



STRUCTURAL CALCULATIONS

Steinborn Residence 8435 SE 47th PL, Mercer Island, WA 98040

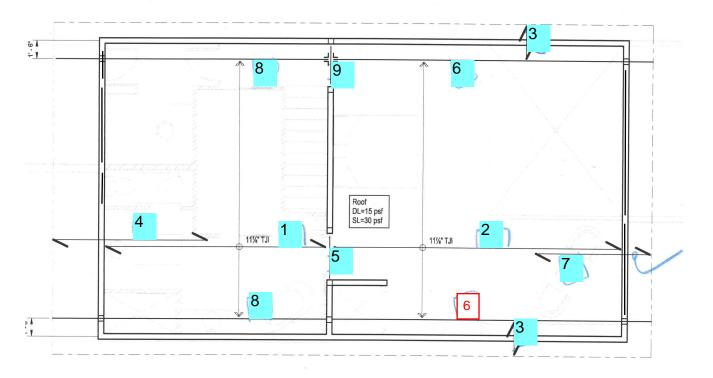
Ectypos Architecture 4212 W Mercer Way, Mercer Island, WA 98040

February 14, 2022

Structural Permit Calculations



Roof DL=15 psf SL=30 psf (includes rain surcharge)

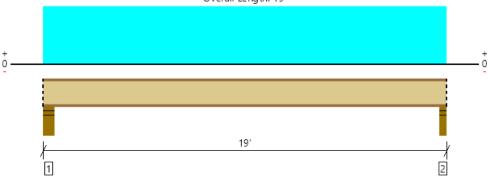




Roof, J1 1 piece(s) 11 7/8" TJI ® 210 @ 24" OC



Overall Length: 19'



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	863 @ 4 1/2"	1679 (3.50")	Passed (51%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	821 @ 5 1/2"	1903	Passed (43%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3816 @ 9' 7"	4364	Passed (87%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.539 @ 9' 7"	0.921	Passed (L/410)		1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.808 @ 9' 7"	1.228	Passed (L/273)		1.0 D + 1.0 S (All Spans)

System : Roof Member Type : Joist Building Use : Residential Building Code : IBC 2018 Design Methodology : ASD Member Pitch : 0/12

• Deflection criteria: LL (L/240) and TL (L/180).

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

	Bearing Length			Loads t	o Supports		
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Stud wall - HF	5.50"	5.50"	1.75"	288	575	863	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.75"	283	565	848	Blocking
Blocking Panels are assumed to carry no load	s annlied dire	tly above the	m and the ful	l load is annlie	d to the men	her heina	designed

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 8" o/c	
Bottom Edge (Lu)	19' o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.

•Maximum allowable bracing intervals based on applied load.

			Dead	Snow	
Vertical Load	Location	Spacing	(0.90)	(1.15)	Comments
1 - Uniform (PSF)	0 to 19'	24"	15.0	30.0	Roof Load

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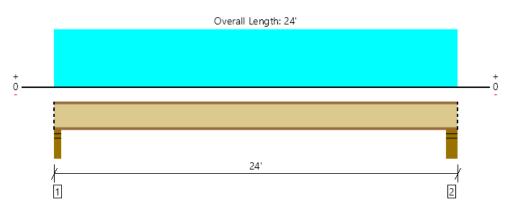
ForteWEB Software Operator	Job Notes
Jane Johnson Bykonen Carter Quinn (206) 264-7784 jaj@bcq-se.com	





Roof, J2 1 piece(s) 11 7/8" TJI ® 360 @ 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)	1088 @ 23' 7 1/2"	1731 (3.50")	Passed (63%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1046 @ 3 1/2"	1961	Passed (53%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	6169 @ 11' 11"	7107	Passed (87%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	1.043 @ 11' 11"	1.171	Passed (L/270)		1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	1.564 @ 11' 11"	1.561	Passed (L/180)		1.0 D + 1.0 S (All Spans)

System : Roof Member Type : Joist Building Use : Residential Building Code : IBC 2018 Design Methodology : ASD Member Pitch : 0/12

• Deflection criteria: LL (L/240) and TL (L/180).

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

Dead Snow	Total	Accessories
358 715	1073	Blocking
363 725	1088	Blocking
:	363 725	

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 6" o/c	
Bottom Edge (Lu)	24' o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.

•Maximum allowable bracing intervals based on applied load.

			Dead	Snow	
Vertical Load	Location	Spacing	(0.90)	(1.15)	Comments
1 - Uniform (PSF)	0 to 24'	24"	15.0	30.0	Roof Load

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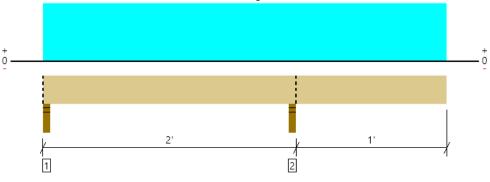
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Roof, J3 1 piece(s) 2 x 4 HF No.2 @ 24" OC





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)	213 @ 1' 10 1/4"	2126 (3.50")	Passed (10%)		1.0 D + 1.0 S (All Spans)
Shear (lbs)	71 @ 1' 5"	604	Passed (12%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-59 @ 1' 10 1/4"	430	Passed (14%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.008 @ 3'	0.200	Passed (2L/999+)		1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.011 @ 3'	0.200	Passed (2L/999+)		1.0 D + 1.0 S (Alt Spans)

System : Roof Member Type : Joist Building Use : Residential Building Code : IBC 2018 Design Methodology : ASD Member Pitch : 0/12

• Deflection criteria: LL (L/240) and TL (L/180).

• Overhang deflection criteria: LL (2L/0.2") and TL (2L/0.2").

• 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.

• A 15% increase in the moment capacity has been added to account for repetitive member usage.

Applicable calculations are based on NDS.

	Bearing Length			Loads t	o Supports		
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Stud wall - HF	3.50"	3.50"	1.50"	19	50	69	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.50"	71	142	213	Blocking

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

Lateral Bracing	Bracing Intervals	Comments				
Top Edge (Lu)	3' o/c					
Bottom Edge (Lu)	3' o/c					
Maximum allowable bracing intervals based on applied load						

Maximum allowable bracing intervals based on applied load.

			Dead	Snow	
Vertical Load	Location (Side)	Spacing	(0.90)	(1.15)	Comments
1 - Uniform (PSF)	0 to 3'	24"	15.0	30.0	Roof Load

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

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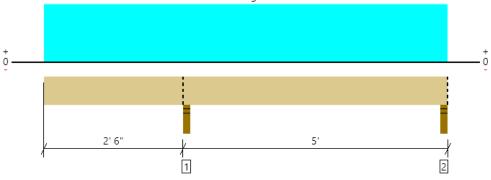


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Roof, J4 2 piece(s) 2 x 4 HF No.2 @ 24" OC

Overall Length: 7' 6"



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)	515 @ 2' 7 3/4"	4253 (3.50")	Passed (12%)		1.0 D + 1.0 S (All Spans)
Shear (lbs)	237 @ 3' 1"	1208	Passed (20%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-315 @ 2' 7 3/4"	861	Passed (37%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.111 @ 0	0.265	Passed (2L/572)		1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.146 @ 0	0.353	Passed (2L/434)		1.0 D + 1.0 S (Alt Spans)

System : Roof Member Type : Joist Building Use : Residential Building Code : IBC 2018 Design Methodology : ASD Member Pitch : 0/12

PASSED

• Deflection criteria: LL (L/240) and TL (L/180).

• Overhang deflection criteria: LL (2L/240) and TL (2L/180).

• Left cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.

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

• A 15% increase in the moment capacity has been added to account for repetitive member usage.

· Applicable calculations are based on NDS.

	Bearing Length			Loads to Supports (Ibs)			
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Stud wall - HF	3.50"	3.50"	1.50"	172	343	515	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.50"	53	129	182	Blocking

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

Lateral Bracing	Bracing Intervals	Comments				
Top Edge (Lu)	7' 6" o/c					
Bottom Edge (Lu)	7' 6" o/c					
•Maximum allowable bracing intervals based on applied load						

ium allowable bracing intervals based on applied load.

			Dead	Snow	
Vertical Load	Location (Side)	Spacing	(0.90)	(1.15)	Comments
1 - Uniform (PSF)	0 to 7' 6"	24"	15.0	30.0	Roof Load

Weyerhaeuser Notes

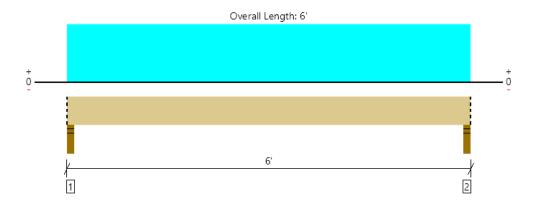
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1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



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)	3009 @ 2"	4961 (3.50")	Passed (61%)		1.0 D + 1.0 S (All Spans)
Shear (lbs)	1724 @ 1' 3 3/8"	9878	Passed (17%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-Ibs)	4026 @ 3'	18346	Passed (22%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.030 @ 3'	0.283	Passed (L/999+)		1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.045 @ 3'	0.378	Passed (L/999+)		1.0 D + 1.0 S (All Spans)

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

• Deflection criteria: LL (L/240) and TL (L/180).

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

Available	Required	Dead	Snow	Total	Accessories
3.50"	2.12"	1029	1980	3009	Blocking
3.50"	2.12"	1029	1980	3009	Blocking
	3.50"	3.50" 2.12"	3.50" 2.12" 1029	3.50" 2.12" 1029 1980	

above them and the full load is ap

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

•Maximum allowable bracing intervals based on applied load.

			Dead	Snow	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.15)	Comments
0 - Self Weight (PLF)	0 to 6'	N/A	13.0		
1 - Uniform (PSF)	0 to 6' (Front)	22'	15.0	30.0	Roof Load

Weyerhaeuser Notes

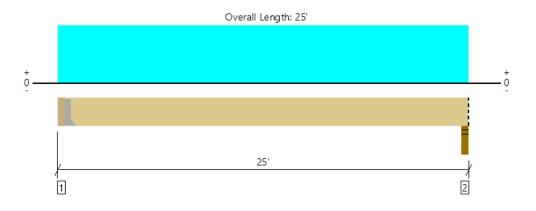
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1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



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)	1264 @ 3 1/2"	4725 (1.50")	Passed (27%)		1.0 D + 1.0 S (All Spans)
Shear (lbs)	1162 @ 1' 3 3/8"	9878	Passed (12%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-Ibs)	7754 @ 12' 6 3/4"	18346	Passed (42%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.663 @ 12' 6 3/4"	1.227	Passed (L/444)		1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	1.138 @ 12' 6 3/4"	1.636	Passed (L/259)		1.0 D + 1.0 S (All Spans)

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

PASSED

• Deflection criteria: LL (L/240) and TL (L/180).

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

	Bearing Length			Loads t	o Supports		
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Hanger on 11 7/8" HF beam	3.50"	Hanger ¹	1.50"	536	754	1290	See note 1
2 - Stud wall - HF	3.50"	3.50"	1.50"	535	746	1281	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)	24' 9" o/c				
Bottom Edge (Lu)	24' 9" o/c				
•Maximum allowable bracing intervals based on applied load.					

app

Connector: Simpson Strong-Tie

1 5						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	LUS410	2.00"	N/A	8-10dx1.5	6-10d	

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

			Dead	Snow	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.15)	Comments
0 - Self Weight (PLF)	3 1/2" to 25'	N/A	13.0		
1 - Uniform (PSF)	0 to 25' (Front)	2'	15.0	30.0	

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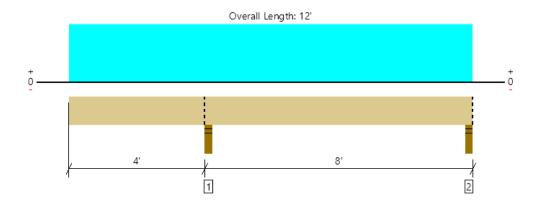
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator Job Notes Jane Johnson Bykonen Carter Quinn (206) 264-7784 jaj@bcq-se.com





Roof, J7 2 piece(s) 1 3/4" x 3 1/2" 2.0E Microllam® LVL @ 24" OC



LDF

1.15

1.15

Load: Combination (Pattern)

1.0 D + 1.0 S (All Spans)

1.0 D + 1.0 S (All Spans)

1.0 D + 1.0 S (All Spans)

1.0 D + 1.0 S (Alt Spans)

1.0 D + 1.0 S (Alt Spans)

System : Roof Member Type : Joist Building Use : Residential Building Code : IBC 2018 Design Methodology : ASD Member Pitch : 0/12

Total Load Defl. (in)
 O.
 Deflection criteria: LL (L/240) and TL (L/180)

Design Results

Shear (lbs)

Moment (Ft-lbs)

Live Load Defl. (in)

Member Reaction (lbs)

• Overhang deflection criteria: LL (2L/240) and TL (2L/180).

• Left cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.

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

· 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.

Actual @ Location

818 @ 4' 1 3/4"

406 @ 4' 7"

-773 @ 4' 1 3/4"

0.374 @ 0

0.481 @ 0

Resawn products must maintain manufacturing stamps.

	Bearing Length		Loads to Supports (lbs)				
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Stud wall - HF	3.50"	3.50"	1.50"	273	546	819	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.50"	87	208	295	Blocking

Allowed

4961 (3.50")

2677

2190

0.415

0.553

Result

Passed (16%)

Passed (15%)

Passed (35%)

Passed (2L/266)

Passed (2L/206)

• 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)	12' o/c				
Bottom Edge (Lu)	12' o/c				
Maximum allowable bracing intervals based on applied load					

Maximum allowable bracing intervals based on applied load.

			Dead	Snow	
Vertical Load	Location (Side)	Spacing	(0.90)	(1.15)	Comments
1 - Uniform (PSF)	0 to 12'	24"	15.0	30.0	Roof Load

Weyerhaeuser Notes

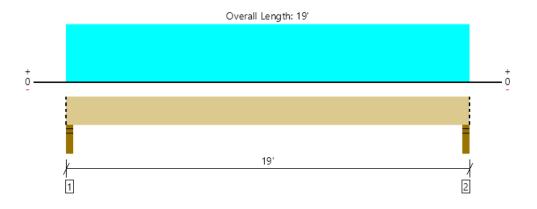
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1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



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)	978 @ 2"	4961 (3.50")	Passed (20%)		1.0 D + 1.0 S (All Spans)
Shear (lbs)	846 @ 1' 3 3/8"	9878	Passed (9%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	4486 @ 9' 6"	18346	Passed (24%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.226 @ 9' 6"	0.933	Passed (L/992)		1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.388 @ 9' 6"	1.244	Passed (L/578)		1.0 D + 1.0 S (All Spans)

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

• Deflection criteria: LL (L/240) and TL (L/180).

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

Available	Required	Dead	-		
1		Deau	Snow	Total	Accessories
3.50"	1.50"	408	570	978	Blocking
3.50"	1.50"	408	570	978	Blocking
	3.50"	3.50" 1.50"	3.50" 1.50" 408	3.50" 1.50" 408 570	

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

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

•Maximum allowable bracing intervals based on applied load.

			Dead	Snow	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.15)	Comments
0 - Self Weight (PLF)	0 to 19'	N/A	13.0		
1 - Uniform (PSF)	0 to 19' (Front)	2'	15.0	30.0	

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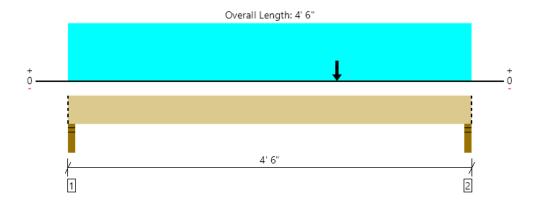
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1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



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)	3799 @ 4' 4"	4961 (3.50")	Passed (77%)		1.0 D + 1.0 S (All Spans)
Shear (lbs)	2514 @ 3' 2 5/8"	9878	Passed (25%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3951 @ 2' 11 11/16"	18346	Passed (22%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.018 @ 2' 3 7/16"	0.208	Passed (L/999+)		1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.029 @ 2' 3 7/16"	0.278	Passed (L/999+)		1.0 D + 1.0 S (All Spans)

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

• Deflection criteria: LL (L/240) and TL (L/180).

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

Bearing Length			Loads to Supports (Ibs)			
Total	Available	Required	Dead	Snow	Total	Accessories
3.50"	3.50"	2.10"	1074	1909	2983	Blocking
3.50"	3.50"	2.68"	1414	2385	3799	Blocking
	3.50" 3.50"	3.50" 3.50" 3.50" 3.50"	3.50" 3.50" 2.10" 3.50" 3.50" 2.68"	3.50" 3.50" 2.10" 1074 3.50" 3.50" 2.68" 1414	3.50" 3.50" 2.10" 1074 1909 3.50" 3.50" 2.68" 1414 2385	3.50° 3.50° 2.10° 1074 1909 2983

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' 6" o/c	
Bottom Edge (Lu)	4' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

			Dead	Snow	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.15)	Comments
0 - Self Weight (PLF)	0 to 4' 6"	N/A	13.0		
1 - Uniform (PSF)	0 to 4' 6" (Front)	22'	15.0	30.0	Roof Load
2 - Point (lb)	3' (Front)	N/A	536	754	Linked from: B6, Support 1
3 - Point (lb)	3' (Front)	N/A	408	570	Linked from: B8, Support 2

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

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Job Notes





Roof, Roof header, 14' opening 1 piece(s) 5 1/4" x 11 1/4" 2.0E Parallam® PSL



LDF

1.15

1.15

--

1.0 D + 1.0 S (All Spans)

 Load: Combination (Pattern)
 System : Wall

 1.0 D + 1.0 S (All Spans)
 Member Type

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

 Total Load Defl. (in)
 0.551 @ 7' 3"

 • Deflection criteria: LL (L/360) and TL (L/240).

Design Results

Shear (lbs)

Moment (Ft-lbs)

Live Load Defl. (in)

Member Reaction (lbs)

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

	Bearing Length			Loads to Supports (Ibs)			
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Trimmer - DF	3.00"	3.00"	1.53"	1765	3263	5028	None
2 - Trimmer - DF	3.00"	3.00"	1.53"	1765	3263	5028	None

Allowed

9844 (3.00")

13132

30998

0.475

0.712

Result

Passed (51%)

Passed (32%)

Passed (57%)

Passed (L/478)

Passed (L/310)

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

•Maximum allowable bracing intervals based on applied load.

			Dead	Snow	
Vertical Loads	Location	Tributary Width	(0.90)	(1.15)	Comments
0 - Self Weight (PLF)	0 to 14' 6"	N/A	18.5		
1 - Uniform (PSF)	0 to 14' 6"	15'	15.0	30.0	Snow

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

Actual @ Location

5028 @ 1 1/2"

4204 @ 1' 2 1/4"

17602 @ 7' 3"

0.357 @ 7' 3"

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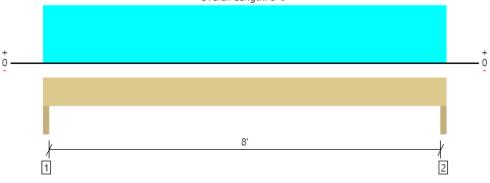
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Roof, Roof header, 8' opening 3 piece(s) 2 x 10 HF No.2

Overall Length: 8' 6"



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)	2914 @ 1 1/2"	5468 (3.00")	Passed (53%)		1.0 D + 1.0 S (All Spans)
Shear (lbs)	2214 @ 1' 1/4"	4787	Passed (46%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	5832 @ 4' 3"	5750	Passed (101%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.122 @ 4' 3"	0.275	Passed (L/814)		1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.185 @ 4' 3"	0.412	Passed (L/535)		1.0 D + 1.0 S (All Spans)

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

• Deflection criteria: LL (L/360) and TL (L/240).

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

Applicable calculations are based on NDS.

	Bearing Length			Loads t	o Supports (
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Trimmer - DF	3.00"	3.00"	1.60"	1001	1913	2914	None
2 - Trimmer - DF	3.00"	3.00"	1.60"	1001	1913	2914	None

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

•Maximum allowable bracing intervals based on applied load.

			Dead	Snow	
Vertical Loads	Location	Tributary Width	(0.90)	(1.15)	Comments
0 - Self Weight (PLF)	0 to 8' 6"	N/A	10.6		
1 - Uniform (PSF)	0 to 8' 6"	15'	15.0	30.0	Snow

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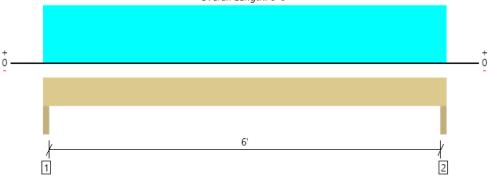
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Roof, Roof header, 6' opening 2 piece(s) 2 x 8 HF No.2

Overall Length: 6' 6"



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)	1700 @ 1 1/2"	3645 (3.00")	Passed (47%)		1.0 D + 1.0 S (All Spans)
Shear (lbs)	1253 @ 10 1/4"	2501	Passed (50%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2554 @ 3' 3"	2569	Passed (99%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.096 @ 3' 3"	0.208	Passed (L/784)		1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.145 @ 3' 3"	0.313	Passed (L/517)		1.0 D + 1.0 S (All Spans)

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

• Deflection criteria: LL (L/360) and TL (L/240).

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

Applicable calculations are based on NDS.

	Bearing Length			Loads t	o Supports		
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Trimmer - DF	3.00"	3.00"	1.50"	579	1121	1700	None
2 - Trimmer - DF	3.00"	3.00"	1.50"	579	1121	1700	None

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

•Maximum allowable bracing intervals based on applied load.

			Dead	Snow	
Vertical Loads	Location	Tributary Width	(0.90)	(1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 6"	N/A	5.5		
1 - Uniform (PSF)	0 to 6' 6"	11' 6"	15.0	30.0	Snow

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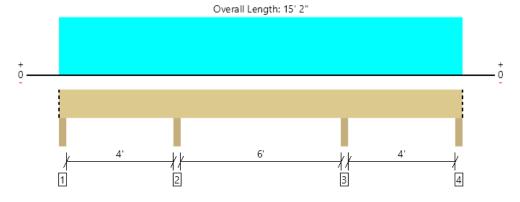
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Roof, Trellis joist, see Risa for steel framing 1 piece(s) 2 x 4 HF No.2 @ 24" OC



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)	545 @ 4' 5 1/4"	2126 (3.50")	Passed (26%)		1.0 D + 1.0 S (Adj Spans)
Shear (lbs)	250 @ 4' 10 1/2"	604	Passed (41%)	1.15	1.0 D + 1.0 S (Adj Spans)
Moment (Ft-lbs)	-276 @ 4' 5 1/4"	430	Passed (64%)	1.15	1.0 D + 1.0 S (Adj Spans)
Live Load Defl. (in)	0.110 @ 7' 7"	0.315	Passed (L/684)		1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.153 @ 7' 7"	0.419	Passed (L/494)		1.0 D + 1.0 S (Alt Spans)

System : Roof Member Type : Joist Building Use : Residential Building Code : IBC 2018 Design Methodology : ASD Member Pitch : 0/12

• Deflection criteria: LL (L/240) and TL (L/180).

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

• A 15% increase in the moment capacity has been added to account for repetitive member usage.

• Applicable calculations are based on NDS.

	Bearing Length		Loads to Supports (Ibs)				
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Beam - DF	3.50"	3.50"	1.50"	49	113	162	Blocking
2 - Beam - DF	3.50"	3.50"	1.50"	179	366	545	None
3 - Beam - DF	3.50"	3.50"	1.50"	179	366	545	None
4 - Beam - DF	3.50"	3.50"	1.50"	49	113	162	Blocking
 Blocking Panels are assumed to carry no load 	s applied dire	ctly above the	m and the ful	l load is applie	ed to the men	ber being	designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	15' 2" o/c	
Bottom Edge (Lu)	13' 11" o/c	
Maximum allowable brasing inter	als based on emplied lead	

Maximum allowable bracing intervals based on applied load.

			Dead	Snow	
Vertical Load	Location (Side)	Spacing	(0.90)	(1.15)	Comments
1 - Uniform (PSF)	0 to 15' 2"	24"	15.0	30.0	Default Load

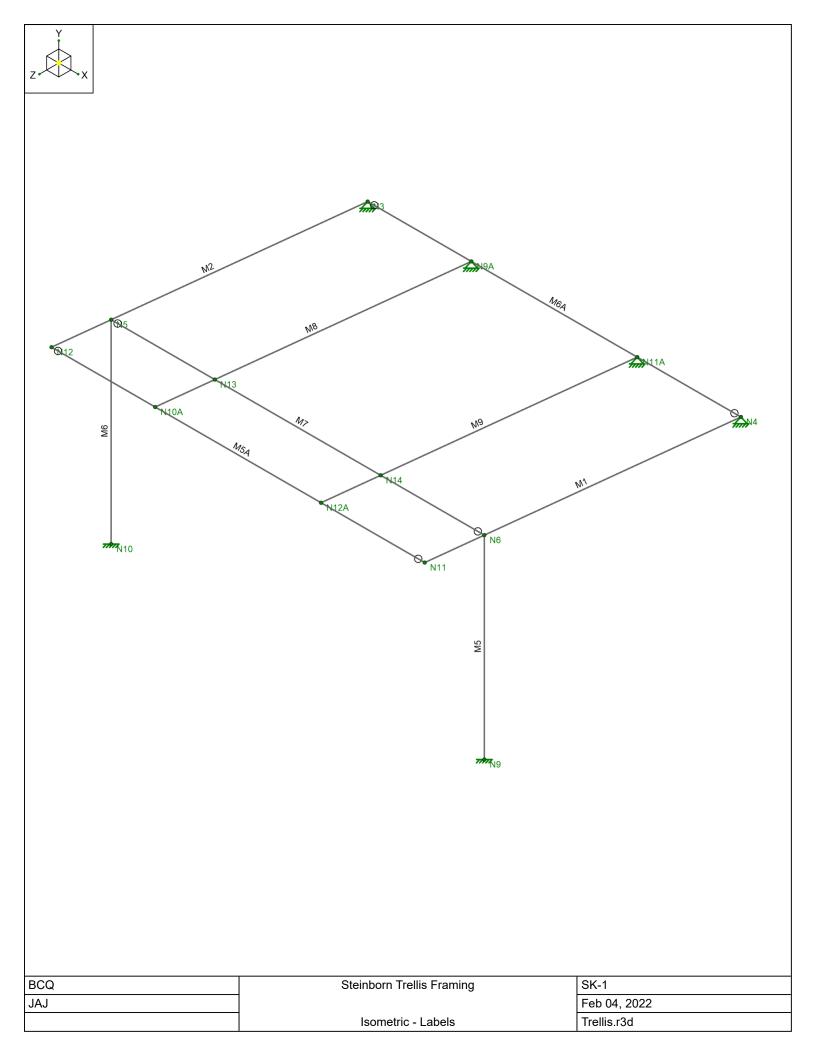
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Nodes

	Label	X [ft]	Y [ft]	Z [ft]	Temp [deg F]	Detach From Diap
1	N3	0	6.5	2.3		
2	N4	14.4	6.5	2.3		
3	N5	0	7.5	12.2		
4	N6	14.4	7.5	12.2		
5	N9	14.4	0	12.2		
6	N10	0	0	12.2		
7	N11	14.4	7.732323	14.5		
8	N12	0	7.732323	14.5		
9	N9A	4	6.5	2.3		
10	N10A	4	7.732323	14.5		
11	N11A	10.4	6.5	2.3		
12	N12A	10.4	7.732323	14.5		
13	N13	4	7.5	12.2		
14	N14	10.4	7.5	12.2		

Boundary Conditions

	Node Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot [k-ft/rad]	Y Rot [k-ft/rad]	Z Rot [k-ft/rad]
1	N3	Reaction	Reaction	Reaction			
2	N4	Reaction	Reaction	Reaction			
3	N10	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
4	N9	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
5	N9A	Reaction	Reaction	Reaction			
6	N11A	Reaction	Reaction	Reaction			

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Co	Density [k/ft ³]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A992	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
4	A500 Gr.B	29000	11154	0.3	0.65	0.527	42	1.4	58	1.3
5	A500 Gr.B	29000	11154	0.3	0.65	0.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	0.3	0.65	0.49	35	1.6	60	1.2
7	A1085	29000	11154	0.3	0.65	0.49	50	1.4	65	1.3
8	A913 Gr.65	29000	11154	0.3	0.65	0.49	65	1.1	80	1.1

Primary Member Properties

		Label	I Node	J Node	K Node	Rotate(deg)	Section/Sh	Туре	Design List	Material	Design Rule
	1	M1	N4	N11			W4X13	Beam	Wide Flange	A992	Typical
	2	M2	N3	N12			W4X13	Beam	Wide Flange	A992	Typical
	3	M5	N9	N6			PIPE_3.5X	Column	Tube	A992	Typical
Γ	4	M6	N10	N5			PIPE_3.5X	Column	Tube	A992	Typical
	5	M5A	N12	N11			2X8	Beam	Rectangular	DF	Typical
	6	M6A	N3	N4			2X8	Beam	Rectangular	DF	Typical
	7	M7	N6	N5			W6X25	Beam	Wide Flange	A992	Typical
Γ	8	M8	N9A	N10A			W4X13	Beam	Wide Flange	A992	Typical
	9	M9	N11A	N12A			W4X13	Beam	Wide Flange	A992	Typical

Advanced Member Properties

	Label	I Release	J Release	I Offset [in]	J Offset [in]	T/C Only	Physical	Deflection	Analysis	Activation	Seismic DR
1	M1						Yes				None
2	M2						Yes				None
3	M5						Yes	** NA **			None
4	M6						Yes	** NA **			None
5	M5A	BenPIN	BenPIN				Yes				None
6	M6A	BenPIN	BenPIN				Yes				None
7	M7	BenPIN	BenPIN				Yes				None
8	M8						Yes				None
9	M9						Yes				None



Hot Rolled Member Properties

	Label	Shape	Length [ft]	Lb y-y [ft]	Lb z-z [ft]	Lcomp t	Lcomp b	L-Torque	К у-у	K z-z	Cb	Function
1	M1	W4X13	12.262			Lbyy						Lateral
2	M2	W4X13	12.262			Lbyy						Lateral
3	M5	PIPE_3.5X	7.5									Lateral
4	M6	PIPE_3.5X	7.5									Lateral
5	M7	W6X25	14.4			Lbyy						Lateral
6	M8	W4X13	12.262			Lbyy						Lateral
7	M9	W4X13	12.262			Lbyy						Lateral

Member Distributed Loads (BLC 4 : BLC 1 Transient Area Loads)

	Member Label	Direction	Start Magnitude	End Magnitude	Start Location [(End Location [(f	Inactive [(k, k-ft)
1	M1	Y	-0.029	-0.029	0	2.044	Active
2	M1	Y	-0.029	-0.029	2.044	4.087	Active
3	M1	Y	-0.029	-0.029	4.087	6.131	Active
4	M1	Y	-0.029	-0.029	6.131	8.175	Active
5	M1	Y	-0.029	-0.031	8.175	10.218	Active
6	M1	Y	-0.031	-0.036	10.218	12.262	Active
7	M2	Y	-0.029	-0.029	0	2.044	Active
8	M2	Y	-0.029	-0.029	2.044	4.087	Active
9	M2	Y	-0.029	-0.029	4.087	6.131	Active
10	M2	Y	-0.029	-0.029	6.131	8.175	Active
11	M2	Y	-0.029	-0.031	8.175	10.218	Active
12	M2	Y	-0.031	-0.036	10.218	12.262	Active
13	M8	Y	-0.075	-0.075	0	2.044	Active
14	M8	Y	-0.075	-0.075	2.044	4.087	Active
15	M8	Y	-0.075	-0.075	4.087	6.131	Active
16	M8	Y	-0.075	-0.075	6.131	8.175	Active
17	M8	Y	-0.075	-0.082	8.175	10.218	Active
18	M8	Y	-0.082	-0.094	10.218	12.262	Active
19	M9	Y	-0.075	-0.075	0	2.044	Active
20	M9	Y	-0.075	-0.075	2.044	4.087	Active
21	M9	Y	-0.075	-0.075	4.087	6.131	Active
22	M9	Y	-0.075	-0.075	6.131	8.175	Active
23	M9	Y	-0.075	-0.082	8.175	10.218	Active
24	M9	Y	-0.082	-0.094	10.218	12.262	Active

Member Distributed Loads (BLC 5 : BLC 2 Transient Area Loads)

	Member Label	Direction	Start Magnitude	End Magnitude	Start Location [(End Location [(f	Inactive [(k, k-ft)
1	M1	Y	-0.058	-0.058	0	2.044	Active
2	M1	Y	-0.058	-0.058	2.044	4.087	Active
3	M1	Y	-0.058	-0.058	4.087	6.131	Active
4	M1	Y	-0.058	-0.058	6.131	8.175	Active
5	M1	Y	-0.058	-0.063	8.175	10.218	Active
6	M1	Y	-0.063	-0.072	10.218	12.262	Active
7	M2	Y	-0.058	-0.058	0	2.044	Active
8	M2	Y	-0.058	-0.058	2.044	4.087	Active
9	M2	Y	-0.058	-0.058	4.087	6.131	Active
10	M2	Y	-0.058	-0.058	6.131	8.175	Active
11	M2	Y	-0.058	-0.063	8.175	10.218	Active
12	M2	Y	-0.063	-0.072	10.218	12.262	Active
13	M8	Y	-0.151	-0.151	0	2.044	Active
14	M8	Y	-0.151	-0.151	2.044	4.087	Active
15	M8	Y	-0.151	-0.151	4.087	6.131	Active
16	M8	Y	-0.151	-0.151	6.131	8.175	Active
17	M8	Y	-0.151	-0.163	8.175	10.218	Active
18	M8	Y	-0.163	-0.188	10.218	12.262	Active
19	M9	Y	-0.151	-0.151	0	2.044	Active
20	M9	Y	-0.151	-0.151	2.044	4.087	Active
21	M9	Y	-0.151	-0.151	4.087	6.131	Active
22	M9	Y	-0.151	-0.151	6.131	8.175	Active
23	M9	Y	-0.151	-0.163	8.175	10.218	Active
24	M9	Y	-0.163	-0.188	10.218	12.262	Active



Basic Load Cases

		BLC Descr	Category	X Gravity	Y Gravity	Z Gravity	Nodal	Point	Distributed	Area(Mem	Surface(Pl
	1	D	DL		-1					1	
	2	S	SL							1	
	3	E	EL								
Γ	4	BLC 1 Tra	None						24		
	5	BLC 2 Tra	None						24		

Load Combinations

	De	. Solve	PD	SR	BLC	Fa																		
1	D	Yes	Y		1	1																		
2	S	Yes	Y		2	1																		
3	D+S	Yes	Y		1	1	2	1																

Load Combination Design

	Description ASIF		Service	Hot Rolled	Cold For	Wood	Concrete	Masonry	Aluminum	Stainless	Connecti
1	D			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	S			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	D+S			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Member Section Forces

	LC	Member Label	Sec	Axial [k]	y Shear [k]	z Shear [k]	Torque [k-ft]	v-v Moment	z-z Moment
1	1	M1	1	0.018	0.17	0	0	0	-0.015
2			2	0.005	0.042	0	0	0	-0.339
3			3	-0.008	-0.086	0	0	0	-0.271
4			4	-0.021	-0.215	0	0	0	0.191
5			5	0.005	0.047	0	0	0	-0.005
6	1	M2	1	0.018	0.17	0	0	0	-0.015
7			2	0.005	0.042	0	0	0	-0.339
8			3	-0.008	-0.086	0	0	0	-0.271
9			4	-0.021	-0.215	0	0	0	0.191
10			5	0.005	0.047	0	0	0	-0.005
11	1	M5	1	1.337	0	-0.028	0	0.071	0
12			2	1.315	0	-0.028	0	0.018	0
13			3	1.293	0	-0.028	0	-0.035	0
14			4	1.271	0	-0.028	0	-0.089	0
15			5	1.249	0	-0.028	0	-0.142	0
16	1	M6	1	1.337	0	-0.028	0	0.071	0
17			2	1.315	0	-0.028	0	0.018	0
18			3	1.293	0	-0.028	0	-0.035	0
19			4	1.271	0	-0.028	0	-0.089	0
20			5	1.249	0	-0.028	0	-0.142	0
21	1	M5A	1	0	0.047	0	0.005	0	0
22			2	0	0.037	0	0.005	0	-0.151
23			3	0	0	0	0	0	-0.181
24			4	0	-0.037	0	-0.005	0	-0.151
25			5	0	-0.047	0	-0.005	0	0
26	1	M6A	1	0	0.003	0	-0.015	0	0
27			2	0	-0.007	0	-0.015	0	0.006
28			3	0	0	0	0	0	-0.006
29			4	0	0.007	0	0.015	0	0.006
30			5	0	-0.003	0	0.015	0	0
31	1	M7	1	0	0.846	0.027	-0.005	0	0
32			2	0	0.756	0.027	-0.005	0.098	-2.883
33			3	0	0	0	0	0.107	-3.308
34			4	0	-0.756	-0.027	0.005	0.098	-2.883
35			5	0	-0.846	-0.027	0.005	0	0
36	1	M8	1	0.07	0.418	0	0.002	0	0.015
37			2	0.042	0.148	0	0.002	0	-0.852
38			3	0.015	-0.122	0	0.002	0	-0.892
39			4	-0.012	-0.393	0	0.002	0	-0.104
40			5	-0.003	-0.028	0	-0.001	0	0.005



Member Section Forces (Continued)

	LC	Member Label	Sec	Axial [k]	y Shear [k]	z Shear [k]	Torque [k-ft]	v-v Moment	z-z Moment
41	1	M9	1	0.07	0.418	0	-0.002	0	0.015
42			2	0.042	0.148	0	-0.002	0	-0.852
43			3	0.015	-0.122	0	-0.002	0	-0.892
44			4	-0.012	-0.393	0	-0.002	0	-0.104
45			5	-0.003	-0.028	0	0.001	0	0.005
46	2	M1	1	0.027	0.235	0	0	0	-0.025
47	_		2	0.01	0.058	0	0	0	-0.475
48			3	-0.008	-0.119	0	0	0	-0.384
49			4	-0.026	-0.297	0	0	0	0.251
50			5	0.005	0.053	0	0	0	-0.01
51	2	M2	1	0.027	0.235	0	0	0	-0.025
52	2	IVIZ	2	0.01	0.058	0	0	0	-0.475
53			3	-0.008	-0.119	0	0	0	-0.384
54			4	-0.026	-0.297	0	0	0	0.251
55			5	0.005	0.053	0	0	0	-0.01
56	2	M5	1	1.692	0.000	-0.042	0	0.105	0
57	L	INIO	2	1.692	0	-0.042	0	0.026	0
58			3	1.692	0	-0.042	0	-0.052	0
59			4	1.692	0	-0.042	0	-0.131	0
60			5	1.692	0	-0.042	0	-0.209	0
61	2	M6	1	1.692	0	-0.042	0	0.105	0
62	2	IVIO	2	1.692	0	-0.042	0	0.026	0
63			3	1.692	0	-0.042	0	-0.052	0
64			4	1.692	0	-0.042	0	-0.131	0
65			5	1.692	0	-0.042	0	-0.209	0
66	2	M5A	1	0	0.053	0	0.01	0	0
67	2	IVIJA	2	0	0.053	0	0.01	0	-0.191
68			3	0	0.000	0	0.01	0	-0.215
69			4	0	-0.053	0	-0.01	0	-0.191
70			5	0	-0.053	0	-0.01	0	0
70	2	M6A	1	0	-0.055	0	-0.01	0	0
71	2	IVIOA	2	0	0	0	-0.025	0	0.002
73			3	0	0	0	-0.025	0	0.002
74			4	0	0	0	0.025	0	0.002
75			5	0	0	0	0.025	0	0.002
76	2	M7		0	1.14	0.038	-0.011	0	0
78	2	IVI /	1 2					-	-4.104
77				0	1.14	0.038	-0.011	0.137	
			3	0	0	0-0.038	0 0.011	0.149 0.137	-4.555
79			4	0	-1.14				-4.104
80	2	N40	5	0	-1.14	-0.038	0.011	0	0
81 82	2	M8	1	0.11 0.064	0.712	0	0.003	0	0.025
			2		0.252		0.003		-1.453
83			3 4	0.017 -0.029	-0.208 -0.671	0	0.003	0	-1.521
84 85			<u>4</u> 5	-0.029	-0.071	0	-0.003	0	-0.177 0.01
85	2	M9	<u>ວ</u> 1	0.11	0.712	0	-0.003	0	0.01
80	2	IVI9	2	0.064	0.712	0	-0.003	0	-1.453
88			3	0.064	-0.208	0	-0.003	0	-1.453
88			4	-0.029	-0.208	0	-0.003	0	-0.177
90			5	-0.029	-0.053	0	0.003	0	0.01
90	3	M1	<u> </u>	0.005	0.406	0	0.003	0	-0.04
91	3		2	0.046	0.406	0	0	0	-0.04
92			3	-0.015	-0.205	0	0	0	-0.655
93			4	-0.018	-0.205	0	0	0	0.442
94			5		0.099		0		-0.015
95	3	MO		0.01	0.099	0		0	
96	3	M2	1 2	0.046		0	0	0	-0.04
97				0.015	0.1	0	0	0	-0.815
98			3 4	-0.016	-0.205 -0.512	0	0	0	-0.655
100			<u> </u>	-0.047 0.01		0	0	0	0.442
	2	ME			0.099	-	0	-	-0.015
101	3	M5	1	3.028	0	-0.07	0	0.176	0
102			2	3.007	0	-0.07	0	0.044	0



Member Section Forces (Continued)

	LC	Member Label	Sec	Axial [k]	y Shear [k]	z Shear [k]	Torque [k-ft]	y-y Moment	z-z Moment
103			3	2.985	0	-0.07	0	-0.088	0
104			4	2.963	0	-0.07	0	-0.219	0
105			5	2.941	0	-0.07	0	-0.351	0
106	3	M6	1	3.028	0	-0.07	0	0.176	0
107			2	3.007	0	-0.07	0	0.044	0
108			3	2.985	0	-0.07	0	-0.088	0
109			4	2.963	0	-0.07	0	-0.219	0
110			5	2.941	0	-0.07	0	-0.351	0
111	3	M5A	1	0	0.1	0	0.015	0	0
112			2	0	0.09	0	0.015	-0.002	-0.342
113			3	-0.001	0	0	0	-0.002	-0.396
114			4	0	-0.09	0	-0.015	-0.002	-0.342
115			5	0	-0.1	0	-0.015	0	0
116	3	M6A	1	0	0.003	0	-0.04	0	0
117			2	0	-0.007	0	-0.04	0	0.008
118			3	0	0	0	0	0	-0.007
119			4	0	0.007	0	0.04	0	0.008
120			5	0	-0.003	0	0.04	0	0
121	3	M7	1	0	1.986	0.065	-0.016	0	0
122			2	0	1.896	0.065	-0.016	0.234	-6.987
123			3	0.001	0	0	0	0.256	-7.863
124			4	0	-1.896	-0.065	0.016	0.234	-6.987
125			5	0	-1.986	-0.065	0.016	0	0
126	3	M8	1	0.18	1.13	0	0.004	0	0.04
127			2	0.106	0.4	0	0.004	0	-2.306
128			3	0.033	-0.33	0	0.004	0	-2.413
129			4	-0.042	-1.065	0	0.004	0	-0.281
130			5	-0.008	-0.08	0.001	-0.004	0	0.015
131	3	M9	1	0.18	1.13	0	-0.004	0	0.04
132			2	0.106	0.4	0	-0.004	0	-2.306
133			3	0.033	-0.33	0	-0.004	0	-2.413
134			4	-0.042	-1.065	0	-0.004	0	-0.281
135			5	-0.008	-0.08	-0.001	0.004	0	0.015

Maximum Member Section Forces

	LC	Memb		Axial [k]	Loc [ft]	y She…	Loc [ft]	z She	Loc [ft]	Torque	Loc [ft]	у-у Мо…	Loc [ft]	z-z Mo	Loc [ft]
1	1	M1	max	0.018	0	0.17	0	0	12.262	0	12.262	0	12.262	0.337	9.835
2			min	-0.023	9.835	-0.243	9.835	0	0	0	0	0	9.963	-0.36	4.087
3	1	M2	max	0.018	0	0.17	0	0	9.835	0	12.262	0	9.963	0.337	9.835
4			min	-0.023	9.835	-0.243	9.835	0	9.963	0	0	0	0	-0.36	4.087
5	1	M5	max	1.337	0	0	7.5	-0.028	7.5	0	7.5	0.071	0	0	7.5
6			min	1.249	7.5	0	0	-0.028	0	0	0	-0.142	7.5	0	0
7	1	M6	max	1.337	0	0	7.5	-0.028	7.5	0	7.5	0.071	0	0	0
8			min	1.249	7.5	0	0	-0.028	0	0	0	-0.142	7.5	0	7.5
9	1	M5A	max	0	14.4	0.047	0	0	14.4	0.005	3.9	0	14.4	0	14.4
10			min	0	4.05	-0.047	14.4	0	0	-0.005	10.5	0	4.05	-0.181	7.2
11	1	M6A	max	0	14.4	0.008	4.05	0	3.9	0.015	14.4	0	3.9	0.008	10.5
12			min	0	0	-0.008	10.35	0	10.5	-0.015	0	0	4.05	-0.006	7.2
13	1	M7	max	0	10.35	0.846	0	0.027	3.9	0.005	14.4	0.107	10.35	0	14.4
14			min	0	0	-0.846	14.4	-0.027	10.5	-0.005	0	0	0	-3.308	7.2
15	1	M8	max	0.07	0	0.418	0	0	12.262	0.002	9.835	0	9.835	0.21	9.963
16			min	-0.018	9.835	-0.452	9.835	0	0	-0.001	9.963	-0.001	9.963	-0.977	4.726
17	1	M9	max	0.07	0	0.418	0	0	9.835	0.001	12.262	0.001	9.963	0.21	9.963
18			min	-0.018	9.835	-0.452	9.835	0	9.963	-0.002	0	0	9.835	-0.977	4.726
19	2	M1	max	0.027	0	0.235	0	0	12.262	0	12.262	0	12.262	0.453	9.835
20			min	-0.03	9.835	-0.336	9.835	0	0	0	0	0	9.963	-0.505	4.087
21	2	M2	max	0.027	0	0.235	0	0	9.835	0	12.262	0	9.963	0.453	9.835
22			min	-0.03	9.835	-0.336	9.835	0	9.963	0	0	0	0	-0.505	4.087
23	2	M5	max	1.692	7.5	0	7.5	-0.042	7.5	0	7.5	0.105	0	0	7.5
24			min	1.692	0	0	0	-0.042	0	0	0	-0.209	7.5	0	0
25	2	M6	max	1.692	7.5	0	7.5	-0.042	7.5	0	7.5	0.105	0	0	0

