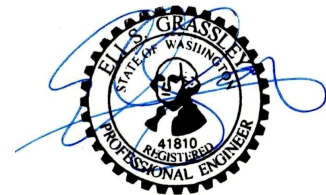


STRUCTURAL CALCULATIONS

FOR
Giola Residence
Mercer Island, WA

02/21/2024 PERMIT



PREPARED BY:

ESG DESIGN, PLLC
February 21, 2024

ENGINEERED • STRUCTURES • GLOBAL • DESIGN

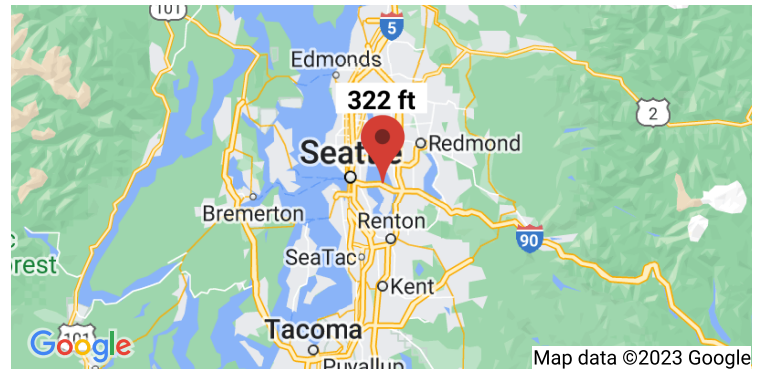
⚠ This is a beta release of the new ATC Hazards by Location website. Please [contact us](#) with feedback.

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: 2969 74th Ave SE, Mercer Island, WA 98040, USA
Coordinates: 47.5824113, -122.2407143
Elevation: 322 ft
Timestamp: 2023-04-11T17:53:01.499Z
Hazard Type: Seismic
Reference Document: ASCE7-16
Risk Category: II
Site Class: D-default



Basic Parameters

Name	Value	Description
S_S	1.405	MCE_R ground motion (period=0.2s)
S_1	0.489	MCE_R ground motion (period=1.0s)
S_{MS}	1.686	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	1.124	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	0.896	Coefficient of risk (1.0s)
PGA	0.601	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.721	Site modified peak ground acceleration

ENGINEERED STRUCTURES GLOBAL DESIGN, PLLC

Project Name: Giola Residence
Description: New Construction **2969 74th Ave SE, Mercer Island, WA 98040**
City of Mercer Island
Location: Mercer Island
Code: IRC 2018/ WFCM 2018

STRUCTURAL LOADING SUMMARY

Vertical Loads: Ground SN = 25 PSF
Roof SN = 25 PSF
Roof DL = 10 PSF
Floor LL = 40 PSF
Floor DL = 10 PSF

Soil Bearing Pressure: 1500 PSF

Frost Depth: 12 in
Wind Exp = B
Kzt = 1.0
Seismic Sds = 1.124

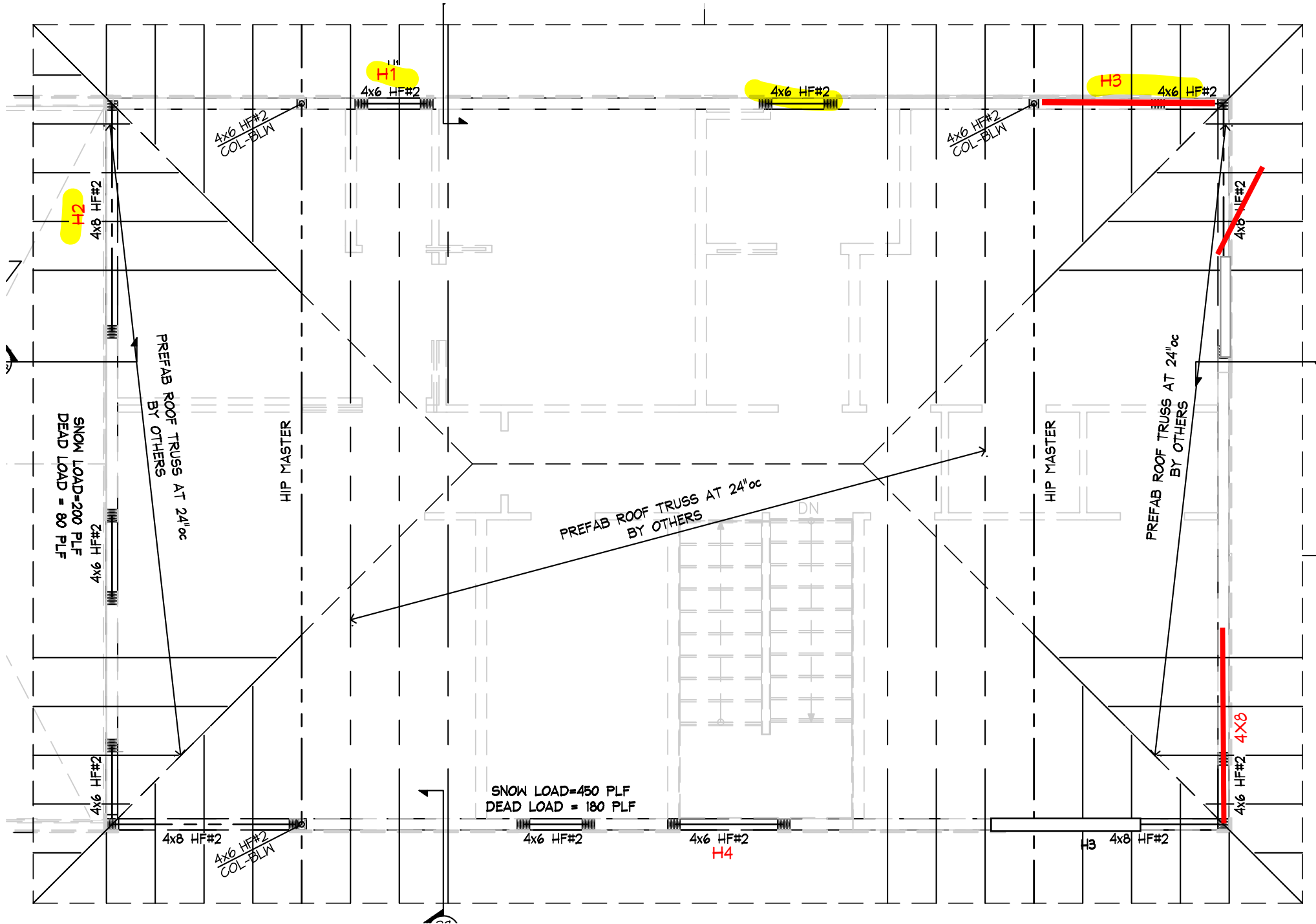
Roof: Prefab Trusses

Upper Floor: 14" TJI

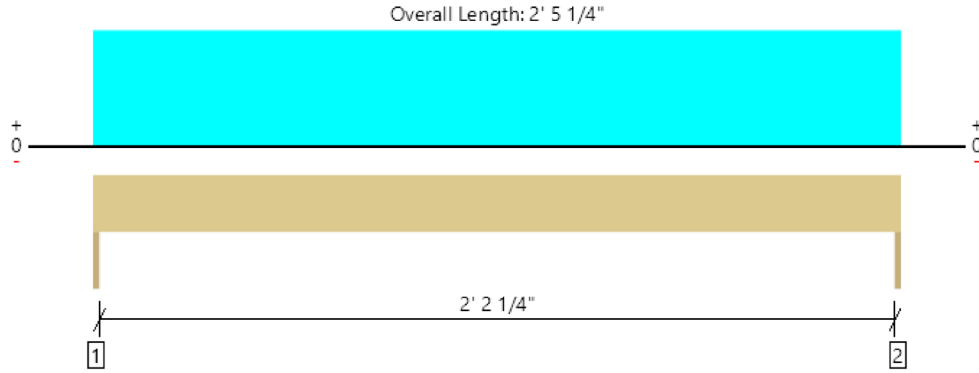
Main Floor: 14" TJI



ROOF GRAVITY DESIGN



Level, Roof Header **H1**
1 piece(s) 4 x 6 HF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	786 @ 0	2126 (1.50")	Passed (37%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	410 @ 7"	2214	Passed (19%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	479 @ 1' 2 5/8"	1869	Passed (26%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.006 @ 1' 2 5/8"	0.081	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.008 @ 1' 2 5/8"	0.122	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	237	548	786	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	237	548	786	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	2' 5" o/c	
Bottom Edge (Lu)	2' 5" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 2' 5 1/4"	N/A	4.9	--	
1 - Uniform (PSF)	0 to 2' 5 1/4"	18'	10.5	25.0	Default Load

Member Notes
Roof Header H1

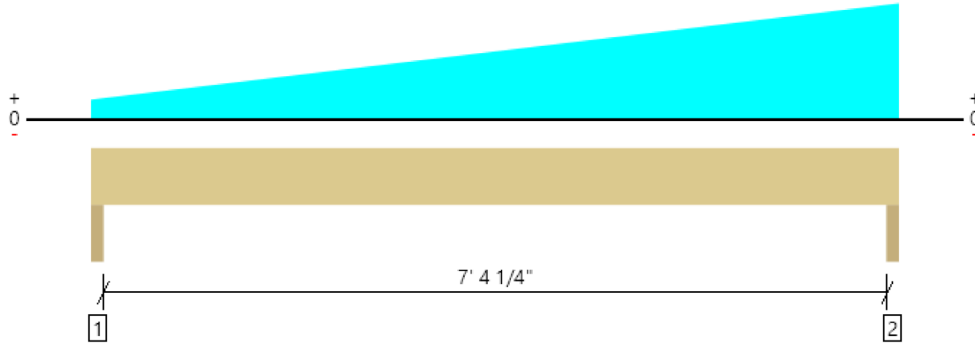
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Level, Roof Header **H2**
1 piece(s) 4 x 8 HF No.2

Overall Length: 7' 10 1/4"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	634 @ 7' 8 3/4"	4253 (3.00")	Passed (15%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	454 @ 7'	2918	Passed (16%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	957 @ 4' 3 15/16"	3247	Passed (29%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.046 @ 4' 3/16"	0.253	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.068 @ 4' 1/8"	0.313	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (5/16").
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Trimmer - SPF	3.00"	3.00"	1.50"	135	259	394	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	206	428	634	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	7' 10" o/c	
Bottom Edge (Lu)	7' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 7' 10 1/4"	N/A	6.4	--	
1 - Tapered (PSF)	0 to 7' 10 1/4"	1' to 6'	10.5	25.0	Default Load

Member Notes
Roof Header H2

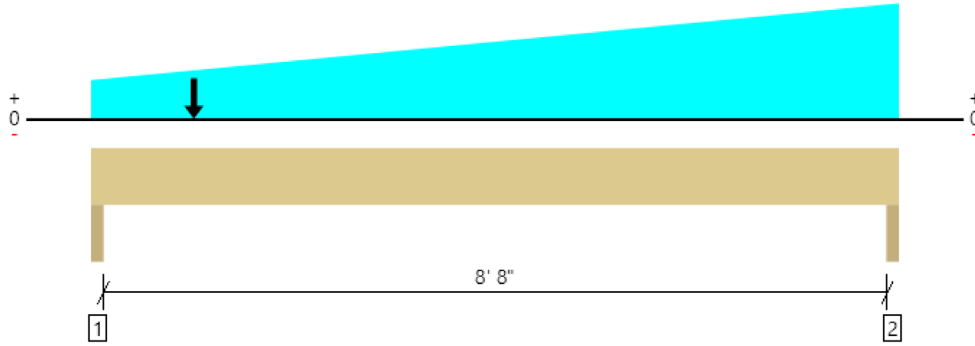
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ForteWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Level, Roof Header **H3**
1 piece(s) 4 x 8 HF No.2

Overall Length: 9' 2"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2424 @ 1 1/2"	4253 (3.00")	Passed (57%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2352 @ 10 1/4"	2918	Passed (81%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2704 @ 3' 2 1/8"	3247	Passed (83%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.190 @ 4' 3 7/8"	0.297	Passed (L/562)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.275 @ 4' 4"	0.313	Passed (L/389)	--	1.0 D + 1.0 S (All Spans)

System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (5/16").
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Trimmer - SPF	3.00"	3.00"	1.71"	720	1705	2424	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	326	712	1038	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	9' 2" o/c	
Bottom Edge (Lu)	9' 2" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 9' 2"	N/A	6.4	--	
1 - Tapered (PSF)	0 to 9' 2"	2' to 6'	10.5	25.0	Default Load
2 - Point (lb)	1' 2"	N/A	600	1500	

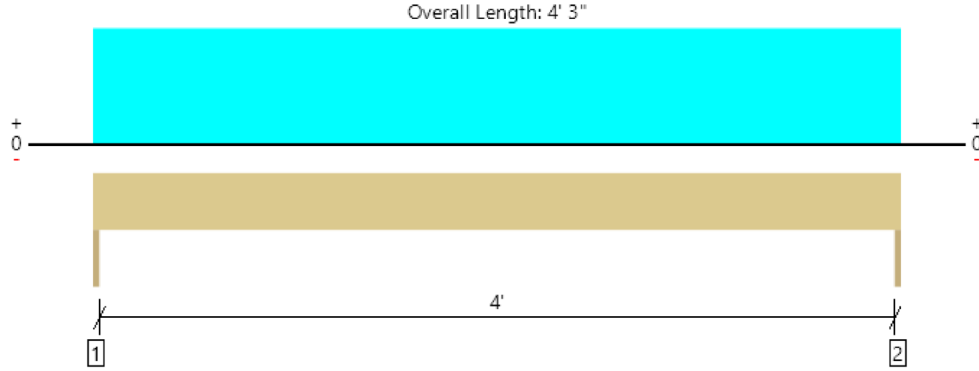
Member Notes
Roof Header H3

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ForteWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Level, Roof Header **H4**
1 piece(s) 4 x 6 HF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1370 @ 0	2126 (1.50")	Passed (64%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	994 @ 7"	2214	Passed (45%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1455 @ 2' 1 1/2"	1869	Passed (78%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.052 @ 2' 1 1/2"	0.142	Passed (L/974)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.075 @ 2' 1 1/2"	0.213	Passed (L/680)	--	1.0 D + 1.0 S (All Spans)

System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	414	956	1370	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	414	956	1370	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 3" o/c	
Bottom Edge (Lu)	4' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 4' 3"	N/A	4.9	--	
1 - Uniform (PSF)	0 to 4' 3"	18'	10.5	25.0	Default Load

Member Notes
Roof Header H4

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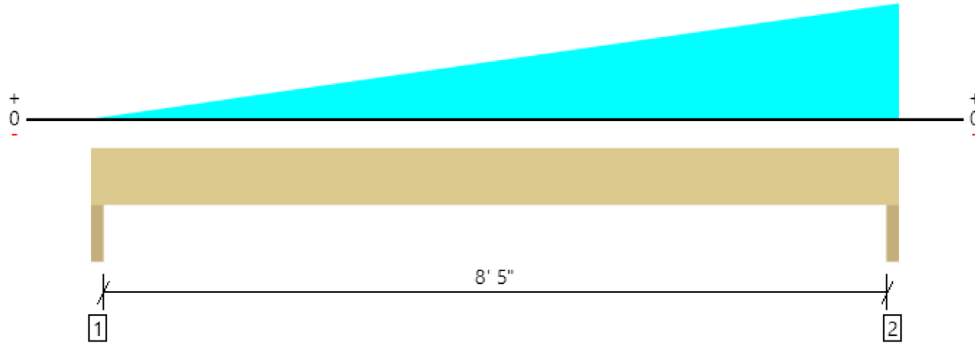
ForteWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Level, Roof Header H5

1 piece(s) 4 x 8 HF No.2

Overall Length: 8' 11"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	667 @ 8' 9 1/2"	4253 (3.00")	Passed (16%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	488 @ 8' 3/4"	2918	Passed (17%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1085 @ 5' 15/16"	3247	Passed (33%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.066 @ 4' 7 3/16"	0.289	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.099 @ 4' 7 1/16"	0.313	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (5/16").
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Trimmer - SPF	3.00"	3.00"	1.50"	121	220	341	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	218	449	667	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' 11" o/c	
Bottom Edge (Lu)	8' 11" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 8' 11"	N/A	6.4	--	
1 - Tapered (PSF)	0 to 8' 11"	0 to 6'	10.5	25.0	Default Load

Member Notes
Roof Header H4

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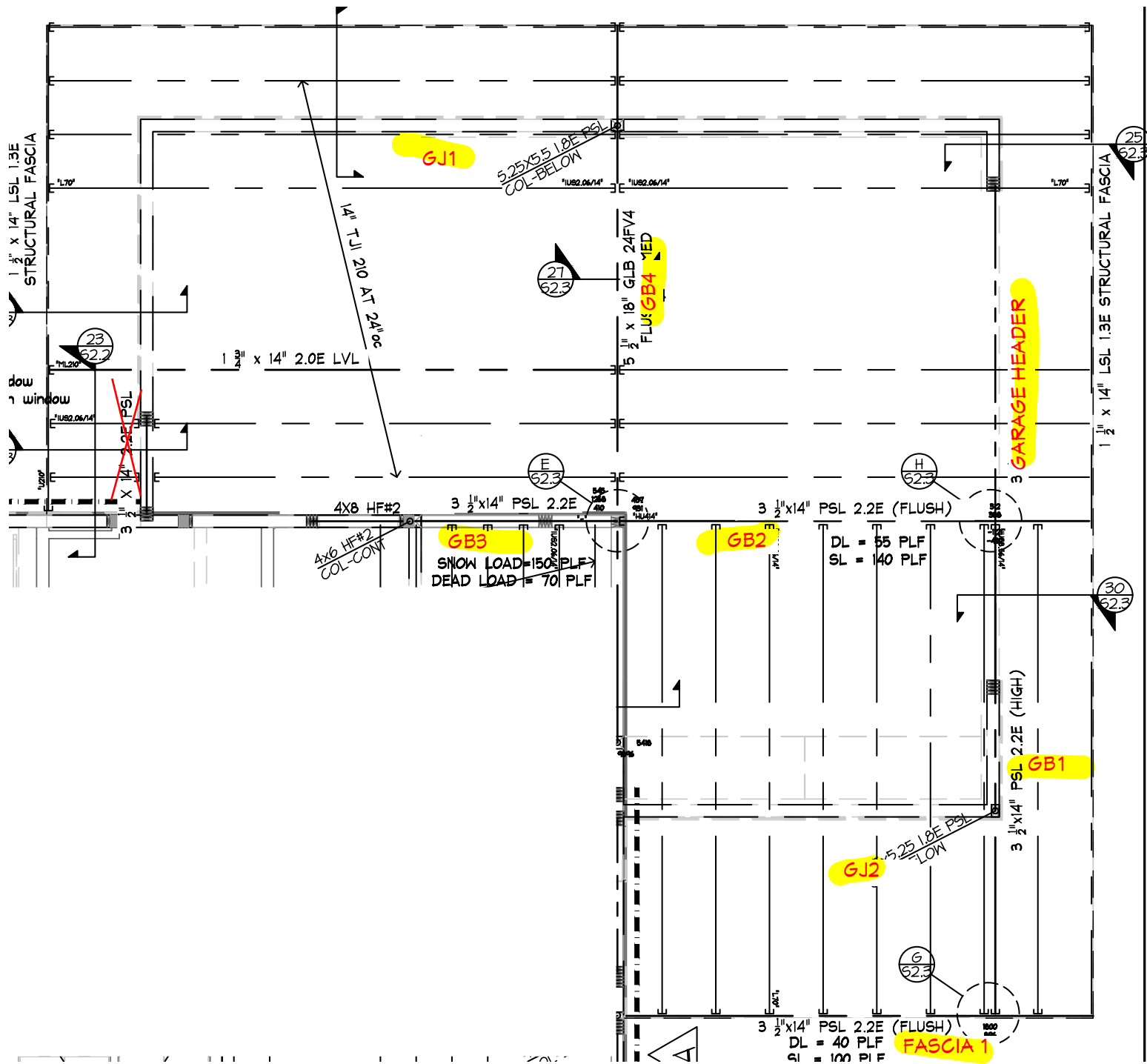
ForteWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	





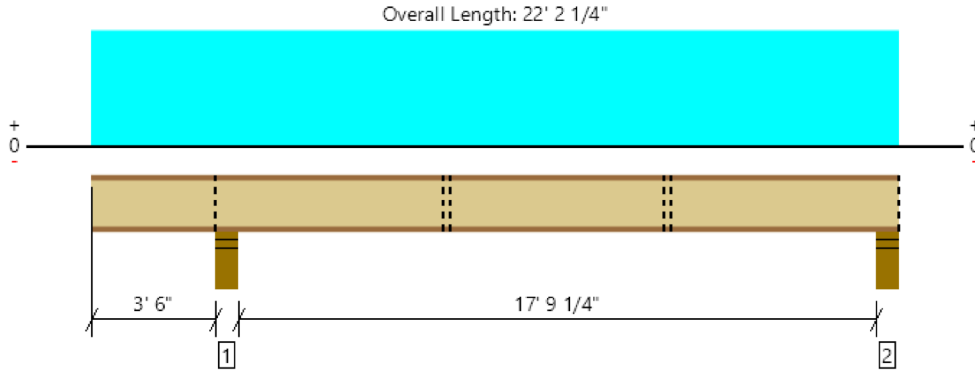
"LOW GARAGE" ROOF GRAVITY DESIGN

PERMIT REVISION #2 - GARAGE IS MIRRORRED FROM THIS VIEW
(FLIPPED OVER THE X-X AXIS)



Alternative 2

Level, Garage Roof Joist
1 piece(s) 14" TJI® 210 @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	642 @ 21' 9 3/4"	1679 (3.50")	Passed (38%)	1.15	1.0 D + 1.0 S (Alt Spans)
Shear (lbs)	610 @ 21' 8 3/4"	2237	Passed (27%)	1.15	1.0 D + 1.0 S (Alt Spans)
Moment (Ft-lbs)	2707 @ 13' 3/16"	5164	Passed (52%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	0.278 @ 12' 10 1/16"	0.603	Passed (L/780)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.384 @ 12' 10 5/16"	0.904	Passed (L/565)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
 Member Type : Joist
 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.
- Permanent bracing at third points in the back span or a direct applied ceiling over the entire back span length is required at the left span of the member. See literature detail (PB1) For clarification.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Factored	
1 - Stud wall - HF	5.50"	5.50"	3.50"	263	526	658	921	Blocking
2 - Stud wall - HF	5.50"	5.50"	1.75"	181	369	461	642	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 11" o/c	
Bottom Edge (Lu)	8' 8" o/c	

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

Vertical Load	Location	Spacing	Dead (0.90)	Roof Live (non-snow: 1.25)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 22' 2 1/4"	24"	10.0	20.0	25.0	Default Load

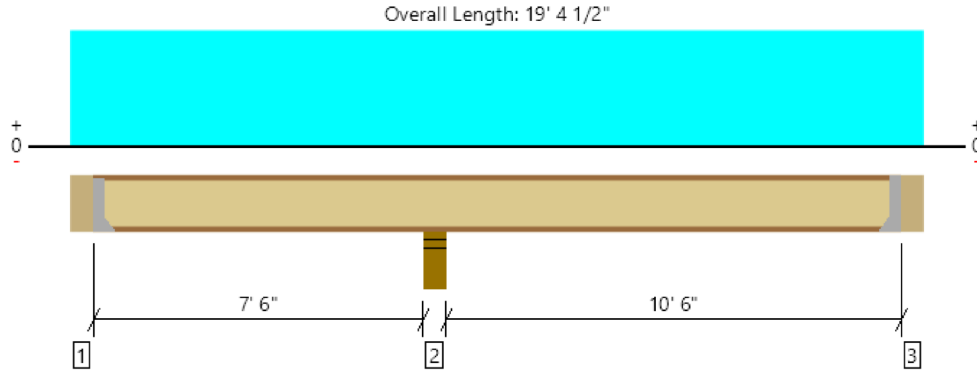
Member Notes
Garage Roof Joist GJ1

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ForteWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Level, Garage Roof Joist GJ2
1 piece(s) 14" TJI® 210 @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	825 @ 8' 2 1/4"	2950 (5.25")	Passed (28%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	416 @ 8' 5"	2237	Passed (19%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-804 @ 8' 2 1/4"	5164	Passed (16%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.030 @ 14' 1/8"	0.358	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.041 @ 14' 7/16"	0.536	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
 Member Type : Joist
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD
 Member Pitch : 0/12

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Hanger on 14" PSL beam	5.50"	Hanger ¹	1.75" / - ²	57	169	226	See note ¹
2 - Stud wall - SPF	5.50"	5.50"	3.50"	236	589	825	None
3 - Hanger on 14" PSL beam	5.50"	Hanger ¹	1.75" / - ²	95	245	340	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)	8' 8" o/c	
Bottom Edge (Lu)	8' 8" o/c	

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

Connector: Simpson Strong-Tie							
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories	
1 - Face Mount Hanger	IUS2.06/14	2.00"	N/A	12-10dx1.5	2-Strong-Grip		
3 - Face Mount Hanger	IUS2.06/14	2.00"	N/A	12-10dx1.5	2-Strong-Grip		

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

Vertical Load	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 19' 4 1/2"	24"	10.0	25.0	Default Load

Member Notes
Garage Roof Joist GJ2

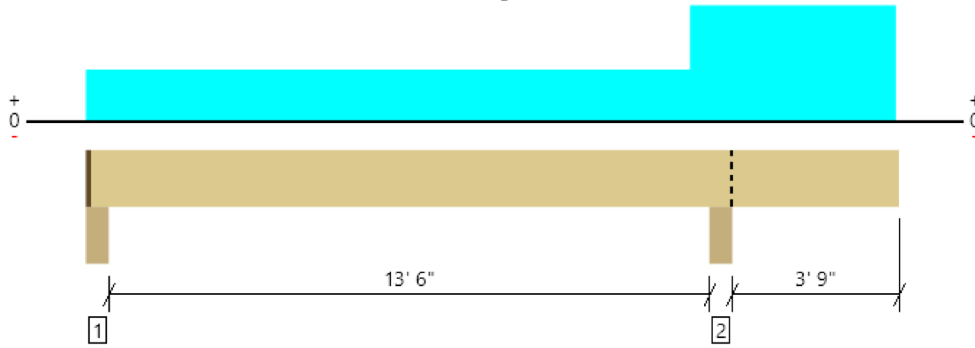
ForTEWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Level, Roof: Flush Beam

1 piece(s) 3 1/2" x 14" 2.2E Parallam® PSL

Overall Length: 18' 2"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2696 @ 14' 2 1/4"	12031 (5.50")	Passed (22%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1045 @ 12' 9 1/2"	10894	Passed (10%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2932 @ 6' 5 3/4"	31236	Passed (9%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	0.042 @ 7' 1/8"	0.693	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.061 @ 6' 11 1/8"	0.924	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Column - HF	5.50"	4.25"	1.50"	341	664	1005	1 1/4" Rim Board
2 - Beam - PSL	5.50"	5.50"	1.50"	896	1800	2696	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)	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)	1 1/4" to 18' 2"	N/A	15.3	--	
1 - Uniform (PSF)	0 to 13' 6" (Back)	4'	10.0	25.0	Default Load
2 - Uniform (PSF)	13' 6" to 18' 1 3/16" (Back)	9'	10.0	25.0	

Member Notes

FASCIA BEAM GARAGE FRAMING
 FASCIA 1

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

ForteWEB Software Operator	Job Notes
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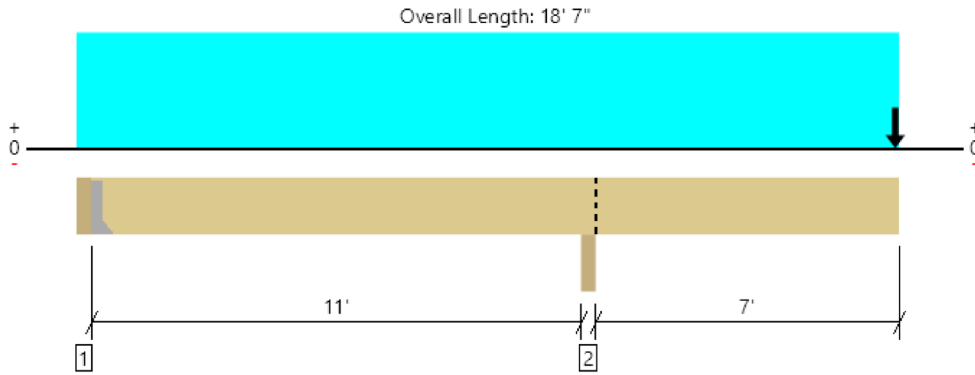
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Page 1 / 1

Level, Roof: Flush Beam

1 piece(s) 3 1/2" x 14" 2.2E Parallam® PSL

An excessive uplift of -1603 lbs at support located at 3 1/2" failed this product.



