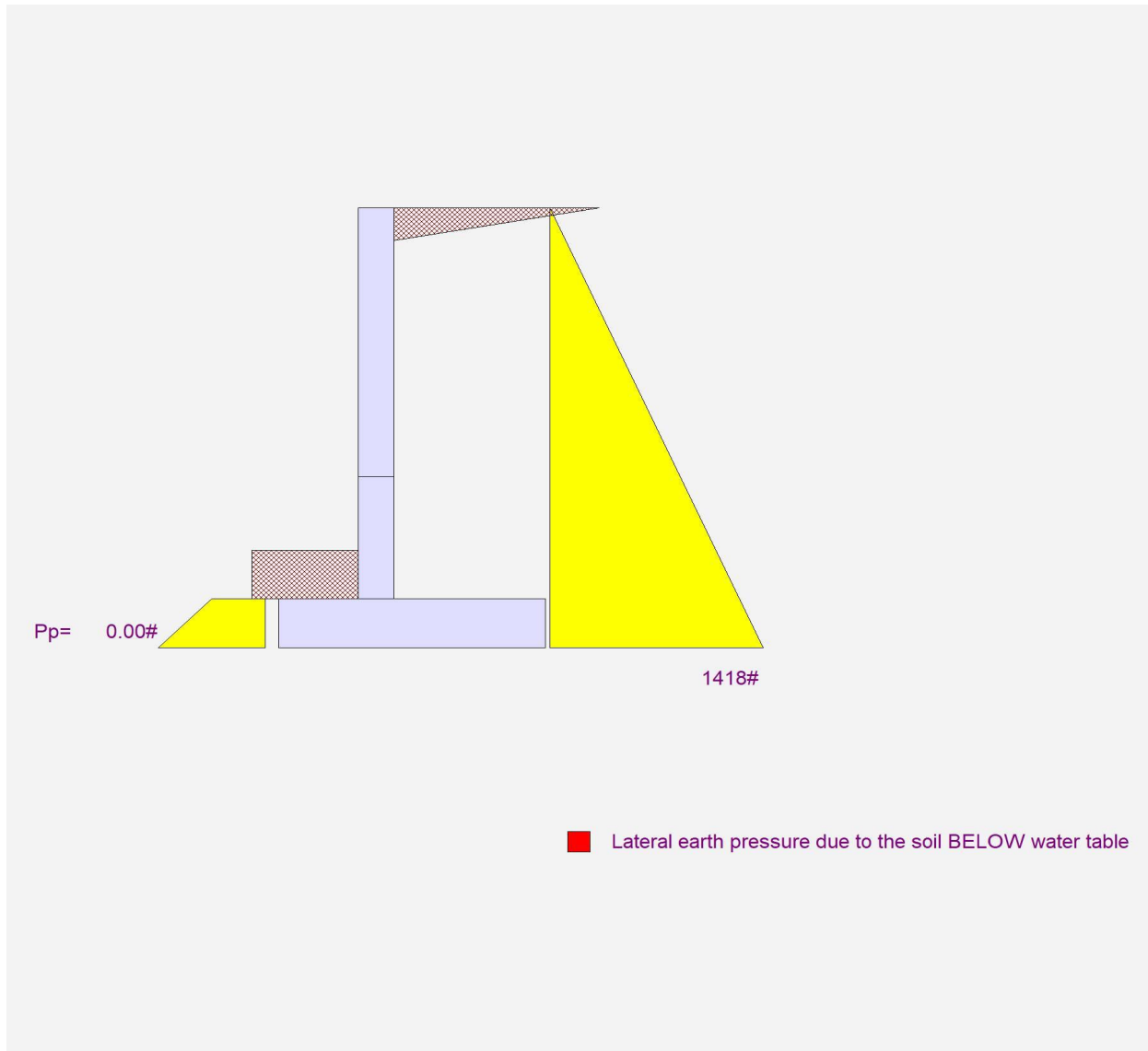
Project File: Fauser Residence.ec6

LIC# : KW-06016450, Build:20.24.12.17

QUANTUM CONSULTING ENGINEERS

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DESCRIPTION: Site Retaining Wall, 8ft



FAUSER RESIDENCE REMODEL

9640 SE 61st Pl

Mercer Island, WA 98040

Quantum Job Number: 24339.01

LATERAL DESIGN

Per IBC 2021 & ASCE 7-16

Structure: **Fauser Residence**
 Address: **9640 SE 61st Place, Mercer Island, WA 98040**
 Latitude: **47.5483** Longitude: **-122.2103**

Structure Classification

Risk Category : **II** per ASCE Table 1.5-1

Seismic Force-Resisting System: **Light-Framed Wood Walls Sheathed with Structural Panels**

R: **6 1/2** per ASCE Table 12.2-1
 W_o: **3** per ASCE Table 12.2-1
 C_d: **4** per ASCE Table 12.2-1
 h_n (ft): **24.00** height above the base to the highest level of the structure

Site Ground Motion

Reg. Structure/5 Stories Max: **Yes** **S_{ds} (max) = 1.0** Per ASCE 12.8.1.3
 S₁ (g-sec): **0.50** S_s (g-sec): **1.45**
 Site Class: **D** **Assumed Value** per ASCE 11.4.3
 ASCE 11.4.8 Exception 2 Used
 F_v **1.80** F_a **1.20**
 1.2 Min Value where SC D Assumed

S_{M1} (g-sec): **0.90** S_{MS} (g-sec): **1.74** per ASCE 11.4.4
 S_{D1} (g-sec): **0.60** S_{DS} (g-sec): **1.16** per ASCE 11.4.5
 SDC: **D** per ASCE 11.6
 I_E: **1.00** per ASCE Table 1.5-2


Fundamental Period per ASCE 12.8.2

Period Method: **Approximate Fundamental Period**
 Structure Type: **All Other Structural Systems**
 T_L (sec): **6.00** ASCE Figures 22-14 through 22-17
 T_s: 0.52
 T_a (sec): 0.22 C_t * h_n per ASCE Eq. 12.8-7
 T_{use} (sec): **0.22** τ ≤ TL

Equivalent Lateral Force Procedure Design Base Shear per ASCE 12.8

C_s: 0.18 = S_{DS} / (R/I_E) per ASCE Eq. 12.8-2
 C_{s-max}: 0.43 = S_{D1} / (T_a*R/I_E) for T ≤ T_L per ASCE Eq. 12.8-3
 C_{s-max}: -- = S_{D1}*T_L / (T_a²*R/I_E) for T > T_L per ASCE Eq. 12.8-4
 C_{s-min}: 0.05 per ASCE Eq. 12.8-5
 C_{s-min}: -- = 0.5S₁ / (R/I_E) for S₁ ⇒ 0.6g per ASCE Eq. 12.8-6
 C_{s-use}: 0.18

V : 0.178 W = C_{s-use} * W per ASCE Eq. 12.8-1

	Quantum Consulting Engineers LLC	Project: Fauser Residence	Date: 1/15/25	Job No: 24339.01
	1511 Third Avenue, Suite 323		Designer: MKS	Sheet: 1
	Seattle, WA 98101	Client: RRA	Checked By: SKK	