Maximum Member Section Forces (Continued)

	LC	Memb		Axial [k]	Loc [ft]	y She…	Loc [ft]	z She	Loc [ft]	Torque	Loc [ft]	у-у Мо…	Loc [ft]	z-z Mo	
26			min	1.692	0	0	0	-0.042	0	0	0	-0.209	7.5	0	7.5
27	2	M5A	max	0	14.4	0.053	3.9	0	14.4	0.01	3.9	0	14.4	0	14.4
28			min	0	4.05	-0.053	10.5	0	0	-0.01	10.5	0	4.05	-0.215	4.05
29	2	M6A	max	0	14.4	0	14.4	0	3.9	0.025	14.4	0	3.9	0.002	10.5
30			min	0	0	0	0	0	10.5	-0.025	0	0	4.05	0	10.05
31	2	M7	max	0	10.35	1.14	3.9	0.038	3.9	0.011	14.4	0.149	10.35	0	14.4
32			min	0	0	-1.14	10.5	-0.038	10.5	-0.011	0	0	0	-4.555	4.05
33	2	M8	max	0.11	0	0.712	0	0	12.262	0.003	9.835	0	9.835	0.358	9.963
34			min	-0.04	9.835	-0.772	9.835	0	0	-0.003	9.963	-0.002	9.963	-1.665	4.726
35	2	M9	max	0.11	0	0.712	0	0	9.835	0.003	12.262	0.002	9.963	0.358	9.963
36			min	-0.04	9.835	-0.772	9.835	0	9.963	-0.003	0	0	9.835	-1.665	4.726
37	3	M1	max	0.046	0	0.406	0	0	12.262	0	12.262	0	12.262	0.79	9.835
38			min	-0.054	9.835	-0.579	9.835	0	0	0	0	0	9.963	-0.865	4.087
39	3	M2	max	0.046	0	0.406	0	0	9.835	0	12.262	0	9.963	0.79	9.835
40			min	-0.054	9.835	-0.579	9.835	0	9.963	0	0	0	0	-0.865	4.087
41	3	M5	max	3.028	0	0	7.5	-0.07	7.5	0	7.5	0.176	0	0	7.5
42			min	2.941	7.5	0	0	-0.07	0	0	0	-0.351	7.5	0	0
43	3	M6	max	3.028	0	0	7.5	-0.07	7.5	0	7.5	0.176	0	0	0
44			min	2.941	7.5	0	0	-0.07	0	0	0	-0.351	7.5	0	7.5
45	3	M5A	max	0	14.4	0.1	0	0	14.4	0.015	3.9	0	14.4	0	14.4
46			min	-0.001	4.05	-0.1	14.4	0	0	-0.015	10.5	-0.002	4.05	-0.396	7.2
47	3	M6A	max	0	14.4	0.008	4.05	0	3.9	0.04	14.4	0	3.9	0.01	10.5
48			min	0	0	-0.008	10.35	0	10.5	-0.04	0	0	4.05	-0.007	7.2
49	3	M7	max	0.001	10.35	1.986	0	0.065	3.9	0.016	14.4	0.256	10.35	0	14.4
50			min	0	0	-1.986	14.4	-0.065	10.5	-0.016	0	0	0	-7.863	7.2
51	3	M8	max	0.18	0	1.13	0	0.001	12.262	0.004	9.835	0	9.835	0.569	9.963
52			min	-0.058	9.835	-1.224	9.835	0	0	-0.004	9.963	-0.003	9.963	-2.642	4.726
53	3	M9	max	0.18	0	1.13	0	0	9.835	0.004	12.262	0.003	9.963	0.569	9.963
54			min	-0.058	9.835	-1.224	9.835	-0.001	9.963	-0.004	0	0	9.835	-2.642	4.726

Member End Reactions

	LC	Member Label	Member End	Axial [k]	y Shear [k]	z Shear [k]	Torque [k-ft]	y-y Moment	z-z Moment
1	1	M1		0.018	0.17	0	0	0	-0.015
2			J	0.005	0.047	0	0	0	-0.005
3	1	M2	I	0.018	0.17	0	0	0	-0.015
4			J	0.005	0.047	0	0	0	-0.005
5	1	M5		1.337	0	-0.028	0	0.071	0
6			J	1.249	0	-0.028	0	-0.142	0
7	1	M6		1.337	0	-0.028	0	0.071	0
8			J	1.249	0	-0.028	0	-0.142	0
9	1	M5A		0	0.047	0	0.005	0	0
10			J	0	-0.047	0	-0.005	0	0
11	1	M6A		0	0.003	0	-0.015	0	0
12			J	0	-0.003	0	0.015	0	0
13	1	M7		0	0.846	0.027	-0.005	0	0
14			J	0	-0.846	-0.027	0.005	0	0
15	1	M8		0.07	0.418	0	0.002	0	0.015
16			J	-0.003	-0.028	0	-0.001	0	0.005
17	1	M9	I	0.07	0.418	0	-0.002	0	0.015
18			J	-0.003	-0.028	0	0.001	0	0.005
19	2	M1		0.027	0.235	0	0	0	-0.025
20			J	0.005	0.053	0	0	0	-0.01
21	2	M2		0.027	0.235	0	0	0	-0.025
22			J	0.005	0.053	0	0	0	-0.01
23	2	M5	I	1.692	0	-0.042	0	0.105	0
24			J	1.692	0	-0.042	0	-0.209	0
25	2	M6		1.692	0	-0.042	0	0.105	0
26			J	1.692	0	-0.042	0	-0.209	0
27	2	M5A		0	0.053	0	0.01	0	0
28			J	0	-0.053	0	-0.01	0	0
29	2	M6A	I	0	0	0	-0.025	0	0

Member End Reactions (Continued)

	LC	Member Label	Member End	Axial [k]	y Shear [k]	z Shear [k]	Torque [k-ft]	y-y Moment	z-z Moment
30			J	0	0	0	0.025	0	0
31	2	M7	1	0	1.14	0.038	-0.011	0	0
32			J	0	-1.14	-0.038	0.011	0	0
33	2	M8	1	0.11	0.712	0	0.003	0	0.025
34			J	-0.005	-0.053	0	-0.003	0	0.01
35	2	M9	1	0.11	0.712	0	-0.003	0	0.025
36			J	-0.005	-0.053	0	0.003	0	0.01
37	3	M1	I	0.046	0.406	0	0	0	-0.04
38			J	0.01	0.099	0	0	0	-0.015
39	3	M2	I	0.046	0.406	0	0	0	-0.04
40			J	0.01	0.099	0	0	0	-0.015
41	3	M5	1	3.028	0	-0.07	0	0.176	0
42			J	2.941	0	-0.07	0	-0.351	0
43	3	M6	I	3.028	0	-0.07	0	0.176	0
44			J	2.941	0	-0.07	0	-0.351	0
45	3	M5A		0	0.1	0	0.015	0	0
46			J	0	-0.1	0	-0.015	0	0
47	3	M6A	I	0	0.003	0	-0.04	0	0
48			J	0	-0.003	0	0.04	0	0
49	3	M7	1	0	1.986	0.065	-0.016	0	0
50			J	0	-1.986	-0.065	0.016	0	0
51	3	M8	I	0.18	1.13	0	0.004	0	0.04
52			J	-0.008	-0.08	0.001	-0.004	0	0.015
53	3	M9	I	0.18	1.13	0	-0.004	0	0.04
54			J	-0.008	-0.08	-0.001	0.004	0	0.015

Torsion

	LC	Member Label	Sec	Torque [k-ft]	Shear [ksi]	y Warp She…	z Warp She	z-Top Warp…	z-Bot Warp
1	1	M1	1	0	0	0	0	0	0
2			2	0	0	0	0	0	0
3			3	0	0	0	0	0	0
4			4	0	0	0	0	0	0
5			5	0	0	0	0	0	0
6	1	M2	1	0	0	0	0	0	0
7			2	0	0	0	0	0	0
8			3	0	0	0	0	0	0
9			4	0	0	0	0	0	0
10			5	0	0	0	0	0	0
11	1	M5	1	0	0	NC	NC	NC	NC
12			2	0	0	NC	NC	NC	NC
13			3	0	0	NC	NC	NC	NC
14			4	0	0	NC	NC	NC	NC
15			5	0	0	NC	NC	NC	NC
16	1	M6	1	0	0	NC	NC	NC	NC
17			2	0	0	NC	NC	NC	NC
18			3	0	0	NC	NC	NC	NC
19			4	0	0	NC	NC	NC	NC
20			5	0	0	NC	NC	NC	NC
21	1	M5A	1	0.005	0.012	NC	NC	NC	NC
22			2	0.005	0.012	NC	NC	NC	NC
23			3	0	0	NC	NC	NC	NC
24			4	-0.005	-0.012	NC	NC	NC	NC
25			5	-0.005	-0.012	NC	NC	NC	NC
26	1	M6A	1	-0.015	-0.037	NC	NC	NC	NC
27			2	-0.015	-0.037	NC	NC	NC	NC
28			3	0	0	NC	NC	NC	NC
29			4	0.015	0.037	NC	NC	NC	NC
30			5	0.015	0.037	NC	NC	NC	NC
31	1	M7	1	-0.005	-0.061	NC	NC	NC	NC
32			2	-0.005	-0.061	NC	NC	NC	NC
33			3	0	0	NC	NC	NC	NC



Torsion (Continued)

	LC	Member Label	Sec	Torque [k-ft]	Shear [ksi]	y Warp She	z Warp She	. z-Top Warp	z-Bot Warp…
34			4	0.005	0.061	NC	NC	NC	NC
35			5	0.005	0.061	NC	NC	NC	NC
36	1	M8	1	0.002	0	0	0.006	0.093	0.093
37			2	0.002	0.045	0	0	0.009	0.009
38			3	0.002	0.049	0	0	0	0
39			4	0.002	0.045	0	0	-0.009	-0.009
40			5	-0.001	0	0	-0.005	0.07	0.07
40	1	M9	1	-0.002	0	0	-0.006	-0.093	-0.093
41	•	1013	2	-0.002	-0.045	0	0.000	-0.009	-0.009
43			3	-0.002	-0.049	0	0	0	0
44			4	-0.002	-0.045	0	0	0.009	0.009
45			5	0.001	0	0	0.005	-0.07	-0.07
46	2	M1	1	0	0	0	0	0	0
47			2	0	0	0	0	0	0
48			3	0	0	0	0	0	0
49			4	0	0	0	0	0	0
50			5	0	0	0	0	0	0
51	2	M2	1	0	0	0	0	0	0
52			2	0	0	0	0	0	0
53			3	0	0	0	0	0	0
54			4	0	0	0	0	0	0
55			5	0	0	0	0	0	0
56	2	M5	1	0	0	NC	NC	NC	NC
57	<u>ک</u>	INIO	2	0	0	NC	NC	NC	NC
58			3	0	0	NC	NC	NC	NC
59			4	0	0	NC	NC	NC	NC
60			5	0	0	NC	NC	NC	NC
	0	N40							
61	2	M6	1	0	0	NC	NC	NC	NC
62			2	0	0	NC	NC	NC	NC
63			3	0	0	NC	NC	NC	NC
64			4	0	0	NC	NC	NC	NC
65			5	0	0	NC	NC	NC	NC
66	2	M5A	1	0.01	0.026	NC	NC	NC	NC
67			2	0.01	0.026	NC	NC	NC	NC
68			3	0	0	NC	NC	NC	NC
69			4	-0.01	-0.026	NC	NC	NC	NC
70			5	-0.01	-0.026	NC	NC	NC	NC
71	2	M6A	1	-0.025	-0.063	NC	NC	NC	NC
72			2	-0.025	-0.063	NC	NC	NC	NC
73			3	0	0	NC	NC	NC	NC
74			4	0.025	0.063	NC	NC	NC	NC
75			5	0.025	0.063	NC	NC	NC	NC
76	2	M7	1	-0.011	-0.134	NC	NC	NC	NC
77	_		2	-0.011	-0.134	NC	NC	NC	NC
78			3	0	0	NC	NC	NC	NC
79			4	0.011	0.134	NC	NC	NC	NC
80			5	0.011	0.134	NC	NC	NC	NC
81	2	M8	1	0.003	0.134	0	0.009	0.13	0.13
82	2	IVIO	2	0.003	0.063	0	0.009	0.012	0.012
83			3	0.003	0.068	0	0	0.012	0.012
83							0	-	
			4	0.003	0.063	0		-0.012	-0.012
85	-	140	5	-0.003	0	0	-0.01	0.156	0.156
86	2	M9	1	-0.003	0	0	-0.009	-0.13	-0.13
87			2	-0.003	-0.063	0	0	-0.012	-0.012
88			3	-0.003	-0.068	0	0	0	0
89			4	-0.003	-0.063	0	0	0.012	0.012
90			5	0.003	0	0	0.01	-0.156	-0.156
91	3	M1	1	0	0	0	0	0	0
92			2	0	0	0	0	0	0
93			3	0	0	0	0	0	0
94			4	0	0	0	0	0	0
95			5	0	0	0	0	0	0



Torsion (Continued)

	LC	Member Label	Sec	Torque [k-ft]	Shear [ksi]	y Warp She	z Warp She	z-Top Warp	z-Bot Warp…
96	3	M2	1	0	0	0	0	0	0
97			2	0	0	0	0	0	0
98			3	0	0	0	0	0	0
99			4	0	0	0	0	0	0
100			5	0	0	0	0	0	0
101	3	M5	1	0	0	NC	NC	NC	NC
102			2	0	0	NC	NC	NC	NC
103			3	0	0	NC	NC	NC	NC
104			4	0	0	NC	NC	NC	NC
105			5	0	0	NC	NC	NC	NC
106	3	M6	1	0	0	NC	NC	NC	NC
107			2	0	0	NC	NC	NC	NC
108			3	0	0	NC	NC	NC	NC
109			4	0	0	NC	NC	NC	NC
110			5	0	0	NC	NC	NC	NC
111	3	M5A	1	0.015	0.038	NC	NC	NC	NC
112			2	0.015	0.038	NC	NC	NC	NC
113			3	0	0	NC	NC	NC	NC
114			4	-0.015	-0.038	NC	NC	NC	NC
115			5	-0.015	-0.038	NC	NC	NC	NC
116	3	M6A	1	-0.04	-0.101	NC	NC	NC	NC
117			2	-0.04	-0.101	NC	NC	NC	NC
118			3	0	0	NC	NC	NC	NC
119			4	0.04	0.101	NC	NC	NC	NC
120			5	0.04	0.101	NC	NC	NC	NC
121	3	M7	1	-0.016	-0.195	NC	NC	NC	NC
122			2	-0.016	-0.195	NC	NC	NC	NC
123			3	0	0	NC	NC	NC	NC
124			4	0.016	0.195	NC	NC	NC	NC
125			5	0.016	0.195	NC	NC	NC	NC
126	3	M8	1	0.004	0	0	0.015	0.223	0.223
127			2	0.004	0.108	0	0.001	0.021	0.021
128			3	0.004	0.117	0	0	0	0
129			4	0.004	0.108	0	0.001	-0.021	-0.021
130			5	-0.004	0	0	-0.015	0.227	0.227
131	3	M9	1	-0.004	0	0	-0.015	-0.223	-0.223
132			2	-0.004	-0.108	0	-0.001	-0.021	-0.021
133			3	-0.004	-0.117	0	0	0	0
134			4	-0.004	-0.108	0	-0.001	0.021	0.021
135			5	0.004	0	0	0.015	-0.227	-0.227

Member Section Stresses

	LC	Member L	Sec	Axial [ksi]	y Shear [ksi]	z Shear [ksi]	y top Bend	y bot Bend	z top Bend	z bot Bend…
1	1	M1	1	0.005	0.146	0	0.033	-0.033	0	0
2			2	0.001	0.036	0	0.75	-0.75	0	0
3			3	-0.002	-0.074	0	0.599	-0.599	0	0
4			4	-0.005	-0.185	0	-0.421	0.421	0	0
5			5	0.001	0.04	0	0.011	-0.011	0	0
6	1	M2	1	0.005	0.146	0	0.033	-0.033	0	0
7			2	0.001	0.036	0	0.75	-0.75	0	0
8			3	-0.002	-0.074	0	0.599	-0.599	0	0
9			4	-0.005	-0.185	0	-0.421	0.421	0	0
10			5	0.001	0.04	0	0.011	-0.011	0	0
11	1	M5	1	0.39	0	-0.017	0	0	0.287	-0.287
12			2	0.383	0	-0.017	0	0	0.072	-0.072
13			3	0.377	0	-0.017	0	0	-0.143	0.143
14			4	0.371	0	-0.017	0	0	-0.358	0.358
15			5	0.364	0	-0.017	0	0	-0.573	0.573
16	1	M6	1	0.39	0	-0.017	0	0	0.287	-0.287
17			2	0.383	0	-0.017	0	0	0.072	-0.072
18			3	0.377	0	-0.017	0	0	-0.143	0.143



Member Section Stresses (Continued)

	LC	Member L	Sec	Axial [ksi]	y Shear [ksi]		y top Bend	y bot Bend	z top Bend	z bot Bend
19			4	0.371	0	-0.017	0	0	-0.358	0.358
20			5	0.364	0	-0.017	0	0	-0.573	0.573
21	1	M5A	1	0	0.006	0	0	0	0	0
22			2	0	0.005	0	0.138	-0.138	-0.003	0.003
23			3	0	0	0	0.165	-0.165	-0.003	0.003
24			4	0	-0.005	0	0.138	-0.138	-0.003	0.003
25			5	0	-0.006	0	0	0	0	0
26	1	M6A	1	0	0	0	0	0	0	0
27			2	0	0	0	-0.006	0.006	0	0
28			3	0	0	0	0.006	-0.006	0	0
29			4	0	0	0	-0.006	0.006	0	0
30			5	0	0	0	0	0	0	0
31	1	M7	1	0	0.414	0.005	0	0	0	0
32	•		2	0	0.37	0.005	2.067	-2.067	0.208	-0.208
33			3	0	0	0	2.371	-2.371	0.228	-0.228
34			4	0	-0.37	-0.005	2.067	-2.067	0.208	-0.208
35			5	0	-0.414	-0.005	0	0	0.200	0.200
36	1	M8	1	0.018	0.359	0	-0.033	0.033	0	0
37	1	IVIO	2	0.018	0.339	0	1.883	-1.883	0	0
38			3	0.004	-0.105	0	1.971	-1.971	0	0
38			4	-0.003	-0.338	0	0.23	-0.23	0.002	-0.002
40			5	-0.003	-0.338		-0.011	0.011		
	1	MO				0		0.011	0	0
41	1	M9	1	0.018	0.359	0	-0.033		0	0
42			2	0.011	0.127	0	1.883	-1.883	0	0
43			3	0.004	-0.105	0	1.971	-1.971	0	0
44			4	-0.003	-0.338	0	0.23	-0.23	-0.002	0.002
45			5	0	-0.024	0	-0.011	0.011	0	0
46	2	M1	1	0.007	0.202	0	0.055	-0.055	0	0
47			2	0.002	0.05	0	1.05	-1.05	0	0
48			3	-0.002	-0.102	0	0.847	-0.847	0	0
49			4	-0.007	-0.255	0	-0.556	0.556	0	0
50	-		5	0.001	0.045	0	0.023	-0.023	0	0
51	2	M2	1	0.007	0.202	0	0.055	-0.055	0	0
52			2	0.002	0.05	0	1.05	-1.05	0	0
53			3	-0.002	-0.102	0	0.847	-0.847	0	0
54			4	-0.007	-0.255	0	-0.556	0.556	0	0
55			5	0.001	0.045	0	0.023	-0.023	0	0
56	2	M5	1	0.493	0	-0.024	0	0	0.423	-0.423
57			2	0.493	0	-0.024	0	0	0.106	-0.106
58			3	0.493	0	-0.024	0	0	-0.211	0.211
59			4	0.493	0	-0.024	0	0	-0.529	0.529
60			5	0.493	0	-0.024	0	0	-0.846	0.846
61	2	M6	1	0.493	0	-0.024	0	0	0.423	-0.423
62			2	0.493	0	-0.024	0	0	0.106	-0.106
63			3	0.493	0	-0.024	0	0	-0.211	0.211
64			4	0.493	0	-0.024	0	0	-0.529	0.529
65			5	0.493	0	-0.024	0	0	-0.846	0.846
66	2	M5A	1	0	0.007	0	0	0	0	0
67	_		2	0	0.007	0	0.174	-0.174	-0.004	0.004
68			3	0	0	0	0.196	-0.196	-0.004	0.004
69			4	0	-0.007	0	0.174	-0.174	-0.004	0.004
70			5	0	-0.007	0	0	0	0	0
71	2	M6A	1	0	0	0	0	0	0	0
72	-		2	0	0	0	-0.001	0.001	0	0
73			3	0	0	0	0	0.001	0	0
74			4	0	0	0	-0.001	0.001	0	0
75			5	0	0	0	0.001	0.001	0	0
76	2	M7	1	0	0.558	0.007	0	0	0	0
77	۷	111	2	0	0.558	0.007	2.942	-2.942	0.292	-0.292
78			3	0	0.000	0.007	3.265	-3.265	0.232	-0.318
79			4	0	-0.558	-0.007	2.942	-2.942	0.318	-0.292
80			5	0	-0.558	-0.007	0	-2.942	0.292	0.292
00			5	5	-0.000	-0.007	0	0	0	0



Member Section Stresses (Continued)

	LC	Momborl		Avial [kai]	v Shoor [kai]		v top Bond	v bot Bond	z ton Bond	7 hot Dond
81	2	Member L M8	Sec	Axial [ksi] 0.029	0.612		-0.055	0.055	-0.002	z bot Bend 0.002
82	2	IVIO	2	0.029	0.012	0	3.21	-3.21	0	0.002
83			3	0.005	-0.179	0	3.36	-3.36	0.001	-0.001
84			4	-0.003	-0.576	0	0.391	-0.391	0.001	-0.001
85			5	-0.008	-0.045	0	-0.023	0.023	0.003	-0.003
86	2	M9	1	0.029	0.612	0	-0.025	0.025	0.002	-0.002
87	2	1019	2	0.029	0.012	0	3.21	-3.21	0.002	0.002
88			3	0.005	-0.179	0	3.36	-3.36	-0.001	0.001
89			4	-0.003	-0.576	0	0.391	-0.391	-0.003	0.003
90			5	-0.008	-0.045	0	-0.023	0.023	-0.003	0.003
90	3	M1	1	0.012	0.348	0	0.023	-0.088	-0.002	0.002
92	3		2	0.012	0.086	0	1.8	-0.088	0	0
93			3	-0.004	-0.176	0	1.446	-1.446	0	0
93			4	-0.004	-0.170	0	-0.976	0.976	0	0
94			5	0.003	0.085	0	0.033	-0.033	0	0
95	3	M2	1	0.003	0.348	0	0.033	-0.033	0	0
97	3	IVIZ	2	0.012	0.086	0	1.8	-1.8	0	0
98			3	-0.004	-0.176	0	1.446	-1.446	0	0
98			4	-0.004	-0.176	0	-0.976	0.976	0	0
100			5	0.003	0.085	0	0.033	-0.033	0	0
100	3	M5	1	0.883	0.085	-0.041	0.033	-0.033	0.71	-0.71
101	3		2	0.883	0	-0.041	0	0	0.178	-0.178
102			3	0.87	0	-0.041	0	0	-0.354	0.354
103			4	0.864	0	-0.041	0	0	-0.334	0.887
104			5	0.857	0	-0.041	0	0	-1.419	1.419
105	3	M6	1	0.883	0	-0.041	0	0	0.71	-0.71
100	5	IVIO	2	0.877	0	-0.041	0	0	0.178	-0.178
107			3	0.87	0	-0.041	0	0	-0.354	0.354
109			4	0.864	0	-0.041	0	0	-0.887	0.887
110			5	0.857	0	-0.041	0	0	-1.419	1.419
111	3	M5A	1	0.007	0.014	0.041	0	0	0	0
112	5	WOA	2	0	0.012	0	0.312	-0.312	-0.007	0.007
113			3	0	0.012	0	0.361	-0.361	-0.007	0.007
114			4	0	-0.012	0	0.312	-0.312	-0.007	0.007
115			5	0	-0.012	0	0.012	0	0	0.007
116	3	M6A	1	0	0	0	0	0	0	0
117		WIG/ (2	0	0	0	-0.007	0.007	0	0
118			3	0	0	0	0.006	-0.006	0	0
119			4	0	0	0	-0.007	0.007	0	0
120			5	0	0	0	0	0	0	0
120	3	M7	1	0	0.973	0.012	0	0	0	0
122	-		2	0	0.929	0.012	5.009	-5.009	0.5	-0.5
123			3	0	0	0	5.637	-5.637	0.546	-0.546
124			4	0	-0.929	-0.012	5.009	-5.009	0.5	-0.5
125			5	0	-0.973	-0.012	0	0	0	0
126	3	M8	1	0.047	0.97	0	-0.088	0.088	-0.003	0.003
127	_		2	0.028	0.344	0	5.093	-5.093	0	0
128			3	0.008	-0.283	0	5.331	-5.331	0.002	-0.002
129			4	-0.011	-0.914	0	0.621	-0.621	0.005	-0.005
130			5	-0.002	-0.069	0	-0.033	0.033	0.003	-0.003
131	3	M9	1	0.047	0.97	0	-0.088	0.088	0.003	-0.003
132			2	0.028	0.344	0	5.093	-5.093	0	0
133			3	0.008	-0.283	0	5.331	-5.331	-0.002	0.002
134			4	-0.011	-0.914	0	0.621	-0.621	-0.005	0.005
135			5	-0.002	-0.069	0	-0.033	0.033	-0.003	0.003

Asd360

	LC	Member	Shape	UC Max	Loc [ft]	Shear	Loc [ft]	Dir	Pnc/o	Pnt/om	Mnyy/o	Mnzz/o	Cb	Eqn
1	1	M1	W4X13	0.023	4.087	0.010	9.835	У	26.796	114.671	7.285	15.438	1.26	H1-1b
2	1	M2	W4X13	0.023	4.087	0.010	9.835	У	26.796	114.671	7.285	15.438	1.26	H1-1b
3	1	M5	PIPE	0.023	7.5	0.001	7.5		72.95	102.695	10.155	10.155	1	H1-1b

Asd360 (Continued)

	LC	Member	Shape	UC Max	Loc [ft]	Shear	Loc [ft]	Dir	Pnc/o	Pnt/om	Mnyy/o	Mnzz/o	Cb	Eqn
4	1	M6	PIPE	0.023	7.5	0.001	7.5		72.95	102.695	10.155	10.155	1	H1-1b
5	1	M7	W6X25	0.086	7.2	0.024	14.4	У	86.09	219.76	21.357	40.868	1.066	H1-1b
6	1	M8	W4X13	0.063	4.726	0.022	9.835	У	26.796	114.671	7.285	15.669	1.375	H1-1b
7	1	M9	W4X13	0.063	4.726	0.022	9.835	у	26.796	114.671	7.285	15.669	1.375	H1-1b
8	2	M1	W4X13	0.033	4.087	0.014	9.835	У	26.796	114.671	7.285	15.543	1.268	H1-1b
9	2	M2	W4X13	0.033	4.087	0.014	9.835	у	26.796	114.671	7.285	15.543	1.268	H1-1b
10	2	M5	PIPE	0.032	7.5	0.001	7.5		72.95	102.695	10.155	10.155	1	H1-1b
11	2	M6	PIPE	0.032	7.5	0.001	7.5		72.95	102.695	10.155	10.155	1	H1-1b
12	2	M7	W6X25	0.120	10.35	0.035	14.4	У	86.09	219.76	21.357	40.259	1.05	H1-1b
13	2	M8	W4X13	0.107	4.726	0.036	9.835	У	26.796	114.671	7.285	15.669	1.375	H1-1b
14	2	M9	W4X13	0.107	4.726	0.036	9.835	У	26.796	114.671	7.285	15.669	1.375	H1-1b
15	3	M1	W4X13	0.056	4.087	0.025	9.835	у	26.796	114.671	7.285	15.499	1.265	H1-1b
16	3	M2	W4X13	0.056	4.087	0.025	9.835	У	26.796	114.671	7.285	15.499	1.265	H1-1b
17	3	M5	PIPE	0.055	7.5	0.002	7.5		72.95	102.695	10.155	10.155	1	H1-1b
18	3	M6	PIPE	0.055	7.5	0.002	7.5		72.95	102.695	10.155	10.155	1	H1-1b
19	3	M7	W6X25	0.206	7.2	0.058	14.4	у	86.09	219.76	21.357	40.513	1.056	H1-1b
20	3	M8	W4X13	0.170	4.726	0.058	9.835	У	26.796	114.671	7.285	15.669	1.375	H1-1b
21	3	M9	W4X13	0.170	4.726	0.058	9.835	у	26.796	114.671	7.285	15.669	1.375	H1-1b

Warning Log

No Data to Print ...

Member Section Deflections Strength

$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate [rad]	(n) L/y' Ratio	(n) L/z' Ratio
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	1	1	M1		0		0	0		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	2			2	0	-0.019	0	0	7345	NC
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	3			3	0	-0.019	0	0	6985	NC
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	4			4	0	-0.005	0	0		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	5			5	0	0.004	0	0	NC	NC
8 3 0 -0.019 0 0 6985 NC 9 4 0 -0.005 0 0 NC NC 10 5 0 0.004 0 0 NC NC 11 1 M5 1 0 0 0 NC NC 12 2 0 0 0.001 0 NC NC 13 3 0 0 0.001 0 NC NC 14 4 -0.001 0 0.004 0 NC NC 15 5 -0.001 0 0 0 NC NC 16 1 M6 1 0 0 0 NC NC 18 3 0 0 0.004 NC NC NC 20 5 -0.001 0 0 0 NC NC 21 1 </td <td>6</td> <td>1</td> <td>M2</td> <td>1</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>NC</td> <td>NC</td>	6	1	M2	1	0	0	0	0	NC	NC
9 4 0 -0.005 0 0 NC NC 10 5 0 0.004 0 0 NC NC 11 1 M5 1 0 0 0 NC NC 12 2 0 0 0.001 0 NC NC 13 3 0 0 0.003 0 NC NC 14 4 -0.001 0 0.004 0 NC NC 15 5 -0.001 0 0 0 NC NC 16 1 M6 1 0 0 0 NC NC 17 2 0 0 0.001 NC NC NC 18 3 0 0 0.004 0 NC NC 20 5 -0.001 0 0 NC NC NC 22 2 <td>7</td> <td></td> <td></td> <td>2</td> <td>0</td> <td></td> <td>0</td> <td>0</td> <td>7345</td> <td></td>	7			2	0		0	0	7345	
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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	9				0	-0.005	0	0		
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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		1	M5		0	0		0		
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$ \begin{array}{c c c c c c c c c c c c c c c c c c c $				3				0		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $							0.004	0		
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18 3 0 0 0.003 0 NC NC 19 4 -0.001 0 0.004 0 NC NC 20 5 -0.001 0 0 0 NC NC 21 1 M5A 1 0 0.004 0 -1.615e-04 NC NC 22 2 2 0 -0.059 0.006 -7.106e-04 2751 NC 23 3 0 -0.084 0.008 -7.717e-04 1976 NC 24 4 0 -0.059 0.006 -7.106e-04 2751 NC 25 5 0 0.004 0 -1.615e-04 NC NC 26 1 M6A 1 0 0 0 2.303e-03 NC NC 28 3 0 0 0 2.486e-03 NC NC 30 5 0 0	16	1	M6	•	0	-	0	0		
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25 5 0 0.004 0 -1.615e-04 NC NC 26 1 M6A 1 0 0 0 6.545e-04 NC NC 27 2 0 0 0 2.303e-03 NC NC 28 3 0 0 0 2.486e-03 NC NC 29 4 0 0 0 2.303e-03 NC NC 30 5 0 0 0 2.303e-03 NC NC 31 1 M7 1 0 -0.001 0 2.773e-04 NC NC 32 2 0 -0.079 -0.008 7.961e-04 2215 NC 33 3 0 -0.079 -0.008 7.961e-04 2215 NC 34 4 0 -0.079 -0.008 7.961e-04 2215 NC 35 5 0 -0.001				3	0					
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36 1 M8 1 0 0 0 -9.447e-06 NC NC				· ·	-					
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37 2 0 -0.081 0 -3.827e-04 2277 NC		1	M8							
	37			2	0	-0.081	0	-3.827e-04	2277	NC



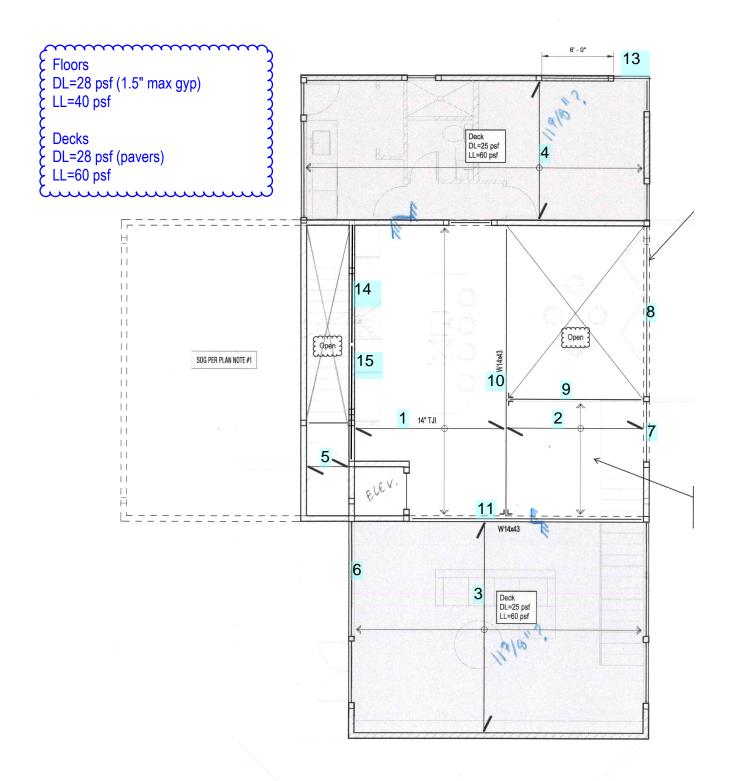
Member Section Deflections Strength (Continued)

$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate [rad]	(n) L/y' Ratio	(n) L/z' Ratio
39	38							-7.559e-04		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $					0		0	-1.129e-03		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $							0			
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79 4 0 -0.111 -0.011 1.55e-03 1582 NC 80 5 0 -0.002 0 4.1e-04 NC NC 81 2 M8 1 0 0 0 -4.32e-06 NC NC 82 2 0 -0.13 0 -5.277e-04 1335 NC 83 3 0 -0.176 0 -1.051e-03 1069 NC 84 4 0 -0.136 0 -1.574e-03 1885 NC 85 5 0 -0.078 0 -1.23e-03 1898 NC 86 2 M9 1 0 0 0 4.32e-06 NC NC 87 2 0 -0.13 0 5.277e-04 1335 NC 88 3 0 -0.176 0 1.051e-03 1069 NC 90 5 0 -0.078										
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	99			4	0	-0.011	0	0	7975	NC



Member Section Deflections Strength (Continued)

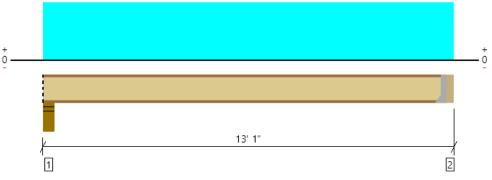
	LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate [rad]	(n) L/y' Ratio	(n) L/z' Ratio
100			5	0	0.01	0	0	NC	NC
101	3	M5	1	0	0	0	0	NC	NC
102			2	0	0	0.003	0	NC	NC
103			3	-0.002	0	0.008	4.128e-08	NC	NC
104			4	-0.003	0	0.009	6.193e-08	NC	NC
105			5	-0.003	0	0	8.257e-08	NC	NC
106	3	M6	1	0	0	0	0	NC	NC
107			2	0	0	0.003	0	NC	NC
108			3	-0.002	0	0.008	-4.128e-08	NC	NC
109			4	-0.003	0	0.009	-6.193e-08	NC	NC
110			5	-0.003	0	0	-8.257e-08	NC	NC
111	3	M5A	1	0	0.01	0	-4.289e-04	NC	NC
112			2	0	-0.13	0.013	-2.121e-03	1235	NC
113			3	0	-0.184	0.018	-2.309e-03	889	8867
114			4	0	-0.13	0.013	-2.121e-03	1235	NC
115			5	0	0.01	0	-4.289e-04	NC	NC
116	3	M6A	1	0	0	0	1.576e-03	NC	NC
117			2	0	0	0	6.011e-03	NC	NC
118			3	0	0	0	6.504e-03	NC	NC
119			4	0	0	0	6.011e-03	NC	NC
120			5	0	0	0	1.576e-03	NC	NC
121	3	M7	1	0	-0.003	0	6.874e-04	NC	NC
122			2	0	-0.191	-0.019	2.346e-03	923	9167
123			3	0	-0.262	-0.026	2.53e-03	668	6626
124			4	0	-0.191	-0.019	2.346e-03	923	9167
125			5	0	-0.003	0	6.874e-04	NC	NC
126	3	M8	1	0	0	0	-1.377e-05	NC	NC
127			2	0	-0.21	0	-9.104e-04	842	NC
128			3	0	-0.289	0	-1.807e-03	674	NC
129			4	0	-0.23	0	-2.704e-03	1188	NC
130			5	0	-0.142	0	-2.238e-03	1035	NC
131	3	M9	1	0	0	0	1.377e-05	NC	NC
132			2	0	-0.21	0	9.104e-04	842	NC
133			3	0	-0.289	0	1.807e-03	674	NC
134			4	0	-0.23	0	2.704e-03	1188	NC
135			5	0	-0.142	0	2.238e-03	1035	NC





Upper Floor, J1 1 piece(s) 14" TJI ® 110 @ 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)	563 @ 12' 9 1/2"	910 (1.75")	Passed (62%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	563 @ 12' 9 1/2"	1860	Passed (30%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1747 @ 6' 7"	3740	Passed (47%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.074 @ 6' 7"	0.310	Passed (L/999+)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.126 @ 6' 7"	0.621	Passed (L/999+)		1.0 D + 1.0 L (All Spans)
TJ-Pro [™] Rating	65	40	Passed		

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

• Deflection criteria: LL (L/480) and TL (L/240).

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

• A structural analysis of the deck has not been performed.

• Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser EdgeTM Panel (24" Span Rating) that is glued and nailed down.

• Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling, bridging or blocking at max. 8' o.c., Perpendicular Partitions, Pour Flooring Overlay.

	B	earing Leng	th	Loads t	o Supports ((lbs)	
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
1 - Stud wall - HF	5.50"	5.50"	1.75"	246	351	597	Blocking
2 - Hanger on 14" HF beam	3.50"	Hanger ¹	1.75" / - 2	243	347	590	See note 1

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

• At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger

¹ See Connector grid below for additional information and/or requirements.

• ² Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 9" o/c	
Bottom Edge (Lu)	12' 10" o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-T	Connector: Simpson Strong-Tie											
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories						
2 - Face Mount Hanger	IUS1.81/14	2.00"	N/A	12-10dx1.5	2-Strong-Grip							

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

			Dead	Floor Live	
Vertical Load	Location	Spacing	(0.90)	(1.00)	Comments
1 - Uniform (PSF)	0 to 13' 1"	16"	28.0	40.0	Floor Load

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

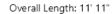
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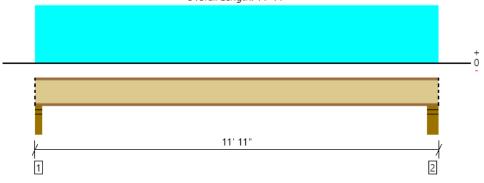


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Upper Floor, J2 1 piece(s) 14" TJI ® 110 @ 16" OC





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)	548 @ 11' 6 1/2"	1375 (3.50")	Passed (40%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	506 @ 3 1/2"	1860	Passed (27%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1456 @ 5' 10 1/2"	3740	Passed (39%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.054 @ 5' 10 1/2"	0.283	Passed (L/999+)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.091 @ 5' 10 1/2"	0.567	Passed (L/999+)		1.0 D + 1.0 L (All Spans)
TJ-Pro [™] Rating	69	40	Passed		

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

Deflection criteria: LL (L/480) and TL (L/240).

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

0

· 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 Man (24" Span Rating) that is glued and nailed down.

• Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling, bridging or blocking at max. 8' o.c., Perpendicular Partitions, Pour Flooring Overlay.

	Bearing Length			Loads t	o Supports (
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
1 - Stud wall - HF	3.50"	3.50"	1.75"	219	313	532	Blocking
2 - Stud wall - HF	5.50"	5.50"	1.75"	226	322	548	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 2" o/c	
Bottom Edge (Lu)	11' 11" o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.

•Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	
Vertical Load	Location	Spacing	(0.90)	(1.00)	Comments
1 - Uniform (PSF)	0 to 11' 11"	16"	28.0	40.0	Floor Load

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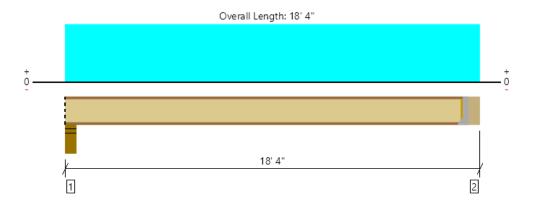
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Upper Floor, J3 1 piece(s) 11 7/8" TJI ® 360 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1027 @ 17' 10 1/2"	1080 (1.75")	Passed (95%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1027 @ 17' 10 1/2"	1705	Passed (60%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	4492 @ 9' 1 1/2"	6180	Passed (73%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.395 @ 9' 1 1/2"	0.438	Passed (L/532)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.579 @ 9' 1 1/2"	0.875	Passed (L/363)		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 2018 Design Methodology : ASD

Deflection criteria: LL (L/480) and TL (L/240).

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

• A structural analysis of the deck has not been performed.

• Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser EdgeTM Panel (24" Span Rating) that is glued and nailed down.

• Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling, bridging or blocking at max. 8' o.c., Perpendicular Partitions, Pour Flooring Overlay.

	Bearing Length			Loads t	o Supports		
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
1 - Stud wall - HF	5.50"	5.50"	1.75"	341	730	1071	Blocking
2 - Hanger on 11 7/8" HF beam	5.50"	Hanger ¹	1.75" / - 2	344	737	1081	See note 1

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

• At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger

¹ See Connector grid below for additional information and/or requirements.

• ² Required Bearing Length / Required Bearing Length with Web Stiffeners

Bracing Intervals	Comments
4' 3" o/c	
17' 11" o/c	
	4' 3" 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	U3516/20	2.00"	N/A	16-10dx1.5	6-10dx1.5	Web Stiffeners			

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

		Dead Floor Live		Floor Live	
Vertical Load	Location	Spacing	(0.90)	(1.00)	Comments
1 - Uniform (PSF)	0 to 18' 4"	16"	28.0	60.0	Deck Load

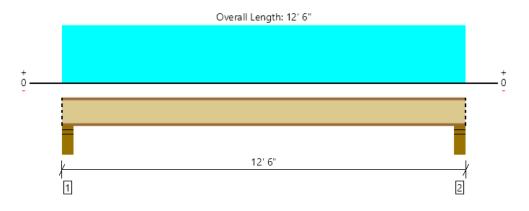
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Upper Floor, J4 1 piece(s) 11 7/8" TJI ® 110 @ 16" OC



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)	733 @ 4 1/2"	1375 (3.50")	Passed (53%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	680 @ 5 1/2"	1560	Passed (44%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2025 @ 6' 3"	3160	Passed (64%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.127 @ 6' 3"	0.294	Passed (L/999+)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.186 @ 6' 3"	0.587	Passed (L/757)		1.0 D + 1.0 L (All Spans)
TJ-Pro [™] Rating	66	40	Passed		

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

Deflection criteria: LL (L/480) and TL (L/240).

• 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 Manal (24" Span Rating) that is glued and nailed down.

• Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling, bridging or blocking at max. 8' o.c., Perpendicular Partitions, Pour Flooring Overlay.

	Bearing Length			Loads t	o Supports (
Supports	Total Available Required		Dead	Floor Live	Total	Accessories	
1 - Stud wall - HF	5.50"	5.50"	1.75"	233	500	733	Blocking
2 - Stud wall - HF	5.50" 5.50" 1.75"		233 500		733	Blocking	

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 11" o/c	
Bottom Edge (Lu)	12' 6" o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.

•Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	
Vertical Load	Location	Spacing	(0.90)	(1.00)	Comments
1 - Uniform (PSF)	0 to 12' 6"	16"	28.0	60.0	Deck Load

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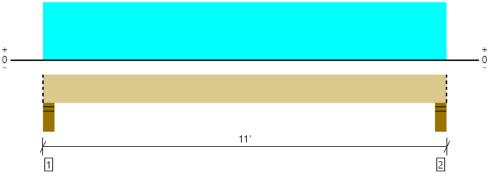
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Upper Floor, B6 2 piece(s) 2 x 8 HF No.2





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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	710 @ 4"	6683 (5.50")	Passed (11%)		1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	573 @ 1' 3/4"	2501	Passed (23%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	1724 @ 5' 6"	2569	Passed (67%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.155 @ 5' 6"	0.258	Passed (L/798)		1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.268 @ 5' 6"	0.517	Passed (L/463)		1.0 D + 0.75 L + 0.75 S (All Spans)

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

• Deflection criteria: LL (L/480) and TL (L/240).

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

Applicable calculations are based on NDS.

	Bearing Length			L	oads to Sup			
Supports	Total	Available	Required	Dead	Floor Live	Snow	Total	Accessories
1 - Stud wall - HF	5.50"	5.50"	1.50"	298	220	330	848	Blocking
2 - Stud wall - HF	5.50"	5.50"	1.50"	298	220	330	848	Blocking
Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.								