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5159 @ 11' 5 1/4"	7656 (3.50")	Passed (67%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2989 @ 12' 9"	10894	Passed (27%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-20325 @ 11' 5 1/4"	31236	Passed (65%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.590 @ 18' 7"	0.715	Passed (2L/290)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.890 @ 18' 7"	0.953	Passed (2L/192)	--	1.0 D + 1.0 S (Alt Spans)

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).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- 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 - Hanger on 14" PSL beam	3.50"	Hanger ¹	1.50"	-482	-1121	-1603	See note ¹
2 - Column - SPF	3.50"	3.50"	2.36"	1844	3316	5159	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)	18' 4" o/c	
Bottom Edge (Lu)	18' 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 - Face Mount Hanger	LUS414	2.00"	N/A	10-SD9112	6-SD9212		

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

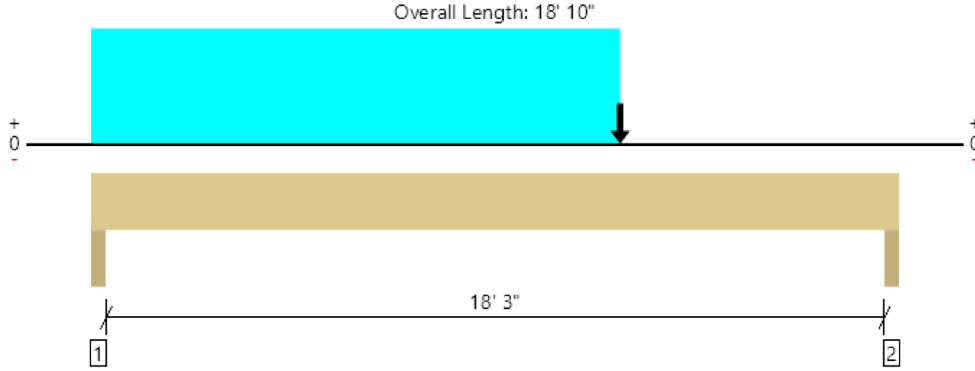
Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	3 1/2" to 18' 7"	N/A	15.3	--	
1 - Uniform (PSF)	0 to 18' 7" (Front)	1'	10.0	25.0	Default Load
2 - Point (lb)	18' 6" (Front)	N/A	896	1800	Load from Structural Fascia Fascia 1

Member Notes
Beam above Garage Door Header GB1

FORTEWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Level, Garage Door Header
1 piece(s) 3 1/2" x 14" 2.2E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3300 @ 2"	7656 (3.50")	Passed (43%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2767 @ 1' 5 1/2"	10894	Passed (25%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	14362 @ 9' 7/16"	31236	Passed (46%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.341 @ 9' 2 9/16"	0.925	Passed (L/651)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.520 @ 9' 3 1/8"	1.233	Passed (L/427)	--	1.0 D + 1.0 S (All Spans)

System : Roof
 Member Type : Drop 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 - Trimmer - HF	3.50"	3.50"	1.51"	1084	2216	3300	None
2 - Trimmer - HF	3.50"	3.50"	1.50"	749	1255	2005	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	18' 10" o/c	
Bottom Edge (Lu)	18' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 18' 10"	N/A	15.3	--	
1 - Uniform (PSF)	0 to 12' 4" (Top)	10'	10.0	25.0	Default Load
2 - Point (lb)	12' 4" (Top)	N/A	312	388	Load from PSL

Member Notes

Garage Header

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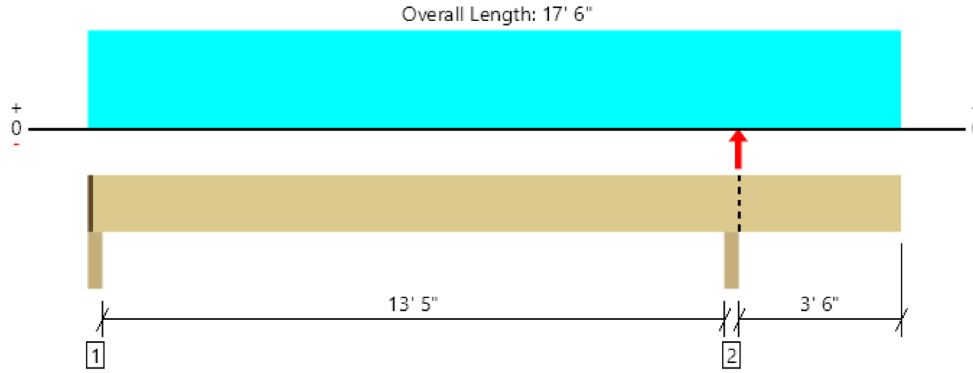
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Level, GARAGE BEAM GB2

1 piece(s) 3 1/2" x 14" 2.2E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1368 @ 2"	4922 (2.25")	Passed (28%)	--	1.0 D + 1.0 S (Alt Spans)
Shear (lbs)	1250 @ 12' 6 1/2"	10894	Passed (11%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	4416 @ 6' 8 1/4"	31236	Passed (14%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	0.063 @ 6' 11 1/16"	0.684	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.093 @ 6' 10 11/16"	0.913	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Column - SPF	3.50"	2.25"	1.50"	457	931	1388	1 1/4" Rim Board
2 - Beam - SPF	3.50"	3.50"	1.50"	312	388/-82	700	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)	17' 5" o/c	
Bottom Edge (Lu)	17' 5" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	1 1/4" to 17' 6"	N/A	15.3	--	
1 - Uniform (PSF)	0 to 17' 6" (Front)	5' 6"	10.0	25.0	Default Load
2 - Point (lb)	14' (Front)	N/A	-460	-1121	

Member Notes

Garage Beam GB2

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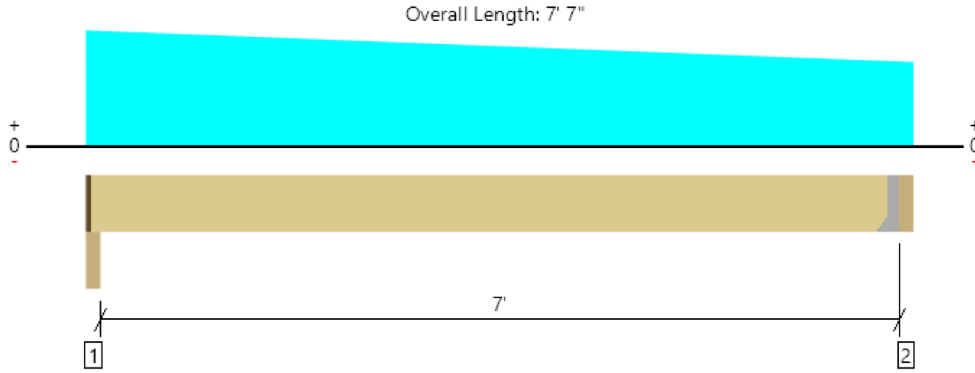
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Level, Garage Beam GB3

1 piece(s) 3 1/2" x 14" 2.2E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1672 @ 7' 3 1/2"	3281 (1.50")	Passed (51%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1139 @ 6' 1 1/2"	9473	Passed (12%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3031 @ 3' 8 3/8"	27162	Passed (11%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.016 @ 3' 8 3/4"	0.356	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.022 @ 3' 8 11/16"	0.475	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

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	Floor Live	Snow	Factored	
1 - Column - SPF	3.50"	2.25"	1.50"	545	1268	410	1813	1 1/4" Rim Board
2 - Hanger on 14" SPF beam	3.50"	Hanger ¹	1.50"	490	1310	255	1800	See note ¹

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

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

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie

Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	THA413	1.75"	N/A	14-10d	4-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	1 1/4" to 7' 3 1/2"	N/A	15.3	--	--	
1 - Uniform (PSF)	0 to 7' 7" (Front)	8' 6"	10.0	40.0	-	Default Load
2 - Tapered (PSF)	0 to 7' 7" (Top)	6' to 1'	10.5	-	25.0	Wall Loading from Main Roof

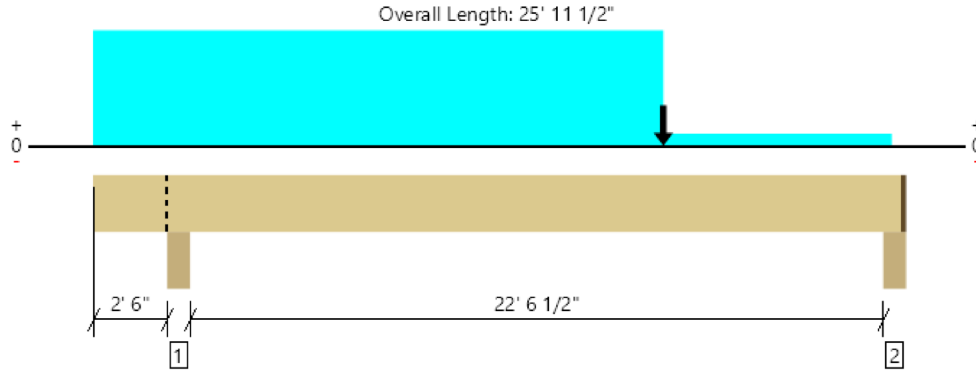
Member Notes

Garage Beam GB3

FORTEWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Level, Garage Roof Beam GB4
1 piece(s) 5 1/2" x 18" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	9865 @ 2' 8 3/4"	19663 (5.50")	Passed (50%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	6793 @ 4' 5 1/2"	20114	Passed (34%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	44133 @ 14' 3 1/8"	64634	Passed (68%)	1.15	1.0 D + 1.0 S (Alt Spans)
Neg Moment (Ft-lbs)	-2566 @ 2' 8 3/4"	52656	Passed (5%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.568 @ 14' 15/16"	1.145	Passed (L/484)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.847 @ 14' 1 1/2"	1.526	Passed (L/324)	--	1.0 D + 1.0 S (Alt Spans)

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).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume factor of 0.95 that was calculated using length L = 22' 8 3/16".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 3' 11/16".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Snow	Factored	
1 - Column - HF	5.50"	5.50"	2.76"	3146	411	60	6719	9865	Blocking
2 - Column - HF	5.50"	4.25"	1.51"	1948	857	305	3445	5393	1 1/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	25' 10" o/c	
Bottom Edge (Lu)	25' 10" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 25' 10 1/4"	N/A	24.1	--	--	--	
1 - Uniform (PSF)	0 to 18' 2 1/2" (Front)	9'	10.0	-	-	25.0	Default Load
2 - Uniform (PSF)	0 to 18' 2 1/2" (Back)	10'	10.0	-	-	25.0	Default Load
3 - Point (lb)	18' 2 1/2" (Front)	N/A	410	1268	-	545	
4 - Point (lb)	18' 2 1/2" (Back)	N/A	457	-	-	931	
5 - Uniform (PSF)	18' 2 1/2" to 25' 6" (Front)	2'	10.0	-	25.0	-	
6 - Tapered (PSF)	18' 2 1/2" to 25' 6" (Top)	3' to 7'	-	-	-	-	

Member Notes
Garage Roof Framing GB4

FORTEWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Giola

Prepared by:

Date: 3/30/23

Selection

6x 6 Hem-Fir #2 Solid Wood Column

Conditions

NDS 2018, Using values for 5x + solid sawn, Posts and Timbers.

Data

Load	10000 #	Column Area	30.25 in ²	Kf	1.00
Actual Height	9.0 ft	le d1 Effective Ht	108 in	c	0.80
Unbraced L1	9.0 ft	le d2 Effective Ht	108 in	KcE	0.30
Unbraced L2	9.0 ft	Ke Buckling Mode	1.0	FcE	857

Attributes and Values

Controlling d is 5.5 inches

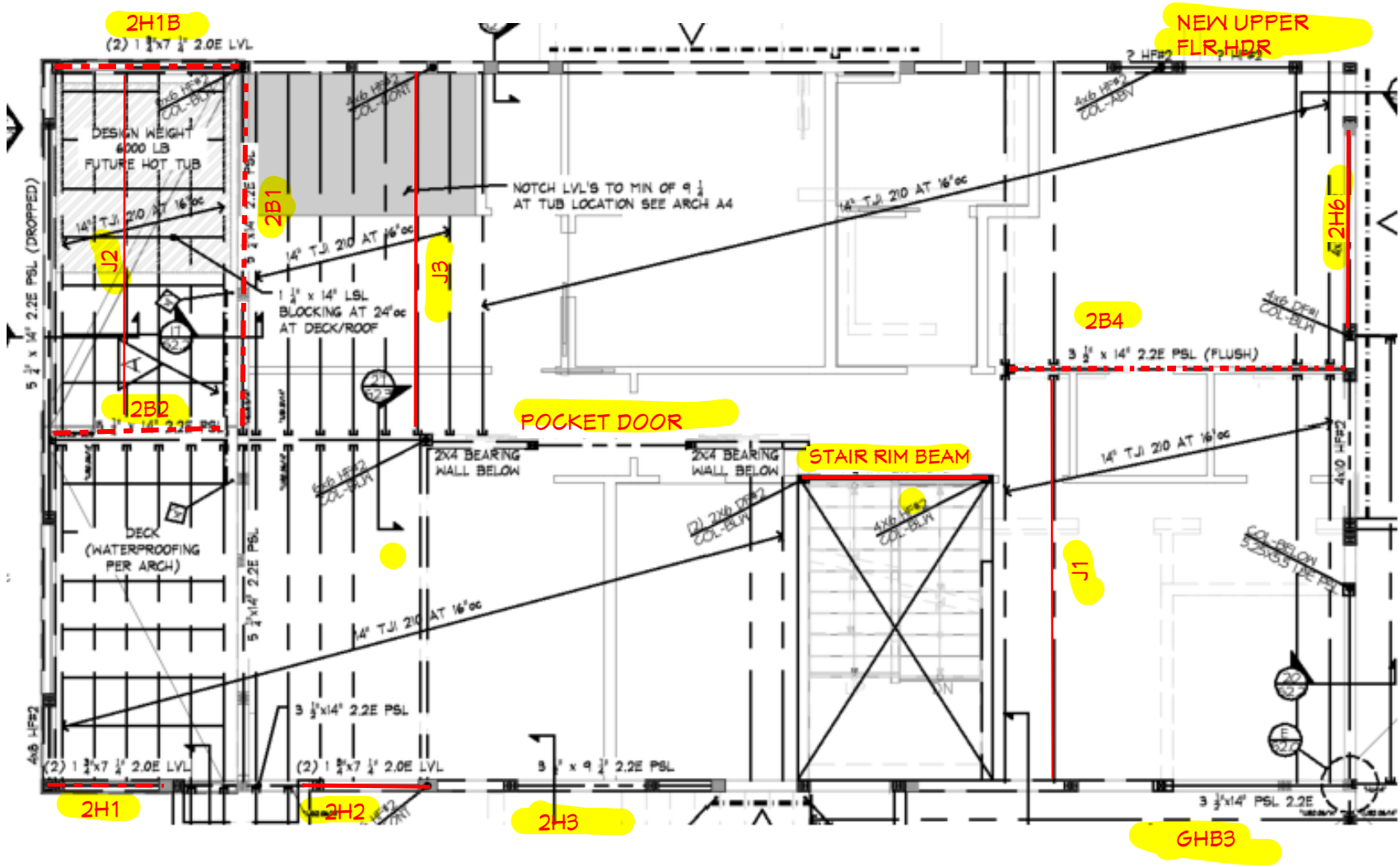
Fc || (psi) E (psi x mil)

	le/d	psi	Area (in ²)		
Actual	20	331	30.25	Reference Values	575 1.1
Critical	50	465	21.52	Adjusted Values	465 1.1
Status	OK	OK	OK	CF Size Factor	1.00
Ratio	40%	71%	71%	Cd Duration	1.00
				Cm Wet Use	1.00 1.00
				Cp Stability	0.81

Note: A wood plate under this column must have an Fc value, perpendicular to the grain, greater than 331 psi.

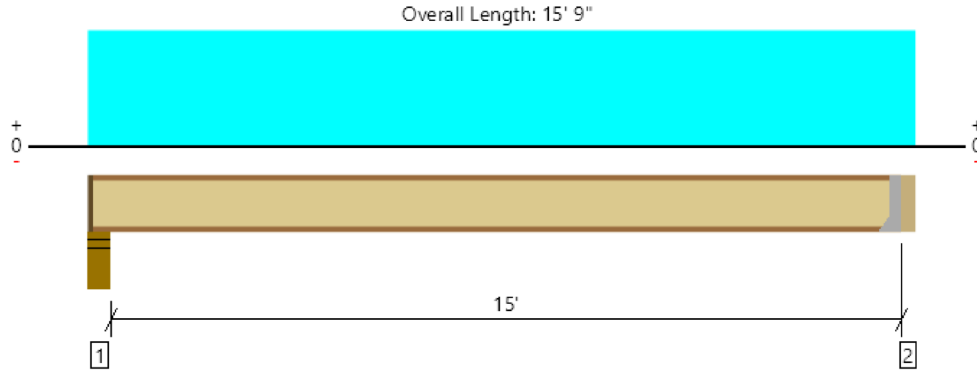


UPPER FLOOR GRAVITY DESIGN



Level, Upper Floor Joist J1
1 piece(s) 14" TJI® 210 @ 16" OC

02/07/2024



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	503 @ 15' 5 1/2"	1005 (1.75")	Passed (50%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	503 @ 15' 5 1/2"	1945	Passed (26%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1896 @ 7' 11"	4490	Passed (42%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.134 @ 7' 11"	0.503	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.167 @ 7' 11"	0.754	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	51	40	Passed	--	--

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

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	5.50"	4.25"	1.75"	106	422	528	1 1/4" Rim Board
2 - Hanger on 14" HF beam	3.50"	Hanger ¹	1.75" / - ²	104	418	522	See note ¹

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 11" o/c	
Bottom Edge (Lu)	15' 4" 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
2 - Face Mount Hanger	IUS2.06/14	2.00"	N/A	12-10dx1.5	2-Strong-Grip	

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

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 15' 9"	16"	10.0	40.0	Default Load

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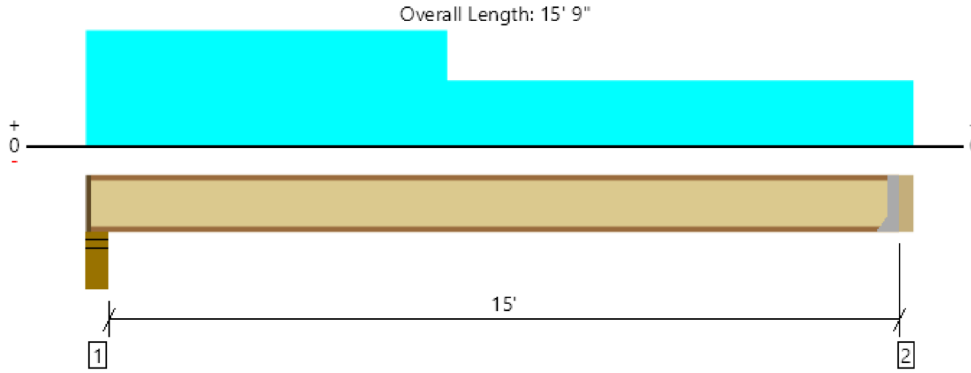
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Level, Upper Balcony with Hottub
1 piece(s) 14" TJI® 210 @ 16" OC J2

02/07/2024



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	809 @ 15' 5 1/2"	1005 (1.75")	Passed (80%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1062 @ 5 1/2"	1945	Passed (55%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3502 @ 6' 10 5/8"	4490	Passed (78%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.273 @ 7' 8 3/4"	0.503	Passed (L/663)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.306 @ 7' 9"	0.754	Passed (L/591)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	51	40	Passed	--	--

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

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	5.50"	4.25"	2.20"	106	1033	1138	1 1/4" Rim Board
2 - Hanger on 14" HF beam	3.50"	Hanger ¹	1.75" / - ²	104	731	836	See note ¹

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 2" o/c	
Bottom Edge (Lu)	15' 4" 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
2 - Face Mount Hanger	IUS2.06/14	2.00"	N/A	12-10dx1.5	2-Strong-Grip	

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

Vertical Loads	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	7' to 15' 9"	16"	10.0	60.0	Default Load
2 - Uniform (PSF)	0 to 7'	16"	10.0	114.0	

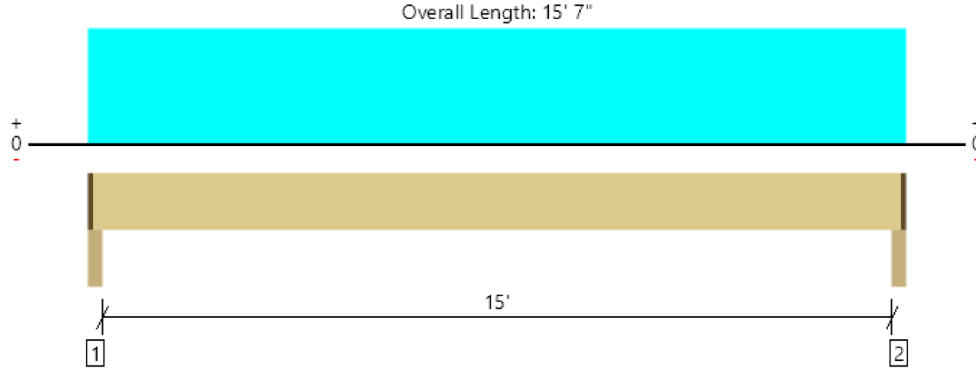
FORTEWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Level, Upper Floor 2B1

1 piece(s) 3 1/2" x 14" 2.2E Parallam® PSL

02/07/2024



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3039 @ 2"	4922 (2.25")	Passed (62%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2504 @ 1' 5 1/2"	10894	Passed (23%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	11492 @ 7' 9 1/2"	31236	Passed (37%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.151 @ 7' 9 1/2"	0.508	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.298 @ 7' 9 1/2"	0.762	Passed (L/615)	--	1.0 D + 1.0 S (All Spans)

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).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Column - HF	3.50"	2.25"	1.50"	1520	312	1558	3079	1 1/4" Rim Board
2 - Column - HF	3.50"	2.25"	1.50"	1520	312	1558	3079	1 1/4" Rim Board

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

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

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	1 1/4" to 15' 5 3/4"	N/A	15.3	--	--	
1 - Uniform (PLF)	0 to 15' 7" (Top)	N/A	180.0	40.0	200.0	Default Load

Member Notes

Upper Floor Beam 2B1 (carrying snow load from Roof above)

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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
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



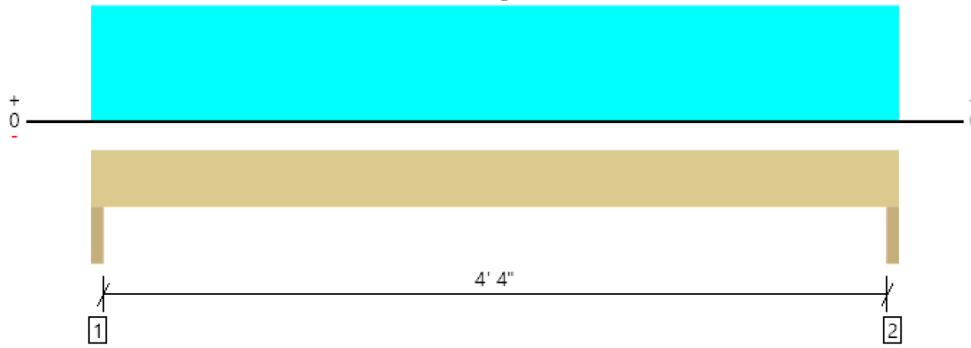
Alternative

Level, Upper Floor Header **2H1**
1 piece(s) 3 1/2" x 7" 1.8E Parallam® PSL

02/07/2024

CHANGE TO LVL

Overall Length: 4' 10"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4078 @ 1 1/2"	5723 (3.00")	Passed (71%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2672 @ 10"	3757	Passed (71%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	4432 @ 2' 5"	6322	Passed (70%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.058 @ 2' 5"	0.153	Passed (L/951)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.116 @ 2' 5"	0.229	Passed (L/473)	--	1.0 D + 1.0 L (All Spans)

System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Trimmer - HF	3.00"	3.00"	2.14"	2048	2030	363	4078	None
2 - Trimmer - HF	3.00"	3.00"	2.14"	2048	2030	363	4078	None

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

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 4' 10"	N/A	7.6	--	--	
1 - Uniform (PSF)	0 to 4' 10"	7'	110.0	120.0	-	(Hot tub and Deck)
2 - Uniform (PLF)	0 to 4' 10"	N/A	70.0	-	150.0	

Member Notes

Header 2H1
 (Future Hot Tub Load)

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

ForteWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Giola

Upper Floor Header

2H1-B

Prepared by: JM

Date: 2/06/24

Selection (2) 1-3/4x 7-1/4 2.0E LP SolidStart LVL Lu = 0.0 Ft

Conditions NDS 2018

Min Bearing Area R1= 1.8 in² R2= 1.8 in² (1.5) DL Defl= 0.08 in

Data

Beam Span	7.0 ft	Reaction 1 LL	630 #	Reaction 2 LL	630 #
Beam Wt per ft	6.34 #	Reaction 1 TL	1352 #	Reaction 2 TL	1352 #
Bm Wt Included	44 #	Maximum V	1352 #		
Max Moment	2366 #'	Max V (Reduced)	1119 #		
TL Max Defl	L / 240	TL Actual Defl	L / 669		
LL Max Defl	L / 360	LL Actual Defl	L / >1000		

Attributes

	Section (in ³)	Shear (in ²)	TL Defl (in)	LL Defl
Actual	30.66	25.38	0.13	0.05
Critical	9.26	5.89	0.35	0.23
Status	OK	OK	OK	OK
Ratio	30%	23%	36%	20%

Values

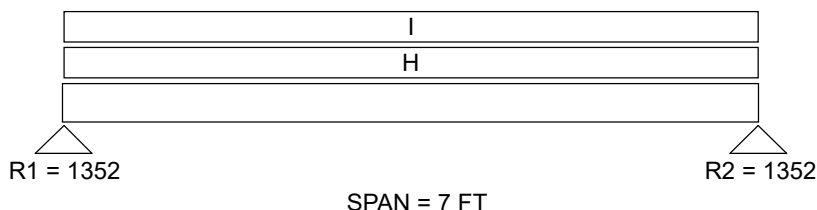
	Fb (psi)	Fv (psi)	E (psi x mil)	Fc _I (psi)
Reference Values	2900	285	2.0	750
Adjusted Values	3067	285	2.0	750

Adjustments

CF Size Factor	1.058			
Cd Duration	1.00	1.00		
Cr Repetitive	1.00			
Ch Shear Stress		N/A		
Cm Wet Use	1.00	1.00	1.00	1.00
CI Stability	1.0000	Rb = 0.00	Le = 0.00 Ft	

Loads

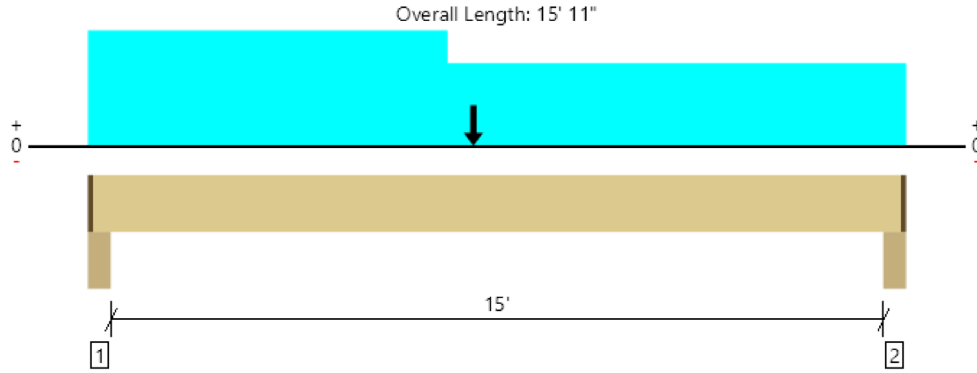
	Par Unif LL	Par Unif TL	Start	End
	110	H = 230	0	7.0
	70	I = 150	0	7.0



Uniform and partial uniform loads are lbs per lineal ft.

Level, Upper Floor 2B2

1 piece(s) 5 1/4" x 14" 2.2E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	9184 @ 4"	13945 (4.25")	Passed (66%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	7658 @ 1' 7 1/2"	14210	Passed (54%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	38446 @ 7' 6"	40743	Passed (94%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.504 @ 7' 10 1/16"	0.508	Passed (L/363)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.619 @ 7' 10 1/4"	0.762	Passed (L/296)	--	1.0 D + 1.0 L (All Spans)

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).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Column - HF	5.50"	4.25"	2.80"	1625	7660	9286	1 1/4" Rim Board
2 - Column - HF	5.50"	4.25"	2.39"	1588	6329	7917	1 1/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	15' 9" o/c	
Bottom Edge (Lu)	15' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 15' 9 3/4"	N/A	23.0	--	
1 - Uniform (PSF)	0 to 7' (Back)	14'	10.0	60.0	Default Load
2 - Uniform (PSF)	7' to 15' 11" (Front)	14'	10.0	40.0	
3 - Point (lb)	7' 6" (Front)	N/A	312	1558	
4 - Point (lb)	7' 6" (Back)	N/A	312	1558	

Member Notes

Second Floor 2B2

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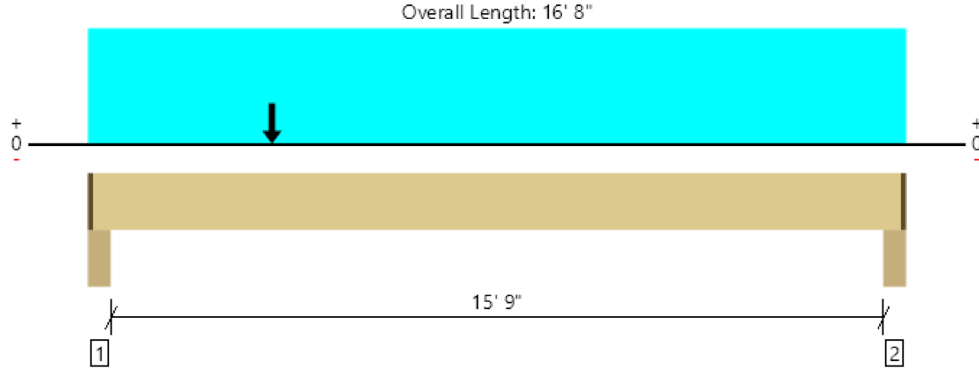
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Level, Balcony 2B3

1 piece(s) 5 1/4" x 14" 2.2E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	10069 @ 4"	13945 (4.25")	Passed (72%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	9359 @ 1' 7 1/2"	14210	Passed (66%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	31528 @ 4' 8 9/16"	40743	Passed (77%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.379 @ 7' 8 13/16"	0.533	Passed (L/507)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.571 @ 7' 10 1/16"	0.800	Passed (L/336)	--	1.0 D + 1.0 L (All Spans)

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).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Column - SPF	5.50"	4.25"	3.07"	3105	7011	10115	1 1/4" Rim Board
2 - Column - SPF	5.50"	4.25"	1.69"	2195	3385	5580	1 1/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	16' 6" o/c	
Bottom Edge (Lu)	16' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 16' 6 3/4"	N/A	23.0	--	
1 - Uniform (PSF)	0 to 16' 8" (Front)	2'	100.0	122.0	Default Load
2 - Point (lb)	3' 9" (Front)	N/A	1588	6329	

Member Notes
2B3- Deck Loading

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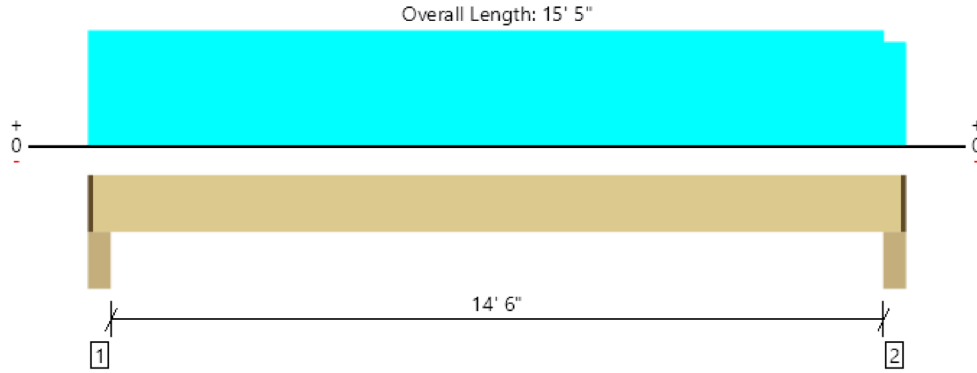
ForteWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Level, Interior Flush Beam

1 piece(s) 3 1/2" x 14" 2.2E Parallam® PSL

2B4



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	7721 @ 4"	9297 (4.25")	Passed (83%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	6176 @ 1' 7 1/2"	9473	Passed (65%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	27612 @ 7' 8 1/2"	27162	Passed (102%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.477 @ 7' 8 1/2"	0.492	Passed (L/371)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.673 @ 7' 8 1/2"	0.738	Passed (L/263)	--	1.0 D + 1.0 L (All Spans)

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).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Column - SPF	5.50"	4.25"	3.53"	2275	5550	7825	1 1/4" Rim Board
2 - Column - SPF	5.50"	4.25"	3.52"	2233	5550	7783	1 1/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6" o/c	
Bottom Edge (Lu)	15' 3" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 15' 3 3/4"	N/A	15.3	--	
1 - Uniform (PSF)	0 to 15' 5" (Top)	18'	10.0	40.0	Default Load
2 - Uniform (PLF)	0 to 15' (Front)	N/A	100.0	-	

Member Notes
Interior Flush Beam

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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
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Level, 2H2

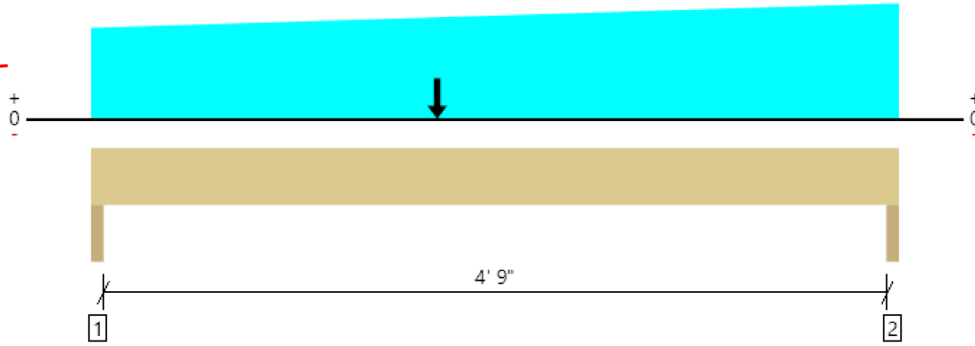
MAKE THIS A 14" DEEP

1 piece(s) 3 1/2" x 7" 1.8E Parallam® PSL

FOR BUMP OUT PER ARCH SECTION

Overall Length: 5' 3"

SEE REVISED DETAIL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3075 @ 1 1/2"	5723 (3.00")	Passed (54%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2673 @ 10"	3757	Passed (71%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	5312 @ 2' 3"	6322	Passed (84%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.100 @ 2' 3"	0.167	Passed (L/602)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.140 @ 2' 3"	0.250	Passed (L/429)	--	1.0 D + 1.0 L (All Spans)

System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Trimmer - SPF	3.00"	3.00"	1.61"	865	2210	217	3075	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	769	1880	308	2649	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 3" o/c	
Bottom Edge (Lu)	5' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 5' 3"	N/A	7.6	--	--	
1 - Uniform (PSF)	0 to 5' 3"	9'	10.0	40.0	-	Default Load
2 - Tapered (PSF)	0 to 5' 3"	2' to 6'	10.5	-	25.0	
3 - Point (lb)	2' 3"	N/A	900	2200	-	

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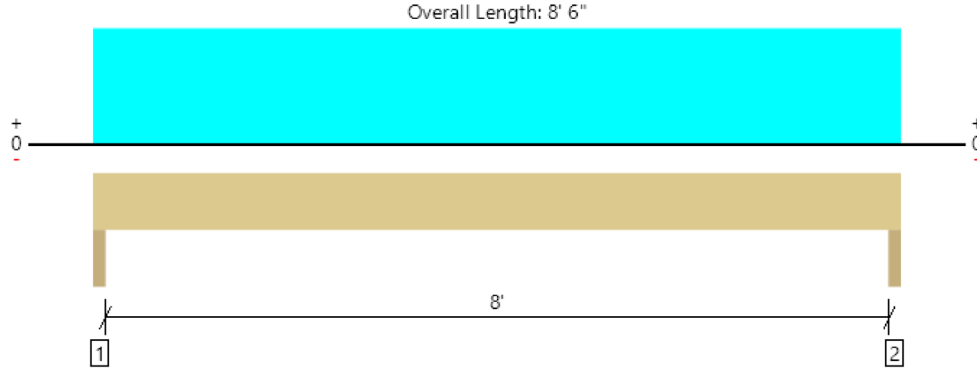
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Level, 2H3

1 piece(s) 3 1/2" x 9 1/4" 2.2E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2653 @ 1 1/2"	6563 (3.00")	Passed (40%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2016 @ 1' 1/4"	7198	Passed (28%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	5312 @ 4' 3"	14278	Passed (37%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.099 @ 4' 3"	0.275	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.145 @ 4' 3"	0.412	Passed (L/681)	--	1.0 D + 1.0 S (All Spans)

System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Factored	
1 - Trimmer - SPF	3.00"	3.00"	1.50"	847	170	1806	2653	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	847	170	1806	2653	None

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

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 8' 6"	N/A	10.1	--	--	
1 - Uniform (PSF)	0 to 8' 6"	1'	10.0	40.0	-	Default Load
2 - Uniform (PSF)	0 to 8' 6"	17'	10.5	-	25.0	

Member Notes

2H3

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

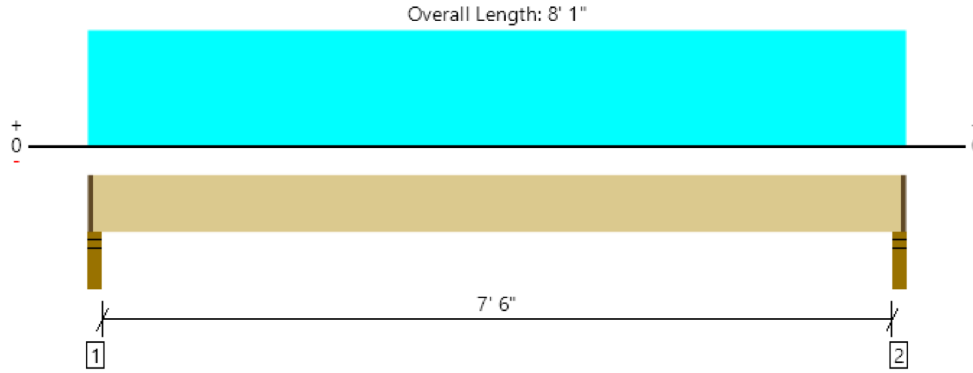
ForteWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Level, **STAIR RIM BEAM**

1 piece(s) 1 3/4" x 14" 2.OE Microllam® LVL

02/07/2024



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1603 @ 2"	1595 (2.25")	Passed (101%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1052 @ 1' 5 1/2"	4655	Passed (23%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3057 @ 4' 1/2"	12129	Passed (25%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.044 @ 4' 1/2"	0.258	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.056 @ 4' 1/2"	0.387	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

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).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	2.25"	2.26"	351	1293	1645	1 1/4" Rim Board
2 - Stud wall - HF	3.50"	2.25"	2.26"	351	1293	1645	1 1/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	7' 11" o/c	
Bottom Edge (Lu)	7' 11" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 7' 11 3/4"	N/A	7.2	--	
1 - Uniform (PSF)	0 to 8' 1" (Top)	8'	10.0	40.0	Default Load

Member Notes
Stair Rim Beam

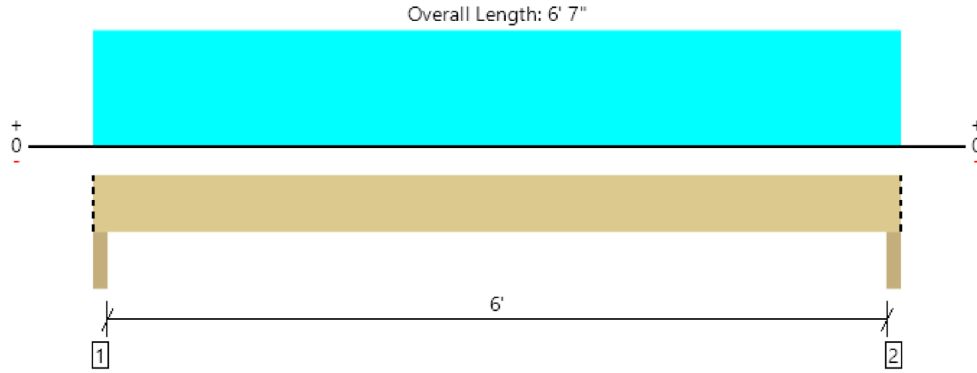
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ForteWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Level, Floor: Drop Beam

1 piece(s) 3 1/2" x 7" 1.8E Parallam® PSL P1



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2658 @ 2"	6676 (3.50")	Passed (40%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1952 @ 10 1/2"	3757	Passed (52%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3944 @ 3' 3 1/2"	6322	Passed (62%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.138 @ 3' 3 1/2"	0.208	Passed (L/542)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.175 @ 3' 3 1/2"	0.313	Passed (L/430)	--	1.0 D + 1.0 L (All Spans)

System : Floor
 Member Type : Drop Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Column - HF	3.50"	3.50"	1.50"	552	2107	2658	Blocking
2 - Column - HF	3.50"	3.50"	1.50"	552	2107	2658	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' 7" o/c	
Bottom Edge (Lu)	6' 7" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 6' 7"	N/A	7.6	--	
1 - Uniform (PSF)	0 to 6' 7" (Top)	16'	10.0	40.0	Default Load

Member Notes

Interior Header at pocket door

Weyerhaeuser Notes

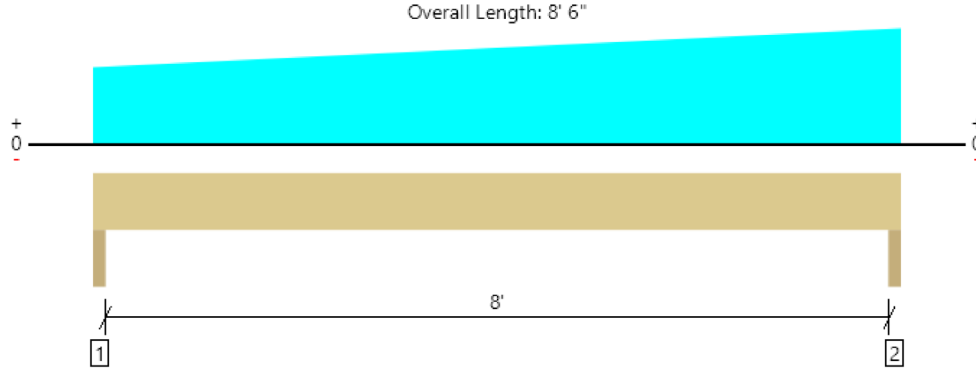
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ForteWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Level, 2H6
1 piece(s) 4 x 10 HF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	999 @ 8' 4 1/2"	4253 (3.00")	Passed (23%)	--	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Shear (lbs)	735 @ 7' 5 3/4"	4047	Passed (18%)	1.25	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Moment (Ft-lbs)	1874 @ 4' 4 5/8"	5303	Passed (35%)	1.25	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Live Load Defl. (in)	0.050 @ 4' 3 5/16"	0.275	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Total Load Defl. (in)	0.076 @ 4' 3 5/16"	0.412	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 Lr (All Spans)

System : Wall
 Member Type : Header
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Factored	
1 - Trimmer - SPF	3.00"	3.00"	1.50"	298	340	423	871	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	345	340	533	999	None

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

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	0 to 8' 6"	N/A	8.2	--	--	
1 - Uniform (PSF)	0 to 8' 6"	2'	10.0	40.0	-	Default Load
2 - Tapered (PSF)	0 to 8' 6"	3' to 6'	10.5	-	25.0	

Member Notes
 Header for second floor framing
 2H6

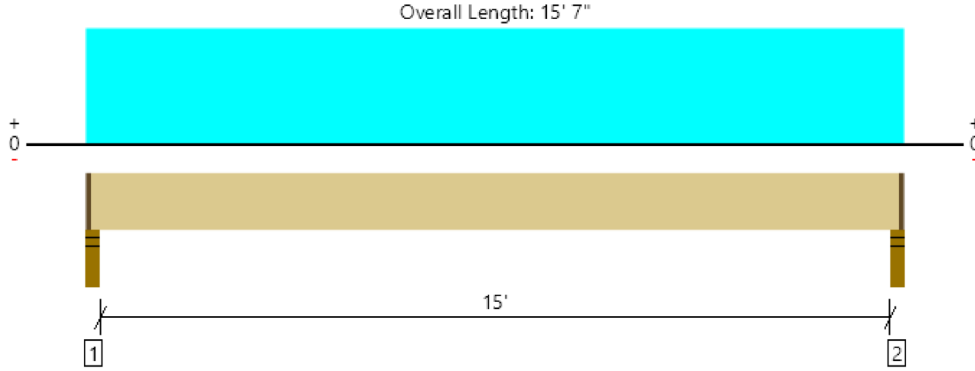
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ForteWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



Level, UPPER LEVEL TUB JOIST

1 piece(s) 1 3/4" x 9 1/4" 2.0E Microllam® LVL @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	564 @ 2 1/2"	1595 (2.25")	Passed (35%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	493 @ 1' 3/4"	3076	Passed (16%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2109 @ 7' 9 1/2"	5826	Passed (36%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.253 @ 7' 9 1/2"	0.506	Passed (L/719)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.348 @ 7' 9 1/2"	0.758	Passed (L/523)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	44	40	Passed	--	--

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

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 4% increase in the moment capacity has been added to account for repetitive member usage.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - HF	3.50"	2.25"	1.50"	156	416	571	1 1/4" Rim Board
2 - Stud wall - HF	3.50"	2.25"	1.50"	156	416	571	1 1/4" Rim Board

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

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

•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 15' 7"	16"	15.0	40.0	Default Load

Member Notes

Upper Level Joists at Bathroom Tub

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ForteWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



ESG Design

www.esg-design.com

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Giola

Upper Floor Header

Prepared by: JM

Date: 2/06/24

Selection **(2) 1-3/4x 5-1/2 1.9E TJ Microllam LVL** Lu = 0.0 Ft

Conditions NDS 2018

Min Bearing Area R1= 2.6 in² R2= 2.6 in² (1.5) DL Defl= 0.02 in

Data

Beam Span	4.0 ft	Reaction 1 LL	1460 #	Reaction 2 LL	1460 #
Beam Wt per ft	4.95 #	Reaction 1 TL	1970 #	Reaction 2 TL	1970 #
Bm Wt Included	20 #	Maximum V	1970 #		
Max Moment	1970 #	Max V (Reduced)	1518 #		
TL Max Defl	L / 180	TL Actual Defl	L / 667		
LL Max Defl	L / 240	LL Actual Defl	L / >1000		

Attributes

	Section (in ³)	Shear (in ²)	TL Defl (in)	LL Defl
Actual	17.65	19.25	0.07	0.05
Critical	8.18	7.99	0.27	0.20
Status	OK	OK	OK	OK
Ratio	46%	42%	27%	24%

Values

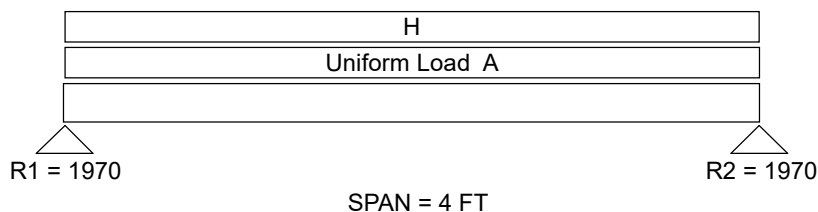
	Fb (psi)	Fv (psi)	E (psi x mil)	Fc _I (psi)
Reference Values	2600	285	1.9	750
Adjusted Values	2891	285	1.9	750

Adjustments

CF Size Factor	1.112			
Cd Duration	1.00	1.00		
Cr Repetitive	1.00			
Ch Shear Stress		N/A		
Cm Wet Use	1.00	1.00	1.00	1.00
CI Stability	1.0000	Rb = 0.00	Le = 0.00 Ft	

Loads

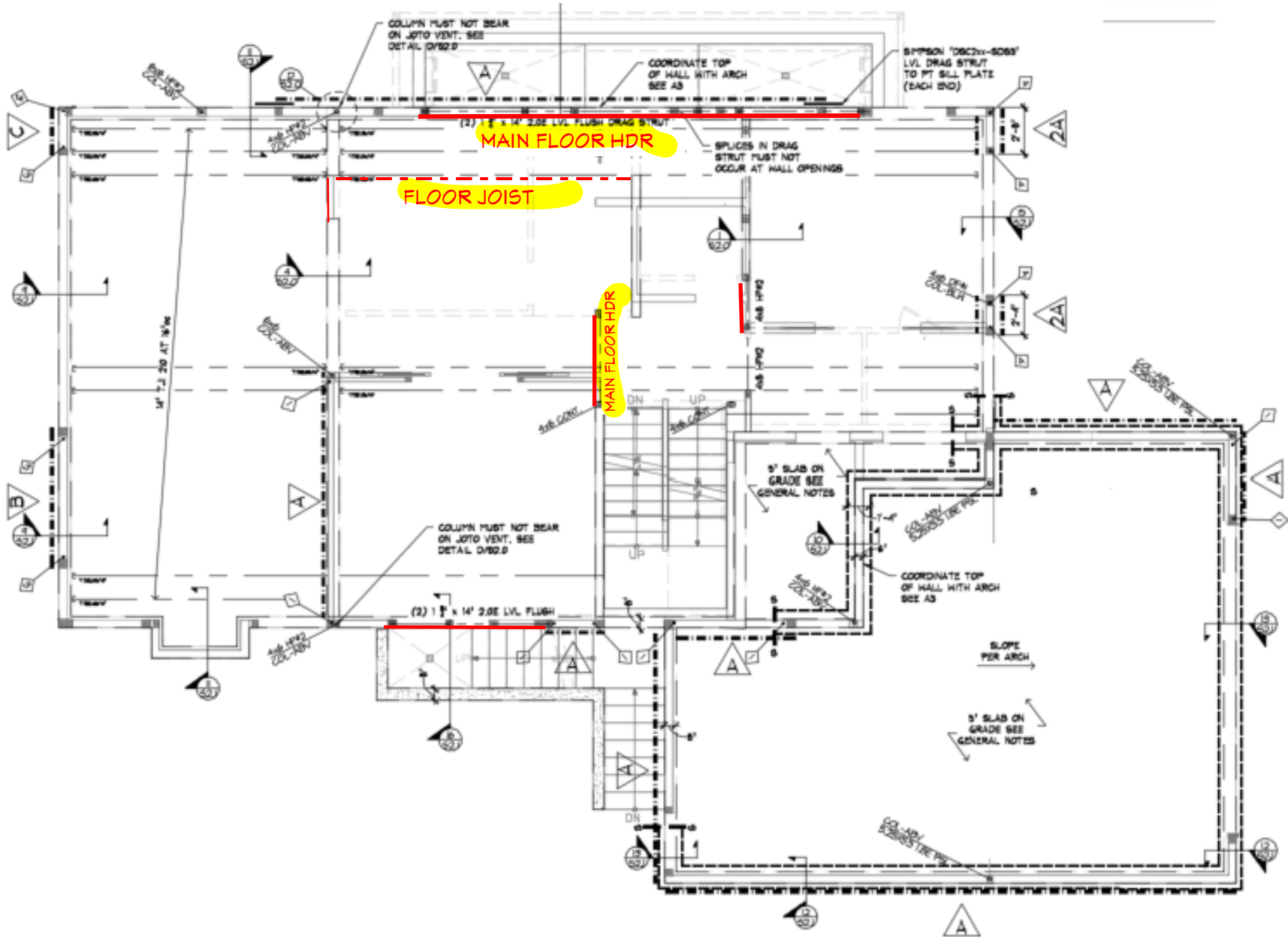
	Uniform LL: 280	Uniform TL: 350 = A		
	Par Unif LL	Par Unif TL	Start	End
	450	H = 630	0	4.0



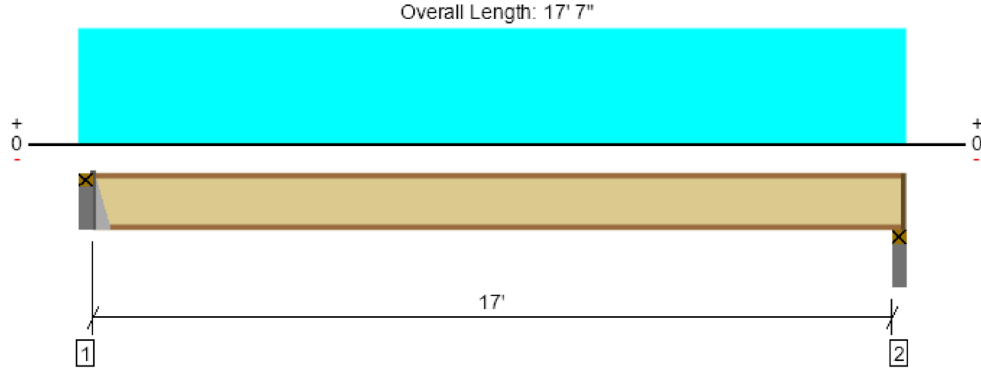
Uniform and partial uniform loads are lbs per lineal ft.



MAIN LEVEL AND FOUNDATION GRAVITY DESIGN



Main Level Floor, Floor: Joist
1 piece(s) 14" TJI® 210 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	569 @ 3 1/2"	1005 (1.75")	Passed (57%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	569 @ 3 1/2"	1945	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2432 @ 8' 10"	4490	Passed (54%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.211 @ 8' 10"	0.569	Passed (L/969)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.264 @ 8' 10"	0.854	Passed (L/775)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	49	40	Passed	--	--

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

- Deflection criteria: LL (L/360) 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 Single 2X SPF plate	3.50"	Hanger ¹	1.75" / - ²	118	471	589	See note ¹
2 - Plate on concrete - SPF	3.50"	2.25"	1.75"	117	467	583	1 1/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 2" o/c	
Bottom Edge (Lu)	17' 2" o/c	

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

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Top Mount Hanger	ITS2.06/14	2.00"	4-10dx1.5	2-10dx1.5	2-Strong-Grip	

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

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 17' 7"	16"	10.0	40.0	Default Load

Member Notes
Floor Joist 1

FORTEWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



ESG Design

www.esg-design.com

BeamChek v2023 licensed to: ESG Design Reg # 2999-68483

Giola

Main Floor Header

Prepared by: JM Date: 2/01/24

Selection **4x 8 HF #2** Lu = 0.0 Ft

Conditions NDS 2018

Min Bearing Area R1= 2.4 in² R2= 2.4 in² (1.5) DL Defl= <0.01 in.

Data

Beam Span	3.5 ft	Reaction 1 LL	770 #	Reaction 2 LL	770 #
Beam Wt per ft	6.17 #	Reaction 1 TL	973 #	Reaction 2 TL	973 #
Bm Wt Included	22 #	Maximum V	973 #		
Max Moment	852 #	Max V (Reduced)	637 #		
TL Max Defl	L / 180	TL Actual Defl	L / >1000		
LL Max Defl	L / 240	LL Actual Defl	L / >1000		

Attributes

	Section (in ³)	Shear (in ²)	TL Defl (in)	LL Defl
Actual	30.66	25.38	0.01	0.01
Critical	9.25	6.37	0.23	0.18
Status	OK	OK	OK	OK
Ratio	30%	25%	6%	6%

Values

	Fb (psi)	Fv (psi)	E (psi x mil)	Fc _I (psi)
Reference Values	850	150	1.3	405
Adjusted Values	1105	150	1.3	405

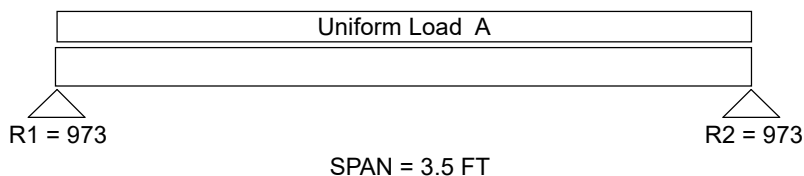
Adjustments

CF Size Factor	1.300			
Cd Duration	1.00	1.00		
Cr Repetitive	1.00			
Ch Shear Stress		N/A		
Cm Wet Use	1.00	1.00	1.00	1.00
CI Stability	1.0000	Rb = 0.00	Le = 0.00 Ft	

Loads

Uniform LL: 440

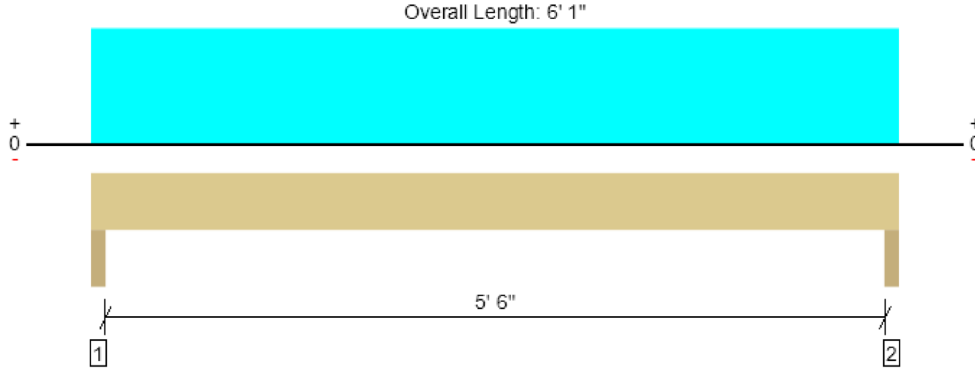
Uniform TL: 550 = A



Uniform and partial uniform loads are lbs per lineal ft.

Main Level Floor, Header

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



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1564 @ 2"	8881 (3.50")	Passed (18%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	814 @ 1' 5 1/2"	9310	Passed (9%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2125 @ 3' 1/2"	24258	Passed (9%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.010 @ 3' 1/2"	0.192	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.013 @ 3' 1/2"	0.287	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

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).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Trimmer - SPF	3.50"	3.50"	1.50"	348	1217	1564	None
2 - Trimmer - SPF	3.50"	3.50"	1.50"	348	1217	1564	None

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

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 6' 1"	N/A	14.3	--	
1 - Uniform (PSF)	0 to 6' 1" (Top)	2'	10.0	40.0	Main Floor Load
2 - Uniform (PSF)	0 to 6' 1" (Top)	8'	10.0	40.0	Upper Floor Load
3 - Uniform (PSF)	0 to 6' 1" (Front)	18'	-	-	Roof Load

Member Notes
Header at Walk out Stairs in Basement

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

ForteWEB Software Operator	Job Notes
Jenniferann Martin ESGDesign (303) 995-1098 jmartin.esgd@outlook.com	



LOAD ON FDN WALL

SNOW LOAD = 450 PLF

DEAD LOA = 180 PLF

SECOND FLOOR LIVE LOAD = 300 PLF

SECOND FLOOR DEAD LOAD = 75 PLF

MAIN FLOOR LIVE LOAD = 300 PLF

MAIN FLOOR DEAD LOAD = 75 PLF

FDN

$18''/12 * 145 \text{ PCF} * 8/12 = 145 \text{ PLF}$

FTG

$10/12 \times 16/12 \times 145 = 161 \text{ PLF}$

TOTAL = 1686 PLF / 1500 PSF = 1.124 FT = 14" -----> 16" REINF W/ (3) #4 AT NON FULL HEIGHT WALL

SEE ENERCALC FOR THE FOLLOWING CALCULATIONS

1. BASEMENT WALL SEPARATING THE CRAWL SPACE FROM THE FULL HEIGHT BASEMENT

---> RESTRAINED RETAINING WALL (SOIL NOT AT FULL HEIGHT OF WALL)

---> WITH SLAB AT BOTTOM

2. FULL HEIGHT RETAINING WALL (EXTERIOR WALL) SOIL TO TOP OF WALL

---> RESTRAINED AT TOP WITH SLAB AT BOTTOM

3. CANTILEVERED RETAINING WALL AT EXTERIOR STAIRS

---> SLAB AT BOTTOM NOT RESTRAINED AT TOP (9.5' SOIL)

4. CANTILEVERED RETAINING WALL AT WINDOW WELL

1. Restrained Retaining wall separating
crawl and full height basement

Project Title: Giola
Engineer: Jennifer
Project ID:
Project Descr:

Restrained Retaining Wall

Project File: Restrained Retaining Wall.ec6

LIC# : KW-06015228, Build:20.22.2.2

Engineered Structures Global Design, PLLC

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Code Reference:

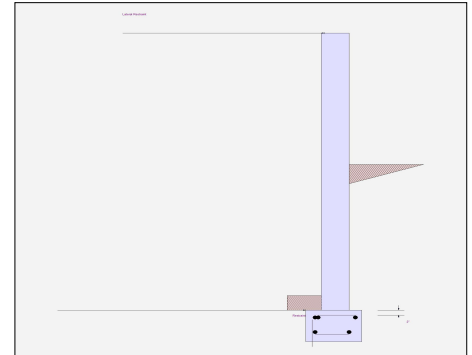
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	5.0 ft
Wall height above soil	=	4.50 ft
Total Wall Height	=	9.50 ft
Top Support Height	=	9.50 ft
Slope Behind Wall	=	0
Height of Soil over Toe	=	6 in

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
At-Rest Heel Pressure	=	32.0 psf/ft
	=	0.0 psf/ft
Passive Pressure	=	250.0 psf/ft
Soil Density	=	110 pcf
Footing Soil Frictior	=	0.4 psf
Soil height to ignore for passive pressure	=	12 in



Surcharge Loads

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

Axial Load Applied to Stem

Axial Dead Load	=	200.0 lbs
Axial Live Load	=	620.0 lbs
Axial Load Eccentricity	=	in

Earth Pressure Seismic Load

Uniform Lateral Load Applied to Stem

Lateral Load	=	#/ft
...Height to Top	=	ft
...Height to Bottom	=	ft
Load Type	=	Wind (W) (Strength Level)
Wind on Exposed Stem	=	0.00 psf (Strength Level)
Wind acts left-to-right toward retention side.		
K_h Soil Density Multiplier	=	0.2 g

Adjacent Footing Load

Adjacent Footing Load	=	lbs
Footing Width	=	ft
Eccentricity	=	in
Wall to Ftg CL Dist	=	ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	ft
Poisson's Ratio	=	0.3
Added seismic per unit area	=	0.0 psf

Design Summary

Total Bearing Load	=	2,224.58 lbs
...resultant ecc.	=	0.0 in
Soil Pressure @ Toe	=	1,483.06 psf OK
Soil Pressure @ Heel	=	1,483.06 psf OK
Allowable	=	psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,945.0 psf
ACI Factored @ Heel	=	1,945.0 psf
Footing Shear @ Toe	=	0.6678 psi OK
Footing Shear @ Heel	=	2.884 psi OK
Allowable	=	82.158 psi
Reaction at Top	=	23.784 lbs
Reaction at Bottom	=	567.33 lbs

Sliding Calcs

Lateral Sliding Force	=	567.33 lbs
-----------------------	---	------------

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

Concrete Stem Construction

Thickness	=	8.00 in
Wall Weight	=	100.0 psf
Stem is FIXED to top of footing		

	@ Top Support	Mmax Between Top & Base	@ Base of Wall
Design Height Above Ftg	Stem OK = 9.50 ft	Stem OK = 3.777 ft	Stem OK = 0.00 ft
Rebar Size	# 5	# 5	# 5
Rebar Spacing	16.00 in	16.00 in	16.00 in
Rebar Placed at	Center	Center	Center
Rebar Depth 'd'	4.0 in	4.0 in	4.0 in
Design Data			
fb/FB + fa/Fa	=		
Moment.....Actual	=	0.0 ft-#	211.364 ft-#
Moment.....Allowable	=	3,897.96 ft-#	3,897.96 ft-#
Shear Force @ this height	=	39.655 lbs	600.35 lbs
Shear.....Actual	=	0.8261 psi	12.507 psi
Shear.....Allowable	=	75.0 psi	75.0 psi

Load Factors

Building Code	
Dead Load	0.000
Live Load	0.000
Earth, H	0.000
Wind, W	0.000
Seismic, E	0.000

Restrained Retaining Wall

Project File: Restrained Retaining Wall.ec6

LIC# : KW-06015228, Build:20.22.2.2

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Footing Strengths & Dimensions

Toe Width	=	0.50 ft
Heel Width	=	1.0
Total Footing Width	=	1.50
Footing Thickness	=	13.0 in
Key Width	=	in
Key Depth	=	in
Key Distance from Toe	=	ft
f'c =	3,000 psi	Fy = 60000 psi
Footing Concrete Density	=	150 pcf
Min. As %	=	0.0018
Cover @ Top	= 2 in	@ Btm.= 3 in

Footing Design Results

	Toe	Heel
Factored Pressure	= 1,945.0	1,945.0 psf
Mu' : Upward	= 243.125	ft-#
Mu' : Downward	= 32.625	ft-#
Mu: Design	= 211	-61 ft-#
Actual 1-Way Shear	= 0.6678	psi
Allow 1-Way Shear	= 82.158	82.158 psi

Other Acceptable Sizes & Spacings:

Toe: # 5 @ 12.30 in	-or-	#4@ 8.54 in, #5@ 13.24 in, #6@ 18.80 in, #7@ 25.1
Heel: # 5 @ 12.30 in	-or-	#4@ 8.54 in, #5@ 13.24 in, #6@ 18.80 in, #7@ 25.1
Key: # 0 @ 0.00 in	-or-	No key defined
Min footing T&S reinf Area		0.42 in2
Min footing T&S reinf Area per foot		0.28 in2 /ft
If one layer of horizontal bars:		If two layers of horizontal bars:
#4@ 8.55 in		#4@ 17.09 in
#5@ 13.25 in		#5@ 26.50 in
#6@ 18.80 in		#6@ 37.61 in

Summary of Forces on Footing : Slab RESISTS sliding, stem is FIXED at footing

Forces acting on footing for soil pressure

>>> Sliding Forces are restrained by the adjacent slab

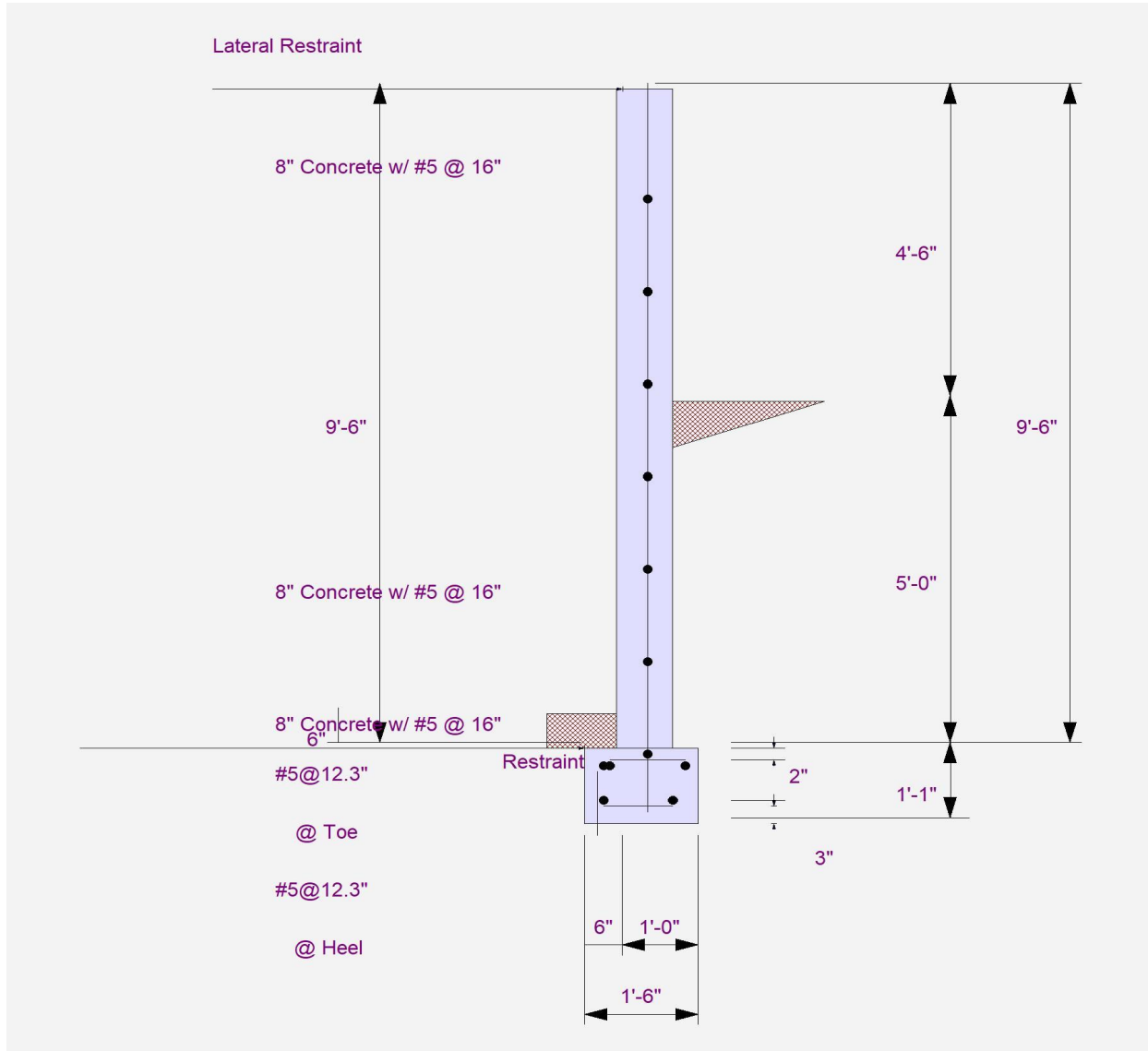
Load & Moment Summary For Footing : For Soil Pressure Calcs

Moment @ Top of Footing Applied from Stem	=	-431.216 ft-#
Surcharge Over Heel	= 0.0 lbs	0.0 ft
Adjacent Footing Load	= 0.0 lbs	0.0 ft
Axial Dead Load on Stem	= 820.0 lbs	0.8333 ft
Soil Over Toe	= 27.50 lbs	0.250 ft
Surcharge Over Toe	= 0.0 lbs	0.0 ft
Stem Weight	= 950.0 lbs	0.8333 ft
Soil Over Heel	= 183.333 lbs	1.333 ft
Footing Weight	= 243.750 lbs	0.750 ft
Total Vertical Force	= 2,224.58 lbs	Base Moment = 1,477.92 ft-#

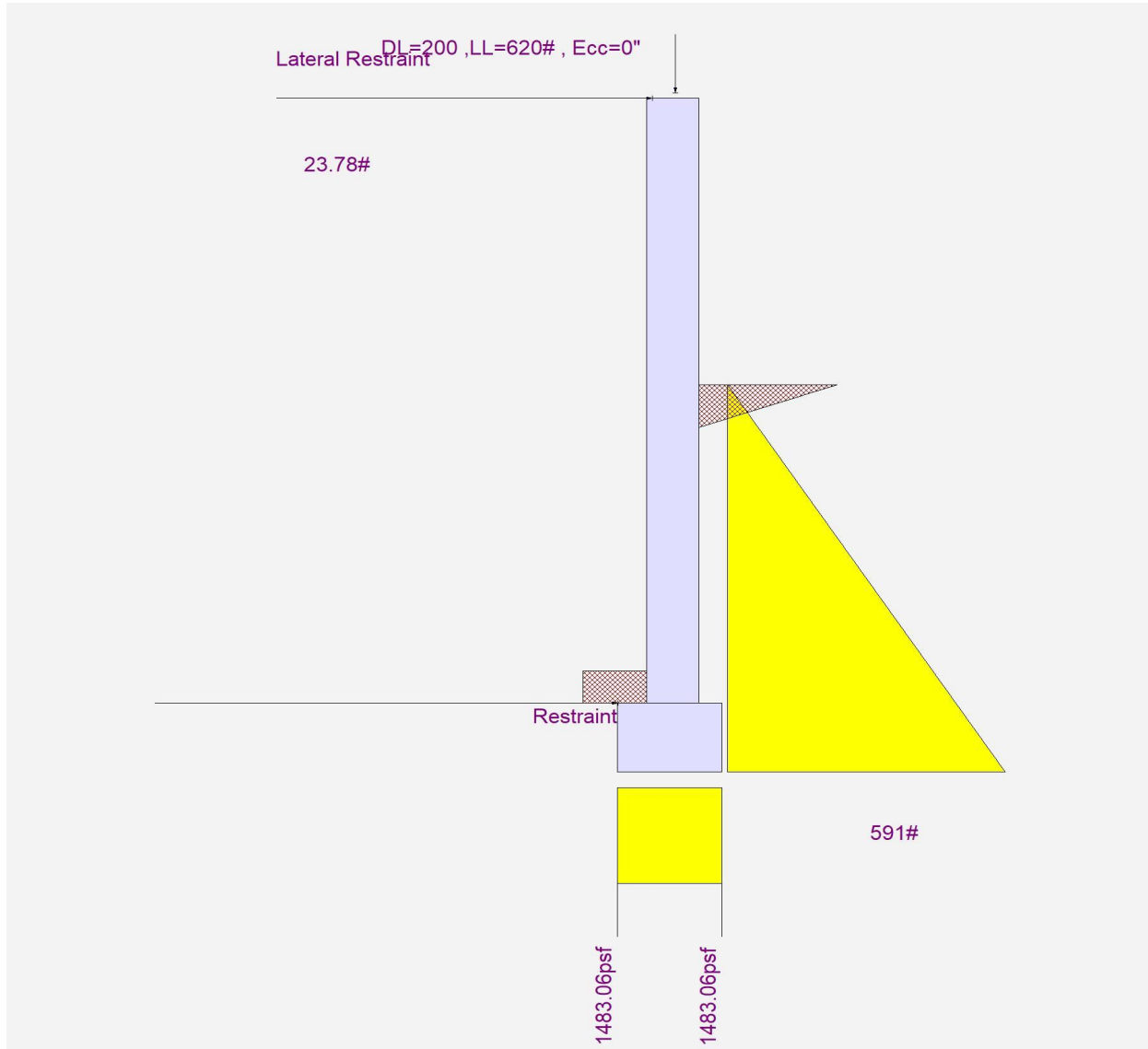
Stem is specified to be fixed to footing, and top restraint is assumed to react out any tendency for moment at the footing/soil interface, so uniform soil pressure is assumed.

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

Restrained Retaining Wall



Restrained Retaining Wall



2. Full height retaining wall restrained at top and slab at bottom

Project Title: **Giola**
 Engineer: **Jennifer**
 Project ID:
 Project Descr:

Restrained Retaining Wall

Project File: Restrained Retaining Wall.ec6

LIC# : KW-06015228, Build:20.22.2.2

Engineered Structures Global Design, PLLC

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DESCRIPTION: Full height Retained Soil- Restrained at top

Code Reference:

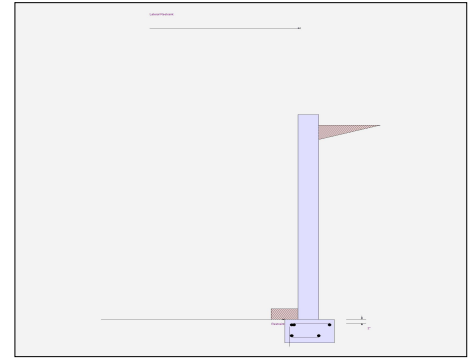
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	9.0 ft
Wall height above soil	=	0.50 ft
Total Wall Height	=	9.50 ft
Top Support Height	=	13.50 ft
Slope Behind Wall	=	0
Height of Soil over Toe	=	6 in

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
At-Rest Heel Pressure	=	32.0 psf/ft
	=	0.0 psf/ft
Passive Pressure	=	250.0 psf/ft
Soil Density	=	110 pcf
Footing Soil Frictior	=	0.4 psf
Soil height to ignore for passive pressure	=	12 in



Surcharge Loads

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

Axial Load Applied to Stem

Axial Dead Load	=	200.0 lbs
Axial Live Load	=	620.0 lbs
Axial Load Eccentricity	=	in

Earth Pressure Seismic Load

Uniform Lateral Load Applied to Stem

Lateral Load	=	#/ft
...Height to Top	=	ft
...Height to Bottom	=	ft
Load Type	=	Wind (W) (Strength Level)
Wind on Exposed Stem	=	0.00 psf (Strength Level)
Wind acts left-to-right toward retention side.		
K_h Soil Density Multiplier	=	0.2 g

Adjacent Footing Load

Adjacent Footing Load	=	lbs
Footing Width	=	ft
Eccentricity	=	in
Wall to Ftg CL Dist	=	ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	ft
Poisson's Ratio	=	0.3
Added seismic per unit area	=	0.0 psf

Design Summary

Total Bearing Load	=	2,652.61 lbs
...resultant ecc.	=	0.0 in
Soil Pressure @ Toe	=	1,476.13 psf OK
Soil Pressure @ Heel	=	1,476.13 psf OK
Allowable	=	psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,909.37 psf
ACI Factored @ Heel	=	1,909.37 psf
Footing Shear @ Toe	=	0.5186 psi OK
Footing Shear @ Heel	=	2.361 psi OK
Allowable	=	82.158 psi
Reaction at Top	=	123.797 lbs
Reaction at Bottom	=	1,501.98 lbs

Concrete Stem Construction

Thickness	=	8.00 in
Wall Weight	=	100.0 psf
Stem is FIXED to top of footing		

	@ Top Support	Mmax Between Top & Base	@ Base of Wall
Design Height Above Ftg	Stem OK = 13.50 ft	Stem OK = 6.235 ft	Stem OK = 0.00 ft
Rebar Size	# 5	# 5	# 5
Rebar Spacing	16.00 in	16.00 in	16.00 in
Rebar Placed at	Center	Center	Center
Rebar Depth 'd'	4.0 in	4.0 in	4.0 in
Design Data			
fb/FB + fa/Fa	=		
Moment.....Actual	= 0.0 ft-#	1,270.34 ft-#	3,525.18 ft-#
Moment.....Allowable	= 3,897.96 ft-#	3,897.96 ft-#	3,897.96 ft-#
Shear Force @ this height	= 199.676 lbs		1,873.92 lbs
Shear.....Actual	= 4.160 psi		39.040 psi
Shear.....Allowable	= 75.0 psi		75.0 psi

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

Load Factors

Building Code	
Dead Load	0.000
Live Load	0.000
Earth, H	0.000
Wind, W	0.000
Seismic, E	0.000

Restrained Retaining Wall

Project File: Restrained Retaining Wall.ec6

LIC# : KW-06015228, Build:20.22.2.2

Engineered Structures Global Design, PLLC

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DESCRIPTION: Full height Retained Soil- Restrained at top

Footing Strengths & Dimensions

Toe Width	=	1.56516666 ft
Heel Width	=	.23183333
Total Footing Width	=	1.797
Footing Thickness	=	13.0 in
Key Width	=	in
Key Depth	=	in
Key Distance from Toe	=	ft
f'c =	3,000 psi	Fy = 60000 psi
Footing Concrete Density	=	150 pcf
Min. As %	=	0.0018
Cover @ Top	=	2 in @ Btm.= 3 in

Footing Design Results

	Toe	Heel
Factored Pressure	= 1,909.37	1,909.37 psf
Mu' : Upward	= 304.939	ft-#
Mu' : Downward	= 41.683	ft-#
Mu: Design	= 263	-84 ft-#
Actual 1-Way Shear	= 0.5186	psi
Allow 1-Way Shear	= 82.158	82.158 psi

Other Acceptable Sizes & Spacings:

Toe: # 5 @ 12.30 in	-or-	#4@ 8.54 in, #5@ 13.24 in, #6@ 18.80 in, #7@ 25.1
Heel: # 5 @ 12.30 in	-or-	#4@ 8.54 in, #5@ 13.24 in, #6@ 18.80 in, #7@ 25.1
Key: # 0 @ 0.00 in	-or-	No key defined
Min footing T&S reinf Area		0.50 in ²
Min footing T&S reinf Area per foot		0.28 in ² /ft
If one layer of horizontal bars:		If two layers of horizontal bars:
#4@ 8.55 in		#4@ 17.09 in
#5@ 13.25 in		#5@ 26.50 in
#6@ 18.80 in		#6@ 37.61 in

Summary of Forces on Footing : Slab RESISTS sliding, stem is FIXED at footing

Forces acting on footing for soil pressure

>>> Sliding Forces are restrained by the adjacent slab

Load & Moment Summary For Footing : For Soil Pressure Calcs

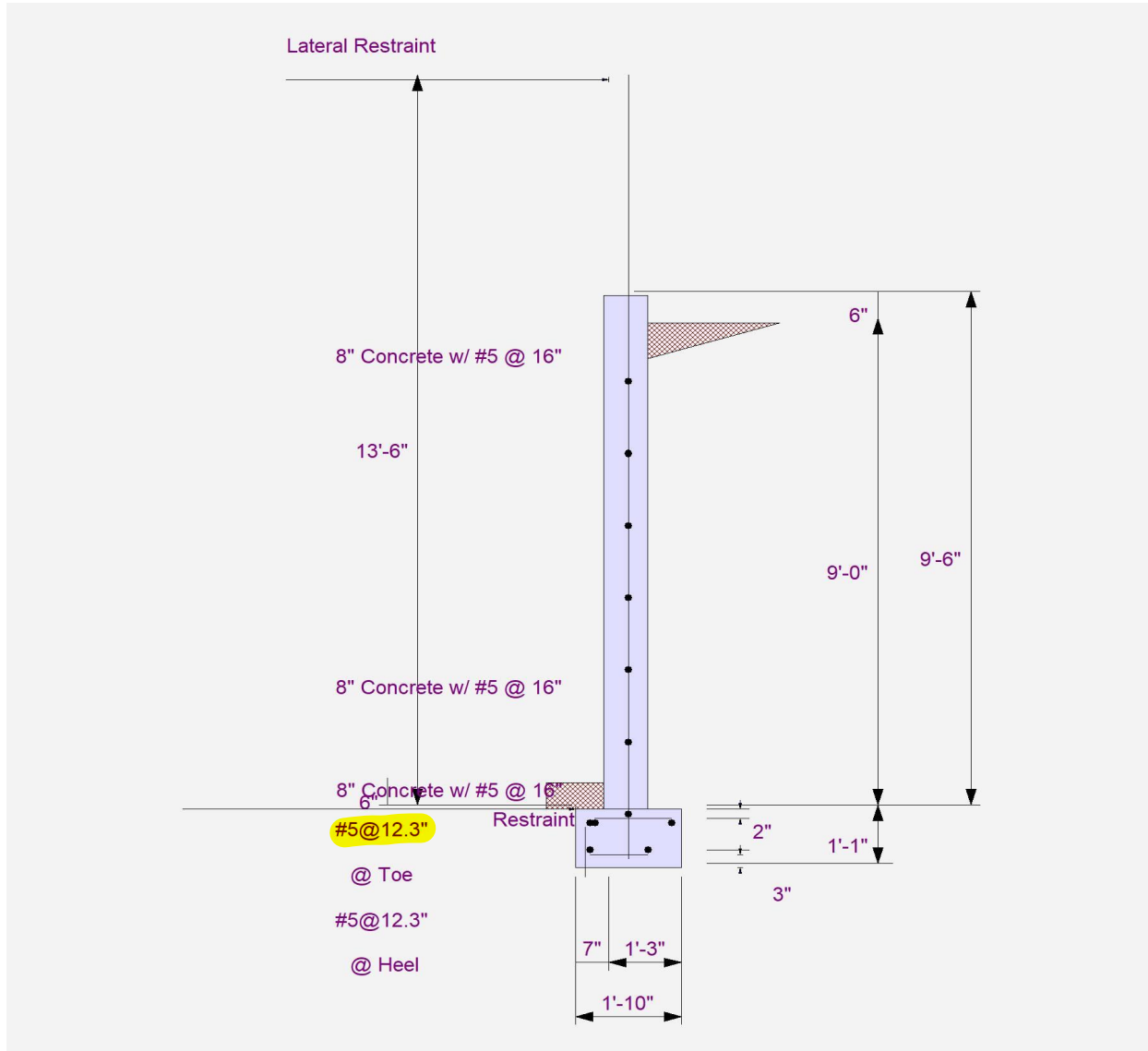
Moment @ Top of Footing Applied from Stem	=	-2,203.24 ft-#
Surcharge Over Heel	=	0.0 lbs 0.0 ft 0.0 ft-#
Adjacent Footing Load	=	0.0 lbs 0.0 ft 0.0 ft-#
Axial Dead Load on Stem	=	820.0 lbs 0.8985 ft 736.77 ft-#
Soil Over Toe	=	31.084 lbs 0.2826 ft 8.784 ft-#
Surcharge Over Toe	=	0.0 lbs 0.0 ft 0.0 ft-#
Stem Weight	=	950.0 lbs 0.8985 ft 853.58 ft-#
Soil Over Heel	=	559.52 lbs 1.514 ft 847.34 ft-#
Footing Weight	=	292.013 lbs 0.8985 ft 262.373 ft-#
Total Vertical Force	=	2,652.61 lbs Base Moment = 505.61 ft-#

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

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

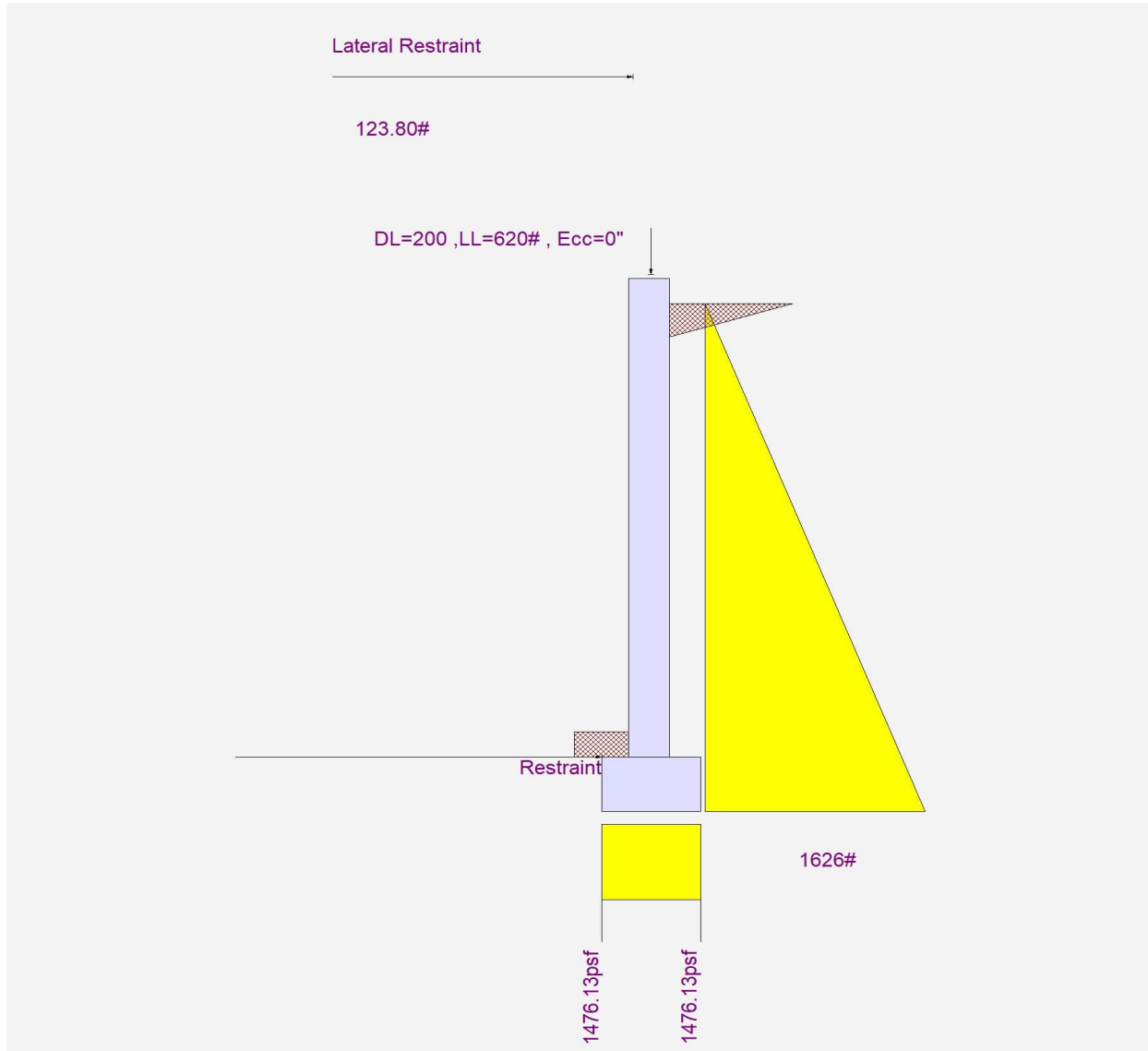
Restrained Retaining Wall

DESCRIPTION: Full height Retained Soil- Restrained at top



Restrained Retaining Wall

DESCRIPTION: Full height Retained Soil- Restrained at top



Project Title: **Giola**
 Engineer: **Jennifer**
 Project ID:
 Project Descr: **Not Restrained at top- slab at bottom 7'-6"**

Cantilevered Retaining Wall

Project File: Restrained Retaining Wall.ec6

LIC# : KW-06015228, Build:20.22.2.2

Engineered Structures Global Design, PLLC

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DESCRIPTION: Cantilevered Retaining wall AT Window Well

Code Reference:

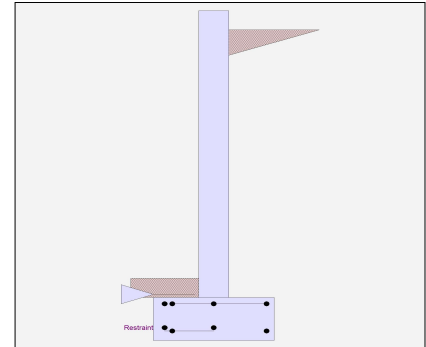
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	7.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	6.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	25.0 psf/ft
	=	
Passive Pressure	=	300.0 psf/ft
Soil Density, Heel	=	115.00 pcf
Soil Density, Toe	=	115.00 pcf
Footing Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

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

Axial Load Applied to Stem

Axial Dead Load	=	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: Restrained Retaining Wall.ec6

LIC# : KW-06015228, Build:20.22.2.2

Engineered Structures Global Design, PLLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Cantilevered Retaining wall AT Window Well

Design Summary

Wall Stability Ratios

Overturning	=	1.52	OK
Slab Resists All Sliding !			
Global Stability	=	2.66	
Total Bearing Load	=	2,519 lbs	
...resultant ecc.	=	2.32 in	
Soil Pressure @ Toe	=	1,108 psf	OK
Soil Pressure @ Heel	=	438 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	1,551 psf	
ACI Factored @ Heel	=	613 psf	
Footing Shear @ Toe	=	1.8 psi	OK
Footing Shear @ Heel	=	8.9 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	825.2 lbs
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Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

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

ft =	Stem OK	0.00
Wall Material Above "Ht"	=	Concrete
Design Method	=	SD
Thickness	=	8.00
Rebar Size	=	# 5
Rebar Spacing	=	12.00
Rebar Placed at	=	Center

Design Data

fb/FB + fa/Fa	=	0.410
---------------	---	-------

Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	980.0

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	2,286.7
Moment....Allowable	=	5,575.7

Shear....Actual

Service Level	psi =	
Strength Level	psi =	20.4
Shear.....Allowable	psi =	821.6
Anet (Masonry)	in2 =	
Rebar Depth 'd'	in =	4.00

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Wall Weight	psf =	100.0
Short Term Factor	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	300,000.0
Fy	psi =	60,000.0

Cantilevered Retaining Wall

Project File: Restrained Retaining Wall.ec6

LIC# : KW-06015228, Build:20.22.2.2

Engineered Structures Global Design, PLLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Cantilevered Retaining wall AT Window Well

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1353 in2/ft		
(4/3) * As :	0.1804 in2/ft	Min Stem T&S Reinf Area 1.440 in2	
$3\sqrt{f'c}bd/fy : 3\sqrt{(300000)(12)(4)/60000}$	1.3145 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.1804 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.31 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	49.725 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Footing Data

Toe Width	=	1.01 ft
Heel Width	=	1.67
Total Footing Width	=	2.68
Footing Thickness	=	13.50 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	1.17 ft
$f'c = 2,500 \text{ psi}$	$Fy = 60,000 \text{ psi}$	
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

	Toe	Heel
Factored Pressure	= 1,551	613 psf
$\mu' : \text{Upward}$	= 724	0 ft-#
$\mu' : \text{Downward}$	= 137	590 ft-#
$\mu : \text{Design}$	= 587	590 ft-#
ϕ_{Min}	= 13,703	14,740 ft-#
Actual 1-Way Shear	= 1.76	8.90 psi
Allow 1-Way Shear	= 75.00	75.00 psi
Toe Reinforcing	= # 5 @ 12.00 in	
Heel Reinforcing	= # 5 @ 12.30 in	
Key Reinforcing	= None Spec'd	
Footing Torsion, Tu	=	0.00 ft-lbs
Footing Allow. Torsion, ϕTu	=	0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

Toe:
 Heel:
 Key:

Min footing T&S reinf Area	0.78 in2
Min footing T&S reinf Area per foot	0.29 in2 /ft
If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 8.23 in	#4@ 16.46 in
#5@ 12.76 in	#5@ 25.51 in
#6@ 18.11 in	#6@ 36.21 in

Cantilevered Retaining Wall

Project File: Restrained Retaining Wall.ec6

LIC# : KW-06015228, Build:20.22.2.2

Engineered Structures Global Design, PLLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Cantilevered Retaining wall AT Window Well

Summary of Overturning & Resisting Forces & Moments

ItemOVERTURNING.....		RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	825.2	2.71	2,234.9	Soil Over HL (ab. water tbl)	809.2	2.17	1,759.4
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.17	1,759.4
Hydrostatic Force				Watre 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 =	57.8	0.50	29.0
				Surcharge Over Toe =			
				Stem Weight(s) =	750.0	1.34	1,003.9
				Earth @ Stem Transitions =			
Total	= 825.2	O.T.M. =	2,234.9	Footing Weight =	451.7	1.34	604.7
				Key Weight =		1.17	
				Vert. Component =			
Resisting/Overturning Ratio		= 1.52		Total =	2,068.7 lbs	R.M.=	3,397.0
Vertical Loads used for Soil Pressure =		2,519.4 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) 0.086 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.

Project Title: **Giola**
Engineer: **Jennifer**
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: Restrained Retaining Wall.ec6

LIC# : KW-06015228, Build:20.22.2.2

Engineered Structures Global Design, PLLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Cantilevered Retaining wall AT Window Well

Rebar Lap & Embedment Lengths Information

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 = 15.60 in

Development length for #5 bar specified in this stem design segment = 12.00 in

Hooked embedment length into footing for #5 bar specified in this stem design segment = 10.50 in

As Provided = 0.3100 in²/ft

As Required = 0.1804 in²/ft

Cantilevered Retaining Wall

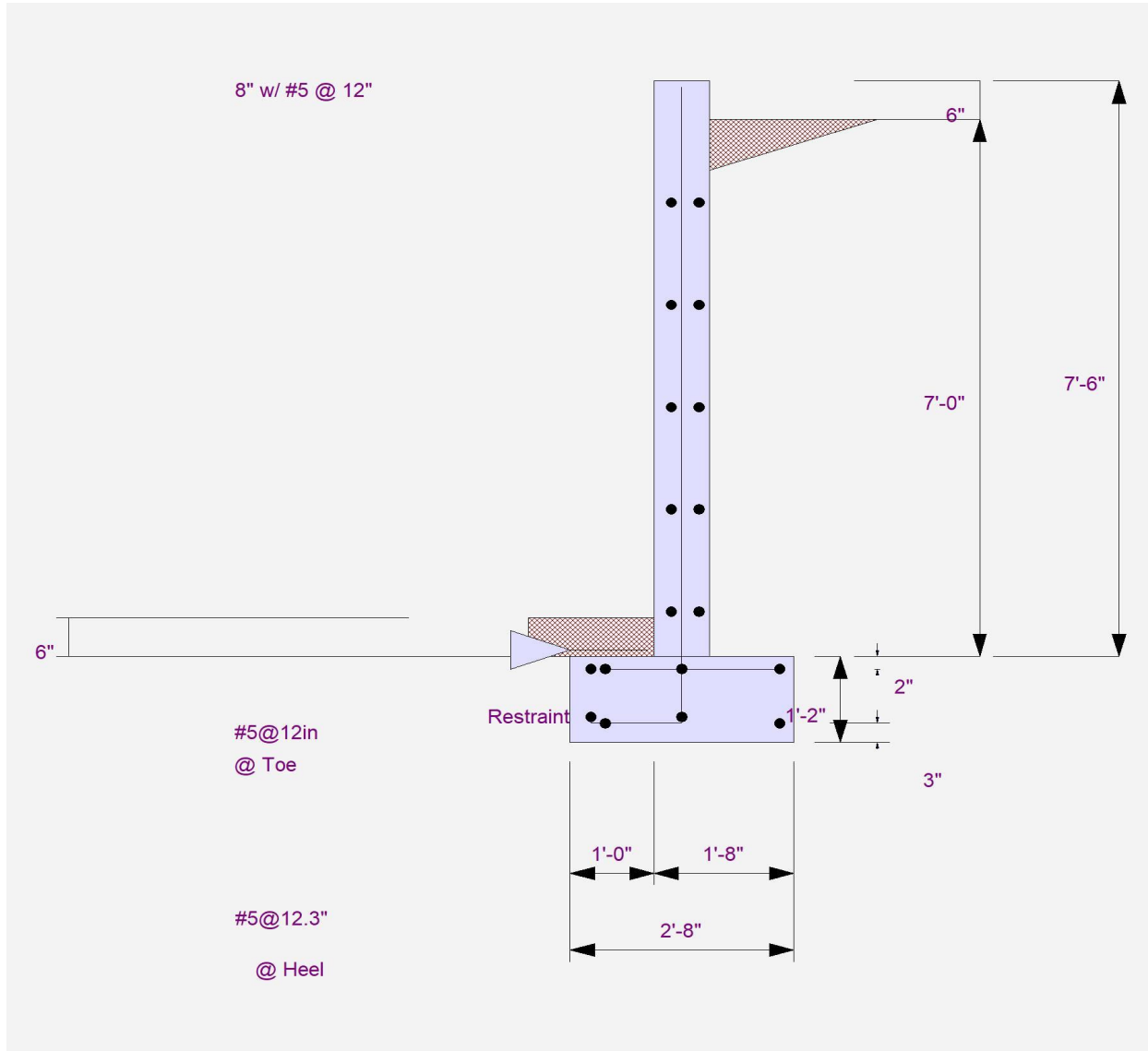
Project File: Restrained Retaining Wall.ec6

LIC# : KW-06015228, Build:20.22.2.2

Engineered Structures Global Design, PLLC

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DESCRIPTION: Cantilevered Retaining wall AT Window Well



Cantilevered Retaining Wall

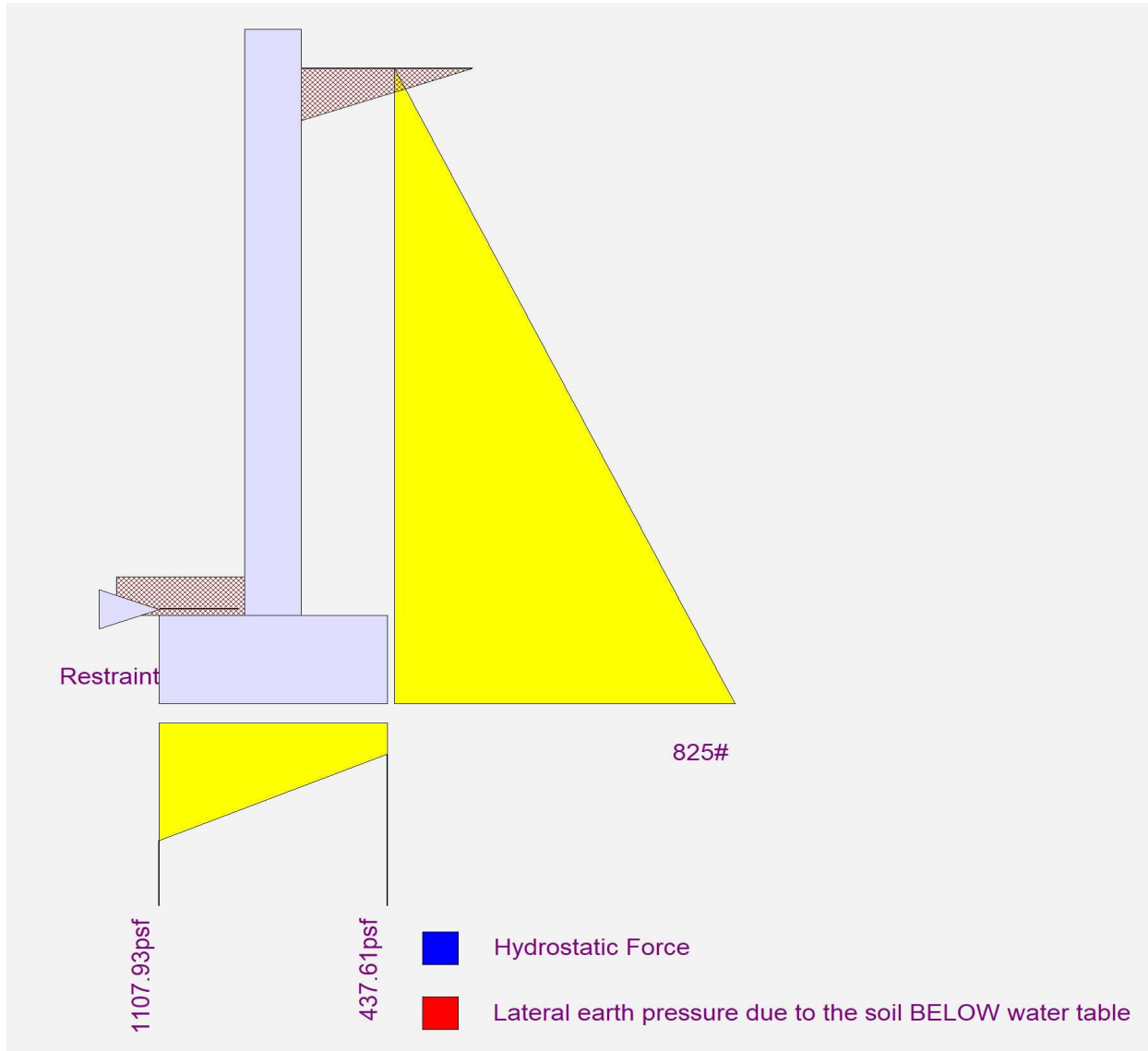
Project File: Restrained Retaining Wall.ec6

LIC# : KW-06015228, Build:20.22.2.2

Engineered Structures Global Design, PLLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Cantilevered Retaining wall AT Window Well



Cantilevered Retaining wall at stairs (9'-6")

Project Title: Giola
Engineer: Jennifer
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: Restrained Retaining Wall.ec6

LIC# : KW-06015228, Build:20.22.2.2

Engineered Structures Global Design, PLLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Cantilevered Retaining wall AT STAIRS

Code Reference:

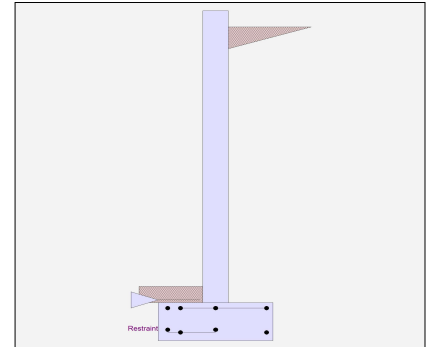
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	8.50 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	6.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	25.0 psf/ft
	=	
Passive Pressure	=	300.0 psf/ft
Soil Density, Heel	=	115.00 pcf
Soil Density, Toe	=	115.00 pcf
Footing Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

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

Axial Load Applied to Stem

Axial Dead Load	=	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: Restrained Retaining Wall.ec6

LIC# : KW-06015228, Build:20.22.2.2

Engineered Structures Global Design, PLLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Cantilevered Retaining wall AT STAIRS

Design Summary

Wall Stability Ratios

Overturning	=	1.82	OK
Slab Resists All Sliding !			
Global Stability	=	2.40	
Total Bearing Load	=	3,270 lbs	
...resultant ecc.	=	3.95 in	
Soil Pressure @ Toe	=	1,455 psf	OK
Soil Pressure @ Heel	=	300 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	2,037 psf	
ACI Factored @ Heel	=	420 psf	
Footing Shear @ Toe	=	3.8 psi	OK
Footing Shear @ Heel	=	19.1 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	1,168.1 lbs
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Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

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

ft =	Stem OK	0.00
Wall Material Above "Ht"	=	Concrete
Design Method	=	SD
Thickness	=	8.00
Rebar Size	=	# 5
Rebar Spacing	=	8.00
Rebar Placed at	=	Center

Design Data

fb/FB + fa/Fa	=	0.489
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Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	1,445.0

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	4,094.2

Moment.....Allowable	=	8,360.4
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Shear.....Actual

Service Level	psi =	
Strength Level	psi =	30.1

Shear.....Allowable	psi =	821.6
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Anet (Masonry)	in2 =	
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Rebar Depth 'd'	in =	4.00
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Masonry Data

f'm	psi =	
Fs	psi =	

Solid Grouting	=	
Modular Ratio 'n'	=	

Wall Weight	psf =	100.0
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Short Term Factor	=	
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Equiv. Solid Thick.	=	
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Masonry Block Type	=	
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Masonry Design Method	=	ASD
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Concrete Data

f'c	psi =	300,000.0
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Fy	psi =	60,000.0
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Bottom

SD SD SD SD SD

Cantilevered Retaining Wall

Project File: Restrained Retaining Wall.ec6

LIC# : KW-06015228, Build:20.22.2.2

Engineered Structures Global Design, PLLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Cantilevered Retaining wall AT STairs

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.2422 in2/ft		
(4/3) * As :	0.323 in2/ft	Min Stem T&S Reinf Area 1.728 in2	
$3\sqrt{f'c}bd/fy : 3\sqrt{300000}(12)(4)/60000$	1.3145 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.323 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.465 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	49.725 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Footing Data

Toe Width	=	1.17 ft
Heel Width	=	1.83
Total Footing Width	=	3.00
Footing Thickness	=	14.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	1.17 ft
$f'c = 2,500$ psi	$Fy = 60,000$ psi	
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>
Factored Pressure	=	2,037	420 psf
μ' : Upward	=	1,244	0 ft-#
μ' : Downward	=	190	2,132 ft-#
μ : Design	=	1,054	2,132 ft-#
ϕ Min	=	14,400	15,795 ft-#
Actual 1-Way Shear	=	3.83	19.09 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	# 5 @ 12.00 in	
Heel Reinforcing	=	# 5 @ 12.00 in	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, ϕ Tu	=		0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

Toe:
 Heel:
 Key:

Min footing T&S reinf Area	0.91	in2
Min footing T&S reinf Area per foot	0.30	in2 /ft
If one layer of horizontal bars:		If two layers of horizontal bars:
#4@ 7.94 in		#4@ 15.87 in
#5@ 12.30 in		#5@ 24.60 in
#6@ 17.46 in		#6@ 34.92 in

Cantilevered Retaining Wall

Project File: Restrained Retaining Wall.ec6

LIC# : KW-06015228, Build:20.22.2.2

Engineered Structures Global Design, PLLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Cantilevered Retaining wall AT STairs

Summary of Overturning & Resisting Forces & Moments

ItemOVERTURNING.....		RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	1,168.1	3.22	3,763.7	Soil Over HL (ab. water tbl)	1,140.4	2.42	2,756.0
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.42	2,756.0
Hydrostatic Force				Watre 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 =	67.1	0.58	39.1
				Surcharge Over Toe =			
				Stem Weight(s) =	900.0	1.50	1,350.0
				Earth @ Stem Transitions =			
Total	= 1,168.1	O.T.M.	= 3,763.7	Footing Weight =	525.0	1.50	787.5
				Key Weight =		1.17	
				Vert. Component =	638.0	3.00	1,913.9
Resisting/Overturning Ratio		=	1.82	Total =	3,270.5 lbs	R.M.=	6,846.5
Vertical Loads used for Soil Pressure =		3,270.5 lbs		* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.			

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

Vertical component of active lateral soil pressure IS 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) 0.121 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.

Project Title: **Giola**
Engineer: **Jennifer**
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: Restrained Retaining Wall.ec6

LIC# : KW-06015228, Build:20.22.2.2

Engineered Structures Global Design, PLLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Cantilevered Retaining wall AT STairs

Rebar Lap & Embedment Lengths Information

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 = 15.60 in

Development length for #5 bar specified in this stem design segment = 12.00 in

Hooked embedment length into footing for #5 bar specified in this stem design segment = 7.29 in

As Provided = 0.4650 in²/ft

As Required = 0.3230 in²/ft

Cantilevered Retaining Wall

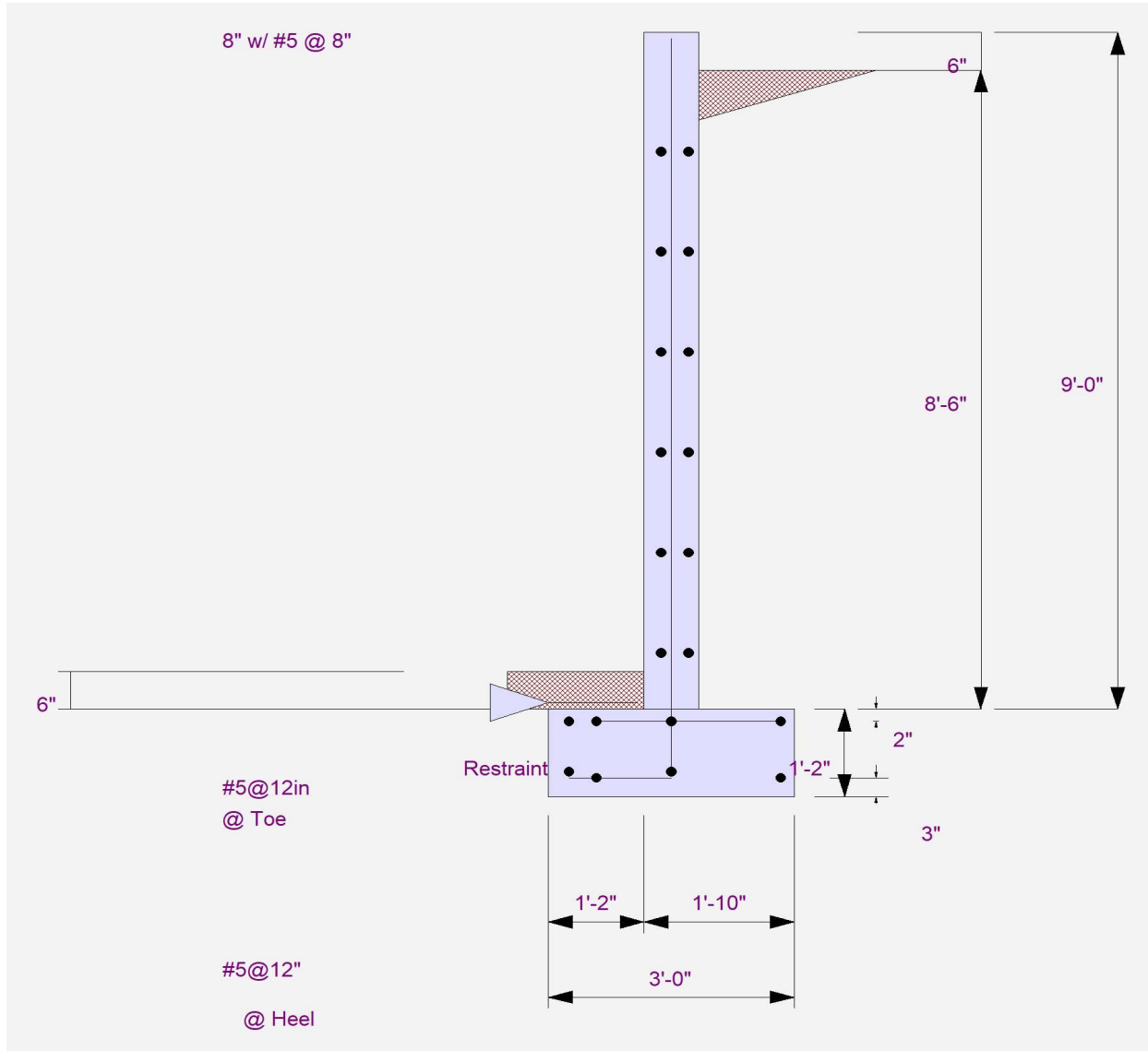
Project File: Restrained Retaining Wall.ec6

LIC# : KW-06015228, Build:20.22.2.2

Engineered Structures Global Design, PLLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Cantilevered Retaining wall AT STairs



Cantilevered Retaining Wall

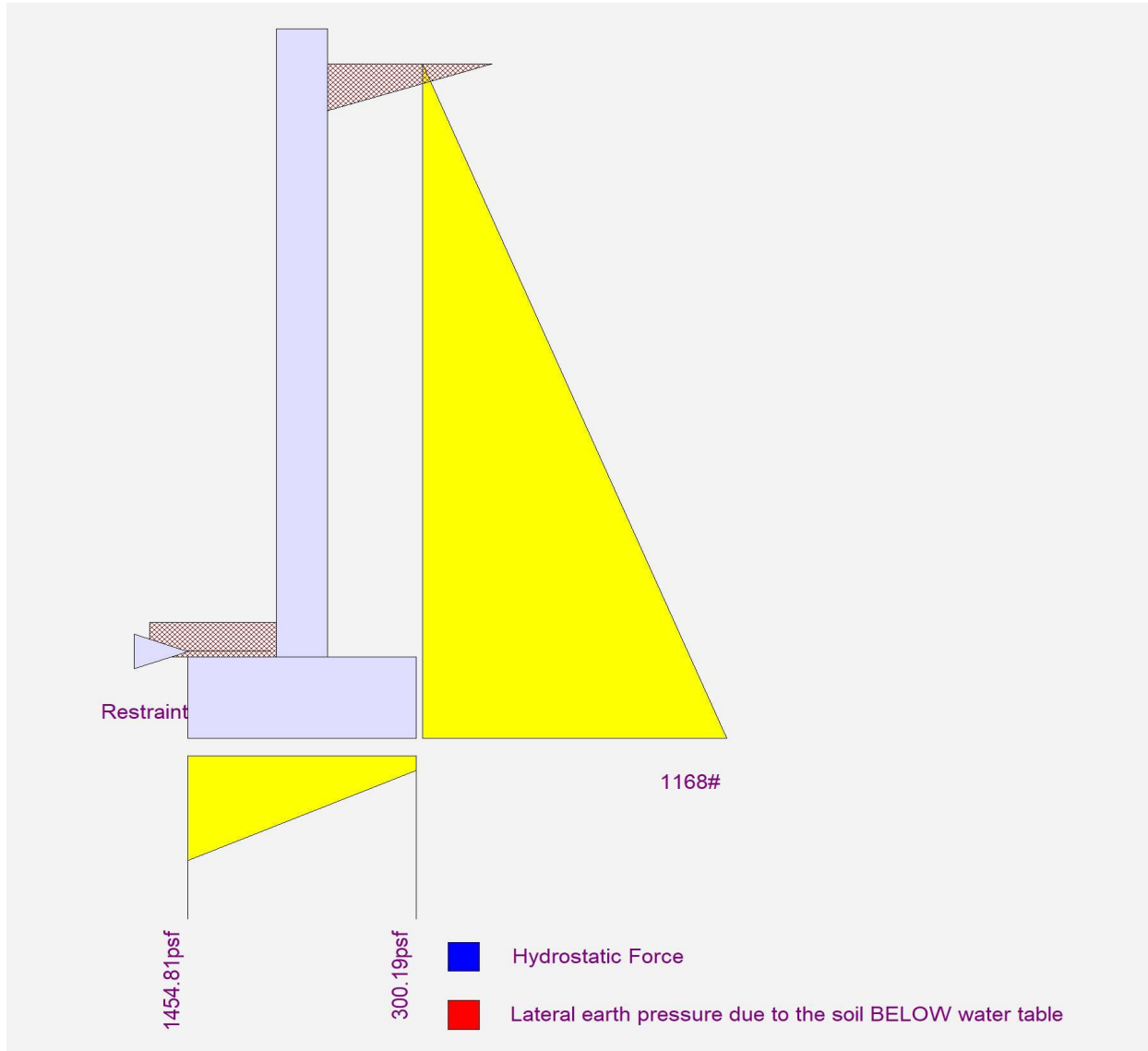
Project File: Restrained Retaining Wall.ec6

LIC# : KW-06015228, Build:20.22.2.2

Engineered Structures Global Design, PLLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Cantilevered Retaining wall AT STairs





ICC-ES Evaluation Report ESR-4161

Reissued May 2022

Revised February 2023

This report is subject to renewal May 2024.

DIVISION: 08 00 00—OPENINGS
Section: 08 95 16—Wall Vents

REPORT HOLDER:

JOTO TECHNO CO., LTD.

EVALUATION SUBJECT:

JOTO-VENT SYSTEM®

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021, 2018 and 2015 *International Building Code*® (IBC)
- 2021, 2018 and 2015 *International Residential Code*® (IRC)

Properties evaluated:

- Ventilation (Under-floor Space)
- Structural

2.0 USES

The Joto-Vent System® is used to provide under-floor space continuous perimeter ventilation in accordance with IRC Section R408 and IBC Section 1202.4 [2015 IBC Section 1203.4].

3.0 DESCRIPTION

3.1 General:

The Joto-Vent System® consists of two types of the Joto-Vent (Figures 1 and 2) and Airtight Joto-Vent (Figure 3), Joto Reinforcement Block (Figure 4), Joto-Vent Shim Plate (Figure 5) and two types of vent coverings - the Joto Architectural Coverings and the Joto Insect Prevention Strip Coverings (Figure 6 and 7).

3.2 Joto-Vent:

The Joto-Vent (Figures 1 and 2) is made of a composite material consisting of calcium carbonate, plastic, and polyolefin resin. The vent is formed into a honeycomb pattern that forms an air-flow pathway for crawlspace ventilation. The vents provide a net free ventilation area of either 4.81 square inches of ventilation per lineal foot (102 cm²/m) for Joto-Vent models KP-L150U, KP-L102U, KP-L120U or 11.03 square inches of ventilation per lineal foot (234 cm²/in) for Joto-Vent model JVS-26CV. The Joto

Vent is available in various models and sizes as described in Table 1. The vents may be sawn, as needed, for shorter lengths.

3.3 Airtight Joto-Vent:

The Airtight Joto-Vent (Figure 3) is comprised of the same material as the Joto-Vent. Airtight Joto-vent contains 1/4-inch EPDM foam strips and does not provide an air-flow pathway. The Airtight vents are designed for use in areas where ventilation is not required.

3.4 Joto Reinforcement Block:

The Joto Reinforcement Block is comprised of the same material as the Joto-Vent and consists of two components that interlock to form a solid block (Figure 4). The reinforcing block fits between the openings in the Joto-Vent and is designed to be added to the vent when the applied loads exceed what is allowed for the Joto-Vent as determined by a registered design professional. The Joto Reinforcement Block is available in various models and sizes as described in Table 3.

3.5 Joto-Vent Shim Plate:

The Joto-Vent Shim Plates are 6-inch by 6-inch zinc-coated hot-rolled steel plates (Figure 5). The shim plates are available in 1/16-inch, 1/8-inch and 1/4-inch thicknesses for models XS-S116, XS-S108 and XS-104, respectively. When installed, the shim plates provide level adjustment for concrete foundation or stem walls.

3.6 Vent Coverings:

The Joto Architectural Coverings and Insect Prevention Strip Coverings (Figures 6 and 7) are formed from 55 percent aluminum-zinc alloy-coated steel conforming to ASTM A792 or similar material. The coverings are installed to provide the vent covering required by Section R408.2 of the IRC, Section 1202.4.1 of the 2021 and 2018 IBC, and Section 1203.4.1 of the 2015 IBC.

3.7 Surface burning Characteristics:

The Joto-Vent System® has a flame-spread index of 200 or less when tested in accordance with ASTM E84.

4.0 DESIGN AND INSTALLATION

4.1 Design:

Each model of the Joto-Vent and Airtight Joto Vent described in this report provides an allowable bearing area as noted in Table 1. Due to the reduced bearing area, floor

spans and roof spans supported by the Joto-Vent System® must be reduced by the percentage noted in Table 2 for prescriptive applications under the IRC. For engineered systems, the reduced bearing area under the sill plate must be taken into account. See Figure 8 for bearing area layout. The maximum allowable load on the Joto-Vent System® is as noted in Table 2. Each model of the Joto Reinforcement Block provides an allowable bearing and maximum allowable load as noted in Table 3.

4.2 Installation:

The Joto-Vent System® must be installed in accordance with this report and the manufacturer’s published installation instructions. A copy of the manufacturer’s published installation instructions must be available on the jobsite at all times during installation.

The Joto-Vent is installed between the top of the foundation wall and the bottom of the sill plate. (Figure 9). If needed, Joto-Vent Shim Plates can be installed between the foundation wall or sill plate and the Joto-Vent to provide level adjustment.

For installations in accordance with the prescriptive provisions of the code, anchor bolts must be spaced as defined in Table 4.

5.0 CONDITIONS OF USE

The Joto-Vent System® described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 The Joto-Vent System® must be installed in accordance with this report, the applicable code and the manufacturer’s published installation instructions. In the event of a conflict, the more restrictive requirements govern.
- 5.2 For engineer designed structures, complete plans and calculations demonstrating compliance with this report must be submitted to the code official for approval when required. The calculations and details must be

prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

- 5.3 Protection against subterranean termites must be provided as specified in IRC Section R318 or IBC Section 2304.12.1.2, as applicable.
- 5.4 For applications under the IBC, the Joto-Vent System® is limited to Type V-B construction.

6.0 EVIDENCE SUBMITTED

Data in accordance with ICC-ES Acceptance Criteria for Under-Floor Space Continuous Perimeter Vents (AC497), dated October 2018 (editorially revised May 2021).

7.0 IDENTIFICATION

- 7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-4161) along with the name, registered trademark, or registered logo of the report holder must be included in the product label.
- 7.2 In addition, the Joto Techno Co., Ltd. Joto-Vent System® Components must be identified by a label bearing the manufacturer’s name (Joto Techno Company).
- 7.3 The report holder’s contact information is the following:

JOTO TECHNO CO., LTD.
14F NISSEI YODOYABASHI EAST
3-3-13 IMABASHI, CHUO-KU
OSAKA, OSAKA 541-0042
JAPAN
+81-6-6786-8601
info@joto.com
www.joto.com

TABLE 1—JOTO-VENT SYSTEM® MODELS AND DIMENSIONAL PROPERTIES

JOTO-VENT SYSTEM® COMPONENT	PRODUCT NAME	THICKNESS (in)	WIDTH (in)	LENGTH (ft)	CONTACT AREA (in ² /ft)	WEB AREA (in ² /ft)	VENTILATION AREA (in ² /ft)
Joto-Vent	KP-L150U	0.79	6.0	3.0	26.34	11.84	4.81
	KP-L102U	0.79	4.0	3.0	18.97	8.24	4.81
	KP-L120U	0.79	4.75	3.0	24.84	10.80	4.81
	JVS-26CV	1.53	5.5	3.0	41.28	9.99	11.03
Airtight Joto-Vent	KPK-N140U	0.79	5.5	3.0	36.98	10.41	N/A

For SI: 1 inch = 25.4 mm; 1ft=0.305 m

TABLE 2—JOTO-VENT SYSTEM® DESIGN PROPERTIES

JOTO-VENT SYSTEM® COMPONENT	PRODUCT NAME	REDUCTION FACTOR (%)	MAXIMUM ALLOWABLE LOAD (psi)	MAXIMUM ALLOWABLE LOAD (plf)
Joto-Vent	KP-L150U ¹	60	279	7140
	KP-L102U	55	194	4967
	KP-L120U ²	62	254	6513
	JVS-26CV ³	37	117	4812
Airtight Joto-Vent	KPK-N140U ⁴	44	235	8703

VERIFY COLUMN LOADS AT JOJO VENT LOCATIONS

Notes:

- (1) – The presented % Reduction for the KP-L150U assumes allowable prescriptive loads are for 2x6 stud walls. Where 2x4 stud walls are used, the % Reduction will be 37%. In all cases, the sill plate over the KP-150U Joto Vent shall not be less than a 2x6.
- (2) – The presented % Reduction for the KP-L120U assumes allowable prescriptive loads for 2x6 stud walls. Where 2x4 stud walls are used, the % Reduction will be 41%. In all cases, the sill plate over the KP-L120U Joto Vent shall not be less than a 2x6.
- (3) – The presented % Reduction for the JVS-26CV assumes prescriptive loads are for 2x6 stud walls. Where 2x4 stud walls are used, the % Reduction will be 2%. In all cases, the sill plate over the JVS-26CV Joto Vent shall not be less than a 2x6.
- (4) – The presented % Reduction for the KPK-N140U assumes allowable prescriptive loads are for 2x6 stud walls. Where 2x4 stud walls are used, the % Reduction will be 12%. In all cases, the sill plate over the KPK-N140U Joto Vent shall not be less than a 2x6.

TABLE 3—JOTO REINFORCEMENT BLOCK DESIGN PROPERTIES

JOTO-REINFORCEMENT BLOCK MODEL NUMBER	CONTACT AREA (in ²)	MAXIMUM ALLOWABLE LOAD (psi)	MAXIMUM ALLOWABLE LOAD PER BLOCK (lbs)
KP-LRB150	4.84	1131	5470
KP-LRB45	2.84	1131	3208

TABLE 4—MAXIMUM CENTER TO CENTER SPACING OF ANCHOR BOLTS

Anchor Bolt Size (inches)		¾" Joto Vent		1 ½" Joto Vent	
		Case 1	Case 2	Case 1	Case 2
		½	4'-0"	2'-8"	3'-0"
5/8	6'-0"	4'-0"	4'-0"	3'-0"	
¾	6'-0"	4'-0"	6'-0"	4'-0"	

Case 1 – For installation in accordance with the prescriptive provisions of the code.

Case 2 – For structures subject to the IBC, anchor bolts in sill plates of braced wall lines in structures over two stories above grade.

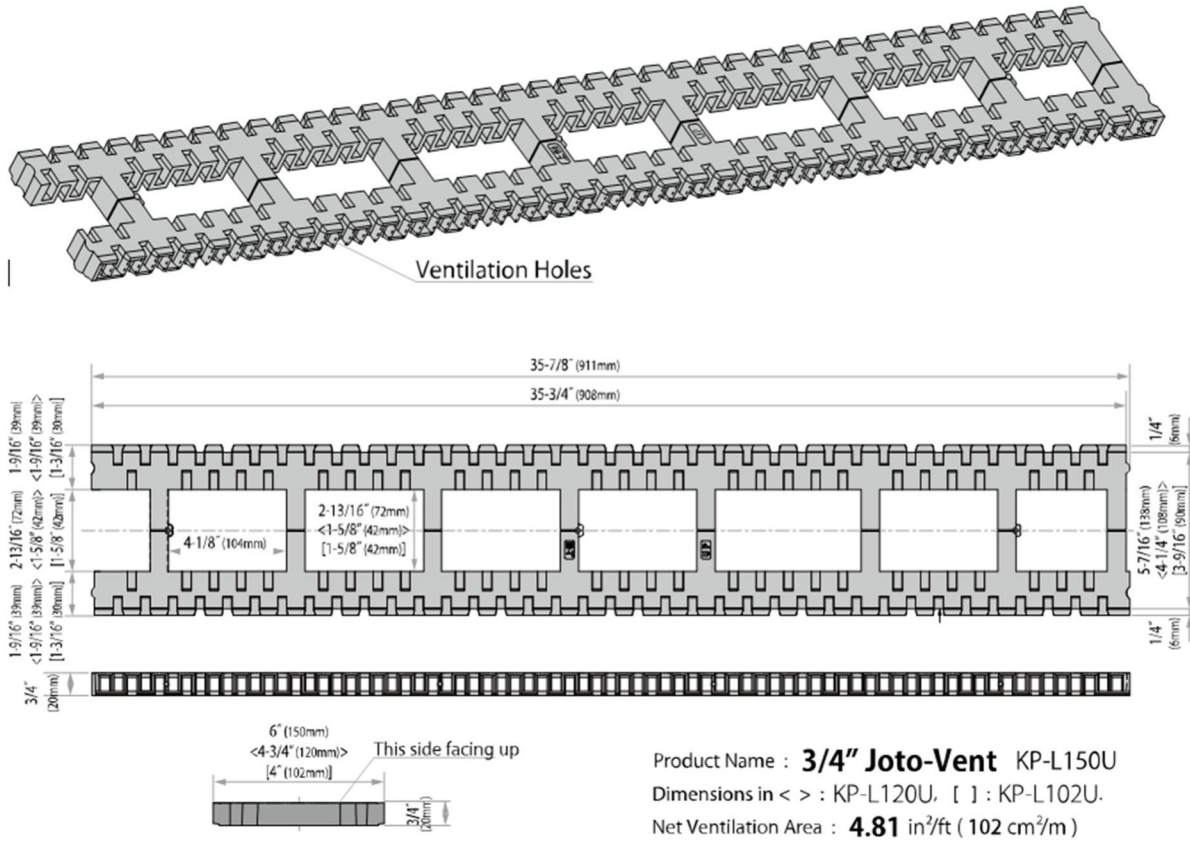


FIGURE 1—JOTO-VENT (KP-L150U, KP-L120U, KP-L102U)

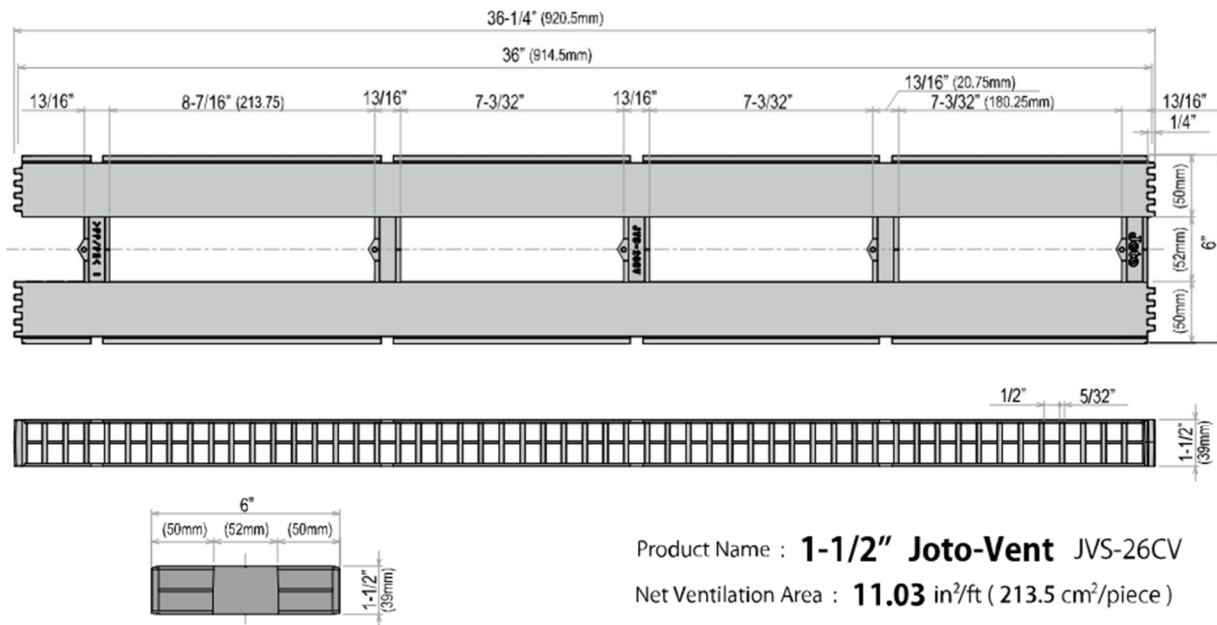


FIGURE 2—JOTO-VENT (JVS-26CV)

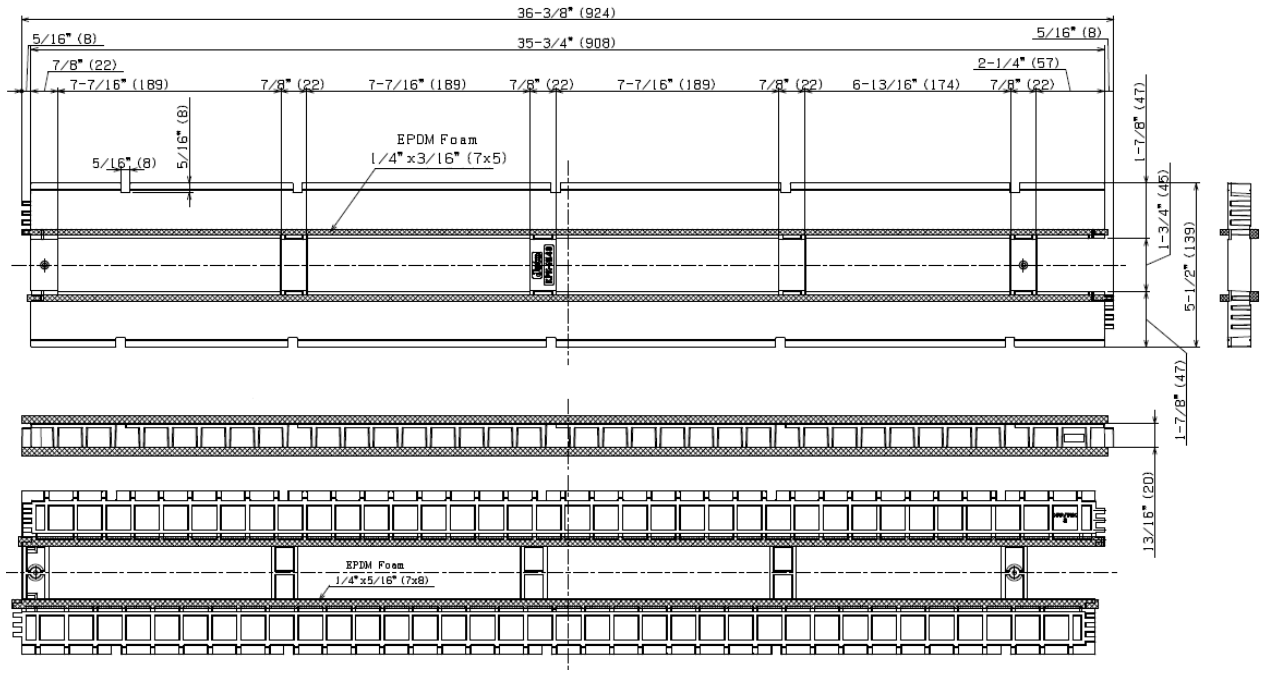


FIGURE 3—AIRTIGHT JOTO-VENT (KPK-N140U)

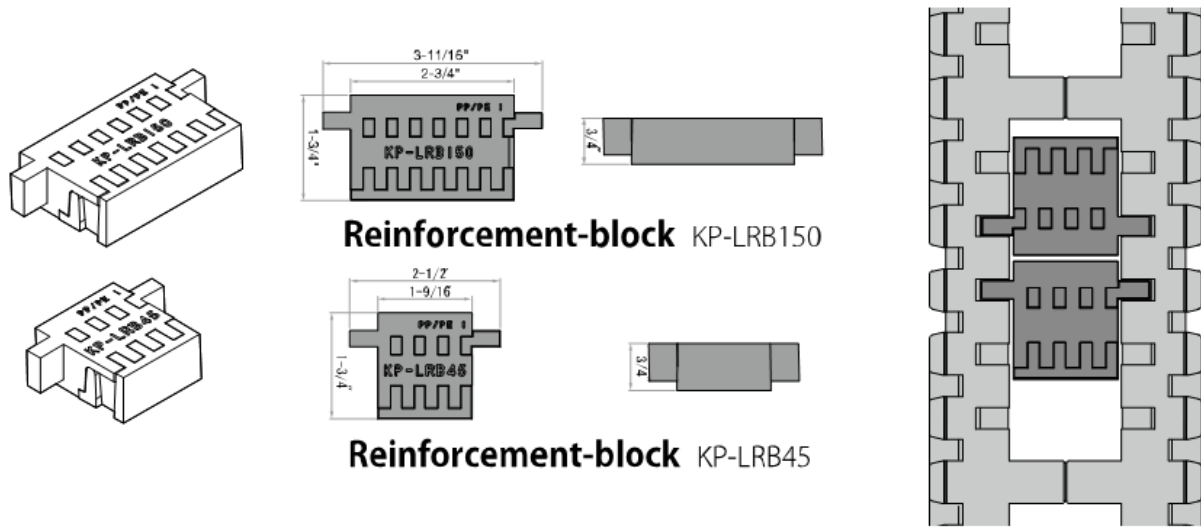
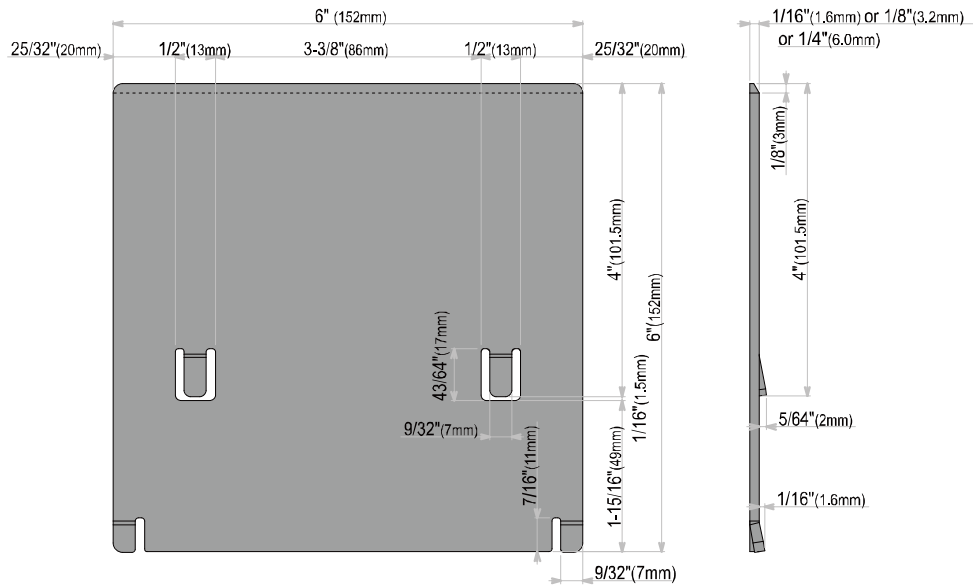


FIGURE 4—JOTO REINFORCEMENT BLOCK

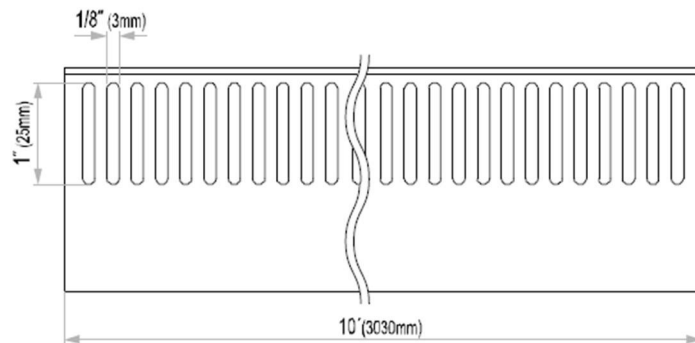
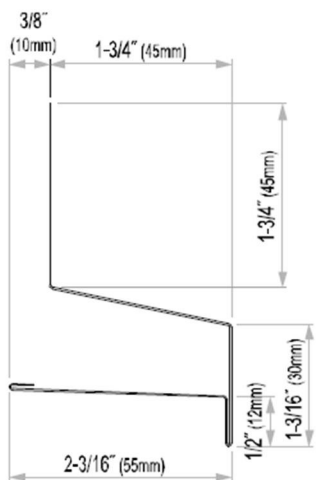


Product Name : **Joto-Vent Shim Plate**

for JVS-26CV

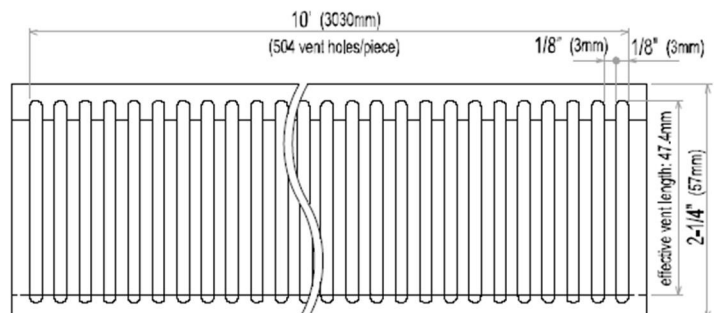
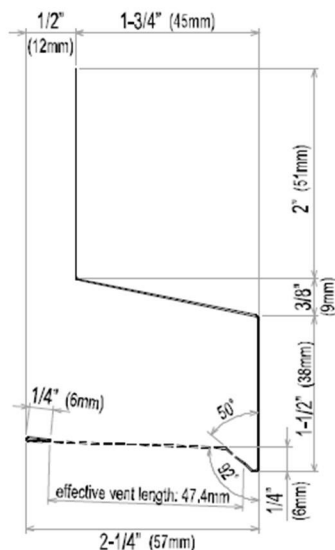
1/16" : XS-S116 1/8" : XS-S108 1/4" : XS-S104