Per IBC 2021 & ASCE 7-16

Structure: **Fauser Residence**

Seismic Parameters

I_E : 1.00 per ASCE Table 1.5-2
 S_{DS} (g-sec): 1.16 per ASCE 11.4.4
 Period (Sec): 0.22 per ASCE 12.8.2.1
 k : 1.00 per ASCE 12.8.3

Vertical Distribution of Seismic Forces per ASCE 12.8.3

$F_x = C_{vx}V$ per ASCE Eq. 12.8-11

$C_{vx} = (w_x h_x^k) / (\sum w_i h_i^k)$ per ASCE Eq. 12.8-12

Level	h_x (ft)	w_x (k)	% of W_{total}	$w_x * h_x^k$	C_{vx} (%)	F_x (k)	V_x (k)
Roof	21.00	30.96	51.1%	650.2	68.7%	7.42	7.42
2nd Floor	10.00	29.64	48.9%	296.4	31.3%	3.38	10.80

Total WT (k): 60.60 Sum: 947
 C_{s-use} : 0.178
 V (k): **10.80** per ASCE 12.8.1

Vertical Distribution of Seismic Diaphragm Forces per ASCE 12.10.1.1

$F_{px} = (SF_i / \sum w_i) * w_{px}$ per ASCE Eq 12.10-1

$F_{px-max} = 0.4 * S_{DS} * I_E * w_{px}$ per per ASCE 12.10.1.1

$F_{px-min} = 0.2 * S_{DS} * I_E * w_{px}$ per per ASCE 12.10.1.1

Level	w_{px} (k)	$\sum w_i$ (k)	F_x (k)	$\sum F_i$ (k)	F_{px} (k)	Notes
Roof	30.96	30.96	7.42	7.42	7.42	
2nd Floor	29.64	60.60	3.38	10.80	6.87	= F_{p-min}

Diaphragm/Story
 Force Ratio
 1.000
 2.031

Wind Loads Criteria

Per IBC 2021 & ASCE 7-16

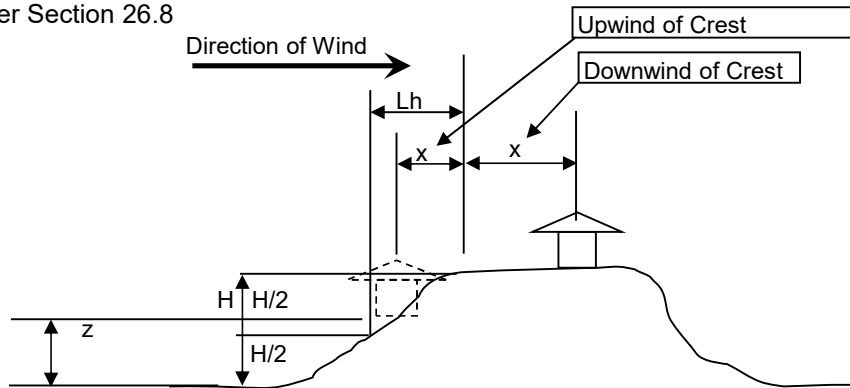
Wind Load Criteria

Risk Category: **II** Table 1.5-1
 Basic Wind Speed: **97** Figure 26.5.1
 Exposure Category: **C** Section 26.7.3
 Ground Elevation: **51 ft**
 Wall Ht: **18.0 ft**

Roof Type: **Hip Roof**
 Roof Slope: **5.0:12** 22.6 DEG
 Mean Roof HT: **20.0 ft** UP TO 160FT
 Parapet: **No** UP TO 160FT

Wind Topographic Factor, K_{zt} :

per Section 26.8



Terrain Type: **Per Local Jurisdiction**
 Direction: **Upwind of Crest**

L_h : **DIST UPWIND OF CREST TO HALF HT OF HILL OR ESCARP.**
 H : **HT. OF HILL OR ESCARP. RELATIVE TO THE UPWIND TERRAIN**
 x : **DIST. (UPWIND OR DOWNWIND) FROM THE CREST TO THE BUILDING**
 Z : **HEIGHT ABOVE GROUND SURFACE AT BUILDING SITE**

K_{zt} : **NA** EQUATION 26.8-1
 K_{zt} : **1.00** MANUALLY INPUT

K_e : **0.998** ASCE 26.10.1

K_d : **0.85** ASCE 26.6



Quantum Consulting Engineers LLC
 1511 Third Avenue, Suite 323
 Seattle, WA 98101

Project: Shipper Residence	Date: 1/15/25	Job No: 24349.01
Client: Chesmore Buck	Designer: MKS	Sheet: 1
	Checked By: SHT	

Wind Loads - Main Wind Force Resisting System

Per IBC 2021 & ASCE 7-16 Chapter 27.3 Part 1 - Enclosed Simple Diaphragm, $h < 160\text{ft}$

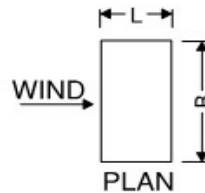
Wind Load Criteria

Risk Category:	II	Table 1.5-1	K_e :	0.9982	Section 26.10.1
Basic Wind Speed:	97 mph	Figure 26.5.1	K_d :	0.85	Section 26.6
Exposure Category:	C	Section 26.7.3	G :	0.85	Section 26.11
K_{zt} :	1.00	Section 26.8	Roof Height:	20.0 ft	

Wall Pressures:

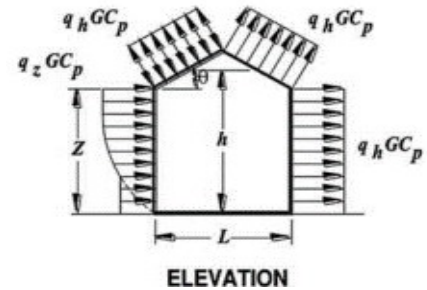
L/B Ratio:

Short Dimension:	73.0 ft
Long Dimension:	94.0 ft
Transverse Wind L/B:	0.78
Longitudinal Wind L/B:	1.29



*NOTE: INTERNAL BUILDING PRESSURE CANCEL EACH OTHER OUT IN ENCLOSED BUILDING

K_h & K_z :	0.902	At Top of Wall
K_z :	0.85	0 ft to 15 ft



	<u>Transverse</u> Wind Direction	<u>Longitudinal</u> Wind Direction
Top of Wall:	20.4 psf	19.5 psf
0 ft to 15 ft Wall:	19.6 psf	18.7 psf

ASCE EQ 27.3-1
ASCE EQ 27.3-1

*Enveloped Leeward and Windward Pressure
*All Values Ultimate (multiply x0.6 for ASD)



Quantum Consulting Engineers LLC
1511 Third Avenue, Suite 323
Seattle, WA 98101

Project: Shipper Residence
Client: Chesmore Buck

Date: 1/15/25
Designer: MKS
Checked By: SHT

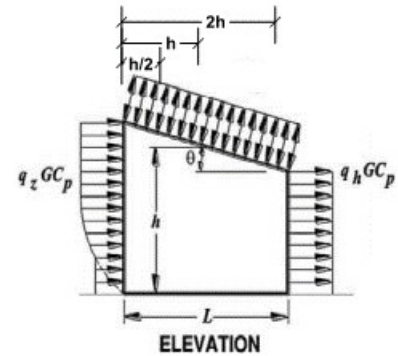
Job No: 24349.01
Sheet: 2

Wind Loads - Main Wind Force Resisting System (Cont.)