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

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 11'	N/A	5.5			
1 - Uniform (PSF)	0 to 11' (Front)	8"	28.0	60.0	-	Deck Load
2 - Uniform (PSF)	0 to 11' (Front)	2'	15.0	-	30.0	Canopy

Weyerhaeuser Notes

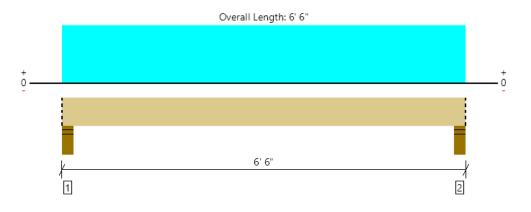
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1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



LDF

1.15

1.15

Load: Combination (Pattern)

1.0 D + 0.75 L + 0.75 S (All Spans)

1.0 D + 0.75 L + 0.75 S (All Spans)

1.0 D + 0.75 L + 0.75 S (All Spans)

1.0 D + 0.75 L + 0.75 S (All Spans)

1.0 D + 0.75 L + 0.75 S (All Spans)

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

Total Load Defl. (in) 0.044 @ 3' 3" Deflection criteria: LL (L/480) and TL (L/240)

Design Results

Shear (lbs)

Moment (Ft-lbs)

Live Load Defl. (in)

Member Reaction (lbs)

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

	В	earing Leng	th	Loads to Supports (lbs)				
Supports	Total	Available	Required	Dead	Floor Live	Snow	Total	Accessories
1 - Stud wall - HF	5.50"	5.50"	2.03"	1260	775	1388	3423	Blocking
2 - Stud wall - HF	5.50"	5.50"	2.03"	1260	775	1388	3423	Blocking
Blocking Panels are assumed to carry no load	s annlied dire	ctly above the	m and the ful	l load is annli	ed to the mem	her heina de	ianed	

ed directly above them and the full load is

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

Allowed

7796 (5.50")

9878

18346

0.146

0.292

Result

Passed (37%)

Passed (16%)

Passed (21%)

Passed (L/999+)

Passed (L/999+)

Actual @ Location

2882 @ 4"

1598 @ 1' 5 3/8"

3772 @ 3' 3"

0.025 @ 3' 3"

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

Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	Snow	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.00)	(1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 6"	N/A	13.0			
1 - Uniform (PSF)	0 to 6' 6" (Front)	5' 11 1/2"	28.0	40.0	-	Deck Load
2 - Uniform (PLF)	0 to 6' 6" (Front)	N/A	181.5	-	362.5	Linked from: J2, Support 2
3 - Uniform (PLF)	0 to 6' 6" (Front)	N/A	26.5	-	64.5	Linked from: J4, Support 2

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

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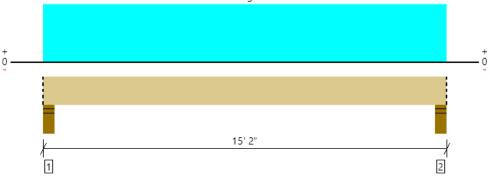
Job Notes





Upper Floor, B8 1 piece(s) 5 1/4" x 16" 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)	5014 @ 4"	11694 (5.50")	Passed (43%)		1.0 D + 1.0 S (All Spans)
Shear (lbs)	3830 @ 1' 9 1/2"	18676	Passed (21%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	17378 @ 7' 7"	60297	Passed (29%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.122 @ 7' 7"	0.290	Passed (L/999+)		1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.188 @ 7' 7"	0.725	Passed (L/923)		1.0 D + 1.0 S (All Spans)

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

• Deflection criteria: LL (L/600) and TL (L/240).

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

	В	earing Leng	th	Loads to Supports (lbs)			
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Stud wall - HF	5.50"	5.50"	2.36"	1776	3238	5014	Blocking
2 - Stud wall - HF	5.50"	5.50"	2.36"	1776	3238	5014	Blocking
 Blocking Panels are assumed to carry no load 	Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.						

ads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	15' 2" o/c	
Bottom Edge (Lu)	15' 2" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 15' 2"	N/A	26.3		
1 - Uniform (PLF)	0 to 15' 2" (Front)	N/A	181.5	362.5	Linked from: J2, Support 2
2 - Uniform (PLF)	0 to 15' 2" (Front)	N/A	26.5	64.5	Linked from: J4, Support 2

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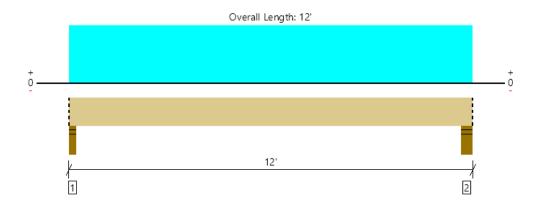
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Upper Floor, B9 1 piece(s) 3 1/2" x 14" 1.55E TimberStrand® LSL



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)	627 @ 2"	4961 (3.50")	Passed (13%)		1.0 D + 1.0 L (All Spans)
Shear (lbs)	473 @ 1' 5 1/2"	10127	Passed (5%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1752 @ 5' 11"	21840	Passed (8%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.020 @ 5' 11"	0.287	Passed (L/999+)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.039 @ 5' 11"	0.575	Passed (L/999+)		1.0 D + 1.0 L (All Spans)

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

• Deflection criteria: LL (L/480) and TL (L/240).

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

Required	Dead	Floor Live	Total	Accessories
1.50"	312	316	628	Blocking
1.50"	320	324	644	Blocking
-	1.50"	1.50" 320	1.50" 320 324	

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)	12' o/c	
Bottom Edge (Lu)	12' o/c	

•Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.00)	Comments
0 - Self Weight (PLF)	0 to 12'	N/A	15.3		
1 - Uniform (PSF)	0 to 12' (Front)	1' 4"	28.0	40.0	Floor Load

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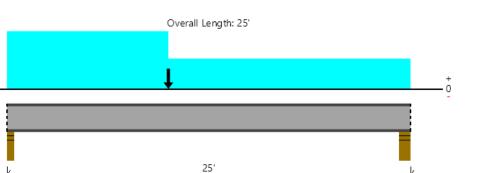
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Upper Floor, B10 1 piece(s) W14X43 (A992) ASTM Steel



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	9607 @ 2"	11340 (3.50")	Passed (85%)		1.0 D + 1.0 L (All Spans)
Shear (lbs)	9349 @ 3 1/2"	83570	Passed (11%)		1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	50273 @ 10' 3 5/16"	82296	Passed (61%)		1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.236 @ 12' 1 1/16"	0.613	Passed (L/999+)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.433 @ 12' 1 1/4"	1.225	Passed (L/679)		1.0 D + 1.0 L (All Spans)

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

2

Deflection criteria: LL (L/480) and TL (L/240).

Applicable calculations are based on ANSI/AISC 360-16.

• A lateral-torsional buckling factor (Сь) of 1.0 has been assumed.

0

1

	Bearing Length			Loads t	o Supports (
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories			
1 - Stud wall - HF	3.50"	3.50"	3.50"	4302	5305	9607	Blocking			
2 - Stud wall - HF	5.50"	5.50"	5.50"	3284	3865	7149	Blocking			
Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.										

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

			Dead	Floor Live	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.00)	Comments
0 - Self Weight (PLF)	0 to 25'	N/A	43.0		
1 - Uniform (PLF)	0 to 10'	N/A	164.3	234.8	Linked from: J2, Support 1
2 - Uniform (PLF)	0 to 25'	N/A	182.3	260.3	Linked from: J1, Support 2
3 - Point (lb)	10'	N/A	312	316	Linked from: B9, Support 1

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

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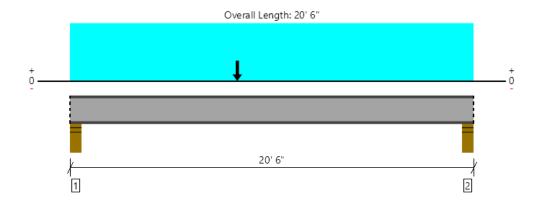


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Upper Floor, B11 1 piece(s) W14X43 (A992) ASTM Steel

PASSED



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)	16583 @ 4"	17820 (5.50")	Passed (93%)		1.0 D + 1.0 L (All Spans)
Shear (lbs)	16094 @ 5 1/2"	83570	Passed (19%)		1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	96958 @ 8' 6"	110273	Passed (88%)		1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.299 @ 10' 1/2"	0.496	Passed (L/796)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.507 @ 10' 5/16"	0.992	Passed (L/469)		1.0 D + 1.0 L (All Spans)

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

• Deflection criteria: LL (L/480) and TL (L/240).

• Applicable calculations are based on ANSI/AISC 360-16.

• A lateral-torsional buckling factor (Сь) of 1.0 has been assumed.

	Bearing Length			L	oads to Supp					
Supports	Total	Available	Required	Dead	Floor Live	Snow	Total	Accessories		
1 - Stud wall - HF	5.50"	5.50"	5.50"	6731	9851	728	17310	Blocking		
2 - Stud wall - HF	5.50"	5.50"	5.50"	5972	8915	728	15615	Blocking		
Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.										

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

			Dead	Floor Live	Snow	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.00)	(1.15)	Comments
0 - Self Weight (PLF)	0 to 20' 6"	N/A	43.0			
1 - Uniform (PSF)	0 to 20' 6"	2' 8"	28.0	40.0	-	Floor Load
2 - Uniform (PSF)	0 to 20' 6"	9' 2"	28.0	60.0	-	Deck Load
3 - Uniform (PLF)	0 to 20' 6"	N/A	35.5	-	71.0	Linked from: J3, Support 2
4 - Point (lb)	8' 6"	N/A	4302	5305	-	Linked from: B10, Support 1

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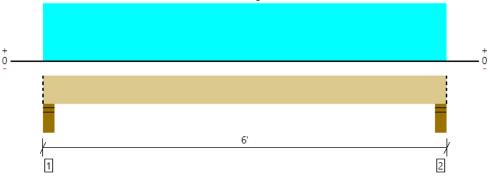
Job Notes





Upper Floor, B12 2 piece(s) 2 x 8 HF No.2





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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	388 @ 4"	6683 (5.50")	Passed (6%)		1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	250 @ 1' 3/4"	2501	Passed (10%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	459 @ 3'	2569	Passed (18%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.011 @ 3'	0.133	Passed (L/999+)		1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.019 @ 3'	0.267	Passed (L/999+)		1.0 D + 0.75 L + 0.75 S (All Spans)

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

• Deflection criteria: LL (L/480) and TL (L/240).

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

Applicable calculations are based on NDS.

	Bearing Length			Loads to Supports (lbs)				
Supports	Total	Available	Required	Dead	Floor Live	Snow	Total	Accessories
1 - Stud wall - HF	5.50"	5.50"	1.50"	163	120	180	463	Blocking
2 - Stud wall - HF	5.50"	5.50"	1.50"	163	120	180	463	Blocking
Blocking Panels are assumed to carry no load	s applied dire	ctly above the	m and the ful	l load is applie	ed to the men	ber beina de	sianed.	

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

•Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	Snow	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.00)	(1.15)	Comments
0 - Self Weight (PLF)	0 to 6'	N/A	5.5			
1 - Uniform (PSF)	0 to 6' (Front)	8"	28.0	60.0	-	Deck Load
2 - Uniform (PSF)	0 to 6' (Front)	2'	15.0	-	30.0	

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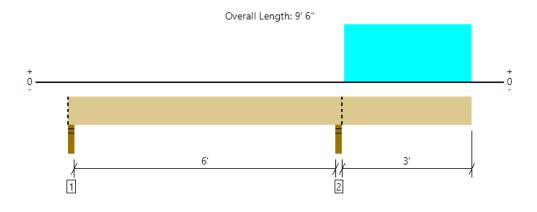
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Upper Floor, B13 Corner Cantilever Rim Header 1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



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)	2087 @ 6' 4 1/2"	4253 (3.00")	Passed (49%)		1.0 D + 1.0 L (All Spans)
Shear (lbs)	1088 @ 7' 5 7/8"	8590	Passed (13%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-2637 @ 6' 4 1/2"	15953	Passed (17%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.042 @ 9' 6"	0.200	Passed (2L/999+)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.062 @ 9' 6"	0.313	Passed (2L/999+)		1.0 D + 1.0 L (All Spans)

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

• Deflection criteria: LL (L/480) and TL (L/240).

• Overhang deflection criteria: LL (2L/0.2") and TL (2L/240).

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

• -380 lbs uplift at support located at 1 1/2". Strapping or other restraint may be required.

	Bearing Length			Loads t	o Supports (
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
1 - Stud wall - HF	3.00"	3.00"	1.50"	-99	-281	-380	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.50"	726	1361	2087	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	9' 6" o/c	
Bottom Edge (Lu)	9' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.00)	Comments
0 - Self Weight (PLF)	0 to 9' 6"	N/A	13.0		
1 - Uniform (PSF)	6' 6" to 9' 6" (Front)	6'	28.0	60.0	Deck

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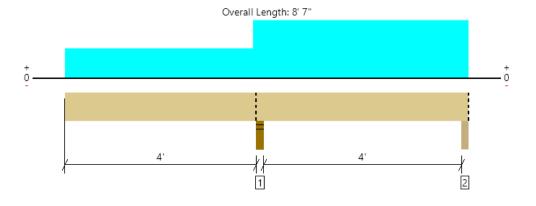
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Upper Floor, Canopy Joist 1 piece(s) 2 x 8 HF No.2 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	522 @ 4' 1 3/4"	2126 (3.50")	Passed (25%)		1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	235 @ 4' 10 3/4"	1251	Passed (19%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	-515 @ 4' 1 3/4"	1477	Passed (35%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.097 @ 0	0.207	Passed (2L/999+)		1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.132 @ 0	0.415	Passed (2L/752)		1.0 D + 1.0 S (All Spans)
TJ-Pro [™] Rating	N/A	N/A	N/A		N/A

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

• Deflection criteria: LL (L/480) and TL (L/240).

• Overhang deflection criteria: LL (2L/480) and TL (2L/240).

• Left cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.

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

• A 15% increase in the moment capacity has been added to account for repetitive member usage.

Applicable calculations are based on NDS.

• No composite action between deck and joist was considered in analysis.

	Bearing Length			Loads to Supports (lbs)				
Supports	Total	Available	Required	Dead	Floor Live	Snow	Total	Accessories
1 - Stud wall - HF	3.50"	3.50"	1.50"	205	181	241	627	Blocking
2 - Beam - HF	3.50"	3.50"	1.50"	46	186	-81	232/-81	Blocking
Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.								

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

Lateral Bracing	Bracing Intervals	Comments			
Top Edge (Lu)	8' 7" o/c				
Bottom Edge (Lu)	8' 7" o/c				
Maximum allowable bracing intervals based on applied load					

Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	Snow	
Vertical Loads	Location (Side)	Spacing	(0.90)	(1.00)	(1.15)	Comments
1 - Uniform (PSF)	0 to 4'	16"	15.0	-	30.0	Default Load
2 - Uniform (PSF)	4' to 8' 7"	16"	28.0	60.0	-	Deck

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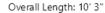
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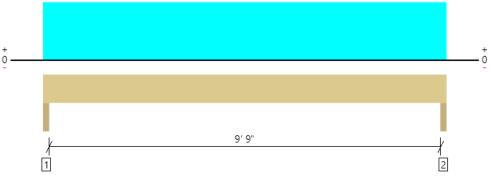
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Upper Floor, Canopy edge beam 2 piece(s) 2 x 8 HF No.2





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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	489 @ 1 1/2"	3645 (3.00")	Passed (13%)		1.0 D + 1.0 S (All Spans)
Shear (lbs)	408 @ 10 1/4"	2501	Passed (16%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1194 @ 5' 1 1/2"	2569	Passed (46%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.109 @ 5' 1 1/2"	0.333	Passed (L/999+)		1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.174 @ 5' 1 1/2"	0.313	Passed (L/692)		1.0 D + 1.0 S (All Spans)

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

• Deflection criteria: LL (L/360) and TL (L/5/16").

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

Applicable calculations are based on NDS.

	Bearing Length			Loads t	o Supports (
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Trimmer - DF	3.00"	3.00"	1.50"	182	308	490	None
2 - Trimmer - DF	3.00"	3.00"	1.50"	182	308	490	None

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

•Maximum allowable bracing intervals based on applied load.

			Dead	Snow	
Vertical Loads	Location	Tributary Width	(0.90)	(1.15)	Comments
0 - Self Weight (PLF)	0 to 10' 3"	N/A	5.5		
1 - Uniform (PSF)	0 to 10' 3"	2'	15.0	30.0	Snow

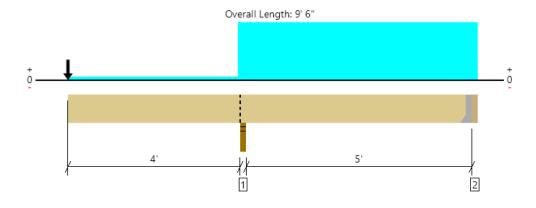
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All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3290 @ 4' 1 1/2"	6379 (3.00")	Passed (52%)		1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1734 @ 4' 10 1/4"	7232	Passed (24%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-3820 @ 4' 1 1/2"	12273	Passed (31%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.169 @ 0	0.206	Passed (2L/584)		1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.228 @ 0	0.412	Passed (2L/434)		1.0 D + 1.0 S (All Spans)

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

• Deflection criteria: LL (L/480) and TL (L/240).

• Overhang deflection criteria: LL (2L/480) and TL (2L/240).

• Left cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.

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

	Bearing Length Loads to Supports (lbs)							
Supports	Total	Available	Required	Dead	Floor Live	Snow	Total	Accessories
1 - Stud wall - HF	3.00"	3.00"	1.55"	1343	1452	1144	3939	Blocking
2 - Hanger on 7 1/4" HF beam	3.00"	Hanger ¹	1.50"	476	1519	-484	1995/- 484	See note 1

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

• At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger

• ¹ See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments				
Top Edge (Lu)	9' 3" o/c					
Bottom Edge (Lu)	9' 3" o/c					
Maximum alloughle bracing intervals based on applied load						

Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie

1 0	1	1		1	1		
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories	
2 - Face Mount Hanger	HGUS5.50/8	4.00"	N/A	36-10d	12-10d		
Refer to manufacturer notes and instructions for proper installation and use of all connectors							

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

			Dead	Floor Live	Snow	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.00)	(1.15)	Comments
0 - Self Weight (PLF)	0 to 9' 3"	N/A	11.1			
1 - Uniform (PSF)	0 to 4' (Front)	1'	15.0	-	30.0	Canopy
2 - Point (lb)	0 (Front)	N/A	270	-	540	Canopy beam reactions
3 - Uniform (PSF)	4' to 9' 6" (Front)	9'	28.0	60.0	-	Deck

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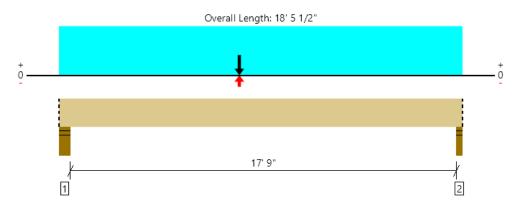
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator Jane Johnson Bykonen Carter Quinn (206) 264-7784 jaj@bcq-se.com Job Notes



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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)	2126 @ 18' 4"	6379 (3.00")	Passed (33%)		1.0 D + 1.0 L (All Spans)
Shear (lbs)	2196 @ 1' 5 3/8"	12053	Passed (18%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	14308 @ 8' 3"	29854	Passed (48%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.327 @ 9' 1 11/16"	0.450	Passed (L/661)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.478 @ 9' 1 7/8"	0.900	Passed (L/452)		1.0 D + 1.0 L (All Spans)

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

• Deflection criteria: LL (L/480) and TL (L/240).

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

	Bearing Length			Loads to Supports (lbs)				
Supports	Total	Available	Required	Dead	Floor Live	Snow	Total	Accessories
1 - Stud wall - HF	5.50"	5.50"	1.50"	797	1598	-271	2395/- 271	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.50"	728	1398	-213	2126/- 213	Blocking

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

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

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 18' 5 1/2"	N/A	19.5			
1 - Uniform (PSF)	0 to 18' 5 1/2" (Front)	1' 4"	28.0	60.0	-	Deck
2 - Point (lb)	8' 3" (Front)	N/A	476	1519		Linked from: Canopy Cantilever, Support 2

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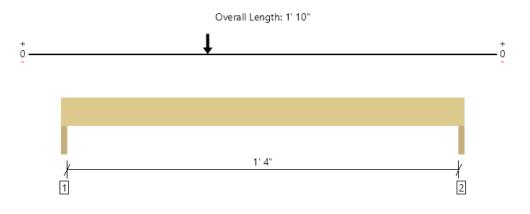
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PASSED

Upper Floor, Elevator Rim - out of plane 1 piece(s) 1 3/4" x 14" 1.55E TimberStrand® LSL (Plank)



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)	172 @ 1 1/2"	32550 (3.00")	Passed (1%)		1.0 D + 1.0 L (All Spans)
Shear (lbs)	169 @ 4 3/4"	2450	Passed (7%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-Ibs)	92 @ 8"	1557	Passed (6%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.004 @ 10 11/16"	0.053	Passed (L/999+)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.004 @ 10 11/16"	0.079	Passed (L/999+)		1.0 D + 1.0 L (All Spans)

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

• Deflection criteria: LL (L/360) and TL (L/240).

• Member has been designed in flat (plank) orientation with vertical (gravity) loads applied to wide strand face.

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

	Bearing Length			Loads t	o Supports (
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
1 - Trimmer - DF	3.00"	3.00"	1.50"	7	165	172	None
2 - Trimmer - DF	3.00"	3.00"	1.50"	7	86	93	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	1' 10" o/c	
Bottom Edge (Lu)	1' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	
Vertical Loads	Location	Tributary Width	(0.90)	(1.00)	Comments
0 - Self Weight (PLF)	0 to 1' 10"	N/A	7.7		
1 - Point (Ib)	8"	N/A	-	251	

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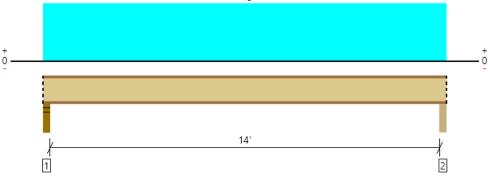
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Upper Floor, Floor: Joist 14' span, typ. 1 piece(s) 11 7/8" TJI ® 210 @ 16" OC





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)	661 @ 2 1/2"	1460 (3.50")	Passed (45%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	635 @ 3 1/2"	1655	Passed (38%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2275 @ 7' 3 1/2"	3795	Passed (60%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.149 @ 7' 3 1/2"	0.354	Passed (L/999+)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.253 @ 7' 3 1/2"	0.708	Passed (L/672)		1.0 D + 1.0 L (All Spans)
TJ-Pro [™] Rating	47	40	Passed		

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

Deflection criteria: LL (L/480) and TL (L/240).

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

• A structural analysis of the deck has not been performed.

• Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.

• Additional considerations for the TJ-Pro[™] Rating include: None.

	Bearing Length			Loads to Supports (lbs)			
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
1 - Stud wall - HF	3.50"	3.50"	1.75"	272	389	661	Blocking
2 - Beam - HF	3.50"	3.50"	1.75"	272	389	661	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' 10" o/c	
Bottom Edge (Lu)	14' 7" o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.

•Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	
Vertical Load	Location	Spacing	(0.90)	(1.00)	Comments
1 - Uniform (PSF)	0 to 14' 7"	16"	28.0	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

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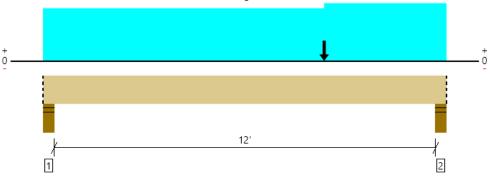
Job Notes





1 piece(s) 5 1/4" x 14" 2.0E Parallam® PSL

Overall Length: 12' 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)	10019 @ 12' 7"	11694 (5.50")	Passed (86%)		1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	6545 @ 11' 3 1/2"	16342	Passed (40%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	24319 @ 6' 8 3/16"	46854	Passed (52%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.223 @ 6' 7 7/16"	0.306	Passed (L/658)		1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.358 @ 6' 6 7/8"	0.613	Passed (L/410)		1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)

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

• Deflection criteria: LL (L/480) and TL (L/240).

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

	В	Bearing Length			Loads t				
Supports	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	Accessories
1 - Stud wall - HF	5.50"	5.50"	4.05"	3506	1908	4166	1044/-1044	10624/- 1044	Blocking
2 - Stud wall - HF	5.50"	5.50"	4.71"	3766	2403	4166	2526/-2526	12861/- 2526	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)	12' 11" o/c	
Bottom Edge (Lu)	12' 11" o/c	
M		

•Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	Snow	Seismic	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.00)	(1.15)	(1.60)	Comments
0 - Self Weight (PLF)	0 to 12' 11"	N/A	23.0				
1 - Uniform (PSF)	0 to 12' 11" (Front)	6' 6"	28.0	40.0	-		Default Load
2 - Uniform (PSF)	0 to 12' 11" (Top)	21' 6"	15.0	-	30.0	-	
3 - Uniform (PSF)	9' to 12' 11" (Back)	2'	28.0	40.0	-	-	Default Load
4 - Point (lb)	9' (Top)	N/A	240	640	-	-	Stair beam
5 - Point (lb)	9' (Front)	N/A	-	-	-	3570	Hold-down

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

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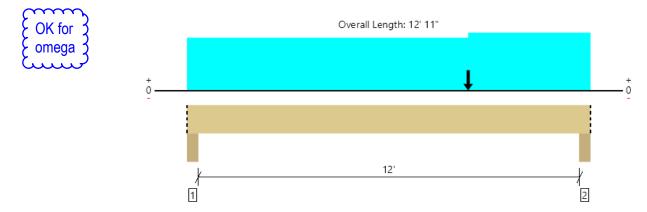




Upper Floor, B14 FB at stair, omega

1 piece(s) 5 1/4" x 14" 2.0E Parallam® PSL

An excessive uplift of -2160 lbs at support located at 12' 7" 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)	12008 @ 12' 7"	18047 (5.50")	Passed (67%)		1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	9860 @ 11' 3 1/2"	22736	Passed (43%)	1.60	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	24319 @ 6' 8 3/16"	46854	Passed (52%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.292 @ 6' 8 11/16"	0.306	Passed (L/503)		1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.427 @ 6' 7 13/16"	0.613	Passed (L/344)		1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)

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

• Deflection criteria: LL (L/480) and TL (L/240).

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

	Bearing Length			Loads to Supports (lbs)					
Supports	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	Accessories
1 - Column - HF	5.50"	5.50"	2.87"	3506	1908	4166	2611/-2611	12191/- 2611	Blocking
2 - Column - HF	5.50"	5.50"	3.66"	3766	2403	4166	6314/-6314	16649/- 6314	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)	12' 11" o/c							
Bottom Edge (Lu)	12' 11" o/c							
Maximum allowable bracing intervals based on applied load.								

			Dead	Floor Live	Snow	Seismic	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.00)	(1.15)	(1.60)	Comments
0 - Self Weight (PLF)	0 to 12' 11"	N/A	23.0				
1 - Uniform (PSF)	0 to 12' 11" (Front)	6' 6"	28.0	40.0	-		Default Load
2 - Uniform (PSF)	0 to 12' 11" (Top)	21' 6"	15.0	-	30.0		
3 - Uniform (PSF)	9' to 12' 11" (Back)	2'	28.0	40.0	-		Default Load
4 - Point (lb)	9' (Top)	N/A	240	640	-	-	Stair beam
5 - Point (lb)	9' (Front)	N/A	-	-	-	8925	Hold-down, overstrength = 2.5

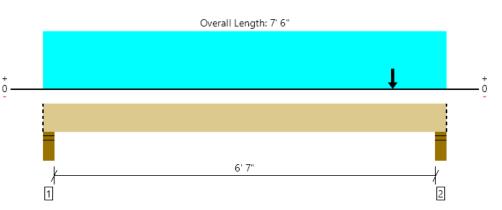
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All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	7271 @ 7' 2"	7796 (5.50")	Passed (93%) 1.0 D + 0.525 E + 0.75 L + Spans)		1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (Ibs)	3057 @ 5' 10 1/2"	11646	Passed (26%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	7915 @ 3' 9 5/8"	25116	Passed (32%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.051 @ 3' 10"	0.171	Passed (L/999+)		1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.085 @ 3' 9 11/16"	0.342	Passed (L/966)		1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)

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

• Deflection criteria: LL (L/480) and TL (L/240).

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

• -830 lbs uplift at support located at 7' 2". Strapping or other restraint may be required.

	Bearing Length				Loads t				
Supports	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	Accessories
1 - Stud wall - HF	5.50"	5.50"	3.66"	2183	1337	2419	348/-348	6287/- 348	Blocking
2 - Stud wall - HF	5.50"	5.50"	5.13"	2376	1853	2419	3222/-3222	9870/- 3222	Blocking

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

Lateral Bracing	Bracing Intervals	Comments			
Top Edge (Lu)	7' 6" o/c				
Bottom Edge (Lu)	7' 6" o/c				
Maximum alloughts having interpole based on analised load					

Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	Snow	Seismic	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.00)	(1.15)	(1.60)	Comments
0 - Self Weight (PLF)	0 to 7' 6"	N/A	15.3				
1 - Uniform (PSF)	0 to 7' 6" (Front)	6' 6"	28.0	40.0	-	-	Default Load
2 - Uniform (PSF)	0 to 7' 6" (Top)	21' 6"	15.0	-	30.0	-	
3 - Uniform (PSF)	0 to 7' 6" (Back)	2'	28.0	40.0	-	-	Default Load
4 - Point (lb)	6' 6" (Top)	N/A	240	640	-	-	Stair beam
5 - Point (Ib)	6' 6" (Front)	N/A	-	-	-	3570	Hold-down

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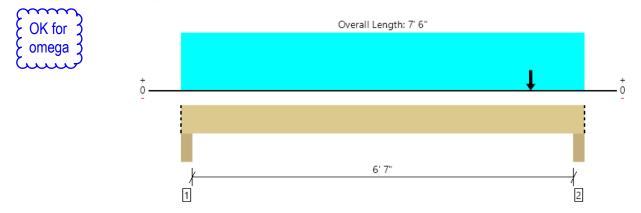
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Upper Floor, B14 FB at stair, omega 1 piece(s) 3 1/2" x 14" 1.55E TimberStrand® LSL

An excessive uplift of -4212 lbs at support located at 7' 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)	9808 @ 7' 2"	13956 (5.50")	Passed (70%)		1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	4776 @ 5' 10 1/2"	16203	Passed (29%)	1.60	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	7915 @ 3' 9 5/8"	25116	Passed (32%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.062 @ 3' 10 3/4"	0.171	Passed (L/999+)		1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.095 @ 3' 10 3/16"	0.342	Passed (L/859)		1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)

vstem : Floor ember Type : Flush Beam uilding Use : Residential uilding Code : IBC 2018 esign Methodology : ASD

• Deflection criteria: LL (L/480) and TL (L/240).

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

	Bearing Length			Loads to Supports (lbs)					
Supports	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	Accessories
1 - Column - HF	5.50"	5.50"	2.15"	2183	1337	2419	871/-871	6810/- 871	Blocking
2 - Column - HF	5.50"	5.50"	3.87"	2376	1853	2419	8054/-8054	14702/- 8054	Blocking

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

Lateral Bracing	Bracing Intervals	Comments			
Top Edge (Lu)	7' 6" o/c				
Bottom Edge (Lu)	7' 6" o/c				
•Maximum allowable bracing intervals based on applied load					

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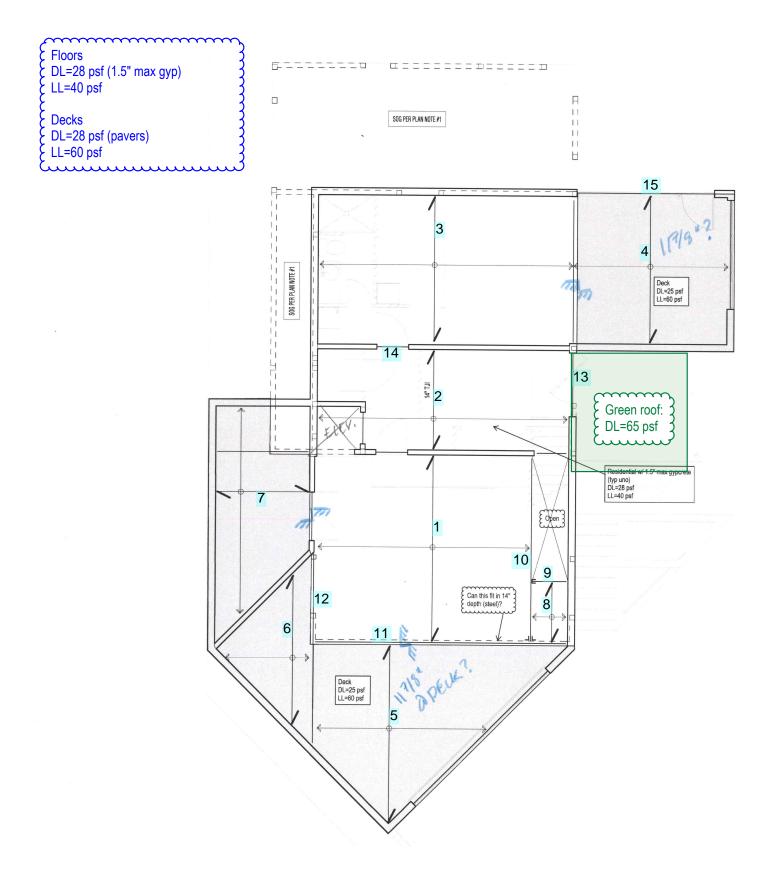
			Dead	Floor Live	Snow	Seismic	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.00)	(1.15)	(1.60)	Comments
0 - Self Weight (PLF)	0 to 7' 6"	N/A	15.3				
1 - Uniform (PSF)	0 to 7' 6" (Front)	6' 6"	28.0	40.0	-		Default Load
2 - Uniform (PSF)	0 to 7' 6" (Top)	21' 6"	15.0	-	30.0		
3 - Uniform (PSF)	0 to 7' 6" (Back)	2'	28.0	40.0	-		Default Load
4 - Point (lb)	6' 6" (Top)	N/A	240	640	-	-	Stair beam
5 - Point (lb)	6' 6" (Front)	N/A	-	-	-	8925	Hold-down, overstrength = 2.5

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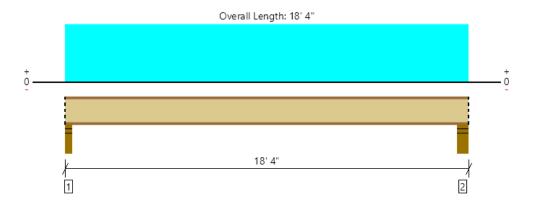
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Main Floor, J1 1 piece(s) 14" TJI ® 110 @ 16" OC



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)	839 @ 17' 11 1/2"	1375 (3.50")	Passed (61%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	797 @ 3 1/2"	1860	Passed (43%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3571 @ 9' 1"	3740	Passed (95%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.276 @ 9' 1"	0.444	Passed (L/771)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.470 @ 9' 1"	0.887	Passed (L/454)		1.0 D + 1.0 L (All Spans)
TJ-Pro [™] Rating	53	40	Passed		

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

Deflection criteria: LL (L/480) and TL (L/240).

• 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 Man (24" Span Rating) that is glued and nailed down.

• Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling, bridging or blocking at max. 8' o.c., Perpendicular Partitions, Pour Flooring Overlay.

	Bearing Length			Loads t	o Supports		
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
1 - Stud wall - HF	3.50"	3.50"	1.75"	339	484	823	Blocking
2 - Stud wall - HF	5.50"	5.50"	1.75"	345	493	838	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 2" o/c	
Bottom Edge (Lu)	18' 4" o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.

•Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	
Vertical Load	Location	Spacing	(0.90)	(1.00)	Comments
1 - Uniform (PSF)	0 to 18' 4"	16"	28.0	40.0	Floor Load

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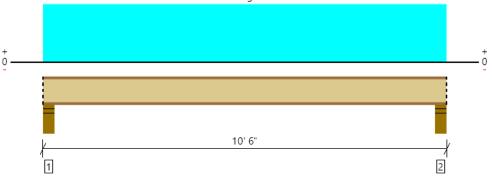




Main Floor, J2 1 piece(s) 14" TJI ® 110 @ 16" OC







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)	476 @ 4 1/2"	1375 (3.50")	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	434 @ 5 1/2"	1860	Passed (23%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1077 @ 5' 3"	3740	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.032 @ 5' 3"	0.244	Passed (L/999+)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.054 @ 5' 3"	0.488	Passed (L/999+)		1.0 D + 1.0 L (All Spans)
TJ-Pro [™] Rating	72	40	Passed		

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

Deflection criteria: LL (L/480) and TL (L/240).

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

• A structural analysis of the deck has not been performed.

• Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge Manal (24" Span Rating) that is glued and nailed down.

• Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling, bridging or blocking at max. 8' o.c., Perpendicular Partitions, Pour Flooring Overlay.

	Bearing Length		Loads to Supports (Ibs)				
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
1 - Stud wall - HF	5.50"	5.50"	1.75"	196	280	476	Blocking
2 - Stud wall - HF	5.50"	5.50"	1.75"	196	280	476	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 1" o/c	
Bottom Edge (Lu)	10' 6" o/c	
		· · · · · · · · · · · · · · · · · · ·

•TJI joists are only analyzed using Maximum Allowable bracing solutions.

•Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	
Vertical Load	Location	Spacing	(0.90)	(1.00)	Comments
1 - Uniform (PSF)	0 to 10' 6"	16"	28.0	40.0	Floor Load

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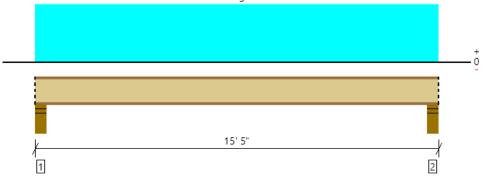




Main Floor, J3 1 piece(s) 14" TJI ® 110 @ 16" OC







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)	699 @ 4 1/2"	1375 (3.50")	Passed (51%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	657 @ 5 1/2"	1860	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2438 @ 7' 8 1/2"	3740	Passed (65%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.136 @ 7' 8 1/2"	0.367	Passed (L/999+)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.231 @ 7' 8 1/2"	0.733	Passed (L/763)		1.0 D + 1.0 L (All Spans)
TJ-Pro [™] Rating	62	40	Passed		

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

Deflection criteria: LL (L/480) and TL (L/240).

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

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• 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 Man (24" Span Rating) that is glued and nailed down.

• Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling, bridging or blocking at max. 8' o.c., Perpendicular Partitions, Pour Flooring Overlay.

	Bearing Length		Loads to Supports (lbs)				
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
1 - Stud wall - HF	5.50"	5.50"	1.75"	288	411	699	Blocking
2 - Stud wall - HF	5.50"	5.50"	1.75"	288	411	699	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 11" o/c	
Bottom Edge (Lu)	15' 5" o/c	
		·

•TJI joists are only analyzed using Maximum Allowable bracing solutions.

•Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	
Vertical Load	Location	Spacing	(0.90)	(1.00)	Comments
1 - Uniform (PSF)	0 to 15' 5"	16"	28.0	40.0	Floor Load

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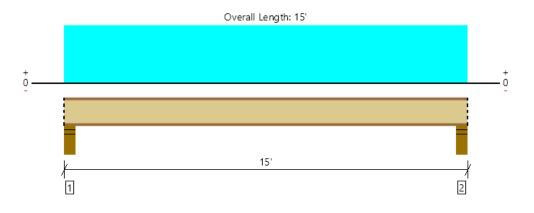
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Main Floor, J4 1 piece(s) 11 7/8" TJI ® 110 @ 16" OC



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)	880 @ 4 1/2"	1375 (3.50")	Passed (64%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	826 @ 5 1/2"	1560	Passed (53%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2978 @ 7' 6"	3160	Passed (94%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.257 @ 7' 6"	0.356	Passed (L/664)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.378 @ 7' 6"	0.712	Passed (L/453)		1.0 D + 1.0 L (All Spans)
TJ-Pro [™] Rating	59	40	Passed		

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

Deflection criteria: LL (L/480) and TL (L/240).

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

• A structural analysis of the deck has not been performed.

• Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge Man (24" Span Rating) that is glued and nailed down.

• Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling, bridging or blocking at max. 8' o.c., Perpendicular Partitions, Pour Flooring Overlay.

	Bearing Length			Loads t	o Supports (
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
1 - Stud wall - HF	5.50"	5.50"	1.75"	280	600	880	Blocking
2 - Stud wall - HF	5.50"	5.50"	1.75"	280	600	880	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 2" o/c	
Bottom Edge (Lu)	15' o/c	
		·

•TJI joists are only analyzed using Maximum Allowable bracing solutions.

•Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	
Vertical Load	Location	Spacing	(0.90)	(1.00)	Comments
1 - Uniform (PSF)	0 to 15'	16"	28.0	60.0	Deck Load

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

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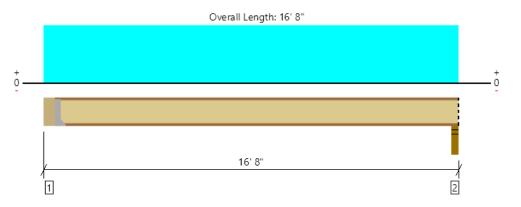
Job Notes



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Main Floor, J5 1 piece(s) 11 7/8" TJI ® 360 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	939 @ 5 1/2"	1080 (1.75")	Passed (87%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	939 @ 5 1/2"	1705	Passed (55%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-Ibs)	3755 @ 8' 5 1/2"	6180	Passed (61%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.283 @ 8' 5 1/2"	0.400	Passed (L/677)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.416 @ 8' 5 1/2"	0.800	Passed (L/462)		1.0 D + 1.0 L (All Spans)
TJ-Pro [™] Rating	56	40	Passed		

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

• Deflection criteria: LL (L/480) and TL (L/240).

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

• A structural analysis of the deck has not been performed.

• Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser EdgeTM Panel (24" Span Rating) that is glued and nailed down.

• Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling, bridging or blocking at max. 8' o.c., Perpendicular Partitions, Pour Flooring Overlay.

	Bearing Length			Loads t	o Supports (
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
1 - Hanger on 11 7/8" HF beam	5.50"	Hanger ¹	1.75" / - 2	316	677	993	See note 1
2 - Stud wall - HF	3.50"	3.50"	1.75"	306	657	963	Blocking

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

• At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger

• ¹ See Connector grid below for additional information and/or requirements.

• ² Required Bearing Length / Required Bearing Length with Web Stiffeners

Bracing Intervals	Comments
4' 9" o/c	
16' 3" o/c	
	4' 9" o/c

•TJI joists are only analyzed using Maximum Allowable bracing solutions.

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie							
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories	
1 - Face Mount Hanger	IUS2.37/11.88	2.00"	N/A	10-10d	2-Strong-Grip		

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

			Dead	Floor Live	
Vertical Load	Location	Spacing	(0.90)	(1.00)	Comments
1 - Uniform (PSF)	0 to 16' 8"	16"	28.0	60.0	Deck Load

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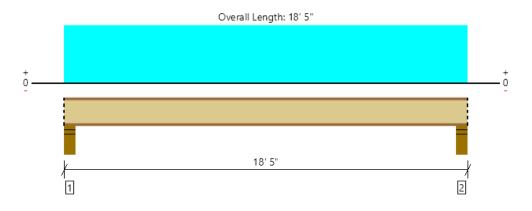
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Main Floor, J6 2 piece(s) 11 7/8" TJI ® 360 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1080 @ 4 1/2"	3010 (3.50")	Passed (36%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1027 @ 5 1/2"	3410	Passed (30%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	4578 @ 9' 2 1/2"	12360	Passed (37%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.217 @ 9' 2 1/2"	0.442	Passed (L/977)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.318 @ 9' 2 1/2"	0.883	Passed (L/666)		1.0 D + 1.0 L (All Spans)
TJ-Pro [™] Rating	61	40	Passed		

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

Deflection criteria: LL (L/480) and TL (L/240).

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

• A structural analysis of the deck has not been performed.

• Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge Man (24" Span Rating) that is glued and nailed down.

• Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling, bridging or blocking at max. 8' o.c., Perpendicular Partitions, Pour Flooring Overlay.

	Bearing Length			Loads t	o Supports		
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
1 - Stud wall - HF	5.50"	5.50"	1.75"	344	737	1081	Blocking
2 - Stud wall - HF	5.50"	5.50"	1.75"	344	737	1081	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' 3" o/c					
Bottom Edge (Lu)	18' 5" o/c					

•TJI joists are only analyzed using Maximum Allowable bracing solutions.

•Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	
Vertical Load	Location	Spacing	(0.90)	(1.00)	Comments
1 - Uniform (PSF)	0 to 18' 5"	16"	28.0	60.0	Deck Load

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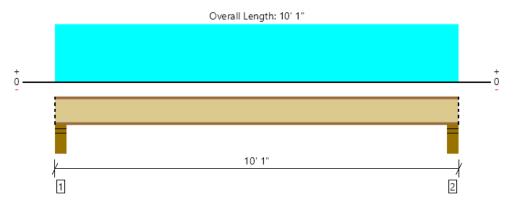
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Main Floor, J7 1 piece(s) 11 7/8" TJI ® 110 @ 16" OC



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)	592 @ 4 1/2"	1375 (3.50")	Passed (43%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	538 @ 5 1/2"	1560	Passed (34%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1278 @ 5' 1/2"	3160	Passed (40%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.056 @ 5' 1/2"	0.233	Passed (L/999+)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.083 @ 5' 1/2"	0.467	Passed (L/999+)		1.0 D + 1.0 L (All Spans)
TJ-Pro [™] Rating	71	40	Passed		

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

Deflection criteria: LL (L/480) and TL (L/240).

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

• A structural analysis of the deck has not been performed.

• Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge Man (24" Span Rating) that is glued and nailed down.

• Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling, bridging or blocking at max. 8' o.c., Perpendicular Partitions, Pour Flooring Overlay.

	Bearing Length			Loads to Supports (lbs)			
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
1 - Stud wall - HF	5.50"	5.50"	1.75"	188	403	591	Blocking
2 - Stud wall - HF	5.50"	5.50"	1.75"	188	403	591	Blocking

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

Lateral Bracing	Bracing Intervals	Comments			
Top Edge (Lu)	5' 1" o/c				
Bottom Edge (Lu)	10' 1" o/c				

•TJI joists are only analyzed using Maximum Allowable bracing solutions.

•Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	
Vertical Load	Location	Spacing	(0.90)	(1.00)	Comments
1 - Uniform (PSF)	0 to 10' 1"	16"	28.0	60.0	Deck Load

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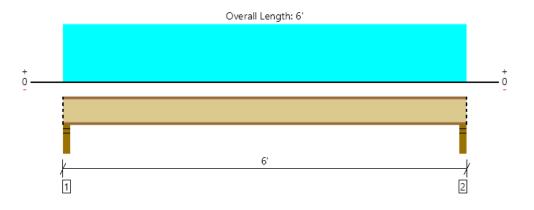
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Main Floor, J8 1 piece(s) 14" TJI ® 110 @ 16" OC



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)	272 @ 2 1/2"	1375 (3.50")	Passed (20%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	246 @ 3 1/2"	1860	Passed (13%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-Ibs)	353 @ 3'	3740	Passed (9%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.006 @ 3'	0.140	Passed (L/999+)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.009 @ 3'	0.279	Passed (L/999+)		1.0 D + 1.0 L (All Spans)
TJ-Pro [™] Rating	78	40	Passed		

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

Deflection criteria: LL (L/480) and TL (L/240).