FIGURE 5—JOTO-VENT SHIM PLATE



Product Name : **Architectural Covering**

for 3/4" WACF-U45



Product Name : **Architectural Covering**

for 1-1/2" JAC-2-10

FIGURE 6—JOTO ARCHITECTURAL COVERINGS

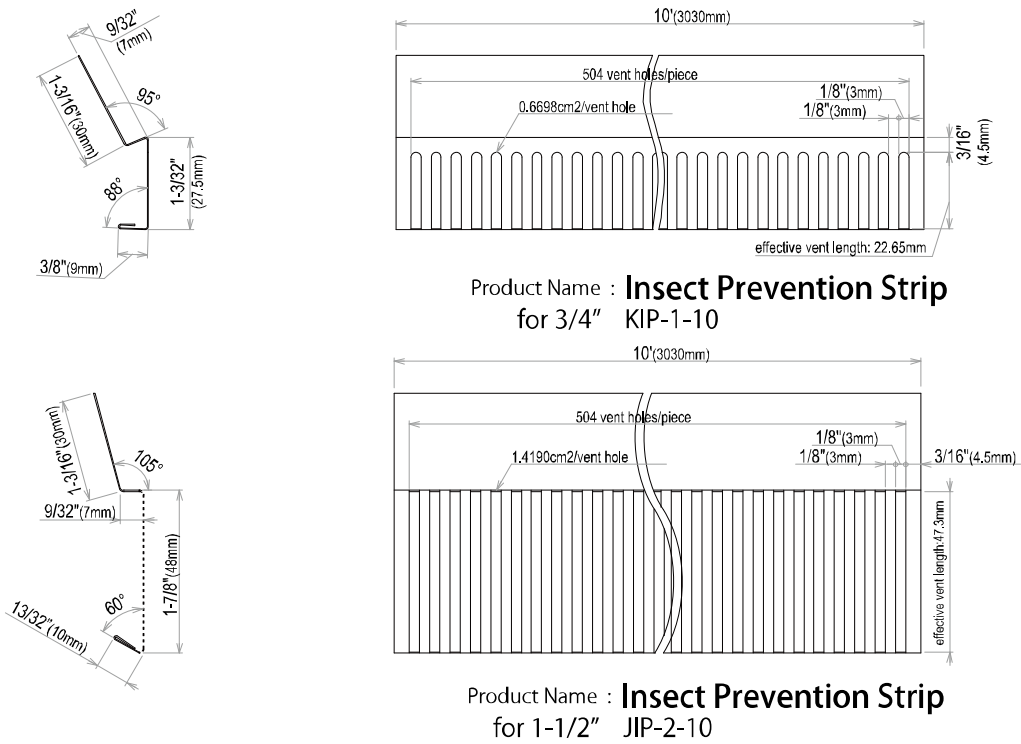


FIGURE 7—JOTO INSECT PREVENTION STRIP COVERINGS

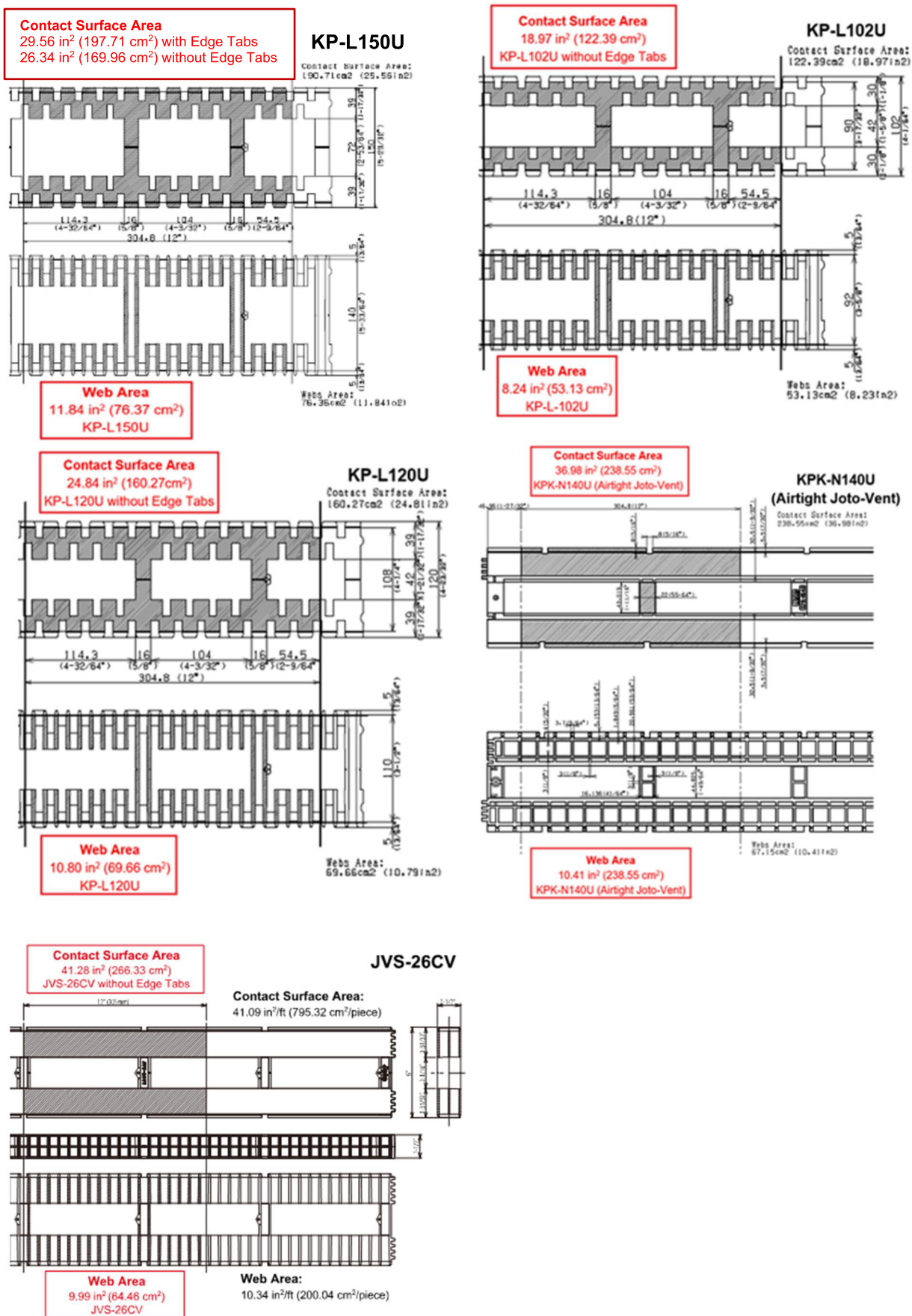
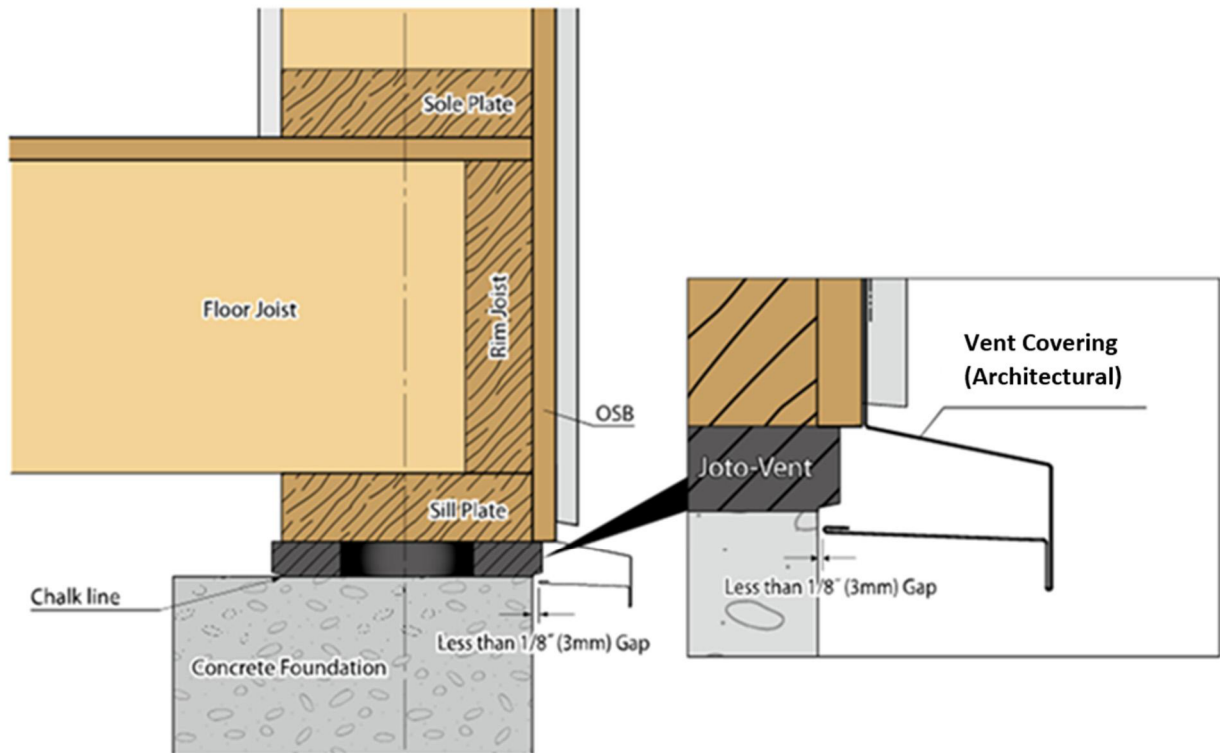
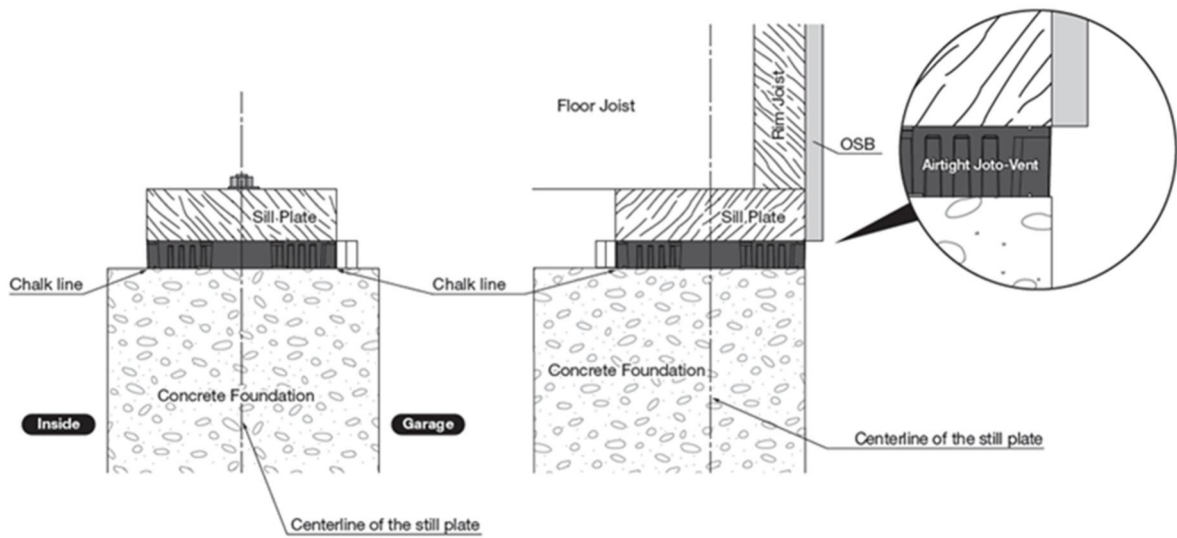


FIGURE 8—JOTO-VENT SYSTEM® BEARING AREA

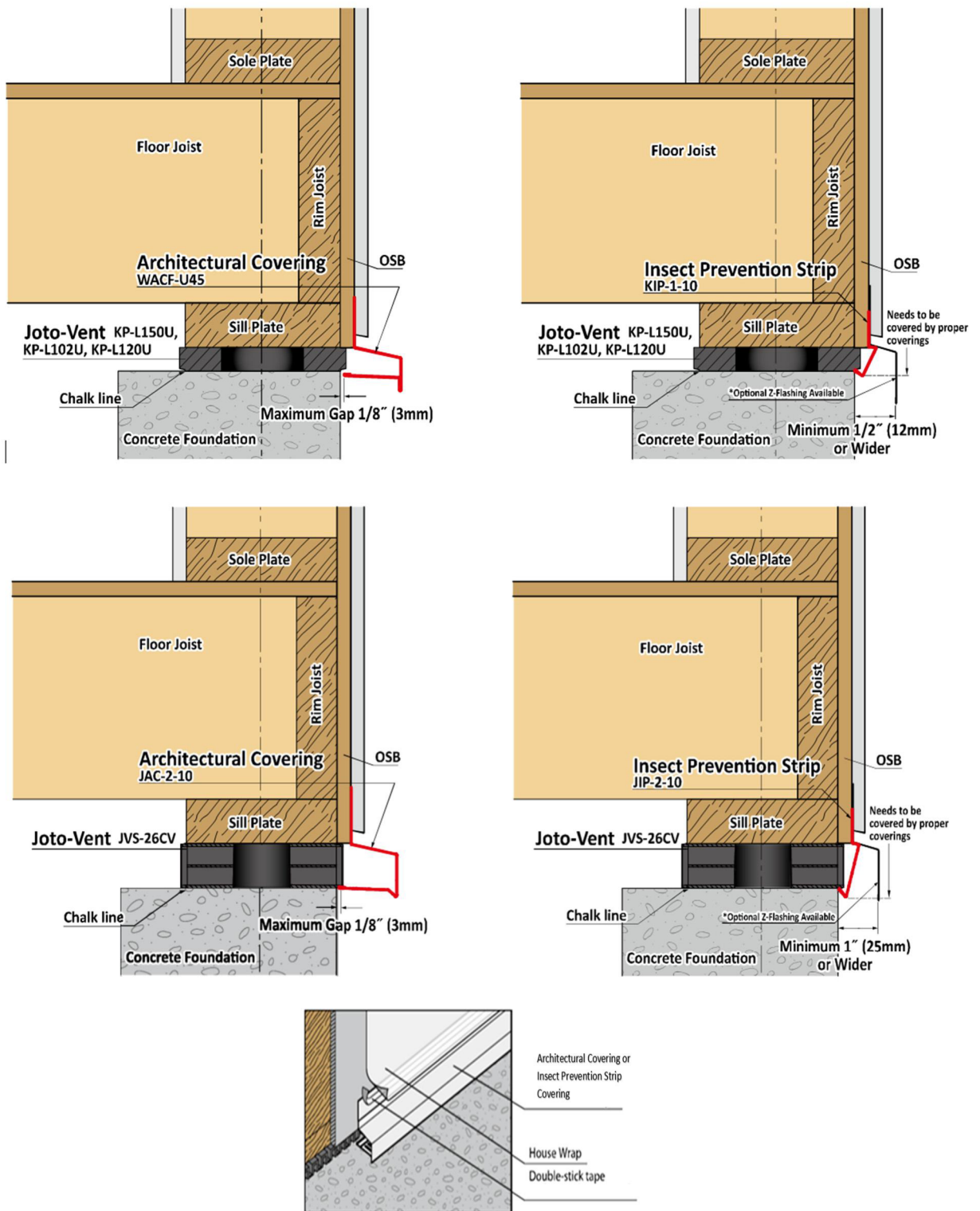


JOTO-VENT INSTALLATION DETAILS



AIRTIGHT JOTO-VENT INSTALLATION DETAILS

FIGURE 9—JOTO-VENT SYSTEM® INSTALLATION DETAILS



ARCHITECTURAL AND INSECT PREVENTION STRIP COVERINGS INSTALLATION DETAILS

FIGURE 10—JOTO-VENT SYSTEM® INSTALLATION DETAILS (Continued)

DIVISION: 08 00 00—OPENINGS**Section: 08 95 16—Wall Vents****REPORT HOLDER:**

JOTO TECHNO CO., LTD.

EVALUATION SUBJECT:

JOTO-VENT SYSTEM®

1.0 REPORT PURPOSE AND SCOPE**Purpose:**

The purpose of this evaluation report supplement is to indicate that Joto-Vent System®, described in ICC-ES evaluation report ESR-4161, has also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2019 *California Building Code* (CBC)

For evaluation of applicable chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) aka: California Department of Health Care Access and Information (HCAI) and the Division of State Architect (DSA), see Sections 2.1.1 and 2.1.2 below.

- 2019 *California Residential Code* (CRC)

2.0 CONCLUSIONS**2.1 CBC:**

The Joto-Vent System®, described in Sections 2.0 through 7.0 of the evaluation report ESR-4161, complies with CBC Chapter 12, provided the design and installation are in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements of CBC Chapters 12 and 23, as applicable.

The Joto-Vent System® (with the exception of 1½-inch Joto-Vent JVS-26CV, Architectural Covering JAC-2-10, Insect Prevention Strip Coverings KIP-1-10 and JIP-2-10) may be used in the exterior design and construction of new buildings located in a Fire Hazard Severity Zone within State Responsibility Areas or any Wildland-Urban Interface Fire Area, provided installation is in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements of CBC Sections 701A.3 and 706A. The Joto-Vent System® (with the exception of 1½-inch Joto-Vent JVS-26CV, Architectural Covering JAC-2-10, Insect Prevention Strip Coverings KIP-1-10 and JIP-2-10) complies with the performance requirements of ASTM E2886, as described in ICC-ES listing report ESL-1274, in accordance with Item 1 of CBC Section 706A.2 and may be used in the exterior design and construction of new buildings located in a Fire Hazard Severity Zone within State Responsibility Areas or any Wildland-Urban Interface Fire Area.

2.1.1 OSHPD:

The applicable OSHPD Sections of the CBC are beyond the scope of this supplement.

2.1.2 DSA:

The applicable DSA Sections of the CBC are beyond the scope of this supplement.

2.2 CRC:

The Joto-Vent System®, described in Sections 2.0 through 7.0 of the evaluation report ESR-4161, complies with CRC Chapter 4, provided the design and installation are in accordance with the 2018 *International Residential Code*® (IRC) provisions noted in the evaluation report and the additional requirements of CRC Chapters 3 and 4, as applicable.

The Joto-Vent System® (with the exception of 1½-inch Joto-Vent JVS-26CV, Architectural Covering JAC-2-10, Insect Prevention Strip Coverings KIP-1-10 and JIP-2-10) may be used in the exterior design and construction of new buildings located in a Fire-Hazard Severity Zone within State Responsibility Areas or any Wild-Urban Interface Fire Area, provided installation is in accordance with the 2018 *International Residential Code*® (IRC) provisions noted in the evaluation report and the additional requirements of CRC Sections R337.1.3 and R337.6.2. The Joto-Vent System® (with the exception of 1½-inch Joto-Vent JVS-26CV, Architectural Covering JAC-2-10, Insect Prevention Strip Coverings KIP-1-10 and JIP-2-10) complies with the performance requirements of ASTM E2886, as described in ICC-ES listing report ESL-1274, in accordance with Item 1 of CRC Section R337.6.2 and may be used in the exterior design and construction of new buildings located in a Fire Hazard Severity Zone within State Responsibility Areas or any Wildland-Urban Interface Fire Area.

The Joto-Vent products described in this supplement have not been evaluated for compliance with the *International Wildland-Urban Interface Code* (IWUIC).

This supplement expires concurrently with the evaluation report, reissued May 2022 and revised February 2023.



LATERAL DESIGN

WFCM

WOOD FRAME CONSTRUCTION MANUAL
for One- and Two-Family Dwellings

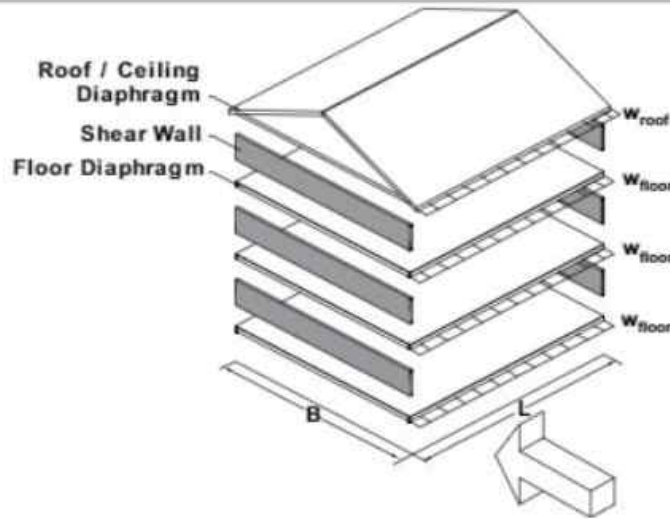
Table 2.1.3.1 Adjustment for Wind Exposure and Mean Roof Height

Mean Roof Height (feet)	Exposure B		Exposure C	Exposure D
	MWFRS	C&C	MWFRS and C&C	MWFRS and C&C
0-15	0.97	0.79	1.18	1.43
20	0.97	0.86	1.25	1.50
25	0.97	0.92	1.31	1.56
30	0.97	0.97	1.36	1.61
33	1.00	1.00	1.39	1.64

Table 2.5A Lateral Diaphragm Loads from Wind - Perpendicular to Ridge

(For Calculating In-Plane Shear in Roof and Floor Diaphragm)

MAIN HOUSE
WIND AGAINST THE NORTH
WALL-
SLOPE: 4:12
HEIGHT OF ROOF= 26'1.5"
LENGTH OF NORTH WALL 46'



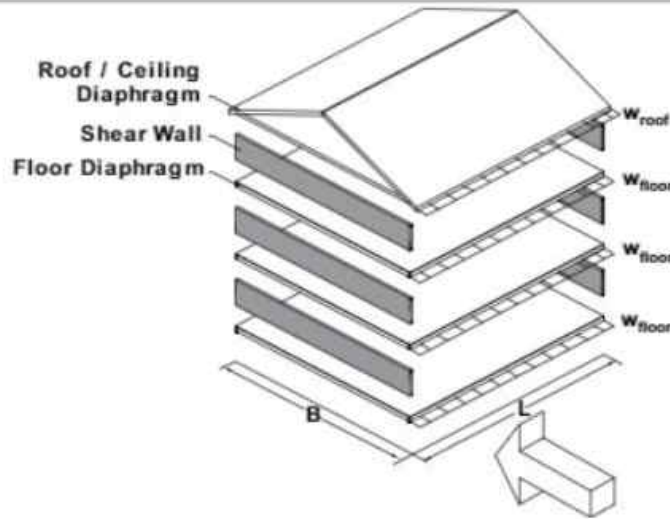
Wind Speed 3-second gust (mph) (See Figure 1.1)		90	95	100	105	110	115	120	130	140	150	160	170	180	195
Roof Pitch	Roof Span (ft)	Unit Lateral Loads for Roof Diaphragm, w_{roofL} , (plf) ^{1,3,4,5}													
1.5:12 - 3:12	24	65	65	65	65	65	65	65	76	88	101	115	130	146	172
	36	73	73	73	73	73	73	73	76	88	101	115	130	146	172
	48	80	80	80	80	80	80	80	80	88	101	115	130	146	172
	60	88	88	88	88	88	88	88	88	88	101	115	130	146	172
4:12	24	70	70	70	70	70	70	71	83	97	111	126	142	160	187
	36	80	80	80	80	80	80	80	83	97	111	126	142	160	187
	48	90	90	90	90	90	90	90	90	97	111	126	142	160	187
	60	100	100	100	100	100	100	100	100	100	111	126	142	160	187
5:12	24	75	75	75	75	75	75	75	84	97	112	127	143	161	189
	36	88	88	88	88	88	88	88	88	95	110	125	141	158	185
	48	100	100	100	100	100	100	100	100	100	110	125	141	158	185
	60	113	113	113	113	113	113	113	113	113	113	125	141	158	185
6:12	24	80	80	80	80	83	90	98	115	134	154	175	197	221	260
	36	95	95	95	95	95	102	112	131	152	174	198	224	251	295
	48	110	110	110	110	110	116	126	148	172	197	224	253	284	333
	60	125	125	125	125	125	129	141	165	191	220	250	282	316	371
7:12	24	85	85	91	101	110	121	131	154	179	205	234	264	296	347
	36	103	103	112	124	136	149	162	190	220	253	287	325	364	427
	48	120	121	134	148	163	178	194	227	263	302	344	388	435	511
	60	138	141	157	173	189	207	225	265	307	352	401	452	507	595
8:12	24	90	90	98	108	118	129	141	165	191	220	250	282	316	371
	36	110	110	122	134	147	161	175	206	239	274	312	352	395	463
	48	130	133	147	162	178	194	212	248	288	331	376	425	476	559
	60	150	156	172	190	208	228	248	291	338	388	441	498	558	655
9:12	24	95	95	104	115	126	138	150	176	204	234	266	301	337	396
	36	118	118	131	145	159	174	189	222	257	295	336	379	425	499
	48	140	144	160	176	193	211	230	270	313	359	409	461	517	607
	60	163	170	188	207	228	249	271	318	369	423	482	544	609	715
10:12	24	100	100	110	122	134	146	159	187	216	249	283	319	358	420
	36	125	127	141	155	170	186	203	238	276	317	360	407	456	535
	48	150	156	172	190	208	228	248	291	338	388	441	498	558	655
	60	175	184	204	225	247	270	294	345	400	459	522	589	661	775
11:12	24	105	105	117	129	141	155	168	197	229	263	299	338	379	444
	36	133	136	150	166	182	199	216	254	294	338	385	434	487	571
	48	160	167	185	204	224	245	266	313	362	416	473	534	599	703
	60	188	198	220	242	266	291	316	371	431	494	562	635	712	835
12:12	24	110	111	123	136	149	163	177	208	242	277	315	356	399	469
	36	140	144	160	176	193	211	230	270	313	359	409	461	517	607
	48	170	178	198	218	239	261	285	334	387	445	506	571	640	751
	60	200	213	235	260	285	311	339	398	462	530	603	681	763	895
		Unit Lateral Loads for Floor Diaphragm, w_{floorL} , (plf) ^{1,3,3,5}													
		110	110	112	123	135	148	161	189	219	251	286	323	362	425

* See Footnotes 1 -5.

Table 2.5A Lateral Diaphragm Loads from Wind - Perpendicular to Ridge

(For Calculating In-Plane Shear in Roof and Floor Diaphragm)

MAIN HOUSE
WIND AGAINST THE EAST
WALL-
SLOPE: 4:12
HEIGHT OF ROOF= 26'1.5"
LENGTH OF NORTH WALL 30'



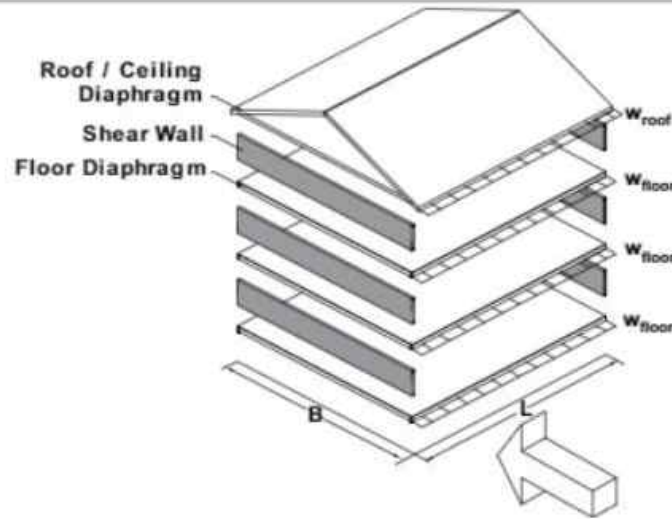
Wind Speed 3-second gust (mph) (See Figure 1.1)		90	95	100	105	110	115	120	130	140	150	160	170	180	195
Roof Pitch	Roof Span (ft)	Unit Lateral Loads for Roof Diaphragm, w_{roofL} , (plf) ^{1,3,4,5}													
1.5:12 - 3:12	24	65	65	65	65	65	65	65	76	88	101	115	130	146	172
	36	73	73	73	73	73	73	73	76	88	101	115	130	146	172
	48	80	80	80	80	80	80	80	80	88	101	115	130	146	172
	60	88	88	88	88	88	88	88	88	88	101	115	130	146	172
4:12	24	70	70	70	70	70	70	70	71	83	97	111	126	142	187
	36	80	80	80	80	80	80	80	83	97	111	126	142	160	187
	48	90	90	90	90	90	90	90	90	97	111	126	142	160	187
	60	100	100	100	100	100	100	100	100	100	111	126	142	160	187
5:12	24	75	75	75	75	75	75	75	84	97	112	127	143	161	189
	36	88	88	88	88	88	88	88	88	95	110	125	141	158	185
	48	100	100	100	100	100	100	100	100	100	110	125	141	158	185
	60	113	113	113	113	113	113	113	113	113	113	125	141	158	185
6:12	24	80	80	80	80	83	90	98	115	134	154	175	197	221	260
	36	95	95	95	95	95	102	112	131	152	174	198	224	251	295
	48	110	110	110	110	110	116	126	148	172	197	224	253	284	333
	60	125	125	125	125	125	129	141	165	191	220	250	282	316	371
7:12	24	85	85	91	101	110	121	131	154	179	205	234	264	296	347
	36	103	103	112	124	136	149	162	190	220	253	287	325	364	427
	48	120	121	134	148	163	178	194	227	263	302	344	388	435	511
	60	138	141	157	173	189	207	225	265	307	352	401	452	507	595
8:12	24	90	90	98	108	118	129	141	165	191	220	250	282	316	371
	36	110	110	122	134	147	161	175	206	239	274	312	352	395	463
	48	130	133	147	162	178	194	212	248	288	331	376	425	476	559
	60	150	156	172	190	208	228	248	291	338	388	441	498	558	655
9:12	24	95	95	104	115	126	138	150	176	204	234	266	301	337	396
	36	118	118	131	145	159	174	189	222	257	295	336	379	425	499
	48	140	144	160	176	193	211	230	270	313	359	409	461	517	607
	60	163	170	188	207	228	249	271	318	369	423	482	544	609	715
10:12	24	100	100	110	122	134	146	159	187	216	249	283	319	358	420
	36	125	127	141	155	170	186	203	238	276	317	360	407	456	535
	48	150	156	172	190	208	228	248	291	338	388	441	498	558	655
	60	175	184	204	225	247	270	294	345	400	459	522	589	661	775
11:12	24	105	105	117	129	141	155	168	197	229	263	299	338	379	444
	36	133	136	150	166	182	199	216	254	294	338	385	434	487	571
	48	160	167	185	204	224	245	266	313	362	416	473	534	599	703
	60	188	198	220	242	266	291	316	371	431	494	562	635	712	835
12:12	24	110	111	123	136	149	163	177	208	242	277	315	356	399	469
	36	140	144	160	176	193	211	230	270	313	359	409	461	517	607
	48	170	178	198	218	239	261	285	334	387	445	506	571	640	751
	60	200	213	235	260	285	311	339	398	462	530	603	681	763	895
		Unit Lateral Loads for Floor Diaphragm, w_{floorL} , (plf) ^{1,3,3,5}													
		110	110	112	123	135	148	161	189	219	251	286	323	362	425

* See Footnotes 1 -5.

Table 2.5A Lateral Diaphragm Loads from Wind - Perpendicular to Ridge

(For Calculating In-Plane Shear in Roof and Floor Diaphragm)

GARAGE



Wind Speed 3-second gust (mph) (See Figure 1.1)		90	95	100	105	110	115	120	130	140	150	160	170	180	195
Roof Pitch	Roof Span (ft)	Unit Lateral Loads for Roof Diaphragm, w_{roofL} , (plf) ^{1,3,4,5}													
1.5:12 - 3:12	24	65	65	65	65	65	65	65	76	88	101	115	130	146	172
	36	73	73	73	73	73	73	73	76	88	101	115	130	146	172
	48	80	80	80	80	80	80	80	80	88	101	115	130	146	172
	60	88	88	88	88	88	88	88	88	88	101	115	130	146	172
4:12	24	70	70	70	70	70	70	71	83	97	111	126	142	160	187
	36	80	80	80	80	80	80	80	83	97	111	126	142	160	187
	48	90	90	90	90	90	90	90	90	97	111	126	142	160	187
	60	100	100	100	100	100	100	100	100	100	111	126	142	160	187
5:12	24	75	75	75	75	75	75	75	84	97	112	127	143	161	189
	36	88	88	88	88	88	88	88	88	95	110	125	141	158	185
	48	100	100	100	100	100	100	100	100	100	110	125	141	158	185
	60	113	113	113	113	113	113	113	113	113	113	125	141	158	185
6:12	24	80	80	80	80	83	90	98	115	134	154	175	197	221	260
	36	95	95	95	95	95	102	112	131	152	174	198	224	251	295
	48	110	110	110	110	110	116	126	148	172	197	224	253	284	333
	60	125	125	125	125	125	129	141	165	191	220	250	282	316	371
7:12	24	85	85	91	101	110	121	131	154	179	205	234	264	296	347
	36	103	103	112	124	136	149	162	190	220	253	287	325	364	427
	48	120	121	134	148	163	178	194	227	263	302	344	388	435	511
	60	138	141	157	173	189	207	225	265	307	352	401	452	507	595
8:12	24	90	90	98	108	118	129	141	165	191	220	250	282	316	371
	36	110	110	122	134	147	161	175	206	239	274	312	352	395	463
	48	130	133	147	162	178	194	212	248	288	331	376	425	476	559
	60	150	156	172	190	208	228	248	291	338	388	441	498	558	655
9:12	24	95	95	104	115	126	138	150	176	204	234	266	301	337	396
	36	118	118	131	145	159	174	189	222	257	295	336	379	425	499
	48	140	144	160	176	193	211	230	270	313	359	409	461	517	607
	60	163	170	188	207	228	249	271	318	369	423	482	544	609	715
10:12	24	100	100	110	122	134	146	159	187	216	249	283	319	358	420
	36	125	127	141	155	170	186	203	238	276	317	360	407	456	535
	48	150	156	172	190	208	228	248	291	338	388	441	498	558	655
	60	175	184	204	225	247	270	294	345	400	459	522	589	661	775
11:12	24	105	105	117	129	141	155	168	197	229	263	299	338	379	444
	36	133	136	150	166	182	199	216	254	294	338	385	434	487	571
	48	160	167	185	204	224	245	266	313	362	416	473	534	599	703
	60	188	198	220	242	266	291	316	371	431	494	562	635	712	835
12:12	24	110	111	123	136	149	163	177	208	242	277	315	356	399	469
	36	140	144	160	176	193	211	230	270	313	359	409	461	517	607
	48	170	178	198	218	239	261	285	334	387	445	506	571	640	751
	60	200	213	235	260	285	311	339	398	462	530	603	681	763	895
		Unit Lateral Loads for Floor Diaphragm, w_{floorL} , (plf) ^{1,3,3,5}													
		110	110	112	123	135	148	161	189	219	251	286	323	362	425

* See Footnotes 1 - 5.

Lateral Analysis

Two Story Residence (Garage Excluded)						
Load Against North -South				Adjust Value	Length (ft)	Loads (lbs)
Table Value	H (ft)	(1+h)/11				
W_{roof} =	90 plf	- ft	0.95	83 plf	48 ft	3981
W_{second}	135 plf	9 ft	0.91	119 plf	46 ft	5476
W_{total} =						9457

Two Story Garage (Garage Excluded)						
Load Against East-West				Adjust Value	Length (ft)	Loads (lbs)
Table Value	H (ft)	(1+h)/11				
W_{roof} =	75 plf	- ft	0.95	69 plf	32 ft	2212
W_{second}	135	9 ft	0.91	119 plf	30 ft	3571
W_{total} =						5783

Wind Loads calculated per WFCM-2018

V_w = 110 mph

Exp: B E_{adj} = 0.97 (Mean Roof Height <33 ft)

K_{zt} 1.00

P_{avg} 18 psf Table C1.1

$(C_o * L_{F-H})$ C_o = adjustment factor

L_{F-H} = length of full-height wall (ft)

ASD Load Comb L_w = total wall length (ft)

$V = 0.6D + W$ H_w = maximum wall height (ft)

Table 4.3.4 Maximum Shear Wall Aspect Ratios

Shear Wall Sheathing Type	Maximum h/b, Ratio
Wood structural panels, unblocked	2:1
Wood structural panels, blocked	3.5:1
Particleboard, blocked	2:1
Diagonal sheathing, conventional	2:1
Gypsum wallboard	2:1 ¹
Portland cement plaster	2:1 ¹
Structural Fiberboard	3.5:1

¹ Walls having aspect ratios exceeding 1.5:1 shall be blocked shear walls.

<u>Upper Shearwalls</u>	Length	Load	Length	Load
North Wall	13.5	81.91 plf	1 4 ft	327.6 lbs
			2 9.5 ft	778.2 lbs
South Wall	14.5	76.26 plf	3 14.5 ft	1106 lbs
East Wall	8	248.8 plf	4 8 ft	1990 lbs
West Wall	17	117.1 plf	5 17 ft	1990 lbs

Lower Story

North Wall	13.5	214.2 plf	6 4 ft	856.7 lbs
			7 9.5 ft	2035 lbs
South Wall	25	115.7 plf	8 25 ft	2891 lbs
East Wall	5.166	610.2 plf	9 2.7 ft	1648 lbs
			10 2.5 ft	1526 lbs
West Wall	10.75	293.2	11 2.75 ft	806.4 lbs
			12 8 ft	2346 lbs
Center Wall	14	225.2	13 14 ft	2927 lbs

Additional Seismic Load from DL of Hot Tub

6000 lbs 399 lbs 1205.9 lbs
 399 lbs 2745.4 lbs

Project:	Giola Residence	Pg. No:	3
Address:	Mercer Island	Date:	4/21/23
Client:		Job No.:	Giola

Seismic Loads - New Loading Main House

Seismic Loads calculated per ASCE 7-16 Ch. 12.14

Sds=	1.124	Width (ft)	Length (ft)	W	0.7 * Fp=	
R=	6.5 (ASCE)	Roof	48 ft	32 ft	15360 lbs	2045 lbs
F=	1.1	Upper Floor	46 ft	30 ft	13800	1837
Cs=	0.190 =Cs*W					
Fp=	W*					3883 lbs

****Wind Controls****Lateral Analysis** Flat Roof**Single Story Garage**

Load Against North -South				Adjust Value	Length (ft)	Loads (lbs)
Table Value	H (ft)	(1+h)/11				
$W_{roof} =$	73 plf	- ft	0.95	67 plf	34 ft	2287
$W_{total} =$						2287

Two Story Garage (Garage Excluded)

Load Against East-West				Adjust Value	Length (ft)	Loads (lbs)
Table Value	H (ft)	(1+h)/11				
$W_{roof} =$	73 plf	- ft	0.95	67 plf	28 ft	1876
$W_{total} =$						1876

North Wall	14 ft
South Wall	32 ft
East Wall	5.5 ft
West Wall	11 ft

Seismic Loads - New Loading Garage

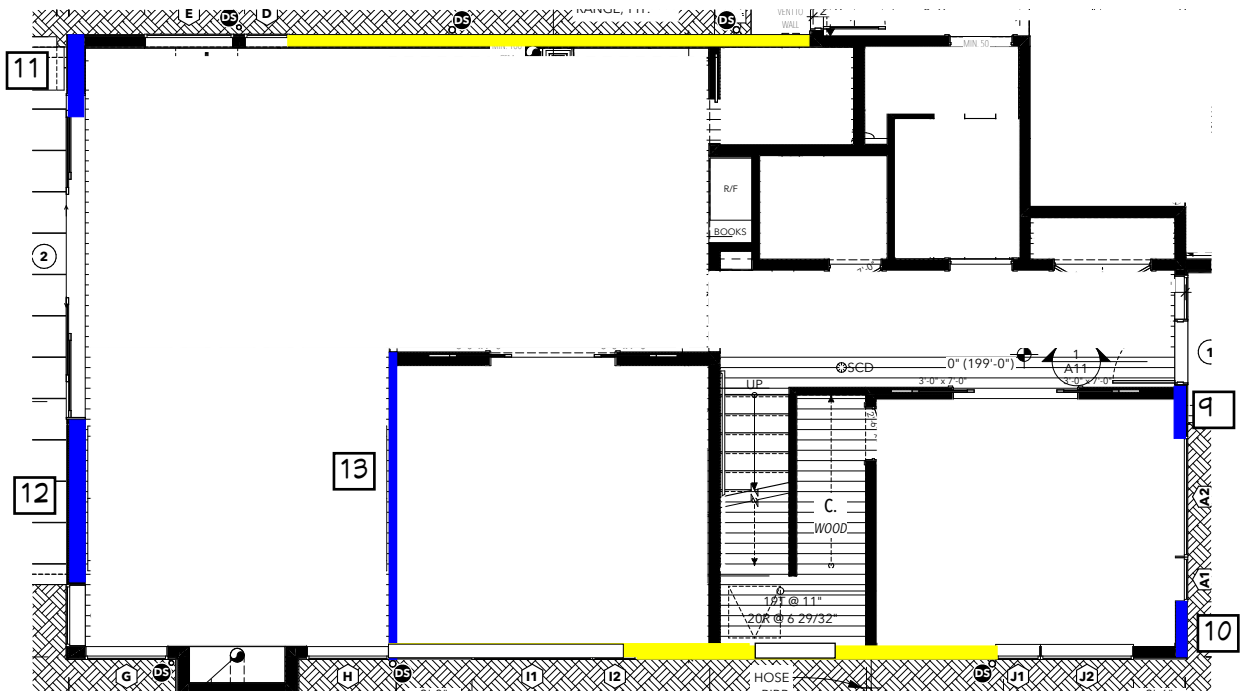
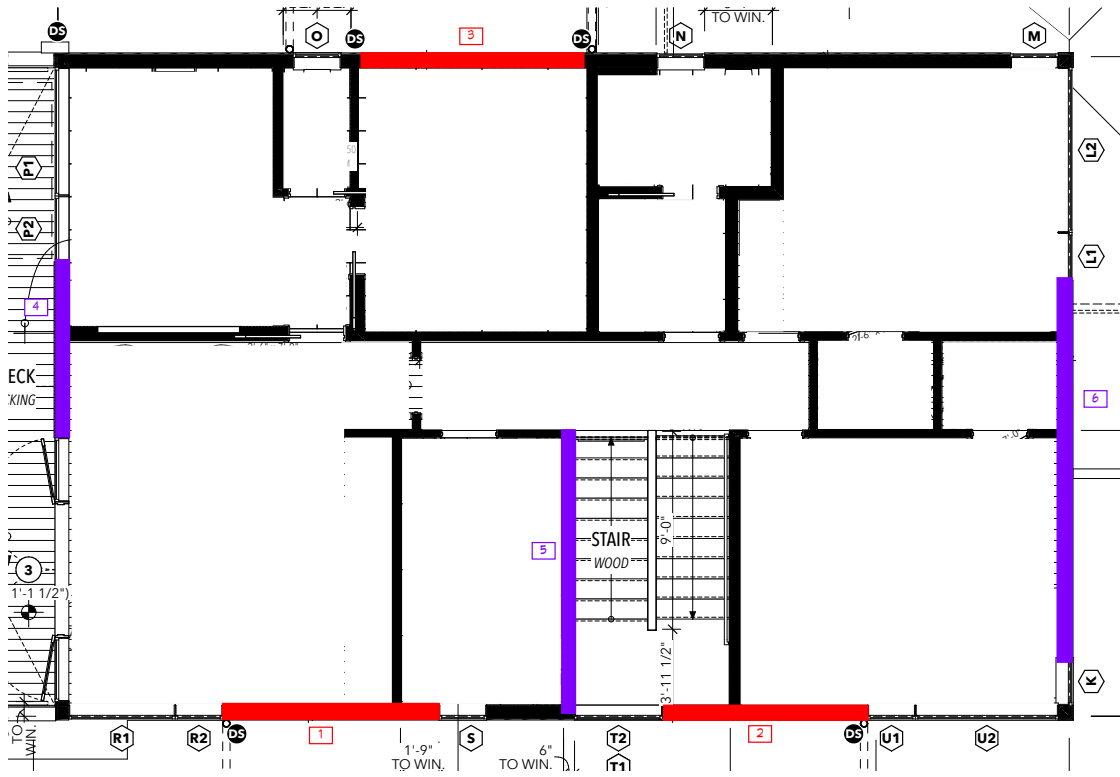
Seismic Loads calculated per ASCE 7-16 Ch. 12.14

Sds=	0.909	Width (ft)	Length (ft)	W	0.7 * Fp=	
R=	6.5 (ASCE)	Roof	34 ft	28 ft	9520 lbs	1025 lbs
F=	1.1					
Cs=	0.154 =Cs*W					
Fp=	W*					1025 lbs

****Wind Controls**

Project: Giola
 Address: Mercer Island
 Client:

Pg. No: 3
 Date: 4/21/23
 Job No.: Giola



This sheet performs calculations for Perforated Shearwalls per IBC 2018 - ASD

Shear Wall Data Input

Results

Callouts

Shear Line	V (lbs)	L _{WALL} (ft)	L _{PULL-OUT} (ft)	H _{WALL} (ft)	H _{OPEN} (ft)	DL (plf)	Opening Ratio	% Full Height	C _o	V (plf)	R (lbs)	R _{total} (lbs)	2bs/h* Adjustment (Perforated) (auto)	Flag Adjustment (Segmented) (manual)	ARF*	SW	HD	Allowable	
Upper Story																			
1	328	4.00	4.00	9.00	0.00	125	0.00	1.00	1.00	82	588	-	1.00	X	0.97	W6	LSTA36	324.531 plf	
2	779	9.50	9.50	9.00	0.00	125	0.00	1.00	1.00	82	382	-	1.00	-	1.00	W6	-	-	
3	1106	14.50	14.50	9.00	0.00	125	0.00	1.00	1.00	76	143	-	1.00	-	1.00	W6	-	-	
4	1990	8.00	8.00	9.00	0.00	125	0.00	1.00	1.00	249	1939	-	1.00	-	1.00	W6	MSTC40	-	
5	1990	17.00	17.00	9.00	0.00	125	0.00	1.00	1.00	117	416	-	1.00	-	1.00	W6	-	-	
Main Story																			
6	857	3.77	3.77	9.00	0.00	165	0.00	1.00	1.00	227	1859	-	1.00	X	0.95	W6	HDU2	318.783 plf	
7	2034	9.50	9.50	9.00	0.00	165	0.00	1.00	1.00	214	1457	-	1.00	-	1.00	W6	HDU2	- plf	
8	2891	25.00	25.00	9.00	0.00	125	0.00	1.00	1.00	116	103	-	1.00	-	1.00	W6	-	- plf	
9	1647	2.70	2.70	9.00	0.00	165	0.00	1.00	1.00	610	5356	-	1.00	X	0.83	2W4	HDU8	816.667 plf	
10	1625	2.50	2.50	9.00	0.00	165	0.00	1.00	1.00	610	5366	-	1.00	X	0.80	2W4	HDU8	784.000 plf	
11	830	2.75	2.75	9.00	0.00	165	0.00	1.00	1.00	302	2580	-	1.00	X	0.84	W4	HDU2	412.045 plf	
12	2346	8.00	8.00	9.00	0.00	165	0.00	1.00	1.00	293	2243	-	1.00	-	1.00	W6	HDU2	- plf	
13	2927	14.00	14.00	9.00	0.00	165	0.00	1.00	1.00	209	1189	-	1.00	-	1.00	W6	HDU2	- plf	

HOLDOWNS: Floor to Floor (SPF/HE)

Item	Capacity
LSTA36	1640#
MSTC40	2650#
MSTC52	3975#
MSTC66	5840#

HOLDOWNS: Foundation (SPF/HE)

Tag	Item	Capacity	Post	AB
H1	DTT2Z	1800#	3"	1 1/2" dia
H2	HDU2	2215#	3"	5/8" dia
H3	HDU5	4065#	3"	5/8" dia
H4	HHDD11	11810#	6x6 DF	1" dia

Shear Wall Adjustments

SDPWS 4.3.4

ARF

Segmented walls

for aspect ratios (h/bs) greater than 2:1

ARF = 1.25-0.125(h/bs)

2bs/h Perforated walls for aspect ratios (h/bs) greater than 2:1

for aspect ratios (h/bs) greater than 3:5:1, segment not considered aka = open wall

code adjustment applies to affected individual segments, spreadsheet is conservative and applies to

full wall

leave as 1.00 if Segmented wall aka always leave 1.00 unless it's an adjusted perforated wall

*2bs/h is applied to the v results in this spreadsheet while the Aspect Ratio Factor (ARF) is accounted for manually by reducing the capacity of the chosen SW

ESG DESIGN, PLLC

Consulting Engineers
12540 202nd Place SE
Issaquah Washington 98027

Job **Cirola**
Date Apr 21, 23
Subject Shear Wall Analysis Summary
Sheet No. 1

written by: **ESG** 9/26/2003
checked by:
updated: 11/30/2004

This sheet performs calculations for Perforated Shearwalls per IBC 2018 - ASD

Shear Wall Data Input

Results

Callouts

Shear Line	V (lbs)	L _{wall} (ft)	L _{pull-ht} (ft)	H _{wall} (ft)	H _{open} (ft)	DL (plf)	Opening Ratio	% Full Height	C _o	V (plf)	R (lbs)	R _{total} (lbs)	2bs/h* Adjustment (Perforated) (auto)	Flag Adjustment (Segmented) (manual)	ARF* (manual)	SW	HD	Allowable	
<u>Garage</u>																			
1	938	14.00	14.00	9.00	0.00	125	0.00	1.00	1.00	67	78	-	1.00	-	1.00	W6	-	plf	
2	938	32.00	32.00	9.00	0.00	25	0.00	1.00	1.00	29	24	-	1.00	-	1.00	W6	-	-	
3	1144	5.50	5.50	9.00	0.00	165	0.00	1.00	1.00	208	1599	-	1.00	-	1.00	W6	HDU2	-	
4	1144	11.00	11.00	9.00	0.00	165	0.00	1.00	1.00	104	392	-	1.00	-	1.00	W6	-	-	

HOLDOWNS: Floor to Floor (SPF/HE)

Item	Capacity
LSTA36	1640#
MSTC40	2650#
MSTC52	3975#
MSTC66	5840#

HOLDOWNS: Foundation (SPF/HE)

Tag	Item	Capacity	Post	AB
H1	DTT2Z	1800#	3"	1/2" dia
H2	HDU2	2215#	3"	5/8" dia
H3	HDU5	4065#	3"	5/8" dia
H4	HHQ11	11810#	6x6 DF	1" dia

Shear Wall Adjustments

SDPWS 4.3.4

ARF

Segmented walls
for aspect ratios (h/bs) greater than 2:1
ARF = 1.25-0.125(h/bs)

2bs/h Perforated walls for aspect ratios (h/bs) greater than 2:1

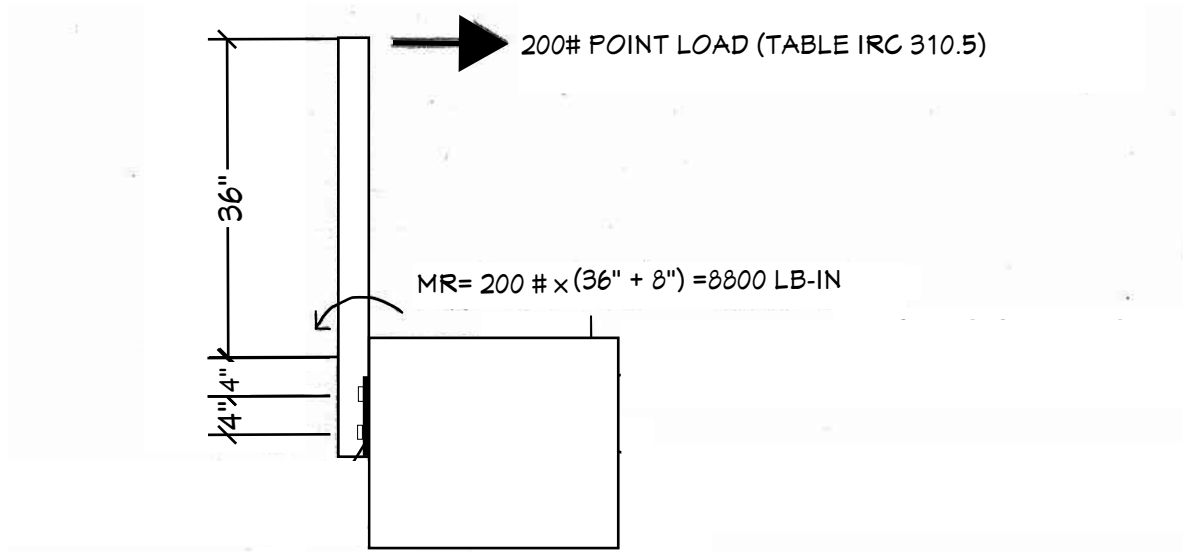
for aspect ratios (h/bs) greater than 3:5:1, segment not considered aka = open wall
code adjustment applies to affected individual segments; spreadsheet is conservative and applies to full wall
leave as 1.00 if Segmented wall aka always leave 1.00 unless it's an adjusted perforated wall

*2bs/h is applied to the v results in this spreadsheet while the Aspect Ratio Factor (ARF) is accounted for manually by reducing the capacity of the chosen SW



FACE MOUNT GUARDPOST CONNECTION CHECK

ALUMINUM GUARD POST



MAX MOMENT = 1050 LB-FT = 12600 LB-IN
12600 LB -IN = 200 LB = 63" - 36" = 27" - 2" = 25" - MAX DISTANCE FROM
TOP OF WALL



Company:	ESGDesign	Date:	9/8/2022
Engineer:	Jennifer	Page:	1/5
Project:	Giola Residence		
Address:	Mercer Island		
Phone:			
E-mail:			

1. Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

General

Design method: ACI 318-19
Units: Imperial units

Anchor Information:

Anchor type: Concrete screw
Material: Carbon Steel
Diameter (inch): 0.500
Nominal Embedment depth (inch): 3.250
Effective Embedment depth, h_{ef} (inch): 2.350
Code report: ICC-ES ESR-2713
Anchor category: 1
Anchor ductility: No
 h_{min} (inch): 5.00
 c_{ac} (inch): 3.56
 C_{min} (inch): 1.75
 S_{min} (inch): 3.00

Base Material

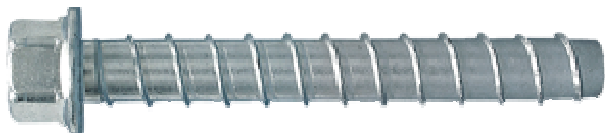
Concrete: Normal-weight
Concrete thickness, h (inch): 12.00
State: Cracked
Compressive strength, f'_c (psi): 2500
 $\Psi_{c,v}$: 1.0
Reinforcement condition: Supplementary reinforcement not present
Supplemental edge reinforcement: Not applicable
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Base Plate

Length x Width x Thickness (inch): 8.00 x 5.00 x 0.25

Recommended Anchor

Anchor Name: Titen HD® - 1/2"Ø Titen HD, h_{nom} : 3.25" (83mm)
Code Report: ICC-ES ESR-2713





Company:	ESGDesign	Date:	9/8/2022
Engineer:	Jennifer	Page:	2/5
Project:	Giola Residence		
Address:	Mercer Island		
Phone:			
E-mail:			

Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: No

Anchors subjected to sustained tension: Not applicable

Apply entire shear load at front row: No

Anchors only resisting wind and/or seismic loads: No

Strength level loads:

N_{ua} [lb]: 0

V_{uax} [lb]: 0

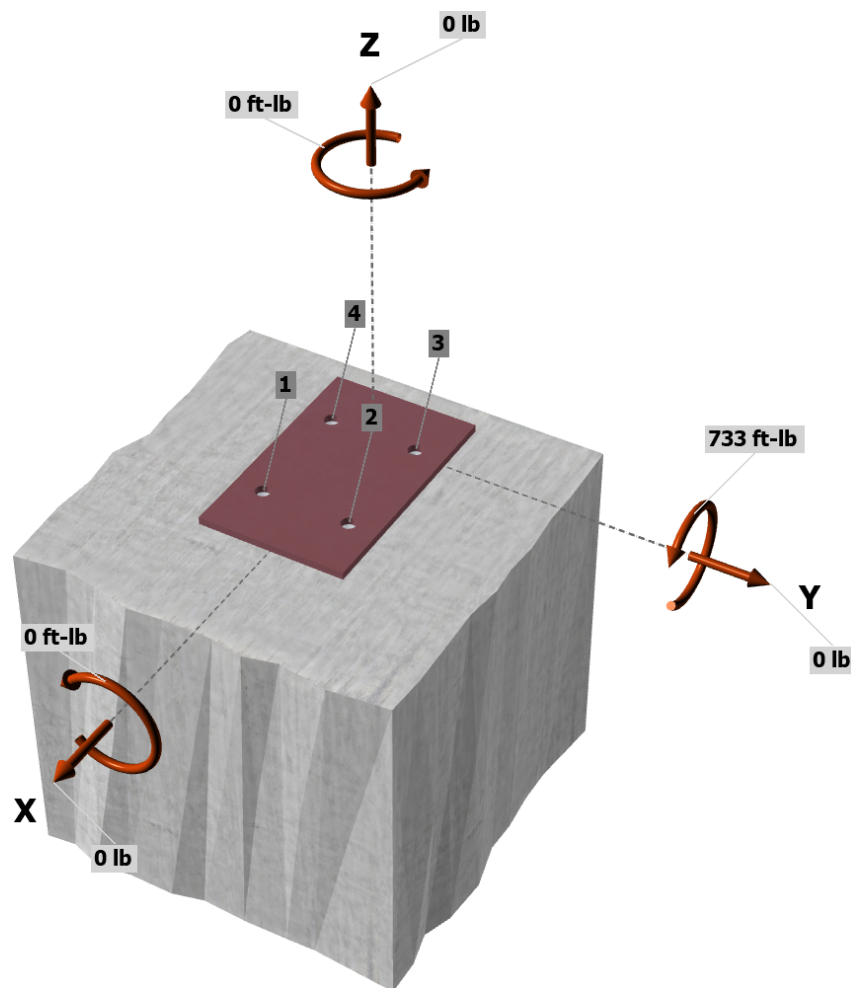
V_{uay} [lb]: 0

M_{ux} [ft-lb]: 0

M_{uy} [ft-lb]: 733

M_{uz} [ft-lb]: 0

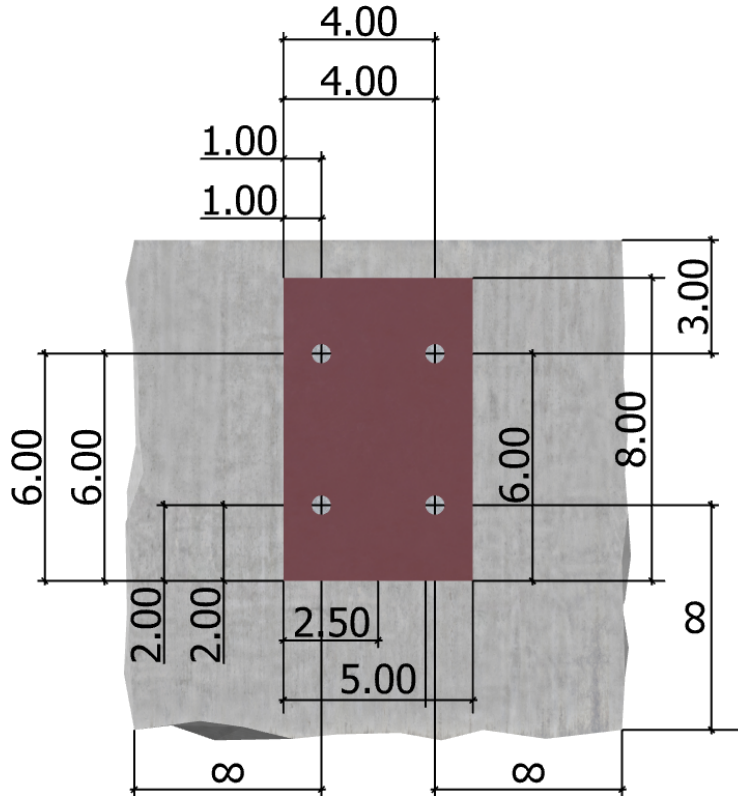
<Figure 1>





Company:	ESGDesign	Date:	9/8/2022
Engineer:	Jennifer	Page:	3/5
Project:	Giola Residence		
Address:	Mercer Island		
Phone:			
E-mail:			

<Figure 2>





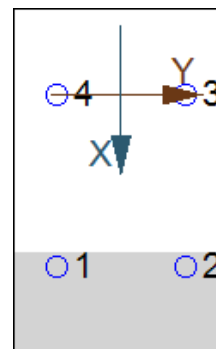
Company:	ESGDesign	Date:	9/8/2022
Engineer:	Jennifer	Page:	4/5
Project:	Giola Residence		
Address:	Mercer Island		
Phone:			
E-mail:			

3. Resulting Anchor Forces

Anchor	Tension load, N _{ua} (lb)	Shear load x, V _{uax} (lb)	Shear load y, V _{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0
3	842.2	0.0	0.0	0.0
4	842.2	0.0	0.0	0.0
Sum	1684.4	0.0	0.0	0.0

Maximum concrete compression strain (%): 0.07
 Maximum concrete compression stress (psi): 288
 Resultant tension force (lb): 1684
 Resultant compression force (lb): 1684
 Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
 Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00

<Figure 3>



4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N _{sa} (lb)	φ	φN _{sa} (lb)
20130	0.65	13085

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.6.2)

$$N_b = k_c \lambda_a \sqrt{f_c} h_{ef}^{1.5} \text{ (Eq. 17.6.2.2.1)}$$

k _c	λ _a	f _c (psi)	h _{ef} (in)	N _b (lb)
17.0	1.00	2500	2.350	3062

$$\phi N_{cbg} = \phi (A_{Nc} / A_{Nco}) \Psi_{ec,N} \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b \text{ (Sec. 17.5.1.2 \& Eq. 17.6.2.1a)}$$

A _{Nc} (in ²)	A _{Nco} (in ²)	c _{a,min} (in)	Ψ _{ec,N}	Ψ _{ed,N}	Ψ _{c,N}	Ψ _{cp,N}	N _b (lb)	φ	φN _{cbg} (lb)
65.58	49.70	3.00	1.000	0.955	1.00	1.000	3062	0.65	2509

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.8)

Tension	Factored Load, N _{ua} (lb)	Design Strength, φN _n (lb)	Ratio	Status
Steel	842	13085	0.06	Pass
Concrete breakout	1684	2509	0.67	Pass (Governs)

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



Anchor Designer™
Software
Version 3.1.2209.3

Company:	ESGDesign	Date:	9/8/2022
Engineer:	Jennifer	Page:	5/5
Project:	Giola Residence		
Address:	Mercer Island		
Phone:			
E-mail:			

1/2"Ø Titen HD, hnom:3.25" (83mm) meets the selected design criteria.

12. Warnings

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