ASCE 7-16 Chapter 27.3 Part 1 - Enclosed Simple Diaphragm, $h < 160\text{ft}$

Roof Pressure:

Slope: 5.0:12 = 22.6 DEGREES
 Mean Roof HT: 20.0 ft
 Building Dimension: **73.0 ft** Parallel to Ridge
 Building Dimension: **94.0 ft** Normal to Ridge
 K_n & K_z : 0.902 At Mean Roof Ht



Windward Pressure Parallel to Ridge

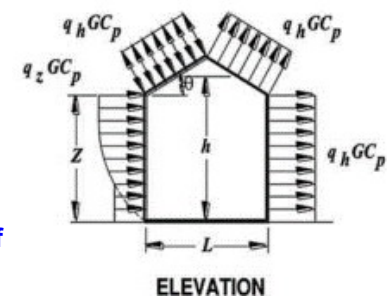
	LC 1	LC 2	LC 1	LC 2
0 to h/2	-17.4 psf	0.5 psf		
h/2 to h	-17.4 psf	0.5 psf		
h to 2h	-11.2 psf	0.5 psf		
>2h	-8.0 psf	0.5 psf		

Windward Pressure Normal to Ridge

7.3 psf *Horizontal Projected Pressure: 2.8 psf*

Leeward Pressure Normal to Ridge

-12.7 psf *Horizontal Projected Pressure: -4.9 psf*



*Negative indicates pressure away from surface

*Total horizontal shear shall not be less than that determined by neglecting roof wind forces

*All Values Ultimate (multiply x0.6 for ASD)

Roof Overhang (PSF)

P_{ovh} : **-25.3 psf** *Horizontal Projected Pressure: -9.7 psf*

Minimum Total Projected Horizontal Pressure (PSF)

8.0 psf

ASCE 27.1.5

Wind Loads - Components and Cladding

Per IBC 2021 & ASCE 7-16 Chapter 30.3 & 30.5 - Part 1 and Part 3 Enclosed Buildings With $h < 160$ FT

Wind Load Criteria

Risk Category:	II	Table 1.5-1	K_d :	0.85	Section 26.6
Basic Wind Speed:	97 mph	Figure 26.5.1	Roof Type:	Hip Roof	
Exposure Category:	C	Section 26.7.3	Roof Slope:	5.0:12	= 22.6 DEG
K_{zt} :	1.00	Section 26.8	Mean Roof Height:	20.0 ft	
K_e :	1.00	Section 26.10.1	Wall Height:	18.0 ft	0.0 ft

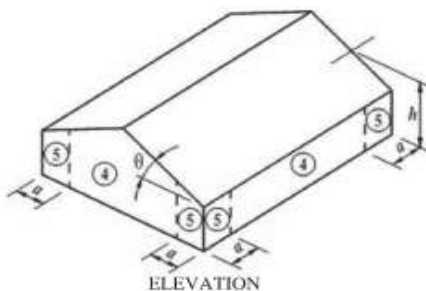
Zone Dimensions

Least Horiz. BLDG Dimension: **73 ft** a: **7.2 ft**
 2a: **14.4 ft**

Wall Pressures

K_z :	0.850	Table 26.10-1	0-15 ft (PART 3)
K_h :	0.902	Table 26.10-1	
Effective Wind Area:	Zone 4:	200 ft²	
	Zone 5:	20 ft²	

Load Case	At Top of Wall		0 FT TO 15 FT (>60' bldg)	
	4	5	4	5
1	17.5	20.8		
2	-19.4	-27.2		



- *Negative indicates pressure away from surface
- *Okay to interpolate between 15ft and top of wall (>60' bldg)
- *All Values Ultimate (multiply x0.6 for ASD)

Roof Pressures

K_h : 0.902 Table 26.10-1
 Overhang?: **Yes**

Effective Wind Area:	Zone 1:	10 ft²	Zone 2:	10 ft²	Zone 3:	10 ft²
	Zone 1':		Zone 2e:	10 ft²	Zone 3e:	
			Zone 2n:		Zone 3r:	
			Zone 2r:	10 ft²	Zone 3':	
			Zone 2':			

Load Case	Zone (PSF)	
	1	1'
1	16.2	-
2	-38.3	-

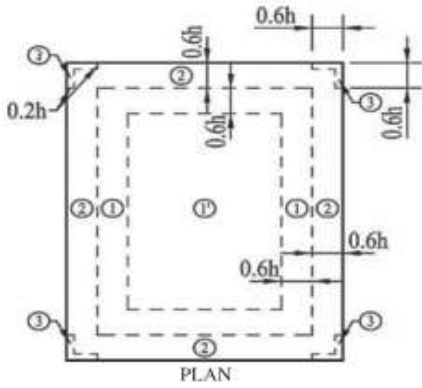
Load Case	2	2e	2n	2r	2'
	1	-	16.2	-	16.2
2	-	-49.4	-	-49.4	-

Load Case	3	3e	3r	3'
	1	16.2	-	-
2	-60.5	-	-	-

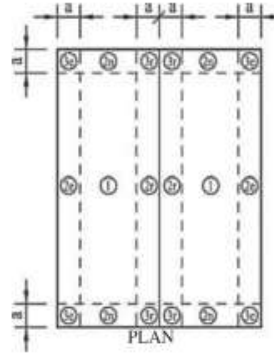
- *Negative indicates pressure away from surface
- *All Values Ultimate (multiply x0.6 for ASD)

Wind Loads - Components and Cladding (Cont.)

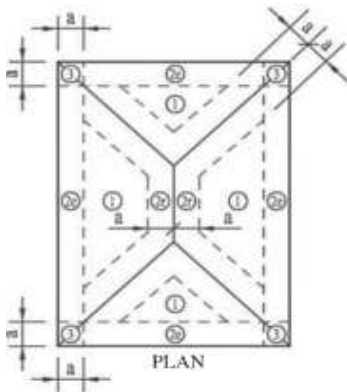
ASCE 7-16 Chapter 30 Part 4 Enclosed Buildings With $h < 160$ FT (Simplified)



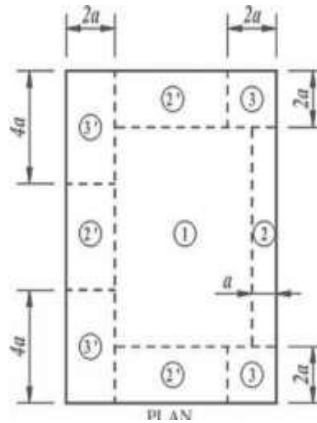
ASCE FIG 30.3-2A
FLAT/GABLE ROOF $\theta \leq 7^\circ$