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

• A structural analysis of the deck has not been performed.

• Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge Man (24" Span Rating) that is glued and nailed down.

• Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling, bridging or blocking at max. 8' o.c., Perpendicular Partitions, Pour Flooring Overlay.

	Bearing Length			Loads t	o Supports (
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
1 - Stud wall - HF	3.50"	3.50"	1.75"	112	160	272	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.75"	112	160	272	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' o/c	
Bottom Edge (Lu)	6' o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.

•Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	
Vertical Load	Location	Spacing	(0.90)	(1.00)	Comments
1 - Uniform (PSF)	0 to 6'	16"	28.0	40.0	Floor Load

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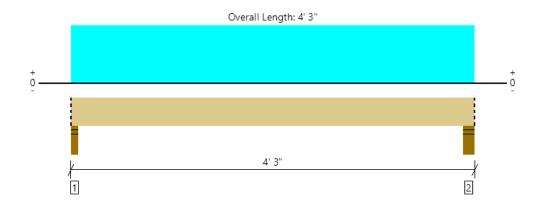




Main Floor, B9 1 piece(s) 3 1/2" x 14" 1.55E TimberStrand® LSL



PASSED



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)	448 @ 2"	4961 (3.50")	Passed (9%)		1.0 D + 1.0 L (All Spans)
Shear (lbs)	128 @ 1' 5 1/2"	10127	Passed (1%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	386 @ 2' 1/2"	21840	Passed (2%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.001 @ 2' 1/2"	0.094	Passed (L/999+)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.002 @ 2' 1/2"	0.188	Passed (L/999+)		1.0 D + 1.0 L (All Spans)

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

• Deflection criteria: LL (L/480) and TL (L/240).

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

	Bearing Length			Loads t	o Supports (
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories				
1 - Stud wall - HF	3.50"	3.50"	1.50"	203	245	448	Blocking				
2 - Stud wall - HF	5.50"	5.50"	1.50"	219	265	484	Blocking				
Blocking Panels are assumed to carry no load	s annlied dire	tly above the	Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.								

above them and the full load is app

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.

			Dead	Floor Live	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.00)	Comments
0 - Self Weight (PLF)	0 to 4' 3"	N/A	15.3		
1 - Uniform (PSF)	0 to 4' 3" (Front)	3'	28.0	40.0	Floor Load

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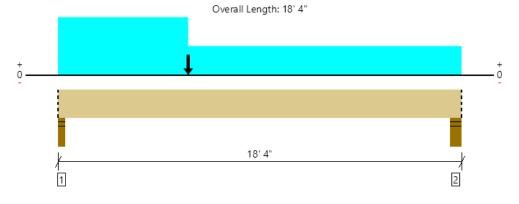




Main Floor, B10

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





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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1665 @ 2"	4961 (3.50")	Passed (34%)		1.0 D + 1.0 L (All Spans)
Shear (lbs)	1463 @ 1' 3/4"	6151	Passed (24%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	6278 @ 6' 9 5/8"	11204	Passed (56%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.427 @ 8' 9"	0.446	Passed (L/502)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.785 @ 8' 9 1/8"	0.892	Passed (L/273)		1.0 D + 1.0 L (All Spans)

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

PASSED

• Deflection criteria: LL (L/480) and TL (L/240).

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

	Bearing Length			Loads 1	to Supports			
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories	
1 - Stud wall - HF	3.50"	3.50"	1.50"	749	917	1666	Blocking	
2 - Stud wall - HF	5.50"	5.50"	1.50"	533	622	1155	Blocking	
2 - Stud wall - HF 5.50" 5.50" 1.50" 533 622 1155 Blocking Blocking Papels are assumed to carry no loads applied directly above them and the full load is applied to 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' 4" o/c	

•Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.00)	Comments
0 - Self Weight (PLF)	0 to 18' 4"	N/A	9.4		
1 - Uniform (PSF)	0 to 5' 11" (Front)	2' 8"	28.0	40.0	Floor Load
2 - Uniform (PSF)	5' 11" to 18' 4" (Front)	1' 4"	28.0	40.0	Floor Load
3 - Point (lb)	5' 11" (Front)	N/A	203	245	Linked from: B9, Support 1

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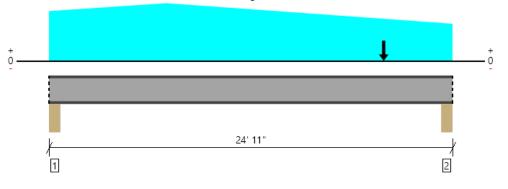
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Main Floor, B11 1 piece(s) W14X61 (A992) ASTM Steel

Overall Length: 24' 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)	26087 @ 4"	39875 (5.50")	Passed (65%)		1.0 D + 1.0 L (All Spans)
Shear (lbs)	25177 @ 5 1/2"	104250	Passed (24%)		1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	151607 @ 12' 1 13/16"	177019	Passed (86%)		1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.545 @ 12' 4 11/16"	0.606	Passed (L/534)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.865 @ 12' 4 13/16"	1.212	Passed (L/336)		1.0 D + 1.0 L (All Spans)

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

• Deflection criteria: LL (L/480) and TL (L/240).

• Bearing reinforcement may be required for support located at 4".

Bearing reinforcement may be required for support located at 24' 7".

• Applicable calculations are based on ANSI/AISC 360-16.

• A lateral-torsional buckling factor (Сь) of 1.0 has been assumed.

	Bearing Length			Loads t	to Supports			
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories	
1 - Column - HF	5.50"	5.50"	5.50"	9581	16506	26087	Blocking	
2 - Column - HF	5.50"	5.50"	5.50"	9177	15175	24352	Blocking	
Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to 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)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

			Dead	Floor Live	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.00)	Comments
0 - Self Weight (PLF)	0 to 24' 11"	N/A	61.0		
1 - Uniform (PSF)	0 to 24' 11"	9' 2"	28.0	40.0	Floor Load
2 - Tapered (PSF)	0 to 7' 3"	5' 6" to 9'	28.0	60.0	Deck Load
3 - Tapered (PSF)	7' 3" to 24' 11"	9' to 0	28.0	60.0	Deck Load
4 - Uniform (PSF)	0 to 24' 11"	9' 2"	28.0	60.0	Upper Floor Deck Load
5 - Point (lb)	20' 8"	N/A	749	917	Linked from: B10, Support 1

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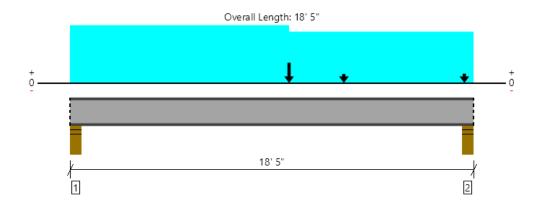


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Main Floor, B12 1 piece(s) W12X53 (A992) ASTM Steel

PASSED



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)	17179 @ 18' 1"	22275 (5.50")	Passed (77%)		1.0 D + 1.0 L (All Spans)
Shear (lbs)	16282 @ 17' 11 1/2"	83490	Passed (20%)		1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	124292 @ 10'	161513	Passed (77%)		1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.289 @ 9' 4 15/16"	0.444	Passed (L/738)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.465 @ 9' 4 15/16"	0.887	Passed (L/458)		1.0 D + 1.0 L (All Spans)

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

Deflection criteria: LL (L/480) and TL (L/240).

Bearing reinforcement may be required for point load located at 10'.

• Applicable calculations are based on ANSI/AISC 360-16.

• A lateral-torsional buckling factor (Сь) of 1.0 has been assumed.

	Bearing Length		Loads to Supports (lbs)					
Supports	Total	Available	Required	Dead	Floor Live	Snow	Total	Accessories
1 - Stud wall - HF	5.50"	5.50"	5.50"	5418	8623	57	14098	Blocking
2 - Stud wall - HF	5.50"	5.50"	5.50"	6794	10385	633	17812	Blocking

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

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

			Dead	Floor Live	Snow	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.00)	(1.15)	Comments
0 - Self Weight (PLF)	0 to 18' 5"	N/A	53.0			
1 - Uniform (PSF)	0 to 10'	2'	28.0	60.0	-	Deck Load
2 - Uniform (PSF)	10' to 18' 5"	1'	28.0	40.0	-	Floor Load
3 - Uniform (PSF)	10' to 18' 5"	1'	28.0	60.0	-	Deck Load
4 - Point (lb)	18'	N/A	298	220	330	Linked from: B6, Support 1
5 - Point (lb)	12' 6"	N/A	163	120	180	Linked from: B12, Support 1
6 - Point (lb)	18'	N/A	163	120	180	Linked from: B12, Support 2
7 - Point (lb)	10'	N/A	9581	16506	-	Linked from: B11, Support 1

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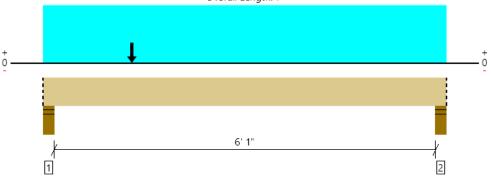
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Main Floor, B13 2 piece(s) 2 x 10 HF No.2

Overall Length: 7'



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)	2628 @ 4"	6683 (5.50")	Passed (39%)		1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	2524 @ 1' 2 3/4"	3191	Passed (79%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	3079 @ 1' 6 1/2"	3833	Passed (80%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.038 @ 3' 2 3/16"	0.158	Passed (L/999+)		1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.069 @ 3' 2 5/16"	0.317	Passed (L/999+)		1.0 D + 0.75 L + 0.75 S (All Spans)

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

PASSED

• Deflection criteria: LL (L/480) and TL (L/240).

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

Applicable calculations are based on NDS.

	Bearing Length		L	oads to Sup				
Supports	Total	Available	Required	Dead	Floor Live	Snow	Total	Accessories
1 - Stud wall - HF	5.50"	5.50"	2.16"	1175	814	1123	3112	Blocking
2 - Stud wall - HF	5.50"	5.50"	1.50"	396	335	265	996	Blocking
Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.								

Bracing Intervals	Comments
7' o/c	
7' o/c	
	7' o/c

•Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	Snow	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.00)	(1.15)	Comments
0 - Self Weight (PLF)	0 to 7'	N/A	7.0			
1 - Uniform (PSF)	0 to 7' (Front)	1' 4"	28.0	40.0	-	Floor Load
2 - Point (lb)	1' 6 1/2" (Front)	N/A	1260	775	1388	Linked from: B7, Support 1

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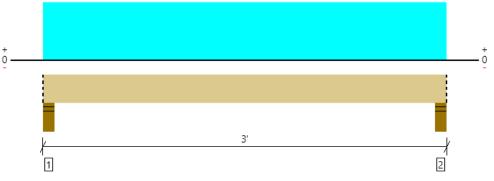
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Main Floor, B14 2 piece(s) 2 x 8 HF No.2

Overall Length: 3'



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)	1330 @ 4"	6683 (5.50")	Passed (20%)		1.0 D + 1.0 L (All Spans)
Shear (lbs)	388 @ 1' 3/4"	2175	Passed (18%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	603 @ 1' 6"	2234	Passed (27%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.003 @ 1' 6"	0.058	Passed (L/999+)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.005 @ 1' 6"	0.117	Passed (L/999+)		1.0 D + 1.0 L (All Spans)

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

• Deflection criteria: LL (L/480) and TL (L/240).

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

Applicable calculations are based on NDS.

	Bearing Length		Loads to Supports (lbs)				
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
1 - Stud wall - HF	5.50"	5.50"	1.50"	553	777	1330	Blocking
2 - Stud wall - HF	5.50"	5.50"	1.50"	553	777	1330	Blocking
 Blocking Panels are assumed to carry no load 	s applied dire	tly above the	m and the ful	l load is appli	ed to the mem	her heina	designed.

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

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

•Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.00)	Comments
0 - Self Weight (PLF)	0 to 3'	N/A	5.5		
1 - Uniform (PLF)	0 to 3' (Front)	N/A	147.0	210.0	Linked from: J2, Support 2
2 - Uniform (PLF)	0 to 3' (Front)	N/A	216.0	308.3	Linked from: J3, Support 1

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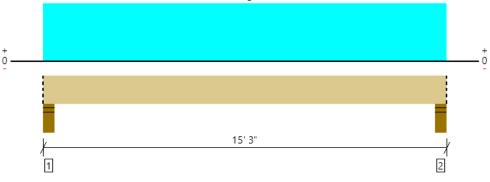
Job Notes





Main Floor, B15 1 piece(s) 5 1/4" x 11 7/8" 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)	5181 @ 4"	11694 (5.50")	Passed (44%)		1.0 D + 1.0 L (All Spans)
Shear (lbs)	4197 @ 1' 5 3/8"	12053	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	18063 @ 7' 7 1/2"	29854	Passed (61%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.304 @ 7' 7 1/2"	0.365	Passed (L/575)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.459 @ 7' 7 1/2"	0.729	Passed (L/381)		1.0 D + 1.0 L (All Spans)

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

• Deflection criteria: LL (L/480) and TL (L/240).

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

	Bearing Length		Loads t	o Supports			
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories
1 - Stud wall - HF	5.50"	5.50"	2.44"	1750	3431	5181	Blocking
2 - Stud wall - HF	5.50"	5.50"	2.44"	1750	3431	5181	Blocking
Blocking Panels are assumed to carry no load	s annlied dire	tly above the	m and the ful	l load is annli	ed to the men	her heina	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)	15' 3" o/c	
Bottom Edge (Lu)	15' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.00)	Comments
0 - Self Weight (PLF)	0 to 15' 3"	N/A	19.5		
1 - Uniform (PSF)	0 to 15' 3" (Front)	7' 6"	28.0	60.0	Deck Load

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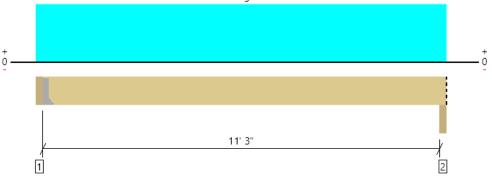
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Main Floor, Entry canopy - Green roof, 65 psf 1 piece(s) 2 x 10 DF No.2 @ 16" OC





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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	831 @ 3 1/2"	1406 (1.50")	Passed (59%)		1.0 D + 1.0 S (All Spans)
Shear (lbs)	718 @ 1' 3/4"	1915	Passed (38%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-Ibs)	2355 @ 5' 11 1/2"	2334	Passed (101%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.094 @ 5' 11 1/2"	0.567	Passed (L/999+)		1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.344 @ 5' 11 1/2"	0.756	Passed (L/395)		1.0 D + 1.0 S (All Spans)

System : Roof Member Type : Joist Building Use : Residential Building Code : IBC 2018 Design Methodology : ASD Member Pitch : 0.25/12

• Deflection criteria: LL (L/240) and TL (L/180).

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

• A 15% increase in the moment capacity has been added to account for repetitive member usage.

Applicable calculations are based on NDS.

	Bearing Length			Loads t	o Supports		
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Hanger on 9 1/4" HF beam	3.50"	Hanger ¹	1.50"	636	238	874	See note 1
2 - Beam - HF	3.50"	3.50"	1.50"	627	235	862	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)	6" o/c					
Bottom Edge (Lu) 11' 7" o/c						
•Maximum allowable bracing intervals based on applied load.						

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	LRU28Z	1.94"	N/A	6-10d	5-10d	

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

			Dead	Snow	
Vertical Load	Location (Side)	Spacing	(0.90)	(1.15)	Comments
1 - Uniform (PSF)	0 to 11' 10"	16"	80.0	30.0	Green roof 50 psf

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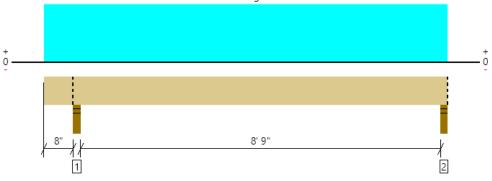
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Main Floor, DB Green roof 65 psf 1 piece(s) 6 x 10 DF No.1

Overall Length: 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)	4050 @ 9 3/4"	7796 (3.50")	Passed (52%)		1.0 D + 1.0 S (All Spans)
Shear (lbs)	2728 @ 1' 9"	6810	Passed (40%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	7580 @ 5' 4 1/4"	10703	Passed (71%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	0.048 @ 5' 3 15/16"	0.451	Passed (L/999+)		1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.176 @ 5' 4"	0.601	Passed (L/615)		1.0 D + 1.0 S (Alt Spans)

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

• Deflection criteria: LL (L/240) and TL (L/180).

• Overhang deflection criteria: LL (2L/240) and TL (2L/180).

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

• Lumber grading provisions must be extended over the length of the member per NDS 4.2.5.5.

Applicable calculations are based on NDS.

	Bearing Length		Loads to Supports (Ibs)				
Supports	Total	Available	Required	Dead	Snow	Total	Accessories
1 - Stud wall - HF	3.50"	3.50"	1.82"	2965	1085	4050	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.58"	2567	943	3510	Blocking
Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to 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)	10' o/c	
Bottom Edge (Lu)	10' o/c	

•Maximum allowable bracing intervals based on applied load.

			Dead	Snow	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.15)	Comments
0 - Self Weight (PLF)	0 to 10'	N/A	13.2		
1 - Uniform (PSF)	0 to 10' (Front)	6' 9"	80.0	30.0	Default Load

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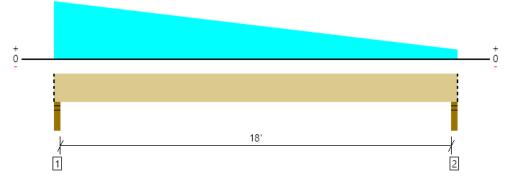




MEMBER REPORT

Main Floor, Garage Flush Header 1 piece(s) 5 1/4" x 11 7/8" 2.2E Parallam® PSL

Overall Length: 18' 6"



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)	4737 @ 1 1/2"	6379 (3.00")	Passed (74%)		1.0 D + 1.0 L (All Spans)
Shear (lbs)	3891 @ 1' 2 7/8"	12053	Passed (32%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	17513 @ 8' 3 1/16"	29854	Passed (59%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.437 @ 9'	0.456	Passed (L/501)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.673 @ 9' 1/8"	0.913	Passed (L/325)		1.0 D + 1.0 L (All Spans)

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

• Deflection criteria: LL (L/480) and TL (L/240).

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

	Bearing Length			Loads t	to Supports (
Supports	Total	Available	Required	Dead	Floor Live	Total	Accessories			
1 - Stud wall - HF	3.00"	3.00"	2.23"	1630	3107	4737	Blocking			
2 - Stud wall - HF	3.00"	3.00"	1.50"	1061	1888	2949	Blocking			
Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.										

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

•Maximum allowable bracing intervals based on applied load.

			Dead	Floor Live	
Vertical Loads	Location (Side)	Tributary Width	(0.90)	(1.00)	Comments
0 - Self Weight (PLF)	0 to 18' 6"	N/A	19.5		
1 - Tapered (PSF)	0 to 18' 6" (Front)	7' 9" to 1' 3"	28.0	60.0	Deck

Weyerhaeuser Notes

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

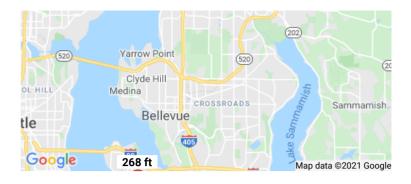
ForteWEB Software Operator	Job Notes
Jane Johnson Bykonen Carter Quinn (206) 264-7784 jaj@bcq-se.com	





Search Information

Address:	7221 78th Ave SE, Mercer Island, WA 98040, USA
Coordinates:	47.560961, -122.225477
Elevation:	268 ft
Timestamp:	2021-12-28T00:19:49.647Z
Hazard Type:	Seismic
Reference Document:	ASCE7-16
Risk Category:	II
Site Class:	D



Basic Parameters

Name	Value	Description
S _S	1.439	MCE _R ground motion (period=0.2s)
S ₁	0.5	MCE _R ground motion (period=1.0s)
S _{MS}	1.439	Site-modified spectral acceleration value
S _{M1}	* null	Site-modified spectral acceleration value
S _{DS}	0.959	Numeric seismic design value at 0.2s SA
S _{D1}	* null	Numeric seismic design value at 1.0s SA
* See Se	ction 11 4 8	

* See Section 11.4.8

Additional Information

Name	Value	Description
SDC	* null	Seismic design category
Fa	1	Site amplification factor at 0.2s
Fv	* null	Site amplification factor at 1.0s
CRS	0.902	Coefficient of risk (0.2s)
CR ₁	0.898	Coefficient of risk (1.0s)
PGA	0.616	MCE _G peak ground acceleration
F _{PGA}	1.1	Site amplification factor at PGA
PGA _M	0.678	Site modified peak ground acceleration
ΤL	6	Long-period transition period (s)
SsRT	1.439	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.595	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	3.957	Factored deterministic acceleration value (0.2s)
S1RT	0.5	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.557	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.551	Factored deterministic acceleration value (1.0s)
PGAd	1.333	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

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

Disclaimer

Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

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report provided by this website. Users of the information from this website assume all liability arising from such use. Use of the output of this website does not imply approval by the governing building code bodies responsible for building code approval and interpretation for the building site described by latitude/longitude location in the report.



Search Information

AOOE 7 40

Address:	7221 78th Ave SE, Mercer Island, WA 98040, USA
Coordinates:	47.560961, -122.225477
Elevation:	268 ft
Timestamp:	2021-12-28T00:22:17.892Z
Hazard Type:	Wind



ASCE 7-16		ASCE 7-10		ASCE 7-05	
MRI 10-Year	67 mph	MRI 10-Year	72 mph	ASCE 7-05 Wind Speed	85 mph
MRI 25-Year	73 mph	MRI 25-Year	79 mph		
MRI 50-Year	78 mph	MRI 50-Year	. 85 mph		
MRI 100-Year	83 mph	MRI 100-Year	91 mph		
Risk Category I	92 mph	Risk Category I	100 mph		
Risk Category II	97 mph	Risk Category II	110 mph		
Risk Category III	104 mph	Risk Category III-IV	115 mph		
Risk Category IV	108 mph				

AOOF 7 40

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

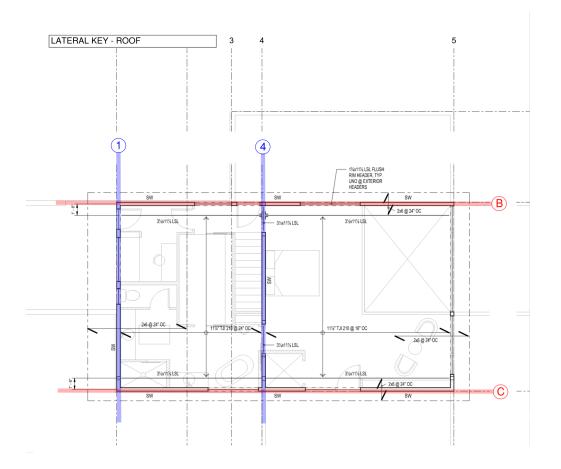
Disclaimer

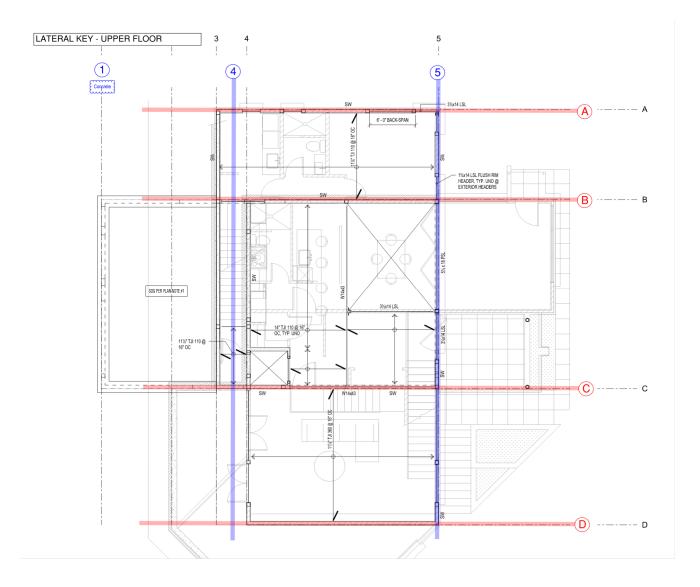
Hazard loads are interpolated from data provided in ASCE 7 and rounded up to the nearest whole integer. Per ASCE 7, islands and coastal areas outside the last contour should use the last wind speed contour of the coastal area – in some cases, this website will extrapolate past the last wind speed contour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

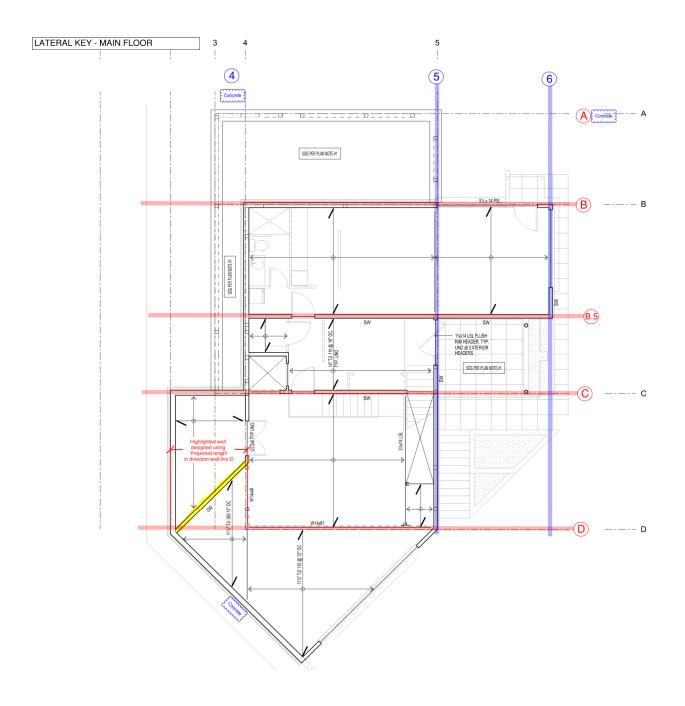
Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

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MASSING		Ur	niform Loads (PSF)		Area (SF)		Σw (k)				
ROOF	Misc	Partitions]			
	15	6.5				1100		23.7				
		Ur	niform Loads (PSF)		Area (SF)	Green Roof (k)	Σw (k)		Green Roof		
FLOORS	Misc	Partitions	Gyp top	,		/ (cd (5/)		<u> </u>		Area (sf)	Unit weight	(psf)
UPP		13	13			1522	9.1	71.5		140.7	65.0	u /
MA		13	13			1804		74.0	J			
SEISMIC												
DESIGN PARAMETERS		Site Class =	D	S _S = 1	439							
		Risk Cat. =	П	S ₁ = (.500							
		S _{DS} =	0.959	f _a = 1	.00							
		R =	6.50	$f_v = 1$	80							
		Cs =	0.148	k = 1								
ASCE 7-16 Equivalent La	teral Force P	rcedure, 12.8										ASD
Level	Area (S	F) Unit DL (PSF)	w (k)		h ^k (ft)			(w)(h ^k)		C _{vx}	F _x (k)	0.7E (k)
ROOF	1100	21.5	23.7		30.0			710		26%	6.4	4.5
UPPER	1522	41.0	71.5		19.2			1371		50%	12.4	8.7
MAIN	1522	41.0	74.0		9.2			678		25%	6.1	4.3
Σ			169.2	25.0				2759		100%		
Base Shear											25.0	
h						-						
WIND		V (mph) =	97	G =	0.85	L/B =	0.57		L/B =	1.76		
DESIGN PARAMETERS		Exposure Cat. =	C	Gcpi =	0.18	Cp =	Windward Wall	0.80	Cp =	Windward Wall	0.80	
		K _{zt} =	1.60	K _z =	0.98		Leeward Wall	-0.50		Leeward Wall	-0.35	
		K _d =	0.85	q _z =	32.1		Side Wall	-0.70		Side Wall	-0.70	
		Roof Slope (in/ft) =	1:12			h/L=	1.23		h/L=	0.70		
ACCE 7 AC MANERS DIVE	diama li Dava a a	1					Roof	-1.30	-0.18	Roof	-0.90	-0.18
ASCE 7-16 MWFRS Direc ROOF	tional Proce	h (ft)	Direction		Wall Area	K _h	q _b	Wall (PSF)	Roof (PSF)	Roof (k)	F _x (k)	ASD 06W (k)
HORIZONTAL PROJECTIC	N/	30.0		LEL TO WL-A	135	0.98	чь 32.1	35.5	30.6	1.3	4.8	2.9
I GINZONIAL FROJECTIC		50.0		LEL TO WL-A	238	0.98	32.1	31.3	19.6	1.3	4.8	4.5
UPPER		h (ft)	Direction		Wall Area	0.50	9h	Wall (PSF)	10.0	2	F _x (k)	06W (k)
HORIZONTAL PROJECTIC	N	19.2		LEL TO WL-A	573	0.90	29.5	34.4			19.7	11.8
		19.2		LEL TO WL-1	458	0.90	29.5	30.6			14.0	8.4
MAIN		h (ft)	Direction		Wall Area		q _h	Wall (PSF)			F _x (k)	06W (k)
HORIZONTAL PROJECTIC	N	9.2		LEL TO WL-A	688	0.85	27.8	33.7			23.2	13.9
				LEL TO WL-1	278	0.85	27.8	30.1			8.4	5.0
Base Shear - Parallel to	Wall Line A										47.7	
Base Shear - Parallel to	Wall Line 1										29.8	







1. Shear wall demands have been increased where seismic controls design and h/L is greater than 2:1 per SDPWS Table 4.3.4. Where wind controls design, shearwall demands have been decreased 40% per IBC 2306.3.

WALL LINE A												
UPPER		WIND TRIB =	11%		ΣL =	14.25						
		0.6W (k) =	1.30									
		SEISMIC TRIB =	11%									
		0.7E (k) =	0.96								Wall weight	
Segment Count	HT (ft)	LENGTH (ft)	h/L	2/(h/L)1	0.6W (plf)	0.7E (plf)	SW	SW Cap (plf)	Tension (k)	0.6-0.14Sds	[0.6-0.14Sds]D (k)	Net T (k)
1	9.4	14.3	0.66	1.00	65	67	SW 1	240	0.6	0.47	0.6	0.3
Concrete												

ROOF		WIND TRIB =	50%	OPEN FRONT	ΣL =	27.00							OPEN FRONT		Mmax	V	v
		0.6W (k) =	1.45	1.75										W (ft)	(k-ft)	(k)	(plf)
		SEISMIC TRIB =	50%										0.6W (k) =	24.5	42.95	1.75	0.065
		0.7E (k) =	2.25	1.75							Wall weight		0.7E (k) =	24.5	42.94	1.75	0.065
Segment Count	HT (ft)	LENGTH (ft)	h/L	2/(h/L)1	0.6W (plf)	0.7E (plf)	SW	SW Cap (plf)	Tension (k)	0.6-0.14Sds	[0.6-0.14Sds]D (k)	Net T (k)	Ī				
1	10.2	10.0	1.02	1.00	46	83	SW 1	240	0.8	0.47	0.5	0.6	T				
1	10.2	5.0	2.04	0.98	46	85	SW 1	240	0.8	0.47	0.2	0.7					
1	10.2	12.0	0.85	1.00	46	83	SW 1	240	0.8	0.47	0.6	0.6					
UPPER		WIND TRIB =	33%		ΣL =	18.00											
		0.6W (k) =	5.65														
		SEISMIC TRIB =	33%														
		0.7E (k) =	5.11								Wall weight						
Segment Count	HT (ft)	LENGTH (ft)	h/L	2/(h/L)1	0.6W (plf)	0.7E (plf)	SW	SW Cap (plf)	Tension (k)	0.6-0.14Sds	[0.6-0.14Sds]D (k)	Net T (k)	Ī				
1	9.4	5.5	1.70	1.00	224	284	SW 2	355	2.7	0.47	0.2	2.5	T				
1	9.4	12.5	0.75	1.00	224	284	SW 2	355	2.7	0.47	0.5	2.4					

v (plf) 0.063 0.063

Concrete

WALL LINE B.5	5											
MAIN		WIND TRIB =	21%									
		0.6W (k) =	2.92									
		SEISMIC TRIB =	23%									
		0.7E (k) =	0.99								Wall weight	
Segment Count	HT (ft)	LENGTH (ft)	h/L	2/(h/L)1	0.6W (plf)	0.7E (plf)	SW	SW Cap (plf)	Tension (k)	0.6-0.14Sds	[0.6-0.14Sds]D (k)	Net T (k)
1	9.4	15.0	0.63	1.00	72	34	SW 1	240	0.7	0.47	0.7	0.3
1	9.4	14.0	0.67	1.00	72	34	SW 1	240	0.7	0.47	0.6	0.4

Concrete

ROOF		WIND TRIB =	50%	OPEN FRONT	ΣL =	27.75							OPEN FRONT		Mmax	v	
		0.6W (k) =	1.45	1.75										W (ft)	(k-ft)	(k)	
		SEISMIC TRIB =	50%										0.6W (k) =	24.5	42.95	1.75	(
		0.7E (k) =	2.25	1.75							Wall weight		0.7E (k) =	24.5	42.94	1.75	(
Segment Count	HT (ft)	LENGTH (ft)	h/L	2/(h/L)1	0.6W (plf)	0.7E (plf)	SW	SW Cap (plf)	Tension (k)	0.6-0.14Sds	[0.6-0.14Sds]D (k)	Net T (k)	1				
2	10.2	11.0	0.93	1.00	45	81	SW 1	240	0.8	0.47	0.5	0.6	1				
1	10.2	5.8	1.77	1.00	45	81	SW 1	240	0.8	0.47	0.3	0.7					
UPPER		WIND TRIB =	39%		ΣL =	9.25											
		0.6W (k) =	6.06														
		SEISMIC TRIB =	39%														
		0.7E (k) =	5.63								Wall weight						
Segment Count	HT (ft)	LENGTH (ft)	h/L	2/(h/L) ¹	0.6W (plf)	0.7E (plf)	SW	SW Cap (plf)	Tension (k)	0.6-0.14Sds	[0.6-0.14Sds]D (k)	Net T (k)	Ĩ				
1	9.4	9.3	1.01	1.00	468	609	SW 3	595	5.7	0.47	0.4	5.5	T				
MAIN		WIND TRIB =	23%		ΣL =	11.75											
		0.6W (k) =	9.25														
		SEISMIC TRIB =	26%														
		0.7E (k) =	6.75								Wall weight		1				
Segment Count	HT (ft)	LENGTH (ft)	h/L	2/(h/L)1	0.6W (plf)	0.7E (plf)	SW	SW Cap (plf)	Tension (k)	0.6-0.14Sds	[0.6-0.14Sds]D (k)	Net T (k)					
1	9.4	11.8	0.80	1.00	562	575	SW 3	595	5.4	0.47	0.5	5.1	Ţ				

UPPER		WIND TRIB =	17%		ΣL =	24.00						
		0.6W (k) =	2.01									
		SEISMIC TRIB =	17%									
		0.7E (k) =	1.48								Wall weight	
Segment Count	HT (ft)	LENGTH (ft)	h/L	2/(h/L)1	0.6W (plf)	0.7E (plf)	SW	SW Cap (plf)	Tension (k)	0.6-0.14Sds	[0.6-0.14Sds]D (k)	Net T (k)
1	9.4	24.0	0.39	1.00	60	62	SW 1	240	0.6	0.47	1.0	0.1
MAIN		WIND TRIB =	43%		ΣL =	9.00						
		0.6W (k) =	7.98									
		SEISMIC TRIB =	35%									
		0.7E (k) =	2.98								Wall weight	
Segment Count	HT (ft)	LENGTH (ft)	h/L	2/(h/L)1	0.6W (plf)	0.7E (plf)	SW	SW Cap (plf)	Tension (k)	0.6-0.14Sds	[0.6-0.14Sds]D (k)	Net T (k)
1	9.4	9.0	1.04	1.00	633	331	SW 4	705	5.9	0.47	0.4	5.7

1. Shear wall demands have been increased where seismic controls design and h/L is greater than 2:1 per SDPWS Table 4.3.4. Where wind controls design, shearwall demands have been decreased 40% per IBC 2306.3.

WALL LINE 1												
ROOF		WIND TRIB =	22%		ΣL =	11.30						
		0.6W (k) =	0.99									
		SEISMIC TRIB =	22%									
		0.7E (k) =	0.99								Wall weight	
Segment Count	HT (ft)	LENGTH (ft)	h/L	2/(h/L)1	0.6W (plf)	0.7E (plf)	SW	SW Cap (plf)	Tension (k)	0.6-0.14Sds	[0.6-0.14Sds]D (k)	Net T (k)
1	10.2	11.3	0.90	1.00	63	87	SW 1	240	0.9	0.47	0.5	0.6

Concrete

ROOF		WIND TRIB =	78%		ΣL =	14.30							OPEN FRONT		Mmax
		0.6W (k) =	3.51											D/2 (ft)	(k-ft)
		SEISMIC TRIB =	78%										0.6W (k) =	12.25	42.95
		0.7E (k) =	3.51								Wall weight		0.7E (k) =	12.25	42.94
Segment Count	HT (ft)	LENGTH (ft)	h/L	2/(h/L)1	0.6W (plf)	0.7E (plf)	SW	SW Cap (plf)	Tension (k)	0.6-0.14Sds	[0.6-0.14Sds]D (k)	Net T (k)			
1	10.2	9.5	1.07	1.00	175	245	SW 2	355	2.5	0.47	0.5	2.3			
1	10.2	4.8	2.13	0.94	175	261	SW 2	355	2.5	0.47	0.2	2.4			
UPPER		WIND TRIB =	50%		ΣL =	36.50									
		0.6W (k) =	7.71												
		SEISMIC TRIB =	50%												
		0.7E (k) =	7.85								Wall weight				
Segment Count	HT (ft)	LENGTH (ft)	h/L	2/(h/L)1	0.6W (plf)	0.7E (plf)	SW	SW Cap (plf)	Tension (k)	0.6-0.14Sds	[0.6-0.14Sds]D (k)	Net T (k)			
1	9.4	24.5	0.38	1.00	151	215	SW 1	240	2.0	0.47	1.1	1.5			
1	9.4	12.0	0.78	1.00	151	215	SW 1	240	2.0	0.47	0.5	1.8			

Concrete

UPPER		WIND TRIB =	50%		ΣL =	12.70						
		0.6W (k) =	4.20									
		SEISMIC TRIB =	50%									
		0.7E (k) =	4.34								Wall weight	
Segment Count	HT (ft)	LENGTH (ft)	h/L	2/(h/L)1	0.6W (plf)	0.7E (plf)	SW	SW Cap (plf)	Tension (k)	0.6-0.14Sds	[0.6-0.14Sds]D (k)	Net T (k)
1	9.4	6.0	1.56	1.00	236	342	SW 3	595	3.2	0.47	0.3	3.1
1	9.4	3.8	2.47	0.81	236	422	SW 3	595	3.2	0.47	0.2	3.1
1	9.4	2.9	3.23	0.62	236	553	SW 3	595	3.2	0.47	0.1	3.1
MAIN		WIND TRIB =	50%		ΣL =	21.00						
		0.6W (k) =	6.71									
		SEISMIC TRIB =	47%									
		0.7E (k) =	6.36								Wall weight	
Segment Count	HT (ft)	LENGTH (ft)	h/L	2/(h/L)1	0.6W (plf)	0.7E (plf)	SW	SW Cap (plf)	Tension (k)	0.6-0.14Sds	[0.6-0.14Sds]D (k)	Net T (k)
1	8.5	21.0	0.41	1.00	228	303	SW 3	595	2.6	0.47	0.8	2.2

Concrete

WALL LINE 6												
MAIN		WIND TRIB =	18%		ΣL =	3.80						
		0.6W (k) =	0.90									
		SEISMIC TRIB =	6%									
		0.7E (k) =	0.26								Wall weight	
Segment Count	HT (ft)	LENGTH (ft)	h/L	2/(h/L)1	0.6W (plf)	0.7E (plf)	SW	SW Cap (plf)	Tension (k)	0.6-0.14Sds	[0.6-0.14Sds]D (k)	Net T (k)
1	8.5	3.8	2.25	0.89	170	76	SW 1	240	1.4	0.47	0.2	1.4
Concrete												

					Bott	om Plate Atta	chment	Capacity
Mark	Sheathing	Blck'g	Panel Nailing ¹	Attachment to top plate ³	Rim Joist Req'd	Nailing to ⁴ wood below	A. Bolts to⁵ concrete below	(plf) (Seismic)
SW 1 SW 2 SW x SW 3 SW 4	15/32" APA Sheathing 15/32" APA Sheathing 15/32" APA Sheathing 15/32" APA Sheathing 15/32" APA Sheathing Each Side	Yes	8d @ 6"oc 8d @ 4"oc ² 8d @ 3"oc ² 8d @ 2"oc ² 8d @ 4"oc ²	CLIP @ 24"oc CLIP @ 20"oc CLIP @ 16"oc CLIP @ 12"oc CLIP @ 9"oc	2x or 1¾" LSL 2x or 1¾" LSL 2x or 1¾" LSL 4x or 3½" LSL 4x or 3½" LSL	16d @ 6"oc 16d @ 4¾"oc 16d @ 3¾"oc (2) Rows ⁶ 16d @ 5¾"oc (2) Rows ⁶ 16d @ 4¾"oc	5/8" @ 36"oc 5/8" @ 24"oc 5/8" @ 24"oc ⁷	240 355 455 595 705

¹ Nails shall be 8d box. Nailing applies to all panel edges (block all unsupported panel edges), top & bottom plates and blocking. Nail to intermediate framing members w/ 8d @ 12"oc.

(Note: where stud spacing is 24"oc, nail to intermediate framing members with 8d@6"oc.)

- ² Framing at adjoining panel edges shall be 3-inch nominal or wider and nails shall be staggered.
- ³ Clip shall be either A35, LTP4.
- ⁴ Nails shall be 16d box (0.135Øx3½") or 10d common (0.148Øx3½")

Screws shall be Simpson SDS25412 (1/4"Øx4½"min).

⁵ Provide 3"x3"x0.229" plate washer at all anchor bolts. Anchor bolts shall be positioned such that plate edge of plate washer is with 1/2" of the edge of the bottom plate. (Plate washers may be diagonally slotted with a width of up to 13/16" and a length not to exceed 1³/₄")

⁶ Rows must be offset at least 1/2" and staggered.

⁷ Alternate plate washers to provide 1/2" dimension on each side fo the shearwall.

SIMPSON

Strong-

Anchor Designer™ Software Version 2.8.7094.0

Company:	Date:	2/4/2022
Engineer:	Page:	1/5
Project:		
Address:		
Phone:		
E-mail:		

1.Project information

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

2. Input Data & Anchor Parameters

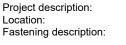
General Design method:ACI 318-14 Units: Imperial units

Anchor Information:

Anchor type: Cast-in-place Material: AB Diameter (inch): 0.875 Effective Embedment depth, h_{ef} (inch): 9.000 Anchor category: -Anchor ductility: Yes h_{min} (inch): 11.38 C_{min} (inch): 1.75 S_{min} (inch): 3.50

Recommended Anchor

Anchor Name: PAB Pre-Assembled Anchor Bolt - PAB7 (7/8"Ø)



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: A tension, A shear Supplemental reinforcement: Not applicable Reinforcement provided at corners: Yes Ignore concrete breakout in tension: No Ignore concrete breakout in shear: No Ignore 6do requirement: Yes Build-up grout pad: No

SIMPSON

Strong-Tie

Anchor Designer™ Software Version 2.8.7094.0

Company:	Date:	2/4/2022
Engineer:	Page:	2/5
Project:		
Address:		
Phone:		
E-mail:		

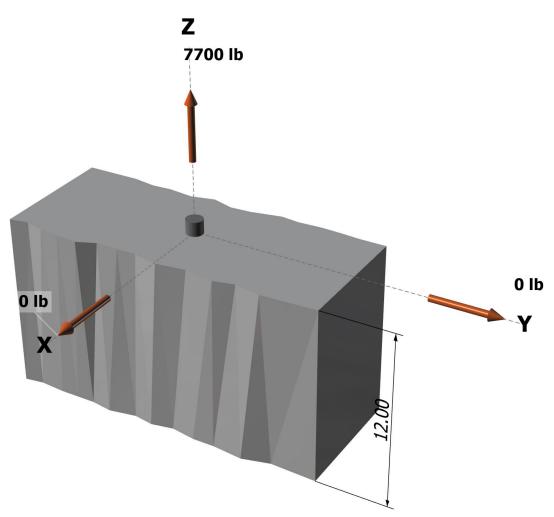
Load and Geometry

Load factor source: ACI 318 Section 5.3 Load combination: U = 0.9D + 1.0E Seismic design: Yes Anchors subjected to sustained tension: Not applicable Ductility section for tension: 17.2.3.4.3 (c) is satisfied Ductility section for shear: 17.2.3.5.2 not applicable Ω_0 factor: not set Apply entire shear load at front row: No Anchors only resisting wind and/or seismic loads: Yes

Service level loads:

	D	E	Strength level loads	
Na [lb]:	0	7700	7700	
V _{ax} [lb]:	0	0	0	
Vay [lb]:	0	0	0	

<Figure 1>



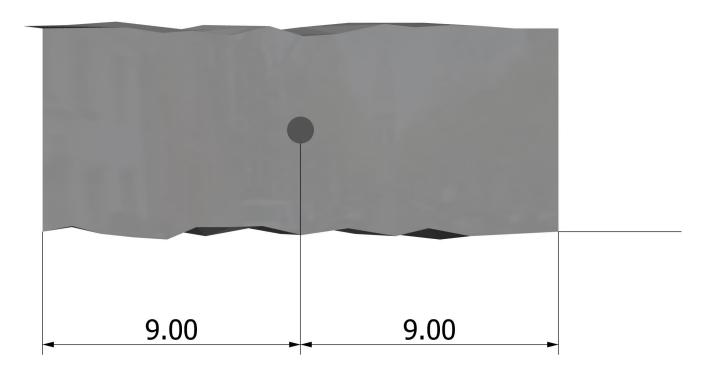
Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility. Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com



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Company:	Date:	2/4/2022
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Phone:		
E-mail:		

<Figure 2>



Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility. Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com

	Company	Date: 2/4/2022
Anchor Designer™	Company: Engineer:	Date: 2/4/2022 Page: 4/5
ong-Tie Software	Project:	1 390. 100
Version 2.8.7094.0	Address:	
	Phone:	
	E-mail:	

3. Resulting Anchor Forces

SI

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	7700.0	0.0	0.0	0.0
Sum	7700.0	0.0	0.0	0.0

Maximum concrete compression strain (‰): 0.00 Maximum concrete compression stress (psi): 0

Resultant tension force (lb): 7700

Resultant compression force (lb): 0

Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00

Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00

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

N _{sa} (lb)	ϕ	ϕN_{sa} (lb)	
26795	0.75	20096	

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

<i>k</i> c	λa	f'c (psi)	h _{ef} (in)	N _b (lb)				
24.0	1.00	2500	9.000	32400				
$0.75\phi N_{cb} =$	0.75 <i>ф</i> (А _{Nc} / А _{Nco}) $\Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} \Lambda$	I₀ (Sec. 17.3.1	& Eq. 17.4.2.1a)			
A (:2)	A_{Nco} (in ²	c _{a,min} (in)	$\Psi_{ed,N}$	Ψc,N	$\Psi_{cp,N}$	N _b (lb)	ϕ	0.75 <i>¢Ncb</i> (lb)
A _№ (in²)								

6. Pullout Strength of Anchor in Tension (Sec. 17.4.3)

$\Psi_{c,P}$	Abrg (in ²)	f'c (psi)	ϕ	0.75 <i>¢Npn</i> (lb)
1.0	4.07	2500	0.70	42683



Anchor Designer™ Software Version 2.8.7094.0

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11. Results

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

Tension	Factored Load, N _{ua} (Ib)	Design Strength, øNn (lb)	Ratio	Status
Steel	7700	20096	0.38	Pass
Concrete breakout	7700	11922	0.65	Pass (Governs)
Pullout	7700	42683	0.18	Pass

PAB7 (7/8"Ø) with hef = 9.000 inch meets the selected design criteria.

12. Warnings

- Minimum spacing and edge distance requirement of 6da per ACI 318 Sections 17.7.1 and 17.7.2 for torqued cast-in-place anchor is waived per designer option.

- Per designer input, ductility requirements for tension have been determined to be satisfied - designer to verify.

- Per designer input, the shear component of the strength-level earthquake force applied to anchors does not exceed 20 percent of the total factored anchor shear force associated with the same load combination. Therefore the ductility requirements of ACI 318 17.2.3.5.2 for shear need not be satisfied – designer to verify.

- Designer must exercise own judgement to determine if this design is suitable.

Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19

DESCRIPTION: Garage/ADU Step (12/S3.2)

=

BYKONEN CARTER QUINN

Project File: Foundations.ec6

(c) ENERCALC INC 1983-2021

Code Reference.

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

Criteria

Retained Height

	00
6.00 ft	Allo

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

Surcharge Loads

Surcharge Over Heel Used To Resist Slidin Surcharge Over Toe Used for Sliding & Ov	=	0.0
Axial Load Applie	ed to	Stem
Axial Dead Load	=	210.0 lbs

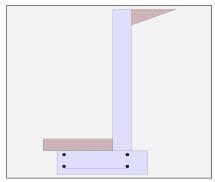
Axial Live Load	=	560.0 lbs
Axial Load Eccentricity	=	0.0 in

Soi	I D	ata

Allow Soil Bearing Equivalent Fluid Pressu	= re Meth	4,000.0 od	psf
Active Heel Pressure	=	40.0	psf/ft
	=		
Passive Pressure	=	525.0	psf/ft
Soil Density, Heel	=	130.00	pcf
Soil Density, Toe	=	130.00	pcf
Footing Soil Friction	=	0.675	
Soil height to ignore for passive pressure	=	12.00	in

Lateral Load Applied to Stem

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



Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Spread Footing
Base Above/Below Soil		0.04
at Back of Wall	=	0.0 ft

Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19

DESCRIPTION: Garage/ADU Step (12/S3.2)

BYKONEN CARTER QUINN	
----------------------	--

Project File: Foundations.ec6

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Design Summary			Stem Construction		Bottom			
			Design Height Above Ftg		Stem OK 0.00			
Wall Stability Ratios			Wall Material Above "Ht"	=	Concrete			
Overturning	=	1.63 OK	Design Method	_	SD	SD	SD	
Sliding	=	1.51 OK	Thickness	=	8.00	02	02	
Global Stability	=	0.00	Rebar Size	=	# 4			
			Rebar Spacing	=	12.00			
Total Bearing Load	=	2.466 lbs	Rebar Placed at	=	Edge			
resultant ecc.	=	5.16 in	Design Data					
			fb/FB + fa/Fa	=	0.491			
Soil Pressure @ Toe	=	1,362 psf OK	Total Force @ Section					
Soil Pressure @ Heel	=	156 psf OK	Service Level	lbs =	1,270.2			
Allowable	=	4,000 psf	Strength Level	lbs =	1,270.2			
Soil Pressure Less ACI Factored @ Toe			MomentActual					
ACI Factored @ Heel	=	1,906 psf 218 psf		ft-# =	2,658.5			
			Strength Level	ft-# =	2,658.5			
Footing Shear @ Toe	=	16.3 psi OK	MomentAllowable	=	5,412.6			
Footing Shear @ Heel	=	3.9 psi OK	ShearActual					
Allowable	=	75.0 psi	Service Level	psi =	16.9			
Sliding Coloo			Strength Level	psi=	16.9			
Sliding Calcs Lateral Sliding Force		1 000 0 lbs	ShearAllowable	psi =	75.0			
0	=	1,066.2 lbs	Anet (Masonry)	in2 =	75.0			
less 100% Passive Force less 100% Friction Force		328.1 lbs 1,286.4 lbs	Rebar Depth 'd'	in =	6.25			
		,	Masonry Data	111 =	0.25			
Added Force Req'd	=	0.0 lbs OK	f'm	psi =				
for 1.5 Stability	=	0.0 lbs OK	Fs	psi =				
Vertical component of active	a lator	al coil proceuro IS	Solid Grouting	= 100				
NOT considered in the calc			Modular Ratio 'n'	=				
	alation	r or oon boaring	Wall Weight	psf =	100.0			
Load Factors			Short Term Factor	= 100	100.0			
Building Code			Equiv. Solid Thick.	=				
Dead Load		1.200	Masonry Block Type	_				
Live Load		1.600	Masonry Design Method		ASD			
Earth, H		1.600	Concrete Data	-				
Wind, W		1.600	f'c	psi =	2,500.0			
Seismic, E		1.000	Fy	psi =	60,000.0			

Vertical compo NOT considere

· · - ·	
Load Factors	
Building Code	
Dead Load	

Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19 DESCRIPTION: Garage/ADU Step (12/S3.2)

Concrete Stem Rebar Area Details

Bottom Stem As (based on applied moment) : (4/3) * As : 200bd/fy : 200(12)(6.25)/60000 : 0.0018bh : 0.0018(12)(8) :

Required Area : Provided Area : Maximum Area :

Footing Data

Toe Width	=	2.00 ft
Heel Width	=	1.25
Total Footing Width	=	3.25
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from 7	Foe =	0.00 ft
f'c = 2,500 ps Footing Concrete De Min. As %	ensity = =	60,000 psi 150.00 pcf 0.0000
Cover @ Top 2	.00 @ E	3tm.= 3.00 in

BYKONEN CARTER QUINN

Horizontal Reinforcing

 Min Stem T&S Reinf Area 1.152 in2

 Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft

 Horizontal Reinforcing Options :

 One layer of :
 Two layers of :

 #4@ 12.50 in
 #4@ 25.00 in

 #5@ 19.38 in
 #5@ 38.75 in

 #6@ 27.50 in
 #6@ 55.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>			
Factored Pressure	=	1,906	218 psf			
Mu' : Upward	=	3,120	54 ft-#			
Mu' : Downward	=	516	201 ft-#			
Mu: Design	=	2,604	146 ft-#			
phiMin	=	7,663	2,500 ft-#			
Actual 1-Way Shear	=	16.29	3.94 psi			
Allow 1-Way Shear	=	75.00	40.00 psi			
Toe Reinforcing	=	# 4 @ 12.00 in				
Heel Reinforcing	=	None Spec'd				
Key Reinforcing	=	None Spec'd				
Footing Torsion, Tu		=	0.00 ft-lbs			
Footing Allow. Torsio	Footing Allow. Torsion, phi Tu = 0.00 ft-lbs					
If torsion exceeds allowable, provide						

supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe:

Vertical Reinforcing

0.0996 in2/ft

0.1328 in2/ft

0.1728 in2/ft

0.1728 in2/ft

0.8467 in2/ft

0.2 in2/ft

0.25 in2/ft

Heel:

Key:

Min footing T&S reinf Area	0.84 in2	
Min footing T&S reinf Area per foot	0.26 in2 /ft	
If one layer of horizontal bars:	If two layers of horizontal	oars:
#4@ 9.26 in	#4@ 18.52 in	
#5@ 14.35 in	#5@ 28.70 in	
#6@ 20.37 in	#6@ 40.74 in	

Project File: Foundations.ec6

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Cantilevered Retaining Wall LIC# : KW-06015393, Build:20.22.1.19

BYKONEN CARTER QUINN

Project File: Foundations.ec6

(c) ENERCALC INC 1983-2021

DESCRIPTION: Garage/ADU Step (12/S3.2)

Summary of Overturning & Resisting Forces & Moments

	0	ERTURNING				SISTING	
Item	Force lbs	Distance ft	ft-#		Force Ibs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	980.0	2.33	2,286.7	Soil Over HL (ab. water tbl)	455.0	2.96	1,346.0
HL Act Pres (be water tbl) Hydrostatic Force				Soil Over HL (bel. water tbl) Watre Table		2.96	1,346.0
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =	= 86.2	3.50	301.5	Surcharge Over Heel =	23.3	2.96	69.0
Surcharge Over Toe =		0.00	001.0	Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =	210.0	2.33	490.0
Added Lateral Load =				* Axial Live Load on Stem =	560.0	2.33	1,306.7
_oad @ Stem Above Soil =				Soil Over Toe =	130.0	1.00	130.0
				Surcharge Over Toe =			
-	-			Stem Weight(s) =	600.0	2.33	1,400.0
_				Earth @ Stem Transitions =			
Total =	= 1,066.2	O.T.M. =	2,588.2	Footing Weight =	487.5	1.63	792.2
				Key Weight =			
Resisting/Overturning I	Ratio	=	1.63	Vert. Component =			
Vertical Loads used for	Soil Pressure	= 2,465.8	B lbs	Total =	1,905.8 I	bs R.M.=	4,227.3
				* Axial live load NOT included in	n total display	ed, or used fo	r overturning

Axial live load NOT included in total displayed, or used for overturnil 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

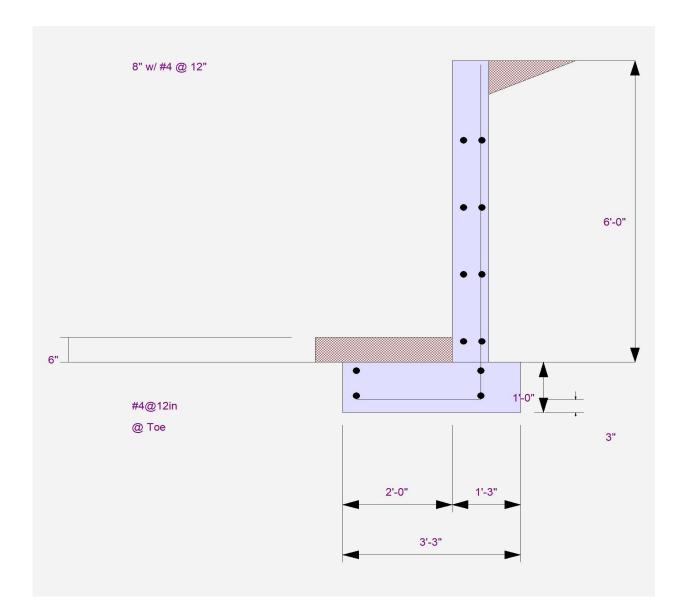
(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus250.0pciHorizontal Defl @ Top of Wall (approximate only)0.070in

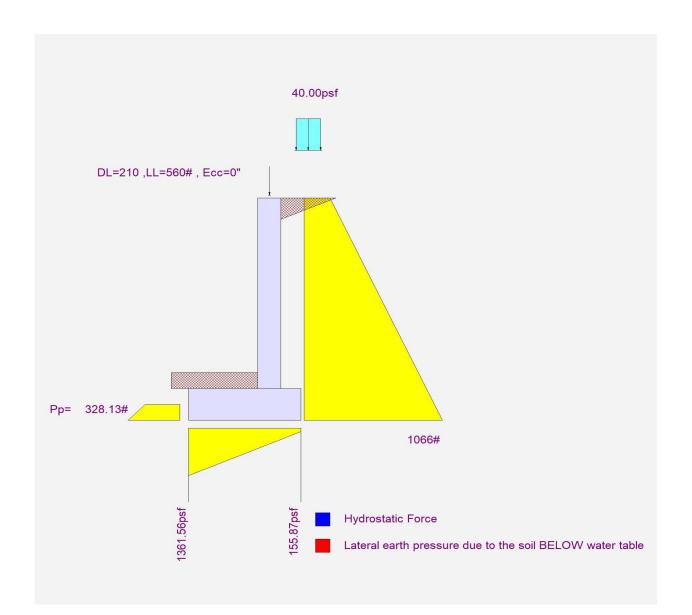
The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,

because the wall would then tend to rotate into the retained soil.









Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19

DESCRIPTION: SE Den/Guest Rm (9/S3.2)

BYKONEN CARTER QUINN

Project File: Foundations.ec6

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Code Reference

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

Criteria

Soil	Data

Retained Height	=	4.00 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

Surcharge Loads

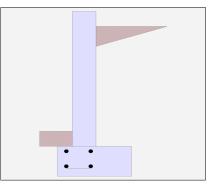
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Ove	=	0.0
Axial Load Applied	d to	Stem
Axial Dead Load	=	120.0 lbs

Axial Live Load	=	40.0 lbs
Axial Load Eccentricity	=	0.0 in

= Meth		psf
=	40.0	psf/ft
=		
=	525.0	psf/ft
=	130.00	pcf
=	130.00	pcf
=	0.675	
=	12.00	in
	Meth = = = = =	Method = 40.0 = 525.0 = 130.00 = 130.00 = 0.675

Lateral Load Applied to Stem

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



Adjacent Footing Load

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

Cantilevered Retaining Wall LIC# : KW-06015393, Build:20.22.1.19

BYKONEN CARTER QUINN

Project File: Foundations.ec6

(c) ENERCALC INC 1983-2021

DESCRIPTION: SE Den/Guest Rm (9/S3.2)

Design Summary			Stem Construction		Bottom			
			Design Height Above Ftg	ft =	Stem OK 0.00			
Wall Stability Ratios			Wall Material Above "Ht"	=	_			
Overturning	=	1.67 OK	Design Method	=	SD	SD	SD	
Sliding	=	2.35 OK	Thickness	=	8.00			
Global Stability	=	0.00	Rebar Size	=	# 4			
2			Rebar Spacing	=	12.00			
Total Bearing Load	=	1.511 lbs	Rebar Placed at	=	Edge			
resultant ecc.	=	7.01 in	Design Data					
			fb/FB + fa/Fa	=	0.155			
Soil Pressure @ Toe	=	2,193 psf OK	Total Force @ Section					
Soil Pressure @ Heel	=	0 psf OK	Service Level	lbs =	590.8			
Allowable Soil Pressure Less	=	4,000 psf	Strength Level	lbs =	590.8			
ACI Factored @ Toe	=	3,070 psf	MomentActual					
ACI Factored @ Heel	=	0 psf	Service Level	ft-# =	840.2			
Footing Shear @ Toe		•	Strength Level	ft-# =	840.2			
Footing Shear @ Heel	=	0.8 psi OK	MomentAllowable	=	5,412.6			
Allowable	=	6.4 psi OK	ShearActual					
Allowable	=	75.0 psi	Service Level	psi =	7.9			
Sliding Calcs			Strength Level	psi =	7.9			
Lateral Sliding Force	=	561.5 lbs	ShearAllowable	psi =	75.0			
less 100% Passive Force	_	328.1 lbs	Anet (Masonry)	in2 =				
less 100% Friction Force		992.6 lbs	Rebar Depth 'd'	in =	6.25			
Added Force Reg'd	/ = =	0.0 lbs OK	Masonry Data		0.20			
for 1.5 Stability	=	0.0 lbs OK	f'm	psi =				
tor 1.5 Stability	-	0.0 103 010	Fs	psi =				
Vertical component of active	e latera	I soil pressure IS	Solid Grouting	. =				
NOT considered in the calcu			Modular Ratio 'n'	=				
		•	Wall Weight	psf =	100.0			
Load Factors			Short Term Factor	. =				
Building Code			Equiv. Solid Thick.	=				
Dead Load		1.200	Masonry Block Type	=				
Live Load		1.600	Masonry Design Method	=	ASD			
Earth, H		1.600	Concrete Data					
Wind, W		1.600	f'c	psi =	2,500.0			
Seismic, E		1.000	Fy	psi =	60,000.0			

Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19 DESCRIPTION: SE Den/Guest Rm (9/S3.2)

Concrete Stem Rebar Area Details

Bottom Stem As (based on applied moment) : (4/3) * As : 200bd/fy : 200(12)(6.25)/60000 : 0.0018bh : 0.0018(12)(8) :

Required Area : Provided Area : Maximum Area :

Footing Data

=	0.42 ft
=	1.67
=	2.09
=	12.00 in
=	0.00 in
=	0.00 in
=	0.00 ft
Fy = y = @ E	60,000 psi 150.00 pcf 0.0000 8tm = 3.00 in
	= = = = Fy = y = =

BYKONEN CARTER QUINN

Project File: Foundations.ec6

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Horizontal Reinforcing

 Min Stem T&S Reinf Area 0.864 in2

 Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft

 Horizontal Reinforcing Options :

 One layer of :
 Two layers of :

 #4@ 12.50 in
 #4@ 25.00 in

 #5@ 19.38 in
 #5@ 38.75 in

 #6@ 27.50 in
 #6@ 55.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	3,070	0 psf	
Mu' : Upward	=	243	9 ft-#	
Mu' : Downward	=	23	434 ft-#	
Mu: Design	=	221	425 ft-#	
phiMin	=	7,663	2,500 ft-#	
Actual 1-Way Shear	=	0.80	6.45 psi	
Allow 1-Way Shear	=	75.00	40.00 psi	
Toe Reinforcing	=	# 4 @ 12.00 in		
Heel Reinforcing	=	None Spec'd		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu		=	0.00 ft-lbs	
Footing Allow. Torsion	n, p	hiTu =	0.00 ft-lbs	
If torsion avcord	6 2	llowable provi	40	

If torsion exceeds allowable, provide

supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe:

Vertical Reinforcing

0.0315 in2/ft

0.042 in2/ft

0.1728 in2/ft

0.1728 in2/ft

0.8467 in2/ft

0.2 in2/ft

0.25 in2/ft

Heel: Kev:

эу	•			

Min footing T&S reinf Area	0.54	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft
If one layer of horizontal bars:	If two lay	ers of horizontal bars:
#4@ 9.26 in	#4@1	8.52 in
#5@ 14.35 in	#5@ 2	8.70 in
#6@ 20.37 in	#6@4	0.74 in

Cantilevered Retaining Wall LIC# : KW-06015393, Build:20.22.1.19

BYKONEN CARTER QUINN

Project File: Foundations.ec6

(c) ENERCALC INC 1983-2021

DESCRIPTION: SE Den/Guest Rm (9/S3.2)

Summary of Overturning & Resisting Forces & Moments

		0\	ERTURNING			RE	ESISTING	
Item		Force lbs	Distance ft	Moment ft-#		Force Ibs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		500.0	1.67	833.3	Soil Over HL (ab. water tbl)	520.2	1.59	825.4
HL Act Pres (be water tbl) Hydrostatic Force					Soil Over HL (bel. water tbl) Watre Table		1.59	825.4
n ´ . n	=				Sloped Soil Over Heel =			
Surcharge over Heel	=	61.5	2.50	153.8	Surcharge Over Heel =	40.0	1.59	63.5
Surcharge Over Toe	=	01.0	2.00	100.0	Adjacent Footing Load =			
	=				Axial Dead Load on Stem =	120.0	0.75	90.4
Added Lateral Load	=				* Axial Live Load on Stem =	40.0	0.75	30.1
Load @ Stem Above Soil					Soil Over Toe =	27.3	0.21	5.7
	=				Surcharge Over Toe =		•	
	-				Stem Weight(s) =	450.0	0.75	339.0
-					Earth @ Stem Transitions =			
Total	=	561.5	O.T.M. =	987.2	Footing Weight =	313.1	1.04	326.7
					Key Weight =			
Resisting/Overturning	Rati	0	=	1.67	Vert. Component =			
Vertical Loads used for	r Soil	Pressure	= 1,510.	5 lbs	Total =	1.470.5	bs R.M.=	1,650.7
					* Axial live load NOT included in	,		,

Axial live load NOT included in total displayed, or used for overturn 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

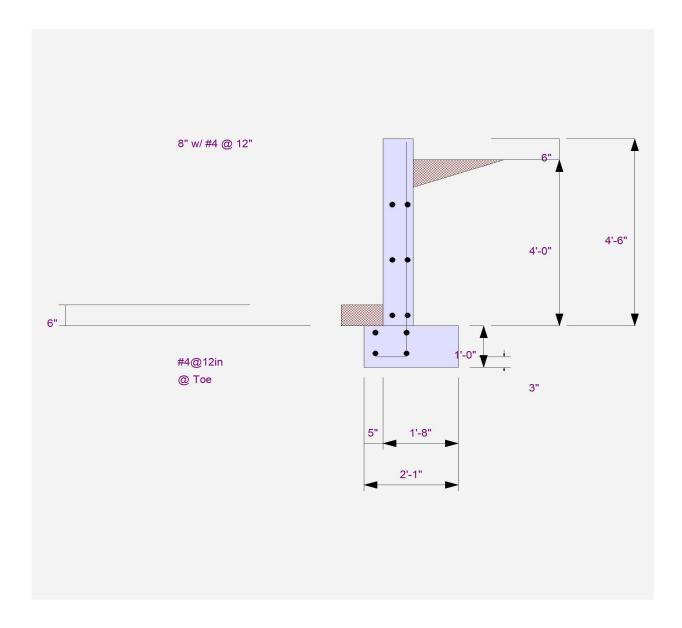
(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus250.0pciHorizontal Defl @ Top of Wall (approximate only)0.131in

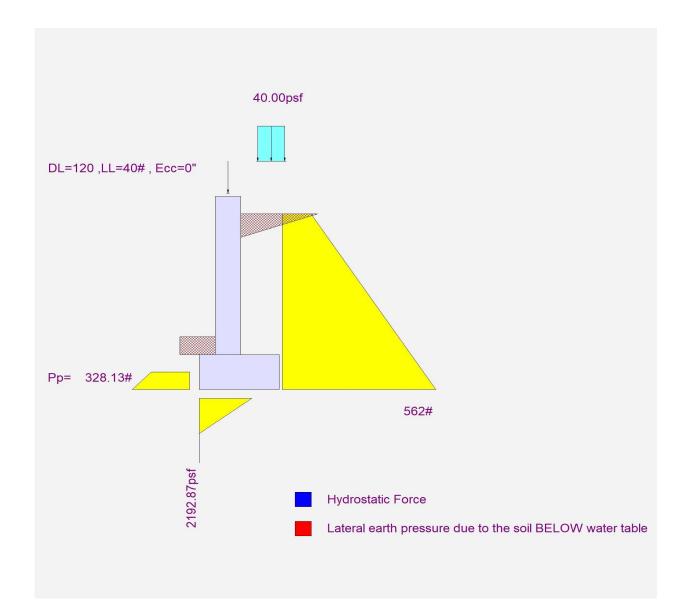
The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,

because the wall would then tend to rotate into the retained soil.









Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19

DESCRIPTION: Garage Wall (12/S3.3)

BYKONEN CARTER QUINN

Project File: Foundations.ec6

(c) ENERCALC INC 1983-2021

Code Reference.

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

Criteria

Soil	Data

Retained Height	=	20.67 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Surcharge Loads

Surcharge Over Hee Used To Resist Slid Surcharge Over Toe Used for Sliding & C	ing & Ov =	0.0		
Axial Load Applied to Stem				
Axial Dead Load Axial Live Load	=	0.0 lbs 0.0 lbs		

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

Allow Soil Bearing Equivalent Fluid Pressure	= Meth	4,000.0 od	psf
Active Heel Pressure	=		psf/ft
	=		
Passive Pressure	=	525.0	psf/ft
Soil Density, Heel	=	10.00	pcf
Soil Density, Toe	=	130.00	pcf
Footing Soil Friction	=	0.525	
Soil height to ignore for passive pressure	=	0.00	in

Lateral Load Applied to Stem

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

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
The Contraction of		0 15 1
Footing Type		Spread Footing
Base Above/Below Soil at Back of Wall	=	O.0 ft

Cantilevered Retaining Wall LIC# : KW-06015393, Build:20.22.1.19

BYKONEN CARTER QUINN

Project File: Foundations.ec6

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DESCRIPTION: Garage Wall (12/S3.3)

Design	Summary

Wall Stability Ratios Overturning Sliding Global Stability	= = =	1.58 OK 1.64 OK 0.00
Total Bearing Loadresultant ecc.	= =	4,957 lbs 23.24 in
Soil Pressure @ Toe Soil Pressure @ Heel Allowable Soil Pressure Less ACI Factored @ Toe ACI Factored @ Heel Footing Shear @ Toe Footing Shear @ Heel Allowable	= = Than = = = =	1,601 psf OK 0 psf OK 4,000 psf Allowable 2,242 psf 0 psf 40.3 psi OK 3.0 psi OK 75.0 psi
Sliding Calcs Lateral Sliding Force less 100% Passive Force less 100% Friction Force Added Force Req'd for 1.5 Stability	= = =	0.0 lbs OK 0.0 lbs OK

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

Load Factors	
Building Code	
5	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction	_	Bottom		
Design Height Above Ftg	ft =	Stem OK 0.00		
Wall Material Above "Ht"	=	Concrete		
Design Method	=	SD	SD SD	
Thickness	=	12.00		
Rebar Size	=	# 5		
Rebar Spacing	=	6.00		
Rebar Placed at	=	Edge		
Design Data				
fb/FB + fa/Fa	=	0.892		
Total Force @ Section				
Service Level	lbs =	3,417.0		
Strength Level	lbs =	3,417.0		
MomentActual				
Service Level	ft-# =	23,539.7		
Strength Level	ft-# =	23,539.7		
MomentAllowable	=	26,382.0		
ShearActual				
Service Level	psi =	28.0		
Strength Level	psi =	28.0		
ShearAllowable	, psi =	75.0		
Anet (Masonry)	in2 =			
Rebar Depth 'd'	in =	10.19		
Masonry Data				
f'm	psi =			
Fs	psi =			
Solid Grouting	- =			
Modular Ratio 'n'	=			
Wall Weight	psf =	150.0		
Short Term Factor	=			
Equiv. Solid Thick.	=			
Masonry Block Type	=			
Masonry Design Method	=	ASD		
Concrete Data				
f'c	psi =	2,500.0		
Fy	psi =	60,000.0		

Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19

DESCRIPTION: Garage Wall (12/S3.3)

Concrete Stem Rebar Area Details

Bottom Stem As (based on applied moment) : (4/3) * As : 200bd/fy : 200(12)(10.1875)/60000 : 0.0018bh : 0.0018(12)(12) :

Required Area : Provided Area : Maximum Area :

Maximum Area

Footing Data

Toe Width	=	= 6	.00 ft
Heel Width	=	: 2	.00
Total Footing Wid	lth =	: 8	.00
Footing Thickness	s =	= 15.	.00 in
Key Width	=	= 12.	.00 in
Key Depth	=	= 12.	.00 in
Key Distance from	n Toe =	= 0.	.00 ft
f'c = 2,500 Footing Concrete Min. As %	Density =	= 150 = 0.00	
Cover @ Top	2.00	@ Btm.=	3.00 in

BYKONEN CARTER QUINN

Project File: Foundations.ec6

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Horizontal Reinforcing

 Min Stem T&S Reinf Area 5.952 in2

 Min Stem T&S Reinf Area per ft of stem Height : 0.288 in2/ft

 Horizontal Reinforcing Options :

 One layer of :
 Two layers of :

 #4@ 8.33 in
 #4@ 16.67 in

 #5@ 12.92 in
 #5@ 25.83 in

 #6@ 18.33 in
 #6@ 36.67 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>		
Factored Pressure	=	2,242	0 psf		
Mu' : Upward	=	27,317	0 ft-#		
Mu' : Downward	=	4,050	237 ft-#		
Mu: Design	=	23,267	237 ft-#		
phiMin	=	30,573	4,225 ft-#		
Actual 1-Way Shear	=	40.33	3.03 psi		
Allow 1-Way Shear	=	75.00	40.00 psi		
Toe Reinforcing	=	# 5 @ 6.00 in			
Heel Reinforcing	=	None Spec'd			
Key Reinforcing	=	None Spec'd			
Footing Torsion, Tu		=	0.00 ft-lbs		
Footing Allow. Torsio	Footing Allow. Torsion, phi Tu = 0.00 ft-lbs				
If torsion exceeds allowable, provide					

supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe:

Vertical Reinforcing

0.5301 in2/ft

0.7067 in2/ft

0.4075 in2/ft

0.2592 in2/ft

0.5301 in2/ft

1.3801 in2/ft

0.62 in2/ft

Heel:

Key:

Min footing T&S reinf Area	2.59	in2
Min footing T&S reinf Area per foot	0.32	in2 /ft
If one layer of horizontal bars:	If two lay	ers of horizontal bars:
#4@ 7.41 in	#4@ 1	4.81 in
#5@ 11.48 in	#5@ 2	2.96 in
#6@ 16.30 in	#6@ 3	2.59 in

Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19

DESCRIPTION: Garage Wall (12/S3.3)

Summary of Overturning & Resisting Forces & Moments

	OV	ERTURNING			RE	ESISTING	
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl) HL Act Pres (be water tbl) Hydrostatic Force	2,401.8	7.31	17,546.6	Soil Over HL (ab. water tbl) Soil Over HL (bel. water tbl) Watre Table	206.7	7.50 7.50	1,550.0 1,550.0
Buoyant Force = Surcharge over Heel = Surcharge Over Toe = Adjacent Footing Load =				Sloped Soil Over Heel = Surcharge Over Heel = Adjacent Footing Load = Axial Dead Load on Stem =			
Added Lateral Load = Load @ Stem Above Soil =				* Axial Live Load on Stem = Soil Over Toe = Surcharge Over Toe =			
_				Stem Weight(s) = Earth @ Stem Transitions =	3,100.1	6.50	20,150.3
Total =	2,401.8	O.T.M. =	17,546.6	Footing Weight = Key Weight =	1,500.0 150.0	4.00 0.50	6,000.0 75.0
Resisting/Overturning Rat Vertical Loads used for So		= = 4,956.7	1.58 7 lbs	Vert. Component		bs R.M.=	27.775.4

BYKONEN CARTER QUINN

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 Modulus250.0pciHorizontal Defl @ Top of Wall (approximate only)0.115in

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.

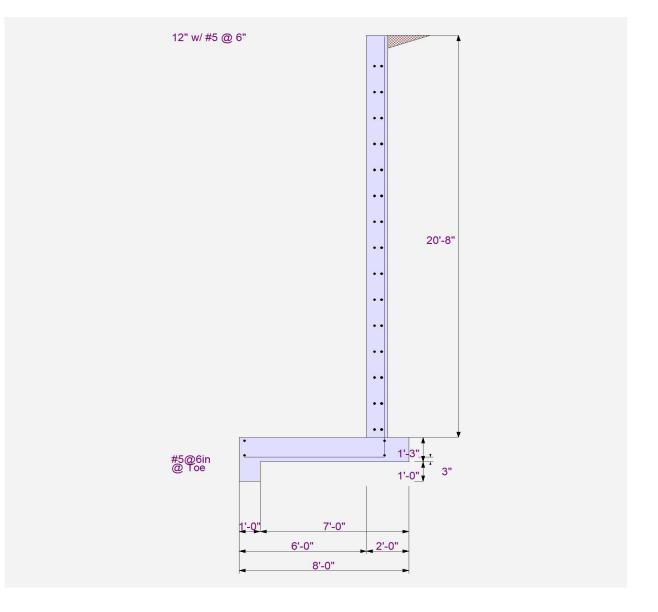
Project File: Foundations.ec6

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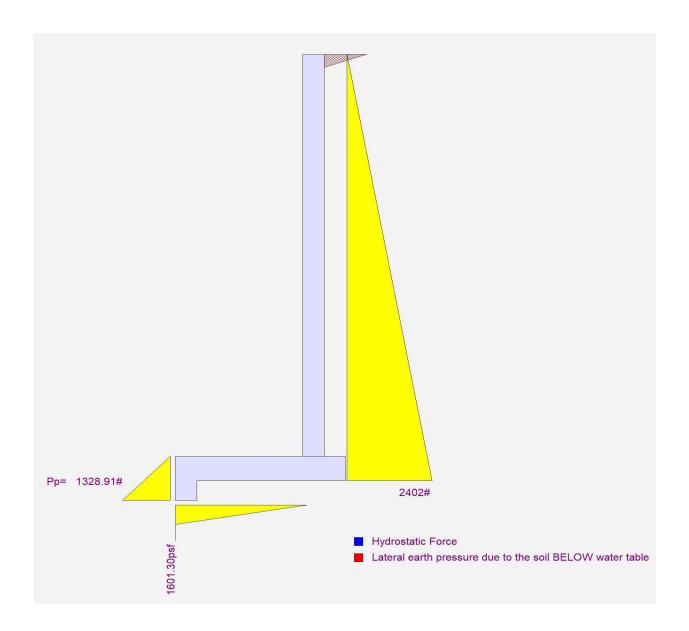
Cantilevered Retaining Wall		Project File: Foundations.ec6
LIC# : KW-06015393, Build:20.22.1.19	BYKONEN CARTER QUINN	(c) ENERCALC INC 1983-2021

DESCRIPTION: Garage Wall (12/S3.3)









Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19 DESCRIPTION: Stair Wall (10/S3.1) BYKONEN CARTER QUINN

Project File: Foundations.ec6

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Code Reference

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

Criteria

Soi	Data

Retained Height	=	19.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Surcharge Loads

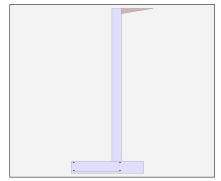
Surcharge Over Heel Used To Resist Slidin Surcharge Over Toe Used for Sliding & Ove	=	0.0
Axial Load Applie	d to	Stem
Axial Dead Load	=	120.0 lbs

Axial Live Load	=	300.0 lbs
Axial Load Eccentricity	=	0.0 in

Allow Soil Bearing Equivalent Fluid Pressure	= Meth	4,000.0	psf
Active Heel Pressure	=		psf/ft
	=		
Passive Pressure	=	525.0	psf/ft
Soil Density, Heel	=	5.00	pcf
Soil Density, Toe	=	130.00	pcf
Footing Soil Friction	=	0.525	
Soil height to ignore for passive pressure	=	0.00	in

Lateral Load Applied to Stem

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



Adjacent Footing Load

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

Cantilevered Retaining Wall LIC# : KW-06015393, Build:20.22.1.19

DESCRIPTION: Stair Wall (10/S3.1)

BYKONEN CARTER QUINN

Project File: Foundations.ec6

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Design Summary

Wall Stability Ratios Overturning Sliding Global Stability	= =	1.53 OK 1.50 OK 0.00
Clobal Stability	-	0.00
Total Bearing Loadresultant ecc.	=	5,197 lbs 24.56 in
Soil Pressure @ Toe Soil Pressure @ Heel Allowable	=	1,988 psf OK 0 psf OK 4,000 psf
Soil Pressure Less	= Than	
ACI Factored @ Toe ACI Factored @ Heel	=	2,783 psf 0 psf
Footing Shear @ Toe Footing Shear @ Heel Allowable	= = =	29.8 psi OK 4.7 psi OK 75.0 psi
Sliding Calcs Lateral Sliding Force less 100% Passive Force less 100% Friction Force Added Force Req'd for 1.5 Stability		2,101.3 lbs 590.6 lbs 2,570.8 lbs 0.0 lbs OK 0.0 lbs OK

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

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

Stem Construction	_	Bottom			
Design Height Above Ftg	ft =	Stem OK 0.00			
Wall Material Above "Ht"		Concrete			
Design Method	=	SD	SD	SD	
Thickness	=	12.00			
Rebar Size	=	# 5			
Rebar Spacing	=	8.00			
Rebar Placed at	=	Edge			
Design Data		0.906			
fb/FB + fa/Fa	=	0.906			
Total Force @ Section		0 000 0			
Service Level	lbs =	2,888.0			
Strength Level MomentActual	lbs =	2,888.0			
Service Level	ft-# =	18,290.7			
Strength Level	ft-# =	18,290.7			
0		,			
MomentAllowable	=	20,169.2			
ShearActual					
Service Level	psi =	23.6			
Strength Level	psi =	23.6			
ShearAllowable	psi =	75.0			
Anet (Masonry)	in2 =				
Rebar Depth 'd'	in =	10.19			
Masonry Data					
f'm –	psi =				
Fs	psi =				
Solid Grouting	=				
Modular Ratio 'n'	=	450.0			
Wall Weight	psf =	150.0			
Short Term Factor	=				
Equiv. Solid Thick. Masonry Block Type	=				
Masonry Design Method	=	ASD			
Concrete Data	=	ASD			
f'c	psi =	2,500.0			
Fy	psi =	60,000.0			
- 5	p.c	20,000.0			

Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19

DESCRIPTION: Stair Wall (10/S3.1)

Concrete Stem Rebar Area Details

Bottom Stem As (based on applied moment) : (4/3) * As : 200bd/fy : 200(12)(10.1875)/60000 : 0.0018bh : 0.0018(12)(12) :

Required Area : Provided Area : Maximum Area :

Footing Data

=	4.25 ft
=	3.33
=	7.58
=	18.00 in
=	0.00 in
=	0.00 in
Гое =	0.00 ft
i Fy =	60,000 psi
ensity =	150.00 pcf
=	0.0000
.00 @	Btm .= 3.00 in
	= = = = Foe = i Fy =

BYKONEN CARTER QUINN

Project File: Foundations.ec6

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Horizontal Reinforcing

 Min Stem T&S Reinf Area 5.472 in2

 Min Stem T&S Reinf Area per ft of stem Height : 0.288 in2/ft

 Horizontal Reinforcing Options :

 One layer of :
 Two layers of :

 #4@ 8.33 in
 #4@ 16.67 in

 #5@ 12.92 in
 #5@ 25.83 in

 #6@ 18.33 in
 #6@ 36.67 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>		
Factored Pressure	=	2,783	0 psf		
Mu' : Upward	=	18,324	0 ft-#		
Mu' : Downward	=	2,438	1,042 ft-#		
Mu: Design	=	15,885	1,042 ft-#		
phiMin	=	29,589	6,400 ft-#		
Actual 1-Way Shear	=	29.78	4.66 psi		
Allow 1-Way Shear	=	75.00	40.00 psi		
Toe Reinforcing	=	# 5 @ 8.00 in			
Heel Reinforcing	=	None Spec'd			
Key Reinforcing	=	None Spec'd			
Footing Torsion, Tu		=	0.00 ft-lbs		
Footing Allow. Torsion, phi Tu = 0.00 ft-lbs					
If torsion exceeds allowable, provide					

supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Teel	
l oe:	
11	
Heel:	

Vertical Reinforcing

0.4119 in2/ft

0.5492 in2/ft

0.4075 in2/ft

0.2592 in2/ft

0.4119 in2/ft

1.3801 in2/ft

0.465 in2/ft

Key:

Min footing T&S reinf Area	2.95	in2
Min footing T&S reinf Area per foot	0.39	in2 /ft
If one layer of horizontal bars:	If two laye	ers of horizontal bars:
#4@ 6.17 in	#4@ 1	2.35 in
#5@ 9.57 in	#5@ 1	9.14 in
#6@ 13.58 in	#6@ 2	7.16 in

Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19

DESCRIPTION: Stair Wall (10/S3.1)

BYKONEN CARTER QUINN

Project File: Foundations.ec6

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Summary of Overturning & Resisting Forces & Moments

	OV	ERTURNING			R	ESISTING	
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl) HL Act Pres (be water tbl) Hydrostatic Force	2,101.3	6.83	14,358.5	Soil Over HL (ab. water tbl) Soil Over HL (bel. water tbl) Watre Table	221.4	6.42 6.42	1,420.0 1,420.0
Buoyant Force = Surcharge over Heel = Surcharge Over Toe =				Sloped Soil Over Heel = Surcharge Over Heel = Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =	120.0	4.75	570.0
Added Lateral Load = Load @ Stem Above Soil =				* Axial Live Load on Stem = Soil Over Toe = Surcharge Over Toe =	300.0	4.75	1,425.0
=				Stem Weight(s) =	2,850.0	4.75	13,537.5
				Earth @ Stem Transitions =			
Total =	2,101.3	O.T.M. =	14,358.5	Footing Weight =	1,705.5	3.79	6,463.8
				Key Weight =			
Resisting/Overturning Rat	io	=	1.53	Vert. Component =			
Vertical Loads used for So	il Pressure	= 5,196.9	9 lbs	Total =	4.896.9	lbs R.M.=	21,991.3

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

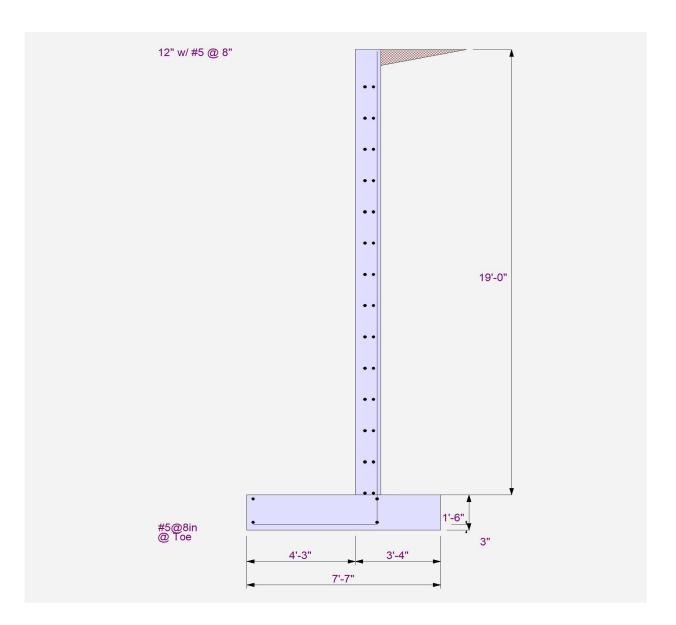
(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci Horizontal Defl @ Top of Wall (approximate only) 0.138 in

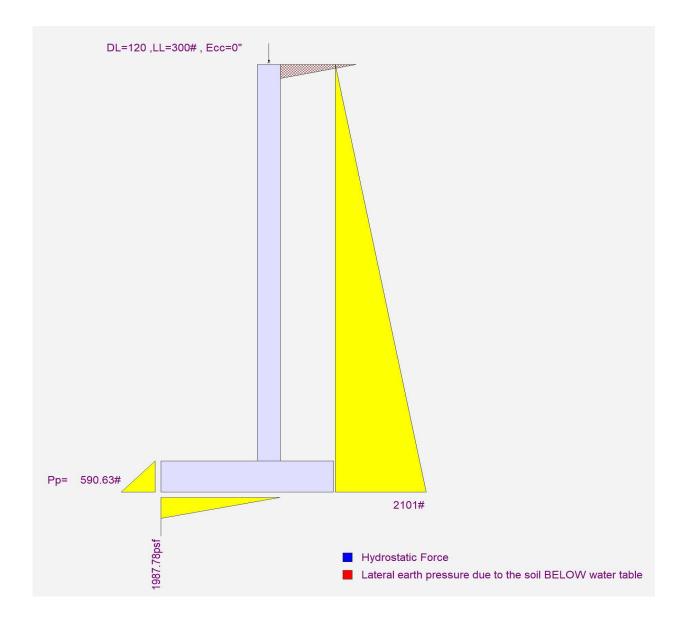
The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,

because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall		Project File: Foundations.ec6
LIC# : KW-06015393, Build:20.22.1.19	BYKONEN CARTER QUINN	(c) ENERCALC INC 1983-2021
DESCRIPTION: Stair Wall (10/S3.1)		







Restrained Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19

BYKONEN CARTER QUINN

Project File: Foundations.ec6

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DESCRIPTION: SE & NW Den/Guest Rm (11/S3.2)

Code Reference:

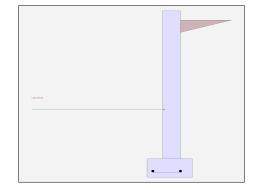
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Soil Data

Retained Height Wall height above soil Total Wall Height	= = =	7.50 ft 0.50 ft 8.0 ft
Top Support Height	=	2.667 ft
Slope Behind Wall Height of Soil over Toe	=	0 in

Allow Soil Bearing	=	4,000.0 psf
Equivalent Fluid Pressure	Metho	bd
At-Rest Heel Pressure	=	55.0 psf/ft
	=	0.0 psf/ft
Passive Pressure	=	525.0 psf/ft
Soil Density	=	130.0 pcf
Footing Soil Frictior	=	0.5250 psf
Soil height to ignore for passive pressure	=	in



Surcharge Loads

Surcharge Over Heel	=	psf
>>>Used To Resist S	liding	& Overturning
Surcharge Over Toe Used for Sliding & Ove	= erturn	40.0 psf ing
Axial Load Applied to	Stem	n

Axial Dead Load	=	120.0 lbs
Axial Live Load	=	40.0 lbs
Axial Load Eccentricity	=	in

Earth Pressure Seismic Load

Design Summary

Total Bearing Load resultant ecc.	=	1,757.50 lbs -0.9165 in
Soil Pressure @ Toe	=	699.39 psf OK
Soil Pressure @ Heel	=	1,140.93 psf OK
Allowable	=	psf
Soil Pressure Less	Tha	n Allowable
ACI Factored @ Toe	=	845.63 psf
ACI Factored @ Heel	=	1,379.50 psf
Footing Shear @ Toe	=	0.2481 psi OK
Footing Shear @ Heel	=	-0.1707 psi OK
Allowable	=	75.0 psi
Reaction at Top Reaction at Bottom	=	1,446.16 lbs 536.86 lbs
Sliding Calcs Lateral Sliding Force	=	536.86 lbs

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

Uniform Lateral Loa	ad App	lied to Stem	
Lateral Load	=	#/ft	
Height to Top Height to Bottom	=	ft ft	
Load Type	=	Wind (W)	
Wind on Exposed St	em =	(Service Leve 0.00 psf (Strength Lev	,
Wind acts left-to-righ	it towa	rd retention sic	le.
K _h Soil Density Mu	ltiplier	= 0.2 g	Add

Adjacent Footing Load

Adjacent Footing Load	=	lbs
Footing Width Eccentricity	= =	ft 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
ded seismic per unit area	=	0.0 psf

Concrete Stem Construction

Thickness = 8.00 in 100.0 psf Wall Weight = Stem is FREE to rotate at top of footing

	@	Top Support	Mmax Between Top & Base	@ Base of Wall
		Stem OK	Stem OK	Stem OK
Design Height Above Ftg	=	2.667 ft	0.2463 ft	0.00 ft
Rebar Size	=	# 4	# 4	# 4
Rebar Spacing	=	12.00 in	12.00 in	12.00 in
Rebar Placed at	=	Edge	Edge	Edge
Rebar Depth 'd'	=	5.50 in	6.0 in	5.50 in
Design Data				
fb/FB + fa/Fa	=			
MomentActual	=	1,655.70 ft-#	18.387 ft-#	0.0 ft-#
MomentAllowable	=	4,737.60 ft-#	5,187.60 ft-#	4,737.60 ft-#
Shear Force @ this height	=	1,292.28 lbs		154.978 lbs
ShearActual	=	19.580 psi		2.348 psi
ShearAllowable	=	75.0 psi		75.0 psi

Restrained Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19

BYKONEN CARTER QUINN

(c) ENERCALC INC 1983-2021

Project File: Foundations.ec6

DESCRIPTION: SE & NW Den/Guest Rm (11/S3.2)

Footing Strengths & Dimensions

Toe Width	=	0.750 ft
Heel Width	= _	1.160
Total Footing Width	=	1.910
Footing Thickness	=	12.0 in
Key Width	=	in
Key Depth	=	in
Key Distance from Toe	=	ft
f'c = 2,500.0 psi Footing Concrete Density Min. As % Cover @ Top = 2 in	=	60000 psi 150 pcf 0.0018 Btm.= 3 in

Footing Design Results

		<u>Toe</u>	Heel
Factored Pressure	=	845.63	1,379.50 psf
Mu' : Upward	=	257.488	ft-#
Mu' : Downward	=	68.625	ft-#
Mu: Design	=	189	-4 ft-#
Actual 1-Way Shear	=	0.2481	psi
Allow 1-Way Shear	=	75.0	75.0 psi
Other Acceptable Siz	es 8	Spacings	:
Toe: # 7 @ 18.00 in		-or-	phiMn = phi * 5 * lambda * sqrt(fc) * Sm
Heel: None Spec'd		-or-	phiMn = phi * 5 * lambda * sqrt(fc) * Sm
Key: # 0 @ 0.00 in		-or-	No key defined
Min footing T&S reinf	Are	а	0.50 in2
Min footing T&S reinf	Are	a per foot	0.26 in2 /ft
If one layer of horizor	ntal k	oars: If	two layers of horizontal bars:
#4@ 9.26 in			#4@ 18.52 in
#5@ 14.35 in			#5@ 28.70 in
#6@ 20.37 in			#6@ 40.74 in

Summary of Forces on Footing : Slab is NOT resisting sliding, stem is PINNED at footing

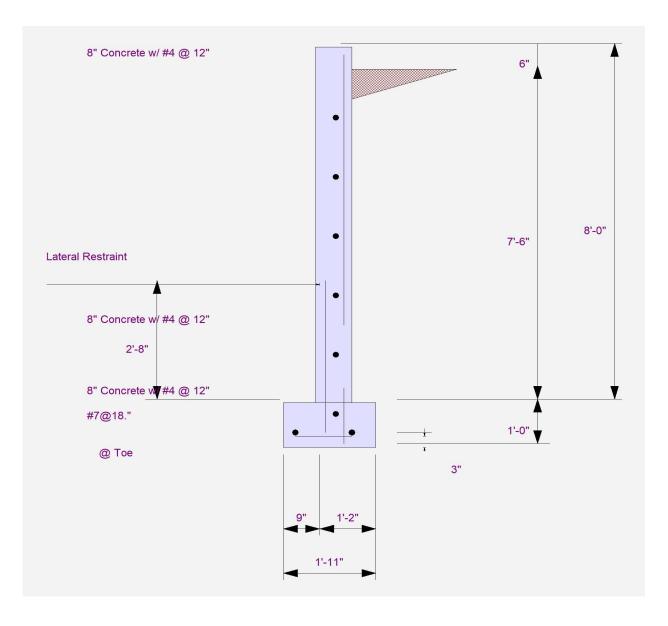
Forces acting on footing for overturning, sliding, & soil pressure Lateral Distance Moment **Overturning Moments...** lbs ft ft-# Stem Shear @ Top of Footing = 96.861 1.0 -96.861 Heel Active Pressure 440.0 0.4896 -215.417 = **Sliding Force** 536.86 = Overturning Moment = -312.278 **Footing Overturning Stability Ratio** 6.805 Net Moment Used For Soil Pressure Calculations -134.231 ft-#

		Vertical	Lateral	Distance	Moment
Resisting Moments		lbs	lbs	ft	ft-#
Surcharge Over Heel	=	0	.0	0.0	0.0
Adjacent Footing Load	=	0	.0	0.0	0.0
Axial Dead Load on Stem	=	160	0.0	1.083	173.333
Soil Over Toe	=	0	.0	0.0	0.0
Stem Weight	=	800	0.0	0.3750	11.250
Surcharge Over Toe	=	30	.0	1.083	866.67
Soil Over Heel	=	481	.0	1.663	800.06
Footing Weight	=	286.	50	0.9550	273.608
Total Vertical Force	=	1,757.	50 lbs		
		Res	sisting Mo	oment =	2,124.92

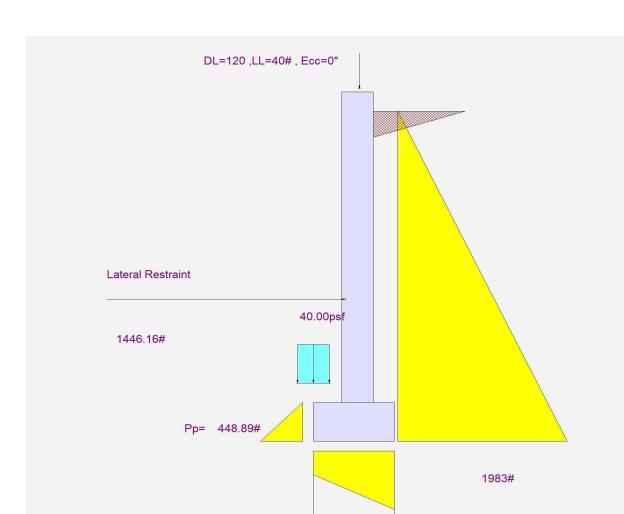
Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.