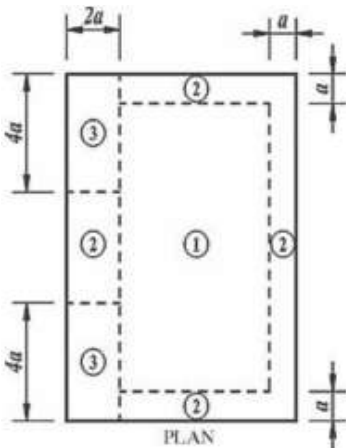
ASCE FIG 30.3-2B to D
GABLE ROOF $7^\circ < \theta \leq 45^\circ$



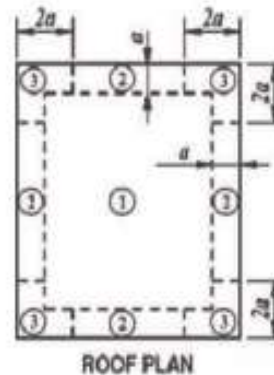
ASCE FIG 30.3-2E to I
HIP ROOF $7^\circ < \theta \leq 45^\circ$



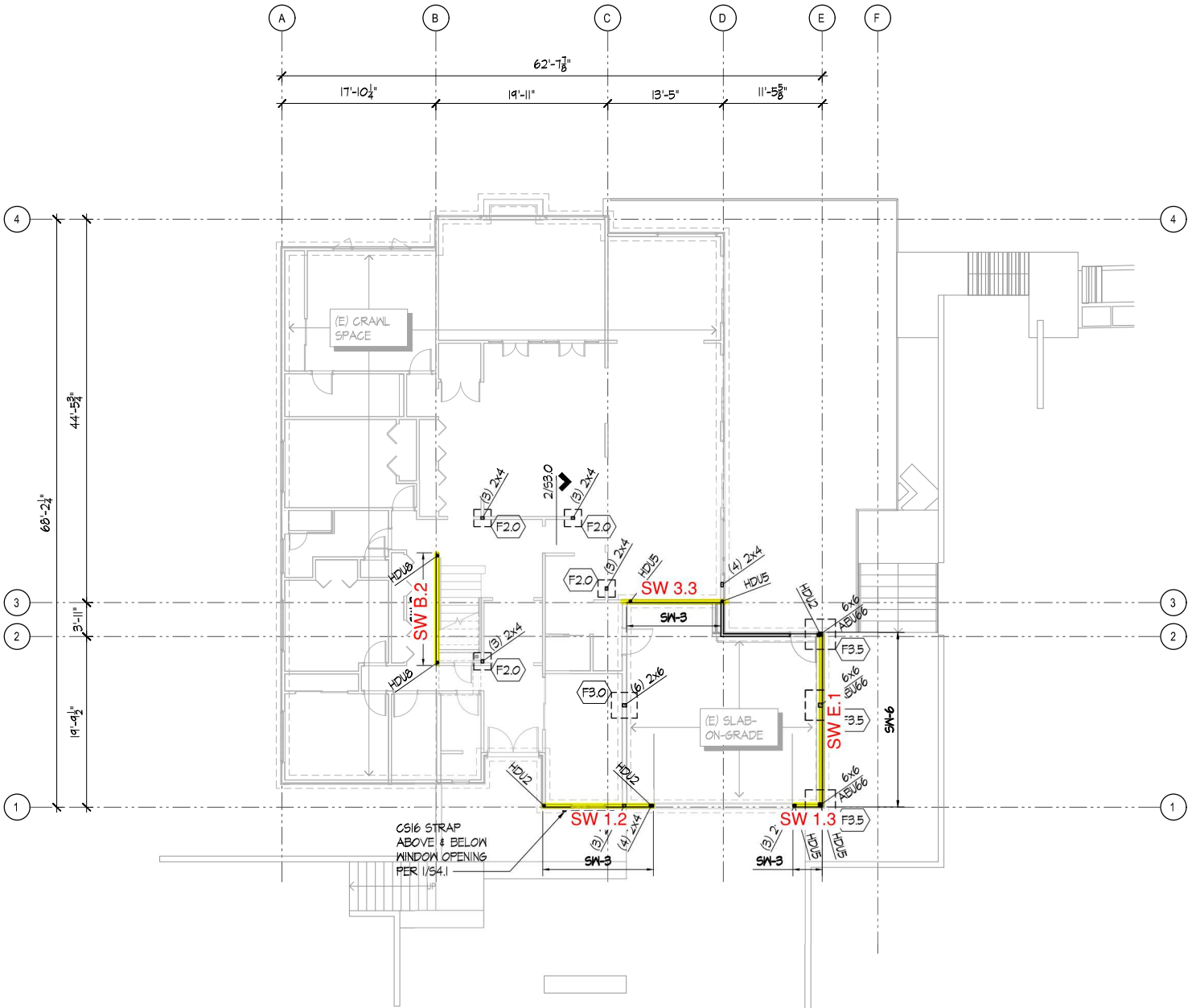
ASCE FIG 30.3-5A
Monoslope ROOF $3^\circ < \theta \leq 10^\circ$



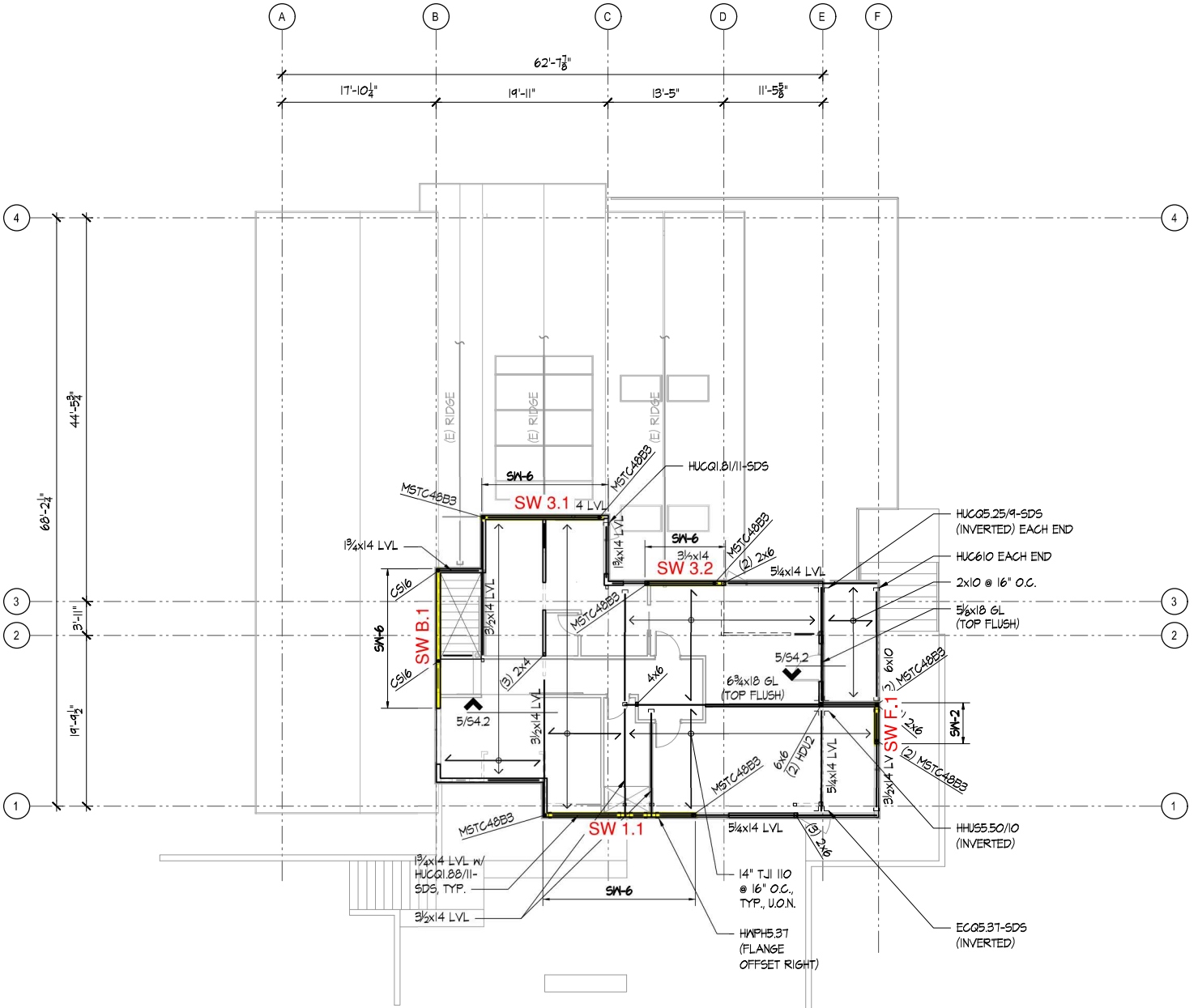
ASCE FIG 30.3-5B
Monoslope ROOF $10^\circ < \theta \leq 30^\circ$