DESCRIPTION: SE & NW Den/Guest Rm (11/S3.2)







699.39psf

1140.93psf

Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19

DESCRIPTION: SW Den/Guest Rm (10/S3.2)

BYKONEN CARTER QUINN

Project File: Foundations.ec6

(c) ENERCALC INC 1983-2021

Code Reference

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

Criteria

Soil	Data

Retained Height	=	7.17 ft
Wall height above soil	=	2.92 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	48.00 in
Water height over heel	=	0.0 ft

Surcharge Loads

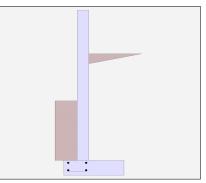
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Over	=	0.0
Axial Load Applied	l to S	Stem
Axial Dead Load	=	120.0 lbs

Axial Live Load	=	40.0 lbs
Axial Load Eccentricity	=	0.0 in

Allow Soil Bearing Equivalent Fluid Pressure	= Meth	4,000.0	psf
Active Heel Pressure	=		psf/ft
	=		
Passive Pressure	=	525.0	psf/ft
Soil Density, Heel	=	130.00	pcf
Soil Density, Toe	=	130.00	pcf
Footing Soil Friction	=	0.675	
Soil height to ignore			
for passive pressure	=	12.00	in

Lateral Load Applied to Stem

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



Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
- ·· -		• • • •
Footing Type		Spread Footing
Base Above/Below Soil at Back of Wall	=	O.0 ft

Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19

DESCRIPTION: SW Den/Guest Rm (10/S3.2)

Design Summary			Stem Construction		Bottom			
			Design Height Above Ftg	ft =	Stem OK 0.00			
Wall Stability Ratios	_		Wall Material Above "Ht"	=	Concrete			
Overturning	=	1.72 OK	Design Method	=	SD	SD	SD	
Sliding	=	6.26 OK	Thickness	=	8.00			
Global Stability	=	0.00	Rebar Size	=	# 4			
			Rebar Spacing	=	10.00			
Total Bearing Load	=	4,016 lbs	Rebar Placed at	=	Edge			
resultant ecc.	=	11.71 in	Design Data		0.688			
			fb/FB + fa/Fa	=	0.688			
Soil Pressure @ Toe Soil Pressure @ Heel	=	3,655 psf OK	Total Force @ Section					
		0 psf OK	Service Level	lbs =	1,786.3			
Allowable Soil Pressure Less	= Thon	4,000 psf	Strength Level	lbs =	1,786.3			
ACI Factored @ Toe	=	5,117 psf	MomentActual					
ACI Factored @ Heel	=	0 psf		ft-# =	4,437.9			
		•	Strength Level	ft-# =	4,437.9			
Footing Shear @ Toe	=	1.7 psi OK	MomentAllowable	=	6,444.1			
Footing Shear @ Heel	=	16.8 psi OK	ShearActual					
Allowable	=	75.0 psi	Service Level	psi =	23.8			
Cliding Coloo			Strength Level	psi=	23.8			
Sliding Calcs		4 405 5 1	ShearAllowable	psi =	23.8 75.0			
Lateral Sliding Force	=	1,435.5 lbs		•	75.0			
less 100% Passive Force		6,300.0 lbs	Anet (Masonry)	in2 =	0.05			
less 100% Friction Force	;≡ -	2,683.8 lbs	Rebar Depth 'd'	in =	6.25			
Added Force Req'd	=	0.0 lbs OK	Masonry Data					
for 1.5 Stability	=	0.0 lbs OK	f'm	psi =				
			Fs Called Crowting	psi =				
Vertical component of active			Solid Grouting Modular Ratio 'n'	=				
NOT considered in the calcu	Jialion	or soil bearing			100.0			
Load Factors			Wall Weight	psf =	100.0			
Building Code			Short Term Factor	=				
Dead Load		1.200	Equiv. Solid Thick.	=				
Live Load		1.600	Masonry Block Type	=				
Earth, H		1.600	Masonry Design Method	=	ASD			
,		1.600	Concrete Data		0 500 0			
Wind, W			f'c	psi =	2,500.0			
Seismic, E		1.000	Fy	psi =	60,000.0			

BYKONEN CARTER QUINN

Project File: Foundations.ec6

Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19

BYKONEN CARTER QUINN

Project File: Foundations.ec6

(c) ENERCALC INC 1983-2021

DESCRIPTION: SW Den/Guest Rm (10/S3.2)

Concrete Stem Rebar Area Details

Bottom Stem As (based on applied moment) : (4/3) * As : 200bd/fy : 200(12)(6.25)/60000 : 0.0018bh : 0.0018(12)(8) :

Required Area : Provided Area : Maximum Area :

Footing Data

Toe Width	= 0.75 ft
Heel Width	= 2.67
Total Footing Width	= 3.42
Footing Thickness	= 12.00 in
Key Width	= 0.00 in
Key Depth	= 0.00 in
Key Distance from Toe	e = 0.00 ft
f'c = 2,500 psi Footing Concrete Dens Min. As % Cover @ Top 2.00	= 0.0000

Horizontal Reinforcing

 Min Stem T&S Reinf Area 1.937 in2

 Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft

 Horizontal Reinforcing Options :

 One layer of :
 Two layers of :

 #4@ 12.50 in
 #4@ 25.00 in

 #5@ 19.38 in
 #5@ 38.75 in

 #6@ 27.50 in
 #6@ 55.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>		
Factored Pressure	=	5,117	0 psf		
Mu' : Upward	=	1,276	185 ft-#		
Mu' : Downward	=	226	2,726 ft-#		
Mu: Design	=	1,049	2,541 ft-#		
phiMin	=	7,663	2,500 ft-#		
Actual 1-Way Shear	=	1.66	16.80 psi		
Allow 1-Way Shear	=	75.00	40.00 psi		
Toe Reinforcing	=	# 4 @ 12.00 in			
Heel Reinforcing	=	None Spec'd			
Key Reinforcing	=	None Spec'd			
Footing Torsion, Tu		=	0.00 ft-lbs		
Footing Allow. Torsio	n, p	ohiTu =	0.00 ft-lbs		
If torsion exceeds allowable, provide					

supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe:

Vertical Reinforcing

0.1663 in2/ft

0.2217 in2/ft

0.1728 in2/ft

0.2217 in2/ft

0.8467 in2/ft

0.24 in2/ft

0.25 in2/ft

Heel:

Key:

Min footing T&S reinf Area	0.89	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft
If one layer of horizontal bars:	If two lay	ers of horizontal bars:
#4@ 9.26 in	#4@1	8.52 in
#5@ 14.35 in	#5@ 2	8.70 in
#6@ 20.37 in	#6@4	0.74 in

Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19

BYKONEN CARTER QUINN

Project File: Foundations.ec6

(c) ENERCALC INC 1983-2021

DESCRIPTION: SW Den/Guest Rm (10/S3.2)

Summary of Overturning & Resisting Forces & Moments

	0\	/ERTURNING				ESISTING	
Item	Force lbs	Distance ft	ft-#		Force Ibs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl) HL Act Pres (be water tbl)	1,335.0	2.72	3,635.6	Soil Over HL (ab. water tbl) Soil Over HL (bel. water tbl)	1,864.5	2.42 2.42	4,506.2 4,506.2
Hydrostatic Force				Watre Table			
Buoyant Force =	=			Sloped Soil Over Heel =			
· · · ·	= 100.6	4.09	410.8	Surcharge Over Heel =	80.0	2.42	193.4
• • • • •	=			Adjacent Footing Load =			
	=			Axial Dead Load on Stem =	120.0	1.08	130.0
Added Lateral Load	=			* Axial Live Load on Stem =	40.0	1.08	43.3
Load @ Stem Above Soil =	=			Soil Over Toe =	390.0	0.38	146.3
:	=			Surcharge Over Toe =			
				Stem Weight(s) =	1,009.0	1.08	1,093.1
				Earth @ Stem Transitions =			
Total =	= 1,435.5	O.T.M. =	4,046.4	Footing Weight =	512.6	1.71	875.7
				Key Weight =			
Resisting/Overturning I	Ratio	=	1.72	Vert. Component =			
Vertical Loads used for	Soil Pressure	= 4,016.7	1 lbs	Total =	3,976.1	lbs R.M.=	6,944.6
				* Axial live load NOT included ir	n total display	ed, or used fo	r overturning

Axial live load NOT included in total displayed, or used for overturn 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

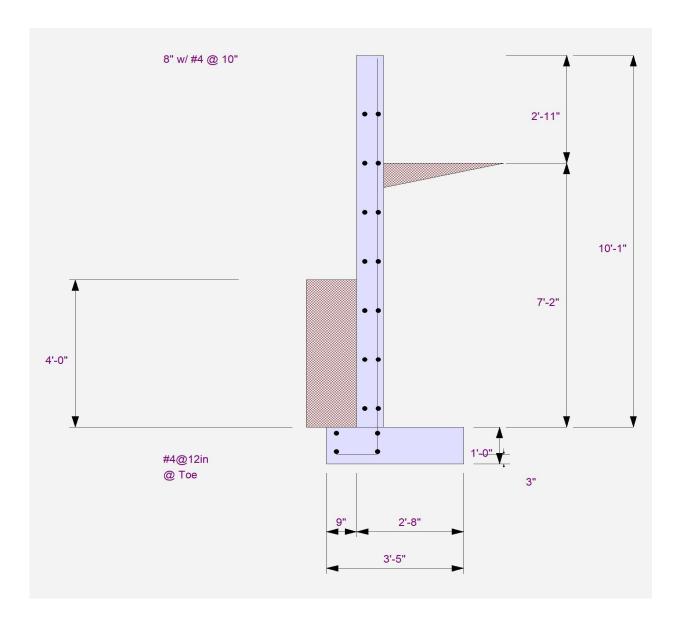
(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus250.0pciHorizontal Defl @ Top of Wall (approximate only)0.300in

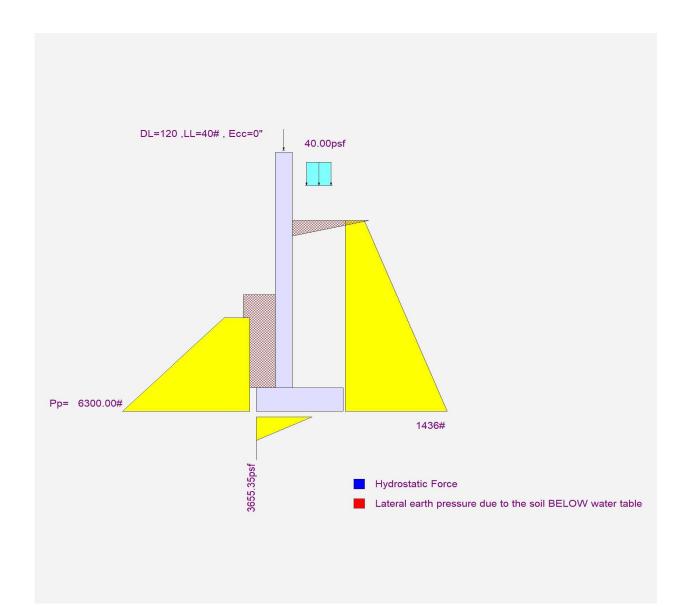
The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,

because the wall would then tend to rotate into the retained soil.









Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19

BYKONEN CARTER QUINN

DESCRIPTION: SE @ ADU/Laundry W/ 9H (12/S3.1)

Code Reference

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

Criteria

Retained Height

	=	6.50 ft
I I	=	3.59 ft

Wall height above soil	=	3.59 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Surcharge Loads

V						
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Ove	=	0.0				
Axial Load Applied to Stem						
Axial Dead Load Axial Live Load Axial Load Eccentricity	= =	290.0 lbs 435.0 lbs 0.0 in				
Earth Proceuro S	aicn	nia Load				

Earth Pressure Seismic Load

Method : Uniform Multiplier Used = 9.000 (Multiplier used on soil density) Soil Data

Allow Soil Bearing Equivalent Fluid Pressure	= Meth	4,000.0 od	psf
Active Heel Pressure	=	55.0	psf/ft
	=		
Passive Pressure	=	525.0	psf/ft
Soil Density, Heel	=	130.00	pcf
Soil Density, Toe	=	130.00	pcf
Footing Soil Friction	=	0.675	
Soil height to ignore for passive pressure	=	0.00	in

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Uniform Seismic Force	=	67.500
Total Seismic Force	=	506.250

Project File: Foundations.ec6

Cantilevered Retaining Wall LIC# : KW-06015393, Build:20.22.1.19

BYKONEN CARTER QUINN

DESCRIPTION: SE @ ADU/Laundry W/ 9H (12/S3.1)

Design Summary			St	em Construction		Bottom			
				Design Height Above Ftg	ft =	Stem OK 0.00			
Wall Stability Ratios				Wall Material Above "Ht"	=	Concrete			
Overturning	=	1.83 OK		Design Method	=	SD	SD	SD	
Sliding	=	1.33 Ratio	0 < 1.5!	Thickness	=	8.00			
Global Stability	=	0.00		Rebar Size	=	# 4			
				Rebar Spacing	=	10.00			
Total Bearing Load	=	4.031 lbs		Rebar Placed at	=	Edge			
resultant ecc.	=	10.01 in		Design Data					
			.	fb/FB + fa/Fa	=	0.935			
Soil Pressure @ Toe	=	1,899 psf (Total Force @ Section					
Soil Pressure @ Heel	=	0 psf (JK	Service Level	lbs =	2,473.8			
Allowable Soil Pressure Less	= Thom	4,000 psf		Strength Level	lbs =	2,473.8			
ACI Factored @ Toe	=	2,658 psf		MomentActual					
ACI Factored @ Heel	=	2,058 psi 0 psf			ft-# =	6,025.8			
			אר	Strength Level	ft-# =	6,025.8			
Footing Shear @ Toe Footing Shear @ Heel	=	26.3 psi (MomentAllowable	=	6,444.1			
Allowable	=	13.4 psi (JK	ShearActual					
Allowable	=	75.0 psi		Service Level	psi =	33.0			
Sliding Calcs				Strength Level	psi =	33.0			
Lateral Sliding Force	=	2,028.2 lbs		ShearAllowable	psi =	75.0			
less 100% Passive Force	_	262.5 lbs		Anet (Masonry)	in2 =				
less 100% Friction Force		2.427.4 lbs		Rebar Depth 'd'	in =	6.25			
Added Force Reg'd	_	0.0 lbs (ЭК	Masonry Data		0.20			
for 1.5 Stability	_	352.3 lbs 1		f'm	psi =				
		002.0 100 1		Fs	, psi =				
ertical component of active	later	al soil pressure	e IS	Solid Grouting	. =				
OT considered in the calcu	latior	n of soil bearing	1	Modular Ratio 'n'	=				
				Wall Weight	psf =	100.0			
Load Factors				Short Term Factor	. =				
Building Code				Equiv. Solid Thick.	=				
Dead Load		1.200		Masonry Block Type	=				
Live Load		1.600		Masonry Design Method	=	ASD			
Earth, H		1.600		Concrete Data					
Wind, W		1.600		f'c	psi =	2,500.0			
Seismic, E		1.000		Fy	psi =	60,000.0			

Project File: Foundations.ec6

Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19

BYKONEN CARTER QUINN

DESCRIPTION: SE @ ADU/Laundry W/ 9H (12/S3.1)

Concrete Stem Rebar Area Details

Bottom Stem Vertical Reinforcing Horizontal Reinforcing As (based on applied moment) : 0.2258 in2/ft (4/3) * As : 0.301 in2/ft Min Stem T&S Reinf Area 1.937 in2 200bd/fy:200(12)(6.25)/60000: 0.25 in2/ft Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft 0.0018bh : 0.0018(12)(8) : Horizontal Reinforcing Options : 0.1728 in2/ft One layer of : Two layers of : _____ Required Area : #4@ 25.00 in 0.25 in2/ft #4@ 12.50 in Provided Area : 0.24 in2/ft #5@ 19.38 in #5@ 38.75 in Maximum Area : 0.8467 in2/ft #6@ 27.50 in #6@ 55.00 in

Footing Data

Toe Width Heel Width Total Footing Width	=	2.00 ft 2.50 4.50
Footing Thickness	=	12.00 in
Key Width Key Depth Key Distance from ⁻	= = Toe =	0.00 in 0.00 in 0.00 ft
f'c = 2,500 ps Footing Concrete Do Min. As % Cover @ Top 2	ensity = =	60,000 psi 150.00 pcf 0.0000 Btm.= 3.00 in

Footing Design Results

Factored Pressure Mu' : Upward Mu' : Downward	=	<u>Toe</u> 2,658 4,482 360	Heel 0 411 2,114			
Mu: Design	=	4,122	1,703 f			
phiMin	=	9,145	10,225 f	ʻt-#		
Actual 1-Way Shear	=	26.26	13.38	psi		
Allow 1-Way Shear	=	75.00	75.00	psi		
Toe Reinforcing	=	# 4 @ 10.00 ir	ì			
Heel Reinforcing	=	# 4 @ 10.00 ir	1			
Key Reinforcing	=	None Spec'd				
Footing Torsion, Tu		=	0.00	ft-lbs		
Footing Allow. Torsion, phi Tu = 0.00 ft-lbs						
If torsion exceeds allowable, provide						

supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

- Toe:
- Heel:

Key:

Min footing T&S reinf Area	1.17 i	n2
Min footing T&S reinf Area per foot	0.26 i	n2 <i>i</i> ft
If one layer of horizontal bars:	If two layers	s of horizontal bars:
#4@ 9.26 in	#4@ 18.	52 in
#5@ 14.35 in	#5@ 28.	70 in
#6@ 20.37 in	#6@ 40.	74 in

Project File: Foundations.ec6

Cantilevered Retaining Wall

Project File: Foundations.ec6

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LIC# : KW-06015393, Build:20.22.1.19 BYKONEN DESCRIPTION: SE @ ADU/Laundry W/ 9H (12/S3.1)

Summary of Overturning & Resisting Forces & Moments

			ERTURNING				ESISTING	
Item		Force lbs	Distance ft	ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water th	ol)	1,546.9	2.50	3,867.2	Soil Over HL (ab. water tbl)	1,549.2	3.58	5,551.2
HL Act Pres (be water the Hydrostatic Force	,	,		- ,	Soil Over HL (bel. water tbl) Watre Table		3.58	5,551.2
Buoyant Force	=				Sloped Soil Over Heel =			
Surcharge over Heel	=	126.9	3.75	476.0	Surcharge Over Heel =	73.3	3.58	262.8
Surcharge Over Toe	=				Adjacent Footing Load =			
Adjacent Footing Load	=				Axial Dead Load on Stem =	290.0	2.33	676.7
Added Lateral Load	=				* Axial Live Load on Stem =	435.0	2.33	1,015.0
Load @ Stem Above So	il =				Soil Over Toe =			
Seismic Earth Load	=	354.4	3.75	1,328.9	Surcharge Over Toe =			
	=			,	Stem Weight(s) =	1,008.7	2.33	2,353.6
					Earth @ Stem Transitions =			
Total	=	2,028.2	O.T.M. =	5,672.1	Footing Weight =	675.0	2.25	1,518.8
					Key Weight =			
Resisting/Overturnin	•			1.83	Vert. Component =			
Vertical Loads used f	for So	il Pressure	= 4,031.2	2 lbs	Total =	3,596.2	bs R.M.=	10,363.0
If seismic is included, th	ne OT	M and slidin	g ratios		* Axial live load NOT included in resistance, but is included for			roverturning

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If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

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)

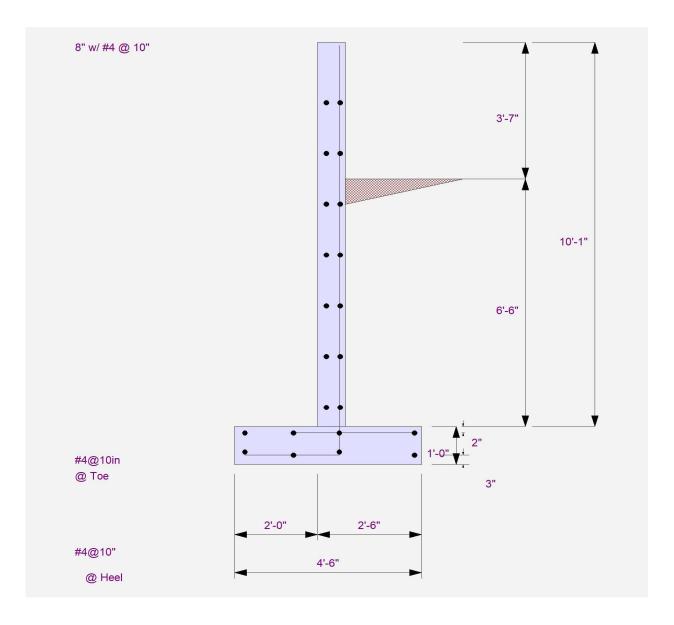
Soil Spring Reaction Modulus250.0pciHorizontal Defl @ Top of Wall (approximate only)0.118in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,

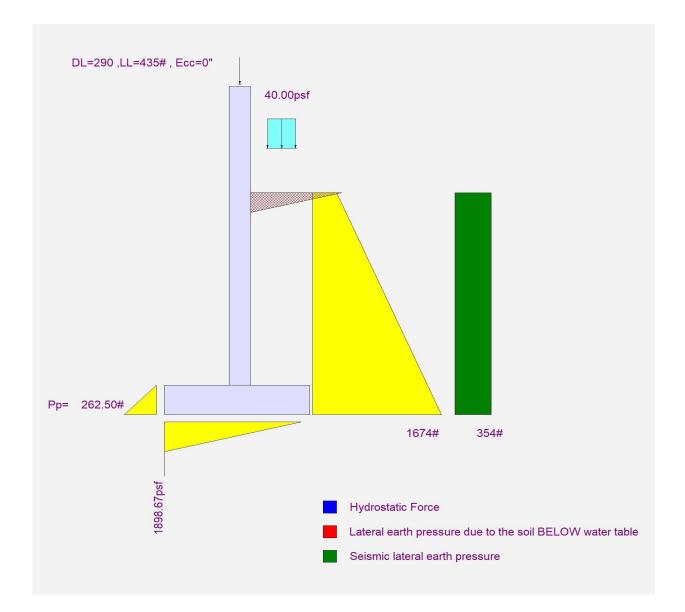
because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall Project File: Foundations.ec6 LIC# : KW-06015393, Build:20.22.1.19 BYKONEN CARTER QUINN (c) ENERCALC INC 1983-2021

DESCRIPTION: SE @ ADU/Laundry W/ 9H (12/S3.1)







Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19

DESCRIPTION: SE @ ADU/Laundry (12/S3.1)

=

BYKONEN CARTER QUINN

Project File: Foundations.ec6

(c) ENERCALC INC 1983-2021

Code Reference

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

Criteria

Retained Height

	Soil Data
7.17 ft	Allow Soil Be

Wall height above soil	=	3.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Surcharge Loads

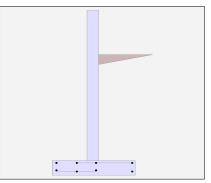
Surcharge Over Heel Used To Resist Slidir Surcharge Over Toe Used for Sliding & Ov	=	0.0			
Axial Load Applied to Stem					
Axial Dead Load Axial Live Load	=	290.0 lbs 435.0 lbs			

Axial Live Load	=	435.0 lbs
Axial Load Eccentricity	=	0.0 in

Allow Soil Bearing Equivalent Fluid Pressure	= Meth	4,000.0	psf
Active Heel Pressure	=	55.0	psf/ft
	=		
Passive Pressure	=	525.0	psf/ft
Soil Density, Heel	=	130.00	pcf
Soil Density, Toe	=	130.00	pcf
Footing Soil Friction	=	0.675	
Soil height to ignore			
for passive pressure	=	0.00	in

Lateral Load Applied to Stem

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



Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Corood Costing
Fooling Type		Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft

BYKONEN CARTER QUINN

Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19

DESCRIPTION: SE @ ADU/Laundry (12/S3.1)

Design Summary			Stem Construction		Bottom			
			Design Height Above Ftg	ft =	Stem OK 0.00			
Wall Stability Ratios			Wall Material Above "Ht"	=	Concrete			
Overturning	=	2.20 OK	Design Method	=	SD	SD	SD	
Sliding	=	1.52 OK	Thickness	=	8.00	_	-	
Global Stability	=	0.00	Rebar Size	=	# 4			
,			Rebar Spacing	=	10.00			
Total Bearing Load	=	4.479 lbs	Rebar Placed at	=	Edge			
resultant ecc.	=	7.85 in	Design Data					
			fb/FB + fa/Fa	=	0.945			
Soil Pressure @ Toe	=	1,722 psf OK	Total Force @ Section					
Soil Pressure @ Heel	=	163 psf OK	Service Level	lbs =	2,454.2			
Allowable	=	4,000 psf	Strength Level	lbs =	2,454.2			
Soil Pressure Less			MomentActual					
ACI Factored @ Toe	=	2,411 psf	Service Level	ft-# =	6,094.8			
ACI Factored @ Heel	=	229 psf	Strength Level	ft-# =	6,094.8			
Footing Shear @ Toe	=	24.5 psi OK	MomentAllowable	=	6,444.1			
Footing Shear @ Heel	=	12.0 psi OK	ShearActual		- 1			
Allowable	=	75.0 psi	Service Level	psi =	32.7			
			Strength Level	•				
Sliding Calcs			e e	psi =	32.7			
Lateral Sliding Force	=	1,972.5 lbs	ShearAllowable	psi =	75.0			
less 100% Passive Force	-	262.5 lbs	Anet (Masonry)	in2 =				
less 100% Friction Force	;≡ -	2,729.4 lbs	Rebar Depth 'd'	in =	6.25			
Added Force Req'd	=	0.0 lbs OK	Masonry Data					
for 1.5 Stability	=	0.0 lbs OK	f'm	psi =				
			Fs Calid Crowting	psi =				
Vertical component of active			Solid Grouting	=				
NOT considered in the calcu	Jialior	i or son bearing	Modular Ratio 'n'		100.0			
Load Factors			Wall Weight	psf =	100.0			
Building Code			Short Term Factor	=				
Dead Load		1.200	Equiv. Solid Thick.	=				
Live Load		1.600	Masonry Block Type	=				
Earth, H		1.600	Masonry Design Method	=	ASD			
Wind, W		1.600	Concrete Data	psi =	2,500.0			
Seismic, E		1.000	Fy	psi =				
		1.000	i y	h2i =	00,000.0			

Project File: Foundations.ec6

Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19

DESCRIPTION: SE @ ADU/Laundry (12/S3.1)

Concrete Stem Rebar Area Details

Bottom Stem As (based on applied moment) : (4/3) * As : 200bd/fy : 200(12)(6.25)/60000 : 0.0018bh : 0.0018(12)(8) :

Required Area : Provided Area : Maximum Area :

Footing Data

_		
Toe Width	=	2.00 ft
Heel Width	=	2.75
Total Footing Width	=	4.75
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from T	oe =	0.00 ft
f'c = 2,500 psi Footing Concrete De Min. As % Cover @ Top 2.0	=	60,000 psi 150.00 pcf 0.0000 3tm.= 3.00 in

BYKONEN CARTER QUINN

Project File: Foundations.ec6

(c) ENERCALC INC 1983-2021

Horizontal Reinforcing

 Min Stem T&S Reinf Area 1.952 in2

 Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft

 Horizontal Reinforcing Options :

 One layer of :
 Two layers of :

 #4@ 12.50 in
 #4@ 25.00 in

 #5@ 19.38 in
 #5@ 38.75 in

 #6@ 27.50 in
 #6@ 55.00 in

Footing Design Results

		<u>To</u>	e	H	leel		
Factored Pressure	=	2,	411		229	psf	
Mu' : Upward	=	4,	210	1,	189	ft-#	
Mu' : Downward	=		360	2,	956	ft-#	
Mu: Design	=	3,	850	1,	767	ft-#	
phiMin	=	9,	145	10	,225	ft-#	
Actual 1-Way Shear	=	24	1.50	1	1.96	psi	
Allow 1-Way Shear	=	75	5.00	7	5.00	psi	
Toe Reinforcing	=	#4@	10.00) in			
Heel Reinforcing	=	#4@	10.00) in			
Key Reinforcing	=	None	Spec'	d			
Footing Torsion, Tu			=		0.00) ft-lbs	
Footing Allow. Torsio	n, p	hi Tu	=		0.00) ft-lbs	
If torsion exceeds allowable, provide							

supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe:

Vertical Reinforcing

0.2283 in2/ft

0.3045 in2/ft

0.1728 in2/ft

0.25 in2/ft

0.25 in2/ft

0.24 in2/ft

0.8467 in2/ft

Heel:

Key:

Min footing T&S reinf Area	1.23	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft
If one layer of horizontal bars:	If two laye	ers of horizontal bars:
#4@ 9.26 in	#4@ 18	8.52 in
#5@ 14.35 in	#5@ 2	8.70 in
#6@ 20.37 in	#6@4	0.74 in

Cantilevered Retaining Wall LIC# : KW-06015393, Build:20.22.1.19

Project File: Foundations.ec6

(c) ENERCALC INC 1983-2021

DESCRIPTION: SE @ ADU/Laundry (12/S3.1)

Summary of Overturning & Resisting Forces & Moments

	0\	/ERTURNING			RE	SISTING	
Item	Force lbs	Distance ft	Moment ft-#		Force Ibs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl) HL Act Pres (be water tbl)	1,834.2	2.72	4,993.4	Soil Over HL (ab. water tbl) Soil Over HL (bel. water tbl)	1,941.1	3.71 3.71	7,198.1 7,198.1
Hydrostatic Force				Watre Table		-	,
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =	138.2	4.08	564.4	Surcharge Over Heel =	83.3	3.71	309.0
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =	290.0	2.33	676.7
Added Lateral Load =				* Axial Live Load on Stem =	435.0	2.33	1,015.0
Load @ Stem Above Soil =				Soil Over Toe =			
=				Surcharge Over Toe =			
				Stem Weight(s) =	1,016.7	2.33	2,372.3
_				Earth @ Stem Transitions =			
Total =	1,972.5	O.T.M. =	5,557.8	Footing Weight =	712.5	2.38	1,692.2
				Key Weight =			
Resisting/Overturning R	latio	=	2.20	Vert. Component =			
Vertical Loads used for S	Soil Pressure	= 4,478.0	6 lbs	Total =	4,043.6 I	bs R.M.=	12,248.3
				* Axial live load NOT included in	n total display	ed, or used fo	r overturnina

BYKONEN CARTER QUINN

Axial live load NOT included in total displayed, or used for overturn 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

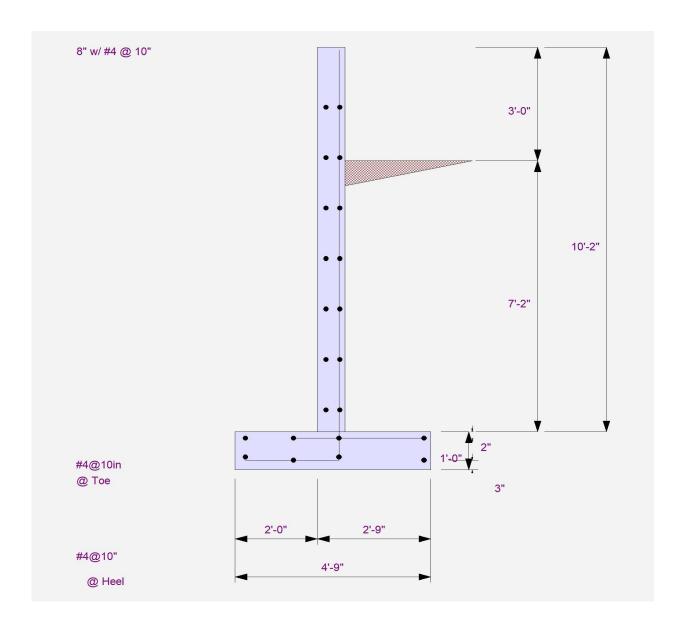
(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus250.0pciHorizontal Defl @ Top of Wall (approximate only)0.102in

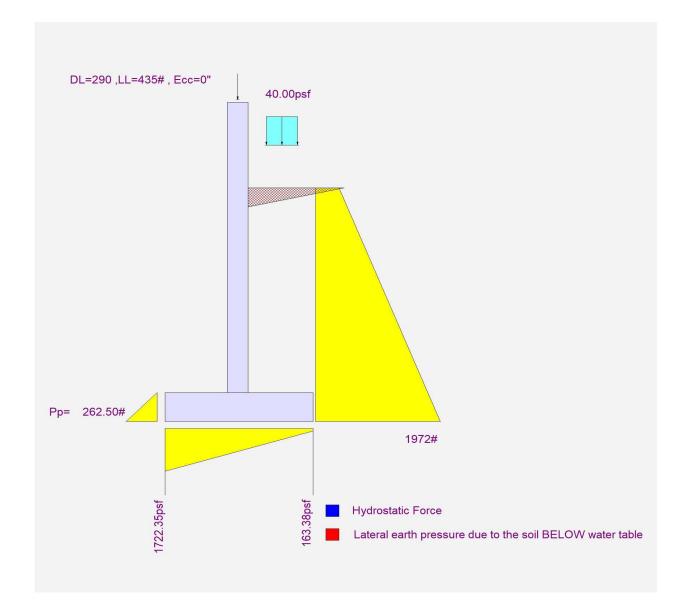
The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,

because the wall would then tend to rotate into the retained soil.









Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19 DESCRIPTION: SE @ ADU (4/S3.1) BYKONEN CARTER QUINN

Project File: Foundations.ec6

(c) ENERCALC INC 1983-2021

Code Reference:

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

Criteria

			_
Retained Height	=	6.00 ft	
Wall height above soil	=	0.50 ft	
Slope Behind Wall	=	0.00	

6.00 in

0.0 ft

Height of Soil over Toe =

Water height over heel =

Surcharge Loads				
Surcharge Over Heel = Used To Resist Sliding & Ov Surcharge Over Toe = Used for Sliding & Overturning	0.0			
Axial Load Applied to Stem				

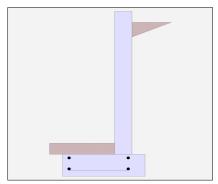
Axial Dead Load	=	290.0 lbs
Axial Live Load	=	435.0 lbs
Axial Load Eccentricity	=	0.0 in

Soil Data

Passive Pressure = 525.0 Soil Density, Heel = 130.00 Soil Density, Toe = 130.00 Footing Soil Friction = 0.675 Soil height to ignore	
==Passive Pressure=525.0Soil Density, Heel=130.00Soil Density, Toe=130.00Footing Soil Friction=0.675Soil height to ignore	psf
Soil Density, Heel=130.00Soil Density, Toe=130.00Footing Soil Friction=0.675Soil height to ignore	psf/ft
Soil Density, Heel=130.00Soil Density, Toe=130.00Footing Soil Friction=0.675Soil height to ignore	
Soil Density, Toe=130.00Footing Soil Friction=0.675Soil height to ignore	psf/ft
Footing Soil Friction = 0.675 Soil height to ignore	pcf
Soil height to ignore	pcf
for passive pressure = 12.00	in

Lateral Load Applied to Stem

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



Adjacent Footing Load

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

Cantilevered Retaining Wall LIC# : KW-06015393, Build:20.22.1.19

BYKONEN CARTER QUINN

Project File: Foundations.ec6

(c) ENERCALC INC 1983-2021

DESCRIPTION: SE @ ADU (4/S3.1)

Design Summary

Wall Stability Ratios Overturning	=	1.84 OK
Sliding	=	1.67 OK
Global Stability	=	0.00
Total Bearing Loadresultant ecc.	= =	2,370 lbs 4.11 in
Soil Pressure @ Toe Soil Pressure @ Heel	=	1,234 psf OK 263 psf OK
Allowable Soil Pressure Less	= Than	4,000 psf Allowable
ACI Factored @ Toe ACI Factored @ Heel	=	1,727 psf 368 psf
Footing Shear @ Toe	=	14.8 psi OK
Footing Shear @ Heel	=	2.7 psi OK
Allowable	=	75.0 psi
Sliding Calcs		
Lateral Sliding Force	=	980.0 lbs
less 100% Passive Force	-	328.1 lbs
less 100% Friction Force	≡ -	1,306.3 lbs
Added Force Req'd	=	0.0 lbs OK
for 1.5 Stability	=	0.0 lbs OK
ertical component of active	lators	21 anussara lias la

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

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

Stem Construction	_	Bottom			
Design Height Above Ftg	ft =	Stem OK 0.00			
Wall Material Above "Ht"	=	Concrete			
Design Method	=	SD	SD	SD	
Thickness	=	8.00			
Rebar Size	=	# 4			
Rebar Spacing	=	12.00			
Rebar Placed at	=	Edge			
Design Data		0.405			
fb/FB + fa/Fa	=	0.425			
Total Force @ Section					
Service Level	lbs =	1,152.0			
Strength Level	lbs =	1,152.0			
MomentActual	.				
Service Level	ft-# =	2,304.0			
Strength Level	ft-# =	2,304.0			
MomentAllowable	=	5,412.6			
ShearActual					
Service Level	psi =	15.4			
Strength Level	psi =	15.4			
ShearAllowable	psi =	75.0			
Anet (Masonry)	in2 =				
Rebar Depth 'd'	in =	6.25			
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		0 500 0			
f'c	psi =	2,500.0			
Fy	psi =	60,000.0			

Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19 DESCRIPTION: SE @ ADU (4/S3.1)

Concrete Stem Rebar Area Details

Bottom Stem As (based on applied moment) : (4/3) * As : 200bd/fy : 200(12)(6.25)/60000 : 0.0018bh : 0.0018(12)(8) :

Required Area : Provided Area : Maximum Area :

Footing Data

Toe Width	=	2.00 ft
Heel Width	=	1.17
Total Footing Width	=	3.17
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from T	oe =	0.00 ft
f'c = 2,500 psi Footing Concrete De Min. As % Cover @ Top 2.	=	60,000 psi 150.00 pcf 0.0000 3tm = 3.00 in
		5un.= 5.00 m

BYKONEN CARTER QUINN

Project File: Foundations.ec6

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Horizontal Reinforcing

 Min Stem T&S Reinf Area 1.248 in2

 Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft

 Horizontal Reinforcing Options :

 One layer of :
 Two layers of :

 #4@ 12.50 in
 #4@ 25.00 in

 #5@ 19.38 in
 #5@ 38.75 in

 #6@ 27.50 in
 #6@ 55.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	1,727	368 psf	
Mu' : Upward	=	2,882	55 ft-#	
Mu' : Downward	=	516	140 ft-#	
Mu: Design	=	2,366	85 ft-#	
phiMin	=	7,663	2,500 ft-#	
Actual 1-Way Shear	=	14.77	2.67 psi	
Allow 1-Way Shear	=	75.00	40.00 psi	
Toe Reinforcing	=	# 4 @ 12.00 in		
Heel Reinforcing	=	None Spec'd		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu		=	0.00 ft-lbs	
Footing Allow. Torsion	n, p	hiTu =	0.00 ft-lbs	
If torsion avoad	~ ~	llowable provi	da	

If torsion exceeds allowable, provide

supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: Heel:

Vertical Reinforcing

0.0863 in2/ft

0.1151 in2/ft

0.1728 in2/ft

0.1728 in2/ft

0.8467 in2/ft

0.2 in2/ft

0.25 in2/ft

Key:

Min footing T&S reinf Area Min footing T&S reinf Area per foot	0.82 0.26	in2 in2 <i>/</i> ft
If one layer of horizontal bars:	If two laye	ers of horizontal bars:
#4@ 9.26 in	#4@ 18	3.52 in
#5@ 14.35 in	#5@ 28	3.70 in
#6@ 20.37 in	#6@ 40).74 in

Cantilevered Retaining Wall LIC# : KW-06015393, Build:20.22.1.19

BYKONEN CARTER QUINN

Project File: Foundations.ec6

(c) ENERCALC INC 1983-2021

DESCRIPTION: SE @ ADU (4/S3.1)

Summary of Overturning & Resisting Forces & Moments

	0\	ERTURNING			RI	ESISTING	
Item	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl) HL Act Pres (be water tbl)	980.0	2.33	2,286.7	Soil Over HL (ab. water tbl) Soil Over HL (bel. water tbl)	390.3	2.92 2.92	1,138.3 1,138.3
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 =	290.0	2.33	676.7
Added Lateral Load =				* Axial Live Load on Stem =	435.0	2.33	1,015.0
Load @ Stem Above Soil =				Soil Over Toe =	130.0	1.00	130.0
=				Surcharge Over Toe =			
				Stem Weight(s) =	650.0	2.33	1,516.7
				Earth @ Stem Transitions =			
Total =	980.0	O.T.M. =	2,286.7	Footing Weight =	475.1	1.58	752.2
				Key Weight =			
Resisting/Overturning R		=	1.84	Vert. Component =			
Vertical Loads used for S	oil Pressure	= 2,370.3	3 lbs	Total =	1,935.3	lbs R.M.=	4,213.9
				* Axial live load NOT included in			r 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

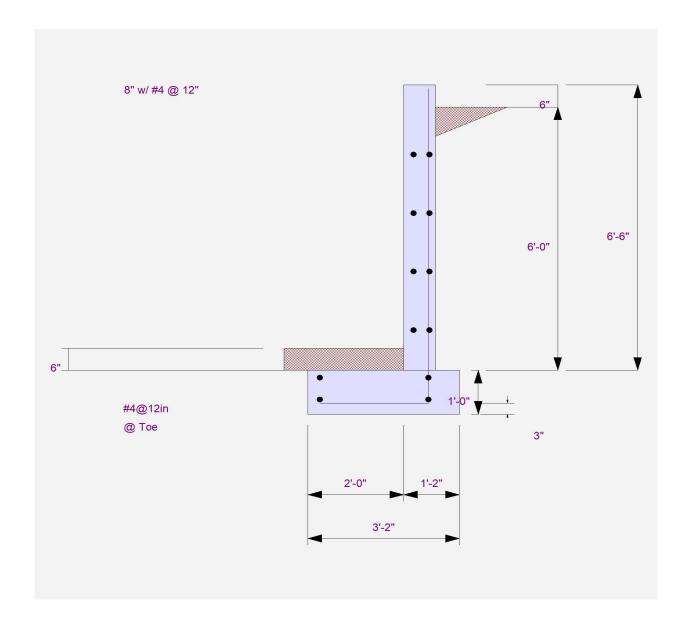
(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus250.0pciHorizontal Defl @ Top of Wall (approximate only)0.070in

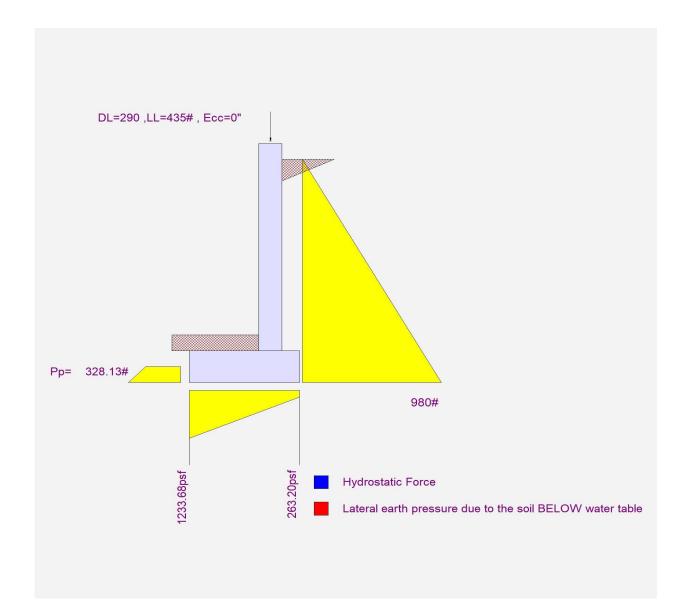
The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,

because the wall would then tend to rotate into the retained soil.









Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19

DESCRIPTION: SE @ ADU w/ 9H (4/S3.1)

BYKONEN CARTER QUINN

Project File: Foundations.ec6

(c) ENERCALC INC 1983-2021

Code Reference

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

Criteria

Retained Height	=	6.00 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

Surcharge Loads

V				
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=290.0 lbsAxial Live Load=435.0 lbsAxial Load Eccentricity=0.0 in				
Farth Pressure Seismic Load				

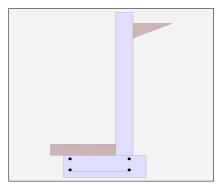
Earth Pressure Seismic Load

Method : Uniform Multiplier Used = 9.000 (Multiplier used on soil density) Soil Data

Allow Soil Bearing Equivalent Fluid Pressure	= Meth	4,000.0 psf
Active Heel Pressure	=	40.0 psf/ft
	=	
Passive Pressure	=	525.0 psf/ft
Soil Density, Heel	=	130.00 pcf
Soil Density, Toe	=	130.00 pcf
Footing Soil Friction	=	0.675
Soil height to ignore for passive pressure	=	12.00 in

Lateral Load Applied to Stem

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



Adjacent Footing Load

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

Uniform Seismic Force	=	63.000
Total Seismic Force	=	441.000

Cantilevered Retaining Wall LIC# : KW-06015393, Build:20.22.1.19

BYKONEN CARTER QUINN

Project File: Foundations.ec6

(c) ENERCALC INC 1983-2021

DESCRIPTION: SE @ ADU w/ 9H (4/S3.1)

Design Summary		S	tem Construction		Bottom			
			Design Height Above Ftg	ft =	Stem OK 0.00			
Wall Stability Ratios			Wall Material Above "Ht"	=	-			
Overturning	=	1.25 Ratio < 1.5	Design Method	=	SD	SD	SD	
Sliding	=	1.27 Ratio < 1.5	Thickness	=	8.00			
Global Stability	=	0.00	Rebar Size	=	# 4			
			Rebar Spacing	=	12.00			
Total Bearing Load	=	2,370 lbs	Rebar Placed at	=	Edge			
resultant ecc.	=	9.58 in	Design Data					
			fb/FB + fa/Fa	=	0.635			
Soil Pressure @ Toe	=	2,012 psf OK	Total Force @ Section					
Soil Pressure @ Heel	=	0 psf OK	Service Level	lbs =	1,530.0			
Allowable Soil Pressure Less	= Thom	4,000 psf	Strength Level	lbs =	1,530.0			
ACI Factored @ Toe	=	2,817 psf	MomentActual					
ACI Factored @ Heel	=	2,017 psi 0 psf	Service Level	ft-# =	3,438.0			
Footing Shear @ Toe		22.3 psi OK	Strength Level	ft-# =	3,438.0			
Footing Shear @ Heel	=	•	MomentAllowable	=	5,412.6			
Allowable	=	4.7 psi OK 75.0 psi	ShearActual					
Allowable	-	75.0 psi	Service Level	psi =	20.4			
Sliding Calcs			Strength Level	psi=	20.4			
Lateral Sliding Force	=	1,288.7 lbs	ShearAllowable	psi=	75.0			
less 100% Passive Force	_	328.1 lbs	Anet (Masonry)	in2 =				
less 100% Friction Force	-	1,306.3 lbs	Rebar Depth 'd'	in =	6.25			
Added Force Reg'd	_	0.0 lbs OK	Masonry Data		0.20			
for 1.5 Stability	_	298.6 lbs NG	f'm	psi =				
		200.0 100 110	Fs	, psi =				
/ertical component of active	e later	al soil pressure IS	Solid Grouting	. =				
NOT considered in the calcu			Modular Ratio 'n'	=				
			Wall Weight	psf=	100.0			
Load Factors			Short Term Factor	. =				
Building Code			Equiv. Solid Thick.	=				
Dead Load		1.200	Masonry Block Type	=				
Live Load		1.600	Masonry Design Method	=	ASD			
Earth, H		1.600	Concrete Data					
Wind, W		1.600	f'c	psi =	2,500.0			
Seismic, E		1.000	Fy	psi =	60,000.0			

Cantilevered Retaining Wall

LIC# : KW-06015393, Build:20.22.1.19 DESCRIPTION: SE @ ADU w/ 9H (4/S3.1)

Concrete Stem Rebar Area Details

Bottom Stem As (based on applied moment) : (4/3) * As : 200bd/fy : 200(12)(6.25)/60000 : 0.0018bh : 0.0018(12)(8) :

Required Area : Provided Area : Maximum Area :

Footing Data

= 2.00 ft
= <u>1.17</u>
= 3.17
= 12.00 in
= 0.00 in
= 0.00 in
e = 0.00 ft
Fy = 60,000 psi
sity = 150.00 pcf
= 0.0000
0 @ Btm.= 3.00 in

BYKONEN CARTER QUINN

Project File: Foundations.ec6

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Horizontal Reinforcing

 Min Stem T&S Reinf Area 1.248 in2

 Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft

 Horizontal Reinforcing Options :

 One layer of :
 Two layers of :

 #4@ 12.50 in
 #4@ 25.00 in

 #5@ 19.38 in
 #5@ 38.75 in

 #6@ 27.50 in
 #6@ 55.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>		
Factored Pressure	=	2,817	0 psf		
Mu' : Upward	=	4,039	0 ft-#		
Mu' : Downward	=	516	140 ft-#		
Mu: Design	=	3,523	140 ft-#		
phiMin	=	7,663	2,500 ft-#		
Actual 1-Way Shear	=	22.30	4.65 psi		
Allow 1-Way Shear	=	75.00	40.00 psi		
Toe Reinforcing	=	# 4 @ 12.00 in			
Heel Reinforcing	=	None Spec'd			
Key Reinforcing	=	None Spec'd			
Footing Torsion, Tu		=	0.00 ft-lbs		
Footing Allow. Torsion	n, p	hiTu =	0.00 ft-lbs		
If torsion exceeds allowable, provide					

If torsion exceeds allowable, provide

supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: Heel:

Vertical Reinforcing

0.1288 in2/ft

0.1717 in2/ft

0.1728 in2/ft

0.1728 in2/ft

0.8467 in2/ft

0.2 in2/ft

0.25 in2/ft

Key:

Min footing T&S reinf Area	0.82	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft
If one layer of horizontal bars:	If two lay	ers of horizontal bars:
#4@ 9.26 in	#4@1	8.52 in
#5@ 14.35 in	#5@2	8.70 in
#6@ 20.37 in	#6@4	0.74 in

Project Title: Engineer: Project ID: Project Descr:

Cantilevered Retaining Wall LIC# : KW-06015393, Build:20.22.1.19

BYKONEN CARTER QUINN

Project File: Foundations.ec6

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DESCRIPTION: SE @ ADU w/ 9H (4/S3.1)

Summary of Overturning & Resisting Forces & Moments

		OV	ERTURNING			RI	ESISTING	
Item		Force Ibs	Distance ft	ft-#		Force Ibs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl))	980.0	2.33	2,286.7	Soil Over HL (ab. water tbl)	390.3	2.92	1,138.3
HL Act Pres (be water tbl) Hydrostatic Force	,			,	Soil Over HL (bel. water tbl) Watre Table		2.92	1,138.3
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 =	290.0	2.33	676.7
Added Lateral Load	=				* Axial Live Load on Stem =	435.0	2.33	1,015.0
Load @ Stem Above Soil	=				Soil Over Toe =	130.0	1.00	130.0
Seismic Earth Load	=	308.7	3.50	1,080.5	Surcharge Over Toe =			
	=			,	Stem Weight(s) =	650.0	2.33	1,516.7
-		4 000 7			Earth @ Stem Transitions =			
Total	=	1,288.7	O.T.M. =	3,367.1	Footing Weight =	475.1	1.58	752.2
					Key Weight =			
Resisting/Overturning			=	1.25	Vert. Component =			
Vertical Loads used fo	or Soil F	ressure	= 2,370.	3 lbs	Total =	1,935.3	bs R.M.=	4,213.9
If seismic is included, the		and slidin	a ratios		* Axial live load NOT included in resistance, but is included for			r overturning

If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

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

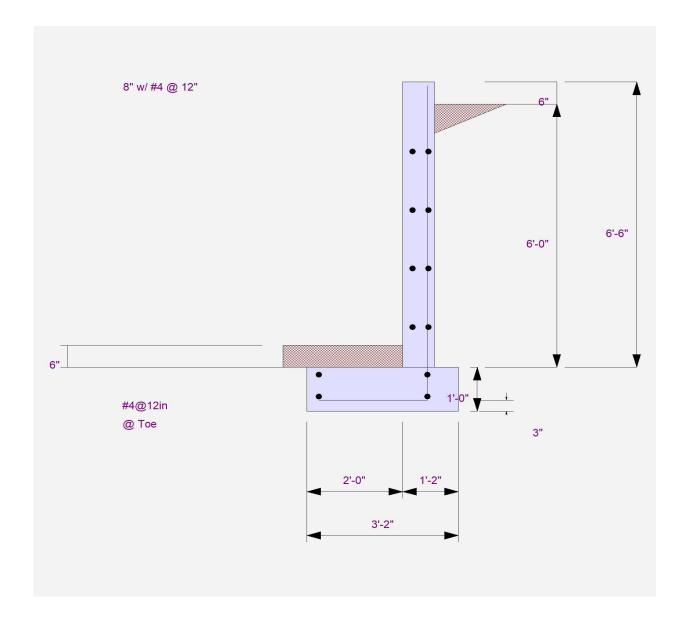
(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus250.0pciHorizontal Defl @ Top of Wall (approximate only)0.115in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,

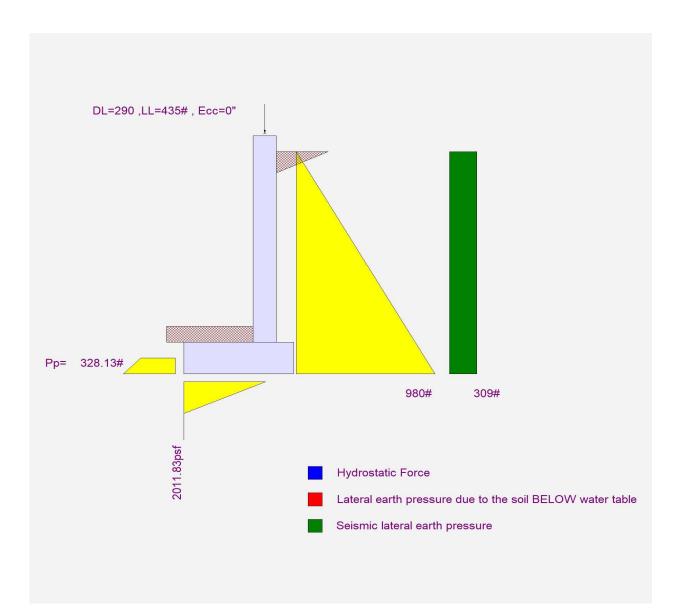
Project Title: Engineer: Project ID: Project Descr:





Project Title: Engineer: Project ID: Project Descr:





etainPro (c) 1987-2019, Build 11.20.03.31 icense : KW-06056595 icense To : BYKONEN CARTER QUINN			Cantilevered Retain	ing V	Code: IBC 2018,ACI 318-14,TMS 402				
Criteria	ARTE	r quinn		Soil Data					
Retained Height	=	7.00 ft		Allow Soil Bearing = 4	4,000.0) psf			
	=	0.50 ft		Equivalent Fluid Pressure Metho					
	=	0.00		Active Heel Pressure =	40.0) psf/ft			
	=	6.00 in		=					
	=	0.0 ft		Passive Pressure =	300.0) psf/ft			
		0.0 11			130.00	•			
				Soil Density, Toe =) pcf			
				Footing Soil Friction =	0.400)	P000000000		
				Soil height to ignore for passive pressure =	12.00	in			•
Surcharge Loads				Lateral Load Applied to	Stem		Adjacent Footing	Load	
Surcharge Over Heel		0.0 pcf					Adjacent Footing Load	·	0.0 lbs
Used To Resist Sliding	= & Ove	0.0 psf erturning		Lateral Load = Height to Top =	0.0 # 0.00 ft		Footing Width	=	0.00 lbs 0.00 ft
Surcharge Over Toe	=	0.0		Height to Bottom =	0.00 ft		Eccentricity	=	0.00 in
Used for Sliding & Over	turnin	g		Load Type = Win			Wall to Ftg CL Dist	=	0.00 ft
Axial Load Applied	l to S	Stem	l		rvice L	evel)	Footing Type		Line Load
Axial Dead Load	=	0.0 lbs		Wind on Exposed Stem _	0.0 p	,	Base Above/Below Sc at Back of Wall	il =	0.0 ft
Axial Live Load	=	0.0 lbs		(Service Level)	0.0 P		Poisson's Ratio	=	0.300
Axial Load Eccentricity	=	0.0 in						_	0.000
Design Summary				Stem Construction		Bottom			
				Design Height Above Ftg	ft =	Stem OK 0.00			
Wall Stability Ratios				Wall Material Above "Ht"	=	Concrete			
Overturning	=	3.09 OK		Design Method	=	LRFD			
Sliding	=	1.60 OK		Thickness	=	10.00			
Total Bearing Load	=	4,039 lbs		Rebar Size Rebar Spacing	=	# 5 12.00			
resultant ecc.	=	5.85 in		Rebar Placed at	=	Edge			
		4 404		Design Data		Lago			
Soil Pressure @ Toe Soil Pressure @ Heel	=	1,481 psf 314 psf		ID/FD + Id/Fd	=	0.335	i		
Allowable	=	4,000 psf	011	Total Force @ Section					
Soil Pressure Less	s Thar			Service Level	lbs =	4 500 0			
ACI Factored @ Toe	=	2,074 psf		Strength Level MomentActual	lbs =	1,568.0			
ACI Factored @ Heel	=	439 psf	.	Service Level	ft-# =				
Footing Shear @ Toe	=	5.0 psi		Strongth Loval	ft-# =	3,658.7	,		
Footing Shear @ Heel Allowable	=	8.1 psi 75.0 psi	υĸ	MomentAllowable		10,911.3			
Sliding Calcs	-	70.0 psi		ShearActual		,			
Lateral Sliding Force	=	1,280.0 lbs		Service Level	psi =				
less 100% Passive Ford		187.5 lbs		Strength Level	psi =	16.0			
less 100% Friction Force	e = -	1,860.8 lbs		ShearAllowable	psi =	75.0			
Added Force Req'd	=	0.0 lbs		···(····))	in2 =				
for 1.5 Stability	=	0.0 lbs	OK		in =	8.19			
				Masonry Data f'm	psi=				
				Fs	psi = psi =				
ertical component of activ	e late	ral soil pressur	e IS		=				
DT considered in the calc				Modular Ratio 'n'	=				
				Wall Weight	psf =	125.0			
oad Factors Building Code	IP	3C 2018,ACI		Short Term Factor	=				
Dead Load	ID	1.200		Equiv. Solid Thick.	=	Modium	Veight		
Live Load		1.600		Masonry Block Type Masonry Design Method		Medium V ASD	veigin		
Earth, H		1.600		Concrete Data		700			
Wind, W		1.000		f'c	psi =	2,500.0			
Seismic, E		1.000		Fy	nei –	60,000.0			

etainPro (c) 1987-2019, Build 11.20.03.31 cense : KW-06056595 cense To : BYKONEN CARTER QUIN	Cantilevered	d Retaining Wall	Code: IBC 2018,ACI 318-14,TMS 402-1
Concrete Stem Rebar Area De			
Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1033 in2/ft	5	
4/3) * As :	0.1378 in2/ft	Min Stem T&S Reinf Area	a 1.800 in2
200bd/fy : 200(12)(8.1875)/60000 :	0.3275 in2/ft	Min Stem T&S Reinf Area	a per ft of stem Height : 0.240 in2/ft
).0018bh : 0.0018(12)(10) :	0.216 in2/ft	Horizontal Reinforcing Op	ptions :
		One layer of : Two la	ayers of :
Required Area :	0.216 in2/ft	#4@ 10.00 in #4@	20.00 in
Provided Area :	0.31 in2/ft	#5@ 15.50 in #5@	31.00 in
Maximum Area :	1.1092 in2/ft	#6@ 22.00 in #6@	44.00 in
Footing Data	Footing D	esign Results	
Toe Width = 1.	00 ft	Toe Hee	<u>el</u>
Heel Width = <u>3</u> .	50 Factored Pressu		39 psf
8	50 Mu': Upward	, , ,	10 ft-#
Footing Thickness = 12.0	00 in Mu' : Downward Mu: Design		23 ft-# 12 ft-#
- ,	00 in Actual 1-Way SI		15 psi
- 3 - 1	JU IN Allow 1-Way Sh		D0 psi
Key Distance from Toe = 0.0	00 ft Toe Reinforcing	= #5 @ 11.48 in	
	00 psi Heel Reinforcing		
Footing Concrete Density = $150.$ Min. As % = 0.00	00 pcf Key Reinforcing 18 Footing Torsion,	•	.00 ft-lbs
Cover @ Top 2.00 @ Btm.=	U		.00 ft-lbs
·	-	ceeds allowable, provide	
		al design for footing torsion	n.
	••	ole Sizes & Spacings	
	•		.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46
		25 in, #5@ 14.35 in, #6@ 20.	37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46
		S reinf Area per foot 0.2	26 in2 /ft
	#4@ 9.26 i #5@ 14.35	n #40	layers of horizontal bars: @ 18.52 in @ 28.70 in
	#6@ 20.37		@ 40.74 in

Summary of Overtur	ning & R	esisting Fo	orces & Mon	nents			
Item	Force Ibs	ERTURNING Distance ft	Moment ft-#		RE Force Ibs	ESISTING Distance ft	Moment ft-#
HL Act Pres (ab water tbl) HL Act Pres (be water tbl) Hydrostatic Force	1,280.0	2.67	3,413.3	Soil Over HL (ab. water tbl) Soil Over HL (bel. water tbl) Watre Table	2,426.7	3.17 3.17	7,684.4 7,684.4
Buoyant Force=Burcharge over Heel=Surcharge Over Toe=Adjacent Footing Load=				Sloped Soil Over Heel = Surcharge Over Heel = Adjacent Footing Load = Axial Dead Load on Stem =			
Added Lateral Load = Load @ Stem Above Soil =				* Axial Live Load on Stem = Soil Over Toe =		0.50	
=				Surcharge Over Toe = Stem Weight(s) = Earth @ Stem Transitions=	937.5	1.42	1,328.1
Total =	1,280.0	O.T.M. =	3,413.3	Footing Weight = Key Weight =	675.0	2.25	1,518.8
Resisting/Overturning Ra Vertical Loads used for So		= = 4,039.2	3.09 2 lbs	Vert. Component = Total = * Axial live load NOT included in resistance, but is included for	n total display		10,531.3 r overturning

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0 pci

Horizontal Defl @ Top of Wall (approximate only) 0.069 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,

etainPro (c) 1987-2019, Build icense : KW-06056595 icense To : BYKONEN C/		Cantilevered	Retaining V	Vall	Code: IBC 2018,ACI 318-14	,TMS 402-
Criteria		Soil Data				
Wall height above soil Slope Behind Wall	= 7.00 ft = 0.50 ft = 0.00	Allow Soil Bearing Equivalent Fluid Press Active Heel Pressure) psf) psf/ft		
	= 6.00 in = 0.0 ft	Passive Pressure Soil Density, Heel Soil Density, Toe Footing Soil Friction Soil height to ignore for passive pressure	$\begin{array}{rcrr} = & 300.0 \\ = & 130.00 \\ = & 0.00 \\ = & 0.400 \end{array}$) pcf)		
Surcharge Loads		Lateral Load Ap	plied to Stem	1	Adjacent Footing Load	
Used To Resist Sliding Surcharge Over Toe Used for Sliding & Over Axial Load Applied	= 0.0 turning	Lateral Load Height to Top Height to Bottom Load Type Wind on Exposed Ste	= 0.0 # = 0.00 ff = 0.00 ff = Wind (W) (Service L em _ 0.0 p	evel)	Eccentricity = Wall to Ftg CL Dist = Footing Type Lin Base Above/Below Soil _	0.0 lbs 0.00 ft 0.00 in 0.00 ft e Load 0.0 ft
	= 0.0 lbs	(Service Level)	an _ 0.0 p		at Back of Wall – Poisson's Ratio = 0	.300
(Multiplier used on soil de Design Summary		Stem Construct		Bottom Stem OK		
Wall Stability Ratios Overturning	= 2.10 OK	eismic Design Height A Wall Material A Design Method	Above "Ht" =	-		
Sliding	= 1.22 Ratio	1.5! Thickness Rebar Size		10.00		
Total Bearing Loadresultant ecc.	= 4,039 lbs = 10.64 in	Rebar Spacing Rebar Placed a Design Data	g =	12.00		
Soil Pressure @ Toe Soil Pressure @ Heel Allowable	= 1,976 psf 0 = 0 psf 0 = 5,320 psf	DK fb/FB + fa/Fa DK Total Force @		0.496		
Soil Pressure Less ACI Factored @ Toe ACI Factored @ Heel	s Than Allowable = 2,766 psf = 0 psf	Service Lev Strength Le MomentAct Service Lev	vel lbs =	2,072.0		
Footing Shear @ Toe Footing Shear @ Heel Allowable	= 6.8 psi C = 14.7 psi C = 75.0 psi	JK Strength Le	vel ft-# = owable =			
Sliding Calcs Lateral Sliding Force less 100% Passive Forc less 100% Friction Force		Service Lev Strength Le	vel psi = evel psi =	21.1		
Added Force Req'd for 1.5 Stability	= 0.0 lbs 0 = 476.5 lbs N	, , , , , , , , , , , , , , , , , , , ,	') in2 =	75.0 8.19		
ertical component of active DT considered in the calc		f'm Fs IS Solid Grouting	psi = psi = = 'n' = psf =	125.0		
Load Factors Building Code Dead Load	IBC 2018,ACI 1.200	Short Term Fa Equiv. Solid Th Masonry Block	ctor = nick. =	Medium V	/sight	

Masonry Block Type

Concrete Data

f'c

Fy

Masonry Design Method

= Medium Weight

2,500.0

= ASD

psi = 60,000.0

psi =

Building Code	IBC 2018,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

etainPro (c) 1987-2019, Build 11.20.03.31 cense : KW-06056595 cense To : BYKONEN CARTER QUIN	Cantilevere	ed Retaining Wall	Code: IBC 2018,ACI 318-14,TMS 402-1
Concrete Stem Rebar Area De			
Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1531 in2/ft	rionzontar Konnoroling	
4/3) * As :	0.2042 in2/ft	Min Stem T&S Reinf Are	a 1.800 in2
200bd/fy : 200(12)(8.1875)/60000 :	0.3275 in2/ft	Min Stem T&S Reinf Are	a per ft of stem Height : 0.240 in2/ft
).0018bh : 0.0018(12)(10) :	0.216 in2/ft	Horizontal Reinforcing O	ptions :
		One layer of : Two la	ayers of :
Required Area :	0.216 in2/ft	#4@ 10.00 in #4@	20.00 in
Provided Area :	0.31 in2/ft	#5@ 15.50 in #5@	31.00 in
/laximum Area :	1.1092 in2/ft	#6@ 22.00 in #6@	44.00 in
Footing Data	Footing [Design Results	
Toe Width = 1.	00 ft	<u>Toe</u> <u>He</u>	<u>el</u>
	50 Factored Press	,	0 psf
6	50 Mu' : Upward		94 ft-#
Footing Thickness = 12.0	00 in Mu' : Downwar Mu: Design		23 ft-# 29 ft-#
- ,	DO in Actual 1-Way 9		66 psi
, ,	JUIN Allow 1-Way S		00 psi
Key Distance from Toe = 0.0	00 ft Toe Reinforcing		
	00 psi Heel Reinforcir		
Footing Concrete Density = 150.0 Min. As % = 0.00°	00 pcf Key Reinforcing 18 Footing Torsion		0.00 ft-lbs
Cover @ Top 2.00 @ Btm.=	- 0	.,	0.00 ft-lbs
	r coung / mom	xceeds allowable, provide	
		tal design for footing torsio	n .
		able Sizes & Spacings	
			.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46
		0.25 in, #5@ 14.35 in, #6@ 20	.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46
	Min footing T	&S reinf Area per foot 0.2	17 in2 26 in2 /ft b layers of horizontal bars:
	#4@ 9.26		@ 18.52 in
	#5@ 14.35	-	@ 28.70 in
	#6@ 20.37	(in #6	@ 40.74 in

Summary of Overtu	rning & R	esisting Fo	orces & Mon	nents			
Item	OV Force Ibs	ERTURNING Distance ft	Moment ft-#		RI Force Ibs	ESISTING Distance ft	Moment ft-#
HL Act Pres (ab water tbl) HL Act Pres (be water tbl) Hydrostatic Force	1,280.0	2.67	3,413.3	Soil Over HL (ab. water tbl) Soil Over HL (bel. water tbl) Watre Table	2,426.7	3.17 3.17	7,684.4 7,684.4
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 =			
dded Lateral Load =				* Axial Live Load on Stem =			
.oad @ Stem Above Soil =				Soil Over Toe =		0.50	
Seismic Earth Load =	403.2	4.00	1,612.8	Surcharge Over Toe =			
=			·	Stem Weight(s) =	937.5	1.42	1,328.1
Tatal	4 000 0		E 000 4	Earth @ Stem Transitions =			
Total =	1,683.2	O.T.M. =	5,026.1	Footing Weight =	675.0	2.25	1,518.8
				Key Weight =			
Resisting/Overturning Ra		=	2.10	Vert. Component =			
Vertical Loads used for S	oil Pressure	= 4,039.2	2 lbs	Total =	4,039.2	lbs R.M.=	10,531.3

If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0 pci
------------------------------	-----------

Horizontal Defl @ Top of Wall (approximate only) 0.091 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,

etainPro (c) 1987-2019, Build 11.20.03.31 icense : KW-06056595 icense To : BYKONEN CARTER QUINN			Cantilevered Retaini	ing V	Code: IBC 2018,ACI 318-14,TMS 402				
Criteria	ARTER	QUINN		Soil Data					
Retained Height	=	6.00 ft		Allow Soil Bearing = 4	4,000.0) psf			
	=	0.50 ft		Equivalent Fluid Pressure Metho		•			
	=	0.00		Active Heel Pressure =	40.0) psf/ft			
	=	6.00 in		=					
	=	0.00 ft		Passive Pressure =	300.0) psf/ft			
valer neight over neer	-	0.0 11		Soil Density, Heel =	130.00) pcf			
				Soil Density, Toe =	0.00) pcf			
				Footing Soil Friction =	0.400)			
				Soil height to ignore for passive pressure =	12.00	in			•
Surcharge Loads				Lateral Load Applied to	Stem		Adjacent Footing	Load	
	=	0.0 psf			0.0 #		Adjacent Footing Load		0.0 lbs
Used To Resist Sliding a					0.00 #		Footing Width	=	0.00 ft
	=	0.0			0.00 ft		Eccentricity	=	0.00 in
Used for Sliding & Overt	0]		Load Type = Win	d (W)		Wall to Ftg CL Dist	=	0.00 ft
Axial Load Applied	to St	tem			rvice L	evel)	Footing Type Base Above/Below Soi		Line Load
Axial Dead Load	=	0.0 lbs		Wind on Exposed Stem _	0.0 p	sf	at Back of Wall	=	0.0 ft
Axial Live Load Axial Load Eccentricity	=	0.0 lbs 0.0 in		(Service Level)			Poisson's Ratio	=	0.300
Design Summary				Stem Construction		Bottom			
,, j				Design Height Above Etc		Stem OK			
Wall Stability Ratios				Design Height Above Ftg Wall Material Above "Ht"		0.00 Concrete			
Overturning	=	2.83 OH	(Design Method	=	LRFD			
Sliding	=	1.62 Ok	(Thickness	=	8.00			
				Rebar Size	=	# 4			
Total Bearing Load resultant ecc.	=	3,033 lbs 5.98 in		Rebar Spacing	=	12.00			
resultant coo.	-	0.00 11		Rebar Placed at Design Data	=	Edge			
Soil Pressure @ Toe	=	1,454 psf		fb/FB + fa/Fa	=	0.425	;		
Soil Pressure @ Heel	=	164 psf	OK	Total Force @ Section					
Allowable Soil Pressure Less	= Than	4,000 psf		Service Level	lbs =				
ACI Factored @ Toe	=	2,035 psf		Strength Level	lbs =	1,152.0			
ACI Factored @ Heel	=	229 psf		MomentActual	.				
Footing Shear @ Toe	=	0.7 psi		Strongth Loval	ft-# =	2.304.0			
Footing Shear @ Heel	=	6.7 psi	OK	Strength Level	ft-# =	,			
Allowable	=	75.0 psi		MomentAllowable ShearActual	=	5,412.6			
Bliding Calcs		000 0 1		SnearActual Service Level	psi =				
Lateral Sliding Force less 100% Passive Force	=	980.0 lbs 187.5 lbs		Strength Level	psi =	15.4			
less 100% Friction Force		1,400.7 lbs		ShearAllowable	psi =	75.0			
Added Force Reg'd	=	0.0 lbs	οк		in2 =	10.0			
for 1.5 Stability	=	0.0 lbs		· (····))	in =	6.25			
				Masonry Data					
				f'm	psi=				
rtical component of active	later			Fs Solid Grouting	psi = _				
rtical component of active DT considered in the calcu		•		Modular Ratio 'n'	=				
			9	Wall Weight	psf=	100.0			
oad Factors				Short Term Factor	=				
Building Code	IBC	C 2018,ACI		Equiv. Solid Thick.	=				
Dead Load		1.200		Masonry Block Type		Medium V	Veight		
Live Load Earth, H		1.600 1.600		Masonry Design Method	=	ASD			
Wind, W		1.000		f'c	psi =	2,500.0			
Seismic, E		1.000		Fy	•	2,500.0			

RetainPro (c) 1987-2019, Build 11.20.03.31 License : KW-06056595 License To : BYKONEN CARTER QUINN		Cantilevered Re	etain	ing Wa	dl c	Code: IBC 2018,ACI 318-14,TMS 402-
Concrete Stem Rebar Area	L_					
ottom Stem	Vertical R	al Reinforcing Horizontal Reinford			rcina	
s (based on applied moment) :	0.0863 in	0			·····g	
4/3) * As :	0.1151 in	2/ft N	/lin Ste	m T&S Re	einf Area 1.2	248 in2
00bd/fy : 200(12)(6.25)/60000 :	0.25 in2/f	t N	/in Ste	m T&S Re	einf Area pei	r ft of stem Height : 0.192 in2/ft
.0018bh : 0.0018(12)(8) :	0.1728 in	2/ft H	lorizon	tal Reinfo	rcing Option	s :
	======	===== (One lay	er of :	Two layers	s of :
equired Area :	0.1728 in	2/ft #	4@ 12	.50 in	#4@ 25.0	00 in
rovided Area :	0.2 in2/ft	#	#5@ 19.38 in #		#5@ 38.7	'5 in
laximum Area :	0.8467 in	2/ft #	6@ 27	.50 in	#6@ 55.0	00 in
Footing Data		Footing Desig	jn Re	sults		
Toe Width =	0.75 ft			Toe	Heel	
Heel Width =	3.00	Factored Pressure	=	2,035	229 ps	sf
Total Footing Width =	3.75	Mu': Upward	=	6,463	1,643 ft-	
Footing Thickness =	12.00 in	Mu' : Downward Mu: Design	=	871 466	3,038 ft- 1,395 ft-	
Key Width =	0.00 in		=	0.71	6.65 ps	
Key Depth =	0.00 in	Allow 1-Way Shear	=	75.00	75.00 ps	
Key Distance from Toe =	0.00 ft	Toe Reinforcing		5@12.00) in	
"c = 2,500 psi Fy =	60,000 psi	Heel Reinforcing		5 @ 12.00		
Footing Concrete Density = Min. As % =	150.00 pcf 0.0018	Key Reinforcing Footing Torsion, Tu	= INC	ne Spec'o =	a 0.00 f	it lbc
	m.= 3.00 in	Footing Allow. Torsio	n nhi 1		0.00 f	
		If torsion exceed				
		supplemental de				
		Other Acceptable S	•	-	•	
					-	n, #7@ 27.77 in, #8@ 36.57 in, #9@ 46
			#5@ [·]			n, #7@ 27.77 in, #8@ 36.57 in, #9@ 46
		Min footing T&S re Min footing T&S re If one layer of horiz #4@ 9.26 in #5@ 14.35 in	inf Area	a per foot		

ItemIbsftft-#IbsftHL Act Pres (ab water tbl)980.02.332,286.7Soil Over HL (ab. water tbl)1,820.02.58HL Act Pres (be water tbl)980.02.332,286.7Soil Over HL (bel. water tbl)1,820.02.58HL Act Pres (be water tbl)980.02.332,286.7Soil Over HL (bel. water tbl)1,820.02.58HL Act Pres (be water tbl)980.02.332,286.7Soil Over HL (bel. water tbl)2.58Buoyant Force=Sloped Soil Over Heel=Surcharge over Heel=Surcharge Over Heel=Surcharge Over Toe=Adjacent Footing Load=Added Lateral Load=* Axial Live Load on Stem=Load @ Stem Above Soil=Soil Over Toe=0.38==Surcharge Over Toe==Surcharge Over Toe=0.38==Surcharge Over Toe==Surcharge Over Toe==Surcharge Over Toe==Surcharge Over Toe==Surcharge Over Toe==Surc			_			orces & Morr	esisting F	ning & Re	Summary of Overturn
HL Act Pres (be water tbl) Soil Over HL (bel. water tbl) 2.58 HL Act Pres (be water tbl) Water Table Water Table Buoyant Force Sloped Soil Over Heel = Surcharge over Heel Surcharge Over Heel = Surcharge Over Toe Adjacent Footing Load = Added Lateral Load * Axial Dead Load on Stem = Load @ Stem Above Soil Soil Over Toe = Soil Over Toe Soil Over Toe = Soil Over Toe Soil Over Toe = Load @ Stem Above Soil Soil Over Toe = Soil Over Toe = 0.38 Surcharge Over Toe = Stem Weight(s) =	ft-#	Distance		Force		Moment	Distance	Force	em
Buoyant Force = Sloped Soil Over Heel = Surcharge over Heel = Surcharge Over Heel = Adjacent Footing Load = Adjacent Footing Load = Axial Dead Load on Stem = Added Lateral Load = * Axial Live Load on Stem = Soil Over Toe = 0.38 Surcharge Over Toe = Stem Weight(s) = 650.0 1.08	4,701.7 4,701.7			1,820.0	Over HL (bel. water tbl)	2,286.7	2.33	980.0	Act Pres (be water tbl)
Adjacent Footing Load = Axial Dead Load on Stem = Added Lateral Load = * Axial Live Load on Stem = Load @ Stem Above Soil = Soil Over Toe = 0.38 = Surcharge Over Toe = 0.38 Stem Weight(s) = 650.0 1.08					charge Over Heel =				uoyant Force = urcharge over Heel =
= Surcharge Over Toe = Stem Weight(s) = 650.0 1.08									djacent Footing Load =
5 ()		0.38							
	704.2	1.08		650.0	m Weight(s) = = = = = = = = = = = = = = = = = = =				
Total = 980.0 O.T.M. = 2,286.7 Footing Weight = 562.5 1.88 Key Weight =	1,054.7	1.88		562.5	ting Weight =	2,286.7	O.T.M. =	980.0	Total =
Resisting/Overturning Ratio = 2.83 Vert. Component =					0	2.83	=	o	Resisting/Overturning Rat

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci

Horizontal Defl @ Top of Wall (approximate only) 0.070 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,

etainPro (c) 1987-2019, Build icense : KW-06056595 icense To : BYKONEN CA			C	antilevered Retain	ing V	Vall	Code: IBC 2018,ACI 318-14,TMS 402
Criteria			Soil	Data			
Wall height above soil : Slope Behind Wall : Height of Soil over Toe :	= 0. = 0. = 6.	00 ft 50 ft 00 00 in 0.0 ft	Equiv Active Passi Soil D Soil D Footir Soil h	alent Fluid Pressure Metho Heel Pressure = = ve Pressure =	40.0 300.0 130.00) psf/ft) psf/ft) pcf) pcf	
Surcharge Loads			·	eral Load Applied to			Adjacent Footing Load
Surcharge Over Heel Used To Resist Sliding & Surcharge Over Toe Used for Sliding & Overt Axial Load Applied Axial Dead Load	& Overtu = (urning to Ste = (= (0.0	Later Hei Hei Load Wind	al Load = ght to Top = ght to Bottom = Type = Win	0.0 # 0.00 ft 0.00 ft	evel)	Adjacent Footing Load=0.0 lbsFooting Width=0.00 ftEccentricity=0.00 inWall to Ftg CL Dist=0.00 ftFooting TypeLine LoadBase Above/Below Soil=0.0 ftat Back of Wall=0.0 ftPoisson's Ratio=0.300
Earth Pressure Se	ismic L	oad					
Multiplier Used (Multiplier used on soil de Design Summary	= 9.0 ensity)	00		Seismic Force = 44 ²	1.000	Bottom	
Wall Stability Ratios Overturning Sliding	= =	>1.2 for seis 1.92 OK 1.23 Ratio <		Design Height Above Ftg Wall Material Above "Ht" Design Method Thickness		Concrete LRFD 8.00	
Total Bearing Loadresultant ecc.	= =	3,033 lbs 10.26 in		Rebar Size Rebar Spacing Rebar Placed at Design Data	=	12.00	1
Soil Pressure @ Toe Soil Pressure @ Heel Allowable	= = =	1,982 psf Oł 0 psf Oł 5,320 psf		fb/FB + fa/Fa Total Force @ Section Service Level	= lbs =	0.635	5
Soil Pressure Less ACI Factored @ Toe ACI Factored @ Heel Footing Shear @ Toe	= =	2,775 psf 0 psf		Strength Level MomentActual Service Level	lbs = ft-# =	1,530.0	
Footing Shear @ Heel Allowable	= = =	1.0 psi Oł 12.1 psi Oł 75.0 psi		Strength Level MomentAllowable ShearActual	ft-# = =	3,438.0 5,412.6	
Sliding Calcs Lateral Sliding Force less 100% Passive Force less 100% Friction Force	e = -	,288.7 lbs 187.5 lbs ,400.7 lbs		Service Level Strength Level ShearAllowable	psi = psi = psi =		
Added Force Req'd for 1.5 Stability	= =	0.0 lbs Of 344.9 lbs NO		Anet (Masonry) Rebar Depth 'd' Masonry Data	in2 = in =		
ertical component of active OT considered in the calcu			S	f'm Fs Solid Grouting Modular Ratio 'n' Wall Weight	psi = psi = = psf =	100.0	
Load Factors Building Code Dead Load	IBC 2	2018,ACI 1.200		Short Term Factor Equiv. Solid Thick. Masonry Block Type	=	Medium V	Noight

Masonry Block Type

Concrete Data

f'c

Fy

Masonry Design Method

= Medium Weight

2,500.0

= ASD

psi = 60,000.0

psi =

Building Code	IBC 2018,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

etainPro (c) 1987-2019, Build 11.20.03. cense : KW-06056595 cense To : BYKONEN CARTER Q	°' Ca UINN	antilevered Re	etaini	ing Wa	II	Code: IBC 2018,ACI 318-14,TMS 402-		
Concrete Stem Rebar Area								
Bottom Stem	Vertical Rein	iforcina H	Iorizont	tal Reinfo	rcina			
As (based on applied moment) :	0.1288 in2/ft	0	10112011		lonig			
4/3) * As :	0.1717 in2/ft		Min Stem T&S Reinf Area 1.248 in2					
200bd/fy : 200(12)(6.25)/60000 :	0.25 in2/ft	Ν	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 lay		Two laye			
Required Area :	0.1728 in2/ft	#	4@ 12	.50 in	#4@ 25	.00 in		
Provided Area :	0.2 in2/ft	#	¢5@ 19	.38 in	#5@ 38	.75 in		
/laximum Area :	0.8467 in2/ft	#	¢6@ 27	.50 in	#6@55	.00 in		
Footing Data		Footing Desig	jn Re	sults				
Toe Width =	0.75 ft			Toe	Heel			
Heel Width =		actored Pressure	=	2,775		psf		
Total Footing Width =		lu' : Upward	=	8,599	671			
Footing Thickness =	12.00 11	lu' : Downward	=	871	3,038			
Key Width =	0 00 in	lu: Design	=	644	2,367 1 12.10			
Key Depth =		ctual 1-Way Shear llow 1-Way Shear	=	1.01 75.00	75.00			
Key Distance from Toe =		oe Reinforcing		5 @ 12.00				
f'c = 2,500 psi Fy = 6	0,000 psi H	eel Reinforcing		5 @ 12.00				
o ,		ey Reinforcing	= No	ne Spec'o				
		poting Torsion, Tu		=		ft-lbs		
Cover @ Top 2.00 @ Btm	.= 3.00 in Fo	ooting Allow. Torsio				ft-lbs		
		If torsion exceed		•••				
		supplemental de	esign fo	or footing	torsion.			
	Ot	ther Acceptable S	Sizes &	Spacing	js			
						in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46		
		Key: No key defin		ι π	-0@ 20.07	III, #7 @ 27.77 III, #0@ 30.37 III, #3@ 40		
		Min footing T&S re			0.97	in2		
		Min footing T&S re				in2 /ft		
		If one layer of horiz	contal b	ars:		yers of horizontal bars:		
		#4@ 9.26 in #5@ 14.35 in			-	18.52 in 28.70 in		
		#6@ 20.37 in				40.74 in		

Summary of Over	rturr	ning & R	esisting Fo	orces & Mon	nents			
Item		OV Force Ibs	ERTURNING Distance ft	Moment ft-#		Force Ibs	SISTING Distance ft	Moment ft-#
HL Act Pres (ab water tbl HL Act Pres (be water tbl Hydrostatic Force Buoyant Force Surcharge over Heel Surcharge Over Toe Adjacent Footing Load Added Lateral Load) = = = =	980.0	2.33	2,286.7	Soil Over HL (ab. water tbl) Soil Over HL (bel. water tbl) Watre Table Sloped Soil Over Heel = Surcharge Over Heel = Adjacent Footing Load = Axial Dead Load on Stem = * Axial Live Load on Stem = Soil Over Toe =	1,820.0	2.58 2.58 0.38	4,701.7 4,701.7
Load @ Stem Above Soil Seismic Earth Load	= = =	308.7	3.50	1,080.5	Surcharge Over Toe = Stem Weight(s) = Earth @ Stem Transitions=	650.0	1.08	704.2
Total Resisting/Overturning	= I Rati	1,288.7	O.T.M. =	3,367.1 1.92	Footing Weight = Key Weight = Vert. Component =	562.5	1.88	1,054.7