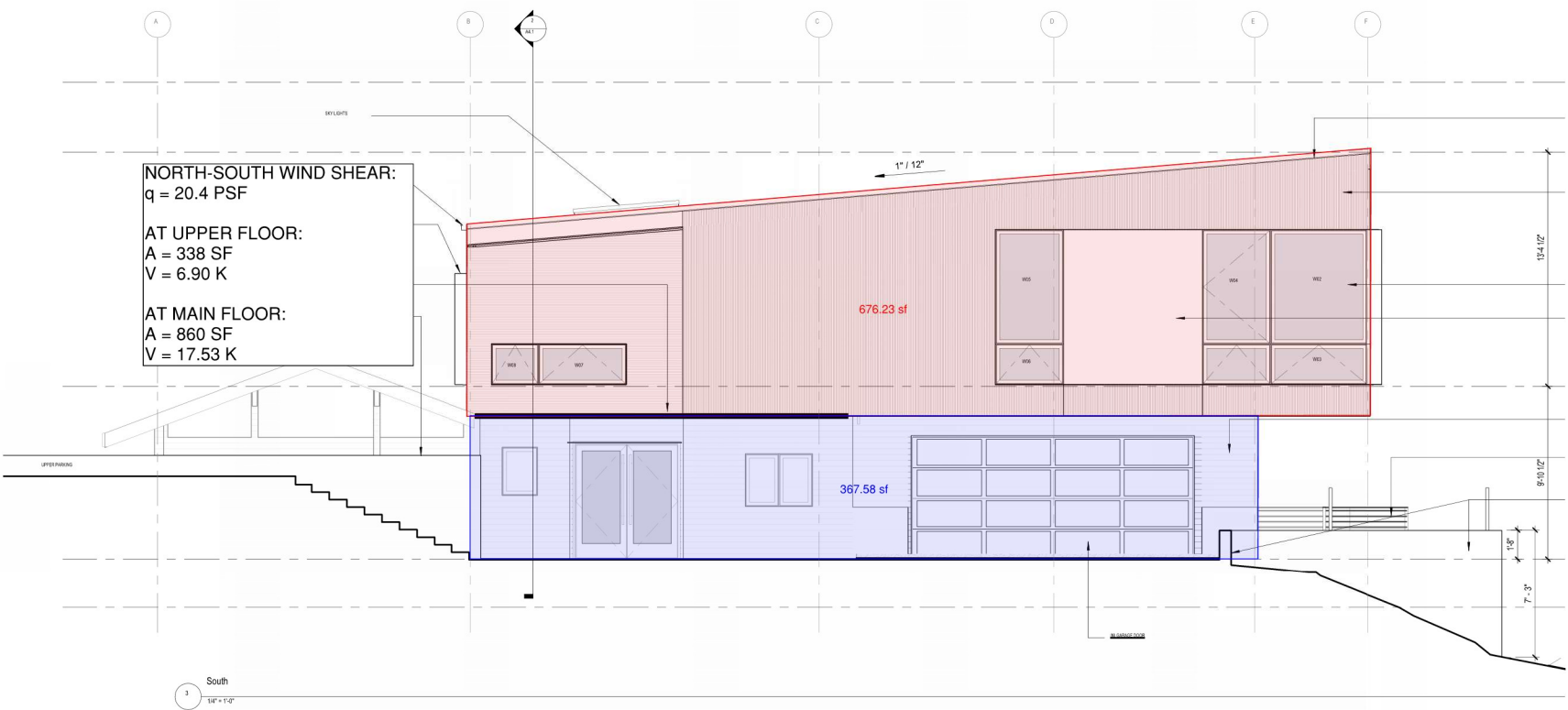
ASCE FIG 30.5-1
ROOF $H > 60$ ft, $\theta \leq 7^\circ$



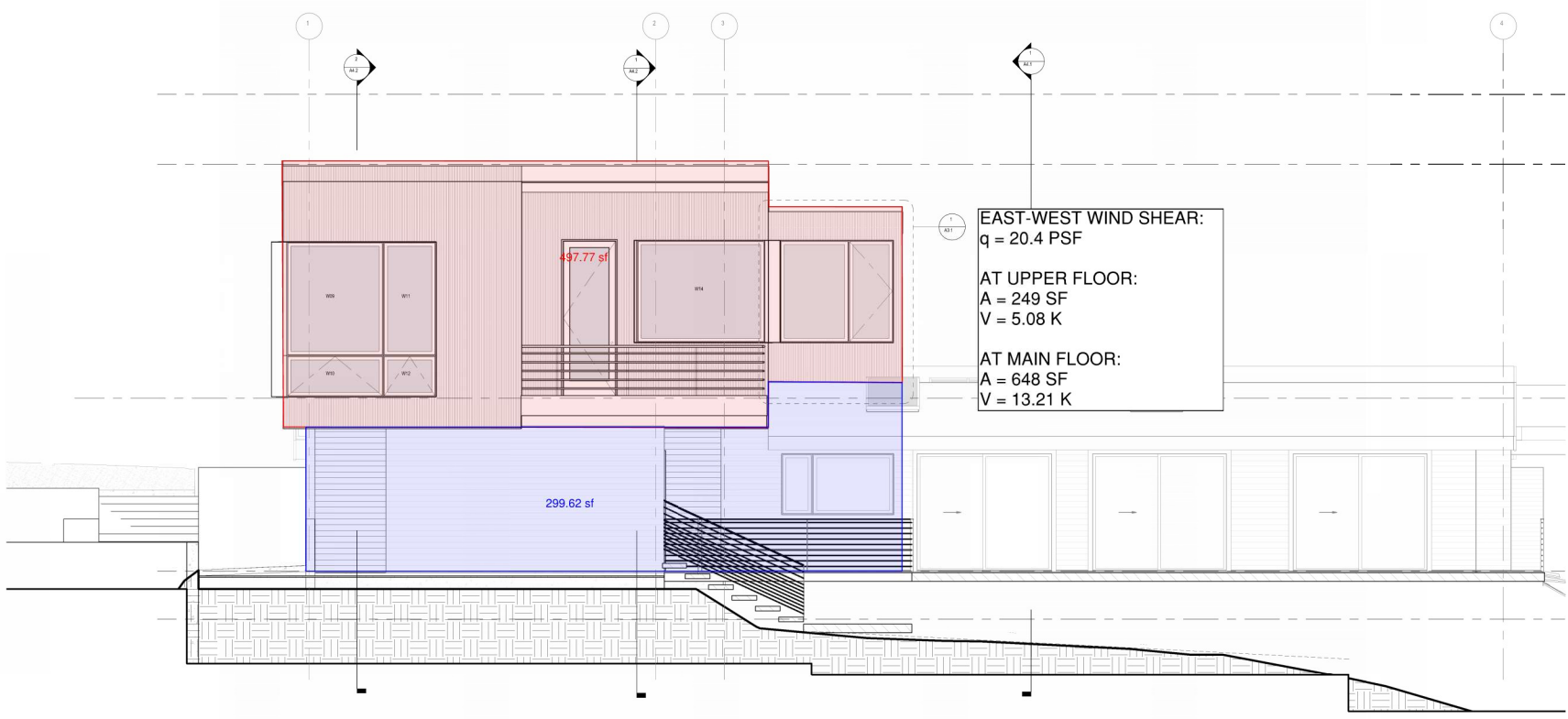
MAIN FLOOR SHEAR WALL KEY PLAN



UPPER FLOOR SHEAR WALL KEY PLAN



South
1/4" = 1'-0"



EAST-WEST WIND SHEAR:
q = 20.4 PSF
AT UPPER FLOOR:
A = 249 SF
V = 5.08 K
AT MAIN FLOOR:
A = 648 SF
V = 13.21 K

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Fauser Residence**
 Floor Level: **Upper Roof (North-South)**


Sds = 1.16
 Depth of Floor Framing & Plates (Clearspan) at Interstory (in) = 19.25

Shear Wall Line Information

SW Mark	L _{sw} (ft)	Wall Pier h _{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory or Base?	h _{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID B	16.25	-	-	-	-	-	-	-	-	-
SW Segment B.1	16.25	8.00	0.49	HF #2	0.43	Interstory	8.00	10.0	6.5	15.0
SW GRID	0.00	-	-	-	-	-	-	-	-	-
SW GRID F	4.75	-	-	-	-	-	-	-	-	-
SW Segment F.1	4.75	12.50	2.63	HF #2	0.43	Interstory	11.25	10.0	2.0	15.0
SW GRID	0.00	-	-	-	-	-	-	-	-	-

Shear Wall Loads and Summary

SW Mark	EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holddown
SW GRID B	3710	3450	-	-	-	-	-	-
SW Segment B.1	3710	3450	2884	400	400	SW-6	2	CS16 (1705)
SW GRID								
SW GRID F	3710	3450						
SW Segment F.1	3710	3450	677	400	400	SW-2	2	CMST14 (6475)
SW GRID								

 Quantum Consulting Engineers LLC 1511 Third Avenue, Suite 323 Seattle, WA 98101	Project: Fauser Residence	Date: 1/15/25	Job No: 24339.01
	Client: RRD	Designer: MKS	Sheet: 1
		Checked By: SKK	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Fauser Residence**
 Floor Level: **Upper Roof (North-South)**

EQ ϕ SDPWS 4.1.4.1 WIND ϕ SDPWS 4.1.4.2
 $\phi_D = 0.5$ $\phi_D = 0.8$

Shear Wall Schedule (LRFD)

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_s (lb/in)
SW-6	APA Rated, 7/16"+15/32", 8d Common	6	730	365	730	584	11
SW-4	APA Rated, 7/16"+15/32", 8d Common	4	1065	533	1065	852	14
SW-3	APA Rated, 7/16"+15/32", 8d Common	3	1370	685	1370	1096	17
SW-2	APA Rated, 7/16"+15/32", 8d Common	2	1790	895	1790	1432	21
2SW-4	APA Rated, 7/16"+15/32", 8d Common	4	2130	1065	2130	1704	28
2SW-3	APA Rated, 7/16"+15/32", 8d Common	3	2740	1370	2740	2192	34
2SW-2	APA Rated, 7/16"+15/32", 8d Common	2	3580	1790	3580	2864	42

**See SDPWS Table 4.3A Note 2, assumes studs at 16" o.c.

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Wind Shear (plf)	Aspect Ratio Reduction	Species Reduction	HD Reduction	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
B.1	228	212	1.00	0.93	1.00	228	SW-6	339	OK	Seismic
F.1	781	726	0.92	0.93	1.00	781	SW-2	895	OK	Seismic

*NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
B.1	16.25	16.04	1.30%	Yes	10.00
F.1	4.75	4.54	4.59%	No	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Fauser Residence**
 Floor Level: **Upper Roof (North-South)**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
B.1	2078		2078	1656		1656	1842	1842
F.1	6151		6151	4903		4903	738	738

Determine Required Holdown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holddown	Holddown Capacity (lb)	Status
B.1	-551	-1271	-551	-1271	-1271	CS16 (1705)	-1705	OK
F.1	-4460	-5828	-4460	-5828	-5828	CMST14 (6475)	-6475	OK

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Fauser Residence**
 Floor Level: **Upper Floor (North-South)**


Sds = 1.16
 Depth of Floor Framing & Plates (Clearspan) at Interstory (in) = 19.25

Shear Wall Line Information

SW Mark	L _{sw} (ft)	Wall Pier h _{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory or Base?	h _{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID B	13.00	-	-	-	-	-	-	-	-	-
SW Segment B.2	13.00	9.00	0.69	HF #2	0.43	Base	9.00	10.0	5.0	15.0
SW GRID	0.00	-	-	-	-	-	-	-	-	-
SW GRID E	20.25	-	-	-	-	-	-	-	-	-
SW Segment E.1	20.25	9.00	0.44	HF #2	0.43	Base	9.00	10.0	2.0	15.0
SW GRID	0.00	-	-	-	-	-	-	-	-	-

Shear Wall Loads and Summary

SW Mark	EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holddown
SW GRID B	5400	8765	-	-	-	-	-	-
SW Segment B.2	5400	8765	2145	1842	1842	SW-4	2	HDU8 (6765DF, 5820HF)
SW GRID								
SW GRID E	5400	8765						
SW Segment E.1	5400	8765	2430			SW-6	2	HDU2 (3075DF, 2215HF)
SW GRID								

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LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Fauser Residence**
 Floor Level: **Upper Floor (North-South)**

EQ ϕ SDPWS 4.1.4.1 WIND ϕ SDPWS 4.1.4.2
 $\phi_D = 0.5$ $\phi_D = 0.8$

Shear Wall Schedule (LRFD)

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_s (lb/in)
SW-6	APA Rated, 7/16"+15/32", 8d Common	6	730	365	730	584	11
SW-4	APA Rated, 7/16"+15/32", 8d Common	4	1065	533	1065	852	14
SW-3	APA Rated, 7/16"+15/32", 8d Common	3	1370	685	1370	1096	17
SW-2	APA Rated, 7/16"+15/32", 8d Common	2	1790	895	1790	1432	21
2SW-4	APA Rated, 7/16"+15/32", 8d Common	4	2130	1065	2130	1704	28
2SW-3	APA Rated, 7/16"+15/32", 8d Common	3	2740	1370	2740	2192	34
2SW-2	APA Rated, 7/16"+15/32", 8d Common	2	3580	1790	3580	2864	42

**See SDPWS Table 4.3A Note 2, assumes studs at 16" o.c.

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Wind Shear (plf)	Aspect Ratio Reduction	Species Reduction	HD Reduction	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
B.2	415	674	1.00	0.93	1.00	674	SW-4	792	OK	Wind
E.1	267	433	1.00	0.93	1.00	433	SW-6	584	OK	Wind

*NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
B.2	13.00	12.51	3.91%	Yes	10.00
E.1	20.25	19.77	2.45%	No	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Fauser Residence**
 Floor Level: **Upper Floor (North-South)**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
B.2	3402	2078	5480	4733	1656	6389	2915	2915
E.1	1680		1680	2337		2337	1215	1215

Determine Required Holddown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holddown	Holddown Capacity (lb)	Status
B.2	-4640	-4204	-4640	-4204	-4640	HDU8 (6765DF, 5820HF)	-5820	OK
E.1	-1608	-1148	-1608	-1148	-1608	HDU2 (3075DF, 2215HF)	-2215	OK

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Fauser Residence**
 Floor Level: **Upper Roof (East-West)**


Sds = 1.16
 Depth of Floor Framing & Plates (Clearspan) at Interstory (in) = 19.25

Shear Wall Line Information

SW Mark	L _{sw} (ft)	Wall Pier h _{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory or Base?	h _{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID 1	17.67	-	-	-	-	-	-	-	-	-
SW Segment 1.1	17.67	11.00	0.62	HF #2	0.43	Interstory	11.00	10.0	7.0	15.0
SW GRID	0.00	-	-	-	-	-	-	-	-	-
SW GRID 3	24.17	-	-	-	-	-	-	-	-	-
3.1	14.67	11.00	0.75	HF #2	0.43	Interstory	11.00	10.0	7.0	15.0
3.2	9.50	11.00	1.16	HF #2	0.43	Interstory	10.00	10.0	2.0	15.0
SW GRID	0.00	-	-	-	-	-	-	-	-	-

Shear Wall Loads and Summary

SW Mark	EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holddown
SW GRID 1	3710	2540	-	-	-	-	-	-
SW Segment 1.1	3710	2540	3798	400	400	SW-6	2	MSTC48B3 (3975DF, 3900HF)
SW GRID								
SW GRID 3	3710	2540						
3.1	2252	1542	3153	400	400	SW-6	2	MSTC48B3 (3975DF, 3900HF)
3.2	1458	998	1235	200	200	SW-6	2	MSTC48B3 (3975DF, 3900HF)
SW GRID								

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LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Fauser Residence**
 Floor Level: **Upper Roof (East-West)**

EQ ϕ SDPWS 4.1.4.1 WIND ϕ SDPWS 4.1.4.2
 $\phi_D = 0.5$ $\phi_D = 0.8$

Shear Wall Schedule (LRFD)

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Nominal Wind SW Capacity (plf)	LRFD Wind SW Capacity (plf)	Sheathing Shear Stiffness, G_s (lb/in)
SW-6	APA Rated, 7/16"+15/32", 8d Common	6	730	365	730	584	11
SW-4	APA Rated, 7/16"+15/32", 8d Common	4	1065	533	1065	852	14
SW-3	APA Rated, 7/16"+15/32", 8d Common	3	1370	685	1370	1096	17
SW-2	APA Rated, 7/16"+15/32", 8d Common	2	1790	895	1790	1432	21
2SW-4	APA Rated, 7/16"+15/32", 8d Common	4	2130	1065	2130	1704	28
2SW-3	APA Rated, 7/16"+15/32", 8d Common	3	2740	1370	2740	2192	34
2SW-2	APA Rated, 7/16"+15/32", 8d Common	2	3580	1790	3580	2864	42

**See SDPWS Table 4.3A Note 2, assumes studs at 16" o.c.


Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Wind Shear (plf)	Aspect Ratio Reduction	Species Reduction	HD Reduction	Controlling Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
1.1	210	144	1.00	0.93	1.00	210	SW-6	339	OK	Seismic
3.1	154	105	1.00	0.93	1.00	154	SW-6	365	OK	Seismic
3.2	154	105	1.00	0.93	1.00	154	SW-6	365	OK	Seismic

*NOTE: CONTROLLING SHEAR IS BASED ON THE DIFFERENCE IN SHEAR WALL CAPACITY BETWEEN WIND & EQ

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Wall Length Lever Arm (ft)	Calculated Lever Arm (ft)	% Different	Override Wall Length	User Input M_{OT} Lever Arm (ft)
1.1	17.67	17.46	1.19%	No	
3.1	14.67	14.46	1.44%	No	
3.2	9.50	9.29	2.24%	No	

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LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Fauser Residence**
 Floor Level: **Upper Roof (East-West)**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
1.1	1617		1617	949		949	2299	2299
3.1	1182		1182	694		694	1977	1977
3.2	1075		1075	631		631	818	818

Determine Required Holddown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holddown	Holddown Capacity (lb)	Status
1.1	431	-611	431	-611	-611	MSTC48B3 (3975DF, 3900HF)	-3900	OK
3.1	492	-317	492	-317	-317	MSTC48B3 (3975DF, 3900HF)	-3900	OK
3.2	-140	-717	-140	-717	-717	MSTC48B3 (3975DF, 3900HF)	-3900	OK

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018

Structure: **Fauser Residence**
 Floor Level: **Upper Floor (East-West)**


Sds = 1.16
 Depth of Floor Framing & Plates (Clearspan) at Interstory (in) = 19.25

Shear Wall Line Information

SW Mark	L _{sw} (ft)	Wall Pier h _{wp} (ft)	Aspect Ratio	Wall Framing Species	Specific Gravity G	Interstory or Base?	h _{sw} (ft)	Wall Wt. (psf)	Roof/Floor Trib. (ft)	Roof/Floor Wt. (psf)
SW GRID 1	12.25	-	-	-	-	-	-	-	-	-
SW Segment 1.2	8.75	9.00	1.03	HF #2	0.43	Base	9.00	10.0	7.0	12.0
1.3	3.50	9.00	2.57	HF #2	0.43	Base	9.00	10.0	7.0	12.0
SW GRID	0.00	-	-	-	-	-	-	-	-	-
SW GRID 3	9.00	-	-	-	-	-	-	-	-	-
SW Segment 3.3	9.00	9.00	1.00	HF #2	0.43	Base	9.00	10.0	7.0	12.0
SW GRID	0.00	-	-	-	-	-	-	-	-	-

Shear Wall Loads and Summary

SW Mark	EQ (lb) Wall (ULT)	Wind (lb) Wall (ULT)	Wall DL (lb)	Wall DL (lb) End 1	Wall DL (lb) End 2	Shear Wall Type	MIN. # of End Studs	Holddown
SW GRID 1	5400	6605	-	-	-	-	-	-
SW Segment 1.2	3857	4718	1523	400	400	SW-3	2	HDU2 (3075DF, 2215HF)
1.3	1543	1887	609	200	200	SW-3	2	HDU5 (5645DF, 4340HF)
SW GRID								
SW GRID 3	5400	6605						
SW Segment 3.3	5400	6605	1566	400	400	SW-3	2	HDU5 (5645DF, 4340HF)
SW GRID								

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	Client: RRD	Designer: MKS	Sheet: 1
		Checked By: SKK	

LIGHT FRAMED WOOD SHEATHED PANEL SHEAR WALL DESIGN

Per IBC 2021, ASCE 7-16, SDPWS 2021 & NDS 2018


Structure: **Fauser Residence**
 Floor Level: **Upper Floor (East-West)**

Shear Wall End Axial Load (ASD)

SW Segment Mark	Seismic Tension (lb)	ASD Seismic Tension Above (lb)	Seismic Tension Total (lb)	Wind Tension (lb)	ASD Wind Tension Above (lb)	Wind Tension Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)
1.2	2025		2025	2123		2123	1161	1161
1.3	2777		2777	2912		2912	505	505
3.3	3780		3780	3963		3963	1183	1183

Determine Required Holddown (ASD)

SW Segment Mark	Wind End 1 Eq. 16-15	EQ End 1 Eq. 16-16	Wind End 2 Eq. 16-15	EQ End 2 Eq. 16-16	Controlling Ten. Load (lb)	Holddown	Holddown Capacity (lb)	Status
1.2	-1426	-1517	-1426	-1517	-1517	HDU2 (3075DF,2215HF)	-2215	OK
1.3	-2609	-2556	-2609	-2556	-2609	HDU5 (5645DF, 4340HF)	-4340	OK
3.3	-3253	-3262	-3253	-3262	-3262	HDU5 (5645DF, 4340HF)	-4340	OK

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	Seattle, WA 98101	Client: RRD	Checked By: SKK	



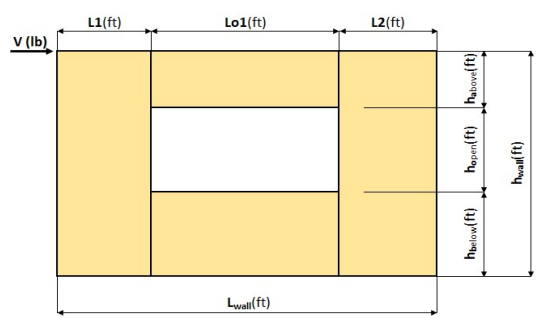
Force Transfer Around Openings Calculator

ONE OPENING
The force transfer around openings (FTAO) method of shear wall analysis is an approach that aims to reinforce the wall such that it performs as if there was no opening. This approach lends certain advantages over segmented shear walls: more versatility, because it allows for narrower wall segments while still meeting the height-to-width ratios and, often, fewer required hold-downs.

The force transfer around openings (FTAO) method of shear wall analysis is an approach that aims to reinforce the wall such that it performs as if there was no opening. This approach lends certain advantages over segmented shear walls: more versatility, because it allows for narrower wall segments while still meeting the height-to-width ratios and, often, fewer required hold-downs.

Project Information

Code:	2021 IBC	Date:	1/15/2025
Designer:	MKS		
Client:	RRA		
Project:	Fauser Residence Remodel		
Wall Line:	Grid 1, Main Floor		



Shear Wall Calculation Variables

V	3360 lbf	Opening 1	Adj. Factor Method =	1.25-0.125h/bs
L1	3.50 ft	ha	Wall Pier Aspect Ratio	Adj. Factor
L2	5.50 ft	ho	P1=ho/L1=	0.86
hwall	8.00 ft	hb	P2=ho/L2=	0.55
Lwall	13.00 ft	Lo1		N/A

1. Hold-down forces: $H = Vh_{wall}/L_{wall}$ = 2068 lbf

2. Unit shear above + below opening
First opening: $va1 = vb1 = H/(h_a+h_b) = 414$ plf

3. Total boundary force above + below openings
First opening: $O1 = va1 \times (Lo1) = 1654$ lbf

4. Corner forces
 $F1 = O1(L1)/(L1+L2) = 643$ lbf
 $F2 = O1(L2)/(L1+L2) = 1011$ lbf

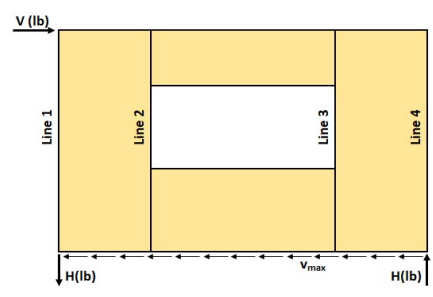
5. Tributary length of openings
 $T1 = (L1*Lo1)/(L1+L2) = 1.56$ ft
 $T2 = (L2*Lo1)/(L1+L2) = 2.44$ ft

6. Unit shear beside opening
 $v1 = (V/L)(L1+T1)/L1 = 373$ plf
 $v2 = (V/L)(L2+T2)/L2 = 373$ plf
Check $v1*L1+v2*L2=V?$ = 3360 lbf **OK**

7. Resistance to corner forces
 $R1 = v1*L1 = 1307$ lbf
 $R2 = v2*L2 = 2053$ lbf

8. Difference corner force + resistance
 $R1-F1 = 663$ lbf
 $R2-F2 = 1042$ lbf

9. Unit shear in corner zones
 $vc1 = (R1-F1)/L1 = 190$ plf
 $vc2 = (R2-F2)/L2 = 190$ plf



Check Summary of Shear Values for One Opening

Line 1: $vc1(h_a+h_b)+v1(h_o)=H?$		948	1120	2068 lbf
Line 2: $va1(h_a+h_b)-vc1(h_a+h_b)-v1(h_o)=0?$	2068	948	1120	0
Line 3: $va1(h_a+h_b)-vc2(h_a+h_b)-v1(h_o)=0?$	2068	948	1120	0
Line 4: $vc2(h_a+h_b)+v2(h_o)=H?$		948	1120	2068 lbf

Design Summary*

Req. Sheathing Capacity	414 plf	4-Term Deflection		3-Term Deflection	
Req. Strap Force	1011 lbf	4-Term Story Drift %		3-Term Story Drift %	
Req. HD Force (H)	2068 lbf				
Req. Shear Wall Anchorage Force (v _{max})	258 plf				

*The Design Summary assumes that the shear wall is designed as blocked.