If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
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Horizontal Defl @ Top of Wall (approximate only) 0.095 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,

tainPro (c) 1987-2019, Build ense : KW-06056595 cense To : BYKONEN CA				Cantilevered Retaini	ing V	Vall	Code: I	BC 2018,A	CI 318	8-14,TMS 402
Criteria	ARTER	QUINN		Soil Data						
Wall height above soil	=	5.00 ft 0.50 ft 0.00		Allow Soil Bearing = 4 Equivalent Fluid Pressure Metho Active Heel Pressure =) psf) psf/ft				
		6.00 in		=						
Nater height over heel	=	0.0 ft		Passive Pressure = Soil Density, Heel =	300.0 130.00) psf/ft) pcf				
				Soil Density, Toe =) pcf				
				Footing Soil Friction =	0.400)				
				Soil height to ignore for passive pressure =	12.00	in		•	•	
Surcharge Loads				Lateral Load Applied to			Adiacent	Footing I	• oad	
	=	0.0 psf					Adjacent Fo		=	0.0 lbs
Used To Resist Sliding &				Lateral Load = Height to Top =	0.0 #/ 0.00 ft		Footing Wid		=	0.00 ft
	=	0.0			0.00 ft		Eccentricity		=	0.00 in
Used for Sliding & Overt	0		_	Load Type = Win	d (W)		Wall to Ftg Footing Typ		=	0.00 ft Line Load
Axial Load Applied	to St	em		(Ser	vice Le	evel)	0 71	e/Below Soil		
	=	0.0 lbs		Wind on Exposed Stem _	0.0 p	sf	at Back c		=	0.0 ft
Axial Live Load	=	0.0 lbs 0.0 in		(Service Level)			Poisson's R	atio	=	0.300
Design Summary				Stem Construction		Bottom				
				Design Height Above Ftg	ft =	Stem OK 0.00				
Wall Stability Ratios Overturning	=		,	Wall Material Above "Ht"	=	Concrete				
Sliding	_	2.51 Oł 1.60 Oł		Design Method Thickness	=	LRFD 8.00				
Chang				Rebar Size	=	8.00 # 4				
Total Bearing Load	=	2,106 lbs		Rebar Spacing	=	12.00				
resultant ecc.	=	6.08 in		Rebar Placed at	=	Edge				
Soil Pressure @ Toe	=	1,477 psf		10/FD + 1a/Fa	=	0.246				
Soil Pressure @ Heel	=	0 psf		Total Force @ Section						
Allowable Soil Pressure Less	= Than	4,000 psf Allowable		Service Level	lbs =					
ACI Factored @ Toe	=	2,067 psf		Strength Level	lbs =	800.0				
ACI Factored @ Heel	=	0 psf		MomentActual Service Level	ft-# =					
Footing Shear @ Toe	=	0.4 psi		Strongth Loval	ft-# =	1,333.3				
Footing Shear @ Heel	=	6.3 psi	OK	MomentAllowable	=	5,412.6				
Allowable Sliding Calcs	=	75.0 psi		ShearActual	-	2,				
Lateral Sliding Force	=	680.6 lbs		Service Level	psi =					
less 100% Passive Force	e = -	116.7 lbs		Strength Level	psi =	10.7				
less 100% Friction Force	e = -	972.8 lbs	.	ShearAllowable	psi =	75.0				
Added Force Req'd	=	0.0 lbs 0.0 lbs			in2 =	0.05				
for 1.5 Stability	=	0.0 105	Un	Rebar Depth 'd' Masonry Data	in =	6.25				
				f'm	psi =					
				Fs	psi =					
rtical component of active		•		-	=					
DT considered in the calcu	liation	or soil bearin	ıg	Modular Ratio 'n' Wall Weight	= psf =	100.0				
oad Factors				Short Term Factor	psi = =	100.0				
Building Code	IBC	2018,ACI		Equiv. Solid Thick.	=					
Dead Load		1.200		Masonry Block Type		Medium V	/eight			
Live Load		1.600 1.600		Masonry Design Method	=	ASD				
Earth, H Wind, W		1.000		f'c	psi =	2,500.0				
Seismic, E		1.000		Fy	•	2,500.0				

tainPro (c) 1987-2019, Build 11.20.03 ense : KW-06056595 cense To : BYKONEN CARTER (Cantilevered F	etain	ing Wa	Code: IBC 2018,ACI 318-14,TMS 402			
Concrete Stem Rebar Area								
ottom Stem	Vertical	Reinforcing	Horizor	tal Reinfo	preing			
s (based on applied moment) :	0.05 in2/	0						
1/3) * As :	0.0666 ir	n2/ft	Min Stem T&S Reinf Area 1.056 in2					
00bd/fy : 200(12)(6.25)/60000 :	0.25 in2/	ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft					
.0018bh : 0.0018(12)(8) :	0.1728 ir	Horizontal Reinforcing Options :						
	======				Two layers of :			
equired Area :	0.1728 ir	n2/ft	#4@ 12	.50 in	#4@ 25.00 in			
rovided Area :	0.2 in2/ft		#5@ 19	.38 in	#5@ 38.75 in			
laximum Area :	0.8467 ir	n2/ft	#6@ 27	'.50 in	#6@ 55.00 in			
Footing Data		Footing Desi	gn Re	sults				
Toe Width =	0.42 ft			Toe	Heel			
Heel Width =	2.50	Factored Pressure	=	2,067	0 psf			
Total Footing Width =	2.92	Mu' : Upward	=	2,042	670 ft-#			
Footing Thickness =	10.00 in	Mu' : Downward	=	237	1,563 ft-#			
Key Width =	0.00 in	Mu: Design Actual 1-Way Shea	=	150 0.41	893 ft-# 6.33 psi			
Key Depth =	0.00 in	Allow 1-Way Shear		75.00	75.00 psi			
Key Distance from Toe =	0.00 ft	Toe Reinforcing		4@11.11	•			
	60,000 psi	Heel Reinforcing		4 @ 11.11				
o ,	150.00 pcf	Key Reinforcing		one Spec'				
	0.0018	Footing Torsion, Tu		_ =	0.00 ft-lbs			
Cover @ Top 2.00 @ Btn	n.= 3.00 in	Footing Allow. Torsi			0.00 ft-lbs			
		If torsion excee		••				
		supplemental c	•					
		Other Acceptable	Sizes &	Spacing	gs			
		Heel: #4@ 11.11	in, #5@		, #6@ 24.44 in, #7@ 33.33 in, #8@ 43.88 in, #9@ 5 , #6@ 24.44 in, #7@ 33.33 in, #8@ 43.88 in, #9@ 5			
		Key: No key def						
		Min footing T&S r Min footing T&S r If one layer of hor	einf Are	a per foot	0.63 in2 0.22 in2 /ft If two layers of horizontal bars:			
		#4@ 11.11 in	Zonan	,uið.	#4@ 22.22 in			
		#5@ 17.22 in #6@ 24.44 in			#5@ 34.44 in #6@ 48.89 in			

Summary of Overtur	ning & R	esisting Fo	orces & Mon	nents			
Item	Force Ibs	ERTURNING Distance ft	Moment ft-#		RE Force Ibs	SISTING Distance ft	Moment ft-#
HL Act Pres (ab water tbl) HL Act Pres (be water tbl) Hydrostatic Force	680.6	1.94	1,323.3	Soil Over HL (ab. water tbl) Soil Over HL (bel. water tbl) Watre Table	1,191.7	2.00 2.00	2,382.5 2,382.5
Buoyant Force = Surcharge over Heel = Surcharge Over Toe =				Sloped Soil Over Heel = Surcharge Over Heel = Adjacent Footing Load = Axial Dead Load on Stem =			
djacent Footing Load =				* Axial Live Load on Stem = Soil Over Toe =		0.01	
oad @ Stem Above Soil = =				Surcharge Over Toe =		0.21	
				Stem Weight(s) = Earth @ Stem Transitions =	550.0	0.75	412.1
Total =	680.6	O.T.M. =	1,323.3	Footing Weight = Key Weight =	364.5	1.46	531.4
Resisting/Overturning Rat	io	=	2.51	Vert. Component =			

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.077	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.

etainPro (c) 1987-2019, Buil icense : KW-06056595 icense To : BYKONEN C	ARTE	R QUINN	0	Cantilevered Reta	aining	gV	Vall	Code: IBC 2018,ACI 318-14,TMS 402			
Criteria			Soi	il Data							
Retained Height Wall height above soil Slope Behind Wall	= = =	5.00 ft 0.50 ft 0.00	Equi	valent Fluid Pressure M) psf) psf/ft				
Height of Soil over Toe Water height over heel		6.00 in 0.0 ft	Soil Soil Foot Soil	sive Pressure = Density, Heel = Density, Toe = ing Soil Friction = height_to ignore	= 130 = (= 0.	0.00					
Surcharge Loads			La	teral Load Applied	to St	em		Adjacent Footing Load			
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Ove Axial Load Applied	= rturning	0.0 g	He He	71	0.0			Adjacent Footing Load=0.0 lbsFooting Width=0.00 ftEccentricity=0.00 inWall to Ftg CL Dist=0.00 ftFooting TypeLine Load			
Axial Dead Load Axial Live Load Axial Load Eccentricity	=	0.0 lbs 0.0 lbs 0.0 in	Wir (Se	nd on Exposed Stem ₌ ervice Level)	`	.0 p	,	Base Above/Below Soil at Back of Wall=0.0 ftPoisson's Ratio=0.300			
Earth Pressure Se			l								
Method : Uniform Multiplier Used (Multiplier used on soil c		9.000)	-	orm Seismic Force = al Seismic Force =	52.50 306.25						
Design Summary			St	tem Construction			Bottom Stem O				
Wall Stability Ratios Overturning Sliding	= =	>1.2 for s 1.71 OK 1.22 Ratio		Design Height Above Wall Material Above Design Method Thickness Rebar Size	-	ft = = = =	0.0 Concret LRF 8.0 #	ete FD 00			
Total Bearing Load resultant ecc.	= =	2,106 lbs 9.65 in		Rebar Spacing Rebar Placed at		=	12.0 Edg	00			
Soil Pressure @ Toe Soil Pressure @ Heel Allowable	= =	2,147 psf (0 psf (5,320 psf		Design Data fb/FB + fa/Fa Total Force @ Sect Service Level		=	0.30	367			
Soil Pressure Les ACI Factored @ Toe ACI Factored @ Heel	= =	3,005 psf 0 psf		Strength Level MomentActual Service Level	lb	s = # =	1,062.	2.5			
Footing Shear @ Toe Footing Shear @ Heel Allowable	= = =	0.4 psi (12.4 psi (75.0 psi		Strength Level MomentAllowable ShearActual		= # =	1,989 5,412.				
Sliding Calcs Lateral Sliding Force less 100% Passive Ford less 100% Friction Ford		894.9 lbs 116.7 lbs 972.8 lbs		Strength Level ShearAllowable	ps	si = si = si =	14. 75.				
Added Force Req'd for 1.5 Stability	=	0.0 lbs (252.9 lbs 1		Anet (Masonry) Rebar Depth 'd' Masonry Data f'm	i p:	2 = n = si =	6.2	25			
ertical component of activ OT considered in the cal				Fs Solid Grouting Modular Ratio 'n' Wall Weight		si = = = sf =	100.	0.0			
Load Factors Building Code Dead Load	IB	C 2018,ACI 1.200		Short Term Factor Equiv. Solid Thick. Masonry Block Type		= = =	Medium				
Live Load Earth H		1.600 1.600		Masonry Design Met	thod	=	ASD				

Concrete Data

f'c

Fy

psi = 60,000.0

psi =

2,500.0

Building Code	IDC 2010,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

etainPro (c) 1987-2019, Build 11.20.0 cense : KW-06056595 cense To : BYKONEN CARTER	QUINN	Cantilevered F	etain	ing Wa	Code: IBC 2018,ACI 318-14,TMS 402
Concrete Stem Rebar Are					
Bottom Stem	Vertical	Reinforcing	Horizor	ntal Reinfo	preing
As (based on applied moment) :	0.0745 i	0			
4/3) * As :	0.0994 i	n2/ft	Min Ste	m T&S R	einf Area 1.056 in2
200bd/fy : 200(12)(6.25)/60000 :	0.25 in2/	/ft	Min Ste	em T&S R	einf Area per ft of stem Height : 0.192 in2/ft
0.0018bh : 0.0018(12)(8) :	0.1728 i	n2/ft	Horizor	ntal Reinfo	prcing Options :
	======	=====	One la	/er of :	Two layers of :
Required Area :	0.1728 i	n2/ft	#4@ 1	2.50 in	#4@ 25.00 in
Provided Area :	0.2 in2/f	t	#5@ 1	9.38 in	#5@ 38.75 in
Maximum Area :	0.8467 i	n2/ft	#6@ 2	7.50 in	#6@ 55.00 in
Footing Data		Footing Desi	gn Re	sults	
Toe Width =	0.42 ft			Toe	Heel
Heel Width =	2.50	Factored Pressure	=	3,005	0 psf
Total Footing Width =	2.92	Mu' : Upward	=	2,900	174 ft-#
Footing Thickness =	10.00 in	Mu' : Downward Mu: Design	=	237 222	1,563 ft-# 1,389 ft-#
Key Width =	0.00 in	Actual 1-Way Shea		0.41	12.36 psi
Key Depth =	0.00 in	Allow 1-Way Shear		75.00	75.00 psi
Key Distance from Toe =	0.00 ft	Toe Reinforcing		4 @ 11.11	
f'c = 2,500 psi Fy =	60,000 psi	Heel Reinforcing		4 @ 11.11	
Footing Concrete Density = Min. As % =	150.00 pcf 0.0018	Key Reinforcing Footing Torsion, Tu	= IN	one Spec' =	a 0.00 ft-lbs
	tm.= 3.00 in	Footing Allow. Torsi	on nhi		0.00 ft-lbs
		If torsion excee			
		supplemental d			
		••	•		
		Other Acceptable			ys , #6@ 24.44 in, #7@ 33.33 in, #8@ 43.88 in, #9@ 5
			in, #5@		, #6@ 24.44 in, #7@ 33.33 in, #8@ 43.88 in, #9@ 5 , #6@ 24.44 in, #7@ 33.33 in, #8@ 43.88 in, #9@ 5
		Min footing T&S r Min footing T&S r If one layer of hor #4@ 11.11 in #5@ 17.22 in #6@ 24.44 in	einf Are	a per foot	0.63 in2 0.22 in2 /ft If two layers of horizontal bars: #4@ 22.22 in #5@ 34.44 in #6@ 48.89 in

Summary of Overt	urning	& R	esisting Fo	rces & Mon	nents			
Item	Fore	се	ERTURNING. Distance ft	Moment ft-#		R Force Ibs	ESISTING Distance ft	Moment ft-#
HL Act Pres (ab water tbl) HL Act Pres (be water tbl) Hydrostatic Force	6	80.6	1.94	1,323.3	Soil Over HL (ab. water tbl) Soil Over HL (bel. water tbl) Watre Table	1,191.7	2.00 2.00	2,382.5 2,382.5
	=				Sloped Soil Over Heel =			
Surcharge over Heel	=				Surcharge Over Heel =			
Surcharge Over Toe	=				Adjacent Footing Load =			
djacent Footing Load	=				Axial Dead Load on Stem =			
dded Lateral Load	=				* Axial Live Load on Stem =			
oad @ Stem Above Soil	=				Soil Over Toe =		0.21	
eismic Earth Load	= 2	14.4	2.92	625.3	Surcharge Over Toe =			
	=				Stem Weight(s) =	550.0	0.75	412.1
-					Earth @ Stem Transitions =			
Total	= 8	94.9	O.T.M. =	1,948.6	Footing Weight =	364.5	1.46	531.4
					Key Weight =			
Resisting/Overturning				1.71	Vert. Component =			
Vertical Loads used for	Soil Pres	sure	= 2,106.2	lbs	Total =	2 106 2	lbs R.M.=	3.326.1

If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0 pci
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Horizontal Defl @ Top of Wall (approximate only) 0.112 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,

RetainPro (c) 1987-2019, Build 11.20.03.31 License : KW-06056595 License To : BYKONEN CARTER QUINN			Cantilevered Retaini	ing V	Vall	Code: IBC 2018,ACI 318-14,TMS 402			
Criteria	RIER	QUINN		Soil Data					
Retained Height = Wall height above soil = Slope Behind Wall =	:	4.00 ft 0.50 ft 0.00		Allow Soil Bearing = 4 Equivalent Fluid Pressure Methor Active Heel Pressure =) psf) psf/ft			
Height of Soil over Toe = Water height over heel =		6.00 in 0.0 ft		Soil Density, Toe = Footing Soil Friction = Soil height to ignore	130.00) pcf)		•	
Surcharge Loads			I	Lateral Load Applied to	Stem		Adjacent Footing	Load	
Surcharge Over Heel = Used To Resist Sliding & Surcharge Over Toe = Used for Sliding & Overtu	over	0.0 psf turning 0.0		5 1	0.0 #, 0.00 ft 0.00 ft		Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist	= = =	0.0 lbs 0.00 ft 0.00 in 0.00 ft
Axial Load Applied	to St	em			vice Le	evel)	Footing Type Base Above/Below Soil		Line Load
Axial Dead Load = Axial Live Load = Axial Load Eccentricity =		0.0 lbs 0.0 lbs 0.0 in		Wind on Exposed Stem ₌ (Service Level)	0.0 p	sf	at Back of Wall Poisson's Ratio	=	0.0 ft 0.300
Design Summary				Stem Construction] -	Bottom			
				Design Height Above Ftg		Stem OK 0.00			
Wall Stability Ratios Overturning Sliding	= =	2.54 OK 1.68 OK		Wall Material Above "Ht" Design Method Thickness	= = =	Concrete LRFD 8.00			
Total Bearing Loadresultant ecc.	=	1,445 lbs 4.85 in		Rebar Size Rebar Spacing Rebar Placed at	=	# 4 12.00 Edge			
Soil Pressure @ Toe Soil Pressure @ Heel	=	1,198 psf 0 psf		10/FD + 14/FA	=	0.126	6		
Allowable Soil Pressure Less	=	4,000 psf	on	Total Force @ Section Service Level	lbs =				
ACI Factored @ Toe ACI Factored @ Heel	=	1,678 psf 0 psf		Strength Level MomentActual	lbs =	512.0			
Footing Shear @ Toe Footing Shear @ Heel	=	0.4 psi 4.6 psi		Service Level Strength Level	ft-# = ft-# =	682.7			
Allowable	=	75.0 psi	UK	MomentAllowable ShearActual	=	5,412.6			
Lateral Sliding Force less 100% Passive Force	= = -	467.2 lbs 116.7 lbs		Service Level Strength Level	psi = psi =	6.8			
less 100% Friction Force Added Force Req'd	= - =	667.6 lbs 0.0 lbs	ОК	ShearAllowable Anet (Masonry)	psi = in2 =	75.0			
for 1.5 Stability	=	0.0 lbs	OK		in =	6.25			
				f'm Fs	psi = psi =				
rtical component of active DT considered in the calcu				Solid Grouting Modular Ratio 'n' Wall Weight	' = = psf =	100.0			
oad Factors Building Code Dead Load Live Load	IBC	2018,ACI 1.200 1.600		Short Term Factor Equiv. Solid Thick. Masonry Block Type Masonry Design Method	= = =	Medium \ ASD			
Earth, H Wind, W Seismic, E		1.600 1.000 1.000		Concrete Data f'c Fy	psi =	2,500.0 60,000.0			

tainPro (c) 1987-2019, Build 11.20.03 ense : KW-06056595 cense To : BYKONEN CARTER 0	QUINN	Cantilevered I	Retain	ing Wa	Code: IBC 2018,ACI 318-14,TMS 40
Concrete Stem Rebar Area	L				
ottom Stem	Vertical	Reinforcing	Horizor	tal Reinfo	prcina
s (based on applied moment) :	0.0256 ir	0			
I/3) * As :	0.0341 ir	n2/ft	Min Ste	m T&S R	einf Area 0.864 in2
00bd/fy : 200(12)(6.25)/60000 :	0.25 in2/	ft	Min Ste	m T&S R	einf Area per ft of stem Height : 0.192 in2/ft
.0018bh : 0.0018(12)(8) :	0.1728 ir	n2/ft			orcing Options :
	======		One lay	er of :	Two layers of :
equired Area :	0.1728 ir	n2/ft	#4@ 12	.50 in	#4@ 25.00 in
rovided Area :	0.2 in2/ft	:	#5@ 19	.38 in	#5@ 38.75 in
laximum Area :	0.8467 ir	n2/ft	#6@ 27	'.50 in	#6@ 55.00 in
Footing Data		Footing Des	ign Re	sults	
Toe Width =	0.42 ft			Toe	Heel
Heel Width =	2.00	Factored Pressure	=	1,678	0 psf
Total Footing Width =	2.42	Mu': Upward	=	1,642	272 ft-#
Footing Thickness =	10.00 in	Mu' : Downward Mu: Design	=	237 117	688 ft-# 416 ft-#
Key Width =	0.00 in	Actual 1-Way Shea		0.41	4.64 psi
Key Depth =	0.00 in	Allow 1-Way Shear		75.00	75.00 psi
Key Distance from Toe =	0.00 ft	Toe Reinforcing		4 @ 11.1 <i>°</i>	
	50,000 psi	Heel Reinforcing		4@11.1	
	150.00 pcf 0.0018	Key Reinforcing Footing Torsion, Τι		one Spec' =	0.00 ft-lbs
	n.= 3.00 in	Footing Allow. Tors			0.00 ft-lbs
		0			
		If torsion exce supplemental		••	
		Other Acceptable	•		-
					, #6@ 24.44 in, #7@ 33.33 in, #8@ 43.88 in, #9@ 5
			in, #5@		, #6@ 24.44 in, #7@ 33.33 in, #8@ 43.88 in, #9@ 5
		Min footing T&S Min footing T&S If one layer of ho	reinf Are	a per foot	0.52 in2 0.22 in2 <i>i</i> ft If two layers of horizontal bars:
		#4@ 11.11 in #5@ 17.22 in #6@ 24.44 in			#4@ 22.22 in #5@ 34.44 in #6@ 48.89 in

Summary of Over	turnin	g & R	esisting Fo	orces & Mon	nents			
Item		OV rce bs	ERTURNING Distance ft	Moment ft-#		R Force Ibs	ESISTING Distance ft	Moment ft-#
HL Act Pres (ab water tbl) HL Act Pres (be water tbl) Hydrostatic Force		467.2	1.61	752.7	Soil Over HL (ab. water tbl) Soil Over HL (bel. water tbl) Watre Table	693.3	1.75 1.75	1,212.9 1,212.9
Buoyant Force	=				Sloped Soil Over Heel =			
Surcharge over Heel	=				Surcharge Over Heel =			
Surcharge Over Toe	=				Adjacent Footing Load =			
djacent Footing Load	=				Axial Dead Load on Stem =			
dded Lateral Load	=				* Axial Live Load on Stem =			
oad @ Stem Above Soil	=				Soil Over Toe =		0.21	
	=				Surcharge Over Toe =			
					Stem Weight(s) =	450.0	0.75	337.2
-		407.0		750 7	Earth @ Stem Transitions =			
Total	=	467.2	O.T.M. =	752.7	Footing Weight =	302.0	1.21	364.8
					Key Weight =			
Resisting/Overturning			=	2.54	Vert. Component =			
Vertical Loads used for	r Soil Pre	essure :	= 1,445.3	3 lbs	Total =	1 445 3	lbs R.M.=	1.914.9

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.062	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,

etainPro (c) 1987-2019, Build cense : KW-06056595 cense To : BYKONEN CA				Cantilevered Retain	ning V	Vall	Code: IBC 2018,ACI 318-14,TMS 402
Criteria			So	il Data			
Retained Height = Wall height above soil = Slope Behind Wall =	:	4.00 ft 0.50 ft 0.00	Equ	w Soil Bearing = ivalent Fluid Pressure Meth- ve Heel Pressure =		psf psf/ft	
Height of Soil over Toe = Water height over heel =		6.00 in 0.0 ft	Soil Soil Foc Soil	= sive Pressure = Density, Heel = Density, Toe = ting Soil Friction = height to ignore pr passive pressure =	300.0 130.00 0.00 0.400 12.00	pcf	
Surcharge Loads			La	teral Load Applied to	Stem		Adjacent Footing Load
Surcharge Over Heel = Used To Resist Sliding & Surcharge Over Toe = Used for Sliding & Overtu	over	0.0	Н Н	eral Load = eight to Top = eight to Bottom = ad Type = Wi	0.0 #/ 0.00 ft 0.00 ft nd (W)	ft	Adjacent Footing Load=0.0 lbsFooting Width=0.00 ftEccentricity=0.00 inWall to Ftg CL Dist=0.00 ft
Axial Load Applied	to St	tem		2 T	ervice Le	evel)	Footing Type Line Load Base Above/Below Soil
Axial Dead Load = Axial Live Load = Axial Load Eccentricity =	=	0.0 lbs 0.0 lbs 0.0 in		nd on Exposed Stem ₌ ervice Level)	0.0 ps	sf	at Back of Wall=0.0 ftPoisson's Ratio=0.300
Earth Pressure Sei	smic	: Load					
Method : Uniform Multiplier Used = (Multiplier used on soil de Design Summary		9.000	Tot		3.500 0.250	Bottom	
Design Summary						Stem Oł	
Wall Stability Ratios		>1.2 for	seismic	Design Height Above Ft Wall Material Above "Ht	-	0.00 Concrete	
Overturning	=	1.73 OK		Design Method	=	LRFE	
Sliding	=	1.28 Rat	0 < 1.5	Thickness Rebar Size	=	8.00 # 4	
Total Bearing Load	=	1,445 lbs		Rebar Spacing	=	# 2 12.00	
resultant ecc.	=	7.80 in		Rebar Placed at	=	Edge	e
Soil Pressure @ Toe Soil Pressure @ Heel	=	1,727 psf 0 psf		Design Data fb/FB + fa/Fa Total Force @ Section	=	0.19	0
Allowable Soil Pressure Less	= Than	5,320 psf		Service Level	lbs =		
ACI Factored @ Toe	=	2,418 psf		Strength Level MomentActual	lbs =	686.0	D
ACI Factored @ Heel	=	0 psf	OK	Service Level	ft-# =		
Footing Shear @ Toe Footing Shear @ Heel	=	0.4 psi 8.7 psi		Strength Level	ft-# =	1,030.	7
Allowable	=	75.0 psi		MomentAllowable	=	5,412.6	6
Sliding Calcs				ShearActual	nc:		
Lateral Sliding Force less 100% Passive Force	= -	614.4 lbs 116.7 lbs		Service Level Strength Level	psi = psi =	9.1	1
less 100% Friction Force		667.6 lbs		ShearAllowable	psi = psi =	9. 75.0	
Added Force Req'd for 1.5 Stability	=	0.0 lbs 137.3 lbs		Anet (Masonry)	in2 =		
or 1.5 Stability	=	101.0 108	110	Rebar Depth 'd' Masonry Data	in =	6.25	
				f'm	psi =		
ertical component of active	lator	al soil procesur	0 19	Fs Solid Grouting	psi = =		
OT considered in the calcu				Modular Ratio 'n'	=		
				Wall Woight	nof -	100 (

Wall Weight

Concrete Data

f'c

Fy

Short Term Factor

Equiv. Solid Thick.

Masonry Block Type

Masonry Design Method

100.0

= Medium Weight

2,500.0

psf =

psi =

=

=

= ASD

psi = 60,000.0

Load Factors	
Building Code	IBC 2018,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

etainPro (c) 1987-2019, Build 11.20 cense : KW-06056595 cense To : BYKONEN CARTE	R QUINN	Cantilevered F	Retain	ing Wa	Code: IBC 2018,ACI 318-14,TMS 402
Concrete Stem Rebar Are					
Bottom Stem	Vertical	Reinforcing	Horizo	ntal Reinfo	prcina
(based on applied moment) :	0.0386	0			
4/3) * As :	0.0515	in2/ft	Min Ste	em T&S R	einf Area 0.864 in2
200bd/fy : 200(12)(6.25)/60000 :	0.25 in2	2/ft	Min Ste	em T&S R	einf Area per ft of stem Height : 0.192 in2/ft
.0018bh : 0.0018(12)(8) :	0.1728	in2/ft	Horizo	ntal Reinfo	prcing Options :
	=====	======	One la	ver of :	Two layers of :
Required Area :	0.1728	in2/ft	#4@ 1	2.50 in	#4@ 25.00 in
Provided Area :	0.2 in2/	ft	#5@ 1	9.38 in	#5@ 38.75 in
laximum Area :	0.8467	in2/ft	#6@ 2	7.50 in	#6@ 55.00 in
Footing Data		Footing Des	ign Re	sults	
Toe Width =	0.42 ft			Тое	Heel
Heel Width =	2.00	Factored Pressure	=	2,418	0 psf
Total Footing Width =	2.42	Mu' : Upward	=	2,302	50 ft-#
Footing Thickness =	10.00 in	Mu' : Downward	=	237	688 ft-#
Key Width =	0.00 in	Mu: Design Actual 1-Way Shea	= 1r =	172 0.41	638 ft-# 8.66 psi
Key Depth =	0.00 in	Allow 1-Way Shear		75.00	75.00 psi
Key Distance from Toe =	0.00 ft	Toe Reinforcing		4 @ 11.11	
f'c = 2,500 psi Fy =	60,000 psi	Heel Reinforcing		4 @ 11.11	
Footing Concrete Density =	150.00 pcf	Key Reinforcing		one Spec'	
Min. As % = Cover @ Top 2.00 @ E	0.0018 3tm.= 3.00 in	Footing Torsion, Tu		=	0.00 ft-lbs
	5un.= 5.00 m	Footing Allow. Tors			0.00 ft-lbs
		If torsion exce		••	
		supplemental	•		
		Other Acceptable			5
			in, #5@		, #6@ 24.44 in, #7@ 33.33 in, #8@ 43.88 in, #9@ 5 , #6@ 24.44 in, #7@ 33.33 in, #8@ 43.88 in, #9@ 5
		Min footing T&S Min footing T&S If one layer of ho #4@ 11.11 in #5@ 17.22 in #6@ 24.44 in	reinf Are	a per foot	0.52 in2 0.22 in2 /ft If two layers of horizontal bars: #4@ 22.22 in #5@ 34.44 in #6@ 48.89 in

Summary of Overt	urning & R	esisting F	orces & Mon	nents			
Item	OV Force Ibs	ERTURNING Distance ft	Moment ft-#		RI Force Ibs	ESISTING Distance ft	Moment ft-#
HL Act Pres (ab water tbl) HL Act Pres (be water tbl) Hydrostatic Force	467.2	1.61	752.7	Soil Over HL (ab. water tbl) Soil Over HL (bel. water tbl) Watre Table	693.3	1.75 1.75	1,212.9 1,212.9
Buoyant Force = Surcharge over Heel =	=			Sloped Soil Over Heel = Surcharge Over Heel = Adjacent Footing Load =			
Adjacent Footing Load =	=			Axial Dead Load on Stem = * Axial Live Load on Stem =			
oad @ Stem Above Soil =		0.40	055 7	Soil Over Toe = Surcharge Over Toe =		0.21	
	= 147.2 =	2.42	355.7	Stem Weight(s) =	450.0	0.75	337.2
Total =	= 614.4	O.T.M. =	1,108.4	Earth @ Stem Transitions = Footing Weight =	302.0	1.21	364.8
Resisting/Overturning Resisting/Overturning Resisting/Overturning Resisting		= = 1,445.	1.73	Key Weight = Vert. Component <u>=</u> Total =		bs R.M.=	1.914.9

If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	рсі
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Horizontal Defl @ Top of Wall (approximate only) 0.089 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,

etainPro (c) 1987-2019, Build cense : KW-06056595 cense To : BYKONEN CA	11.20.	03.31 0.11NN		Cantilevered Retaini	ing V	Vall	Code: IBC 2018,	ACI 318-	14,TMS 402-
Criteria			1	Soil Data					
Retained Height = Wall height above soil = Slope Behind Wall =	=	3.00 ft 0.50 ft 0.00		Allow Soil Bearing = 4 Equivalent Fluid Pressure Metho Active Heel Pressure =) psf) psf/ft			
Height of Soil over Toe = Water height over heel =		6.00 in 0.0 ft		= Passive Pressure = Soil Density, Heel = Soil Density, Toe = Footing Soil Friction =	130.00) pcf			
				Soil height to ignore for passive pressure =	12.00		•	•	
Surcharge Loads				Lateral Load Applied to	Stem		Adjacent Footing	Load	
Used To Resist Sliding &	=	0.0		3	0.0 #, 0.00 ft 0.00 ft d (W)		Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist	= = =	0.0 lbs 0.00 ft 0.00 in 0.00 ft
Axial Load Applied	to St			(Ser	vice L	,	Footing Type Base Above/Below So	il	Line Load 0.0 ft
	= = =	0.0 lbs 0.0 lbs 0.0 in		Wind on Exposed Stem ₌ (Service Level)	0.0 p	sf	at Back of Wall Poisson's Ratio	=	0.300
Design Summary				Stem Construction		Bottom Stem Of	<u> </u>		
Wall Stability Ratios				Design Height Above Ftg Wall Material Above "Ht"		0.00 Concrete)		
Overturning	=	2.19 OK		Design Method	=	LRFE			
Sliding	=	1.54 OK		Thickness	=	8.00			
Total Bearing Load	=	700 lbs		Rebar Size Rebar Spacing	=	# 4 12.00			
resultant ecc.	=	4.93 in		Rebar Placed at	=	Edge			
Soil Pressure @ Toe Soil Pressure @ Heel	=	1,379 psf 0 psf			=	0.05	3		
Allowable	=	4,000 psf	0	Total Force @ Section	lha				
Soil Pressure Less				Service Level Strength Level	lbs = lbs =	288.0)		
ACI Factored @ Toe ACI Factored @ Heel	=	1,930 psf 0 psf		MomentActual	100 -	200.0			
Footing Shear @ Toe	=	0.4 psi	ок	Service Level	ft-# =				
Footing Shear @ Heel	=	5.4 psi		Strength Level	ft-# =	288.0			
Allowable	=	75.0 psi		MomentAllowable	=	5,412.6	j -		
Sliding Calcs Lateral Sliding Force				ShearActual Service Level	psi =				
less 100% Passive Force	= ;= -	293.9 lbs 116.7 lbs		Strength Level	psi =	3.8	3		
less 100% Friction Force	= -	336.2 lbs		ShearAllowable	psi =	75.0			
Added Force Req'd	=	0.0 lbs		Anet (Masonry)	in2 =				
for 1.5 Stability	=	0.0 lbs	OK	Rebar Depth 'd' Masonry Data	in =	6.25	5		
				f'm	psi =				
				Fs Calid Crowfing	psi =				
ertical component of active OT considered in the calcu				Modular Ratio 'n'	= =	100 (
.oad Factors				Wall Weight Short Term Factor	psf = =	100.0	J		
Building Code	IBC	C 2018,ACI		Equiv. Solid Thick.	=				
Dead Load		1.200		Masonry Block Type		Medium	Weight		
Live Load Earth, H		1.600 1.600		Masonry Design Method	=	ASD			
Wind, W		1.000		Concrete Data	psi =	2,500.0)		
Seismic, E		1.000		Fy	•	60,000.0			

etainPro (c) 1987-2019, Build 11.20.03.3 cense : KW-06056595 cense To : BYKONEN CARTER QI	UINN	Cantilevered F	Retain	ing Wa	Code: IBC 2018,ACI 318-14,TMS 402		
Concrete Stem Rebar Area							
Bottom Stem	Vertical F	Reinforcing	Horizor	tal Reinfo	prcina		
As (based on applied moment) :	0.0108 in	0					
4/3) * As :	0.0144 in	2/ft	Min Stem T&S Reinf Area 0.672 in2				
200bd/fy : 200(12)(6.25)/60000 :	0.25 in2/1	ťt	einf Area per ft of stem Height : 0.192 in2/ft				
0.0018bh : 0.0018(12)(8) : 0.1728		2/ft	Horizor	tal Reinfo	orcing Options :		
====		=====	One lay	ver of :	Two layers of :		
Required Area : 0.1728		2/ft	#4@ 12.50 in #4@ 2		#4@ 25.00 in		
Provided Area :	0.2 in2/ft		#5@ 1	9.38 in	#5@ 38.75 in		
Maximum Area :	0.8467 in	2/ft	#6@ 2	7.50 in	#6@ 55.00 in		
Footing Data		Footing Des	ign Re	sults			
Toe Width =	0.42 ft			Toe	Heel		
Heel Width =	1.08	Factored Pressure	=	1,930	0 psf		
Total Footing Width =	1.50	Mu': Upward	=	1,730	0 ft-#		
Footing Thickness =	10.00 in	Mu' : Downward Mu: Design	=	237 124	147 ft-# 147 ft-#		
Key Width =	0.00 in	Actual 1-Way Shea		0.41	5.36 psi		
Key Depth =	0.00 in	Allow 1-Way Shear		75.00	75.00 psi		
Key Distance from Toe =	0.00 ft	Toe Reinforcing		4 @ 11.11			
	0,000 psi	Heel Reinforcing		4 @ 11.11			
	50.00 pcf .0018	Key Reinforcing Footing Torsion, Tu		one Spec' =	0.00 ft-lbs		
	= 3.00 in	Footing Allow. Tors			0.00 ft-lbs		
		0					
		If torsion excee supplemental of		••			
		Other Acceptable	•		•		
		•			, #6@ 24.44 in, #7@ 33.33 in, #8@ 43.88 in, #9@ 5		
			in, #5@		, #6@ 24.44 in, #7@ 33.33 in, #8@ 43.88 in, #9@ 5		
		Min footing T&S Min footing T&S If one layer of ho #4@ 11.11 in #5@ 17.22 in	einf Are	a per foot	0.32 in2 t 0.22 in2 /ft If two layers of horizontal bars: #4@ 22.22 in #5@ 34.44 in		
		#6@ 24.44 in			#6@ 48.89 in		

Summary of Overtu	rning & R	esisting F	orces & Mon	nents			
Item	Force Ibs	ERTURNING Distance ft	G Moment ft-#		Force Ibs	ESISTING Distance ft	Moment ft-#
HL Act Pres (ab water tbl) HL Act Pres (be water tbl) Hydrostatic Force	293.9	1.28	375.5	Soil Over HL (ab. water tbl) Soil Over HL (bel. water tbl) Watre Table	162.4	1.29 1.29	209.6 209.6
Buoyant Force = Surcharge over Heel =				Sloped Soil Over Heel = Surcharge Over Heel = Adjacent Footing Load =			
Surcharge Over Toe=Adjacent Footing Load=Added Lateral Load=				Axial Dead Load on Stem = * Axial Live Load on Stem =			
.oad @ Stem Above Soil = =				Soil Over Toe = Surcharge Over Toe =		0.21	
				Stem Weight(s) = Earth @ Stem Transitions=	350.0	0.75	262.3
Total =	293.9	O.T.M. =	375.5	Footing Weight = Key Weight =	187.4	0.75	140.4
Resisting/Overturning Ra Vertical Loads used for S		=	2.19 .7 lbs	Vert. Component =	140.7	1.50	210.9

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

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

Vertical component of active lateral soil pressure IS 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)	0.089	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,

etainPro (c) 1987-2019, Build cense : KW-06056595 cense To : BYKONEN CA			Cantilevered Retain	ning V	Vall	Code: IBC 2018,AC	CI 318-14,TMS 402
Criteria			Soil Data				
Wall height above soil = Slope Behind Wall = Height of Soil over Toe =	= C = C = 6	0.50 ft E 0.00 6.00 in 0.0 ft S S S S S S S S S S S S	Ilow Soil Bearing = quivalent Fluid Pressure Meth ctive Heel Pressure = assive Pressure = oil Density, Heel = oil Density, Toe = pooting Soil Friction = oil height to ignore =	40.0	psf/ft psf/ft pcf pcf		
Surcharge Loads			ateral Load Applied to	o Stem		Adjacent Footing L	.oad
Surcharge Over Heel Used To Resist Sliding &	= urning	urning . 0.0 .		0.0 #/ 0.00 ft 0.00 ft Vind (W)		Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist Footing Type	= 0.0 lbs = 0.00 ft = 0.00 in = 0.00 ft Line Load
			Υ.	Service Le	,	Base Above/Below Soil	
	=	0.0 lbs 0.0 lbs 0.0 in	Wind on Exposed Stem ₌ (Service Level)	0.0 p:	sf	at Back of Wall Poisson's Ratio	= 0.0 ft = 0.300
Earth Pressure Sei	smic	Load					
Design Summary			Stem Construction	tg ft=	Bottom Stem Ok 0.00		
Wall Stability Ratios		>1.2 for seism	Wall Material Above "H	-			
Overturning Sliding	=	1.49 Ratio < 1 1.22 Ratio < 1		=	LRFD 8.00		
Ū			Rebar Size	=	# 4		
Total Bearing Load	=	840 lbs	Rebar Spacing	=	12.00)	
resultant ecc.	=	4.36 in	Rebar Placed at Design Data	=	Edge)	
Soil Pressure @ Toe Soil Pressure @ Heel	= =	1,208 psf OK 0 psf OK	fb/FB + fa/Fa Total Force @ Section	= n	0.08	I	
Allowable Soil Pressure Less	= Than A	5,320 psf	Service Level	lbs =			
ACI Factored @ Toe ACI Factored @ Heel	=	1,691 psf 0 psf	Strength Level MomentActual	lbs =	391.5	•	
Footing Shear @ Toe	=	0.4 psi OK	Service Level Strength Level	ft-# = ft-# =	443.3	3	
Footing Shear @ Heel	=	5.3 psi OK	MomentAllowable	= #-	5,412.6		
Allowable Sliding Calcs	=	75.0 psi	ShearActual	-	0,712.0		
Lateral Sliding Force	=	386.5 lbs	Service Level	psi =			
less 100% Passive Force	∂ = -	136.1 lbs	Strength Level	psi =	5.2		
less 100% Friction Force	= -	336.2 lbs	ShearAllowable	psi =	75.0)	
Added Force Req'd for 1.5 Stability	=	0.0 lbs OK 107.4 lbs NG	Anet (Masonry) Rebar Depth 'd'	in2 = in =	6.25		
	_		Masonry Data	=	0.20	•	
			f'm	psi =			
autical construct of the state	1		Fs Solid Crouting	psi =			
ertical component of active insidered in the calculatior			Solid Grouting s. Modular Ratio 'n'	=			
		5	Wall Weight	psf =	100.0)	
oad Factors			Short Term Factor	_			

Short Term Factor

Equiv. Solid Thick.

Concrete Data

f'c

Fy

Masonry Block Type

Masonry Design Method

=

=

= ASD

psi = 2,500.0

psi = 60,000.0

= Medium Weight

Load Factors	
Building Code	IBC 2018,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

etainPro (c) 1987-2019, Build 11.20.0 cense : KW-06056595 cense To : BYKONEN CARTER	QUINN	Cantilevered	Retair	ning Wa	all Code: IBC 2018,ACI 318-14,TMS 402			
Concrete Stem Rebar Are								
Bottom Stem	Vertical	Reinforcing	Horizo	ntal Reinfo	orcing			
As (based on applied moment) :	0.0166 i	0	Tonzonar Komorong					
4/3) * As :	0.0221 i	n2/ft	Min Stem T&S Reinf Area 0.672 in2					
200bd/fy : 200(12)(6.25)/60000 :	0.25 in2	/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft					
0.0018bh : 0.0018(12)(8) : 0.172		n2/ft	Horizontal Reinforcing Options :					
		=====	One la	yer of :	Two layers of :			
Required Area :	0.1728 i	n2/ft	#4@ 1	2.50 in	#4@ 25.00 in			
Provided Area :	0.2 in2/f	ť	#5@ 1	9.38 in	#5@ 38.75 in			
laximum Area :	0.8467 i	n2/ft	#6@ 27.50 in #6@		#6@ 55.00 in			
Footing Data		Footing Des	ign Re	esults				
Toe Width =	0.42 ft			Toe	Heel			
Heel Width =	1.08	Factored Pressure	=	1,691	0 psf			
Total Footing Width =	1.50	Mu' : Upward	=	1,546	0 ft-#			
Footing Thickness =	10.00 in	Mu' : Downward	=	237	147 ft-#			
Key Width =	0.00 in	Mu: Design Actual 1-Way She	= ar =	109 0.41	147 ft-# 5.31 psi			
Key Depth =	0.00 in	Allow 1-Way Shea		75.00	75.00 psi			
Key Distance from Toe =	0.00 ft	Toe Reinforcing		4 @ 11.1				
f'c = 2,500 psi Fy =	60,000 psi	Heel Reinforcing		4 @ 11.1				
Footing Concrete Density =	150.00 pcf	Key Reinforcing		one Spec'				
Min. As % = Cover @ Top 2.00 @ Bt	0.0018 m.= 3.00 in	Footing Torsion, T		=	0.00 ft-lbs			
	.m.= 3.00 m	Footing Allow. Tors			0.00 ft-lbs			
		If torsion exce		<i>,</i>				
		supplemental	•		•			
		Other Acceptable		•				
			1 in, #5@		n, #6@ 24.44 in, #7@ 33.33 in, #8@ 43.88 in, #9@ 5 n, #6@ 24.44 in, #7@ 33.33 in, #8@ 43.88 in, #9@ 5			
					0.20 :>2			
		Min footing T&S Min footing T&S If one layer of ho #4@ 11.11 in	reinf Are	ea per foot	0.32 in2 t 0.22 in2 /ft If two layers of horizontal bars: #4@ 22.22 in			
		#5@ 17.22 in #6@ 24.44 in			#5@ 34.44 in #6@ 48.89 in			

Summary of Over	turi	ning & R	esisting Fo	orces & Mom	nents			
Item		OV Force Ibs	ERTURNING Distance ft	Moment ft-#		RE Force Ibs	SISTING Distance ft	Moment ft-#
HL Act Pres (ab water tbl) HL Act Pres (be water tbl) Hydrostatic Force		293.9	1.28	375.5	Soil Over HL (ab. water tbl) Soil Over HL (bel. water tbl) Watre Table	162.4	1.29 1.29	209.6 209.6
Buoyant Force Surcharge over Heel Surcharge Over Toe	= = =				Sloped Soil Over Heel = Surcharge Over Heel = Adjacent Footing Load = Axial Dead Load on Stem =			
Adjacent Footing Load Added Lateral Load Load @ Stem Above Soil	= = =				* Axial Live Load on Stem = Soil Over Toe =		0.21	
Seismic Earth Load	= =	92.6	1.92	177.4	Surcharge Over Toe = Stem Weight(s) = Earth @ Stem Transitions=	350.0	0.75	262.3
Total	=	386.5	O.T.M. =	553.0	Footing Weight = Key Weight =	187.4	0.75	140.4
Resisting/Overturning			=	1.49 5 lbs	Vert. Component = Total =	140.7	1.50 _ bs R.M.=	210.9 823.2

If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

Vertical component of active lateral soil pressure IS 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
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Horizontal Defl @ Top of Wall (approximate only) 0.078 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe,