

MERCER GROVE STRUCTURAL CALCULATIONS

SITE ADDRESS:
38XX W. MERCER WAY
MERCER ISLAND, WA. 98040

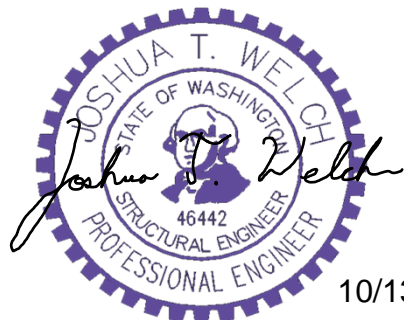
Architect

WITTMAN ESTES
6007 12th Ave. S.
Seattle, WA. 98108

Structural Engineer:

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P.O. Box 28427
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10/13/21

SECTION 1: GENERAL
> assemblies

Assembly Weights & Applied Loading

Gravity

green rf	dead	4" green roof sleepers & roofing 3/4" plywood 2x12 @ 24"oc R38 insulation 5/8" gyp. wallboard miscellaneous	36.7 2.6 2.3 2.2 1.4 2.8 2.1 ^{4%}	live	snow + ice	30.0 psf
			<hr/> 50.0 psf			

total dead + live 80.0 psf

green rf carport	dead	4" green roof tpo roofing 5/8" plywood 2x12 @ 24"oc 5/8" plywood 3x8 @ 21"oc 3/4" shiplap miscellaneous	36.7 0.4 1.8 2.2 1.8 2.9 2.3 2.0 ^{4%}	live	snow + ice	30.0 psf
			<hr/> 50.0 psf			

total dead + live 80.0 psf

carport rf	dead	metal roofing 5/8" plywood (2)2x4 @ 24"oc 5/8" plywood 3x8 @ 21"oc 3/4" shiplap miscellaneous	1.2 1.8 1.4 1.8 2.9 2.3 1.6 ^{12%}	live	snow + ice	30.0 psf
			<hr/> 13.0 psf			

total dead + live 43.0 psf

roof	dead	solar ready zone (if used) sleepers & roofing 3/4" plywood 2x12 @ 24"oc R38 insulation 5/8" gyp. wallboard miscellaneous	4.0 2.6 2.3 2.2 1.4 2.8 1.7 ^{10%}	live	snow + ice	30.0 psf
			<hr/> 17.0 psf			

total dead + live 47.0 psf

eyebrow roof	dead	roofing 5/8" plywood 2x6 @ 24"oc 3/4" shiplap miscellaneous	2.6 1.8 1.1 2.3 2.2 ^{22%}	live	snow + ice	30.0 psf
			<hr/> 10.0 psf			

total dead + live 40.0 psf

floor typ	dead	3/4" hardwood	3.0	live	residential	40.0 psf
		3/4" plywood	2.3			
		2x12 @ 16"oc	3.3			
		5/8" gyp. wallboard	2.8			
		miscellaneous	1.6 ^{12%}			
		<hr/>	13.0 psf			
	total	dead + live	53.0 psf			
deck	dead	2x decking	4.3	live	residential	60.0 psf
		2x10 @ 16"oc	2.8			
		miscellaneous	1.5 ^{17%}			
	total	dead + live	68.6 psf			
carport floor	dead	grating	18.7	live	residential	50.0 psf
		W8x20 @ 48"oc	5.0			
		miscellaneous	2.3 ^{9%}			
		<hr/>	26.0 psf			
walls		wood siding	2.3			
		1/2" plywood	1.5			
		2x6 @ 16"oc	1.7		BA	
		R21 insulation	0.8			
		1/2" gyp. wallboard	2.2			
		<hr/>	8.5 psf			
interior walls		1/2" gyp. wallboard	2.2			
		2x4 @ 16"oc	1.1			
		1/2" gyp. wallboard	2.2			
		<hr/>	5.5 psf			

LATERAL & SOILS GENERAL CRITERIA

Lateral

wind	wind importance factor	1.0	
	basic wind speed	90	mph
	wind exposure	C	
	topographical factor (Kzt)	1.30	
seismic	seismic importance factor	1.0	
	latitude	47.576	°
	longitude	-122.241	°
	Ss	1.418	(from ATC Hazard by location)
	S1	0.493	
	SDS	0.945	
	SD1	0.174	
	PGAm	0.214	
	site class	D	
	seismic design category	D	
response modification factor (	6.5	(plywood sw's)	

Soils

Geo Group Northwest, Inc.	G-5275
Frost depth	18"
Allowable Bearing	2000 psf
Allowable Bearing with E or V	2666.7 psf
Active Unrestrained (flat)	35 psf
Active Unrestrained (2H:1V)	50 psf
Active Restrained (flat)	50 psf
Active Restrained (2H:1V)	75 psf
Passive	300.0 pcf
Coefficient of Friction	0.35
Soil Unit Weight:	110 pcf
Overturing/Sliding Safety Fa	1.5
Safety Factor W/Seismic	1.1

Published on *Mercer Island, Washington* (<https://www.mercerisland.gov>)

Climatic and Geographic Design Criteria

IRC TABLE R301.2 (1)

Climatic and Geographic Design Criteria

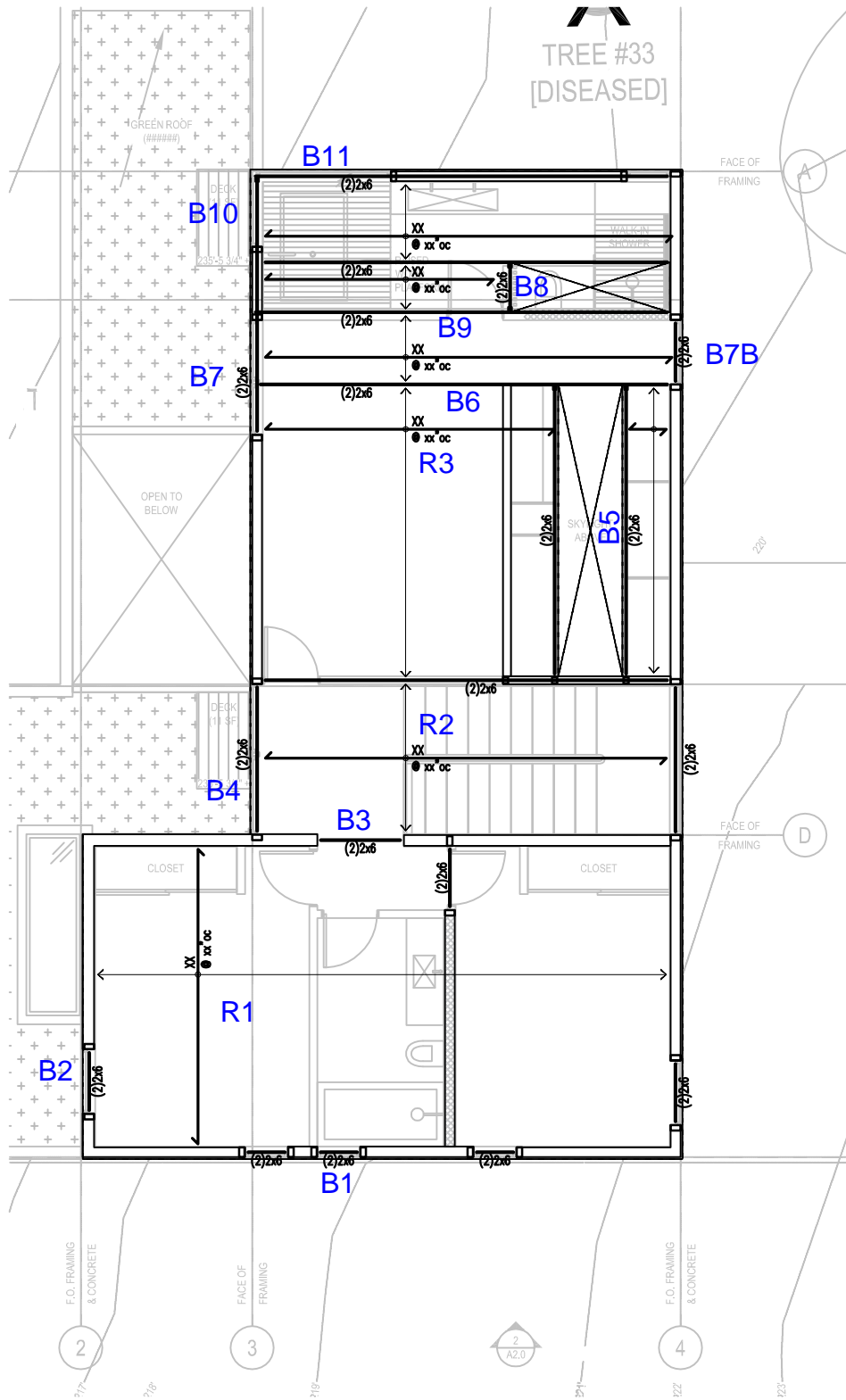
Roof Snow Load ^a	Wind Design ^b		Seismic Design Category ^c	Subject to Damage From:			Outside Design Temp—Heat/Cool	Ice Barrier Under-layment Required	Flood Hazards ^e	Air Freezing Index	Mean Annual Temp
	Speed	Topographic Effects		Weathering ^d	Frost Line Depth	Termite Decay					
25 psf	110 mph	See footnote ^b	D2	Moderate	12"	Slight to Moderate	24°F/83°F	No	NA	113	53°F

- A. When using this roof snow load it will be left to the engineer's judgment whether to consider drift or sliding snow. However, rain on snow surcharge of 5 psf must be considered for roof slopes less than 5 degrees.
- B. Wind exposure category and Topographic effects (Wind Speed-up Kzt factor) shall be determined on a site-specific basis by the Engineer of Record (components and cladding need not consider topographic effects unless otherwise determined by the engineer of record).
- C. From IRC Table 301.2(1).
- D. Weathering may require a higher strength concrete or grade of masonry than necessary to satisfy the structural requirements of this code. The grade of masonry units shall be determined from ASTM C 34, C 55, C 62, C 73, C 90, C 129, C 145, C 216 or C 652.
- E. The City of Mercer Island participates in the National Flood Insurance Program (NFIP); Regular Program (No Special Flood Hazard Area). Further NFIP participation information: CID 530083, Initial FHBM Identified 06/28/74, Initial FIRM Identified 05/16/95, Current Effective Map Date (NSFHA), Reg-Emer Date 06/30/97.

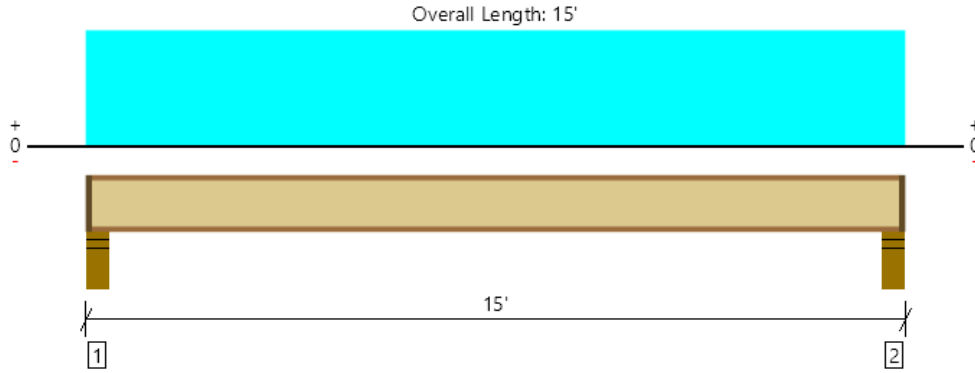
Source URL: <https://www.mercerisland.gov/cpd/page/climatic-and-geographic-design-criteria>

SECTION 2: Gravity Design

- > key plans & framing design**
- > column design**
- > misc. calculations**



roof, R1
1 piece(s) 11 7/8" TJI @ 110 @ 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)	693 @ 4 1/2"	1581 (3.50")	Passed (44%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	662 @ 5 1/2"	1794	Passed (37%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2386 @ 7' 6"	3634	Passed (66%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.236 @ 7' 6"	0.475	Passed (L/725)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.369 @ 7' 6"	0.712	Passed (L/463)	--	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/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	5.50"	4.00"	1.75"	255	450	705	1 1/2" Rim Board
2 - Stud wall - HF	5.50"	4.00"	1.75"	255	450	705	1 1/2" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 8" o/c	
Bottom Edge (Lu)	14' 9" o/c	

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

Vertical Load	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 15'	24"	17.0	30.0	Default Load

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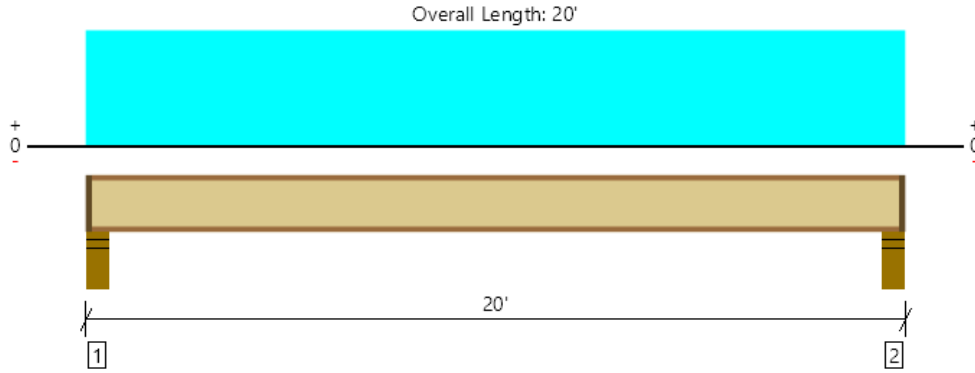
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
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roof, R2
1 piece(s) 11 7/8" TJI ® 230 @ 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)	928 @ 4 1/2"	1708 (3.50")	Passed (54%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	897 @ 5 1/2"	1903	Passed (47%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	4354 @ 10'	4847	Passed (90%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.584 @ 10'	0.642	Passed (L/395)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.915 @ 10'	0.962	Passed (L/252)	--	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/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	5.50"	4.00"	1.75"	340	600	940	1 1/2" Rim Board
2 - Stud wall - HF	5.50"	4.00"	1.75"	340	600	940	1 1/2" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 11" o/c	
Bottom Edge (Lu)	19' 9" o/c	

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

Vertical Load	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 20'	24"	17.0	30.0	Default Load

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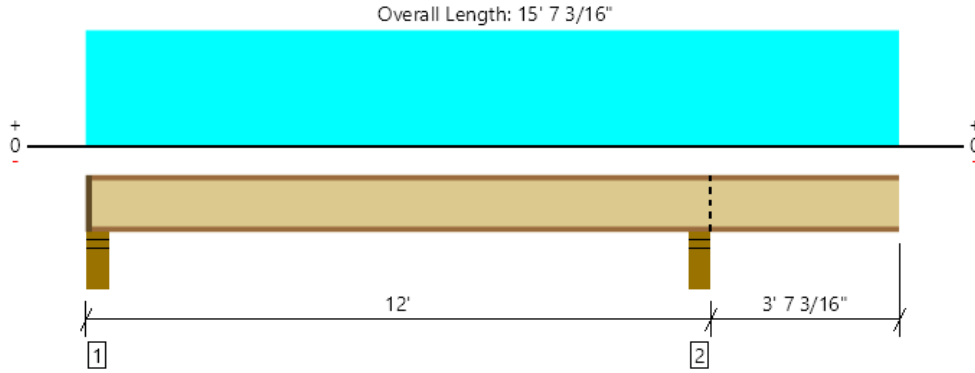
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



roof, R3
1 piece(s) 11 7/8" TJI @ 230 @ 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)	518 @ 4 1/2"	1708 (3.50")	Passed (30%)	1.15	1.0 D + 1.0 S (Alt Spans)
Shear (lbs)	542 @ 11' 6 1/2"	1903	Passed (28%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1300 @ 5' 7 5/8"	4847	Passed (27%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	0.074 @ 5' 11 1/2"	0.380	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.111 @ 5' 10 15/16"	0.570	Passed (L/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/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	5.50"	4.00"	1.75"	185	345	530	1 1/2" Rim Board
2 - Stud wall - HF	5.50"	5.50"	3.50"	346	610	956	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	7' 7" o/c	
Bottom Edge (Lu)	9' 7" o/c	

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

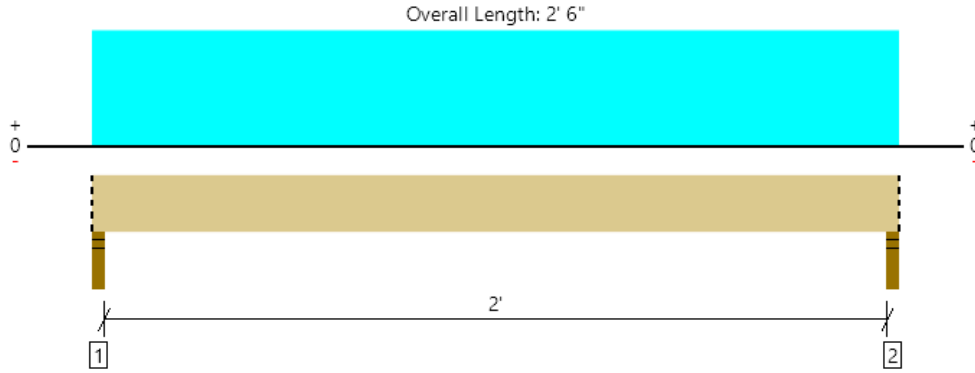
Vertical Load	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 15' 7 3/16"	24"	17.0	30.0	Default Load

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ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



roof, B1
1 piece(s) 1 3/4" 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)	449 @ 1' 1/2"	2126 (3.00")	Passed (21%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	4 @ 1' 2 7/8"	4939	Passed (0%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	227 @ 1' 3"	9173	Passed (2%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.001 @ 1' 3"	0.112	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.002 @ 1' 3"	0.150	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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	1.50"	167	281	448	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.50"	167	281	448	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)	2' 6" o/c	
Bottom Edge (Lu)	2' 6" 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 2' 6"	N/A	6.5	--	
1 - Uniform (PSF)	0 to 2' 6" (Front)	7' 6"	17.0	30.0	Default Load

Weyerhaeuser Notes

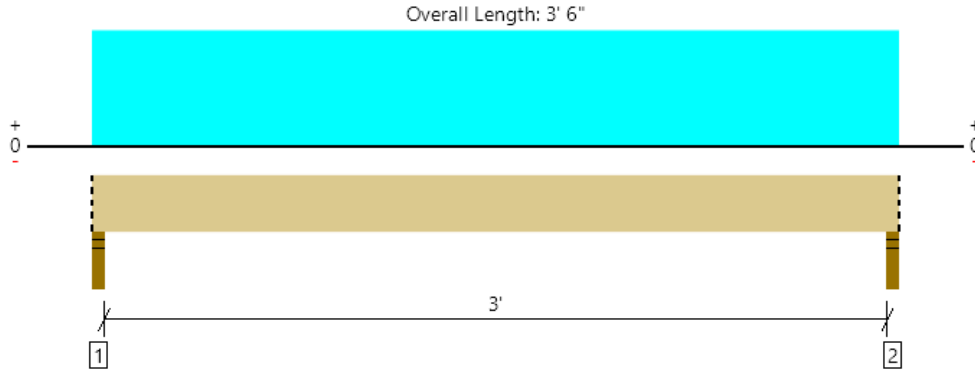
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Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



roof, B2
 1 piece(s) 1 3/4" 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)	94 @ 1' 1/2"	2126 (3.00")	Passed (4%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	27 @ 1' 2 7/8"	4939	Passed (1%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	71 @ 1' 9"	9173	Passed (1%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.000 @ 1' 9"	0.162	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.001 @ 1' 9"	0.217	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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	1.50"	41	53	94	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.50"	41	53	94	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' 6" o/c	
Bottom Edge (Lu)	3' 6" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 6"	N/A	6.5	--	
1 - Uniform (PSF)	0 to 3' 6" (Front)	1'	17.0	30.0	Default Load

Weyerhaeuser Notes

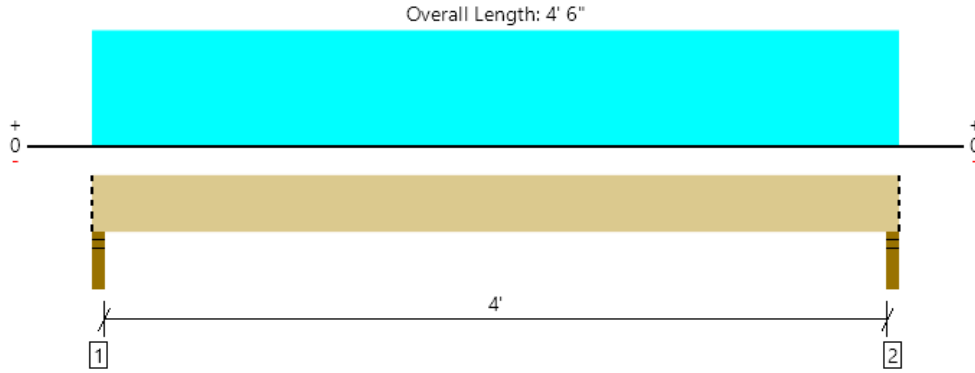
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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Josh Welch J Welch Engineering LLC (206) 356-9553 joshwelch@gmail.com	



roof, B3
1 piece(s) 1 3/4" 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)	913 @ 1 1/2"	2126 (3.00")	Passed (43%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	410 @ 1' 2 7/8"	4939	Passed (8%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	917 @ 2' 3"	9173	Passed (10%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.009 @ 2' 3"	0.213	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.014 @ 2' 3"	0.283	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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	1.50"	340	574	914	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.50"	340	574	914	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' 6" o/c	
Bottom Edge (Lu)	4' 6" 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 4' 6"	N/A	6.5	--	
1 - Uniform (PSF)	0 to 4' 6" (Front)	8' 6"	17.0	30.0	Default Load

Weyerhaeuser Notes

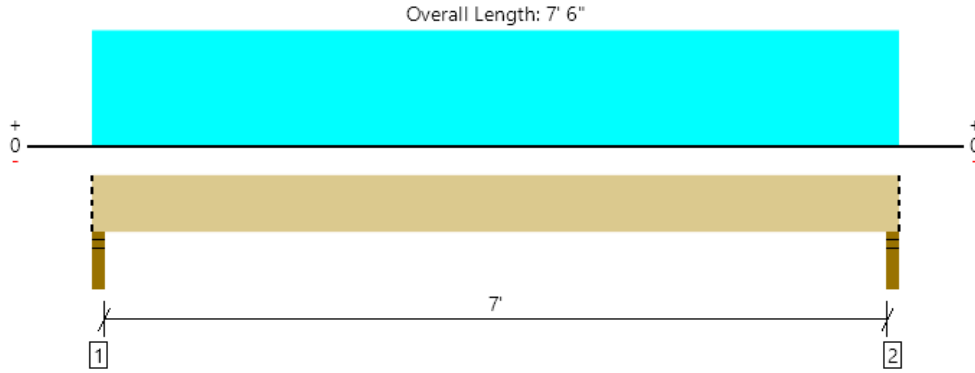
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



roof, B4
1 piece(s) 1 3/4" 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)	1787 @ 1 1/2"	2126 (3.00")	Passed (84%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1196 @ 1' 2 7/8"	4939	Passed (24%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3131 @ 3' 9"	9173	Passed (34%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.063 @ 3' 9"	0.363	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.101 @ 3' 9"	0.483	Passed (L/864)	--	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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	2.52"	662	1125	1787	Blocking
2 - Stud wall - HF	3.00"	3.00"	2.52"	662	1125	1787	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.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 7' 6"	N/A	6.5	--	
1 - Uniform (PSF)	0 to 7' 6" (Front)	10'	17.0	30.0	Default Load

Weyerhaeuser Notes

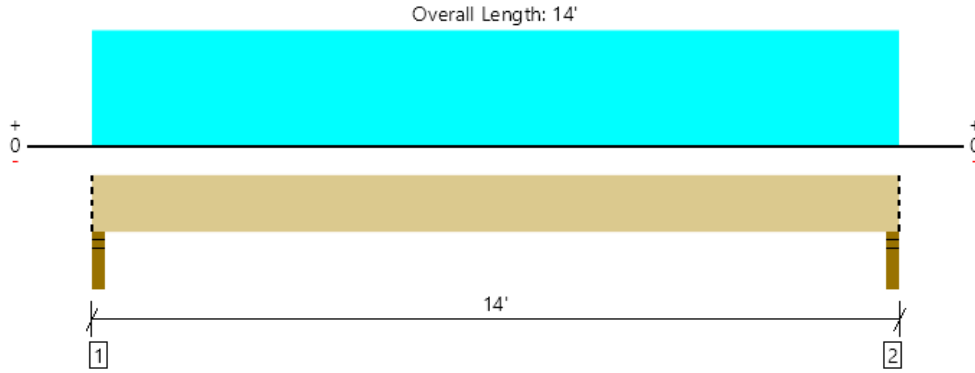
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



roof, B5
1 piece(s) 1 3/4" 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)	1032 @ 1 1/2"	2126 (3.00")	Passed (49%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	850 @ 1' 2 7/8"	4939	Passed (17%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3486 @ 7'	9173	Passed (38%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.206 @ 7'	0.688	Passed (L/799)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.338 @ 7'	0.917	Passed (L/488)	--	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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	1.50"	402	630	1032	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.50"	402	630	1032	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)	10' 1" o/c	
Bottom Edge (Lu)	14' o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 14'	N/A	6.5	--	
1 - Uniform (PSF)	0 to 14' (Front)	3'	17.0	30.0	Default Load

Weyerhaeuser Notes

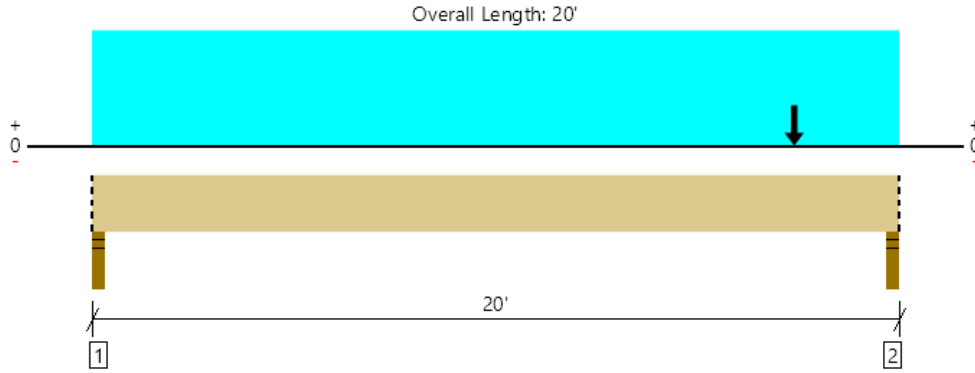
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshwelch@gmail.com	



roof, B6
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)	1973 @ 19' 10 1/2"	4253 (3.00")	Passed (46%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1840 @ 18' 9 1/8"	9878	Passed (19%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	6571 @ 11' 2 1/2"	18346	Passed (36%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.370 @ 10' 3 7/8"	0.988	Passed (L/641)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.647 @ 10' 3 9/16"	1.317	Passed (L/366)	--	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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	1.50"	520	679	1199	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.50"	822	1151	1973	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	20' o/c	
Bottom Edge (Lu)	20' 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 20'	N/A	13.0	--	
1 - Uniform (PSF)	0 to 20' (Front)	2'	17.0	30.0	Default Load
2 - Point (lb)	17' 4 13/16" (Front)	N/A	402	630	Linked from: B5, Support 2

Weyerhaeuser Notes

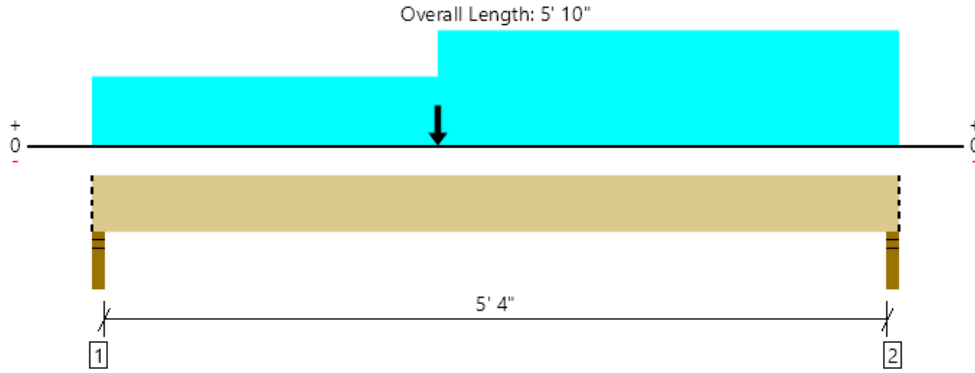
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ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



roof, B7
 1 piece(s) 1 3/4" x 11 7/8" 1.5E 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)	1805 @ 5' 8 1/2"	2126 (3.00")	Passed (85%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1346 @ 1' 2 7/8"	4939	Passed (27%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3147 @ 2' 6"	9173	Passed (34%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.039 @ 2' 10 7/8"	0.279	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.064 @ 2' 10 13/16"	0.372	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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	2.40"	678	1026	1704	Blocking
2 - Stud wall - HF	3.00"	3.00"	2.55"	702	1103	1805	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' 10" o/c	
Bottom Edge (Lu)	5' 10" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 5' 10"	N/A	6.5	--	
1 - Uniform (PSF)	2' 6" to 5' 10" (Front)	10'	17.0	30.0	Default Load
2 - Uniform (PSF)	0 to 2' 6" (Front)	6'	17.0	30.0	Default Load
3 - Point (lb)	2' 6" (Front)	N/A	520	679	Linked from: B6, Support 1

Weyerhaeuser Notes

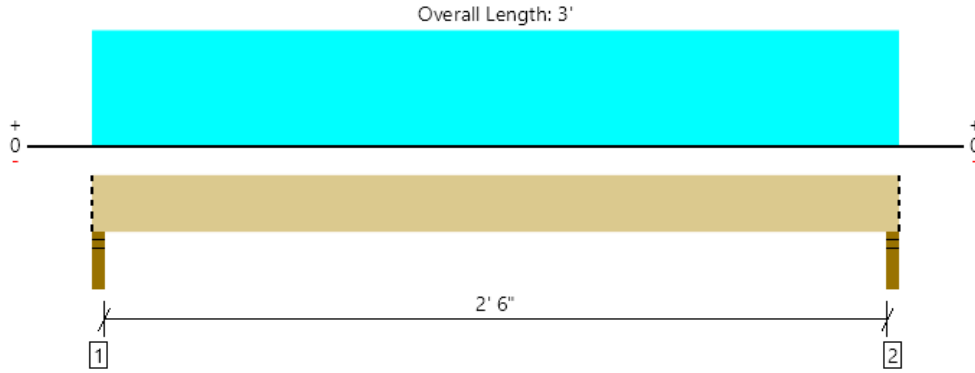
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ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



roof, B8
 1 piece(s) 1 3/4" 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)	715 @ 1' 1/2"	2126 (3.00")	Passed (34%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	124 @ 1' 2 7/8"	4939	Passed (3%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	450 @ 1' 6"	9173	Passed (5%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.003 @ 1' 6"	0.138	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.005 @ 1' 6"	0.183	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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	1.50"	265	450	715	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.50"	265	450	715	Blocking

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

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

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3'	N/A	6.5	--	
1 - Uniform (PSF)	0 to 3' (Front)	10'	17.0	30.0	Default Load

Weyerhaeuser Notes

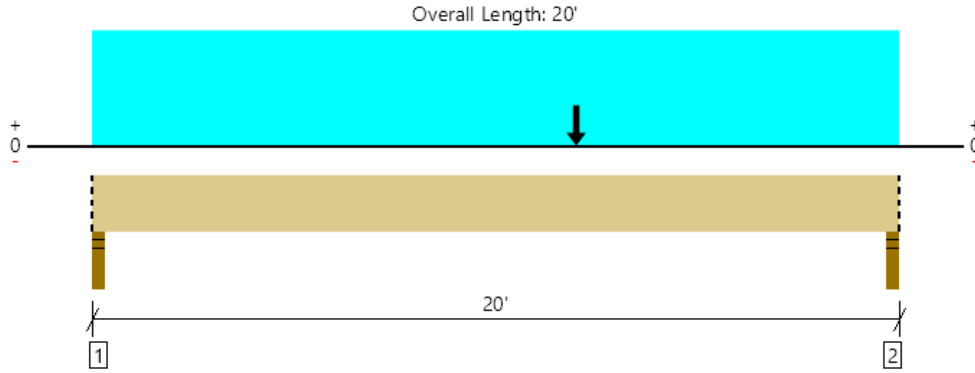
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshwelch@gmail.com	



roof, B9
1 piece(s) 3 1/2" x 11 7/8" 1.5E 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)	1500 @ 19' 10 1/2"	4253 (3.00")	Passed (35%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1367 @ 18' 9 1/8"	9878	Passed (14%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	8388 @ 12'	18346	Passed (46%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.444 @ 10' 2 11/16"	0.988	Passed (L/534)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.760 @ 10' 2 1/2"	1.317	Passed (L/312)	--	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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	1.50"	576	779	1355	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.50"	629	871	1500	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	20' o/c	
Bottom Edge (Lu)	20' 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 20'	N/A	13.0	--	
1 - Uniform (PSF)	0 to 20' (Front)	2'	17.0	30.0	Default Load
2 - Point (lb)	12' (Front)	N/A	265	450	Linked from: B8, Support 1

Weyerhaeuser Notes

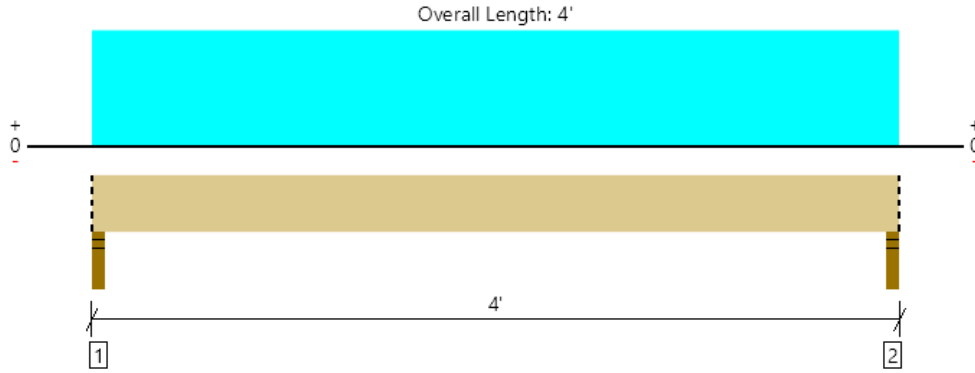
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ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



roof, B10
1 piece(s) 1 3/4" x 11 7/8" 1.5E 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)	953 @ 1 1/2"	2126 (3.00")	Passed (45%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	362 @ 1' 2 7/8"	4939	Passed (7%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	838 @ 2'	9173	Passed (9%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.007 @ 2'	0.188	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.012 @ 2'	0.250	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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	1.50"	353	600	953	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.50"	353	600	953	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' o/c	
Bottom Edge (Lu)	4' 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 4'	N/A	6.5	--	
1 - Uniform (PSF)	0 to 4' (Front)	10'	17.0	30.0	Default Load

Weyerhaeuser Notes

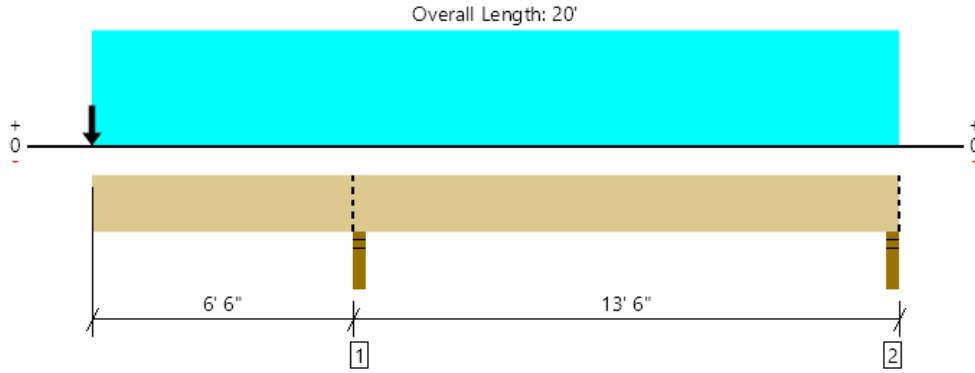
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



roof, B11
1 piece(s) 3 1/2" x 11 7/8" 2.0E 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)	2323 @ 6' 7 1/2"	4253 (3.00")	Passed (55%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1283 @ 5' 6 1/8"	9241	Passed (14%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-7630 @ 6' 7 1/2"	22888	Passed (33%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.351 @ 0	0.663	Passed (2L/452)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.554 @ 0	0.883	Passed (2L/288)	--	1.0 D + 1.0 S (Alt 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).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- -272 lbs uplift at support located at 19' 10 1/2". Strapping or other restraint may be required.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	1.64"	976	1347	2323	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.50"	-24	28/-248	28/-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)	20' o/c	
Bottom Edge (Lu)	20' 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 20'	N/A	13.0	--	
1 - Uniform (PSF)	0 to 20' (Front)	1'	17.0	30.0	Default Load
2 - Point (lb)	0 (Front)	N/A	353	600	Linked from: B10, Support 2

Weyerhaeuser Notes

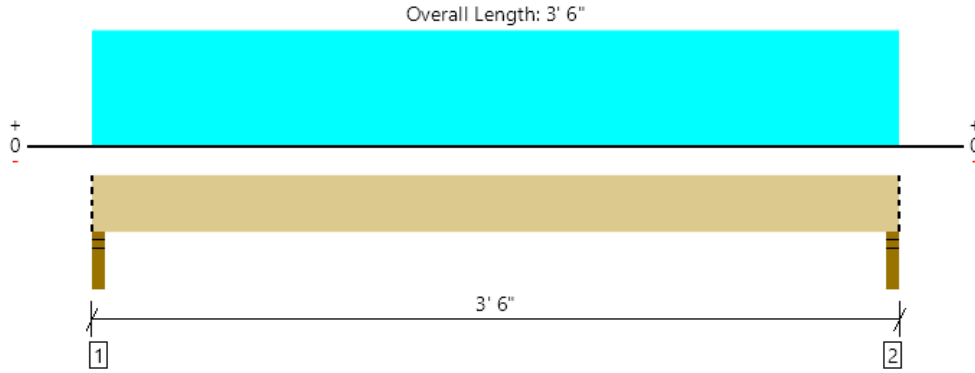
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



roof, b7b
1 piece(s) 1 3/4" x 11 7/8" 1.5E 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)	834 @ 1' 1/2"	2126 (3.00")	Passed (39%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	243 @ 1' 2 7/8"	4939	Passed (5%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	629 @ 1' 9"	9173	Passed (7%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.005 @ 1' 9"	0.162	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.008 @ 1' 9"	0.217	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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	1.50"	309	525	834	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.50"	309	525	834	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' 6" o/c	
Bottom Edge (Lu)	3' 6" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 6"	N/A	6.5	--	
1 - Uniform (PSF)	0 to 3' 6" (Front)	10'	17.0	30.0	Default Load

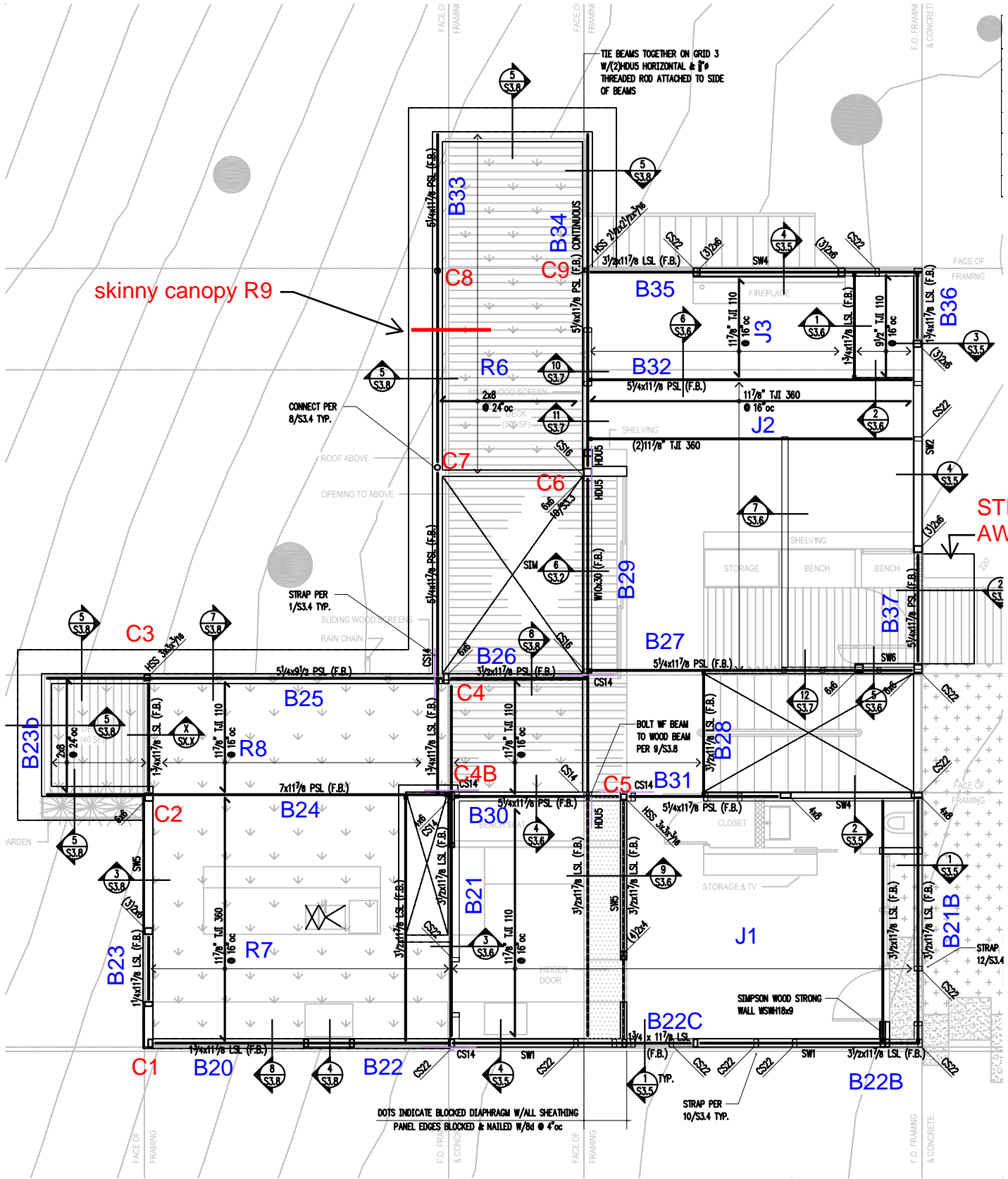
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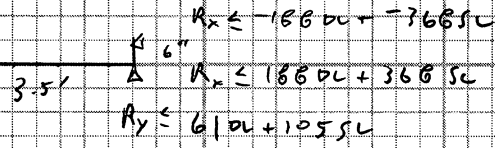




PROJECT:

Date:

STEEL ANCHORS



$$V = 159$$

$$V_{allow} = 56,204$$

$$M = 276$$

$$M_{allow} = 758 \text{ ft-lb}$$

$$\Delta_{sc} = 0.20" = 24/110$$

USE 3/8" H

BOLTS TO BEAM

$$R_y \leq 166 \text{ DL} + 5L / \text{ft}$$

$$(2) 3/8" \text{ B LAC } R_{\perp} = (2) 180 (1.15) = 414 \# = S_{max} = 29"$$

$$R_x \leq 556 \# \text{ DL} + 5L$$

$$3/8" \text{ B } \times 4" \text{ LAC } W' = 305 (1.15) 2.28 = 800$$

$$S_{max} = 17.3" \text{ o.c.}$$

ANCHORS TO FLOOR

$$D \text{ T } 22 \text{ CAP} = 2145 (1.15/1.6) = 1542 \#$$

$$S_{max} = 1542 / 556 = 2.77" = 33" \text{ o.c.}$$

BLOCKERS TO JOIST

$$R_y \leq 556 \# (32/12) (6"/4.8") = 185 \#$$

USE H A 410

PROJECT: M BAKER CLAVE

Date:

SKELTON CARBON
RAISE R9

$W = 2000 + 6050$

2' Δ 2' Δ

DL 60 - 20
SL 180 - 60

$V = 160$ $V_r = 1139$
 $M = 160$ $M_r = 257$

$\Delta_{TL} = 0.259 = 2L/192$ USE 2x6 @ 24" o.c.
 $\Delta_{LL} = 0.19" = 2L/252$ (FLATWISE)

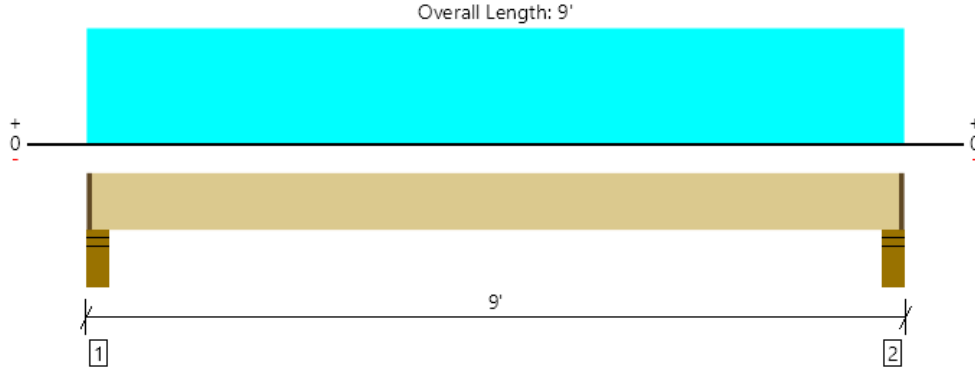
R9 TO BEAM

$R_y < 240$

(2) 0.22 x 3" SOLWS $W' = (2) 15.1 (1.15) = 34.7$

USE (2) 0.22 x 3" SOLWS

UPPER FLOOR, R6
1 piece(s) 2 x 8 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)	703 @ 4 1/2"	2582 (4.25")	Passed (27%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	550 @ 1' 3/4"	1251	Passed (44%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1361 @ 4' 6"	1477	Passed (92%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.101 @ 4' 6"	0.206	Passed (L/980)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.269 @ 4' 6"	0.412	Passed (L/368)	--	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).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	5.50"	4.25"	1.50"	450	270	720	1 1/4" Rim Board
2 - Stud wall - HF	5.50"	4.25"	1.50"	450	270	720	1 1/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 7" o/c	
Bottom Edge (Lu)	8' 10" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 9'	24"	50.0	30.0	Default Load

Weyerhaeuser Notes

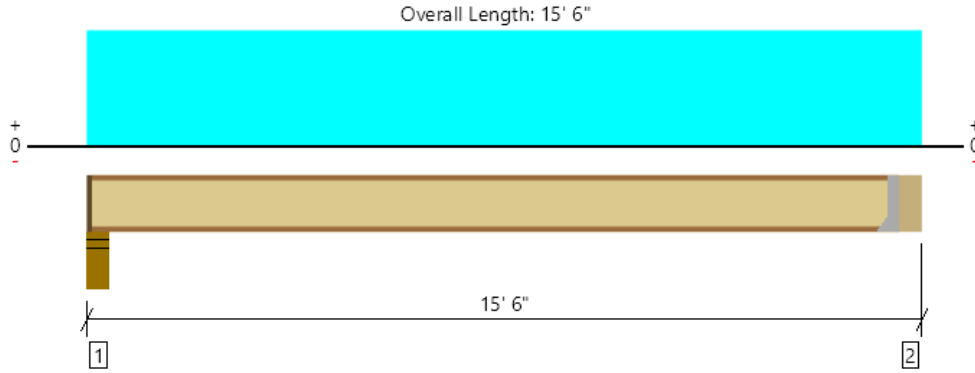
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ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



UPPER FLOOR, R7
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)	1173 @ 15' 1/2"	1242 (1.75")	Passed (94%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1173 @ 15' 1/2"	1961	Passed (60%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	4302 @ 7' 8 1/2"	7107	Passed (61%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.160 @ 7' 8 1/2"	0.367	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.427 @ 7' 8 1/2"	0.733	Passed (L/412)	--	1.0 D + 1.0 S (All Spans)
TJ-Pro™ Rating	40	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" Panel (24" Span Rating) that is nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	5.50"	4.25"	1.75"	771	462	1233	1 1/4" Rim Board
2 - Hanger on 11 7/8" LSL beam	5.50"	Hanger ¹	1.75" / - ²	779	468	1247	See note ¹

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 6" o/c	
Bottom Edge (Lu)	14' 11" o/c	

- TJ1 joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie

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

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

Vertical Load	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 15' 6"	24"	50.0	30.0	Default Load

Weyerhaeuser Notes

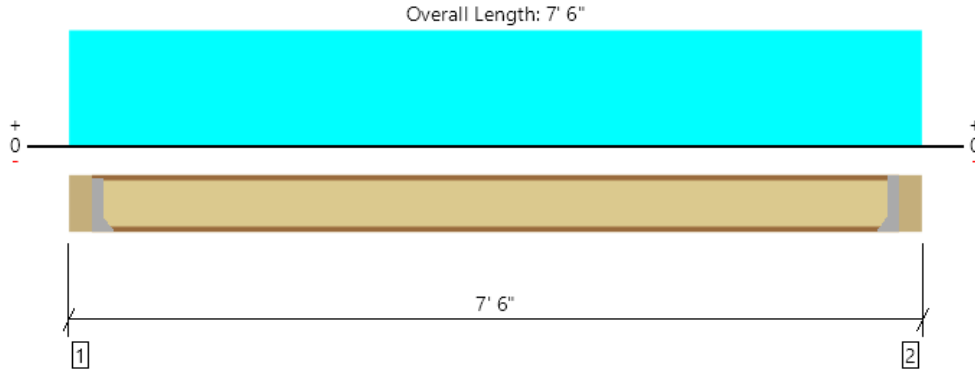
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ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



UPPER FLOOR, R8
1 piece(s) 11 7/8" TJI @ 110 @ 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)	527 @ 5 1/2"	1047 (1.75")	Passed (50%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	527 @ 5 1/2"	1794	Passed (29%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	867 @ 3' 9"	3634	Passed (24%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.014 @ 3' 9"	0.165	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.037 @ 3' 9"	0.329	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
TJ-Pro™ Rating	63	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" Panel (24" Span Rating) that is nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Hanger on 11 7/8" LSL beam	5.50"	Hanger ¹	1.75" / - ²	375	225	600	See note ¹
2 - Hanger on 11 7/8" LSL beam	5.50"	Hanger ¹	1.75" / - ²	375	225	600	See note ¹

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 2" o/c	
Bottom Edge (Lu)	6' 7" o/c	

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

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	IUS1.81/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip	
2 - Face Mount Hanger	IUS1.81/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip	

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

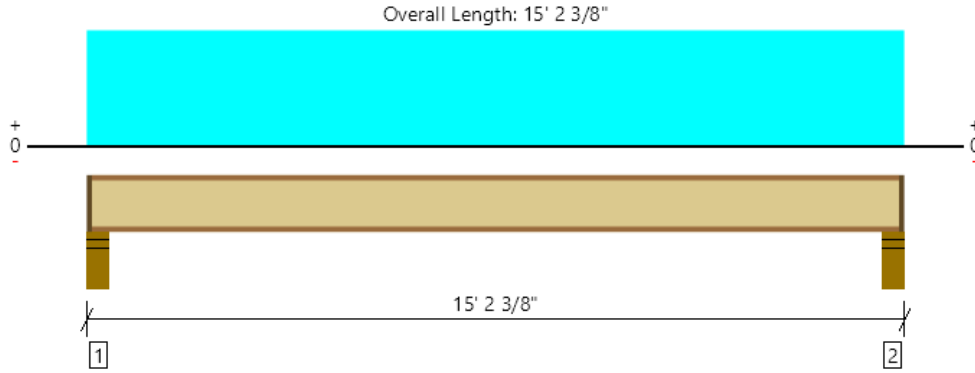
Vertical Load	Location	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 7' 6"	24"	50.0	30.0	Default Load

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ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



UPPER FLOOR, J1
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)	530 @ 4 1/2"	1375 (3.50")	Passed (39%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	505 @ 5 1/2"	1560	Passed (32%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1844 @ 7' 7 3/16"	3160	Passed (58%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.196 @ 7' 7 3/16"	0.361	Passed (L/883)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.260 @ 7' 7 3/16"	0.722	Passed (L/666)	--	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" Panel (24" Span Rating) that is nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - HF	5.50"	4.25"	1.75"	132	405	537	1 1/4" Rim Board
2 - Stud wall - HF	5.50"	4.25"	1.75"	132	405	537	1 1/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 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.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 15' 2 3/8"	16"	13.0	40.0	Default Load

Weyerhaeuser Notes

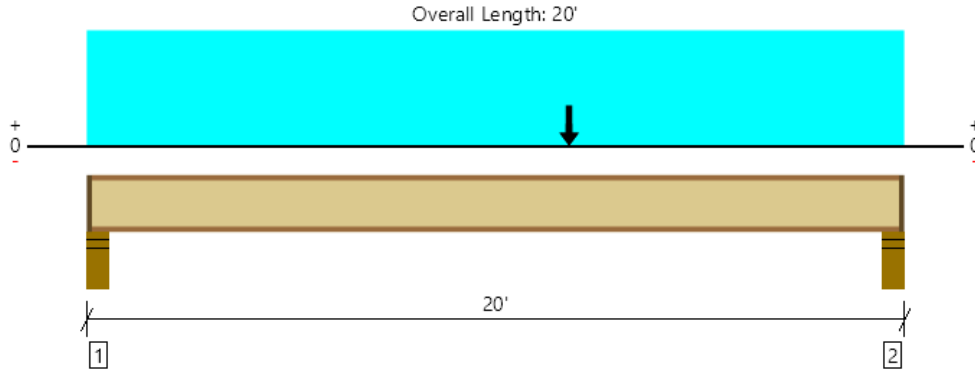
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ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



UPPER FLOOR, J2
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)	915 @ 19' 7 1/2"	1505 (3.50")	Passed (61%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	890 @ 19' 6 1/2"	1705	Passed (52%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	5670 @ 11' 9 5/8"	7107	Passed (80%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.484 @ 10' 2 9/16"	0.481	Passed (L/477)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.833 @ 10' 3 3/16"	0.962	Passed (L/277)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
TJ-Pro™ Rating	43	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" Panel (24" Span Rating) that is nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Stud wall - HF	5.50"	4.25"	1.75"	321	533	165	1019	1 1/4" Rim Board
2 - Stud wall - HF	5.50"	4.25"	1.75"	389	533	241	1163	1 1/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 9" o/c	
Bottom Edge (Lu)	19' 10" o/c	

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

Vertical Loads	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 20'	16"	13.0	40.0	-	Default Load
2 - Point (PLF)	11' 9 5/8"	16"	100.0	-	-	WALL
3 - Point (PLF)	11' 9 5/8"	16"	173.0	-	305.0	Linked from: R3, Support 2

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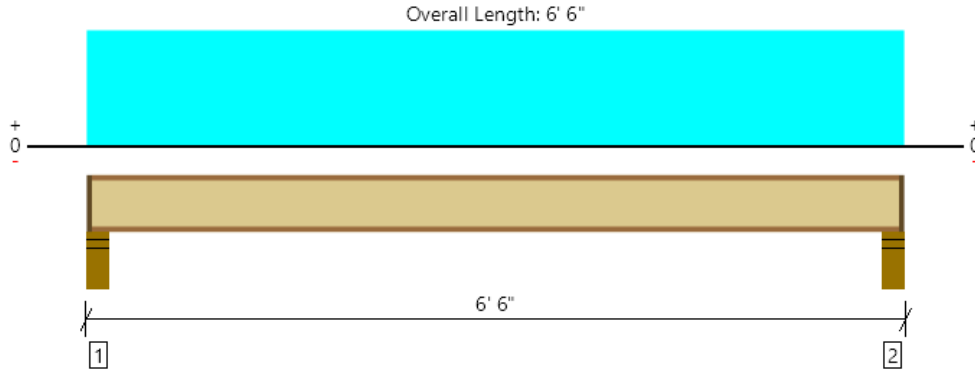
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshwelch@gmail.com	



UPPER FLOOR, J3

1 piece(s) 9 1/2" 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)	222 @ 4 1/2"	1375 (3.50")	Passed (16%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	197 @ 5 1/2"	1220	Passed (16%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	292 @ 3' 3"	2500	Passed (12%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.012 @ 3' 3"	0.144	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.016 @ 3' 3"	0.287	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" Panel (24" Span Rating) that is nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - HF	5.50"	4.25"	1.75"	56	173	229	1 1/4" Rim Board
2 - Stud wall - HF	5.50"	4.25"	1.75"	56	173	229	1 1/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 4" o/c	
Bottom Edge (Lu)	6' 4" o/c	

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

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 6' 6"	16"	13.0	40.0	Default Load

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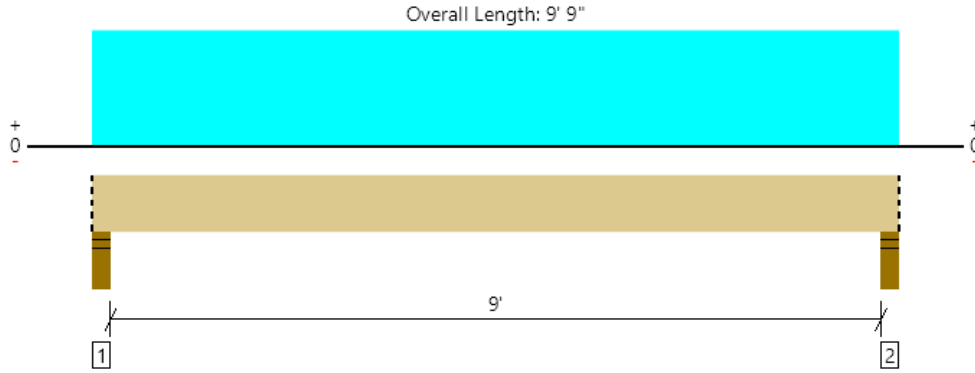
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
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UPPER FLOOR, B20

1 piece(s) 1 3/4" 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)	2957 @ 3"	3189 (4.50")	Passed (93%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2129 @ 1' 4 3/8"	4939	Passed (43%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	6487 @ 4' 10 1/2"	9173	Passed (71%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.115 @ 4' 10 1/2"	0.463	Passed (L/964)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.310 @ 4' 10 1/2"	0.617	Passed (L/358)	--	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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	4.50"	4.50"	4.17"	1860	1097	2957	Blocking
2 - Stud wall - HF	4.50"	4.50"	4.17"	1860	1097	2957	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' 8" o/c	
Bottom Edge (Lu)	9' 9" 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 9' 9"	N/A	6.5	--	
1 - Uniform (PSF)	0 to 9' 9" (Front)	7' 6"	50.0	30.0	Default Load

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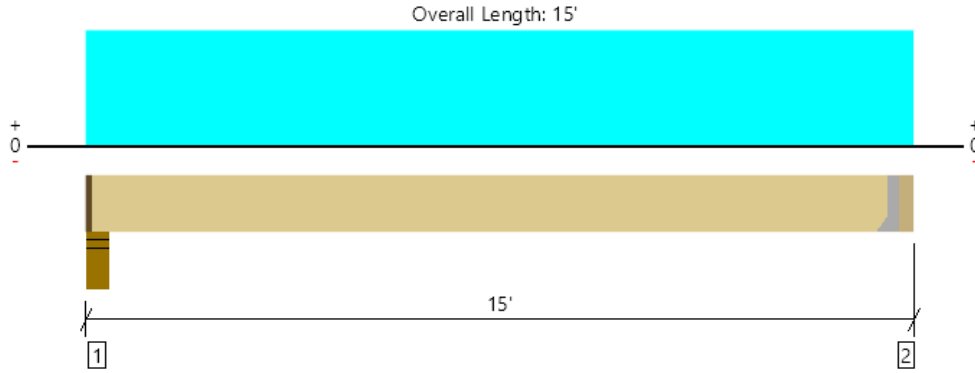
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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UPPER FLOOR, B21

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)	1614 @ 14' 8 1/2"	4725 (1.50")	Passed (34%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1314 @ 13' 8 5/8"	8590	Passed (15%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	5476 @ 7' 6 1/4"	15953	Passed (34%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.071 @ 7' 6 1/4"	0.359	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.306 @ 7' 6 1/4"	0.719	Passed (L/564)	--	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.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Stud wall - HF	5.50"	4.00"	1.50"	1292	301	226	1819	1 1/2" Rim Board
2 - Hanger on 11 7/8" HF beam	3.50"	Hanger ¹	1.50"	1283	299	224	1806	See note ¹

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	14' 7" o/c	
Bottom Edge (Lu)	14' 7" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	LUS410	2.00"	N/A	8-16d	6-16d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	1 1/2" to 14' 8 1/2"	N/A	13.0	--	--	
1 - Uniform (PSF)	0 to 15' (Front)	1'	13.0	40.0	-	Default Load
2 - Uniform (PSF)	0 to 15' (Front)	1'	50.0	-	30.0	Default Load
3 - Uniform (PSF)	0 to 15' (Front)	9' 7 3/16"	10.0	-	-	Default Load

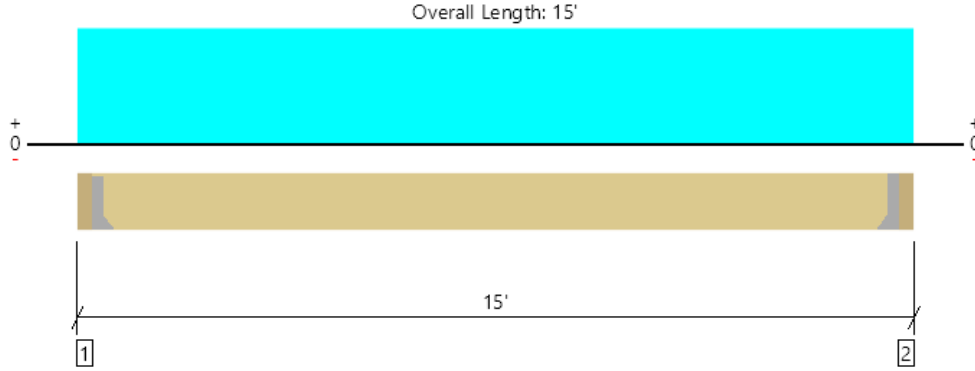
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UPPER FLOOR, B21B

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)	1380 @ 3 1/2"	4725 (1.50")	Passed (29%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1113 @ 1' 3 3/8"	8590	Passed (13%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	4650 @ 7' 6"	15953	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.072 @ 7' 6"	0.360	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.264 @ 7' 6"	0.721	Passed (L/656)	--	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.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Hanger on 11 7/8" HF beam	3.50"	Hanger ¹	1.50"	1039	300	225	1564	See note ¹
2 - Hanger on 11 7/8" HF beam	3.50"	Hanger ¹	1.50"	1039	300	225	1564	See note ¹

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

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

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	LUS410	2.00"	N/A	8-10d	6-10d	
2 - Face Mount Hanger	LUS410	2.00"	N/A	8-10d	6-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	3 1/2" to 14' 8 1/2"	N/A	13.0	--	--	
1 - Uniform (PSF)	0 to 15' (Front)	1'	13.0	40.0	-	Default Load
2 - Uniform (PSF)	0 to 15' (Front)	1'	17.0	-	30.0	Default Load
3 - Uniform (PSF)	0 to 15' (Front)	9' 7 3/16"	10.0	-	-	Default Load

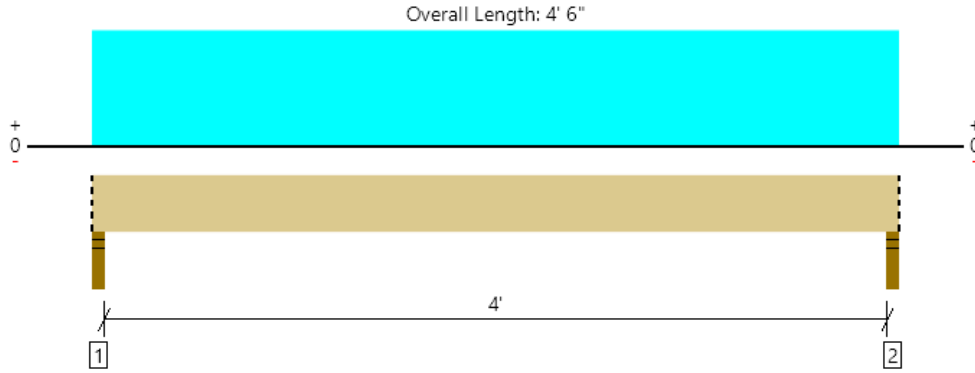
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UPPER FLOOR, B22

1 piece(s) 1 3/4" 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)	1365 @ 1' 1/2"	2126 (3.00")	Passed (64%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	613 @ 1' 2 7/8"	4939	Passed (12%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1369 @ 2' 3"	9173	Passed (15%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.008 @ 2' 3"	0.213	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.022 @ 2' 3"	0.283	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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	1.93"	858	506	1364	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.93"	858	506	1364	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' 6" o/c	
Bottom Edge (Lu)	4' 6" 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 4' 6"	N/A	6.5	--	
1 - Uniform (PSF)	0 to 4' 6" (Front)	7' 6"	50.0	30.0	Default Load

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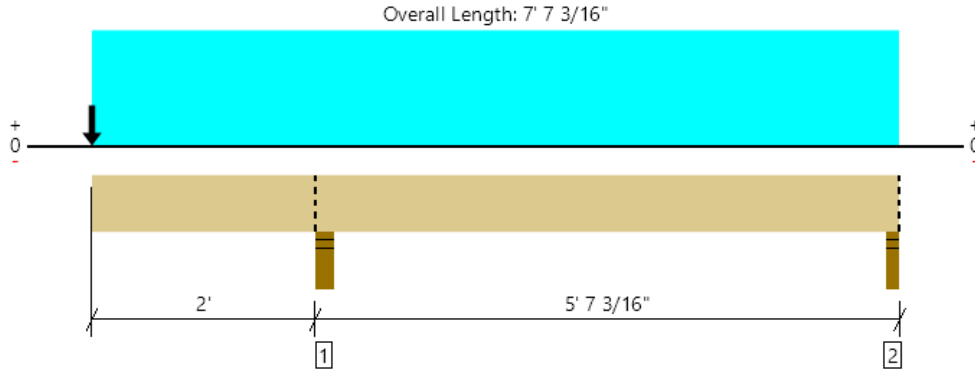
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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UPPER FLOOR, B22B

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)	5245 @ 2' 2 1/4"	6379 (4.50")	Passed (82%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1860 @ 1' 1/8"	8590	Passed (22%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-4162 @ 2' 2 1/4"	15953	Passed (26%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.025 @ 0	0.219	Passed (2L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.063 @ 0	0.292	Passed (2L/834)	--	1.0 D + 0.75 L + 0.75 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).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Stud wall - HF	4.50"	4.50"	3.70"	2607	2009	1507	6123	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.50"	69	831/-260	526	1426/-260	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' 7" o/c	
Bottom Edge (Lu)	7' 7" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 7' 7 3/16"	N/A	13.0	--	--	
1 - Uniform (PSF)	0 to 7' 7 3/16" (Front)	7' 6"	12.0	40.0	-	Default Load
2 - Uniform (PSF)	0 to 7' 7 3/16" (Front)	7' 6"	15.0	-	30.0	Default Load
3 - Point (lb)	0 (Front)	N/A	1039	300	225	Linked from: B21B, Support 1

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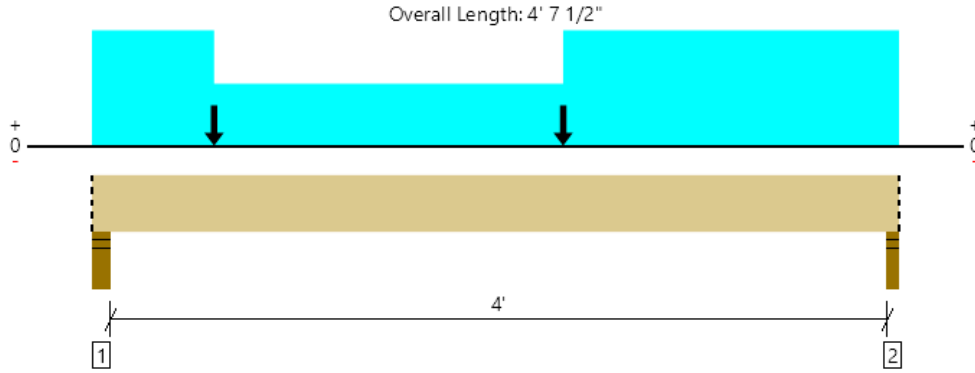
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Josh Welch J Welch Engineering LLC (206) 356-9553 joshwelch@gmail.com	



UPPER FLOOR, B22C

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)	1437 @ 4' 6"	4253 (3.00")	Passed (34%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	681 @ 3' 4 5/8"	9878	Passed (7%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	1462 @ 2' 8 3/8"	18346	Passed (8%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.007 @ 2' 8 3/8"	0.213	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.011 @ 2' 8 3/8"	0.283	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 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.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Stud wall - HF	4.50"	4.50"	1.50"	584	713	608	1905	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.50"	522	675	544	1741	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' 8" o/c	
Bottom Edge (Lu)	4' 8" 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 4' 7 1/2"	N/A	13.0	--	--	
1 - Uniform (PSF)	0 to 4' 7 1/2" (Front)	7' 6"	12.0	40.0	-	Default Load
2 - Uniform (PSF)	0 to 8 3/8" (Front)	7' 6"	15.0	-	30.0	Default Load
3 - Point (lb)	8 3/8" (Front)	N/A	167	-	281	Linked from: B1, Support 1
4 - Point (lb)	2' 8 3/8" (Front)	N/A	167	-	281	Linked from: B1, Support 2
5 - Uniform (PSF)	2' 8 3/8" to 4' 7 1/2" (Front)	7' 6"	15.0	-	30.0	Default Load

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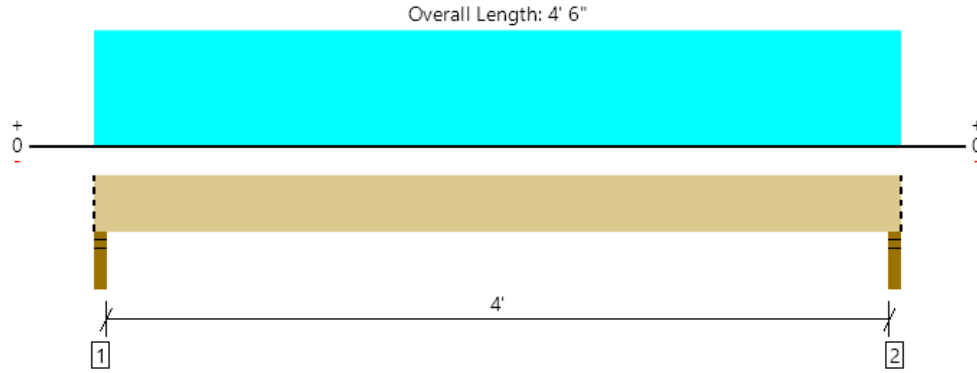
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshwelch@gmail.com	



UPPER FLOOR, b23

1 piece(s) 1 1/4" x 11 7/8" 1.3E 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)	190 @ 1 1/2"	1519 (3.00")	Passed (12%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	85 @ 1' 2 7/8"	4837	Passed (2%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	190 @ 2' 3"	4791	Passed (4%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.002 @ 2' 3"	0.213	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.005 @ 2' 3"	0.283	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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	1.50"	122	68	190	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.50"	122	68	190	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' 6" o/c	
Bottom Edge (Lu)	4' 6" 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 4' 6"	N/A	4.3	--	
1 - Uniform (PSF)	0 to 4' 6" (Front)	1'	50.0	30.0	Default Load

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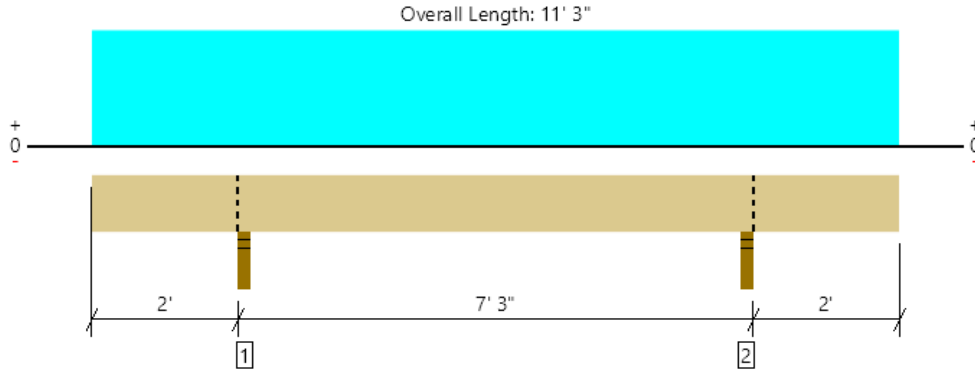
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshwelch@gmail.com	



UPPER FLOOR, b23b

1 piece(s) 1 3/4" x 5 1/2" 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)	475 @ 2' 1 1/2"	2126 (3.00")	Passed (22%)	--	1.0 D + 1.0 S (Adj Spans)
Shear (lbs)	251 @ 2' 8 1/2"	2103	Passed (12%)	1.15	1.0 D + 1.0 S (Adj Spans)
Moment (Ft-lbs)	388 @ 5' 7 1/2"	2444	Passed (16%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	0.056 @ 5' 7 1/2"	0.350	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.072 @ 5' 7 1/2"	0.467	Passed (L/999+)	--	1.0 D + 1.0 S (Alt 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).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	1.50"	128	347	475	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.50"	128	347	475	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' 3" o/c	
Bottom Edge (Lu)	11' 3" 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 11' 3"	N/A	2.8	--	
1 - Uniform (PSF)	0 to 11' 3" (Front)	2'	10.0	30.0	Default Load

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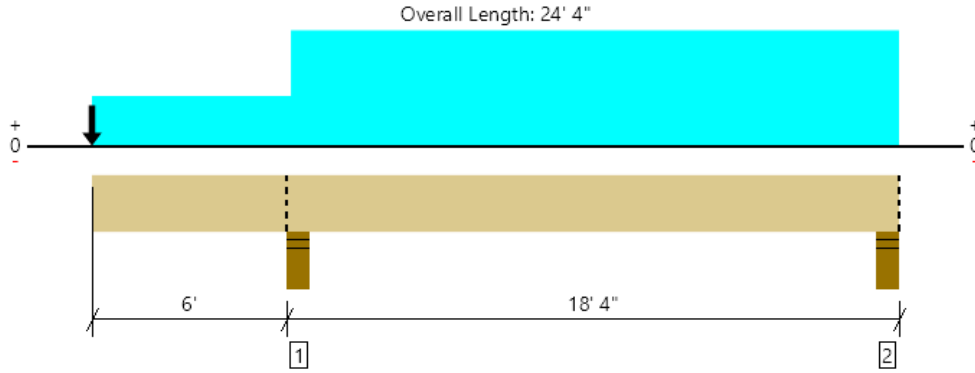
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



UPPER FLOOR, B24

1 piece(s) 7" x 11 7/8" 2.0E 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)	11526 @ 6' 2 3/4"	15593 (5.50")	Passed (74%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	7392 @ 7' 5 3/8"	18481	Passed (40%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	31121 @ 15' 7 7/16"	45776	Passed (68%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.341 @ 15' 3 1/2"	0.889	Passed (L/626)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.928 @ 15' 3 5/8"	1.185	Passed (L/230)	--	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).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Upward deflection on left cantilever exceeds 0.4".
- Member should be side-loaded from both sides of the member or braced to prevent rotation.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	5.50"	5.50"	4.07"	6921	4605	11526	Blocking
2 - Stud wall - HF	5.50"	5.50"	2.72"	4902	2820	7722	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)	24' 4" o/c	
Bottom Edge (Lu)	24' 4" 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 24' 4"	N/A	26.0	--	
1 - Uniform (PSF)	0 to 6' (Front)	3' 7 1/2"	50.0	30.0	Default Load
2 - Uniform (PSF)	0 to 6' (Front)	2'	10.0	30.0	Default Load
3 - Uniform (PSF)	6' to 24' 4" (Front)	10' 9"	50.0	30.0	Default Load
4 - Point (lb)	0 (Front)	N/A	128	347	Linked from: b23b, Support 1

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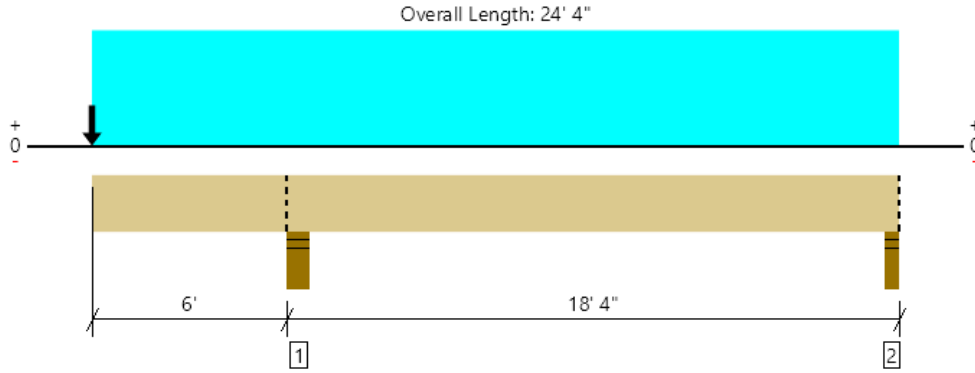
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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UPPER FLOOR, B25

1 piece(s) 5 1/4" x 9 1/2" 2.0E 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)	6917 @ 6' 2 3/4"	11694 (5.50")	Passed (59%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3647 @ 7' 3"	11089	Passed (33%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	11888 @ 16' 3 3/4"	22523	Passed (53%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.325 @ 0	0.415	Passed (2L/460)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.879 @ 15' 8 1/4"	0.897	Passed (L/245)	--	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/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Upward deflection on left cantilever exceeds 0.4".

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	5.50"	5.50"	3.25"	3703	3215	6918	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.50"	1702	1390	3092	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)	24' 4" o/c	
Bottom Edge (Lu)	24' 4" 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 24' 4"	N/A	15.6	--	
1 - Uniform (PSF)	0 to 24' 4" (Front)	3' 7 1/2"	50.0	30.0	Default Load
2 - Uniform (PSF)	0 to 24' 4" (Front)	2'	10.0	30.0	Default Load
3 - Point (lb)	0 (Front)	N/A	128	347	Linked from: b23b, Support 2

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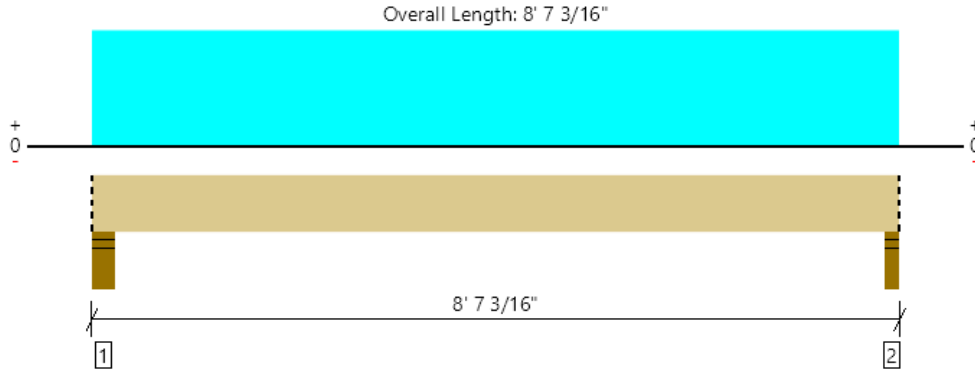
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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UPPER FLOOR, B26

1 piece(s) 3 1/2" x 11 7/8" 2.0E 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)	1320 @ 8' 5 3/16"	4961 (3.50")	Passed (27%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	919 @ 1' 5 3/8"	9241	Passed (10%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2567 @ 4' 4 5/8"	22888	Passed (11%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.014 @ 4' 4 5/8"	0.270	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.038 @ 4' 4 5/8"	0.405	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/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	5.50"	5.50"	1.50"	879	493	1372	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.50"	845	474	1319	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' 7" o/c	
Bottom Edge (Lu)	8' 7" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 8' 7 3/16"	N/A	13.0	--	
1 - Uniform (PSF)	0 to 8' 7 3/16" (Front)	3' 9"	50.0	30.0	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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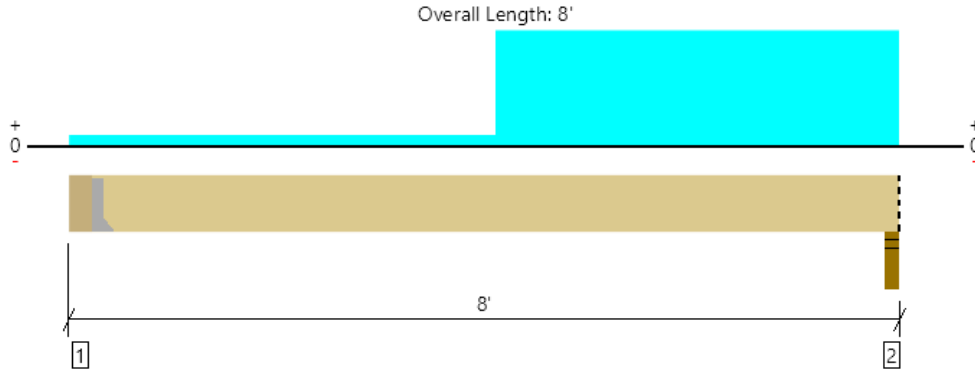


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UPPER FLOOR, B28

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)	1221 @ 7' 10"	4961 (3.50")	Passed (25%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	718 @ 6' 8 5/8"	8590	Passed (8%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1700 @ 4' 10 11/16"	15953	Passed (11%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.019 @ 4' 4 3/8"	0.184	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.026 @ 4' 4 1/4"	0.369	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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 11 7/8" PSL beam	5.50"	Hanger ¹	1.50"	168	370	538	See note ¹
2 - Stud wall - HF	3.50"	3.50"	1.50"	337	884	1221	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)	7' 7" o/c	
Bottom Edge (Lu)	7' 7" o/c	

•Maximum allowable bracing intervals based on applied load.

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

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	5 1/2" to 8"	N/A	13.0	--	
1 - Uniform (PSF)	0 to 8' (Front)	8"	13.0	40.0	Default Load
2 - Uniform (PSF)	4' to 8' (Front)	6' 6"	13.0	40.0	Default Load

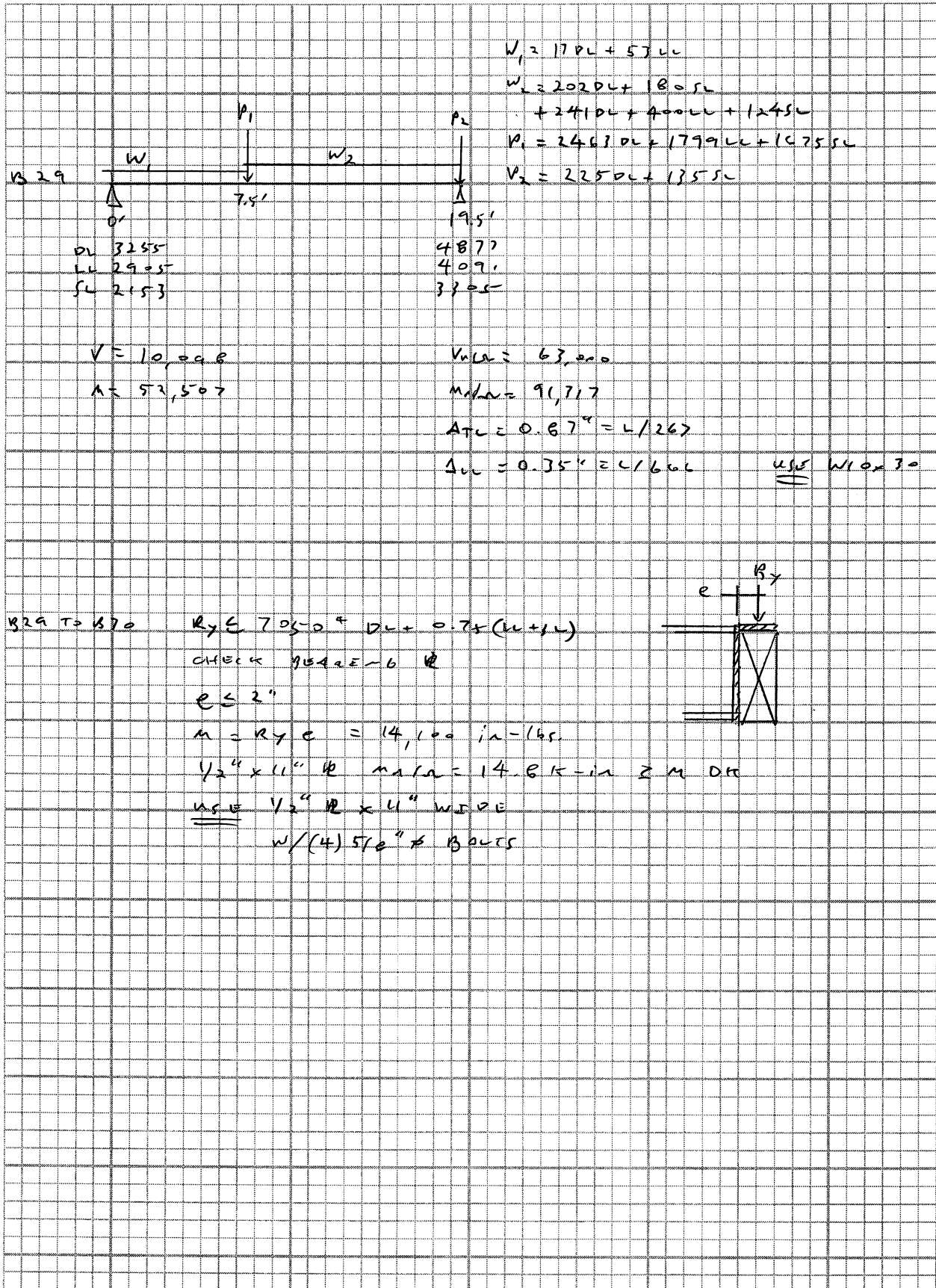
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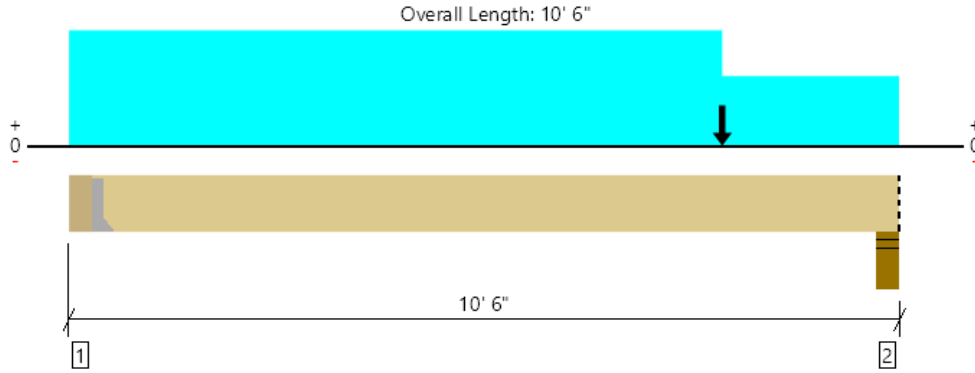
PROJECT:

Date:



UPPER FLOOR, B30

1 piece(s) 5 1/4" x 11 7/8" 2.0E 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)	6469 @ 5 1/2"	6469 (1.97")	Passed (100%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	10270 @ 9' 5/8"	13861	Passed (74%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	21090 @ 6' 11 3/4"	34332	Passed (61%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.142 @ 5' 7 1/16"	0.243	Passed (L/821)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.279 @ 5' 6 13/16"	0.485	Passed (L/418)	--	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.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Hanger on 11 7/8" PSL beam	5.50"	Hanger ¹	1.97"	3493	2210	2351	8054	See note ¹
2 - Stud wall - HF	5.50"	5.50"	5.23"	5278	4167	3633	13078	Blocking

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

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

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	APHH610	3.00"	N/A	14-SDS25300	6-SDWS22312STN	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	5 1/2" to 10' 6"	N/A	19.5	--	--	
1 - Uniform (PSF)	0 to 8' 2 3/8" (Front)	3' 6"	50.0	-	30.0	Default Load
2 - Uniform (PSF)	0 to 10' 6" (Front)	7' 6"	13.0	40.0	-	Default Load
3 - Uniform (PSF)	0 to 10' 6" (Front)	10'	10.0	-	-	
4 - Uniform (PSF)	8' 2 3/8" to 10' 6" (Front)	3' 6"	13.0	40.0	-	Default Load
5 - Uniform (PSF)	0 to 8' 2 3/8" (Front)	7' 6"	17.0	-	30.0	
6 - Point (lb)	8' 2 3/8" (Front)	N/A	662	-	1125	Linked from: B4, Support 1
7 - Point (lb)	8' 2 3/8" (Front)	N/A	3255	2905	2153	

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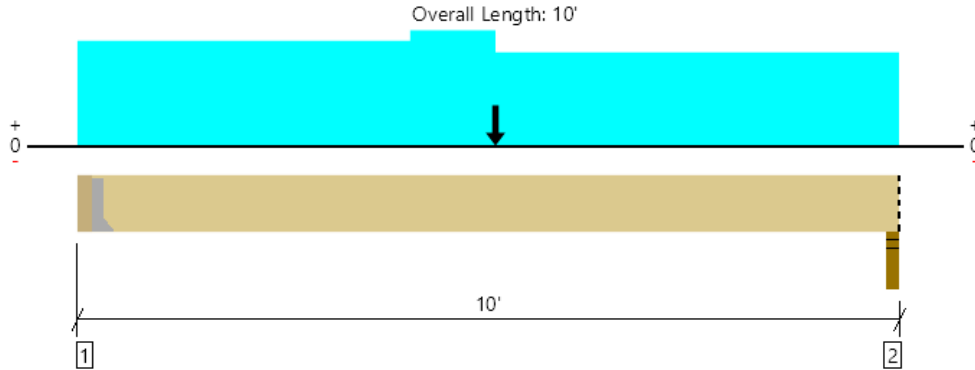
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
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UPPER FLOOR, B31

1 piece(s) 3 1/2" x 11 7/8" 2.0E 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)	4234 @ 3 1/2"	4234 (1.94")	Passed (100%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	3107 @ 1' 3 3/8"	8035	Passed (39%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	9651 @ 5'	19902	Passed (48%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.118 @ 5'	0.240	Passed (L/973)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.203 @ 5'	0.479	Passed (L/565)	--	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.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Hanger on 11 7/8" PSL beam	3.50"	Hanger ¹	1.94"	1758	2328	1296	5382	See note ¹
2 - Stud wall - HF	3.00"	3.00"	2.92"	1816	1842	1254	4912	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)	9' 9" o/c	
Bottom Edge (Lu)	9' 9" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie

Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HHUS48	3.00"	N/A	22-16d	8-16d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	3 1/2" to 10'	N/A	13.0	--	--	
1 - Uniform (PSF)	0 to 10' (Front)	7' 6"	13.0	40.0	-	Default Load
2 - Uniform (PSF)	4' to 10' (Front)	10'	10.0	-	-	
3 - Uniform (PSF)	0 to 5' (Front)	4'	13.0	40.0	-	Default Load
4 - Uniform (PSF)	0 to 10' (Front)	8' 6"	17.0	-	30.0	
5 - Point (lb)	5' (Front)	N/A	168	370	-	Linked from: B28, 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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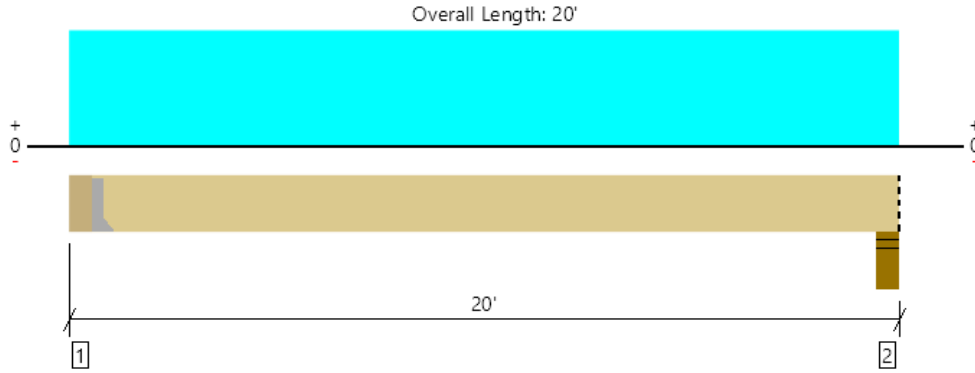


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UPPER FLOOR, B32

1 piece(s) 5 1/4" x 11 7/8" 2.0E 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)	2223 @ 5 1/2"	4922 (1.50")	Passed (45%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1994 @ 1' 5 3/8"	12053	Passed (17%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	10677 @ 10' 3/4"	29854	Passed (36%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.348 @ 10' 3/4"	0.480	Passed (L/662)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.504 @ 10' 3/4"	0.960	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).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 11 7/8" PSL beam	5.50"	Hanger ¹	1.50"	710	1610	2320	See note ¹
2 - Stud wall - HF	5.50"	5.50"	1.50"	710	1590	2300	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	19' 7" o/c	
Bottom Edge (Lu)	19' 7" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie							
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories	
1 - Face Mount Hanger	HU610	2.50"	N/A	18-10d	8-10d		

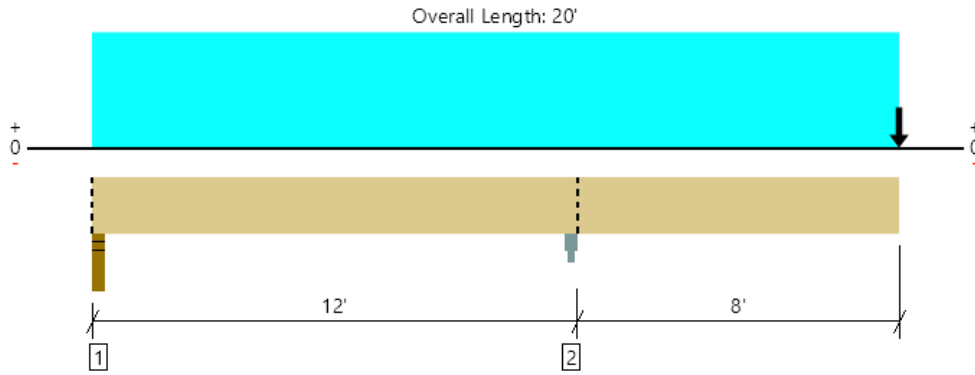
- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	5 1/2" to 20'	N/A	19.5	--	
1 - Uniform (PSF)	0 to 20' (Front)	4'	13.0	40.0	Default Load

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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)	8863 @ 11' 10 1/2"	9844 (3.00")	Passed (90%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3958 @ 10' 9 1/8"	13861	Passed (29%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-19686 @ 11' 10 1/2"	25749	Passed (76%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.512 @ 20'	0.813	Passed (2L/380)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.938 @ 20'	1.083	Passed (2L/208)	--	1.0 D + 1.0 S (Alt 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).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Right cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Moment capacity over cantilever support 2 has been reduced by 25% to lessen the effects of buckling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	1.50"	795	811/-201	1606/-201	Blocking
2 - Column Cap - steel	3.00"	3.00"	2.70"	4873	3991	8864	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	20' o/c	
Bottom Edge (Lu)	20' 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 20'	N/A	19.5	--	
1 - Uniform (PSF)	0 to 20' (Front)	4' 9"	50.0	30.0	Default Load
2 - Uniform (PSF)	0 to 20' (Front)	2'	10.0	30.0	Default Load
3 - Point (lb)	20' (Front)	N/A	128	347	Linked from: b23b, Support 1

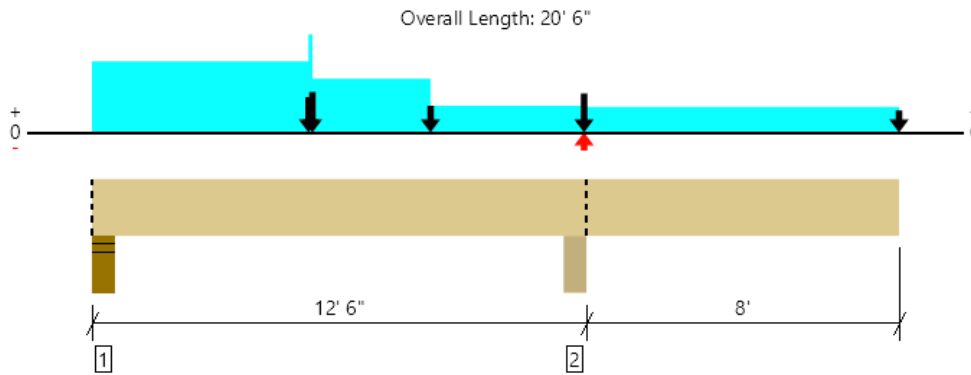
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ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	





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

Design Results	Actual @ Location	Allowed	Result	LDf	Load: Combination (Pattern) [Group]
Member Reaction (lbs)	13425 @ 12' 3 1/4"	18047 (5.50")	Passed (74%)	--	1.0 D + 1.0 S (All Spans) [1]
Shear (lbs)	7038 @ 11' 5/8"	13861	Passed (51%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans) [1]
Moment (Ft-lbs)	-19468 @ 12' 3 1/4"	25749	Passed (76%)	1.15	1.0 D + 1.0 S (All Spans) [1]
Live Load Defl. (in)	0.419 @ 20' 6"	0.411	Passed (2L/472)	--	1.0 D + 1.0 S (All Spans) [1]
Total Load Defl. (in)	0.546 @ 20' 6"	0.823	Passed (2L/362)	--	1.0 D + 1.0 S (All Spans) [1]

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

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Right cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Moment capacity over cantilever support 2 has been reduced by 25% to lessen the effects of buckling.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Stud wall - HF	5.50"	5.50"	3.39"	3535	2674	2221	8430	Blocking
2 - Beam - PSL	5.50"	5.50"	4.09"	7576	1676/-66	5849	15101/-66	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	20' 6" o/c	
Bottom Edge (Lu)	20' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

ForteWEB Software Operator Josh Welch J Welch Engineering LLC (206) 356-9553 joshwelch@gmail.com	Job Notes
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Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 20' 6"	N/A	19.5	--	--	
1 - Uniform (PSF)	0 to 12' 6" (Front)	10'	10.0	-	-	Default Load
2 - Uniform (PSF)	5' 6" to 8' 7 3/16" (Front)	10'	17.0	-	30.0	
3 - Uniform (PSF)	0 to 20' 6" (Front)	4' 6"	50.0	-	30.0	
4 - Uniform (PSF)	12' 6" to 20' 6" (Front)	2'	10.0	-	30.0	
5 - Point (lb)	5' 6" (Front)	N/A	702	-	1103	Linked from: B7, Support 2
6 - Point (lb)	8' 7 3/16" (Front)	N/A	353	-	600	Linked from: B10, Support 1
7 - Point (lb)	12' 6" (Front)	N/A	353	-	600	Linked from: B10, Support 2
8 - Uniform (PLF)	0 to 5' 7 3/16" (Front)	N/A	240.8	399.8	123.8	Linked from: J2, Support 1
9 - Point (lb)	20' 6" (Front)	N/A	128	-	347	Linked from: b23b, Support 2
10 - Point (lb)	5' 7 3/16" (Front)	N/A	710	1610	-	Linked from: B32, Support 1
11 - Point (lb)	12' 6" (Front)	N/A	568	501/-66	153	Linked from: B35, Support 1

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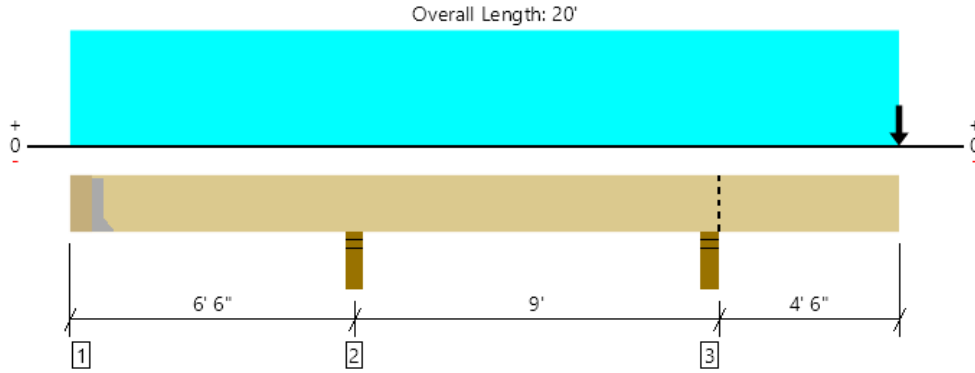
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
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UPPER FLOOR, B35

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)	4556 @ 15' 3 3/4"	6379 (4.50")	Passed (71%)	--	1.0 D + 0.75 L + 0.75 S (Adj Spans)
Shear (lbs)	2099 @ 16' 5 7/8"	9878	Passed (21%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	-8456 @ 15' 3 3/4"	18346	Passed (46%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.174 @ 20'	0.234	Passed (2L/646)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.360 @ 20'	0.469	Passed (2L/312)	--	1.0 D + 0.75 L + 0.75 S (Alt 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).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Hanger on 11 7/8" PSL beam	5.25"	Hanger ¹	1.50"	568	501/-66	153	1222/-66	See note ¹
2 - Stud wall - HF	4.50"	4.50"	1.50"	559	1243	-614	1802/-614	None
3 - Stud wall - HF	4.50"	4.50"	3.21"	2615	1458	1130	5203	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	19' 7" o/c	
Bottom Edge (Lu)	19' 7" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie

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

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	5 1/4" to 20'	N/A	13.0	--	--	
1 - Uniform (PSF)	0 to 20' (Front)	3' 3"	13.0	40.0	-	Default Load
2 - Uniform (PSF)	0 to 20' (Front)	10'	10.0	-	-	Default Load
3 - Point (lb)	20' (Front)	N/A	643	89	669	Linked from: X, Support 2

Forteweb Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



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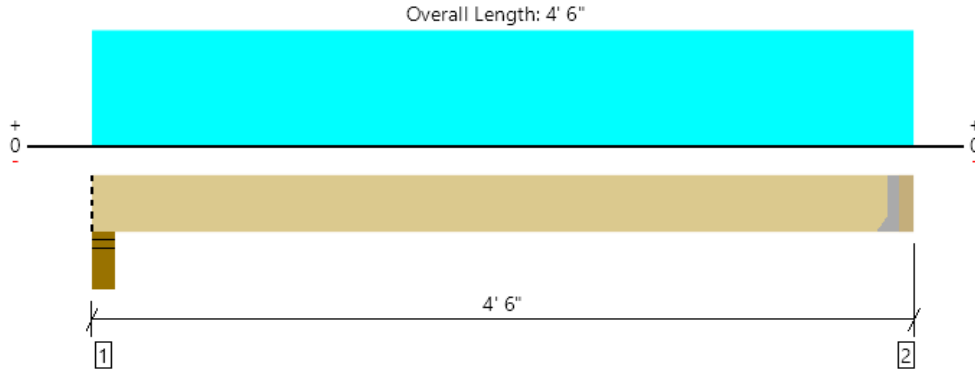
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



UPPER FLOOR, B36

1 piece(s) 1 3/4" x 11 7/8" 1.5E 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)	1142 @ 4' 2 1/2"	2363 (1.50")	Passed (48%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	559 @ 3' 2 5/8"	4939	Passed (11%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1106 @ 2' 3 1/4"	9173	Passed (12%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.008 @ 2' 3 1/4"	0.097	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.016 @ 2' 3 1/4"	0.194	Passed (L/999+)	--	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).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Stud wall - HF	5.50"	5.50"	1.89"	657	91	681	1429	Blocking
2 - Hanger on 11 7/8" LSL beam	3.50"	Hanger ¹	1.50"	643	89	669	1401	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)	4' 3" o/c	
Bottom Edge (Lu)	4' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	IUS1.81/11.88	2.00"	N/A	10-10d	2-10dx1.5	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 4' 2 1/2"	N/A	6.5	--	--	
1 - Uniform (PSF)	0 to 4' 6" (Front)	1'	13.0	40.0	-	Default Load
2 - Uniform (PSF)	0 to 4' 6" (Front)	10'	10.0	-	-	Default Load
3 - Uniform (PSF)	0 to 4' 6" (Front)	10'	17.0	-	30.0	Default Load

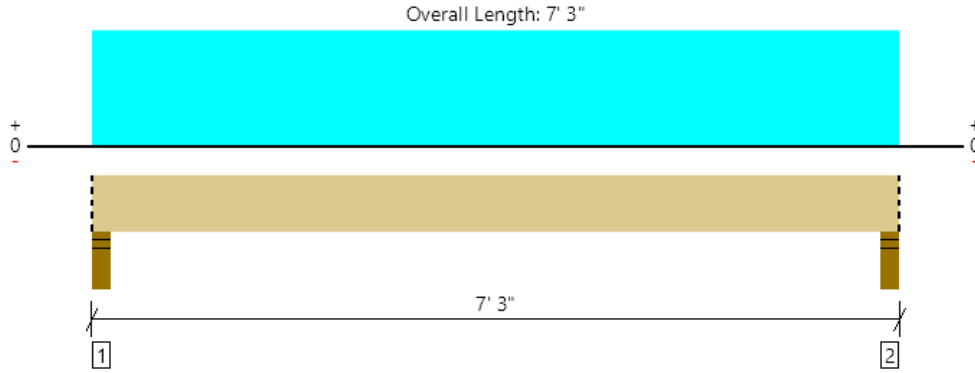
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ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



UPPER FLOOR, B37

1 piece(s) 5 1/4" x 11 7/8" 2.0E 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)	3761 @ 3"	9568 (4.50")	Passed (39%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	2345 @ 1' 4 3/8"	13861	Passed (17%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	5909 @ 3' 7 1/2"	34332	Passed (17%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.023 @ 3' 7 1/2"	0.169	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.044 @ 3' 7 1/2"	0.338	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.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Stud wall - HF	4.50"	4.50"	1.77"	1789	1449	1181	4419	Blocking
2 - Stud wall - HF	4.50"	4.50"	1.77"	1789	1449	1181	4419	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' 3" o/c	
Bottom Edge (Lu)	7' 3" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 7' 3"	N/A	19.5	--	--	
1 - Uniform (PSF)	0 to 7' 3" (Front)	10'	10.0	-	-	WALL
2 - Uniform (PSF)	0 to 7' 3" (Front)	1' 4"	17.0	-	30.0	ROOF
3 - Uniform (PLF)	0 to 7' 3" (Front)	N/A	291.8	399.8	180.8	Linked from: J2, Support 2
4 - Uniform (PSF)	0 to 7' 3" (Front)	3' 6"	17.0	-	30.0	AWNING

Weyerhaeuser Notes

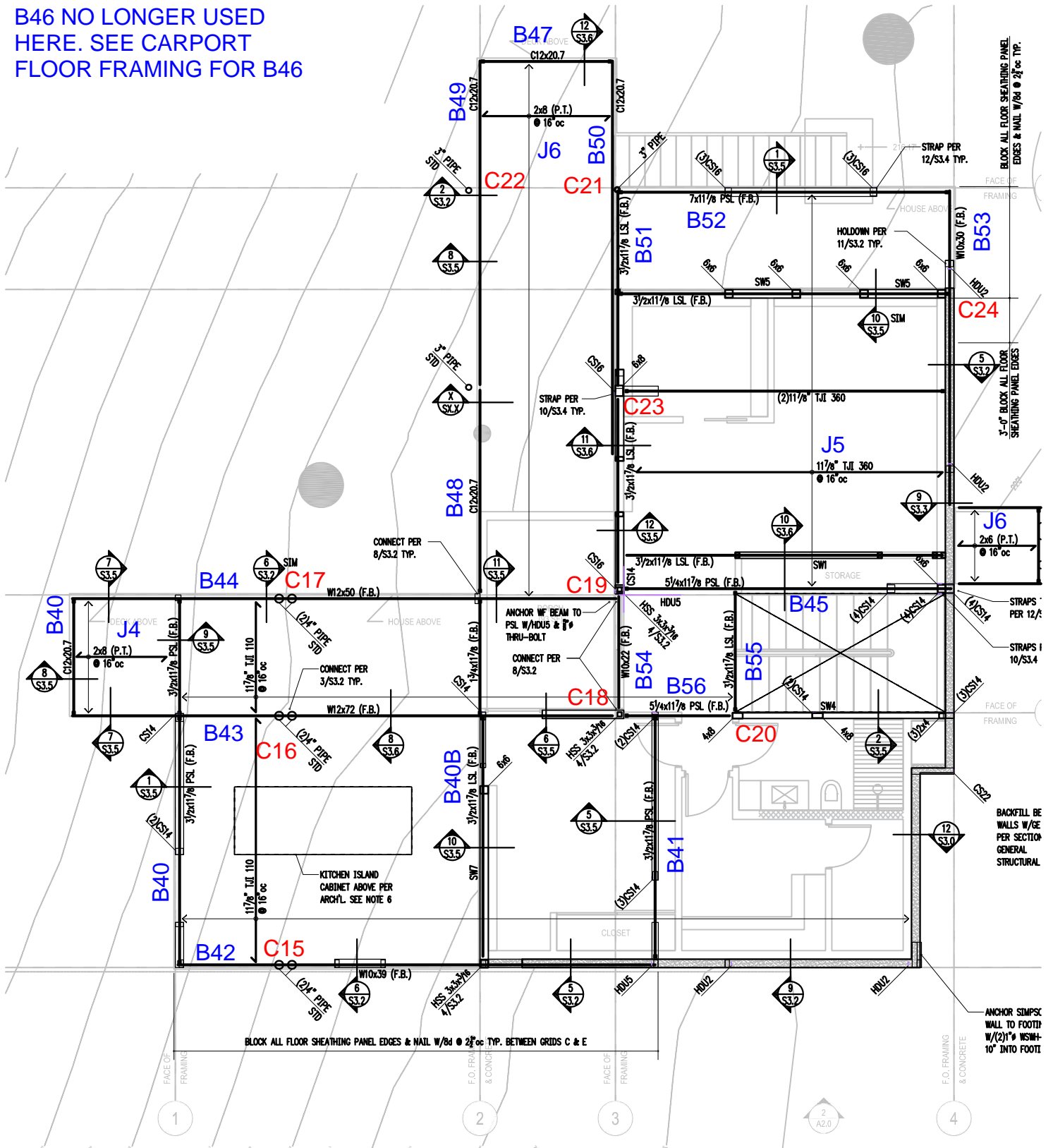
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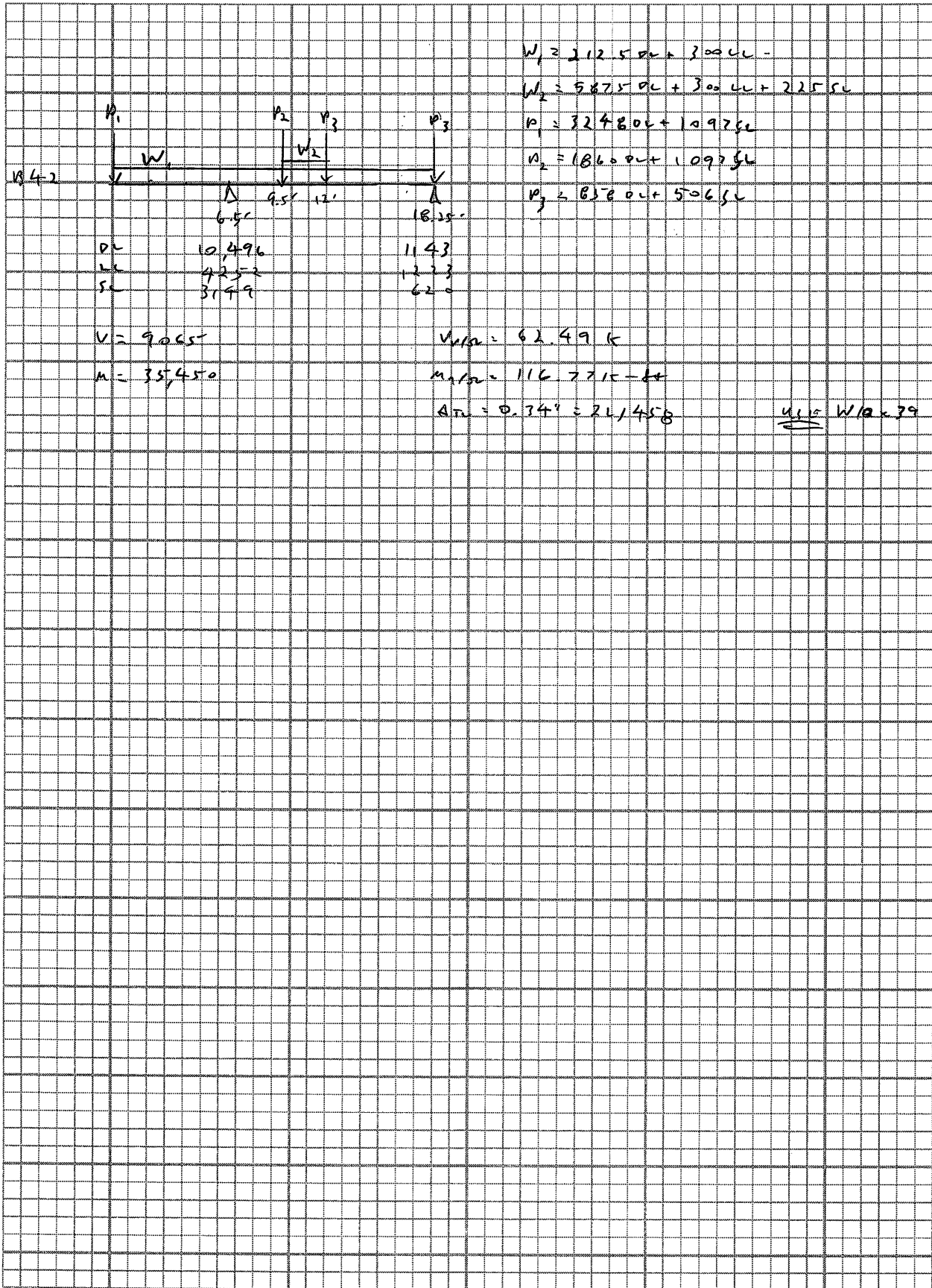


B46 NO LONGER USED
HERE. SEE CARPORT
FLOOR FRAMING FOR B46



PROJECT:

Date:



PROJECT: MERCUR GROVE

Date:

Diagram of beam B44 with spans: 6.3', 12.5', 24.3'. Total length: 32.5'. Reaction points: P0, P1, P2, P3. Column labels: W1, W2, W3.

$P_0 = 2060L + 660LL$
 $P_1 = 3660DL + 3215SL + 1430L + 640LL$
 $P_2 = 2860DL + 691L + 1395SL$
 $W_1 = 180L$
 $W_2 = 152.5DL + 40LL +$
 $W_3 = 152.5DL + 380LL + 100SL$

DL	9183	1801
LL	4977	2670
SL	4703	527

$V \leq 9000$
 $M \leq 54519$

$V_{max} = 9025K$
 $M_{max} = 179.4K - ft$
 $\Delta_{TL} \leq 0.32" = 2L/460$
 $\Delta_{LL} = 0.05"$
 $\Delta_{SL} = 0.15"$

USE W12x50

Diagram of beam B43 with spans: 6.3', 12.5', 24.7'. Total length: 32.5'. Reaction points: P0, P1, P2, P3. Column labels: W1, W2.

$P_0 = 2060L + 660LL$
 $P_1 = 8262DL + 4105SL + 1430L + 660LL$
 $P_2 = 8103DL + 2215LL + 5190SL$
 $W_1 = 180L$
 $W_2 = 165DL + 440LL$

DL	17865	3633
LL	12315	4171
SL	8880	1715

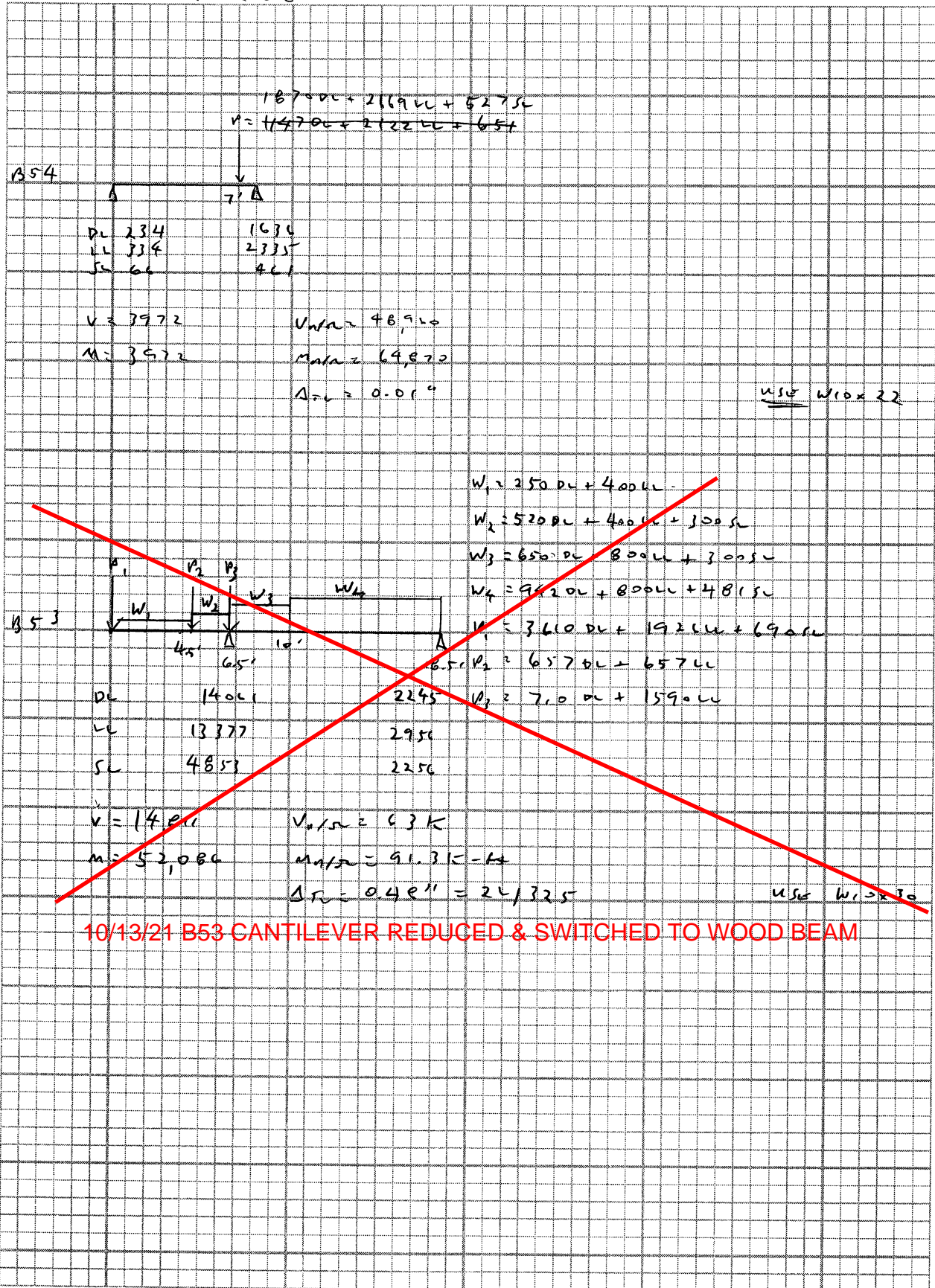
$V \leq 17235$
 $M \leq 49251$

$V_{max} = 105.7K$
 $M_{max} = 269.4K - ft$
 $\Delta_{TL} = 0.35" = 2L/857$
 $\Delta_{LL} = 0.07" = 2L/4286$
 $\Delta_{SL} = 0.1" = 2L/3000$

USE W12x72
or W10x88

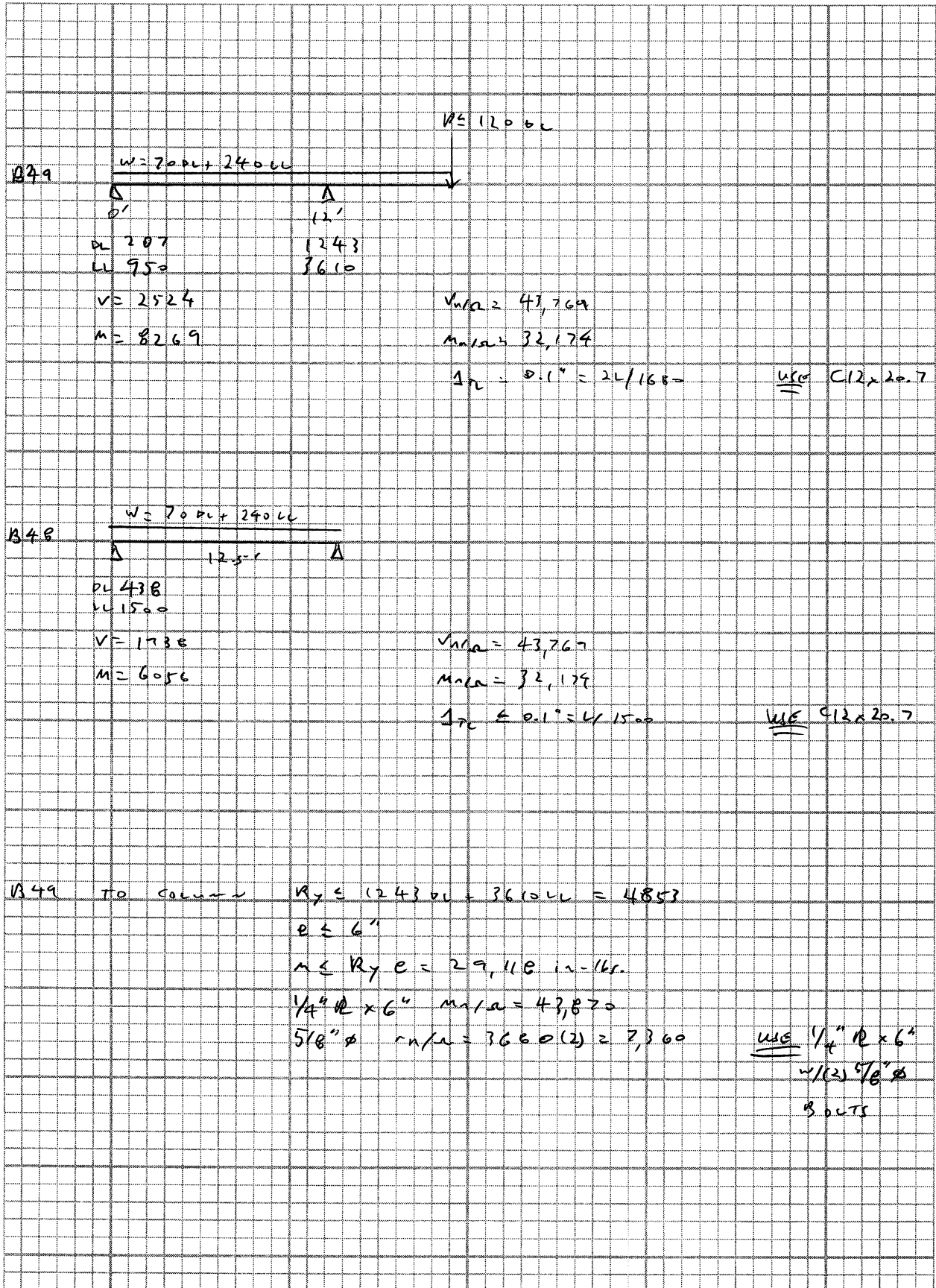
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Date:



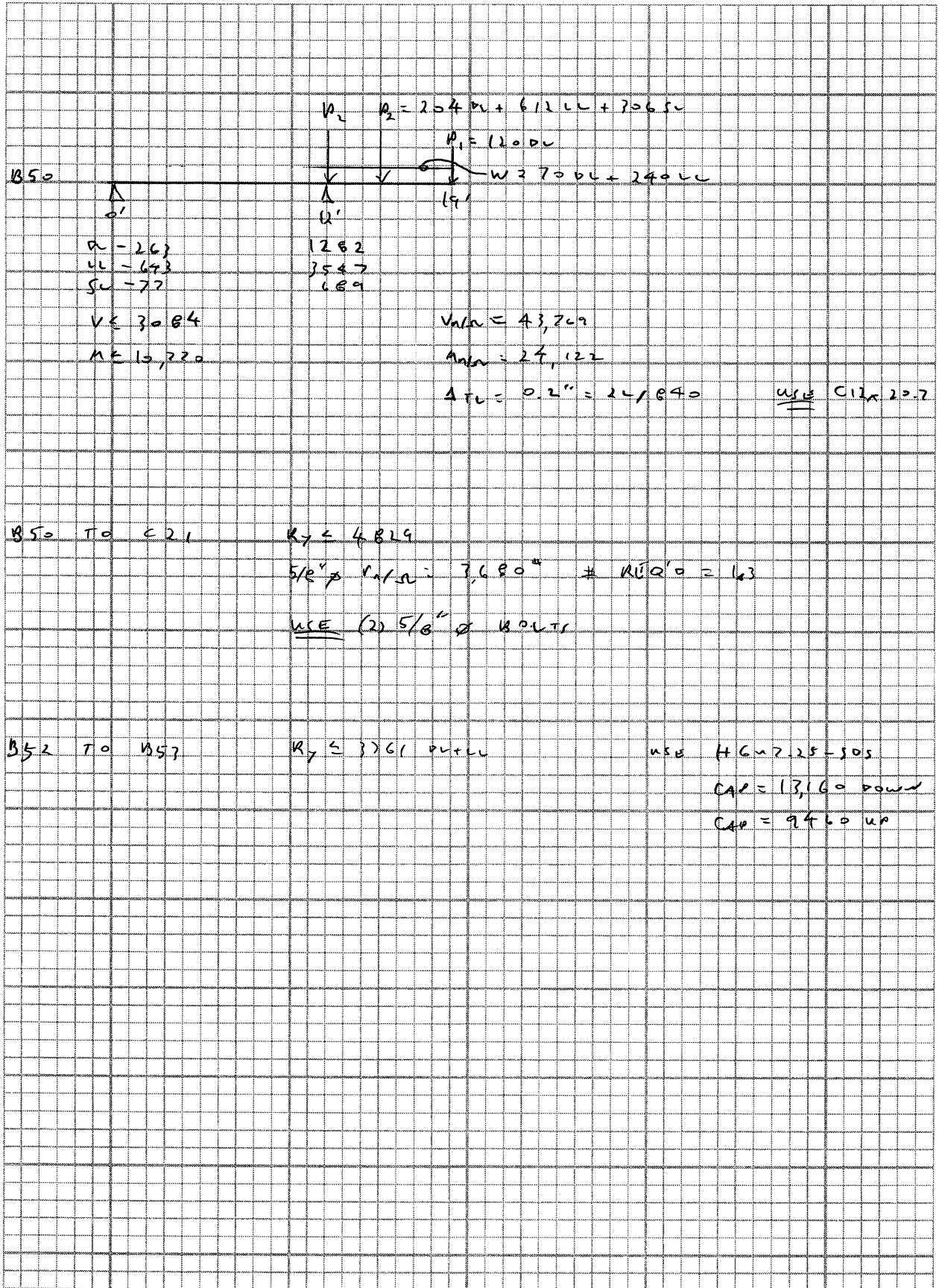
PROJECT:

Date:

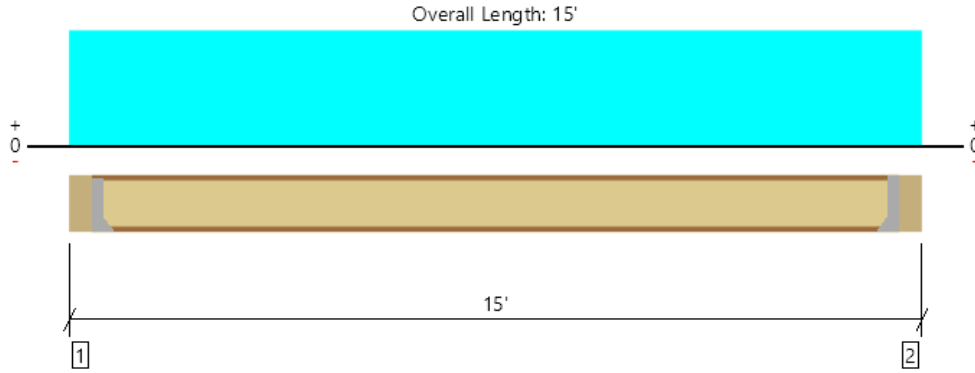


PROJECT:

Date:



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)	516 @ 5 1/2"	910 (1.75")	Passed (57%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	516 @ 5 1/2"	1560	Passed (33%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1818 @ 7' 6"	3160	Passed (58%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.178 @ 7' 6"	0.352	Passed (L/947)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.245 @ 7' 6"	0.704	Passed (L/689)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	50	45	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" Panel (24" Span Rating) that is nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling, bridging or blocking at max. 8' o.c..

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 11 7/8" HF beam	5.50"	Hanger ¹	1.75" / - ²	150	400	550	See note ¹
2 - Hanger on 11 7/8" HF beam	5.50"	Hanger ¹	1.75" / - ²	150	400	550	See note ¹

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 2" o/c	
Bottom Edge (Lu)	14' 1" o/c	

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

Connector: Simpson Strong-Tie							
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories	
1 - Face Mount Hanger	IUS1.81/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip		
2 - Face Mount Hanger	IUS1.81/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip		

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

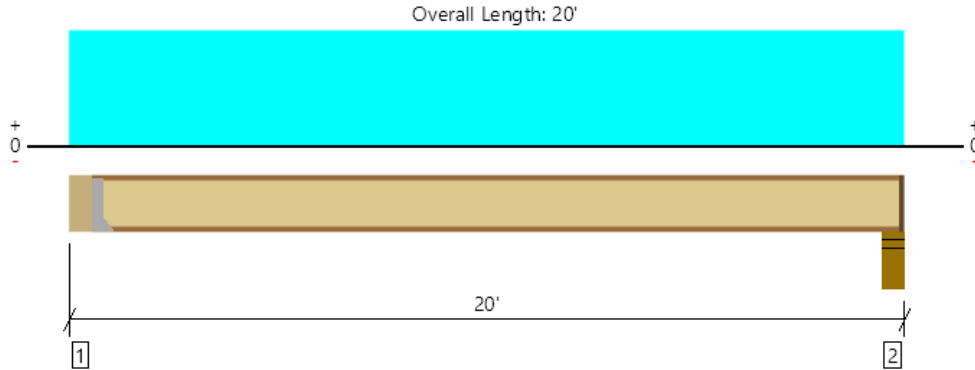
Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 15'	16"	15.0	40.0	Default Load

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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)	703 @ 5 1/2"	1080 (1.75")	Passed (65%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	703 @ 5 1/2"	1705	Passed (41%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3367 @ 10' 1/2"	6180	Passed (54%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.394 @ 10' 1/2"	0.479	Passed (L/583)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.542 @ 10' 1/2"	0.958	Passed (L/424)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	42	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" Panel (24" Span Rating) that is nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 11 7/8" HF beam	5.50"	Hanger ¹	1.75" / - ²	201	536	737	See note ¹
2 - Stud wall - HF	5.50"	4.25"	1.75"	199	531	730	1 1/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 1" o/c	
Bottom Edge (Lu)	19' 5" 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	10-10dx1.5	2-Strong-Grip		

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

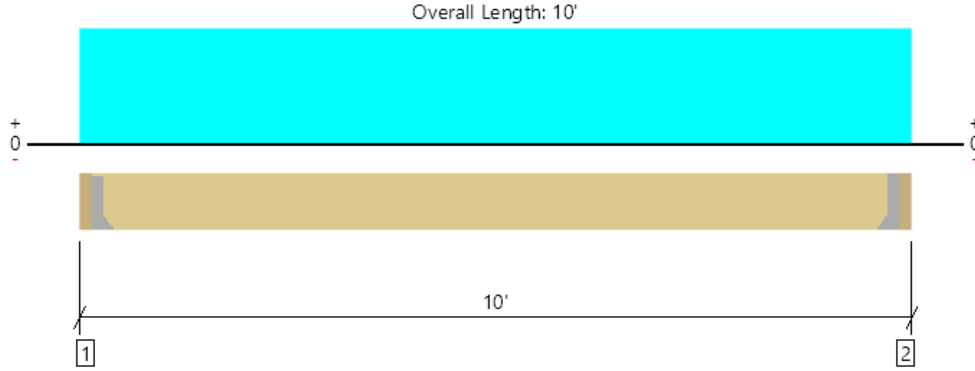
Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 20'	16"	15.0	40.0	Default Load

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MAIN FLOOR, J6
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)	456 @ 3"	911 (1.50")	Passed (50%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	398 @ 10 1/4"	1088	Passed (37%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1083 @ 5'	1284	Passed (84%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.237 @ 5'	0.237	Passed (L/482)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.284 @ 5'	0.475	Passed (L/401)	--	1.0 D + 1.0 L (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).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 7 1/4" HF beam	3.00"	Hanger ¹	1.50"	80	400	480	See note ¹
2 - Hanger on 7 1/4" HF beam	3.00"	Hanger ¹	1.50"	80	400	480	See note ¹

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

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

- Maximum allowable bracing intervals based on applied load.

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

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

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 10'	16"	12.0	60.0	Default Load

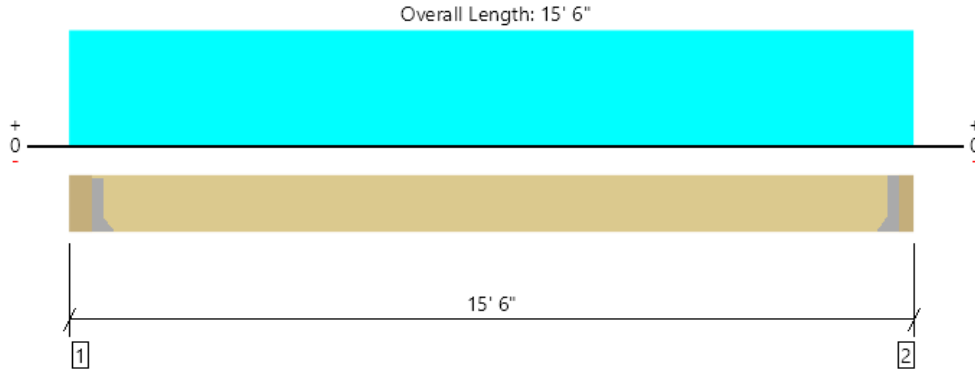
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MAIN FLOOR, B40

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)	1700 @ 5 1/2"	4725 (1.50")	Passed (36%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1392 @ 1' 5 3/8"	8590	Passed (16%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	5928 @ 7' 10"	15953	Passed (37%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.079 @ 7' 10"	0.369	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.347 @ 7' 10"	0.738	Passed (L/511)	--	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.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Hanger on 11 7/8" DF beam	5.50"	Hanger ¹	1.50"	1388	313	235	1936	See note ¹
2 - Hanger on 11 7/8" DF beam	3.50"	Hanger ¹	1.50"	1361	307	230	1898	See note ¹

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	14' 9" o/c	
Bottom Edge (Lu)	14' 9" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie							
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories	
1 - Face Mount Hanger	LUS410	2.00"	N/A	8-16d	6-16d		
2 - Face Mount Hanger	LUS410	2.00"	N/A	8-16d	6-16d		

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	5 1/2" to 15' 2 1/2"	N/A	13.0	--	--	
1 - Uniform (PSF)	0 to 15' 6" (Front)	1'	15.0	40.0	-	Default Load
2 - Uniform (PSF)	0 to 15' 6" (Front)	10'	10.0	-	-	Default Load
3 - Uniform (PSF)	0 to 15' 6" (Front)	1'	50.0	-	30.0	Default Load

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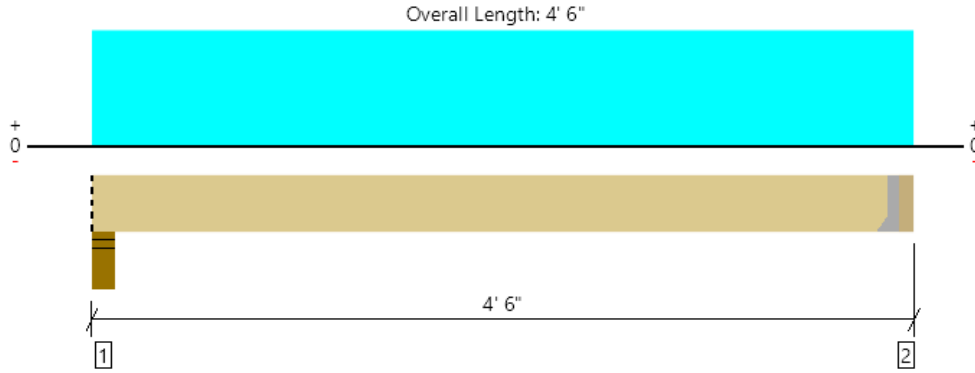
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshwelch@gmail.com	



MAIN FLOOR, B40B

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)	742 @ 4' 2 1/2"	4725 (1.50")	Passed (16%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	333 @ 3' 2 5/8"	8590	Passed (4%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	659 @ 2' 3 1/4"	15953	Passed (4%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.001 @ 2' 3 1/4"	0.097	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.005 @ 2' 3 1/4"	0.194	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.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Stud wall - DF	5.50"	5.50"	1.50"	677	121	136	934	Blocking
2 - Hanger on 11 7/8" DF beam	3.50"	Hanger ¹	1.50"	660	119	134	913	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)	4' 3" o/c	
Bottom Edge (Lu)	4' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	LUS410	2.00"	N/A	8-10dx1.5	6-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 4' 2 1/2"	N/A	13.0	--	--	
1 - Uniform (PSF)	0 to 4' 6" (Front)	1' 4"	15.0	40.0	-	Default Load
2 - Uniform (PSF)	0 to 4' 6" (Front)	20'	10.0	-	-	Default Load
3 - Uniform (PSF)	0 to 4' 6" (Front)	1'	50.0	-	30.0	Default Load
4 - Uniform (PSF)	0 to 4' 6" (Front)	1'	15.0	-	30.0	Default Load

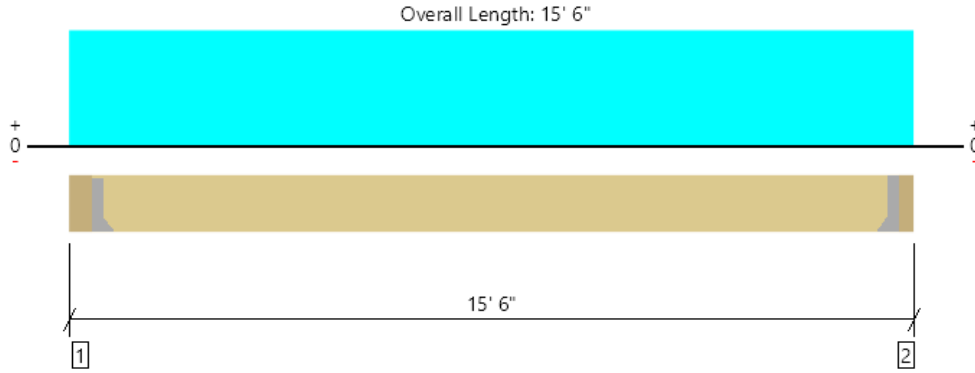
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 The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
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MAIN FLOOR, B41

1 piece(s) 3 1/2" x 11 7/8" 1.5E 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)	1079 @ 5 1/2"	4725 (1.50")	Passed (23%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	934 @ 1' 5 3/8"	8590	Passed (11%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3979 @ 7' 10"	15953	Passed (25%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.080 @ 7' 10"	0.369	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.220 @ 7' 10"	0.738	Passed (L/804)	--	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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 11 7/8" DF beam	5.50"	Hanger ¹	1.50"	722	418	1140	See note ¹
2 - Hanger on 11 7/8" DF beam	3.50"	Hanger ¹	1.50"	709	409	1118	See note ¹

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	14' 9" o/c	
Bottom Edge (Lu)	14' 9" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	LUS410	2.00"	N/A	8-10dx1.5	6-10d	
2 - 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.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	5 1/2" to 15' 2 1/2"	N/A	13.0	--	
1 - Uniform (PSF)	0 to 15' 6" (Front)	1' 4"	15.0	40.0	Default Load
2 - Uniform (PSF)	0 to 15' 6" (Front)	10'	6.0	-	Default Load

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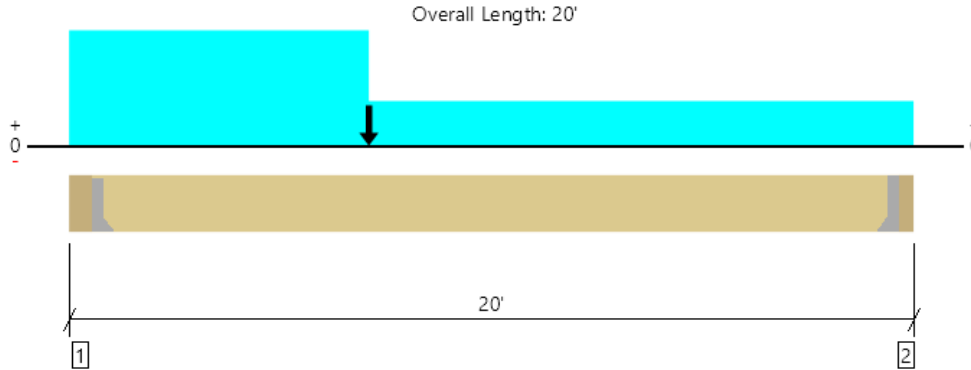
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



MAIN FLOOR, B45

1 piece(s) 5 1/4" x 11 7/8" 2.0E 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)	2955 @ 5 1/2"	4922 (1.50")	Passed (60%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2689 @ 1' 5 3/8"	12053	Passed (22%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	13592 @ 7'	29854	Passed (46%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.327 @ 9' 4 1/16"	0.481	Passed (L/706)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.583 @ 9' 7"	0.962	Passed (L/396)	--	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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 11 7/8" DF beam	5.50"	Hanger ¹	1.50"	1118	1950	3068	See note ¹
2 - Hanger on 11 7/8" DF beam	3.50"	Hanger ¹	1.50"	1013	823	1836	See note ¹

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

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

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HUC612	2.50"	N/A	22-16d	8-16d	
2 - Face Mount Hanger	U610	2.00"	N/A	14-16d	6-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	5 1/2" to 19' 8 1/2"	N/A	19.5	--	
1 - Uniform (PSF)	0 to 20' (Front)	8"	15.0	40.0	Default Load
2 - Uniform (PSF)	7' to 20' (Front)	10'	6.0	-	Default Load
3 - Uniform (PSF)	0 to 7' (Front)	4'	13.0	40.0	Default Load
4 - Point (lb)	7' (Front)	N/A	412	1120	Linked from: B55, Support 2

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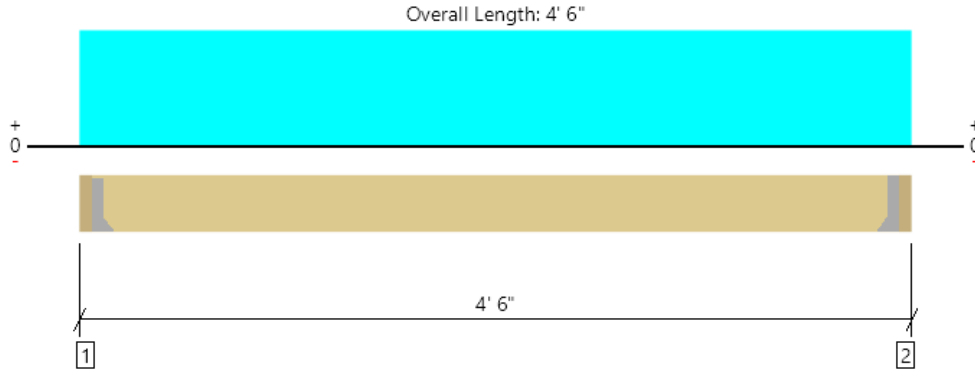
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



MAIN FLOOR, B46
2 piece(s) 2 x 6 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	988 @ 3"	2813 (1.50")	Passed (35%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	762 @ 8 1/2"	1980	Passed (38%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	988 @ 2' 3"	1475	Passed (67%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.036 @ 2' 3"	0.100	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.043 @ 2' 3"	0.200	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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 5 1/2" HF beam	3.00"	Hanger ¹	1.50"	166	945	1111	See note ¹
2 - Hanger on 5 1/2" HF beam	3.00"	Hanger ¹	1.50"	166	945	1111	See note ¹

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

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

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HU26-2	2.50"	N/A	12-10dx1.5	6-10d	
2 - Face Mount Hanger	HU26-2	2.50"	N/A	12-10dx1.5	6-10d	

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

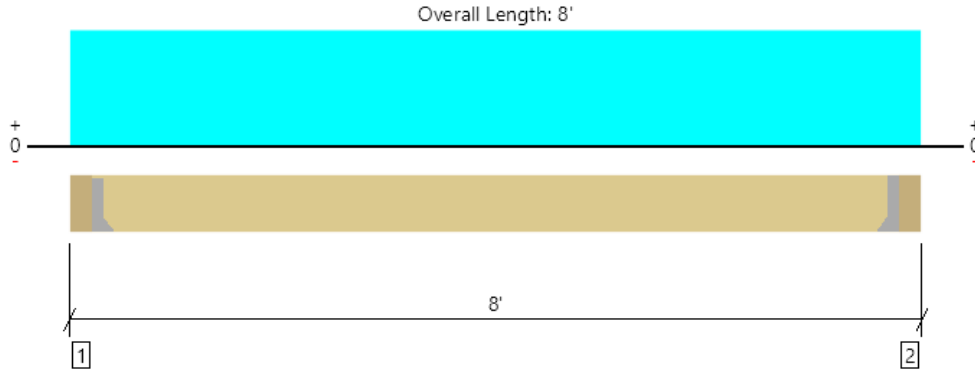
Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	3" to 4' 3"	N/A	4.2	--	
1 - Uniform (PSF)	0 to 4' 6" (Front)	7'	10.0	60.0	Default Load

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ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



MAIN FLOOR, B47
2 piece(s) 2 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1088 @ 5 1/4"	2813 (1.50")	Passed (39%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	904 @ 1' 1/2"	2610	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1939 @ 4'	2365	Passed (82%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.091 @ 4'	0.178	Passed (L/936)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.116 @ 4'	0.356	Passed (L/736)	--	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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 7 1/4" HF beam	5.25"	Hanger ¹	1.50"	260	960	1220	See note ¹
2 - Hanger on 7 1/4" HF beam	5.25"	Hanger ¹	1.50"	260	960	1220	See note ¹

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

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

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie							
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories	
1 - Face Mount Hanger	LUS28-2	2.00"	N/A	6-16d	4-16d		
2 - Face Mount Hanger	LUS28-2	2.00"	N/A	6-16d	4-16d		

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	5 1/4" to 7' 6 3/4"	N/A	5.5	--	
1 - Uniform (PSF)	0 to 8' (Front)	4'	15.0	60.0	Default Load

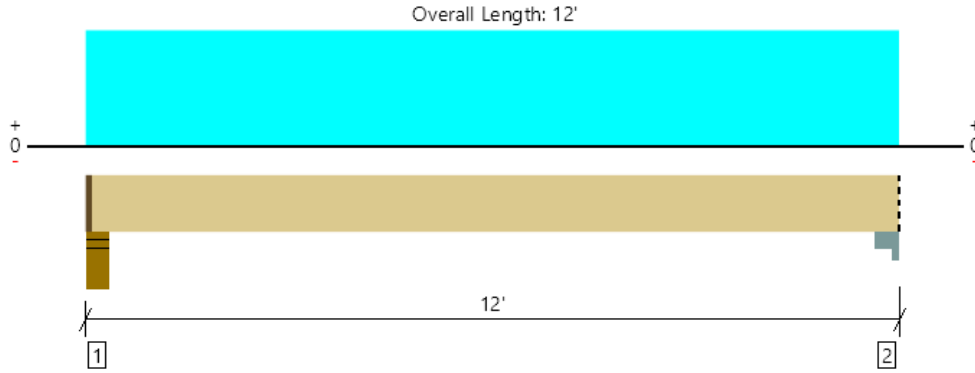
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ForteWEB Software Operator	Job Notes
<p>Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com</p>	



MAIN FLOOR, B51

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)	5520 @ 4"	5670 (4.00")	Passed (97%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4273 @ 1' 5 3/8"	8590	Passed (50%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	15029 @ 5' 11 3/4"	15953	Passed (94%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.346 @ 5' 11 3/4"	0.376	Passed (L/392)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.509 @ 5' 11 3/4"	0.565	Passed (L/266)	--	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/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - HF	5.50"	4.00"	3.89"	1810	3827	5637	1 1/2" Rim Board
2 - Column Cap - steel	6.00"	6.00"	1.80"	1824	3853	5677	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	10' 9" o/c	
Bottom Edge (Lu)	11' 11" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/2' to 12'	N/A	13.0	--	
1 - Uniform (PSF)	0 to 12' (Front)	10'	15.0	40.0	Default Load
2 - Uniform (PSF)	0 to 12' (Front)	10'	10.0	-	Default Load
3 - Uniform (PSF)	0 to 12' (Front)	4'	10.0	60.0	Default Load

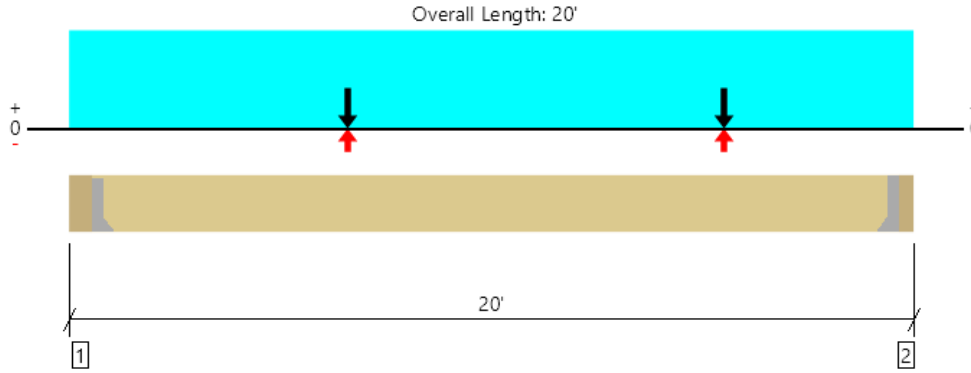
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 The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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MAIN FLOOR, B52

1 piece(s) 7" x 11 7/8" 2.0E 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)	3716 @ 19' 8 1/2"	6563 (1.50")	Passed (57%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	3537 @ 18' 8 5/8"	16071	Passed (22%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	17702 @ 9' 1 5/8"	39805	Passed (44%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.309 @ 10' 11/16"	0.481	Passed (L/748)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.650 @ 10' 3/4"	0.962	Passed (L/355)	--	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.
- Member should be side-loaded from both sides of the member or braced to prevent rotation.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Hanger on 11 7/8" PSL beam	5.50"	Hanger ¹	1.50"	1916	1528	-556	3444/-556	See note ¹
2 - Hanger on 11 7/8" PSL beam	3.50"	Hanger ¹	1.50"	2003	1758	-672	3761/-672	See note ¹

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

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

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HHUS7.25/10	3.31"	N/A	30-10d	10-10d	
2 - Face Mount Hanger	HHUS7.25/10	3.31"	N/A	30-10d	10-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	5 1/2" to 19' 8 1/2"	N/A	26.0	--	--	
1 - Uniform (PSF)	0 to 20' (Front)	1'	15.0	40.0	-	Default Load
2 - Uniform (PSF)	0 to 20' (Front)	10'	10.0	-	-	Default Load
3 - Point (lb)	6' 6" (Front)	N/A	559	1243	-614	Linked from: B35, Support 2
4 - Point (lb)	15' 6" (Front)	N/A	559	1243	-614	Linked from: B35, Support 2

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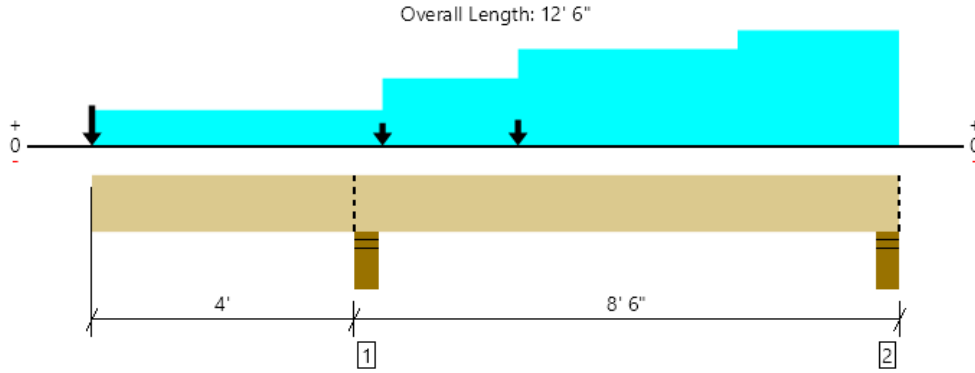


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MAIN FLOOR, B53

1 piece(s) 7" x 11 7/8" 2.0E 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)	19290 @ 4' 3"	26250 (6.00")	Passed (73%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	9019 @ 5' 5 7/8"	16071	Passed (56%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-29633 @ 4' 3"	39805	Passed (74%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.191 @ 0	0.213	Passed (2L/532)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.423 @ 0	0.425	Passed (2L/242)	--	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/480) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- -321 lbs uplift at support located at 12' 2". Strapping or other restraint may be required.
- Member should be side-loaded from both sides of the member or braced to prevent rotation.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Stud wall - DF	6.00"	6.00"	4.41"	10590	8692	2909	22191	Blocking
2 - Stud wall - DF	5.50"	5.50"	1.50"	1169	3765/-1490	1499	6433/-1490	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' 6" o/c	
Bottom Edge (Lu)	12' 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 12' 6"	N/A	26.0	--	--	
1 - Uniform (PSF)	0 to 12' 6" (Front)	10'	15.0	40.0	-	Default Load
2 - Uniform (PSF)	0 to 12' 6" (Front)	10'	10.0	-	-	Default Load
3 - Uniform (PSF)	4' 6" to 12' 6" (Front)	10'	10.0	-	-	Default Load
4 - Uniform (PSF)	6' 7 3/16" to 10' (Front)	10'	13.0	40.0	-	Default Load
5 - Uniform (PSF)	4' 6" to 12' 6" (Front)	10'	17.0	-	30.0	Default Load
6 - Uniform (PLF)	10' to 12' 6" (Front)	N/A	291.8	399.8	180.8	Linked from: J2, Support 2
7 - Point (lb)	6' 7 3/16" (Front)	N/A	710	1590	-	Linked from: B32, Support 2
8 - Point (lb)	4' 6" (Front)	N/A	657	91	681	Linked from: B36, Support 1
9 - Point (lb)	0 (Front)	N/A	3610	1926	690	Linked from: B52, Support 2

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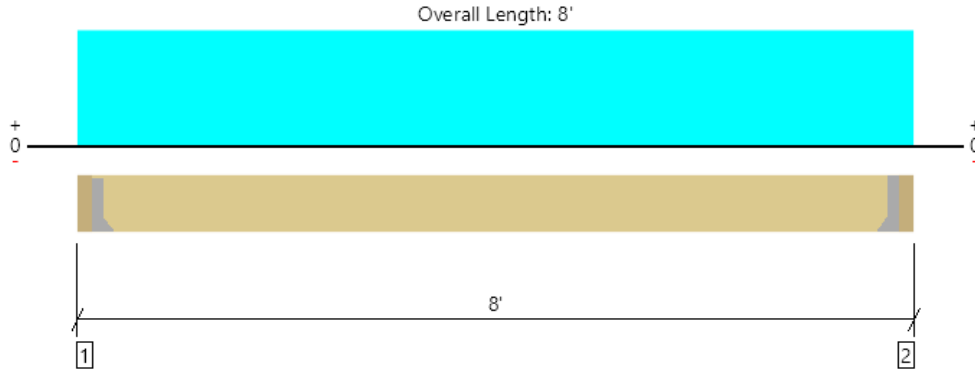
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



MAIN FLOOR, B55

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)	1424 @ 3 1/2"	4725 (1.50")	Passed (30%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1044 @ 1' 3 3/8"	8590	Passed (12%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2640 @ 4'	15953	Passed (17%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.032 @ 4'	0.185	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.044 @ 4'	0.371	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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 11 7/8" HF beam	3.50"	Hanger ¹	1.50"	412	1120	1532	See note ¹
2 - Hanger on 11 7/8" HF beam	3.50"	Hanger ¹	1.50"	412	1120	1532	See note ¹

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	7' 5" o/c	
Bottom Edge (Lu)	7' 5" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie							
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories	
1 - Face Mount Hanger	LUS410	2.00"	N/A	8-16d	6-16d		
2 - Face Mount Hanger	LUS410	2.00"	N/A	8-16d	6-16d		

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	3 1/2" to 7' 8 1/2"	N/A	13.0	--	
1 - Uniform (PSF)	0 to 8' (Front)	1'	13.0	40.0	Default Load
2 - Uniform (PSF)	0 to 8' (Front)	6'	13.0	40.0	Default Load

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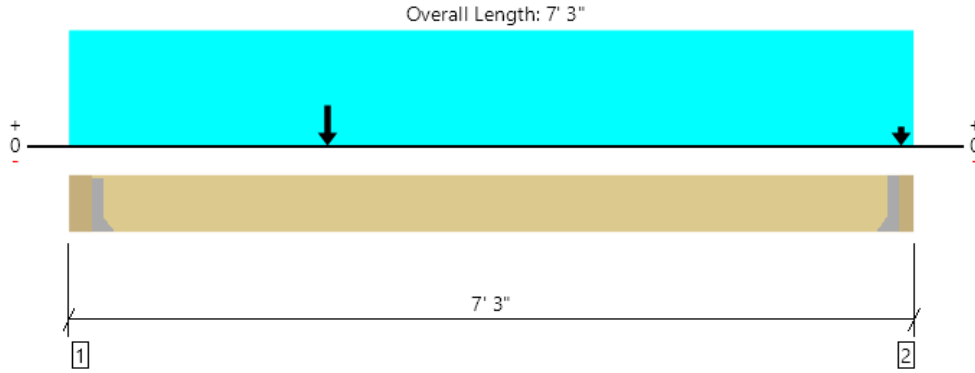
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ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



MAIN FLOOR, B56

1 piece(s) 5 1/4" x 11 7/8" 2.0E 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)	13781 @ 5 1/2"	13781 (4.20")	Passed (100%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	12104 @ 1' 5 3/8"	12053	Passed (100%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	22397 @ 2' 3 5/8"	29854	Passed (75%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.075 @ 3' 5 5/8"	0.162	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.138 @ 3' 5 9/16"	0.325	Passed (L/566)	--	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.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Hanger on 11 7/8" DF beam	5.50"	Hanger ¹	4.20"	6364	6664	3537	16565	See note ¹
2 - Hanger on 11 7/8" DF beam	3.50"	Hanger ¹	1.98"	3311	4712	1400	9423	See note ¹

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

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

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	
2 - Face Mount Hanger	HGUS5.50/10	4.00"	N/A	46-10d	16-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	5 1/2" to 6' 11 1/2"	N/A	19.5	--	--	
1 - Uniform (PSF)	0 to 7' 3" (Front)	7' 6"	15.0	40.0	-	Default Load
2 - Uniform (PSF)	0 to 7' 3" (Front)	4'	13.0	40.0	-	Default Load
3 - Point (lb)	2' 3 5/8" (Front)	N/A	5477	4184	3641	Linked from: B30, Support 2
4 - Point (lb)	2' 3 5/8" (Front)	N/A	1758	2328	1296	Linked from: B31, Support 1
5 - Point (lb)	2' 3 5/8" (Front)	N/A	709	409	-	Linked from: B41, Support 2
6 - Point (lb)	7' (Front)	N/A	412	1120	-	Linked from: B55, Support 2

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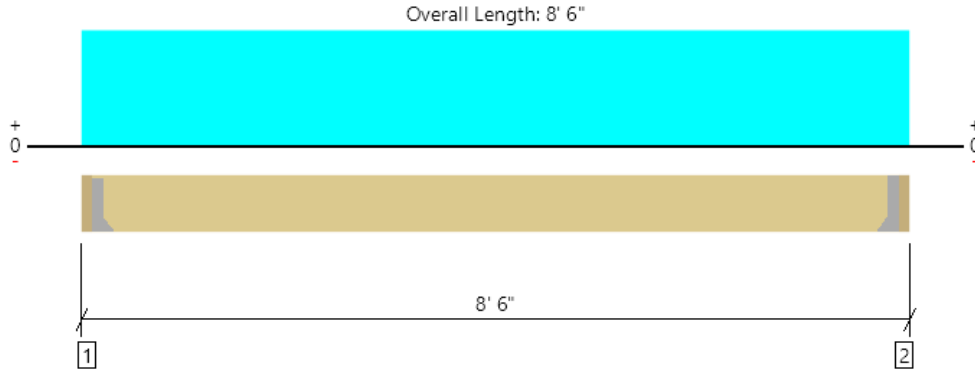
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MAIN FLOOR, deck joist
1 piece(s) 2 x 8 HF No.2 @ 16" OC



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)	397 @ 2 1/2"	911 (1.50")	Passed (44%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	321 @ 9 3/4"	1088	Passed (30%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	762 @ 4' 3"	1284	Passed (59%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.132 @ 4' 3"	0.202	Passed (L/736)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.153 @ 4' 3"	0.404	Passed (L/636)	--	1.0 D + 0.75 L + 0.75 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).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Hanger on 7 1/4" HF beam	2.50"	Hanger ¹	1.50"	57	340	142	539	See note ¹
2 - Hanger on 7 1/4" HF beam	2.50"	Hanger ¹	1.50"	57	340	142	539	See note ¹

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' 1" o/c	
Bottom Edge (Lu)	8' 1" o/c	

- Maximum allowable bracing intervals based on applied load.

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

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

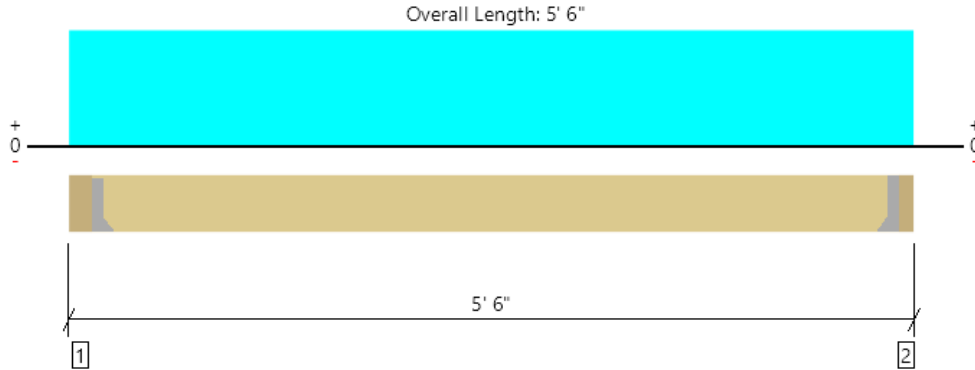
Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 8' 6"	16"	10.0	60.0	25.0	Default Load

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MAIN FLOOR, DECK BEAM
1 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)	751 @ 5' 1/2"	911 (1.50")	Passed (82%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	532 @ 1' 3/4"	1088	Passed (49%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	847 @ 2' 10"	1117	Passed (76%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.050 @ 2' 10"	0.119	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.058 @ 2' 10"	0.237	Passed (L/975)	--	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.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Hanger on 7 1/4" HF beam	5.50"	Hanger ¹	1.50"	127	723	301	1151	See note ¹
2 - Hanger on 7 1/4" HF beam	3.50"	Hanger ¹	1.50"	120	680	283	1083	See note ¹

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

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

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie							
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories	
1 - Face Mount Hanger	LU26	1.50"	N/A	6-16d	4-10dx1.5		
2 - Face Mount Hanger	LU26	1.50"	N/A	6-16d	4-10dx1.5		

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	5' 1/2" to 5' 2 1/2"	N/A	2.8	--	--	
1 - Uniform (PSF)	0 to 5' 6" (Front)	4' 3"	10.0	60.0	25.0	Default Load

Weyerhaeuser Notes

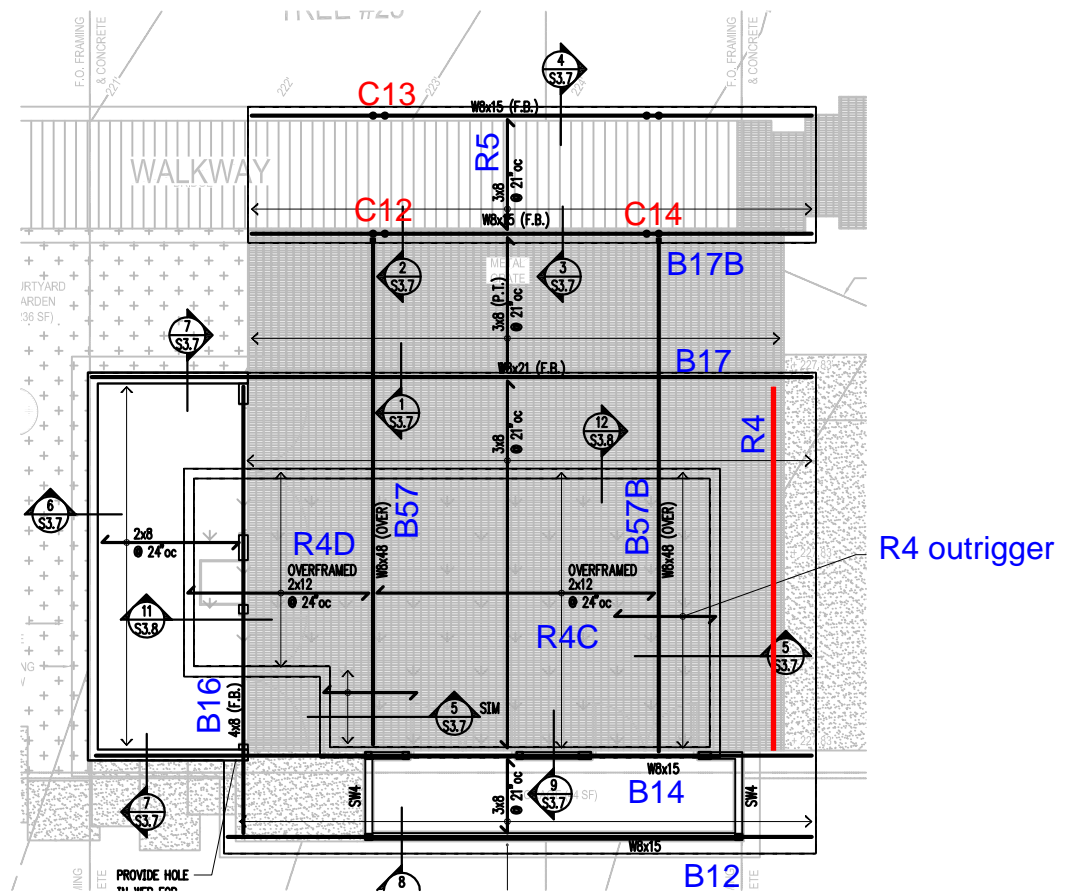
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
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CARPORT ROOF KEY



NO LONGER USED: R4B, B13, B15, B18, B19

RAFTERS & JOISTS (SLOPED AND FLAT)

Material:

Doug-Fir No. 1
 Fb = 1000 psi
 Fv = 180 psi
 E = 1.7 x 10⁶ psi

Loading:

DL = 13 psf
 LL = 30 psf
 s = 21 in.
 Cd = 1.15

Notes: Analysis does not consider axial loads.

Lengths shown are horizontal not diagonal.

Input loads are vertical loads.

Repetitive member factor included in Mr.

SLOPE & EQUIVALENT NORMAL LOAD

slope :12 angle W _{perp} (plf)	FLAT	2	3	4	5	6	7	8	9	10	11	18
		9	14	18	23	27	30	34	37	40	43	56
		75.25	74	73	71	69	67	65	63	60	58	55	42

MAXIMUM HORIZONTAL LENGTH (FT)

3x4 Vr = 1208 I = 8.932 S = 5.104 A = 8.75	Mr = 844	32.1											
	TL/ = 240	9.5	9.4	9.3	9.2	9.1	9.0	8.8	8.6	8.5	8.3	8.1	7.1
	LL/ = 360	7.7	7.6	7.5	7.4	7.3	7.1	6.9	6.8	6.6	6.4	6.2	5.2
		9.1	9.0	8.9	8.8	8.6	8.4	8.2	8.0	7.8	7.6	7.4	6.1
			2	3	4	5	6	7	8	9	10	11	12

3x6 Vr = 1898 I = 34.66 S = 12.6 A = 13.75	Mr = 1806	50.4											
	TL/ = 240	13.9	13.8	13.6	13.5	13.3	13.1	12.9	12.6	12.4	12.1	11.9	10.3
	LL/ = 360	12.0	11.9	11.8	11.6	11.4	11.2	10.9	10.6	10.4	10.1	9.8	8.1
		14.3	14.1	14.0	13.8	13.5	13.3	12.9	12.6	12.3	12.0	11.7	9.6
			2	3	4	5	6	7	8	9	10	11	12

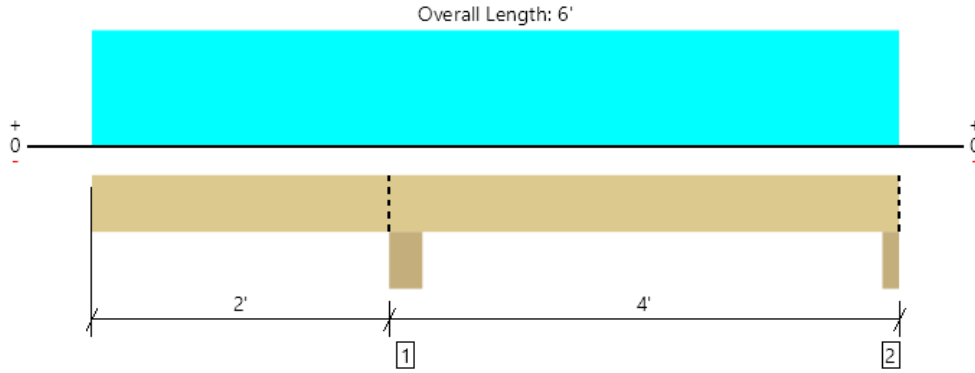
R4>>

3x8 Vr = 2501 I = 79.39 S = 21.9 A = 18.13	Mr = 2896	66.5											
	TL/ = 240	17.5	17.4	17.3	17.1	16.9	16.6	16.3	16.0	15.7	15.4	15.1	13.1
	LL/ = 360	15.9	15.7	15.5	15.3	15.0	14.7	14.4	14.0	13.7	13.3	12.9	10.7
		18.8	18.6	18.4	18.2	17.8	17.5	17.1	16.6	16.2	15.8	15.4	12.7
			2	3	4	5	6	7	8	9	10	11	12

3x10 Vr = 3191 I = 164.9 S = 35.65 A = 23.13	Mr = 4322	84.8											
	TL/ = 240	21.4	21.3	21.1	20.9	20.6	20.3	19.9	19.6	19.2	18.8	18.4	16.0
	LL/ = 360	20.2	20.0	19.8	19.5	19.2	18.8	18.3	17.9	17.4	17.0	16.5	13.7
		24.0	23.8	23.5	23.2	22.8	22.3	21.8	21.2	20.7	20.1	19.6	16.2
			2	3	4	5	6	7	8	9	10	11	12

3x12 Vr = 3881 I = 296.6 S = 52.73 A = 28.13 Cf = 1	Mr = 5812	103.2											
	TL/ = 240	24.9	24.7	24.5	24.2	23.9	23.5	23.1	22.7	22.2	21.8	21.3	18.5
	LL/ = 360	24.6	24.4	24.1	23.8	23.3	22.8	22.3	21.8	21.2	20.6	20.1	16.6
		29.2	28.9	28.6	28.2	27.7	27.1	26.5	25.8	25.2	24.5	23.8	19.7
			2	3	4	5	6	7	8	9	10	11	12

UPPER FLOOR, R4 OUTRIGGER
2 piece(s) 2 x 4 DF 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)	774 @ 2' 4"	9720 (8.00")	Passed (8%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	301 @ 2' 11 1/2"	1449	Passed (21%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-436 @ 2' 4"	911	Passed (48%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.054 @ 0	0.200	Passed (2L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.126 @ 0	0.233	Passed (2L/446)	--	1.0 D + 1.0 S (Alt 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/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/0.2") 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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Beam - HF	8.00"	8.00"	1.50"	484	290	774	Blocking
2 - Beam - HF	4.00"	4.00"	1.50"	116	94	210	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	

•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 6'	24"	50.0	30.0	Default Load

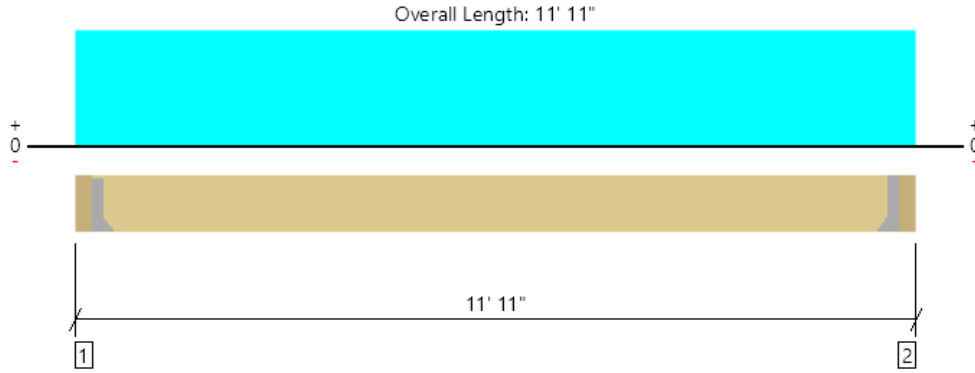
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ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshwelch@gmail.com	





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)	900 @ 4"	911 (1.50")	Passed (99%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	750 @ 1' 3 1/4"	1941	Passed (39%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2531 @ 5' 11 1/2"	2964	Passed (85%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.093 @ 5' 11 1/2"	0.375	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.249 @ 5' 11 1/2"	0.563	Passed (L/542)	--	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/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Hanger on 11 1/4" HF beam	4.00"	Hanger ¹	1.50"	596	358	954	See note ¹
2 - Hanger on 11 1/4" HF beam	4.00"	Hanger ¹	1.50"	596	358	954	See note ¹

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 8" o/c	
Bottom Edge (Lu)	11' 3" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie							
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories	
1 - Face Mount Hanger	LUS28	1.75"	N/A	6-10dx1.5	4-10d		
2 - Face Mount Hanger	LUS28	1.75"	N/A	6-10dx1.5	4-10d		

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

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 11' 11"	24"	50.0	30.0	Default Load

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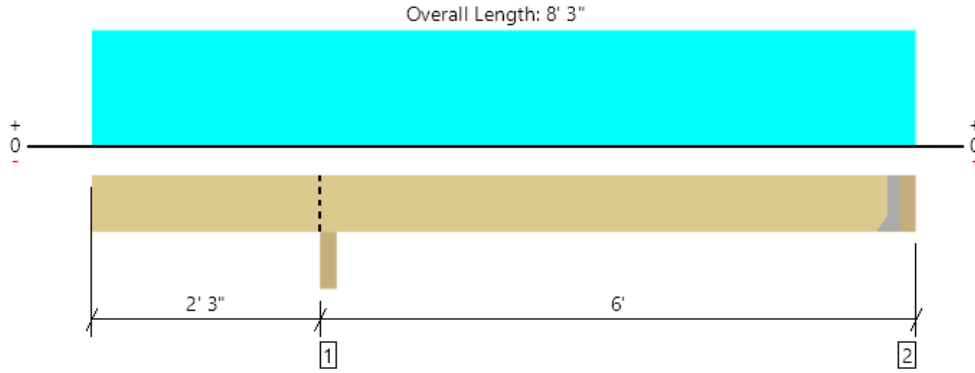
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ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



UPPER FLOOR, R4D

1 piece(s) 2 x 12 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)	371 @ 7' 11"	911 (1.50")	Passed (41%)	--	1.0 D + 1.0 S (Alt Spans)
Shear (lbs)	348 @ 3' 6 1/4"	1941	Passed (18%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-467 @ 2' 5"	2964	Passed (16%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.004 @ 5' 3 3/8"	0.183	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.009 @ 5' 4 9/16"	0.275	Passed (L/999+)	--	1.0 D + 1.0 S (Alt 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/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Beam - HF	4.00"	4.00"	1.50"	570	342	912	Blocking
2 - Hanger on 11 1/4" HF beam	4.00"	Hanger ¹	1.50"	255	169	424	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)	7' 11" o/c	
Bottom Edge (Lu)	7' 11" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie

Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	LUS28	1.75"	N/A	6-10dx1.5	3-10d	

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

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 8' 3"	24"	50.0	30.0	Default Load

Weyerhaeuser Notes

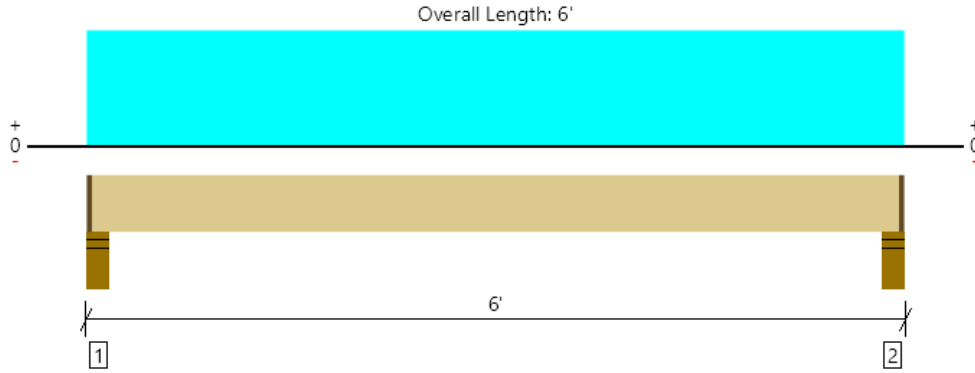
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ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



UPPER FLOOR, R5
1 piece(s) 2 x 6 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)	463 @ 4 1/2"	2582 (4.25")	Passed (18%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	333 @ 11"	949	Passed (35%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	551 @ 3'	921	Passed (60%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.038 @ 3'	0.131	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.101 @ 3'	0.262	Passed (L/623)	--	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).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	5.50"	4.25"	1.50"	300	180	480	1 1/4" Rim Board
2 - Stud wall - HF	5.50"	4.25"	1.50"	300	180	480	1 1/4" Rim Board

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

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

•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 6'	24"	50.0	30.0	Default Load

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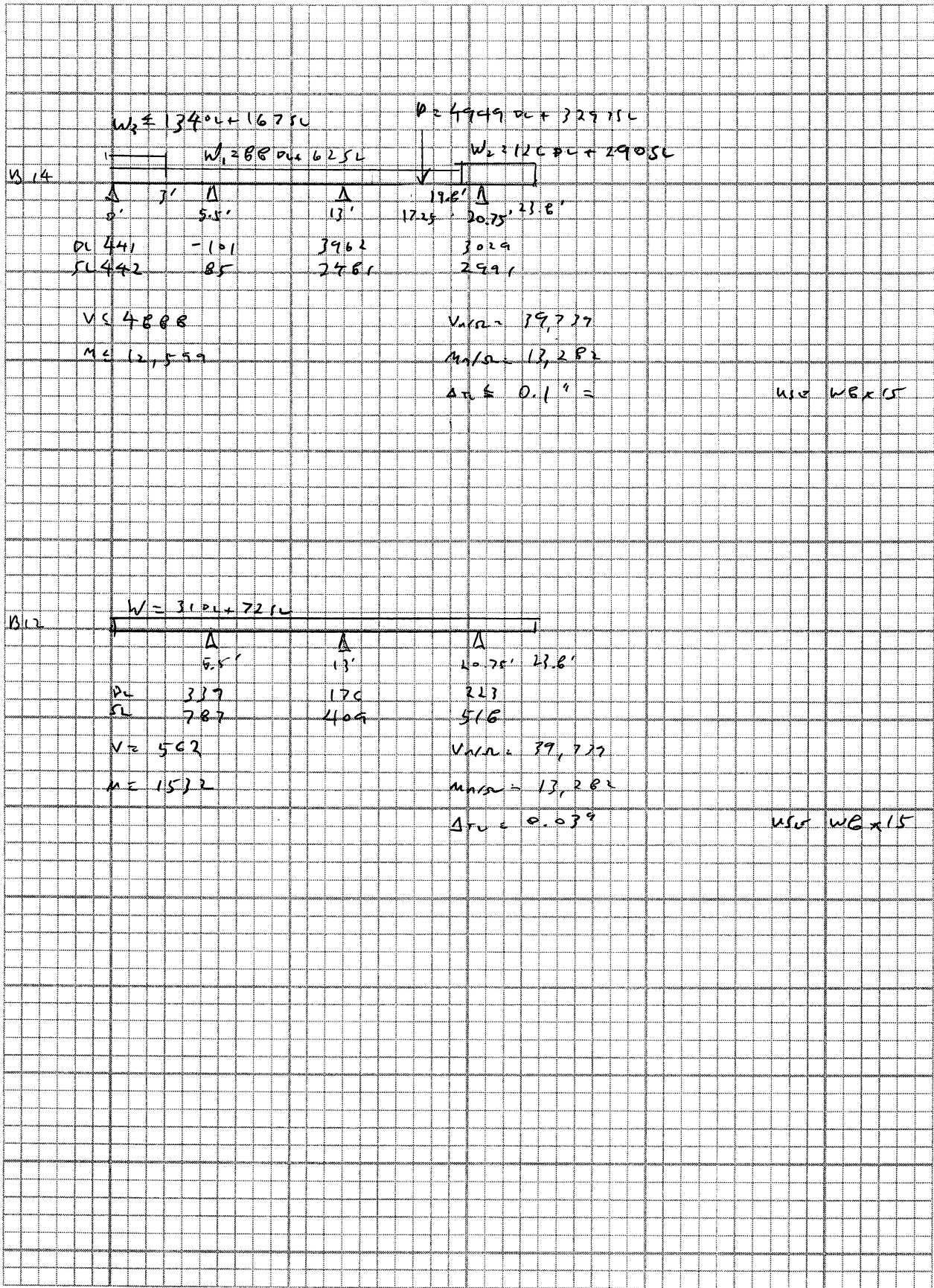
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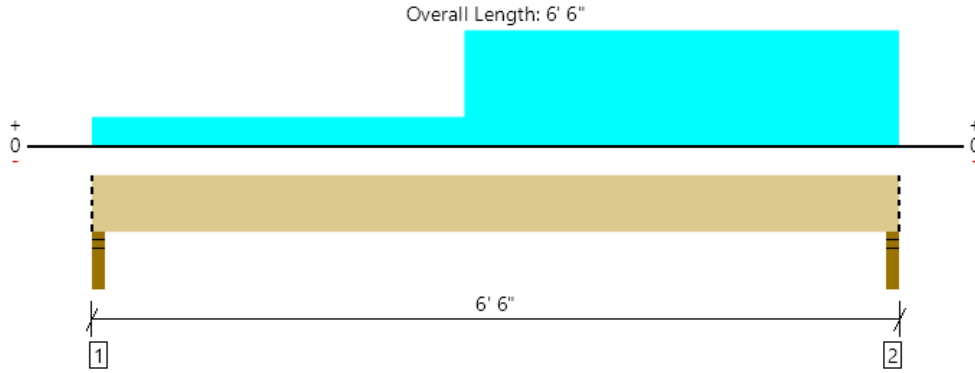


PROJECT:

Date:



UPPER FLOOR, B16
1 piece(s) 4 x 8 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1698 @ 6' 4 1/2"	4253 (3.00")	Passed (40%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1172 @ 5' 7 3/4"	3502	Passed (33%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2135 @ 3' 8 7/8"	3438	Passed (62%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.037 @ 3' 4 1/4"	0.313	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.081 @ 3' 4 1/2"	0.417	Passed (L/931)	--	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.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	1.50"	460	473	933	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.50"	938	760	1698	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' 6" o/c	
Bottom Edge (Lu)	6' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 6"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 6' 6" (Front)	3' 3"	17.0	30.0	Default Load
2 - Uniform (PLF)	3' to 6' 6" (Front)	N/A	285.0	171.0	Linked from: R4C, Support 1

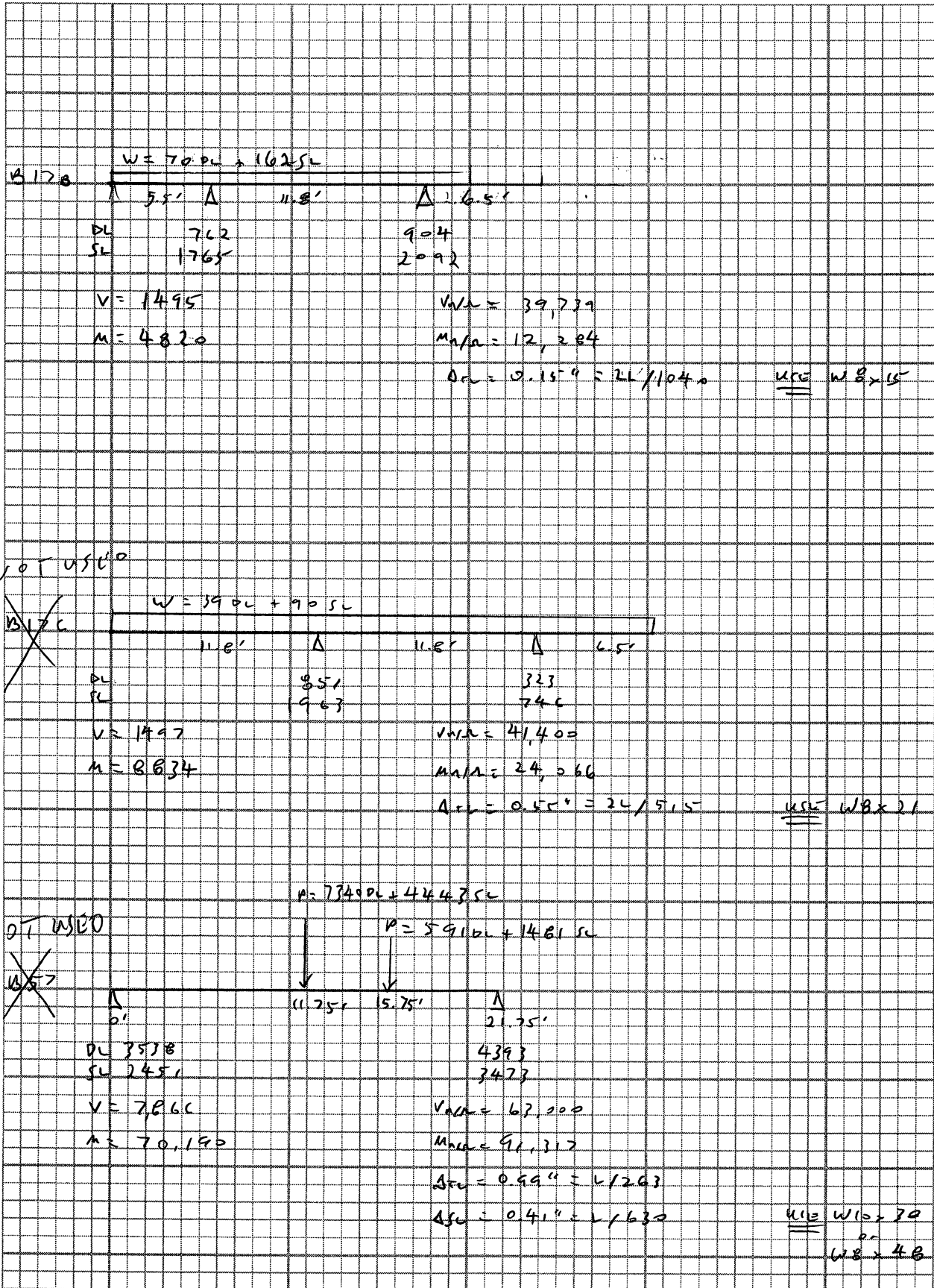
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

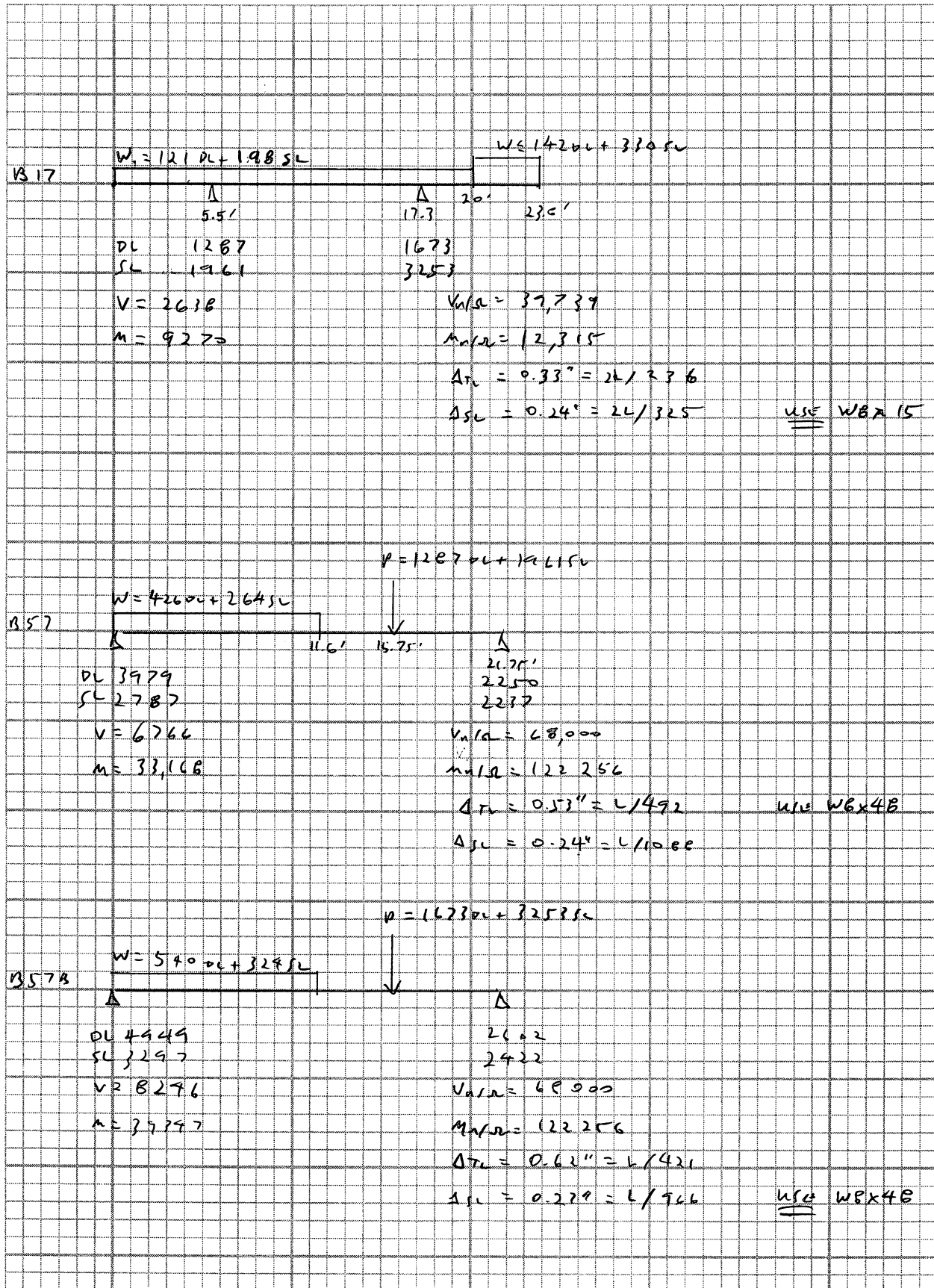
ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	





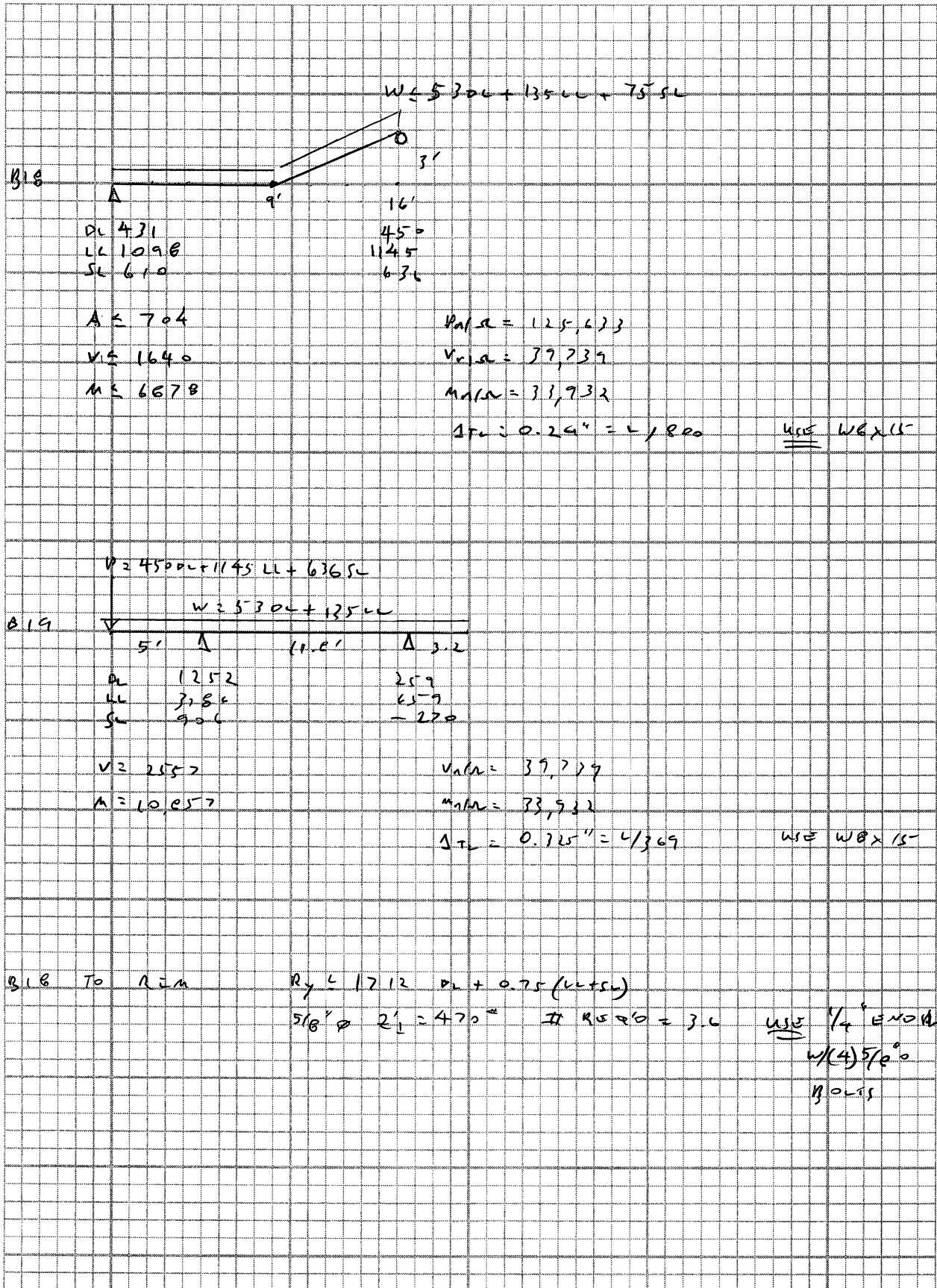
PROJECT:

Date:



PROJECT:

Date:



PROJECT: MERCER GROVE

Date:

GRATING FOR CARPORT

$$W \leq 20 \text{ psf} \text{ OL} + 50 \text{ psf} \text{ LL} = 70 \text{ psf}$$

$$C = 2000 \text{ lb/LL}$$

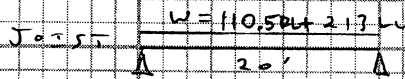
$$L \leq 51''$$

USE 2" x 1/2" G40 McMichael's Bar grating

CAPACITY: $W = 878 \quad A = 0.259$

$$C = 2246 \quad A = 0.207$$

$$L \leq 60''$$



$$DL = 110.5$$

$$LL = 217.0$$

$$V = 2275$$

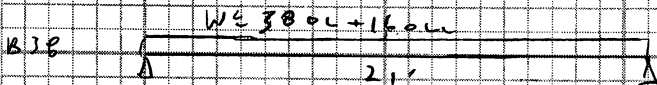
$$M = 16,175$$

$$V_{ALL} = 41,400$$

$$M_{ALL} = 50,898$$

$$ALL = 0.35'' = L/1683$$

USE W8x21
@ 51" oc.



$$DL = 379$$

$$LL = 168.0$$

$$V = 2079$$

$$M = 10,915$$

$$V_{ALL} = 32,240$$

$$M_{ALL} = 37,925$$

$$ALL = 0.69'' = L/305$$

USE W6x20
or
W8x21

PROJECT: MELCOR 61000

Date:

$P = 1105 \text{ DL} + 213 \text{ CL}$

B35

DL 765
CL 1475

$V = 2237$
 $M = 4440$

$V_{max} = 765$
 $M_{max} = 2894.8$

$\Delta_{TC} = 0.02" = 2/4337$ USE W8x13

$P = 340 \text{ DL} + 2000 \text{ CL}$

B58

DL 198
CL 4292

$V = 8227$
 $M = 15,281$

$V_{max} = 41,900$
 $M_{max} = 42,547$

$\Delta_{TC} = 0.34" = 24/388$ USE W8x31

B39 TO CONCRETE WALL

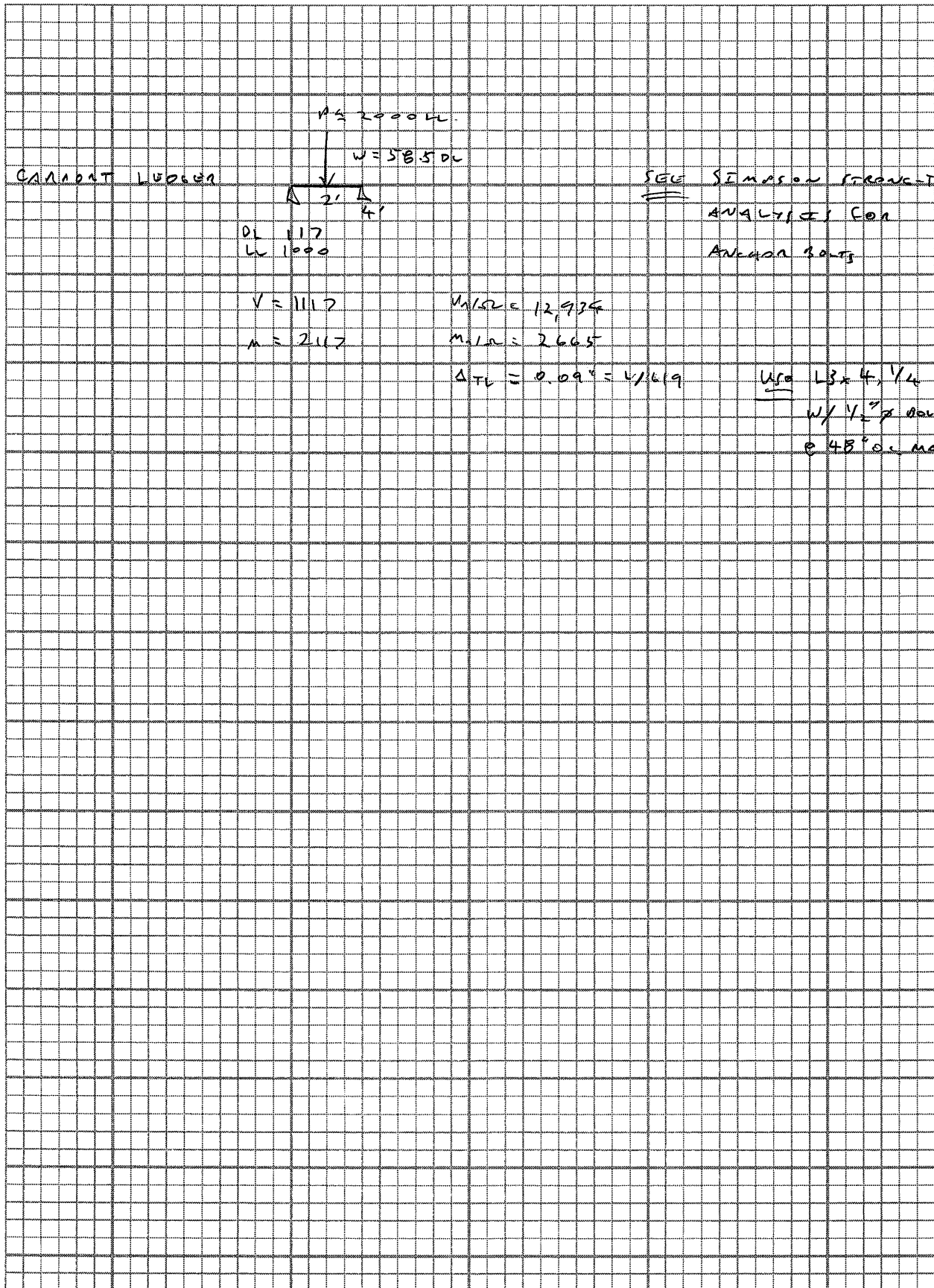
$R_y = 765 \text{ DL} + 2000 \text{ CL}$
 $R_y \leq 4118 \quad e \leq 2.5"$
 $M = R_y \cdot e / 12 = 8518 \text{ ft-lb}$ USE (4) 5/8" ϕ x 5
SEE STAIRS ON SIDEWALK-TOP TIE IN HD
ANALYSIS ATTACHED

B58 TO REAR CONCRETE WALL

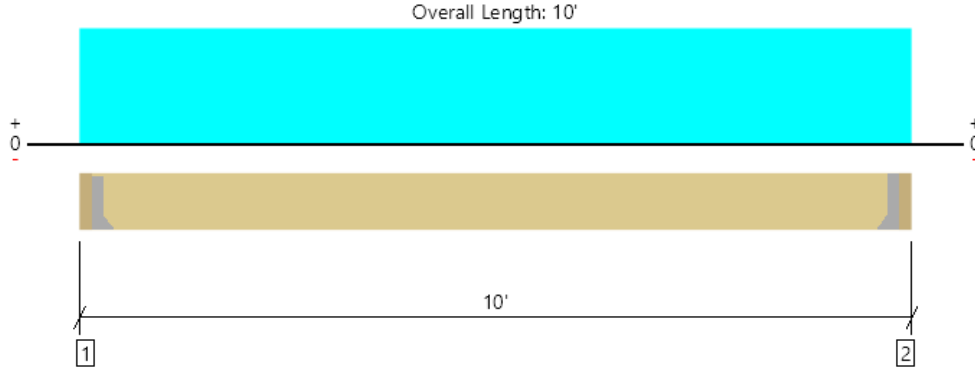
$R_y = 1198 \text{ DL} + 4292 \text{ CL} = 5490$
 $e \leq 5"$
 $M = R_y \cdot e = 27,450$
1/4" R x 6" Mn/a = 43,870 USE 1/4" R x 6"
5/8" ϕ r = 1.2 = 3680 W/12.510" ϕ Bolt
 $\# \text{ bolts} = 1.5$

PROJECT:

Date:



MAIN FLOOR, J6
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)	456 @ 3"	911 (1.50")	Passed (50%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	398 @ 10 1/4"	1088	Passed (37%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1083 @ 5'	1284	Passed (84%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.237 @ 5'	0.237	Passed (L/482)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.284 @ 5'	0.475	Passed (L/401)	--	1.0 D + 1.0 L (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).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 7 1/4" HF beam	3.00"	Hanger ¹	1.50"	80	400	480	See note ¹
2 - Hanger on 7 1/4" HF beam	3.00"	Hanger ¹	1.50"	80	400	480	See note ¹

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

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

- Maximum allowable bracing intervals based on applied load.

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

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

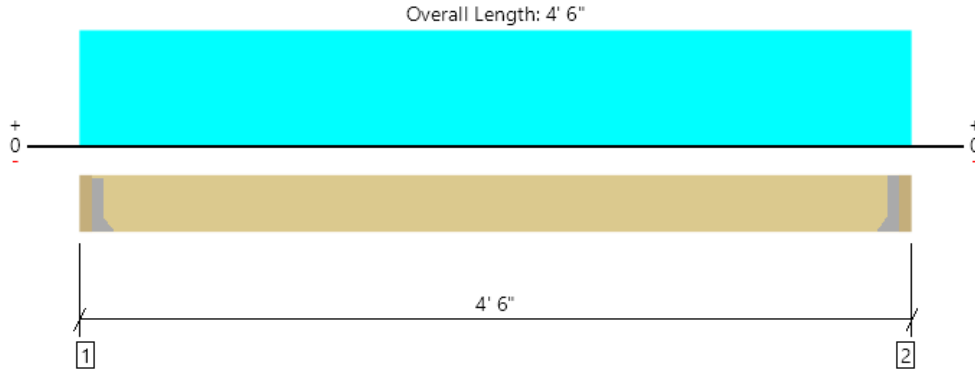
Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 10'	16"	12.0	60.0	Default Load

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

ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



MAIN FLOOR, B46
2 piece(s) 2 x 6 DF No.2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	988 @ 3"	2813 (1.50")	Passed (35%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	762 @ 8 1/2"	1980	Passed (38%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	988 @ 2' 3"	1475	Passed (67%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.036 @ 2' 3"	0.100	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.043 @ 2' 3"	0.200	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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 5 1/2" HF beam	3.00"	Hanger ¹	1.50"	166	945	1111	See note ¹
2 - Hanger on 5 1/2" HF beam	3.00"	Hanger ¹	1.50"	166	945	1111	See note ¹

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

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

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HU26-2	2.50"	N/A	12-10dx1.5	6-10d	
2 - Face Mount Hanger	HU26-2	2.50"	N/A	12-10dx1.5	6-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	3" to 4' 3"	N/A	4.2	--	
1 - Uniform (PSF)	0 to 4' 6" (Front)	7'	10.0	60.0	Default Load

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

ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



COLUMN DESIGN - AXIAL

This worksheet to be used to design columns under axial loading per NDS sections 3.6 & 3.7.

Material properties shown are per general structural notes and NDS

Steel columns shown are per AISC table 4

Pmax: design axial load

l: height

b: braced length

d: un-braced length

P_⊥: Allowable ⊥ to grain capacity

P_{||}: Allowable || to grain capacity

Materials List

Type	Spec.	size	E _{min} x10 ⁶ (psi)	F _c (psi)	F _b (psi)
1	HF#2	2"-4"	0.47	1300	820
2	HF#1	5x5 ≤	0.47	850	975
3	DF#1	2"-4"	0.62	1500	1000
4	DF#1	5x5 ≤	0.58	925	1350
5	CE	2"-4"	0.33	650	700
6	PSL		1.03	2900	2900

MARK	Loads					Dimensions					Material Properties											Axial			Plate Crushing		Use	
	DL (lbs)	LL (lbs)	SL (lbs)	E _{vert.} (lbs)	W _{vert.} (lbs)	Pmax (k)	l (ft.)	b (in.)	d (in.)	Le/d	Type #	E _{min} x10 ⁶ (psi)	F _c (psi)	F _b (psi)	c	K _f	C _d	C other	F _{cE} (psi)	F* _c (psi)	F'c (psi)	C _p	P _n (k)	F _{c⊥} (psi)	P _⊥ (k)			
SECOND FLOOR																												
C1	1860	0	1097	0	0	3.0	9.5	3.00	5.5	20.7	ok	1	0.47	1300	820	0.80	1	1	1	899	1300	720	0.55	11.88	625	10.31	OK	(2)2x6
C2	6921	0	4605	0	0	11.5	9.5	5.50	5.5	20.7	ok	1	0.47	1300	820	0.80	1	1	1	899	1300	720	0.55	21.79	625	18.91	OK	6x6
C3	3703	0	3215	0	0	6.9	9.5	9.00	3.5															625	19.69	OK	HSS 3x3x3/16	
C4	2581	0	1883	0	0	4.5	9.5	3.50	5.5	20.7	ok	3	0.62	1500	1000	0.80	1	1	1	1186	1500	908	0.61	17.48	625	12.03	OK	4x6
C4B	8395	2509	5171	0	0	14.2	9.5	9.25	3.5	32.6	ok	3	0.62	1500	1000	0.80	1	1.15	1	480	1725	449	0.26	14.53	625	20.23	OK	4x10
C5	7036	6495	4929	0	0	15.6	9.5	5.50	5.5	20.7	ok	4	0.58	925	1350	0.80	1	1	1	1110	925	694	0.75	20.98	625	18.91	OK	HSS 3x3x3/16
C6	8412	6765	5526	0	0	17.6	9.5	5.50	5.5	20.7	ok	4	0.58	925	1350	0.80	1	1	1	1110	925	694	0.75	20.98	625	18.91	OK	6x6
C6B	3680	2674	2425	0	0	7.5	9.5	4.50	5.5	20.7	ok	1	0.47	1300	820	0.80	1	1	1	899	1300	720	0.55	17.83	625	15.47	OK	6x6
C7	795	0	811	0	0	1.6	9.5	3.50	3.5	32.6	ok	1	0.47	1300	820	0.80	1	1	1	364	1300	340	0.26	4.17	625	7.66	OK	4x4
C8	4873	0	3991	0	0	8.9	9.5	6.00	5.0															625	18.75	OK	3" PIPE CAP = 25.4K	
C9	7576	1676	5849	0	0	13.4	9.5	9.00	3.0															625	16.88	OK	HSS 2.5x2.5x3/16 CAP =14.1K	
CARPORTRF																												
C10	2103	1449	1778	0	0	4.5	9.5	3.00	5.5	20.7	ok	1	0.47	1300	820	0.80	1	1	1	899	1300	720	0.55	11.88	625	10.31	OK	(2)2x6
C11	3299	2187	2332	0	0	6.7	9.5	4.50	5.5	20.7	ok	1	0.47	1300	820	0.80	1	1	1	899	1300	720	0.55	17.83	625	15.47	OK	(2)2x6
C12	3012	0	4002	0	0	7.0	9.5																					3" PIPE CAP = 25.4K
C13	452	0	1046	0	0	1.5	9.5																					3" PIPE CAP = 25.4K
C14	3506	0	4514	0	0	8.0	9.5																					3" PIPE CAP = 25.4K
CARPORTRFLR																												
C26	1704	3186	1952	0	0	5.6	2.0																					3" PIPE CAP = 25.4K
C25	5462	7478	4908	0	0	14.8	2.0																					3" PIPE CAP = 25.4K
C27	3848	2659	4514	0	0	9.2	2.0																					3" PIPE CAP = 25.4K
FIRST FLOOR																												
C15	10496	4252	3149	0	0	16.0	14.0																					4" PIPE CAP = 33.2K
C16	17865	12215	8080	0	0	33.1	14.0																					4" PIPE CAP = 33.2K
C17	9183	4973	4903	0	0	16.6	14.0																					4" PIPE CAP = 33.2K
C18	10201	11169	5318	0	0	22.6	8.5																					HSS 3x3x3/16 CAP = 24 K
C19	3437	5005	527	0	0	8.4	8.5																					HSS 3x3x3/16 CAP = 24 K
C20	6364	6664	3537	0	0	14.0	8.5	3.50	7.3	14.1	ok	1	0.47	1300	820	0.80	1	1	1	1952	1300	1053	0.81	26.72	625	15.86	OK	4x8
C21	12345	10027	6599	0	0	24.8	8.5																					3" PIPE CAP = 25.4K
C22	6716	4089	3991	0	0	12.8	8.5																					3" PIPE CAP = 25.4K
C23	10010	9198	5526	0	0	21.1	8.5	7.25	5.5	18.5	ok	4	0.58	925	1350	0.80	1	1	1	1386	925	749	0.81	29.86	625	24.92	OK	6x8
C24	11506	1291	2609	0	0	14.4	8.5																					CONC. WALL

SECTION 3: LATERAL

- > diaphragm & shearwall capacities
- > horizontal force distribution & key plans
- > shearwall design
- > seismic & wind worksheets
- > beams supporting SW overturning
- > misc. calculations

Diaphragm & Shearwall Capacities

The following capacities are used for plywood shearwalls & diaphragms.

Reference NDS table 4.2A & 4.2C for plywood diaphragm capacities.

Reference NDS table 4.3A for plywood shearwall capacities.

U.N.O. Sheathing material is Wood Structural Panels-Sheathing.

U.N.O. Hem-Fir used for supporting studs, Rafters & Joists calculations

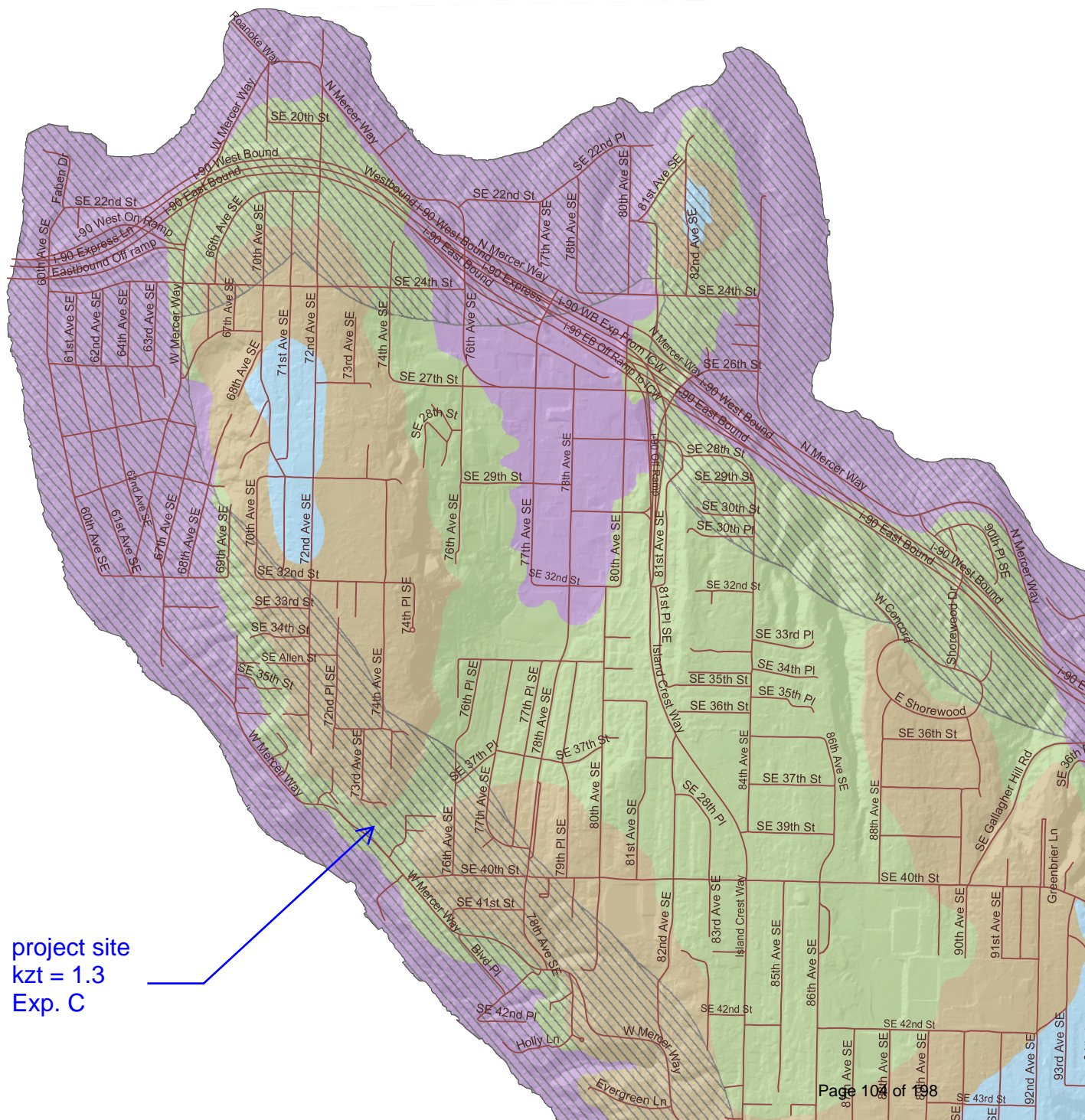
$\Phi = 0.8$

$\Omega = 2.5$

Type	Sheathing	Fastener	Pen. (in)	spacing	spacing at blocking	$\Phi V'_{s, seismic}$	$\Phi V'_{s, wind}$
Typical Roof	0.47	8d Common	2.03125	6"oc	n/a	267.8	375.7
Typ. Blocked Roof	0.47	8d Common	2.03125	6"oc	6"oc	401.8	561.7
Typical Floor	0.72	8d Common	1.78125	6"oc	n/a	267.8	375.7
Typ. Blocked Floor	0.72	8d Common	1.78125	6"oc	6"oc	401.8	561.7
Med. Blocked Floor	0.72	8d Common	1.78125	4"oc	4"oc	535.7	751.4
Max. Blocked Floor	0.72	8d Common	1.78125	2.5"oc	2.5"oc	788.6	1104.8
Shearwall Callout	sheathing	Fastener	Pen. (in)	spacing	Studs	$V'_{s, seismic} / \Omega$	$V'_{s, wind} / \Omega$
SW1	15/32"	8d Common	2	6"oc	2x Hem-fir	241.8	339.5
SW2	15/32"	8d Common	2	4"oc	2x Hem-fir	353.4	495.2
SW3	15/32"	8d Common	2	3"oc	2x Hem-fir	455.7	637.1
SW4	15/32"	8d Common	2	2"oc	3x Doug-Fir	675.0	945.0
SW5	15/32" 2-Sides	8d Common	2	3"oc	3x Doug-Fir	911.4	1274.1
SW6	15/32" 2-Sides	10d Common	2	2"oc	3x Doug-Fir	1540.0	2155.0

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

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



project site
kzt = 1.3
Exp. C

Search Information

Coordinates:	47.576, -122.241
Elevation:	197 ft
Timestamp:	2021-06-02T17:47:41.173Z
Hazard Type:	Seismic
Reference Document:	ASCE7-16
Risk Category:	II
Site Class:	D



Basic Parameters

Name	Value	Description
S_S	1.418	MCE_R ground motion (period=0.2s)
S_1	0.493	MCE_R ground motion (period=1.0s)
S_{MS}	1.418	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	0.945	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA

* See Section 11.4.8

▼Additional Information

Name	Value	Description
SDC	* null	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s
CR_S	0.902	Coefficient of risk (0.2s)
CR_1	0.897	Coefficient of risk (1.0s)
PGA	0.607	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.668	Site modified peak ground acceleration
T_L	6	Long-period transition period (s)

SsRT	1.418	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.572	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	3.518	Factored deterministic acceleration value (0.2s)
S1RT	0.493	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.55	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.412	Factored deterministic acceleration value (1.0s)
PGAd	1.202	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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Search Information

Coordinates: 47.576, -122.241
Elevation: 197 ft
Timestamp: 2021-06-02T17:55:58.613Z
Hazard Type: Wind



ASCE 7-16

MRI 10-Year 67 mph
 MRI 25-Year 73 mph
 MRI 50-Year 78 mph
 MRI 100-Year 83 mph
 Risk Category I 92 mph
 Risk Category II 97 mph
 Risk Category III 104 mph
 Risk Category IV 108 mph

ASCE 7-10

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

ASCE 7-05

ASCE 7-05 Wind Speed 85 mph

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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This website does not imply approval by the governing building code board responsible for building code approval and interpretation for the building site described by latitude/longitude location in the report.

SEISMIC DESIGN - HOUSE

ASCE 7-16

Equivalent Lateral Force Procedure

Occupancy Category	II	Table 1-1
Seismic Design Category	D	Table 11.6-1
Importance Factor	1.00	Table 11.5-1
Site Class	D	Table 20.3-1
S _s	141.80 %g	(from USGS Seismic Hazard Curves, 2008 data)
S ₁	49.30 %g	(from USGS Seismic Hazard Curves, 2008 data)
F _a	1.00	Table 11.4-1
F _v	1.81	Table 11.4-2
C _t	0.02	Table 12.8-2
x	0.75	Table 12.8-2
h _n	30.25 feet	(height to highest level)

S _{MS} = F _a *S _s	1.4180	Eq. 11.4-1
S _{M1} = F _v *S ₁	0.8923	Eq. 11.4-2
S _{DS} = (2/3)*S _{MS}	0.9453 g	Eq. 11.4-3
S _{D1} = (2/3)*S _{M1}	0.5949 g	Eq. 11.4-4
Period T _a = C _t *h _n ^x	0.2580 s	Eq. 12.8-7
T _o	0.1259 s	per section 11.4.6
T _s	0.6293 s	per section 11.4.6
S _a	0.9453 g	per section 11.4.6

R	6.5	Table 12.2-1
Ω _o	2.5	Table 12.2-1
C _d	4	Table 12.2-1
Analysis type okay	Yes	Table 12.6-1

Equivalent Lateral Force Procedure (section 12.8)

C _s	0.1454	Eq. 12.8-2
W, weight	127,801 lb	per table below
V	18,587 lb	Eq. 12.8-1

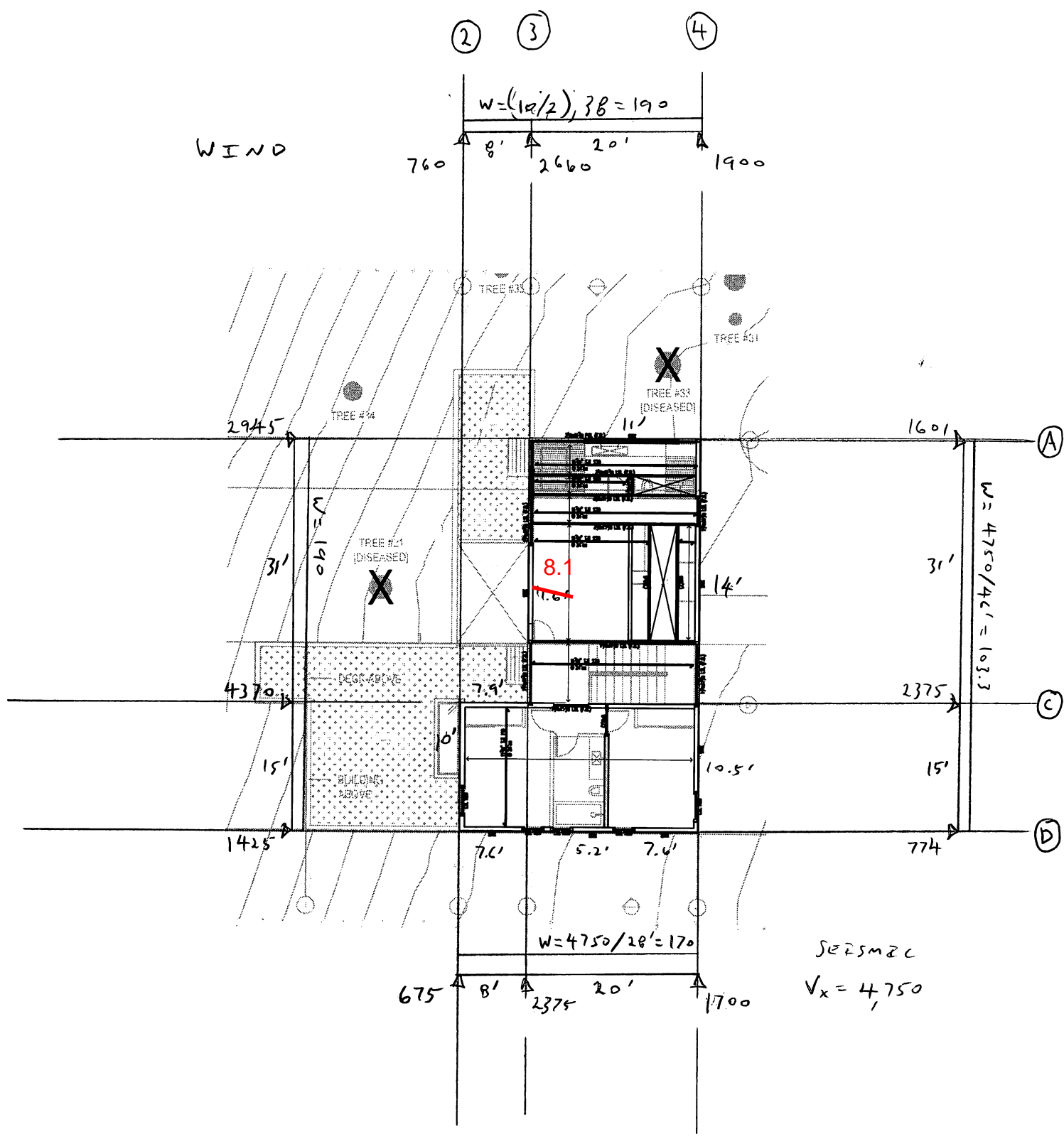
Vertical Force Distribution (section 12.8.3)

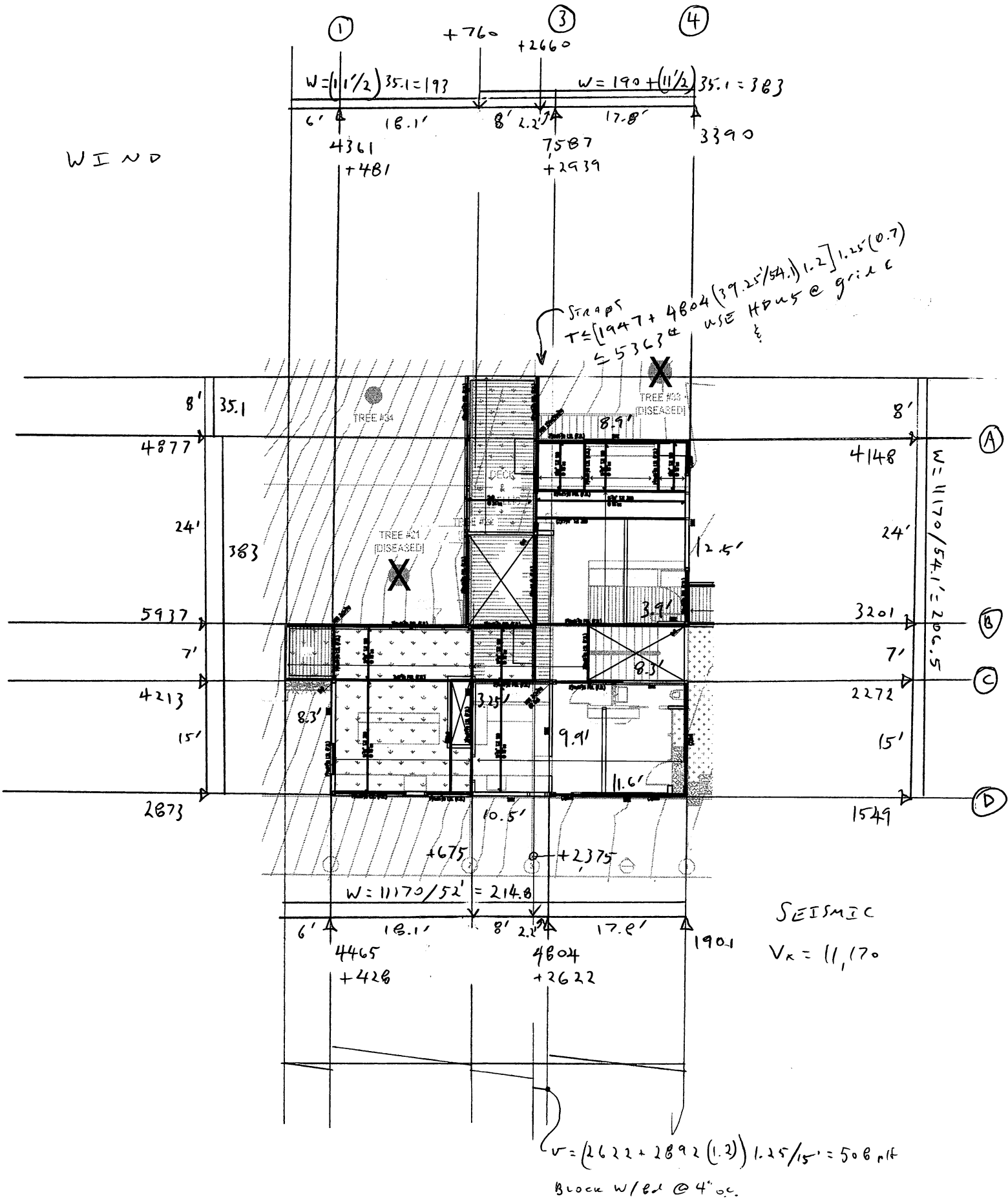
k = 1.00

Level	Hx (ft)	Area (ft ²)	Wt. (psf)	Wt. (k)	Wall allow (psf)	Wall Wt. (k)	Total Wt. (k)	WxHx (k-ft)	Cvx (%)	V (k)
roof	30.25	1051	15	15.8	5	5.3	21.0	635.9	25.6	4.75
2nd flr.	21.00	2846	15	42.7	10	28.5	71.1	1494.0	60.1	11.17
1st floor	10.00	1782	15	26.7	5	8.9	35.6	356.4	14.3	2.66
							127.8	2486.2	100.0	18.6

Diaphragm Force per 12.10-1

Level	F _i	Σ F _i	W _i	Σ W _i	F _{px}	min.	max.	F_{px}	F _{px} /V
roof	4.75	4.75	21.0	21.0	4.75	3.97	7.95	4.75	1.00
2nd flr.	11.17	11.17	71.1	71.1	11.17	13.45	26.90	13.45	1.20
1st floor	2.66	7.42	35.6	56.7	4.67	6.74	13.48	6.74	2.53





Lateral Force Distribution & Plywood Shearwall Design

SEISMIC

Wall DL (psf) = 10
 floor DL (psf) = 12
 Roof DL (psf) = 15
 S_{DS} = 0.94

SWx = Shearwall per 8/S3.1
 P_x = Point Load From Header (DL)
 E = Earthquake
 W = Wind

Notes: Wind and Seismic Loads input as LRFD then converted to ASD for v & O.T.
 Basic Load Combinations Per ASCE 7-16 (Basic Combinations for ASD)
 Base Shear Comparison Shown Below Shearwall Groups
 * In lieu of reducing SW capacity, v(max) will be divided by 2w/l for SW sizing

ASD LOADS (0.7 E & 0.6 W) USED FOR ANALYSIS																											
ROOF	E UNFACTORED			SW	L	h	V/ΣL	Aspect	v(max)*	SW	O.T.	O.T.	DL Trib. Length(ft)			DL max	P _{left}	P _{right}	T _L	T _R	Holddown		C _{LL} (k)	C1	C2	MIN. POST	
GRID	V	V _{above}	V _{total} (k)	MARK	(ft)	(ft)	(klf)	Ratio	ρ	ASD(klf)	above	MAX.(k)	wall	floor	roof	(k)	(k)	(k)	(k)	(k)	L/R	<=	(k)	(k)	L/R		
2	0.68	0.00	0.68	A	10.0	8.0	0.1	0.80	1.3	0.061	SW1	0.0	0.49	8	0	1	0.48	0.0	0.0	0.27	0.27	CS22	CS22	0.00	1.50	1.50	(2)2x6 (2)2x6
3	2.38	0.00	2.38	A	8.1	8.0	0.3	0.99	1.3	0.267	SW2	0.0	2.13	8	0	6	0.68	0.7	0.7	1.51	1.50	CS16	CS16	1.03	3.48	3.48	(2)2x6 (2)2x6
4	1.70	0.00	1.70	A	10.5	8.0	0.1	0.76	1.3	0.063	SW1	0.0	0.51	8	0	1	0.50	0.0	0.7	0.27	-0.04	CS22	CS22	0.00	1.52	1.60	(2)2x6 (2)2x6
TOTAL	4.75	0.00	4.75	A	14.0	8.0	0.1	0.57	1.3	0.063	SW1	0.0	0.51	8	0	1	0.67	0.7	1.1	-0.12	-0.34	CS22	CS22	1.68	2.74	2.80	(2)2x6 (2)2x6
A	0.77	0.00	0.77	1	11.0	8.0	0.1	0.73	1.3	0.064	SW1	0.0	0.51	8	0	0	0.44	1.0	0.0	-0.15	0.32	CS22	CS22	1.35	2.53	2.40	(2)2x6 (2)2x6
C	2.38	0.00	2.38	1	7.9	8.0	0.3	1.01	1.3	0.274	SW2	0.0	2.19	8	0	8	0.76	0.0	0.7	1.83	1.52	CS14	CS14	1.13	3.51	3.60	(2)2x6 (2)2x6
D	1.60	0.00	1.60	1	7.6	8.0	0.1	1.05	1.3	0.071	SW1	0.0	0.57	8	0	8	0.73	0.0	0.2	0.23	0.15	CS22	CS22	0.28	1.66	1.69	(2)2x6 (2)2x6
TOTAL	4.75	0.00	4.75	2	5.2	8.0	0.1	1.54	1.3	0.071	SW1	0.0	0.57	8	0	8	0.52	0.2	0.2	0.25	0.25	CS22	CS22	0.28	1.69	1.69	(2)2x6 (2)2x6
TOTAL	4.75	0.00	4.75	3	7.6	8.0	0.1	1.05	1.3	0.071	SW1	0.0	0.57	8	0	8	0.76	0.2	0.0	0.14	0.22	CS22	CS22	0.28	1.69	1.67	(2)2x6 (2)2x6

ASD LOADS (0.7 E & 0.6 W) USED FOR ANALYSIS																											
2ND FLR.	E UNFACTORED			SW	L	h	V/ΣL	Aspect	v(max)*	SW	O.T.	O.T.	DL Trib. Length(ft)			DL max	P _{left}	P _{right}	T _L	T _R	Holddown		C _{LL} (k)	C1	C2	MIN. POST	
GRID	V	V _{above}	V _{total} (k)	MARK	(ft)	(ft)	(klf)	Ratio	ρ	ASD(klf)	above	MAX.(k)	wall	floor	roof	(k)	(k)	(k)	(k)	(k)	L/R	<=	(k)	(k)	L/R		
1	4.47	0.43	4.89	A	8.3	10.0	0.6	1.20	1.3	0.536	SW5	0.0	5.36	10	0	1	0.48	0.1	6.9	5.08	1.90	(2)CS14	CS14	4.61	8.51	10.37	(3)2x6 6x6
3	4.80	2.62	7.43	A	9.9	10.0	0.8	1.01	1.3	0.683	SW5	0.0	6.83	10	1	0	0.57	0.0	7.2	6.56	3.17	(3)CS14	(2)CS14	11.45	7.84	15.82	(4)2x4 HSS
4	1.90	1.70	3.60	A	12.5	10.0	0.3	0.80	1.3	0.262	SW2	0.5	3.13	18	10	1	1.97	2.8	1.8	0.91	1.37	HDU2	HDU2	4.90	7.43	7.30	(3)2x6 (3)2x6
TOTAL	11.17	4.75	15.92	1	8.9	10.0	0.6	1.12	1.3	0.503	SW4	0.5	5.54	18	3	1	1.04	1.5	2.6	4.34	3.83	(3)CS16	(3)CS16	3.9	8.34	8.48	(3)2x6 (3)2x6
A	4.15	0.77	4.92	1	3.9	10.0	0.8	2.56	1.3	0.958	SW6	0.0	7.47	10	1	0	0.21	0.0	3.3	7.37	5.83	(4)CS14	HDU8	4.52	8.48	10.44	6x6 6x6
B	3.20	0.00	3.20	1	12.3	10.0	0.4	0.81	1.3	0.344	SW2	0.0	3.44	10	8	8	1.86	1.8	0.7	1.72	2.26	CS14	HDU2	4.2	7.02	6.87	4x8 4x8
C	2.27	2.38	4.65	1	10.5	10.0	0.1	0.95	1.3	0.130	SW1	0.6	1.87	18	8	8	2.01	2.2	0.9	-0.08	0.53	HDU2	HDU2	3.52	5.37	5.20	(2)2x6 (2)2x6
D	1.55	1.60	3.15	2	11.6	10.0	0.1	0.86	1.3	0.130	SW1	0.6	1.87	18	8	8	2.26	0.9	2.6	0.41	-0.41	HDU2	HDU2	3.52	5.20	5.43	(2)2x6 (3)2x6
TOTAL	11.17	4.75	15.92																								

ASD LOADS (0.7 E & 0.6 W) USED FOR ANALYSIS																											
1ST FLR.	E UNFACTORED			SW	L	h	V/ΣL	Aspect	v(max)*	SW	O.T.	O.T.	DL Trib. Length(ft)			DL max	P _{left}	P _{right}	T _L	T _R	Holddown		C _{LL} (k)	C1	C2	MIN. POST	
GRID	V	V _{above}	V _{total} (k)	MARK	(ft)	(ft)	(klf)	Ratio	ρ	ASD(klf)	above	MAX.(k)	wall	floor	roof	(k)	(k)	(k)	(k)	(k)	L/R	<=	(k)	(k)	L/R		
2	2.47	12.80	15.26	A	10.6	5.5	1.4	0.52	1.3	1.310	SW6	0.0	7.21	6	1	0	0.38	10.5	0.0	2.11	7.03	HDU14	HDU14	7.40	16.05	11.96	HSS 6x6
4	0.14	3.12	3.26	A	18.1	8.0	0.2	0.44	1.3	0.164	CONC																
TOTAL	2.60	15.92	18.52	1	5.5	8.0	1.5	1.45	1.3	1.375	CONC																
A	1.19	7.12	8.31	1	8.5	8.0	0.2	0.94	1.3	0.177	SW3	0.0	1.41	8	1	0	0.41	0.0	0.0	1.22	1.22	HDU5	HDU5	0.00	2.42	2.42	(2)2x4 (2)2x4
B	0.48	1.17	1.65	1	12.6	8.0	0.5	0.63	1.3	0.429	SW4	3.4	6.87	18	15	8	2.98	5.5	0.9	-0.52	5.07	HDU5	HDU8	9.6	14.15	8.04	4x8 4x6
C	0.63	5.31	5.94	1	23.6	8.0	0.1	0.34	1.3	0.135	CONC																
D	0.36	3.15	3.51	1																							
TOTAL	2.66	16.75	19.41																								

Lateral Force Distribution & Plywood Shearwall Design

WIND

Wall DL (psf) = 10
 floor DL (psf) = 12
 Roof DL (psf) = 15

SWx = Shearwall per 8/S3.1
 Px = Point Load From Header (DL)
 E = Earthquake
W = Wind

Notes: Wind and Seismic Loads input as LRFD then converted to ASD for v & O.T.
 Basic Load Combinations Per ASCE 7-16 (Basic Combinations for ASD)
 Base Shear Comparison Shown Below Shearwall Groups
 * In lieu of reducing SW capacity, v(max) will be divided by 2w/l for SW sizing

ASD LOADS (0.7 E & 0.6 W) USED FOR ANALYSIS																											
ROOF	W UNFACTORED		SW	L	h	V/ΣL	Aspect	v(max)*	SW	O.T.	O.T.	DL Trib. Length(ft)			DL max	P _{left}	P _{right}	T _L	T _R	Holdown	C _{LL} (k)	C1	C2	MIN. POST			
GRID	V	V _{above}	V _{total} (k)	MARK	(ft)	(ft)	(klf)	Ratio	ρ	ASD(klf)	above	MAX.(k)	wall	floor	roof	(k)	(k)	(k)	(k)	L/R	<=	(k)	(k)	L/R			
2	0.76	0.00	0.76	A	10.0	8.0	0.1	0.80	1.3	0.046	SW1	0.0	0.36	8	0	1	0.48	0.0	0.0	0.08	0.08	CS22	CS22	0.00	0.46	0.46	(2)2x6 (2)2x6
3	2.66	0.00	2.66	A	8.1	8.0	0.3	0.99	1.3	0.197	SW1	0.0	1.58	8	0	6	0.68	0.7	0.7	0.77	0.76	CS16	CS16	1.03	2.78	2.80	(2)2x6 (2)2x6
4	1.90	0.00	1.90	A	14.0	8.0	0.1	0.57	1.3	0.047	SW1	0.0	0.37	8	0	1	0.67	0.0	0.7	-0.03	-0.42	CS22	CS22	0.00	0.47	1.13	(2)2x6 (2)2x6
				A	10.5	8.0	0.1	0.76	1.3	0.047	SW1	0.0	0.37	8	0	1	0.50	0.7	1.1	-0.32	-0.61	CS22	CS22	1.68	2.29	2.76	(2)2x6 (2)2x6
TOTAL	5.32	0.00	5.32																								
A	2.95	0.00	2.95	1	11.0	8.0	0.3	0.73	1.3	0.161	SW1	0.0	1.29	8	0	1	0.52	1.0	0.0	0.39	0.99	CS22	CS22	1.35	3.05	2.05	(2)2x6 (2)2x6
C	4.37	0.00	4.37	1	7.9	8.0	0.6	1.01	1.3	0.332	SW2	0.0	2.66	8	0	8	0.76	0.0	0.7	2.20	1.80	CS14	CS14	1.13	3.03	3.69	(2)2x6 (2)2x6
D	1.43	0.00	1.43	1	7.6	8.0	0.1	1.05	1.3	0.042	SW1	0.0	0.34	8	0	8	0.73	0.0	0.2	-0.10	-0.20	CS22	CS22	0.28	0.65	0.82	(2)2x6 (2)2x6
				2	5.2	8.0	0.1	1.54	1.3	0.042	SW1	0.0	0.34	8	0	8	0.52	0.2	0.2	-0.08	-0.08	CS22	CS22	0.28	0.83	0.83	(2)2x6 (2)2x6
				3	7.6	8.0	0.1	1.05	1.3	0.042	SW1	0.0	0.34	8	0	8	0.76	0.2	0.0	-0.22	-0.12	CS22	CS22	0.28	0.83	0.66	(2)2x6 (2)2x6
TOTAL	8.74	0.00	8.74																								

ASD LOADS (0.7 E & 0.6 W) USED FOR ANALYSIS																											
2ND FLR.	W UNFACTORED		SW	L	h	V/ΣL	Aspect	v(max)*	SW	O.T.	O.T.	DL Trib. Length(ft)			DL max	P _{left}	P _{right}	T _L	T _R	Holdown	C _{LL} (k)	C1	C2	MIN. POST			
GRID	V	V _{above}	V _{total} (k)	MARK	(ft)	(ft)	(klf)	Ratio	ρ	ASD(klf)	above	MAX.(k)	wall	floor	roof	(k)	(k)	(k)	(k)	L/R	<=	(k)	(k)	L/R			
1	4.36	0.48	4.84	A	8.3	10.0	0.6	1.20	1.3	0.350	SW5	0.0	3.50	10	0	1	0.48	0.1	6.9	3.14	-0.94	(2)CS14	CS14	4.61	6.32	13.11	(3)2x6 6x6
3	7.59	2.94	10.53	A	9.9	10.0	1.1	1.01	1.3	0.638	SW5	0.0	6.38	10	1	0	0.57	0.0	7.2	6.03	1.69	(3)CS14	(2)CS14	11.45	6.50	20.72	(4)2x4 HSS
4	3.39	1.90	5.29	A	12.5	10.0	0.4	0.80	1.3	0.254	SW2	0.4	2.91	18	10	1	1.97	2.8	1.8	0.07	0.66	HDU2	HDU2	4.90	8.94	7.96	(3)2x6 (3)2x6
TOTAL	15.34	5.32	20.66																								
A	4.88	2.95	7.82	1	8.9	10.0	0.9	1.12	1.3	0.527	SW4	1.3	6.56	18	3	1	1.04	1.5	2.6	5.01	4.36	(3)CS16	(3)CS16	3.9	9.64	10.72	(3)2x6 (3)2x6
B	5.94	0.00	5.94	1	3.9	10.0	1.5	2.56	1.3	0.913	SW6	0.0	9.13	10	1	0	0.21	0.0	3.3	9.01	7.03	(4)CS14	(4)CS14	4.52	9.24	13.65	6x6 6x6
C	4.21	4.37	8.58	1	12.3	10.0	0.7	0.81	1.3	0.419	SW2	0.0	4.19	10	8	8	1.86	1.8	0.7	1.98	2.67	CS14	HDU2	4.2	8.42	7.27	4x8 4x8
D	2.87	1.43	4.30	1	10.5	10.0	0.2	0.95	1.3	0.117	SW1	0.3	1.50	18	8	8	2.01	2.2	0.9	-0.99	-0.22	HDU2	HDU2	3.52	6.30	5.00	(2)2x6 (2)2x6
				2	11.6	10.0	0.2	0.86	1.3	0.117	SW1	0.3	1.50	18	8	8	2.26	0.9	2.6	-0.37	-1.42	HDU2	HDU2	3.52	5.01	6.76	(2)2x6 (3)2x6
TOTAL	17.90	8.74	26.64																								

ASD LOADS (0.7 E & 0.6 W) USED FOR ANALYSIS																											
1ST FLR.	W UNFACTORED		SW	L	h	V/ΣL	Aspect	v(max)*	SW	O.T.	O.T.	DL Trib. Length(ft)			DL max	P _{left}	P _{right}	T _L	T _R	Holdown	C _{LL} (k)	C1	C2	MIN. POST			
GRID	V	V _{above}	V _{total} (k)	MARK	(ft)	(ft)	(klf)	Ratio	ρ	ASD(klf)	above	MAX.(k)	wall	floor	roof	(k)	(k)	(k)	(k)	L/R	<=	(k)	(k)	L/R			
2	11.25	14.64	25.88	A	10.6	5.5	2.4	0.52	1.3	1.465	SW7	0.0	8.06	6	1	0	0.38	0.0	0.0	7.83	7.83	HDU14	HDU14	0.00	8.13	8.13	HSS 6x6
4	2.61	6.02	8.64	A	18.1	8.0	0.5	0.44	1.3	0.286	CONC																
TOTAL	13.86	20.66	34.52																								
A	3.81	9.69	13.49	1	5.5	8.0	2.5	1.45	1.3	1.472	CONC																
B	4.51	2.84	7.36	1	8.5	8.0	0.9	0.94	1.3	0.519	SW3	0.0	4.15	8	1	0	0.41	0.0	0.0	3.91	3.91	HDU5	HDU5	0.00	4.25	4.25	(2)2x4 (2)2x4
C	4.36	9.82	14.18	1	12.6	8.0	1.1	0.63	1.3	0.675	SW4	4.2	9.59	18	15	8	2.98	5.5	0.9	0.34	7.29	HDU5	HDU8	9.6	20.34	10.92	4x8 4x6
D	2.53	4.30	6.82	1	23.6	8.0	0.3	0.34	1.3	0.173	CONC																
TOTAL	15.21	26.64	41.85																								

Job Name: MERCER GROVE
Wall Name: 4
Application: 1st Story Wood Floor Systems

Design Criteria:

- * 2018 International Bldg Code
- * Seismic R=6.5
- * 2500 psi concrete
- * ASD Design Shear = 827 lbs
- * Floor Joist Depth = 12"
- * Nominal wall height = 9 ft

Selected Strong-Wall® Panel Solution:

Model	Type	W (in)	H (in)	T (in)	Sill Anchor	End Anchor Bolts	Total Axial Load (lbs)	Actual Uplift (lbs)
WSWH18x9	Wood	18	105.25	3.5	N/A	2 - 1"	2000	5217 lb

Actual Shear & Drift Distribution:

Model	Actual Shear (lbs)	Allowable Shear (lbs)	Actual / Allow Shear	Actual Drift (in)	Drift Limit (in)
WSWH18x9	827	≤ 1475 OK	0.56	0.24	0.47

Notes:

1. Strong-Wall High-Strength Wood Shearwalls have been evaluated to the 2018 IBC/IRC. See www.strongtie.com for additional design and installation information.
2. Anchor templates are recommended for proper anchor bolt placement, and are required in some jurisdictions.
3. The applied vertical load shall be a concentric point load or a uniformly distributed load not exceeding the allowable vertical load. Alternatively, the load may be applied anywhere along the width of the panel if imposed by a continuous bearing vertical load transfer element such as a rimboard or beam. For eccentric axial loads applied directly to the panel, the allowable vertical load shall be divided by two.
4. Panels may be trimmed to a minimum height of 74½".
5. Raised Floor Application requires WSWH-RF__KT Connection Kit based on panel width (example: WSWH-RF18KT).

Disclaimer:

It is the Designer's responsibility to verify product suitability under applicable building codes. In order to verify code listed applications please refer to the appropriate product code reports at www.strongtie.com or contact Simpson Strong-Tie Company Inc. at 1-800-999-5099.

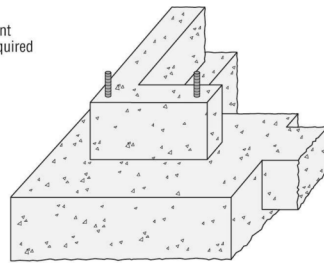
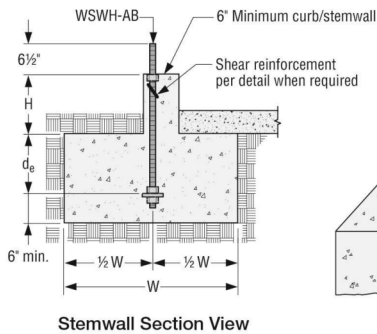
Job Name: MERCER GROVE
Wall Name: 4
Application: 1st Story Wood Floor Systems

Design Criteria:

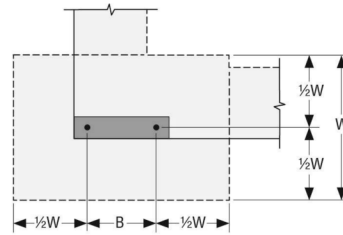
- * Stemwall - Perimeter
- * 2018 International Bldg Code
- * Seismic R=6.5
- * 2500 psi concrete

Anchor Solution Details:

Stemwall Installation

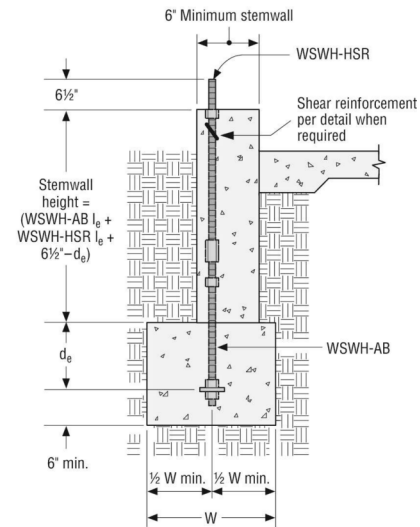


Perspective View
(Slab not shown for clarity)



Footing Plan

Stemwall Extension Installation



**Section at Stemwall
 WSWH-AB and WSWH-HSR
 Extension Application**

Anchor Solution Assuming Cracked Concrete Design:

Model	W	de	B	Anchor Bolt	Strength
WSWH18x9	30	10	14	WSWH-AB	High Strength

Anchor Solution Assuming Uncracked Concrete Design:

Model	W	de	B	Anchor Bolt	Strength
WSWH18x9	30	10	14	WSWH-AB	High Strength

SIMPSON STRONG-TIE COMPANY INC.

(800) 999-5099

5956 W. Las Positas Blvd., Pleasanton, CA 94588.

www.strongtie.com



Notes:

1. Anchorage designs conform to ACI 318-14 and 318-11 Appendix D with no supplementary reinforcement for cracked and uncracked concrete as noted.
2. Anchorage strength indicates required grade of anchor bolt. Standard (ASTM F1554 grade 36) or High Strength (HS)(ASTM A449).
3. Seismic indicates Seismic Design Category C though F. Detached 1 & 2 family dwellings in SDC C may use wind anchorage solutions. Seismic anchorage designs conform to ACI 318-11 section D.3.3.4.3 and ACI 318-14 section 17.2.3.4.3
4. Foundation dimensions are for anchorage only. Foundation design (size and reinforcement) by others. The registered design professional may specify alternate embedment, footing size or anchor bolt.

Job Name: MERCER GROVE
Wall Name: 4
Application: 1st Story Wood Floor Systems

Design Criteria:

- * 2018 International Bldg Code
- * Wind
- * 2500 psi concrete
- * ASD Design Shear = 1302 lbs
- * Floor Joist Depth = 12"
- * Nominal wall height = 9 ft

Selected Strong-Wall® Panel Solution:

Model	Type	W (in)	H (in)	T (in)	Sill Anchor	End Anchor Bolts	Total Axial Load (lbs)	Actual Uplift (lbs)
WSWH18x9	Wood	18	105.25	3.5	N/A	2 - 1"	2000	8788 lb

Actual Shear & Drift Distribution:

Model	Actual Shear (lbs)	Allowable Shear (lbs)	Actual / Allow Shear	Actual Drift (in)	Drift Limit (in)
WSWH18x9	1302	≤ 1935 OK	0.67	0.38	0.60

Notes:

1. Strong-Wall High-Strength Wood Shearwalls have been evaluated to the 2018 IBC/IRC. See www.strongtie.com for additional design and installation information.
2. Anchor templates are recommended for proper anchor bolt placement, and are required in some jurisdictions.
3. The applied vertical load shall be a concentric point load or a uniformly distributed load not exceeding the allowable vertical load. Alternatively, the load may be applied anywhere along the width of the panel if imposed by a continuous bearing vertical load transfer element such as a rimboard or beam. For eccentric axial loads applied directly to the panel, the allowable vertical load shall be divided by two.
4. Panels may be trimmed to a minimum height of 74½".
5. Raised Floor Application requires WSWH-RF__KT Connection Kit based on panel width (example: WSWH-RF18KT).

Disclaimer:

It is the Designer's responsibility to verify product suitability under applicable building codes. In order to verify code listed applications please refer to the appropriate product code reports at www.strongtie.com or contact Simpson Strong-Tie Company Inc. at 1-800-999-5099.

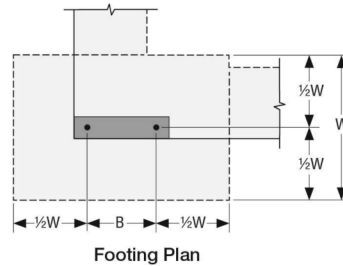
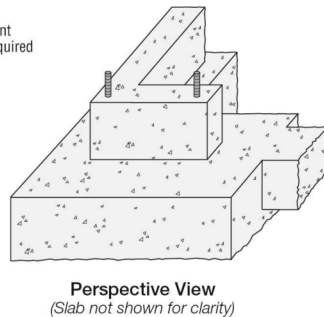
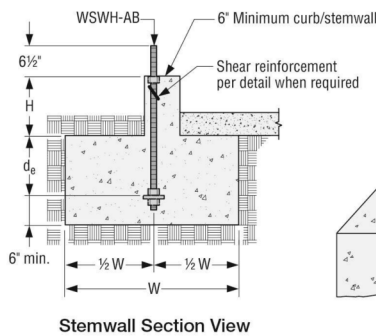
Job Name: MERCER GROVE
Wall Name: 4
Application: 1st Story Wood Floor Systems

Design Criteria:

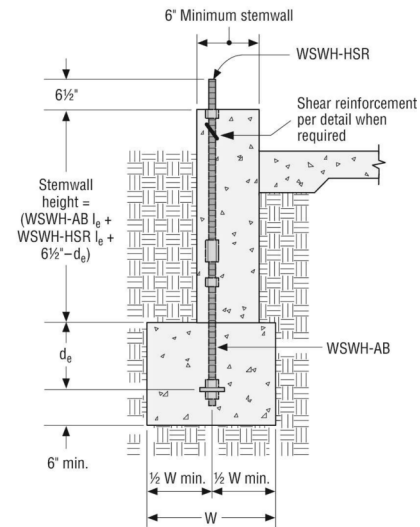
- * Stemwall - Perimeter
- * 2018 International Bldg Code
- * Wind
- * 2500 psi concrete

Anchor Solution Details:

Stemwall Installation



Stemwall Extension Installation



Section at Stemwall
 WSWH-AB and WSWH-HSR
 Extension Application

Anchor Solution Assuming Cracked Concrete Design:

Model	W	de	B	Anchor Bolt	Strength
WSWH18x9	21	7	14	WSWH-AB	High Strength

Anchor Solution Assuming Uncracked Concrete Design:

Model	W	de	B	Anchor Bolt	Strength
WSWH18x9	21	7	14	WSWH-AB	High Strength

Notes:

1. Anchorage designs conform to ACI 318-14 and 318-11 Appendix D with no supplementary reinforcement for cracked and uncracked concrete as noted.
2. Anchorage strength indicates required grade of anchor bolt. Standard (ASTM F1554 grade 36) or High Strength (HS)(ASTM A449).
3. Wind includes Seismic Design Category A and B and detached 1 and 2 family dwellings in SDC C.
4. Foundation dimensions are for anchorage only. Foundation design (size and reinforcement) by others. The registered design professional may specify alternate embedment, footing size or anchor bolt.

SEISMIC DESIGN - CARPORT

ASCE 7-16

Equivalent Lateral Force Procedure

Occupancy Category	II	Table 1-1
Seismic Design Category	D	Table 11.6-1
Importance Factor	1.00	Table 11.5-1
Site Class	D	Table 20.3-1
S _s	141.80 %g	(from USGS Seismic Hazard Curves, 2008 data)
S ₁	49.30 %g	(from USGS Seismic Hazard Curves, 2008 data)
F _a	1.00	Table 11.4-1
F _v	1.81	Table 11.4-2
C _t	0.02	Table 12.8-2
x	0.75	Table 12.8-2
h _n	10.00 feet	(height to highest level)

S _{MS} = F _a *S _s	1.4180	Eq. 11.4-1
S _{M1} = F _v *S ₁	0.8923	Eq. 11.4-2
S _{DS} = (2/3)*S _{MS}	0.9453 g	Eq. 11.4-3
S _{D1} = (2/3)*S _{M1}	0.5949 g	Eq. 11.4-4
Period T _a = C _t *h _n ^x	0.1125 s	Eq. 12.8-7
T _o	0.1259 s	per section 11.4.6
T _s	0.6293 s	per section 11.4.6
S _a	0.0885 g	per section 11.4.6

R	6.5	Table 12.2-1
Ω _o	2.5	Table 12.2-1
C _d	4	Table 12.2-1
Analysis type okay	Yes	Table 12.6-1

Equivalent Lateral Force Procedure (section 12.8)

C _s	0.1454	Eq. 12.8-2
W, weight	34,633 lb	per table below
V	5,037 lb	Eq. 12.8-1

Vertical Force Distribution (section 12.8.3)

k = 1.00

Level	Hx (ft)	Area (ft ²)	Wt. (psf)	Wt. (k)	Wall	Wall	Total	(LRFD)		
					length (ft.)	Wt. (k)	Wt. (k)	WxHx (k-ft)	Cvx (%)	V (k)
green roof	10.00	250	50	12.5	0	0.0	12.5	125.0	36.1	1.82
roof	10.00	848	13	11.0	38.75	1.7	12.8	127.7	36.9	1.86
conc walls	10.00	0	0	0.0	27.75	9.4	9.4	93.7	27.0	1.36
							34.6	346.3	100.0	5.0

Lateral Force Distribution & Plywood Shearwall Design

SEISMIC

Wall DL (psf) = 10
 floor DL (psf) = 0
 Roof DL (psf) = 50
 S_{DS} = 0.95

SWx = Shearwall per 8/S3.1
 P_x = Point Load From Header (DL)
 E = Earthquake
 W = Wind

Notes: Wind and Seismic Loads input as LRFD then converted to ASD for v & O.T.
 Basic Load Combinations Per ASCE 7-16 (Basic Combinations for ASD)
 Base Shear Comparison Shown Below Shearwall Groups
 * In lieu of reducing SW capacity, v(max) will be divided by 2w/l for SW sizing

CARPORT				ASD LOADS (0.7 E & 0.6 W) USED FOR ANALYSIS																								
ROOF	E UNFACTORED		SW	L	h	V/ΣL	Aspect	v(max)*	SW	O.T.	O.T.	DL Trib. Length(ft)			DL max	P _{left}	P _{right}	T _L	T _R	Holdown	C _{LL} (k)	C1	C2	MIN. POST				
GRID	V	V _{above}	V _{total} (K)	MARK	(ft)	(ft)	(k/ft)	Ratio	ρ	ASD(k/ft)	above	MAX.(k)	wall	floor	roof	(k)	(k)	(k)	(k)	L/R	<=	(k)	(k)	L/R	L/R			
1	1.82	0.00	1.82	A	3.6	8.1	0.5	2.25	1.3	0.516	SW4	0.0	3.72	8	0	2	0.33	0.0	0.0	3.56	3.56	HDU5	HDU5	0.00	4.74	4.74	4x6	4x6
2	2.24	0.00	2.24	A	3.6	8.1	0.6	2.25	1.3	0.636	SW4	0.0	4.58	8	0	2	0.33	0.0	0.0	4.43	4.43	HDU5	HDU5	0.00	5.60	5.60	4x6	4x6
3	0.95	0.00	0.95	A	16.2	8.1	0.1	0.50	1.3	0.053	CONC																	
TOTAL	4.05	0.00	4.05																									
E	0.31	0.00	0.31	1	CANTILEVER COLUMNS																							
D	0.65	0.00	0.65	1	CANTILEVER COLUMNS																							
C	1.98	0.00	1.98	1	6.6	8.1	0.3	1.23	1.3	0.273	CONC																	
B	2.06	0.00	2.06	1	6.6	8.1	0.3	1.23	1.3	0.284	CONC																	
TOTAL	2.94	0.00	2.94																									

Lateral Force Distribution & Plywood Shearwall Design

SEISMIC

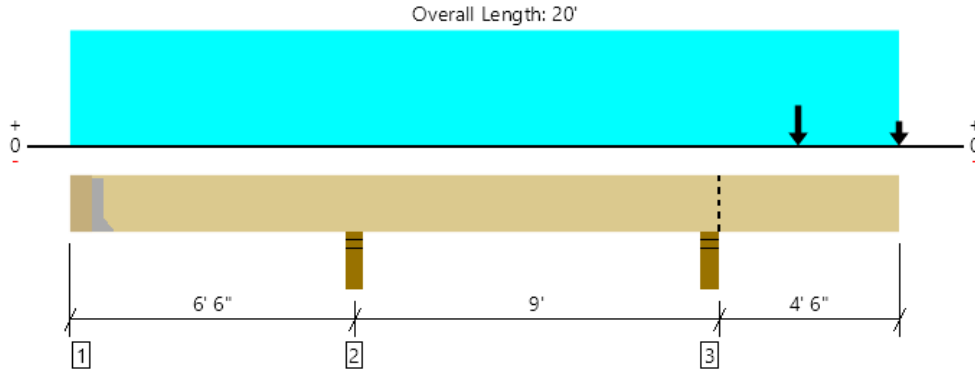
Wall DL (psf) = 10
 floor DL (psf) = 0
 Roof DL (psf) = 0
 S_{DS} = 0.95

SWx = Shearwall per 8/S3.1
 P_x = Point Load From Header (DL)
 E = Earthquake
 W = Wind

Notes: Wind and Seismic Loads input as LRFD then converted to ASD for v & O.T.
 Basic Load Combinations Per ASCE 7-16 (Basic Combinations for ASD)
 Base Shear Comparison Shown Below Shearwall Groups
 * In lieu of reducing SW capacity, v(max) will be divided by 2w/l for SW sizing

CARPORT				ASD LOADS (0.7 E & 0.6 W) USED FOR ANALYSIS																								
ROOF	W	UNFACTORED	SW	L	h	V/ΣL	Aspect	v(max)*	SW	O.T.	O.T.	DL Trib. Length(ft)			DL max	P _{left}	P _{right}	T _L	T _R	Holdown	C _{LL} (k)	C1	C2	MIN. POST				
GRID	V	V _{above}	V _{total} (K)	MARK	(ft)	(ft)	(k/ft)	Ratio	ρ	ASD(k/ft)	above	MAX.(k)	wall	floor	roof	(k)	(k)	(k)	(k)	L/R	<=	(k)	(k)	L/R	L/R			
1	1.56	0.00	1.56	A	3.6	8.1	0.4	2.25	1.3	0.260	SW1	0.0	2.11	8	0	2	0.15	0.0	0.0	2.02	2.02	HDU5	HDU5	0.00	2.19	2.19	4x6	4x6
2	1.91	0.00	1.91	A	3.6	8.1	0.5	2.25	1.3	0.319	SW1	0.0	2.58	8	0	2	0.15	0.0	0.0	2.49	2.49	HDU5	HDU5	0.00	2.66	2.66	4x6	4x6
3	0.91	0.00	0.91	A	16.2	8.1	0.1	0.50	1.3	0.034	CONC																	
TOTAL	3.47	0.00	3.47																									
E	0.09	0.00	0.09	1	CANTILEVER COLUMNS																							
D	0.18	0.00	0.18	1	CANTILEVER COLUMNS																							
C	1.60	0.00	1.60	1	6.6	8.1	0.2	1.23	1.3	0.145	CONC																	
B	2.30	0.00	2.30	1	6.6	8.1	0.3	1.23	1.3	0.209	CONC																	
TOTAL	1.86	0.00	1.86																									

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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)	5834 @ 15' 3 3/4"	6379 (4.50")	Passed (91%)	--	1.0 D + 0.45 W + 0.75 L + 0.75 S (Adj Spans)
Shear (lbs)	3066 @ 16' 5 7/8"	13743	Passed (22%)	1.60	1.0 D + 0.45 W + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	-8456 @ 15' 3 3/4"	18346	Passed (46%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.259 @ 20'	0.234	Failed (2L/434)	--	1.0 D + 0.45 W + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.446 @ 20'	0.469	Passed (2L/252)	--	1.0 D + 0.45 W + 0.75 L + 0.75 S (Alt 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).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- -241 lbs uplift at support located at 6' 6". Strapping or other restraint may be required.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Wind	Seismic	Total	
1 - Hanger on 11 7/8" PSL beam	5.25"	Hanger ¹	1.50"	568	501/-66	153	230	150/-150	1602/-216	See note ¹
2 - Stud wall - HF	4.50"	4.50"	1.50"	559	1243	-614	-922	601/-601	2403/-2137	None
3 - Stud wall - HF	4.50"	4.50"	4.12"	2615	1458	1130	2842	1852/-1852	9897/-1852	Blocking

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	19' 7" o/c	
Bottom Edge (Lu)	19' 7" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HUC410	2.50"	N/A	14-10dx1.5	6-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	5 1/4" to 20'	N/A	13.0	--	--	--	--	
1 - Uniform (PSF)	0 to 20' (Front)	3' 3"	13.0	40.0	-	-	-	Default Load
2 - Uniform (PSF)	0 to 20' (Front)	10'	10.0	-	-	-	-	Default Load
3 - Point (lb)	20' (Front)	N/A	643	89	669	-	-	Linked from: X, Support 2
4 - Point (lb)	17' 6" (Front)	N/A	-	-	-	2150	1401	E x OVERSTRENGTH

ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



Weyerhaeuser Notes

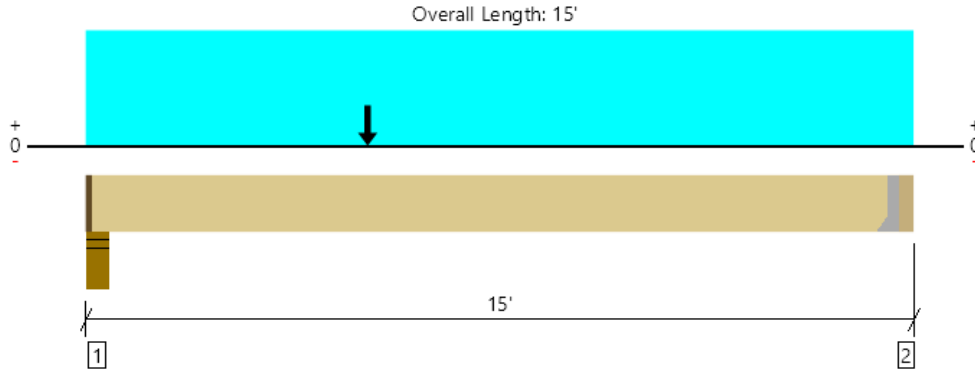
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



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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)	1853 @ 14' 8 1/2"	4725 (1.50")	Passed (39%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1314 @ 13' 8 5/8"	8590	Passed (15%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	5476 @ 7' 6 1/4"	15953	Passed (34%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.164 @ 7' 2 3/16"	0.359	Passed (L/999+)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.398 @ 7' 4 9/16"	0.719	Passed (L/433)	--	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.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Wind	Seismic	Total	
1 - Stud wall - HF	5.50"	4.00"	1.50"	1292	301	226	397	890/-890	3106/-890	1 1/2" Rim Board
2 - Hanger on 11 7/8" HF beam	3.50"	Hanger ¹	1.50"	1283	299	224	203	456/-456	2465/-456	See note ¹

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	14' 7" o/c	
Bottom Edge (Lu)	14' 7" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	HUC410	2.50"	N/A	18-10dx1.5	10-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	1 1/2" to 14' 8 1/2"	N/A	13.0	--	--	--	--	
1 - Uniform (PSF)	0 to 15' (Front)	1'	13.0	40.0	-	-	-	Default Load
2 - Uniform (PSF)	0 to 15' (Front)	1'	50.0	-	30.0	-	-	Default Load
3 - Uniform (PSF)	0 to 15' (Front)	9' 7 3/16"	10.0	-	-	-	-	Default Load
4 - Point (lb)	5' 2 3/8" (Front)	N/A	-	-	-	600	1346	E X OVERSTRENGTH

ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



Weyerhaeuser Notes

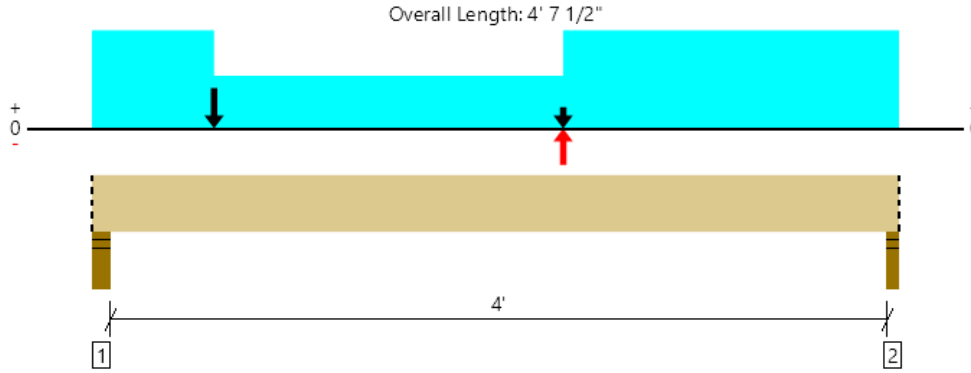
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



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1 piece(s) 1 3/4" 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)	1809 @ 4' 6"	2126 (3.00")	Passed (85%)	--	1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1062 @ 3' 4 5/8"	6872	Passed (15%)	1.60	1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	2144 @ 2' 8 3/8"	12762	Passed (17%)	1.60	1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.023 @ 2' 8 3/8"	0.213	Passed (L/999+)	--	1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.031 @ 2' 8 3/8"	0.283	Passed (L/999+)	--	1.0 D - 0.525 E + 0.75 L + 0.75 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.
- -211 lbs uplift at support located at 4' 6". Strapping or other restraint may be required.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Wind	Seismic	Total	
1 - Stud wall - HF	4.50"	4.50"	2.75"	568	713	608	267	737/-737	2893/-737	Blocking
2 - Stud wall - HF	3.00"	3.00"	2.55"	507	675	544	-267	737/-737	2463/-1004	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' 8" o/c	
Bottom Edge (Lu)	4' 8" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 4' 7 1/2"	N/A	6.5	--	--	--	--	
1 - Uniform (PSF)	0 to 4' 7 1/2" (Front)	7' 6"	12.0	40.0	-	-	-	Default Load
2 - Uniform (PSF)	0 to 8 3/8" (Front)	7' 6"	15.0	-	30.0	-	-	Default Load
3 - Point (lb)	8 3/8" (Front)	N/A	167	-	281	-	-	Linked from: B1, Support 1
4 - Point (lb)	2' 8 3/8" (Front)	N/A	167	-	281	-	-	Linked from: B1, Support 2
5 - Uniform (PSF)	2' 8 3/8" to 4' 7 1/2" (Front)	7' 6"	15.0	-	30.0	-	-	Default Load
6 - Point (lb)	8 3/8" (Front)	N/A	-	-	-	567	1566	E X OVERSTRENGTH
7 - Point (lb)	2' 8 3/8" (Front)	N/A	-	-	-	-567	-1566	E X OVERSTRENGTH

<p>ForTEWEB Software Operator</p> <p>Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com</p>	<p>Job Notes</p>
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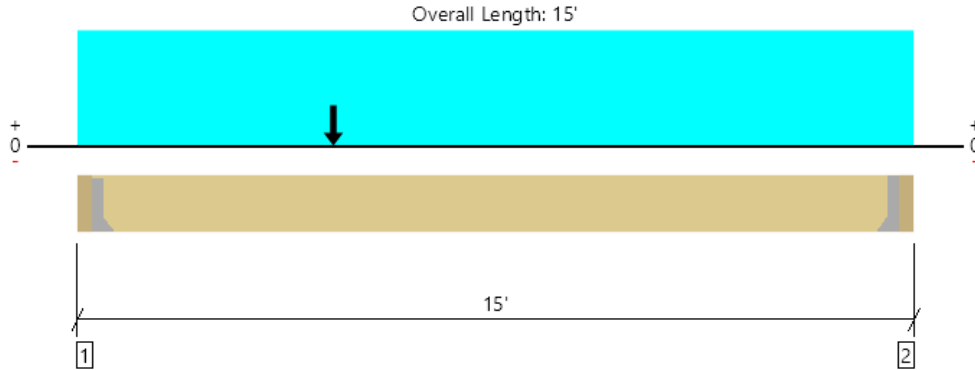
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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UPPER FLOOR, Copy of B21B FOR OT
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)	1896 @ 3 1/2"	4725 (1.50")	Passed (40%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1113 @ 1' 3 3/8"	8590	Passed (13%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	4650 @ 7' 6"	15953	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.162 @ 7' 1 3/8"	0.360	Passed (L/999+)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.352 @ 7' 3 7/8"	0.721	Passed (L/491)	--	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.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Wind	Seismic	Total	
1 - Hanger on 11 7/8" HF beam	3.50"	Hanger ¹	1.50"	1039	300	225	433	982/-982	2979/-982	See note ¹
2 - Hanger on 11 7/8" HF beam	3.50"	Hanger ¹	1.50"	1039	300	225	184	419/-419	2167/-419	See note ¹

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

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

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	LUS410	2.00"	N/A	8-10d	6-10d	
2 - Face Mount Hanger	LUS410	2.00"	N/A	8-10d	6-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	3 1/2" to 14' 8 1/2"	N/A	13.0	--	--	--	--	
1 - Uniform (PSF)	0 to 15' (Front)	1'	13.0	40.0	-	-	-	Default Load
2 - Uniform (PSF)	0 to 15' (Front)	1'	17.0	-	30.0	-	-	Default Load
3 - Uniform (PSF)	0 to 15' (Front)	9' 7 3/16"	10.0	-	-	-	-	Default Load
4 - Point (lb)	4' 7 3/16" (Front)	N/A	-	-	-	617	1401	

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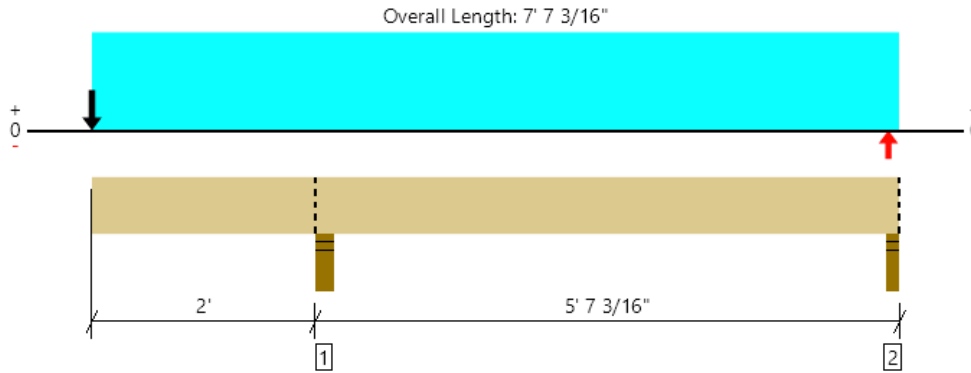
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 1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL



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)	6407 @ 2' 2 1/4"	6379 (4.50")	Passed (100%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1860 @ 1' 1/8"	8590	Passed (22%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-4162 @ 2' 2 1/4"	15953	Passed (26%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.054 @ 0	0.219	Passed (2L/968)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.092 @ 0	0.292	Passed (2L/572)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (Alt 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).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Wind	Seismic	Total	
1 - Stud wall - HF	4.50"	4.50"	4.52"	2607	2009	1507	802	2214/-2214	9139/-2214	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.50"	69	831/-260	526	-802	2214/-2214	3640/-3276	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' 7" o/c	
Bottom Edge (Lu)	7' 7" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 7' 7 3/16"	N/A	13.0	--	--	--	--	
1 - Uniform (PSF)	0 to 7' 7 3/16" (Front)	7' 6"	12.0	40.0	-	-	-	Default Load
2 - Uniform (PSF)	0 to 7' 7 3/16" (Front)	7' 6"	15.0	-	30.0	-	-	Default Load
3 - Point (lb)	0 (Front)	N/A	1039	300	225	-	-	Linked from: B21B, Support 1
4 - Point (lb)	0 (Front)	N/A	-	-	-	567	1566	E x OVERSTRENGTH
5 - Point (lb)	7' 6" (Front)	N/A	-	-	-	-567	-1566	E x OVERSTRENGTH

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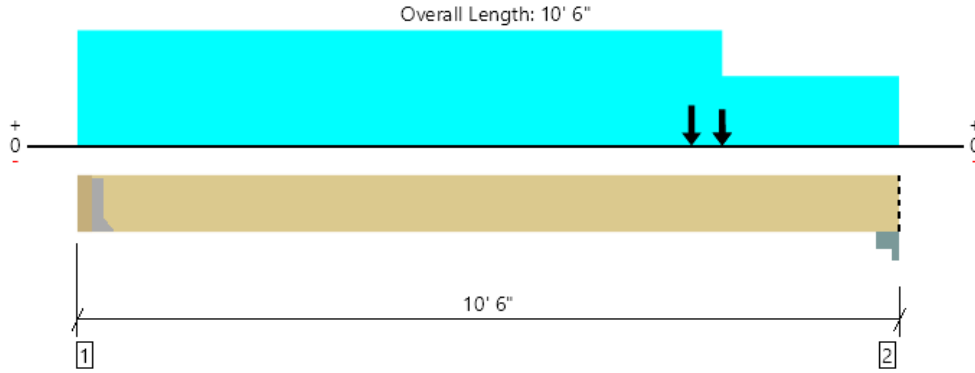
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File Name: mercer grove
 Page 132 of 198 Page 10 / 22

UPPER FLOOR, Copy of B30 FOR OT
1 piece(s) 5 1/4" x 11 7/8" 2.0E 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)	7336 @ 3 1/2"	7336 (2.24")	Passed (100%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	10605 @ 9' 5/8"	13861	Passed (77%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	21817 @ 6' 11 1/16"	34332	Passed (64%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.207 @ 5' 7"	0.247	Passed (L/572)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.355 @ 5' 6 7/16"	0.494	Passed (L/334)	--	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.

Supports	Bearing Length			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Wind	Seismic	Total	
1 - Hanger on 11 7/8" PSL beam	3.50"	Hanger ¹	2.24"	3491	2179	2316	1062	1442/-1442	10490/-1442	See note ¹
2 - Column Cap - steel	5.50"	5.50"	4.23"	5539	4220	3679	3371	4574/-4574	21383/-4574	Blocking

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

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

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie							
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories	
1 - Face Mount Hanger	HGUS5.50/10	4.00"	N/A	46-10d	16-10d		

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	3 1/2" to 10' 6"	N/A	19.5	--	--	--	--	
1 - Uniform (PSF)	0 to 8' 2 3/8" (Front)	3' 6"	50.0	-	30.0	-	-	Default Load
2 - Uniform (PSF)	0 to 10' 6" (Front)	7' 6"	13.0	40.0	-	-	-	Default Load
3 - Uniform (PSF)	0 to 10' 6" (Front)	10'	10.0	-	-	-	-	
4 - Uniform (PSF)	8' 2 3/8" to 10' 6" (Front)	3' 6"	13.0	40.0	-	-	-	Default Load
5 - Uniform (PSF)	0 to 8' 2 3/8" (Front)	7' 6"	17.0	-	30.0	-	-	
6 - Point (lb)	8' 2 3/8" (Front)	N/A	662	-	1125	-	-	Linked from: B4, Support 1
7 - Point (lb)	7' 9 5/8" (Front)	N/A	-	-	-	4433	6016	
8 - Point (lb)	8' 2 3/8" (Front)	N/A	3510	2927	2164	-	-	Linked from: B29, Support 1

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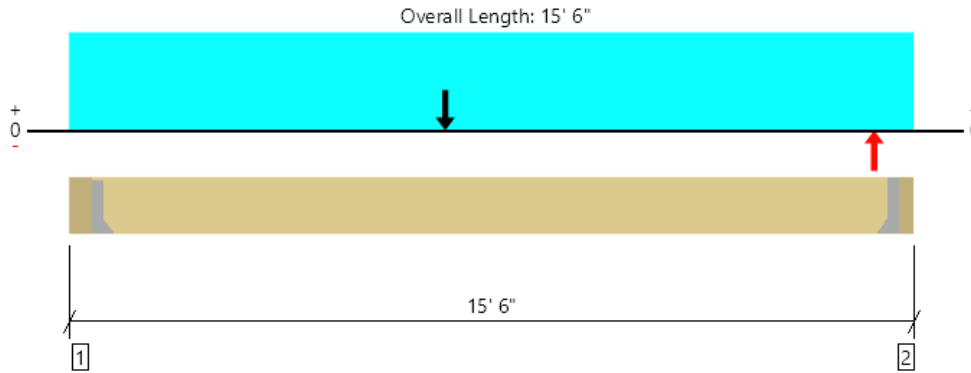
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MAIN FLOOR, Copy of B40 FOR OT
1 piece(s) 5 1/4" x 11 7/8" 2.0E Parallam® PSL



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)	6893 @ 5 1/2"	6893 (2.10")	Passed (100%)	--	1.0 D + 0.7 E (All Spans)
Shear (lbs)	6710 @ 1' 5 3/8"	19285	Passed (35%)	1.60	1.0 D + 0.7 E (All Spans)
Moment (Ft-lbs)	40193 @ 6' 10"	47766	Passed (84%)	1.60	1.0 D + 0.7 E (All Spans)
Live Load Defl. (in)	-0.778 @ 7' 5 9/16"	0.369	Failed (L/227)	--	0.6 D - 0.7 E (All Spans)
Total Load Defl. (in)	0.921 @ 7' 6 1/8"	0.738	Failed (L/192)	--	1.0 D + 0.7 E (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.

OKAY E INCLUDES OVERSTRENGTH FACTOR

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	
1 - Hanger on 11 7/8" DF beam	5.50"	Hanger ¹	2.10"	1436	313	235	7903/-7903	9887/-7903	See note ¹
2 - Hanger on 11 7/8" DF beam	3.50"	Hanger ¹	2.10"	1409	307	230	7903/-7903	9849/-7903	See note ¹

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	14' 9" o/c	
Bottom Edge (Lu)	14' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie							
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories	
1 - Face Mount Hanger	HGUS5.50/12	4.00"	N/A	56-16d	20-16d		
2 - Face Mount Hanger	HGUS5.50/12	4.00"	N/A	56-16d	20-16d		

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	5 1/2" to 15' 2 1/2"	N/A	19.5	--	--	--	
1 - Uniform (PSF)	0 to 15' 6" (Front)	1'	15.0	40.0	-	-	Default Load
2 - Uniform (PSF)	0 to 15' 6" (Front)	10'	10.0	-	-	-	Default Load
3 - Uniform (PSF)	0 to 15' 6" (Front)	1'	50.0	-	30.0	-	Default Load
4 - Point (lb)	6' 10" (Front)	N/A	-	-	-	14725	E X OVERSTRENGTH
5 - Point (lb)	14' 9" (Front)	N/A	-	-	-	-14725	E X OVERSTRENGTH

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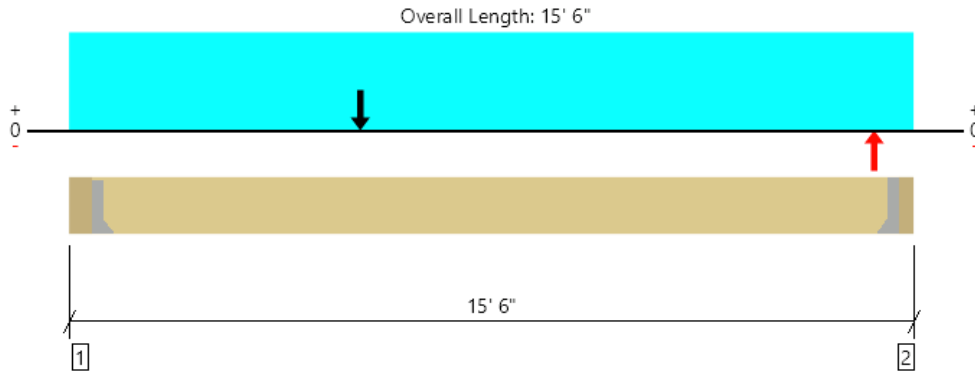
ForteWEB Software Operator	Job Notes
Josh Welch J Welch Engineering LLC (206) 356-9553 joshtwelch@gmail.com	



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File Name: mercer grove
Page 136 of 198 Page 14 / 22

MAIN FLOOR, Copy of B41 FOR OT
1 piece(s) 5 1/4" x 11 7/8" 2.0E 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)	9149 @ 5 1/2"	9149 (2.79")	Passed (100%)	--	1.0 D + 0.7 E (All Spans)
Shear (lbs)	9050 @ 1' 5 3/8"	19285	Passed (47%)	1.60	1.0 D + 0.7 E (All Spans)
Moment (Ft-lbs)	43130 @ 5' 3 5/8"	47766	Passed (90%)	1.60	1.0 D + 0.7 E (All Spans)
Live Load Defl. (in)	-0.850 @ 7' 1/16"	0.369	Failed (L/208)	--	0.6 D - 0.7 E (All Spans)
Total Load Defl. (in)	0.926 @ 7' 7/8"	0.738	Failed (L/191)	--	1.0 D + 0.7 E (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.

OKAY E INCLUDES OVERSTRENGTH FACTOR

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Seismic	Total	
1 - Hanger on 11 7/8" DF beam	5.50"	Hanger ¹	2.79"	770	418	12022/-12022	13210/-12022	See note ¹
2 - Hanger on 11 7/8" DF beam	3.50"	Hanger ¹	2.79"	757	409	12022/-12022	13188/-12022	See note ¹

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	14' 9" o/c	
Bottom Edge (Lu)	14' 9" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie							
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories	
1 - Face Mount Hanger	HGU5.50-SDS H=11.813	5.25"	N/A	36-SDS25212	24-SDS25212		
2 - Face Mount Hanger	HGU5.50-SDS H=11.813	5.25"	N/A	36-SDS25212	24-SDS25212		

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	5 1/2" to 15' 2 1/2"	N/A	19.5	--	--	
1 - Uniform (PSF)	0 to 15' 6" (Front)	1' 4"	15.0	40.0	-	Default Load
2 - Uniform (PSF)	0 to 15' 6" (Front)	10'	6.0	-	-	Default Load
3 - Point (lb)	5' 3 5/8" (Front)	N/A	-	-	18764	E x OVERSTRENGTH
4 - Point (lb)	14' 9" (Front)	N/A	-	-	-18764	E x OVERSTRENGTH

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

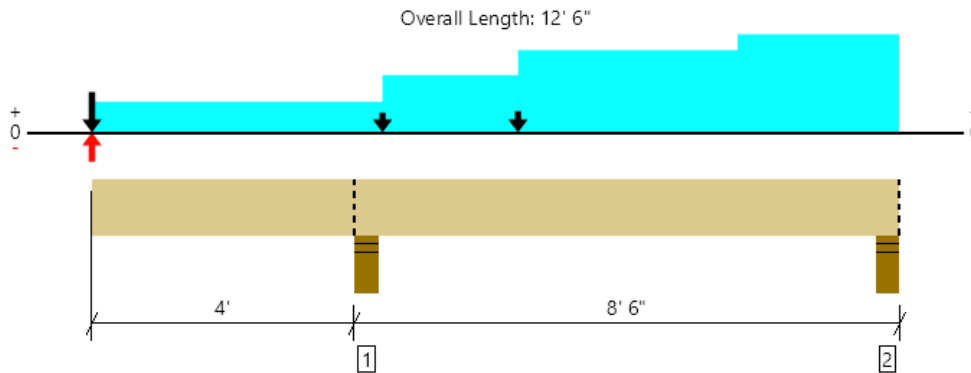
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ForteWEB v3.2, Engine: V8.2.0.17, Data: V8.1.0.16

File Name: mercer grove
Page 138 of 198 Page 16 / 22

MAIN FLOOR, Copy of B53 FOR OT
1 piece(s) 7" x 11 7/8" 2.0E 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) [Group]
Member Reaction (lbs)	24777 @ 4' 3"	26250 (6.00")	Passed (94%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans) [1]
Shear (lbs)	9019 @ 5' 5 7/8"	16071	Passed (56%)	1.00	1.0 D + 1.0 L (All Spans) [1]
Moment (Ft-lbs)	-29633 @ 4' 3"	39805	Passed (74%)	1.00	1.0 D + 1.0 L (All Spans) [1]
Live Load Defl. (in)	0.423 @ 0	0.213	Failed (2L/242)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (Alt Spans) [1]
Total Load Defl. (in)	0.655 @ 0	0.425	Failed (2L/156)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (Alt Spans) [1]

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

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240). Upward deflection on left cantilever exceeds overhang deflection criteria.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- -962 lbs uplift at support located at 4' 3". Strapping or other restraint may be required.
- Member should be side-loaded from both sides of the member or braced to prevent rotation.

OKAY, E INCLUDES OVERSTRENGTH FACTOR

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	
1 - Stud wall - DF	6.00"	6.00"	5.66"	10590	8692	2909	10451/-10451	32642/-10451	Blocking
2 - Stud wall - DF	5.50"	5.50"	1.50"	1169	3765/-1490	1499	3651/-3651	10084/-5141	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' 6" o/c	
Bottom Edge (Lu)	12' 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)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 12' 6"	N/A	26.0	--	--	--	
1 - Uniform (PSF)	0 to 12' 6" (Front)	10'	15.0	40.0	-	-	Default Load
2 - Uniform (PSF)	0 to 12' 6" (Front)	10'	10.0	-	-	-	Default Load
3 - Uniform (PSF)	4' 6" to 12' 6" (Front)	10'	10.0	-	-	-	Default Load
4 - Uniform (PSF)	6' 7 3/16" to 10' (Front)	10'	13.0	40.0	-	-	Default Load
5 - Uniform (PSF)	4' 6" to 12' 6" (Front)	10'	17.0	-	30.0	-	Default Load
6 - Uniform (PLF)	10' to 12' 6" (Front)	N/A	291.8	399.8	180.8	-	Linked from: J2, Support 2
7 - Point (lb)	6' 7 3/16" (Front)	N/A	710	1590	-	-	Linked from: B32, Support 2
8 - Point (lb)	4' 6" (Front)	N/A	657	91	681	-	Linked from: B36, Support 1
9 - Point (lb)	0 (Front)	N/A	3610	1926	690	6800/-6800	Linked from: Copy of B52 FOR OT, Support 2

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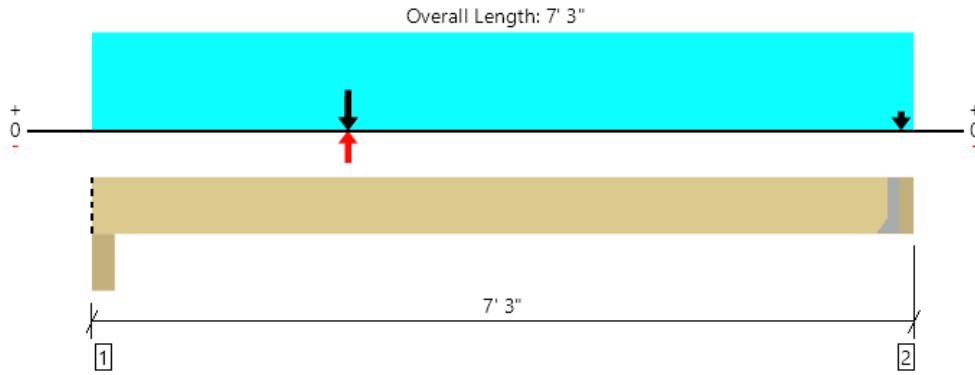
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MAIN FLOOR, COPY OF B56 FOR OT
 1 piece(s) 5 1/4" x 11 7/8" 2.0E Parallam® PSL



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) [Group]
Member Reaction (lbs)	18079 @ 4"	18047 (5.50")	Passed (100%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans) [1]
Shear (lbs)	11745 @ 1' 5 3/8"	12053	Passed (97%)	1.00	1.0 D + 1.0 L (All Spans) [1]
Moment (Ft-lbs)	23288 @ 2' 3 5/8"	29854	Passed (78%)	1.00	1.0 D + 1.0 L (All Spans) [1]
Live Load Defl. (in)	0.130 @ 3' 4 13/16"	0.166	Passed (L/613)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans) [1]
Total Load Defl. (in)	0.196 @ 3' 4 13/16"	0.331	Passed (L/405)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans) [1]

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

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- -470 lbs uplift at support located at 6' 11 1/2". Strapping or other restraint may be required.

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	
1 - Column - DF	5.50"	5.50"	5.51"	6148	6529	3464	8449/-8449	24590/-8449	Blocking
2 - Hanger on 11 7/8" DF beam	3.50"	Hanger ¹	2.62"	3385	4830	1465	3573/-3573	13253/-3573	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)	7' o/c	
Bottom Edge (Lu)	7' o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	HGUS5.50/10	4.00"	N/A	46-16d	16-16d	

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

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Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 6' 11 1/2"	N/A	19.5	--	--	--	
1 - Uniform (PSF)	0 to 7' 3" (Front)	7' 6"	15.0	40.0	-	-	Default Load
2 - Uniform (PSF)	0 to 7' 3" (Front)	4'	13.0	40.0	-	-	Default Load
3 - Point (lb)	2' 3 5/8" (Front)	N/A	1758	2328	1296	-	Linked from: B31, Support 1
4 - Point (lb)	7' (Front)	N/A	412	1120	-	-	Linked from: B55, Support 2
5 - Point (lb)	2' 3 5/8" (Front)	N/A	5278	4167	3633	-	Linked from: B30, Support 2
6 - Point (lb)	2' 3 5/8" (Front)	N/A	757	409	-	12022/-12022	Linked from: Copy of B41 FOR OT, Support 2

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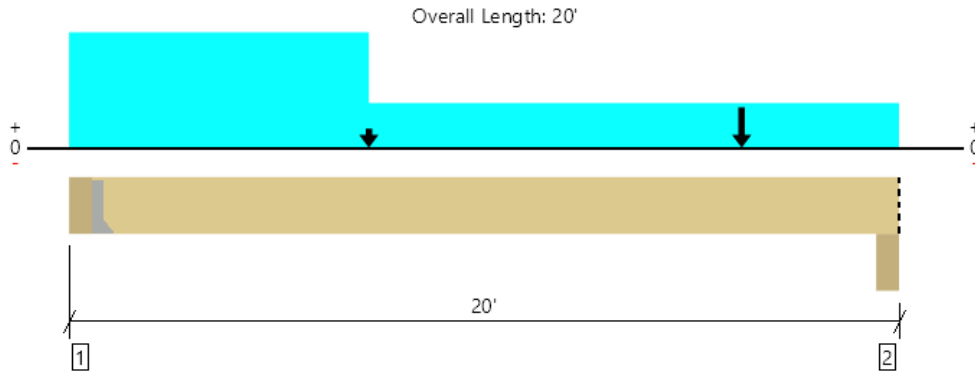
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MAIN FLOOR, Copy of B45 FOR OT
1 piece(s) 5 1/4" x 11 7/8" 2.0E Parallam® PSL



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)	4486 @ 5 1/2"	4922 (1.50")	Passed (91%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	12589 @ 18' 6 5/8"	19285	Passed (65%)	1.60	1.0 D + 0.7 E (All Spans)
Moment (Ft-lbs)	44688 @ 16' 1 3/16"	47766	Passed (94%)	1.60	1.0 D + 0.7 E (All Spans)
Live Load Defl. (in)	-1.411 @ 11' 4 1/8"	0.480	Failed (L/163)	--	0.6 D - 0.7 E (All Spans)
Total Load Defl. (in)	1.658 @ 11' 1 1/4"	0.960	Failed (L/139)	--	1.0 D + 0.7 E (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.

OKAY E INCLUDES OVERSTRENGTH FACTOR

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Seismic	Total	
1 - Hanger on 11 7/8" DF beam	5.50"	Hanger ¹	1.50"	1116	1949	3811/-3811	6876/-3811	See note ¹
2 - Column - DF	5.50"	5.50"	3.88"	1021	825	16711/-16711	18557/-16711	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)	17' 1" o/c	
Bottom Edge (Lu)	19' 7" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie

Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HUCO612-SDS	3.00"	N/A	14-SDS25212	6-SDS25212	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	5 1/2" to 20'	N/A	19.5	--	--	
1 - Uniform (PSF)	0 to 20' (Front)	8"	15.0	40.0	-	Default Load
2 - Uniform (PSF)	7' to 20' (Front)	10'	6.0	-	-	Default Load
3 - Uniform (PSF)	0 to 7' (Front)	4'	13.0	40.0	-	Default Load
4 - Point (lb)	7' (Front)	N/A	412	1120	-	Linked from: B55, Support 2
5 - Point (lb)	16' 1 3/16" (Front)	N/A	-	-	20522	E x OVERSTRENGTH

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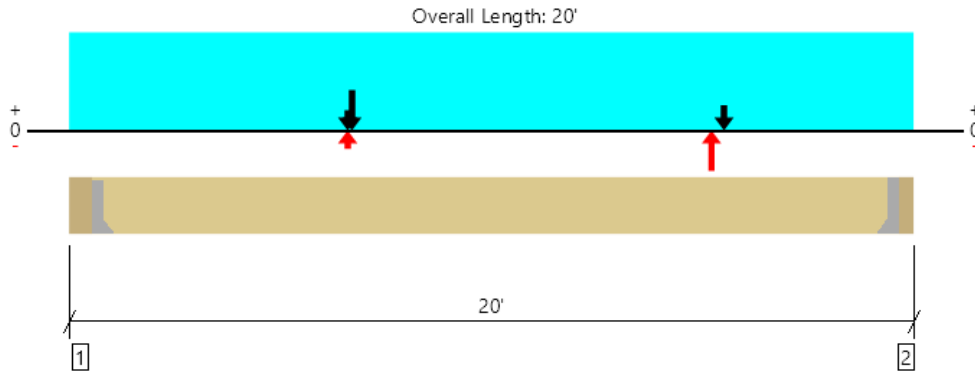
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File Name: mercer grove
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MAIN FLOOR, Copy of B52 FOR OT
1 piece(s) 7" x 11 7/8" 2.0E Parallam® PSL



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)	9099 @ 19' 8 1/2"	9099 (2.08")	Passed (100%)	--	1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	8930 @ 18' 8 5/8"	25713	Passed (35%)	1.60	1.0 D - 0.525 E + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	40720 @ 6' 7 3/16"	63688	Passed (64%)	1.60	1.0 D + 0.7 E (All Spans)
Live Load Defl. (in)	0.518 @ 7' 9 15/16"	0.481	Failed (L/446)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.998 @ 8' 10 9/16"	0.962	Failed (L/231)	--	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.
- Member should be side-loaded from both sides of the member or braced to prevent rotation.

OKAY E INCLUDES OVERSTRENGTH FACTOR

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Seismic	Total	
1 - Hanger on 11 7/8" PSL beam	5.50"	Hanger ¹	1.62"	2365	1575	-174	6800/-6800	10740/-6974	See note ¹
2 - Hanger on 11 7/8" PSL beam	3.50"	Hanger ¹	2.08"	3610	1926	690	6800/-6800	13026/-6800	See note ¹

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

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

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HHUS7.25/10	3.31"	N/A	30-16d	10-16d	
2 - Face Mount Hanger	HGU7.25-SDS H=11.813	5.25"	N/A	36-SDS25212	24-SDS25212	

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

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Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	5 1/2" to 19' 8 1/2"	N/A	26.0	--	--	--	
1 - Uniform (PSF)	0 to 20' (Front)	1'	15.0	40.0	-	-	Default Load
2 - Uniform (PSF)	0 to 20' (Front)	10'	10.0	-	-	-	Default Load
3 - Point (lb)	6' 6" (Front)	N/A	559	1243	-614	-	Linked from: B35, Support 2
4 - Point (lb)	15' 6" (Front)	N/A	2615	1458	1130	-	Linked from: B35, Support 3
5 - Point (lb)	6' 7 3/16" (Front)	N/A	-	-	-	15220	E x OVERSTRENGTH
6 - Point (lb)	15' 2 3/8" (Front)	N/A	-	-	-	-15220	E x OVERSTRENGTH

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SECTION 4: FOUNDATION

FOOTING DESIGN -- LOAD SUMMARY

Allowable bearing = 2000 psf
 with 1/3 increase for E/W = 2666.67 psf
 E = 0.7 QE x RHO
 W = 0.6 W

	W1	W2	F1	F2	RF1	RF2
DL	9	100	13	15	50	15
LL	0	0	40	60	0	0
SL	0	0	0	30	30	30

Notes:
 L1 is the length tributary loads are applied to.
 L2 is the width of footing.
 L3 is the length of footing.
 See foundation key plan for mark locations

C1 = DL + LL
 C2 = DL + SL
 C3 = DL + 0.75(SL+LL)
 C4 = DL + 0.75(E+LL)
 C5 = DL + 0.75(E+LL+SL)

MARK	POINT LOADS (LBS)			E/W	Max. Tributary Areas (Ft.)						SW	Min. Footing Dimensions			Total Load (lbs)				BEARING (Ksf)					max.	
	DL	LL	SL		W1	W2	F1	F2	RF1	RF2		T (in)	L1 ft.	L2 (in)	L3 (ft.)	DL	LL	SL	E/W	C1	C2	C3	C4		C5
HOUSE																									
C15	10496	4252	3149	0	0	0	0	0	0	0	2.4	12	4	48	4	12896	4252	3149	0	1.07	1.00	1.15	1.01	1.15	1.15
C16	17865	12215	8080	0	0	0	0	0	0	0	3.0375	12	4.5	54	4.5	20903	12215	8080	0	1.64	1.43	1.78	1.48	1.78	1.78
C17	9183	4973	4903	0	0	0	0	0	0	0	1.35	12	3	36	3	10533	4973	4903	0	1.72	1.72	1.99	1.58	1.99	1.99
C18	10201	11169	5318	0	8	2	0	0	0	0	2.2	11	4	48	4	13489	11169	5318	0	1.54	1.18	1.62	1.37	1.62	1.62
C19	3437	5005	527	0	8	2	10	0	0	0	0.75167	11	2.05	16	4.1	5013	5825	527	0	1.98	1.01	1.79	1.72	1.79	1.98
C20	6364	6664	3537	0	0	0	0	0	0	0	1.20313	11	3.5	30	3.5	7567	6664	3537	0	1.63	1.27	1.74	1.44	1.74	1.74
C21	12345	10027	6599	0	0	0	0	0	0	0	1.8	9	4	48	4	14145	10027	6599	0	1.51	1.30	1.66	1.35	1.66	1.66
C22	6716	4089	3991	0	0	0	0	0	0	0	1.0125	9	3	36	3	7729	4089	3991	0	1.31	1.30	1.53	1.20	1.53	1.53
C23	10010	9198	5526	0	8	2	10	0	0	0	1.8	9	2	48	4	12614	9998	5526	0	1.41	1.13	1.52	1.26	1.52	1.52
C24	11506	1291	2609	0	0	8	0	0	0	0	1.05	9	2	28	4	14156	1291	2609	0	1.66	1.80	1.83	1.62	1.83	1.83
C26	1704	3186	1952	0	0	0	0	0	0	0	0.45	9	2	24	2	2154	3186	1952	0	1.34	1.03	1.50	1.14	1.50	1.50
C25	5462	7478	4908	0	0	0	0	0	0	0	1.0125	9	3	36	3	6475	7478	4908	0	1.55	1.26	1.75	1.34	1.75	1.75
C27	3848	2659	4514	0	0	0	0	0	0	0	1.35	12	3	36	3	5198	2659	4514	0	0.87	1.08	1.18	0.80	1.18	1.18

SPREAD FOOTING DESIGN -- SQUARE

for 2000 psf Allowable Bearing Pressure

$f_c = 3,000$ psi
 $f_y = 60$ ksi

1'-6" square

P = 5.63 k	one-way:				
Pu = 9.17 k	phi Vc = 8.80 k	Vu = 1.91 k			o.k.
p = 2,500 psf	(2) #4 each way				
h = 9.00 in	phi Mn = 6.05 k-ft	Mu = 1.72 k-ft			o.k.
d = 5.25 in					
b = 18.00 in	two-way:				
bo = 35.00 in	phi Vc = 34.22 k	Vu = 7.00 k			o.k.

2'-0" square

P = 8.00 k	one-way:				
Pu = 13.04 k	phi Vc = 11.73 k	Vu = 3.67 k			o.k.
p = 2,000 psf	(3) #4 each way				
h = 9.00 in	phi Mn = 9.03 k-ft	Mu = 3.26 k-ft			o.k.
d = 5.25 in					
b = 24.00 in	two-way:				
bo = 35.00 in	phi Vc = 34.22 k	Vu = 11.31 k			o.k.

2'-6" square

P = 12.50 k	one-way:				
Pu = 20.38 k	phi Vc = 14.67 k	Vu = 6.62 k			o.k.
p = 2,000 psf	(3) #4 each way				
h = 9.00 in	phi Mn = 9.11 k-ft	Mu = 6.37 k-ft			o.k.
d = 5.25 in					
b = 30.00 in	two-way:				
bo = 35.00 in	phi Vc = 34.22 k	Vu = 18.64 k			o.k.

3'-0" square

P = 18.00 k	one-way:				
Pu = 29.34 k	phi Vc = 24.30 k	Vu = 8.76 k			o.k.
p = 2,000 psf	(4) #4 each way				
h = 11.00 in	phi Mn = 26.77 k-ft	Mu = 11.00 k-ft			o.k.
d = 7.25 in					
b = 36.00 in	two-way:				
bo = 43.00 in	phi Vc = 58.06 k	Vu = 26.72 k			o.k.

4'-0" square

P = 32.00 k	one-way:				
Pu = 52.16 k	phi Vc = 32.40 k	Vu = 18.20 k			o.k.
p = 2,000 psf	(6) #4 each way				
h = 11.00 in	phi Mn = 40.26 k-ft	Mu = 26.08 k-ft			o.k.
d = 7.25 in					
b = 48.00 in	two-way:				
bo = 61.00 in	phi Vc = 82.36 k	Vu = 49.54 k			o.k.

4'-6" square

P = 40.50 k	one-way:				
Pu = 66.02 k	phi Vc = 36.45 k	Vu = 24.14 k			o.k.
p = 2,000 psf	(6) #4 each way				
h = 11.00 in	phi Mn = 40.26 k-ft	Mu = 37.13 k-ft			o.k.
d = 7.25 in					
b = 54.00 in	two-way:				
bo = 61.00 in	phi Vc = 82.36 k	Vu = 63.40 k			o.k.

SPREAD FOOTING DESIGN -- RECTANGULAR

for 2000 psf Max. Allowable Bearing Pressure

$f_c = 3,000$ psi
 $f_y = 60$ ksi

16" wide x 4'-10" long

P = 12.89 k	one-way:				
$P_u = 21.01$ k	$\phi V_c = 8.57$ k	$V_u = 8.42$ k			o.k.
$p = 2,000$ psf	(2) #4 bottom				
$h = 9.00$ in	$\phi M_n = 13.42$ k-ft	$M_u = 12.69$ k-ft			o.k.
$d = 5.75$ in					
$b = 16.00$ in					
$l = 58.00$ in	two-way:				
$bo = 47.00$ in	$\phi V_c = 50.33$ k	$V_u = 19.07$ k			o.k.

24" wide x 3'-6" long

P = 14.00 k	one-way:				
$P_u = 22.82$ k	$\phi V_c = 12.85$ k	$V_u = 8.29$ k			o.k.
$p = 2,000$ psf	(3) #4 bottom				
$h = 9.00$ in	$\phi M_n = 14.57$ k-ft	$M_u = 9.98$ k-ft			o.k.
$d = 5.75$ in					
$b = 24.00$ in					
$l = 42.00$ in	two-way:				
$bo = 45.00$ in	$\phi V_c = 48.19$ k	$V_u = 20.88$ k			o.k.

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Title 4 ft wall
Dsgnr: jtw
Description....

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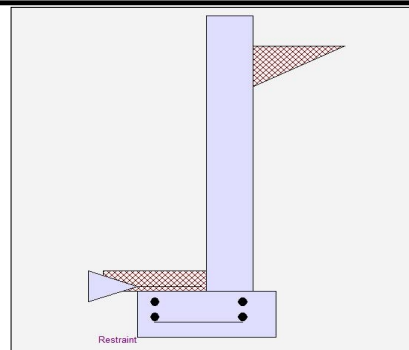
Code: IBC 2018, ACI 318-14, TMS 402-16

Criteria

Retained Height	=	4.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	4.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	40.0 psf/ft
	=	
Passive Pressure	=	200.0 psf/ft
Soil Density, Heel	=	130.00 pcf
Soil Density, Toe	=	130.00 pcf
Footing||Soil Friction	=	0.350
Soil height to ignore for passive pressure	=	0.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	50.0
Used for Sliding & Overturning		

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Axial Load Applied to Stem

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

Design Summary

Wall Stability Ratios

Overturning	=	1.66 OK
Slab Resists All Sliding !		

Total Bearing Load	=	942 lbs
...resultant ecc.	=	5.95 in

Soil Pressure @ Toe	=	1,245 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		

ACI Factored @ Toe	=	1,742 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	9.4 psi OK
Footing Shear @ Heel	=	3.0 psi OK
Allowable	=	75.0 psi

Sliding Calcs

Lateral Sliding Force	=	451.3 lbs
-----------------------	---	-----------

Stem Construction

Design Height Above Ftg	ft =	0.00
Wall Material Above "Ht"	=	Concrete
Design Method	=	LRFD
Thickness	=	8.00
Rebar Size	=	# 4
Rebar Spacing	=	12.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.186
---------------	---	-------

Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	512.0

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	682.7
Moment....Allowable	=	3,655.6

Shear....Actual

Service Level	psi =	
Strength Level	psi =	6.8
Shear....Allowable	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	=	Medium Weight
Masonry Design Method	=	ASD

Concrete Data

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

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

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

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Title 4 ft wall
Dsgnr: jtw
Description....

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.0384 in2/ft		
(4/3) * As :	0.0512 in2/ft	Min Stem T&S Reinf Area 0.778 in2	
200bd/fy : 200(12)(6.25)/40000 :	0.375 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.173 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.1728 in2/ft	#4@ 13.89 in	#4@ 27.78 in
Provided Area :	0.2 in2/ft	#5@ 21.53 in	#5@ 43.06 in
Maximum Area :	1.27 in2/ft	#6@ 30.56 in	#6@ 61.11 in

Footing Data

Toe Width	=	1.00 ft
Heel Width	=	1.00
Total Footing Width	=	2.00
Footing Thickness	=	9.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 40,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm= 3.00 in

Footing Design Results

	Toe	Heel
Factored Pressure	= 1,742	0 psf
Mu' : Upward	= 8,152	0 ft-#
Mu' : Downward	= 1,602	42 ft-#
Mu: Design	= 546	42 ft-#
Actual 1-Way Shear	= 9.41	3.01 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, phi Tu	=	0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

Toe: #4@ 12.34 in, #5@ 19.13 in, #6@ 27.16 in, #7@ 37.03 in, #8@ 48.76 in, #9@ 6
Heel: phiMn = phi'5'lambda'sqrt(fc)'Sm
Key: No key defined

Min footing T&S reinf Area	0.39	in2
Min footing T&S reinf Area per foot	0.19	in2 /ft
If one layer of horizontal bars:	If two layers of horizontal bars:	
#4@ 12.35 in	#4@ 24.69 in	
#5@ 19.14 in	#5@ 38.27 in	
#6@ 27.16 in	#6@ 54.32 in	

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Title 4 ft wall
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Description....

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	451.3	1.58	714.5	Soil Over HL (ab. water tbl)	173.3	1.83	317.8
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		1.83	317.8
Hydrostatic Force				Watre Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =	43.3	0.50	21.7
				Surcharge Over Toe =	50.0	0.50	25.0
				Stem Weight(s) =	450.0	1.33	600.0
				Earth @ Stem Transitions =			
Total	= 451.3	O.T.M.	= 714.5	Footing Weight =	225.0	1.00	225.0
				Key Weight =			
				Vert. Component =			
Resisting/Overturning Ratio		=	1.66	Total =	941.7 lbs	R.M.=	1,189.4
Vertical Loads used for Soil Pressure =			941.7 lbs	* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.			

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 200.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.097 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.

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Title 4 ft wall

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Code: IBC 2018,ACI 318-14,TMS 402-16

Rebar Lap & Embedment Lengths Information

(Applying TMS 402 provisions) or (Applying IBC modifications to TMS 402 provisions)

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment = 15.60 in

Development length for #4 bar specified in this stem design segment = 12.00 in

Hooked embedment length into footing for #4 bar specified in this stem design segment = 6.00 in

As Provided = 0.2000 in²/ft

As Required = 0.1728 in²/ft

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Title 4 ft wall

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Description....

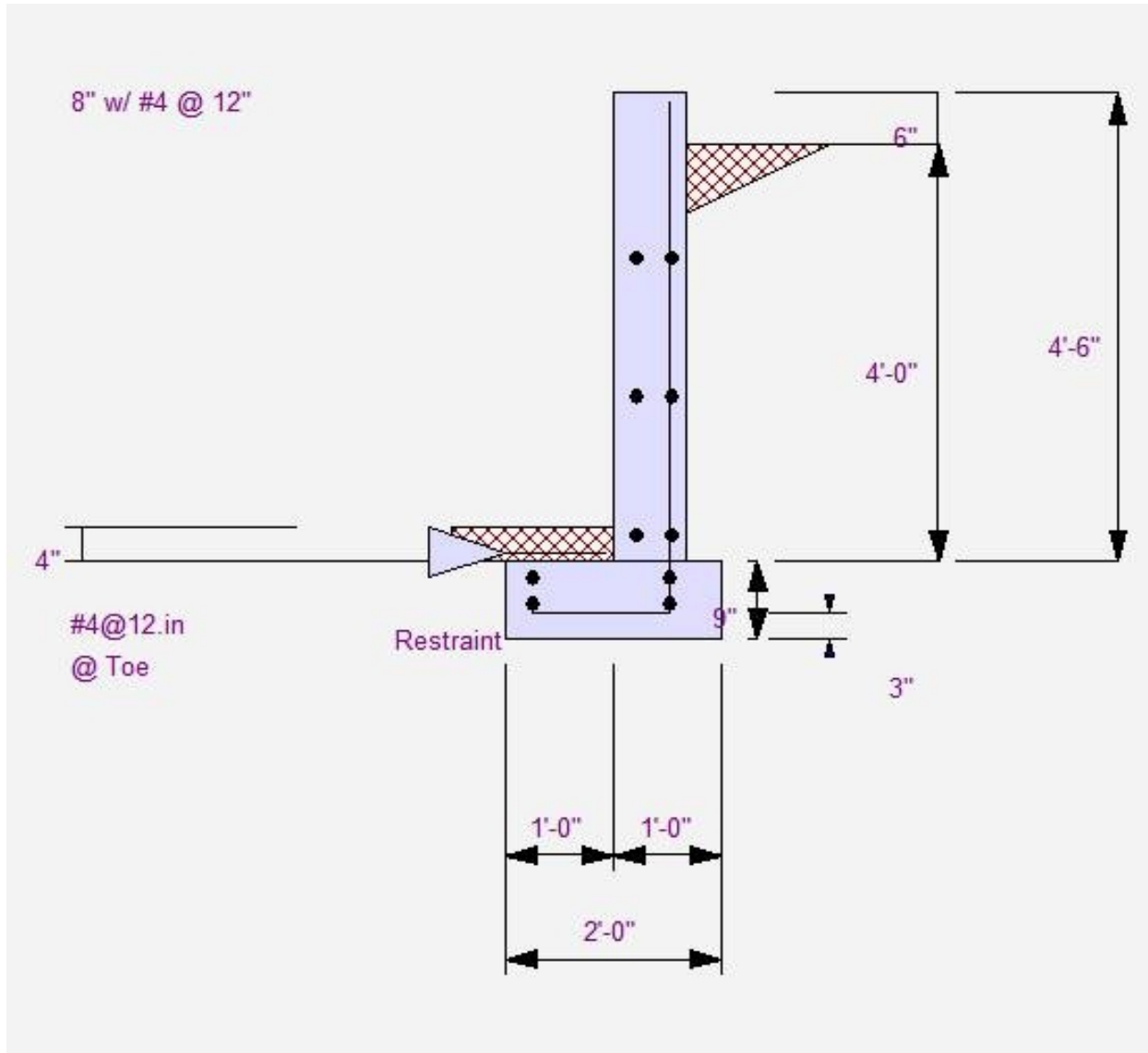
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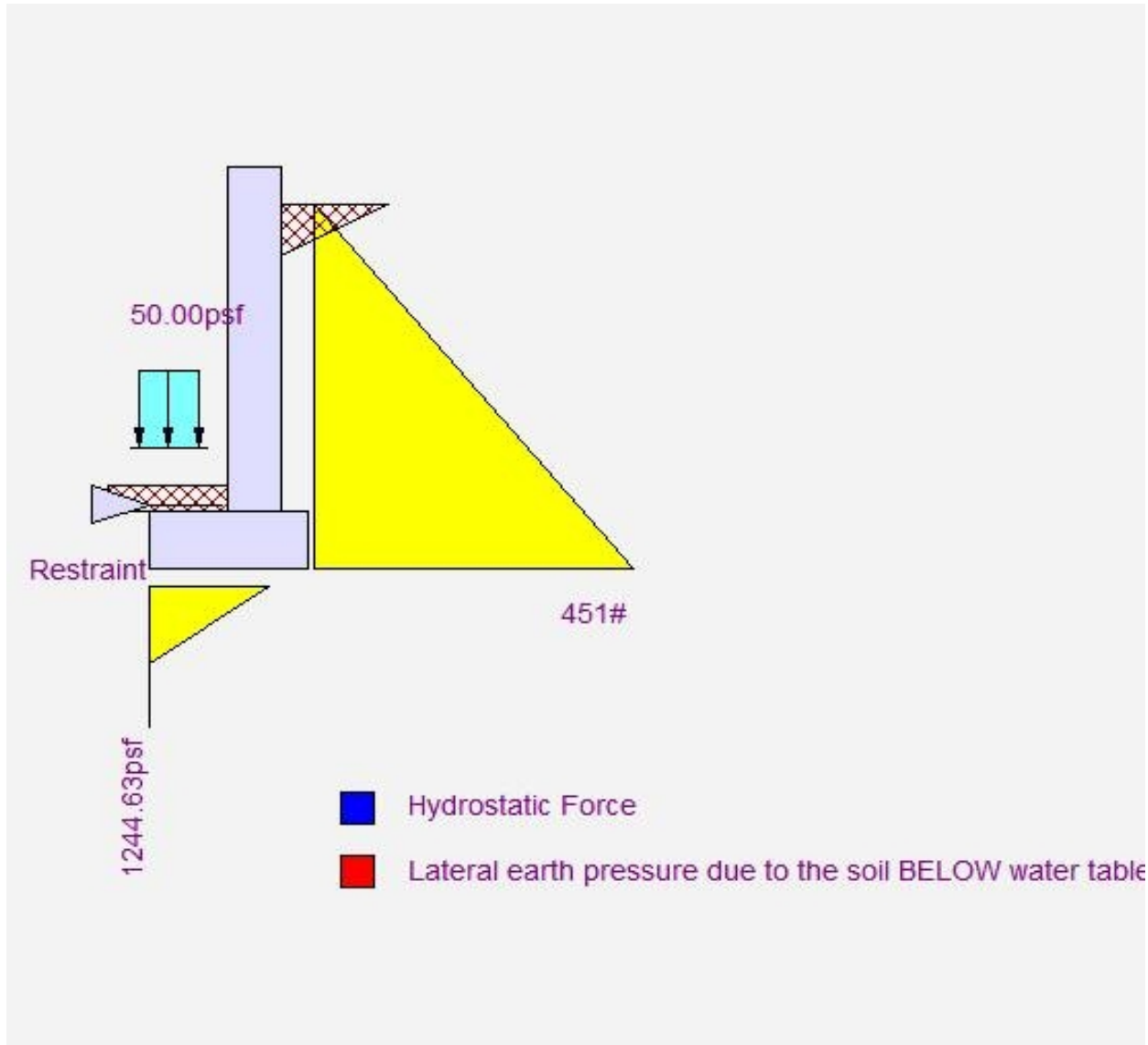
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Project Name/Number : RETAINING WAL

Title 5 ft wall
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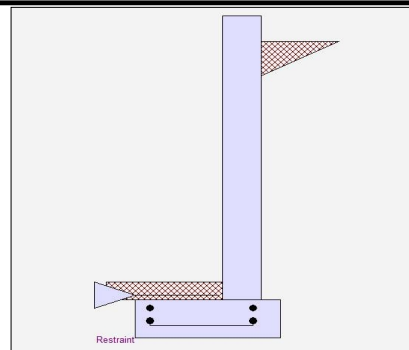
Code: IBC 2018, ACI 318-14, TMS 402-16

Criteria

Retained Height	=	5.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	4.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	40.0 psf/ft
	=	
Passive Pressure	=	200.0 psf/ft
Soil Density, Heel	=	130.00 pcf
Soil Density, Toe	=	130.00 pcf
Footing||Soil Friction	=	0.350
Soil height to ignore for passive pressure	=	0.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	50.0
Used for Sliding & Overturning		

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Axial Load Applied to Stem

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

Design Summary

Wall Stability Ratios

Overturning	=	1.55 OK
Slab Resists All Sliding !		
Total Bearing Load	=	1,188 lbs
...resultant ecc.	=	7.90 in
Soil Pressure @ Toe	=	1,338 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,873 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	16.4 psi OK
Footing Shear @ Heel	=	3.6 psi OK
Allowable	=	75.0 psi
Sliding Calcs		
Lateral Sliding Force	=	661.3 lbs

Stem Construction

Design Height Above Ftg	ft =	0.00
Wall Material Above "Ht"	=	Concrete
Design Method	=	LRFD
Thickness	=	8.00
Rebar Size	=	# 4
Rebar Spacing	=	12.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.364
---------------	---	-------

Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	800.0

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	1,333.3
Moment....Allowable	=	3,655.6

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	10.7
Shear.....Allowable	psi =	75.0
Anet (Masonry)	in ² =	
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	=	Medium Weight
Masonry Design Method	=	ASD

Concrete Data

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

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

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

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Title 5 ft wall
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Description....

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.0749 in2/ft		
(4/3) * As :	0.0999 in2/ft	Min Stem T&S Reinf Area 0.950 in2	
200bd/fy : 200(12)(6.25)/40000 :	0.375 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.173 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.1728 in2/ft	#4@ 13.89 in	#4@ 27.78 in
Provided Area :	0.2 in2/ft	#5@ 21.53 in	#5@ 43.06 in
Maximum Area :	1.27 in2/ft	#6@ 30.56 in	#6@ 61.11 in

Footing Data

Toe Width	=	1.50 ft
Heel Width	=	1.00
Total Footing Width	=	2.50
Footing Thickness	=	9.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 40,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm= 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>
Factored Pressure	= 1,873	0 psf
Mu' : Upward	= 18,168	0 ft-#
Mu' : Downward	= 3,605	51 ft-#
Mu: Design	= 1,214	51 ft-#
Actual 1-Way Shear	= 16.41	3.63 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, phi Tu	=	0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

Toe: #4@ 12.34 in, #5@ 19.13 in, #6@ 27.16 in, #7@ 37.03 in, #8@ 48.76 in, #9@ 6
Heel: phiMn = phi'5'lambda'sqrt(fc)'Sm
Key: No key defined

Min footing T&S reinf Area	0.49	in2
Min footing T&S reinf Area per foot	0.19	in2 /ft
If one layer of horizontal bars:		If two layers of horizontal bars:
#4@ 12.35 in		#4@ 24.69 in
#5@ 19.14 in		#5@ 38.27 in
#6@ 27.16 in		#6@ 54.32 in

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Project Name/Number : RETAINING WAL

Title 5 ft wall
Dsgnr: jtw
Description....

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	661.3	1.92	1,267.4	Soil Over HL (ab. water tbl)	216.7	2.33	505.6
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.33	505.6
Hydrostatic Force				Watre Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =	65.0	0.75	48.8
				Surcharge Over Toe =	75.0	0.75	56.3
				Stem Weight(s) =	550.0	1.83	1,008.3
				Earth @ Stem Transitions =			
Total	= 661.3	O.T.M.	= 1,267.4	Footing Weight =	281.3	1.25	351.6
				Key Weight =			
				Vert. Component =			
Resisting/Overturning Ratio		=	1.55	Total =	1,187.9 lbs	R.M.=	1,970.5
Vertical Loads used for Soil Pressure =		1,187.9 lbs		* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.			

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 200.0 pci

Horizontal Defl @ Top of Wall (approximate only) 0.102 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.

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Title 5 ft wall

Dsgnr: jtw

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Rebar Lap & Embedment Lengths Information

(Applying TMS 402 provisions) or (Applying IBC modifications to TMS 402 provisions)

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment = 15.60 in

Development length for #4 bar specified in this stem design segment = 12.00 in

Hooked embedment length into footing for #4 bar specified in this stem design segment = 6.00 in

As Provided = 0.2000 in/ft

As Required = 0.1728 in/ft

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Project Name/Number : RETAINING WAL

Title 5 ft wall

Dsgnr: jtw

Description....

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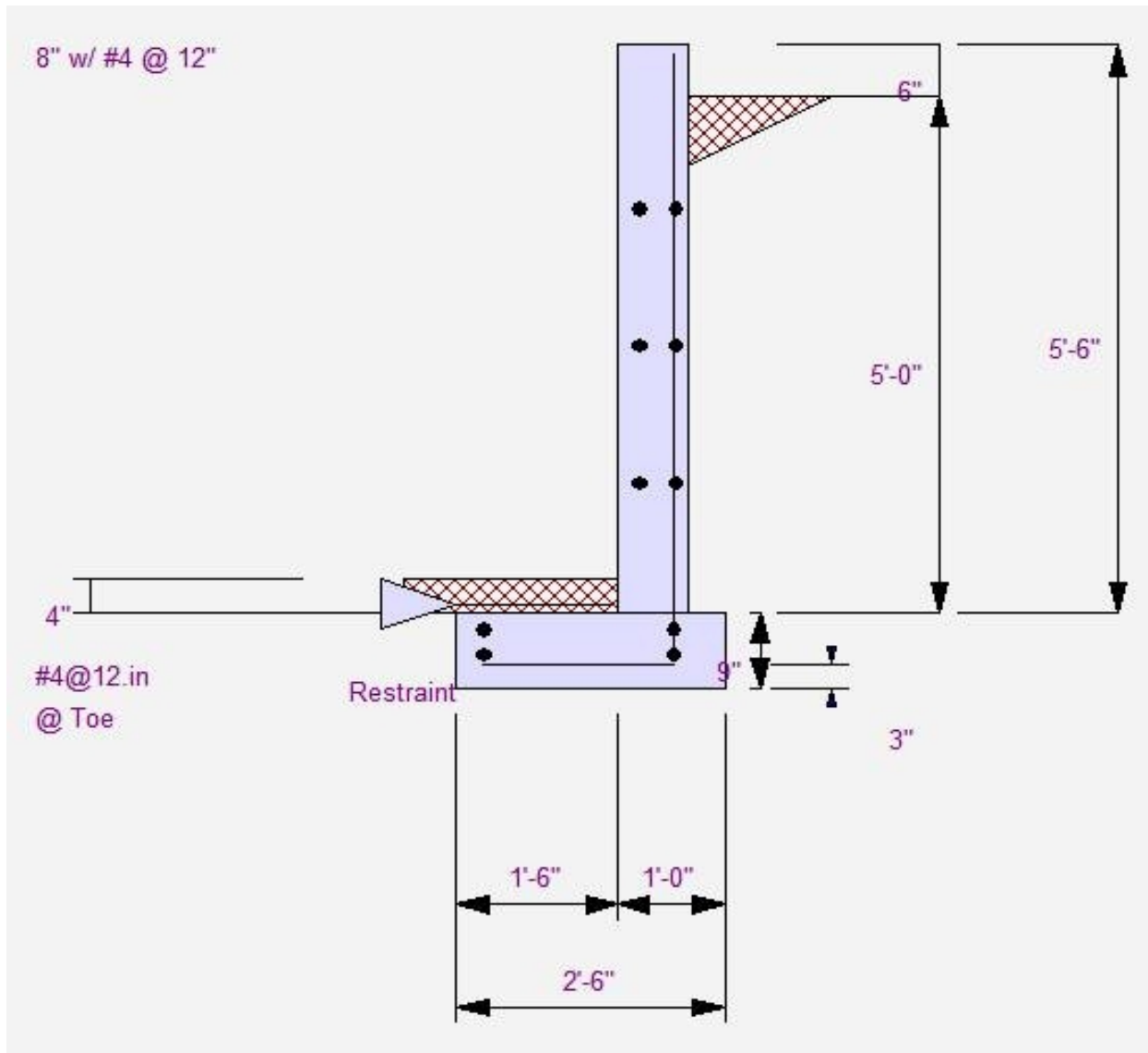
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Title 5 ft wall

Dsgnr: jtw

Description....

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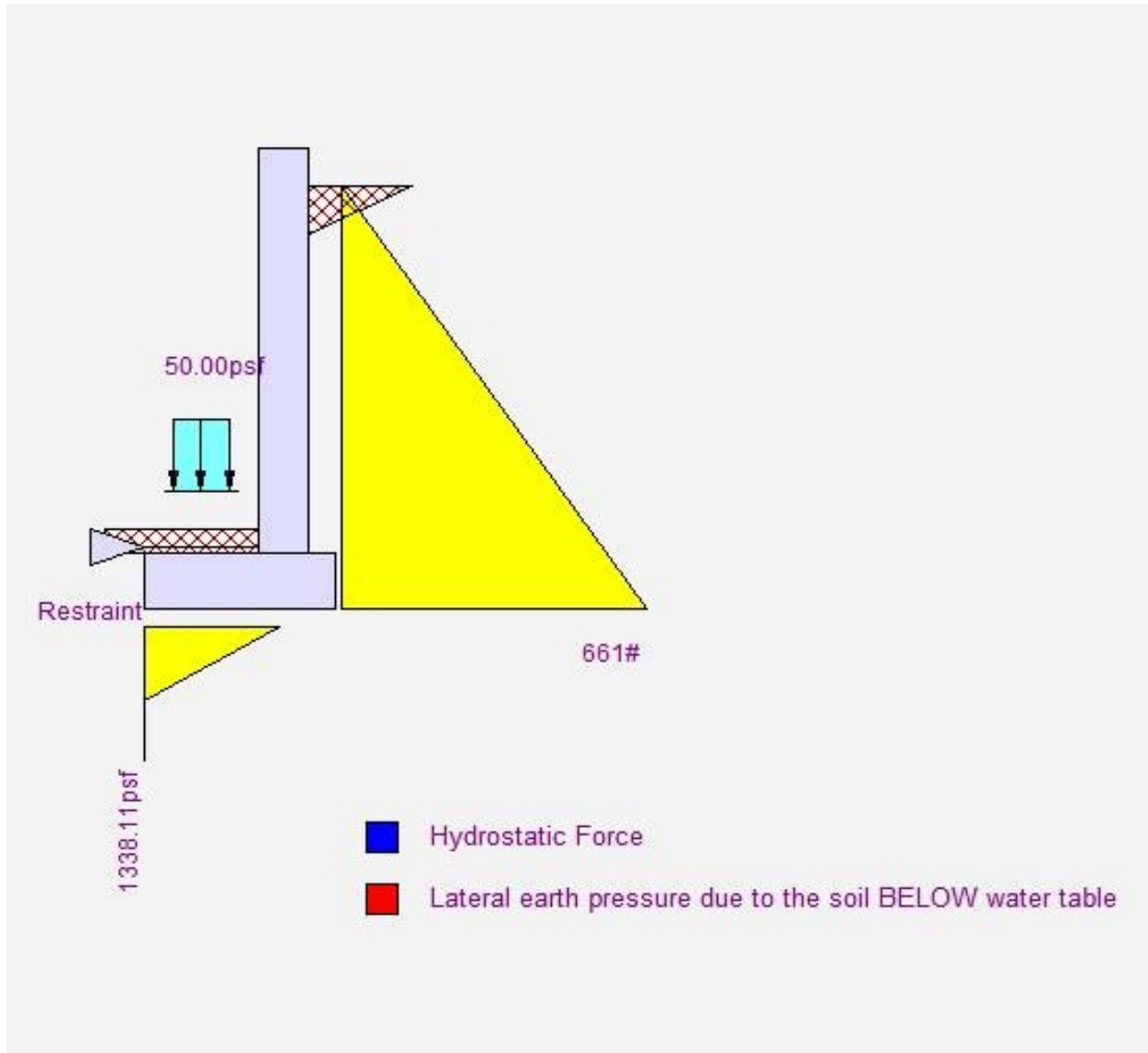
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Title 6 ft wall
Dsgnr: jtw
Description....

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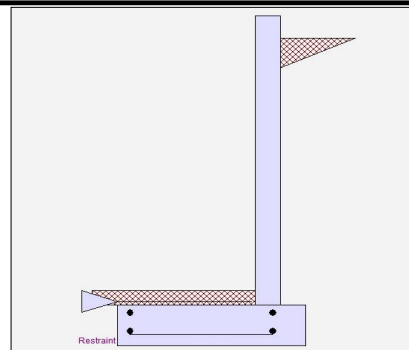
Criteria

Retained Height = 6.00 ft
Wall height above soil = 0.50 ft
Slope Behind Wall = 0.00
Height of Soil over Toe = 4.00 in
Water height over heel = 0.0 ft

Soil Data

Allow Soil Bearing = 2,000.0 psf
Equivalent Fluid Pressure Method
Active Heel Pressure = 40.0 psf/ft

Passive Pressure = 200.0 psf/ft
Soil Density, Heel = 130.00 pcf
Soil Density, Toe = 130.00 pcf
Footings||Soil Friction = 0.350
Soil height to ignore for passive pressure = 0.00 in



Surcharge Loads

Surcharge Over Heel = 0.0 psf
NOT Used To Resist Sliding & Overturning
Surcharge Over Toe = 50.0
NOT Used for Sliding & Overturning

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Axial Load Applied to Stem

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

Design Summary

Wall Stability Ratios

Overturning = 1.79 OK
Slab Resists All Sliding !

Total Bearing Load = 1,512 lbs
...resultant ecc. = 7.10 in

Soil Pressure @ Toe = 785 psf OK
Soil Pressure @ Heel = 22 psf OK
Allowable = 2,000 psf
Soil Pressure Less Than Allowable

ACI Factored @ Toe = 1,199 psf
ACI Factored @ Heel = 33 psf
Footing Shear @ Toe = 13.1 psi OK
Footing Shear @ Heel = 4.6 psi OK
Allowable = 75.0 psi

Sliding Calcs

Lateral Sliding Force = 956.8 lbs

Stem Construction

Design Height Above Ftg ft = 0.00
Wall Material Above "Ht" = Concrete
Design Method = LFRD
Thickness = 6.00
Rebar Size = # 5
Rebar Spacing = 15.00
Rebar Placed at = Edge

Design Data

fb/FB + fa/Fa = 0.530

Total Force @ Section

Service Level lbs =
Strength Level lbs = 1,152.0

Moment....Actual

Service Level ft-# =
Strength Level ft-# = 2,304.0
Moment.....Allowable = 4,346.7

Shear.....Actual

Service Level psi =
Strength Level psi = 22.9
Shear.....Allowable psi = 75.0

Anet (Masonry) in2 =
Rebar Depth 'd' in = 4.19

Masonry Data

f'm psi =
Fs psi =
Solid Grouting =
Modular Ratio 'n' =
Wall Weight psf = 75.0
Short Term Factor =
Equiv. Solid Thick. =
Masonry Block Type = Medium Weight
Masonry Design Method = ASD

Concrete Data

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

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

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

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Title 6 ft wall
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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1323 in2/ft		
(4/3) * As :	0.1765 in2/ft	Min Stem T&S Reinf Area 0.842 in2	
200bd/fy : 200(12)(4.1875)/60000 :	0.1675 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.130 in2/ft	
0.0018bh : 0.0018(12)(6) :	0.1296 in2/ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.1675 in2/ft	#4@ 18.52 in	#4@ 37.04 in
Provided Area :	0.248 in2/ft	#5@ 28.70 in	#5@ 57.41 in
Maximum Area :	0.5673 in2/ft	#6@ 40.74 in	#6@ 81.48 in

Footing Data

Toe Width	=	2.75 ft
Heel Width	=	1.00
Total Footing Width	=	3.75
Footing Thickness	=	11.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 40,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm= 3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>
Factored Pressure	=	1,199	33 psf
Mu' : Upward	=	41,463	11 ft-#
Mu' : Downward	=	13,476	138 ft-#
Mu: Design	=	2,332	127 ft-#
Actual 1-Way Shear	=	13.08	4.58 psi
Allow 1-Way Shear	=	75.00	40.00 psi
Toe Reinforcing	=	# 5 @ 15.00 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

Toe: #4@ 10.10 in, #5@ 15.65 in, #6@ 22.22 in, #7@ 30.30 in, #8@ 39.89 in, #9@ 5
Heel: phiMn = phi'5'lambda'sqrt(fc)'Sm
Key: No key defined

Min footing T&S reinf Area	0.89	in2
Min footing T&S reinf Area per foot	0.24	in2 /ft
If one layer of horizontal bars:		If two layers of horizontal bars:
#4@ 10.10 in		#4@ 20.20 in
#5@ 15.66 in		#5@ 31.31 in
#6@ 22.22 in		#6@ 44.44 in

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Title 6 ft wall
Dsgnr: jtw
Description....

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	956.8	2.31	2,206.0	Soil Over HL (ab. water tbl)	390.0	3.50	1,365.0
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.50	1,365.0
Hydrostatic Force				Watre Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =	119.2	1.38	163.9
				Surcharge Over Toe =			
				Stem Weight(s) =	487.5	3.00	1,462.5
				Earth @ Stem Transitions =			
Total	= 956.8	O.T.M. =	2,206.0	Footing Weight =	515.6	1.88	966.8
				Key Weight =			
				Vert. Component =			
Resisting/Overturning Ratio		= 1.79		Total =	1,512.3 lbs	R.M.=	3,958.2
Vertical Loads used for Soil Pressure =		1,512.3 lbs					

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

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 200.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.047 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.

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Title 6 ft wall

Dsgnr: jtw

Description....

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Rebar Lap & Embedment Lengths Information

(Applying TMS 402 provisions) or (Applying IBC modifications to TMS 402 provisions)

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment = 23.40 in

Development length for #5 bar specified in this stem design segment = 18.00 in

Hooked embedment length into footing for #5 bar specified in this stem design segment = 7.09 in

As Provided = 0.2480 in/ft

As Required = 0.1675 in/ft

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Project Name/Number : RETAINING WAL

Title 6 ft wall

Dsgnr: jtw

Description....

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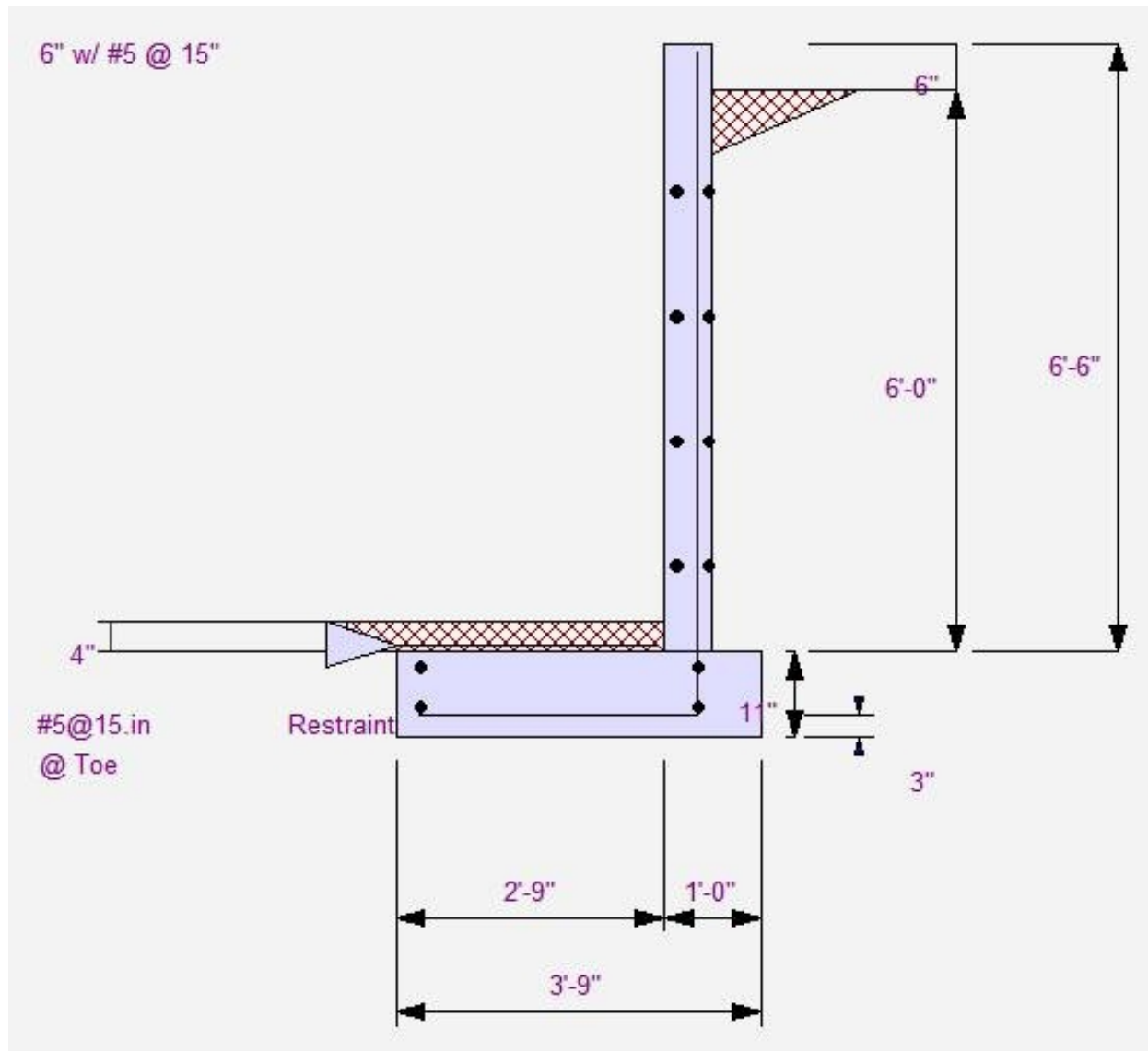
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Title 6 ft wall

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Description....

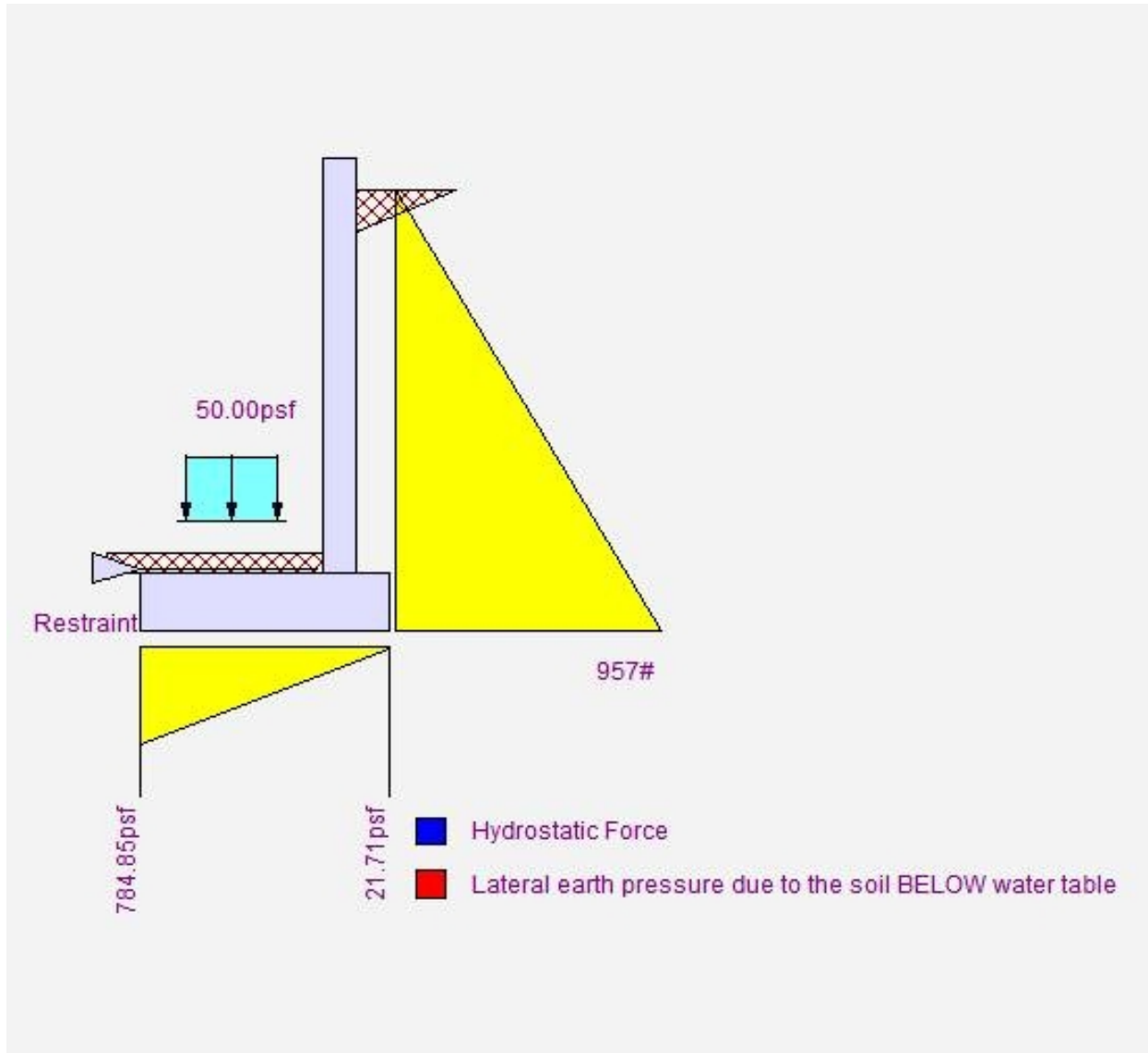
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Title 6 ft wall (SEISMIC)

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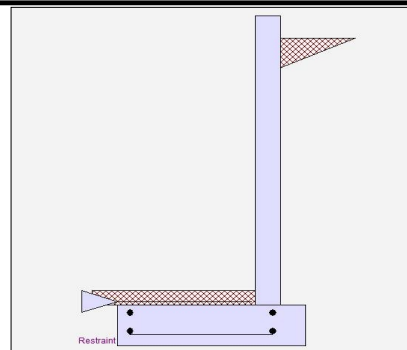
Code: IBC 2018, ACI 318-14, TMS 402-16

Criteria

Retained Height	=	6.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	4.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,667.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	40.0 psf/ft
	=	
Passive Pressure	=	200.0 psf/ft
Soil Density, Heel	=	130.00 pcf
Soil Density, Toe	=	130.00 pcf
Footing||Soil Friction	=	0.350
Soil height to ignore for passive pressure	=	0.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
NOT Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	50.0
NOT Used for Sliding & Overturning		

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Axial Load Applied to Stem

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

Earth Pressure Seismic Load

Method : Uniform		
Multiplier Used	=	8.000
(Multiplier used on soil density)		
Uniform Seismic Force	=	55.333
Total Seismic Force	=	382.722

Design Summary

Wall Stability Ratios

Overturning	=	1.26 Ratio < 1.5!
Slab Resists All Sliding !		
Total Bearing Load	=	1,512 lbs
...resultant ecc.	=	14.45 in
Soil Pressure @ Toe	=	1,503 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	2,667 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	2,295 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	18.2 psi OK
Footing Shear @ Heel	=	5.1 psi OK
Allowable	=	75.0 psi

Sliding Calcs

Lateral Sliding Force	=	1,224.7 lbs
-----------------------	---	-------------

Stem Construction

Bottom

Design Height Above Ftg	ft =	0.00
Wall Material Above "Ht"	=	Concrete
Design Method	=	LRFD
Thickness	=	6.00
Rebar Size	=	# 5
Rebar Spacing	=	15.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.759
---------------	---	-------

Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	1,484.0

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	3,300.0

Moment.....Allowable	=	4,346.7
----------------------	---	---------

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	29.5

Shear.....Allowable	psi =	75.0
---------------------	-------	------

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

Rebar Depth 'd'	in =	4.19
-----------------	------	------

Masonry Data

f'm	psi =	
Fs	psi =	

Solid Grouting	=	
----------------	---	--

Modular Ratio 'n'	=	
-------------------	---	--

Wall Weight	psf =	75.0
-------------	-------	------

Short Term Factor	=	
-------------------	---	--

Equip. Solid Thick.	=	
---------------------	---	--

Masonry Block Type	=	Medium Weight
--------------------	---	---------------

Masonry Design Method	=	ASD
-----------------------	---	-----

Concrete Data

f'c	psi =	2,500.0
-----	-------	---------

Fy	psi =	60,000.0
----	-------	----------

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

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

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Title 6 ft wall (SEISMIC)

Dsgnr: jtw

Description....

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1896 in2/ft		
(4/3) * As :	0.2527 in2/ft	Min Stem T&S Reinf Area 0.842 in2	
200bd/fy : 200(12)(4.1875)/60000 :	0.1675 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.130 in2/ft	
0.0018bh : 0.0018(12)(6) :	0.1296 in2/ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.1896 in2/ft	#4@ 18.52 in	#4@ 37.04 in
Provided Area :	0.248 in2/ft	#5@ 28.70 in	#5@ 57.41 in
Maximum Area :	0.5673 in2/ft	#6@ 40.74 in	#6@ 81.48 in

Footing Data

Toe Width	=	2.75 ft
Heel Width	=	1.00
Total Footing Width	=	3.75
Footing Thickness	=	11.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 40,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm= 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>
Factored Pressure	= 2,295	0 psf
Mu' : Upward	= 57,623	0 ft-#
Mu' : Downward	= 13,476	138 ft-#
Mu: Design	= 3,679	138 ft-#
Actual 1-Way Shear	= 18.24	5.10 psi
Allow 1-Way Shear	= 75.00	40.00 psi
Toe Reinforcing	= # 5 @ 15.00 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

Toe: #4@ 10.10 in, #5@ 15.65 in, #6@ 22.22 in, #7@ 30.30 in, #8@ 39.89 in, #9@ 5
Heel: phiMn = phi'5'lambda'sqrt(fc)'Sm
Key: No key defined

Min footing T&S reinf Area	0.89	in2
Min footing T&S reinf Area per foot	0.24	in2 /ft
If one layer of horizontal bars:	If two layers of horizontal bars:	
#4@ 10.10 in	#4@ 20.20 in	
#5@ 15.66 in	#5@ 31.31 in	
#6@ 22.22 in	#6@ 44.44 in	

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Project Name/Number : RETAINING WAL

Title 6 ft wall (SEISMIC)

Dsgnr: jtw

Description....

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	956.8	2.31	2,206.0	Soil Over HL (ab. water tbl)	390.0	3.50	1,365.0
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.50	1,365.0
Hydrostatic Force				Watre Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =	119.2	1.38	163.9
Seismic Earth Load =	267.9	3.46	926.5	Surcharge Over Toe =			
=				Stem Weight(s) =	487.5	3.00	1,462.5
Total =	1,224.7	O.T.M. =	3,132.5	Earth @ Stem Transitions =			
				Footing Weight =	515.6	1.88	966.8
				Key Weight =			
				Vert. Component =			
Resisting/Overturning Ratio =			1.26	Total =	1,512.3 lbs	R.M.=	3,958.2
Vertical Loads used for Soil Pressure =		1,512.3	lbs				

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

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 Modulus 200.0 pci

Horizontal Defl @ Top of Wall (approximate only) 0.090 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.

Use menu item Settings > Printing & Title Block
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Project Name/Number : RETAINING WAL

Title 6 ft wall (SEISMIC)

Dsgnr: jtw

Description....

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Rebar Lap & Embedment Lengths Information

(Applying TMS 402 provisions) or (Applying IBC modifications to TMS 402 provisions)

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment = 23.40 in

Development length for #5 bar specified in this stem design segment = 18.00 in

Hooked embedment length into footing for #5 bar specified in this stem design segment = 8.03 in

As Provided = 0.2480 in/ft

As Required = 0.1896 in/ft

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Project Name/Number : RETAINING WAL

Title 6 ft wall (SEISMIC)

Dsgnr: jtw

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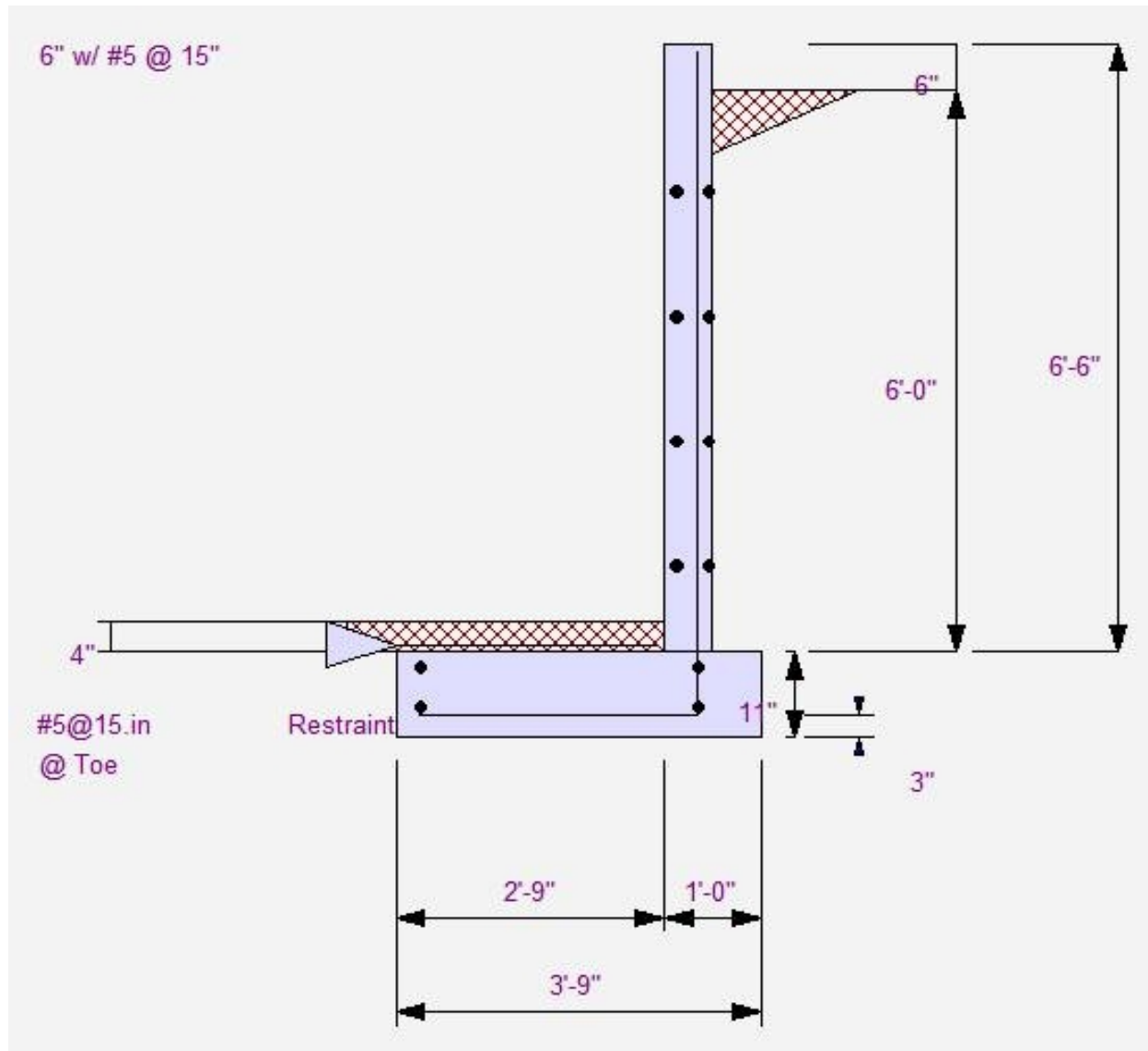
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Title 6 ft wall (SEISMIC)

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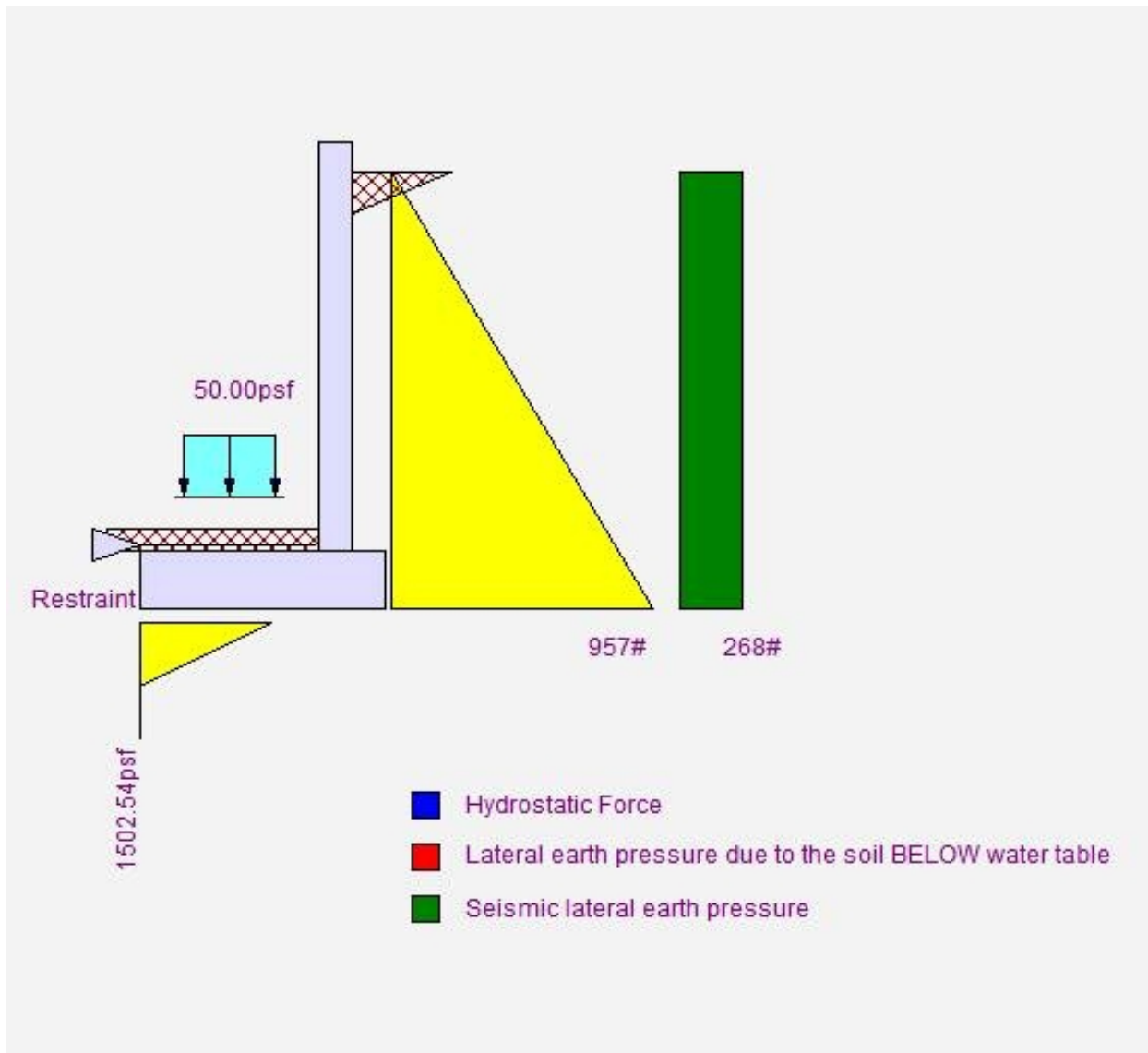
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Title 7 ft wall
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Description....

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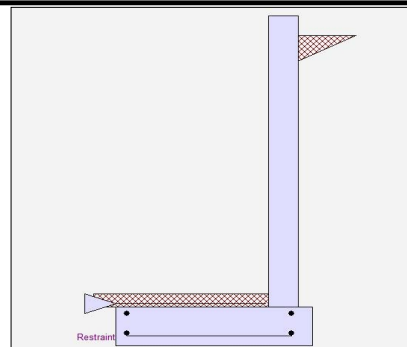
Criteria

Retained Height = 7.00 ft
Wall height above soil = 0.50 ft
Slope Behind Wall = 0.00
Height of Soil over Toe = 4.00 in
Water height over heel = 0.0 ft

Soil Data

Allow Soil Bearing = 2,000.0 psf
Equivalent Fluid Pressure Method
Active Heel Pressure = 40.0 psf/ft

Passive Pressure = 200.0 psf/ft
Soil Density, Heel = 130.00 pcf
Soil Density, Toe = 130.00 pcf
Footings||Soil Friction = 0.350
Soil height to ignore for passive pressure = 0.00 in



Surcharge Loads

Surcharge Over Heel = 0.0 psf
NOT Used To Resist Sliding & Overturning
Surcharge Over Toe = 0.0
NOT Used for Sliding & Overturning

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Axial Load Applied to Stem

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

Design Summary

Wall Stability Ratios

Overturning = 1.75 OK
Slab Resists All Sliding !

Total Bearing Load = 1,880 lbs
...resultant ecc. = 10.66 in

Soil Pressure @ Toe = 920 psf OK
Soil Pressure @ Heel = 0 psf OK
Allowable = 2,000 psf
Soil Pressure Less Than Allowable

ACI Factored @ Toe = 1,288 psf
ACI Factored @ Heel = 0 psf

Footing Shear @ Toe = 16.4 psi OK
Footing Shear @ Heel = 3.5 psi OK
Allowable = 75.0 psi

Sliding Calcs

Lateral Sliding Force = 1,280.0 lbs

Stem Construction

Design Height Above Ftg ft = 0.00
Wall Material Above "Ht" = Concrete
Design Method = LFRD
Thickness = 8.00
Rebar Size = # 5
Rebar Spacing = 13.00
Rebar Placed at = Edge

Design Data

fb/FB + fa/Fa = 0.485

Total Force @ Section

Service Level lbs =
Strength Level lbs = 1,568.0

Moment....Actual

Service Level ft-# =
Strength Level ft-# = 3,658.7
Moment....Allowable = 7,532.8

Shear.....Actual

Service Level psi =
Strength Level psi = 21.1
Shear.....Allowable psi = 75.0
Anet (Masonry) in2 =
Rebar Depth 'd' in = 6.19

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 = Medium Weight
Masonry Design Method = ASD

Concrete Data

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

Bottom

Stem OK

LFRD

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

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

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Project Name/Number : RETAINING WAL

Title 7 ft wall
Dsgnr: jtw
Description....

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1385 in ² /ft		
(4/3) * As :	0.1847 in ² /ft	Min Stem T&S Reinf Area 1.296 in ²	
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in ² /ft	Min Stem T&S Reinf Area per ft of stem Height : 0.173 in ² /ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in ² /ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.1847 in ² /ft	#4@ 13.89 in	#4@ 27.78 in
Provided Area :	0.2862 in ² /ft	#5@ 21.53 in	#5@ 43.06 in
Maximum Area :	0.8382 in ² /ft	#6@ 30.56 in	#6@ 61.11 in

Footing Data

Toe Width	=	3.50 ft
Heel Width	=	1.00
Total Footing Width	=	4.50
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm= 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>
Factored Pressure	= 1,288	0 psf
Mu' : Upward	= 67,658	0 ft-#
Mu' : Downward	= 17,052	71 ft-#
Mu: Design	= 4,217	71 ft-#
Actual 1-Way Shear	= 16.39	3.53 psi
Allow 1-Way Shear	= 75.00	40.00 psi
Toe Reinforcing	= # 5 @ 13.00 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

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 20.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46
Heel: phiMn = phi'5'lambda'sqrt(fc)'Sm
Key: No key defined

Min footing T&S reinf Area	1.17	in ²
Min footing T&S reinf Area per foot	0.26	in ² /ft
If one layer of horizontal bars:	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	

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Title 7 ft wall
Dsgnr: jtw
Description....

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	1,280.0	2.67	3,413.3	Soil Over HL (ab. water tbl)	303.3	4.33	1,314.4
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		4.33	1,314.4
Hydrostatic Force				Watre Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =	151.7	1.75	265.4
				Surcharge Over Toe =			
				Stem Weight(s) =	750.0	3.83	2,875.0
				Earth @ Stem Transitions =			
Total	= 1,280.0	O.T.M.	= 3,413.3	Footing Weight =	675.0	2.25	1,518.8
				Key Weight =			
				Vert. Component =			
Resisting/Overturning Ratio		=	1.75	Total =	1,880.0 lbs	R.M.=	5,973.6
Vertical Loads used for Soil Pressure =		1,880.0	lbs	* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.			

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 200.0 pci

Horizontal Defl @ Top of Wall (approximate only) 0.053 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.

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Title 7 ft wall

Dsgnr: jtw

Description....

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Rebar Lap & Embedment Lengths Information

(Applying TMS 402 provisions) or (Applying IBC modifications to TMS 402 provisions)

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment = 23.40 in

Development length for #5 bar specified in this stem design segment = 18.00 in

Hooked embedment length into footing for #5 bar specified in this stem design segment = 6.78 in

As Provided = 0.2862 in²/ft

As Required = 0.1847 in²/ft

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Project Name/Number : RETAINING WAL

Title 7 ft wall

Dsgnr: jtw

Description....

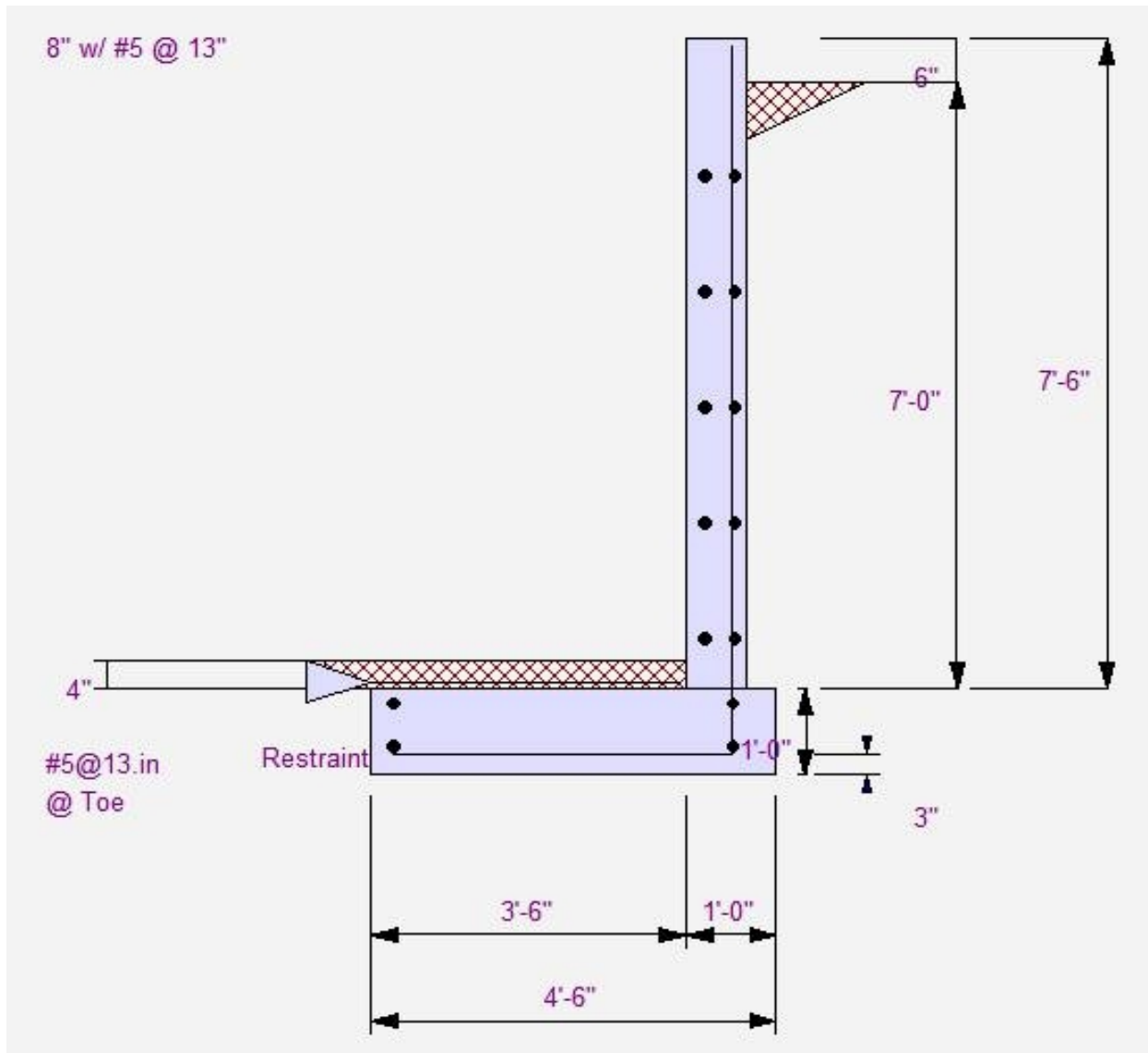
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Title 7 ft wall

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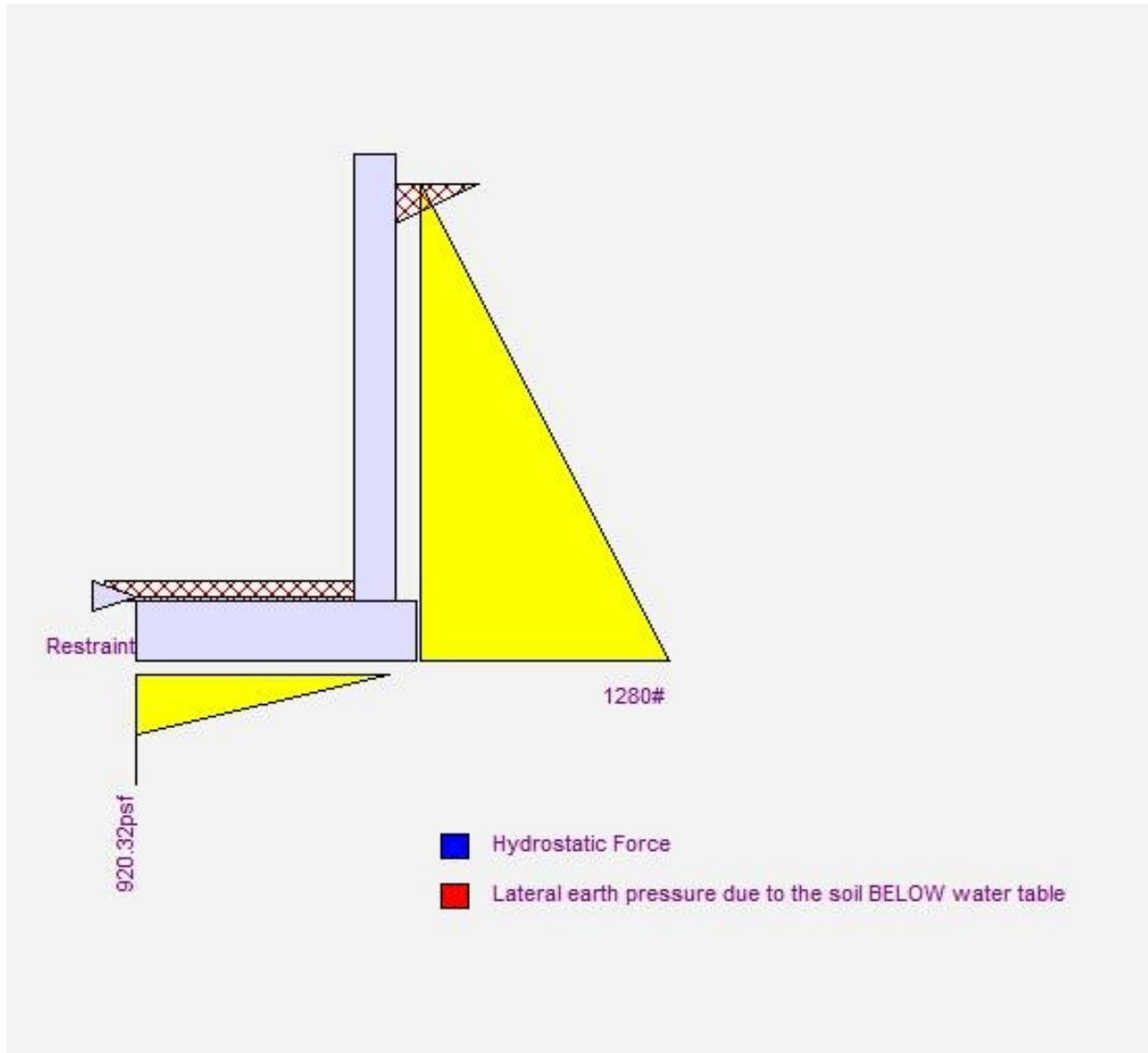
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Project Name/Number : RETAINING WAL

Title 7 ft wall (seismic)
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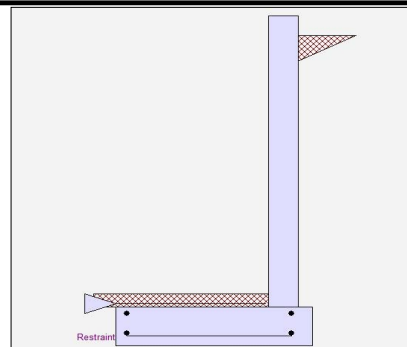
Criteria

Retained Height = 7.00 ft
Wall height above soil = 0.50 ft
Slope Behind Wall = 0.00
Height of Soil over Toe = 4.00 in
Water height over heel = 0.0 ft

Soil Data

Allow Soil Bearing = 2,667.0 psf
Equivalent Fluid Pressure Method
Active Heel Pressure = 40.0 psf/ft

Passive Pressure = 200.0 psf/ft
Soil Density, Heel = 130.00 pcf
Soil Density, Toe = 130.00 pcf
Footings||Soil Friction = 0.350
Soil height to ignore for passive pressure = 0.00 in



Surcharge Loads

Surcharge Over Heel = 0.0 psf
NOT Used To Resist Sliding & Overturning
Surcharge Over Toe = 0.0
NOT Used for Sliding & Overturning

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Axial Load Applied to Stem

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

Earth Pressure Seismic Load

Method : Uniform
Multiplier Used = 8.000
(Multiplier used on soil density)
Uniform Seismic Force = 64.000
Total Seismic Force = 512.000

Design Summary

Wall Stability Ratios

Overturning = 1.23 Ratio < 1.5!
Slab Resists All Sliding !

Total Bearing Load = 1,880 lbs
...resultant ecc. = 19.81 in

Soil Pressure @ Toe = 2,091 psf OK
Soil Pressure @ Heel = 0 psf OK
Allowable = 2,667 psf
Soil Pressure Less Than Allowable
ACI Factored @ Toe = 2,928 psf
ACI Factored @ Heel = 0 psf
Footing Shear @ Toe = 19.0 psi OK
Footing Shear @ Heel = 3.5 psi OK
Allowable = 75.0 psi

Sliding Calcs

Lateral Sliding Force = 1,638.4 lbs

Stem Construction

Bottom
Stem OK
Design Height Above Ftg ft = 0.00
Wall Material Above "Ht" = Concrete
Design Method = LRFD LRFD
Thickness = 8.00
Rebar Size = # 5
Rebar Spacing = 13.00
Rebar Placed at = Edge

Design Data

fb/FB + fa/Fa = 0.693

Total Force @ Section

Service Level lbs =
Strength Level lbs = 2,016.0

Moment....Actual

Service Level ft-# =
Strength Level ft-# = 5,226.7
Moment.....Allowable = 7,532.8

Shear.....Actual

Service Level psi =
Strength Level psi = 27.2
Shear.....Allowable psi = 75.0
Anet (Masonry) in2 =
Rebar Depth 'd' in = 6.19

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 = Medium Weight
Masonry Design Method = ASD

Concrete Data

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

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

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

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Title 7 ft wall (seismic)

Dsgnr: jtw

Description....

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Cantilevered Retaining Wall

Code: IBC 2018, ACI 318-14, TMS 402-16

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1979 in ² /ft		
(4/3) * As :	0.2639 in ² /ft	Min Stem T&S Reinf Area 1.296 in ²	
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in ² /ft	Min Stem T&S Reinf Area per ft of stem Height : 0.173 in ² /ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in ² /ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.2475 in ² /ft	#4@ 13.89 in	#4@ 27.78 in
Provided Area :	0.2862 in ² /ft	#5@ 21.53 in	#5@ 43.06 in
Maximum Area :	0.8382 in ² /ft	#6@ 30.56 in	#6@ 61.11 in

Footing Data

Toe Width	=	3.50 ft
Heel Width	=	1.00
Total Footing Width	=	4.50
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm = 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>
Factored Pressure	= 2,928	0 psf
Mu' : Upward	= 91,616	0 ft-#
Mu' : Downward	= 17,052	71 ft-#
Mu: Design	= 6,214	71 ft-#
Actual 1-Way Shear	= 18.98	3.53 psi
Allow 1-Way Shear	= 75.00	40.00 psi
Toe Reinforcing	= # 5 @ 13.00 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

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 20.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46

Heel: phiMn = phi'5'lambda'sqrt(fc)'Sm

Key: No key defined

Min footing T&S reinf Area	1.17	in ²
Min footing T&S reinf Area per foot	0.26	in ² /ft
If one layer of horizontal bars:		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

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Project Name/Number : RETAINING WAL

Title 7 ft wall (seismic)
Dsgnr: jtw
Description....

Page : 3
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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	1,280.0	2.67	3,413.3	Soil Over HL (ab. water tbl)	303.3	4.33	1,314.4
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		4.33	1,314.4
Hydrostatic Force				Watre Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =	151.7	1.75	265.4
Seismic Earth Load =	358.4	4.00	1,433.6	Surcharge Over Toe =			
=				Stem Weight(s) =	750.0	3.83	2,875.0
Total =	1,638.4	O.T.M. =	4,846.9	Earth @ Stem Transitions =			
				Footing Weight =	675.0	2.25	1,518.8
				Key Weight =			
				Vert. Component =			
Resisting/Overturning Ratio =			1.23	Total =	1,880.0 lbs	R.M.=	5,973.6
Vertical Loads used for Soil Pressure =		1,880.0 lbs					

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

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 Modulus 200.0 pci

Horizontal Defl @ Top of Wall (approximate only) 0.121 in

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

Use menu item Settings > Printing & Title Block
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Project Name/Number : RETAINING WAL

Title 7 ft wall (seismic)

Dsgnr: jtw

Description....

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Rebar Lap & Embedment Lengths Information

(Applying TMS 402 provisions) or (Applying IBC modifications to TMS 402 provisions)

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment = 23.40 in

Development length for #5 bar specified in this stem design segment = 18.00 in

Hooked embedment length into footing for #5 bar specified in this stem design segment = 9.08 in

As Provided = 0.2862 in/ft

As Required = 0.2475 in/ft

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Project Name/Number : RETAINING WAL

Title 7 ft wall (seismic)

Dsgnr: jtw

Description....

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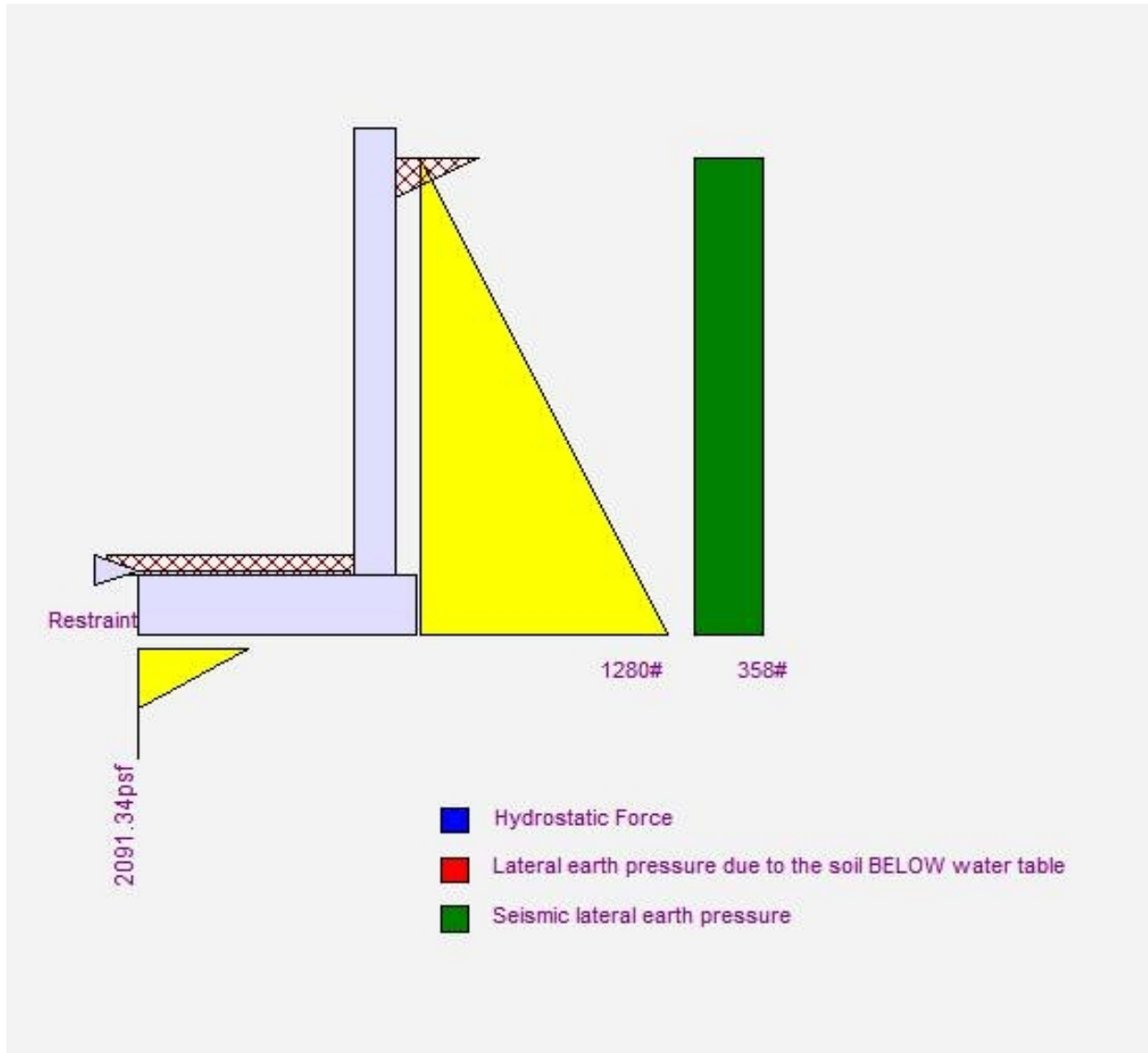
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Title 8 ft wall
Dsgnr: jtw
Description....

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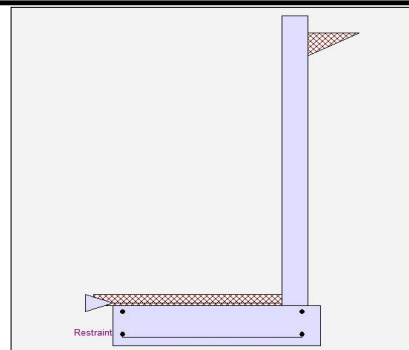
Criteria

Retained Height = 8.00 ft
Wall height above soil = 0.50 ft
Slope Behind Wall = 0.00
Height of Soil over Toe = 4.00 in
Water height over heel = 0.0 ft

Soil Data

Allow Soil Bearing = 2,000.0 psf
Equivalent Fluid Pressure Method
Active Heel Pressure = 40.0 psf/ft

Passive Pressure = 200.0 psf/ft
Soil Density, Heel = 130.00 pcf
Soil Density, Toe = 130.00 pcf
Footings||Soil Friction = 0.350
Soil height to ignore for passive pressure = 0.00 in



Surcharge Loads

Surcharge Over Heel = 0.0 psf
NOT Used To Resist Sliding & Overturning
Surcharge Over Toe = 0.0
NOT Used for Sliding & Overturning

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Axial Load Applied to Stem

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

Design Summary

Wall Stability Ratios

Overturning = 1.72 OK
Slab Resists All Sliding !

Total Bearing Load = 2,332 lbs
...resultant ecc. = 13.50 in

Soil Pressure @ Toe = 987 psf OK
Soil Pressure @ Heel = 0 psf OK
Allowable = 2,000 psf
Soil Pressure Less Than Allowable

ACI Factored @ Toe = 1,382 psf
ACI Factored @ Heel = 0 psf
Footing Shear @ Toe = 16.4 psi OK
Footing Shear @ Heel = 3.4 psi OK
Allowable = 75.0 psi

Sliding Calcs

Lateral Sliding Force = 1,680.6 lbs

Stem Construction

Design Height Above Ftg ft = 0.00
Wall Material Above "Ht" = Concrete
Design Method = LFRD
Thickness = 8.00
Rebar Size = # 5
Rebar Spacing = 12.00
Rebar Placed at = Edge

Design Data
fb/FB + fa/Fa = 0.672

Total Force @ Section
Service Level lbs =
Strength Level lbs = 2,048.0

Moment....Actual
Service Level ft-# =
Strength Level ft-# = 5,461.3
Moment....Allowable = 8,121.3

Shear....Actual
Service Level psi =
Strength Level psi = 27.6
Shear....Allowable psi = 75.0
Anet (Masonry) in2 =
Rebar Depth 'd' in = 6.19

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 = Medium Weight
Masonry Design Method = ASD

Concrete Data
f'c psi = 2,500.0
Fy psi = 60,000.0

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

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

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Project Name/Number : RETAINING WAL

Title 8 ft wall
Dsgnr: jtw
Description....

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.2068 in2/ft		
(4/3) * As :	0.2757 in2/ft	Min Stem T&S Reinf Area 1.469 in2	
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.173 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.2475 in2/ft	#4@ 13.89 in	#4@ 27.78 in
Provided Area :	0.31 in2/ft	#5@ 21.53 in	#5@ 43.06 in
Maximum Area :	0.8382 in2/ft	#6@ 30.56 in	#6@ 61.11 in

Footing Data

Toe Width	=	4.40 ft
Heel Width	=	1.00
Total Footing Width	=	5.40
Footing Thickness	=	14.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm= 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>
Factored Pressure	= 1,382	0 psf
Mu' : Upward	= 110,712	0 ft-#
Mu' : Downward	= 30,434	81 ft-#
Mu: Design	= 6,690	81 ft-#
Actual 1-Way Shear	= 16.43	3.38 psi
Allow 1-Way Shear	= 75.00	40.00 psi
Toe Reinforcing	= # 5 @ 12.00 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

Toe: #4@ 7.93 in, #5@ 12.30 in, #6@ 17.46 in, #7@ 23.80 in, #8@ 31.34 in, #9@ 39
Heel: phiMn = phi'5'lambda'sqrt(fc)'Sm
Key: No key defined

Min footing T&S reinf Area	1.63	in2
Min footing T&S reinf Area per foot	0.30	in2 /ft
If one layer of horizontal bars:	If two layers of horizontal bars:	
#4@ 7.94 in	#4@ 15.87 in	
#5@ 12.30 in	#5@ 24.60 in	
#6@ 17.46 in	#6@ 34.92 in	

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Project Name/Number : RETAINING WAL

Title 8 ft wall
Dsgnr: jtw
Description....

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Cantilevered Retaining Wall

Code: IBC 2018,ACI 318-14,TMS 402-16

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....				.....RESISTING.....		
	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	1,680.6	3.06	5,135.0	Soil Over HL (ab. water tbl)	346.7	5.23	1,814.2
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		5.23	1,814.2
Hydrostatic Force				Watre Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =	190.7	2.20	419.5
				Surcharge Over Toe =			
				Stem Weight(s) =	850.0	4.73	4,023.3
				Earth @ Stem Transitions =			
Total	= 1,680.6	O.T.M.	= 5,135.0	Footing Weight =	945.0	2.70	2,551.5
				Key Weight =			
				Vert. Component =			
Resisting/Overturning Ratio		=	1.72	Total =	2,332.3 lbs	R.M.=	8,808.5
Vertical Loads used for Soil Pressure =		2,332.3	lbs	* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.			

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 200.0 pci

Horizontal Defl @ Top of Wall (approximate only) 0.054 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.

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Project Name/Number : RETAINING WAL

Title 8 ft wall

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Description....

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Code: IBC 2018,ACI 318-14,TMS 402-16

Rebar Lap & Embedment Lengths Information

(Applying TMS 402 provisions) or (Applying IBC modifications to TMS 402 provisions)

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment = 23.40 in

Development length for #5 bar specified in this stem design segment = 18.00 in

Hooked embedment length into footing for #5 bar specified in this stem design segment = 8.38 in

As Provided = 0.3100 in/ft

As Required = 0.2475 in/ft

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Project Name/Number : RETAINING WAL

Title 8 ft wall

Dsgnr: jtw

Description....

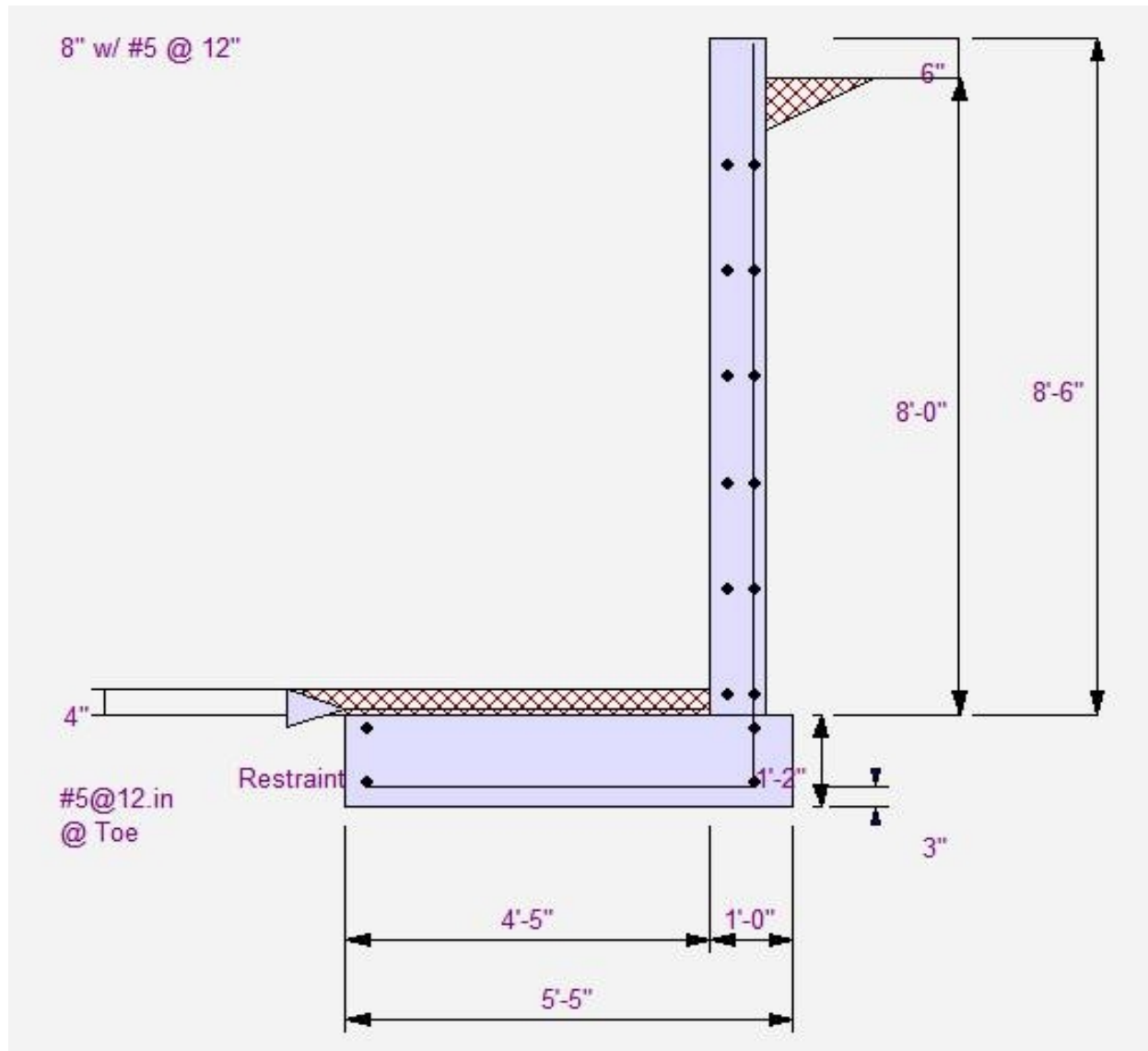
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Title 8 ft wall

Dsgnr: jtw

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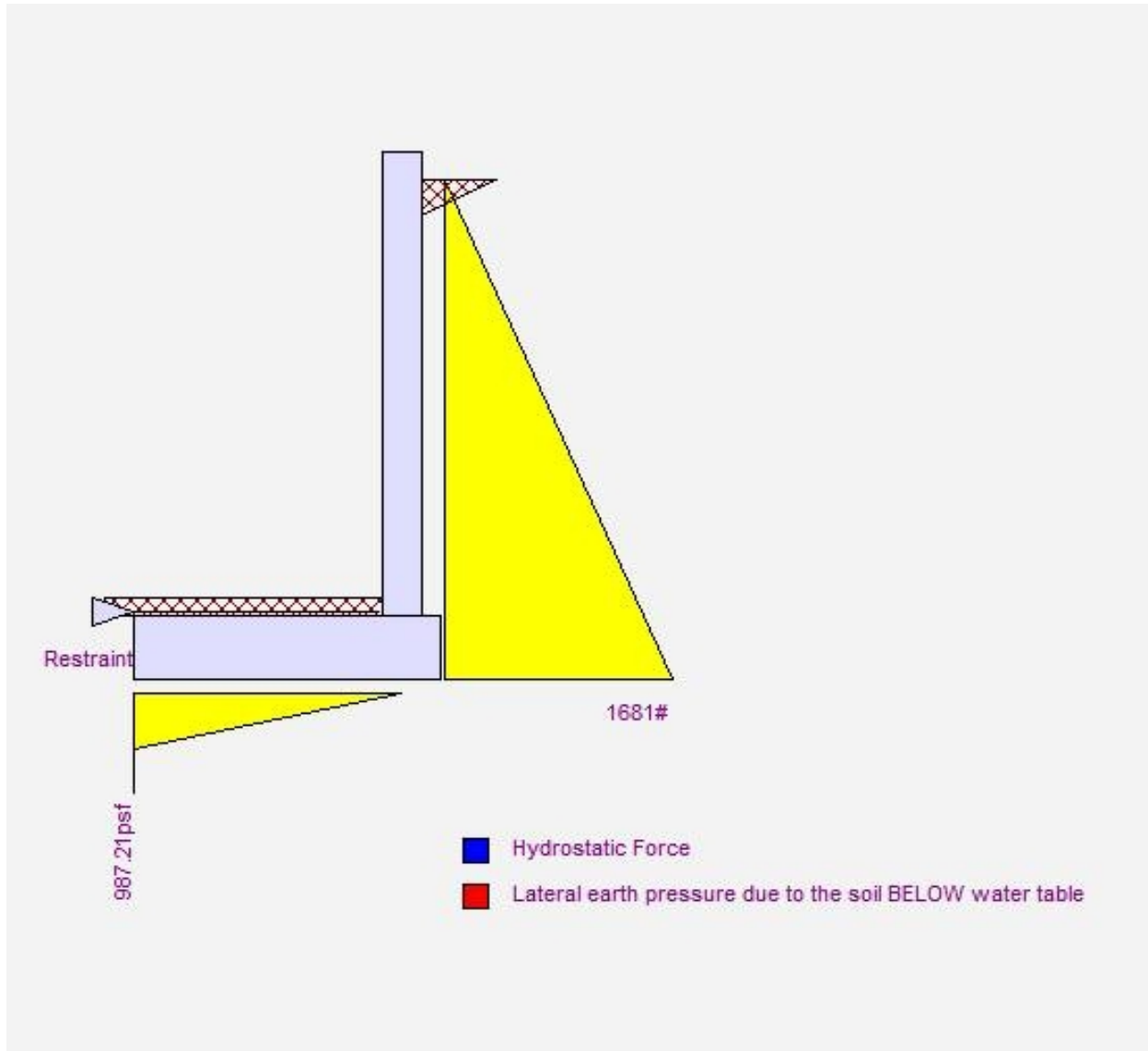
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Project Name/Number : RETAINING WAL

Title 8 ft wall (seismic)
Dsgnr: jtw
Description....

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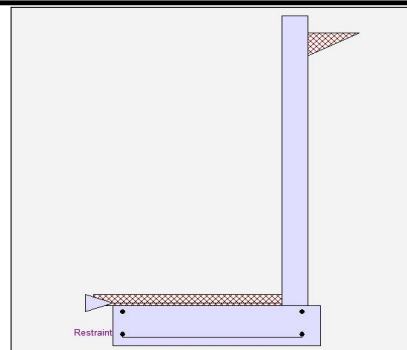
Criteria

Retained Height = 8.00 ft
Wall height above soil = 0.50 ft
Slope Behind Wall = 0.00
Height of Soil over Toe = 4.00 in
Water height over heel = 0.0 ft

Soil Data

Allow Soil Bearing = 2,667.0 psf
Equivalent Fluid Pressure Method
Active Heel Pressure = 40.0 psf/ft

Passive Pressure = 200.0 psf/ft
Soil Density, Heel = 130.00 pcf
Soil Density, Toe = 130.00 pcf
Footings||Soil Friction = 0.350
Soil height to ignore for passive pressure = 0.00 in



Surcharge Loads

Surcharge Over Heel = 0.0 psf
NOT Used To Resist Sliding & Overturning
Surcharge Over Toe = 0.0
NOT Used for Sliding & Overturning

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Axial Load Applied to Stem

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

Earth Pressure Seismic Load

Method : Uniform
Multiplier Used = 8.000
(Multiplier used on soil density)
Uniform Seismic Force = 73.333
Total Seismic Force = 672.222

Design Summary

Wall Stability Ratios

Overturning = 1.21 Ratio < 1.5!
Slab Resists All Sliding !

Total Bearing Load = 2,332 lbs
...resultant ecc. = 24.60 in

Soil Pressure @ Toe = 2,391 psf OK
Soil Pressure @ Heel = 0 psf OK
Allowable = 2,667 psf
Soil Pressure Less Than Allowable
ACI Factored @ Toe = 3,347 psf
ACI Factored @ Heel = 0 psf
Footing Shear @ Toe = 18.1 psi OK
Footing Shear @ Heel = 3.4 psi OK
Allowable = 75.0 psi

Sliding Calcs

Lateral Sliding Force = 2,151.1 lbs

Stem Construction

Bottom
Stem OK
Design Height Above Ftg ft = 0.00
Wall Material Above "Ht" = Concrete
Design Method = LRFD LRFD
Thickness = 8.00
Rebar Size = # 5
Rebar Spacing = 12.00
Rebar Placed at = Edge

Design Data

fb/FB + fa/Fa = 0.961

Total Force @ Section

Service Level lbs =
Strength Level lbs = 2,634.7

Moment....Actual

Service Level ft-# =
Strength Level ft-# = 7,808.0
Moment.....Allowable = 8,121.3

Shear.....Actual

Service Level psi =
Strength Level psi = 35.5
Shear.....Allowable psi = 75.0
Anet (Masonry) in2 =
Rebar Depth 'd' in = 6.19

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 = Medium Weight
Masonry Design Method = ASD

Concrete Data

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

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

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

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Title 8 ft wall (seismic)
Dsgnr: jtw
Description....

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Cantilevered Retaining Wall

Code: IBC 2018, ACI 318-14, TMS 402-16

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.2957 in ² /ft		
(4/3) * As :	0.3942 in ² /ft	Min Stem T&S Reinf Area 1.469 in ²	
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in ² /ft	Min Stem T&S Reinf Area per ft of stem Height : 0.173 in ² /ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in ² /ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.2957 in ² /ft	#4@ 13.89 in	#4@ 27.78 in
Provided Area :	0.31 in ² /ft	#5@ 21.53 in	#5@ 43.06 in
Maximum Area :	0.8382 in ² /ft	#6@ 30.56 in	#6@ 61.11 in

Footing Data

Toe Width	=	4.40 ft
Heel Width	=	1.00
Total Footing Width	=	5.40
Footing Thickness	=	14.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm = 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>
Factored Pressure	= 3,347	0 psf
Mu' : Upward	= 146,924	0 ft-#
Mu' : Downward	= 30,434	81 ft-#
Mu: Design	= 9,708	81 ft-#
Actual 1-Way Shear	= 18.10	3.38 psi
Allow 1-Way Shear	= 75.00	40.00 psi
Toe Reinforcing	= # 5 @ 12.00 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

Toe: #4@ 7.93 in, #5@ 12.30 in, #6@ 17.46 in, #7@ 23.80 in, #8@ 31.34 in, #9@ 39
Heel: phiMn = phi'5'lambda'sqrt(fc)'Sm
Key: No key defined

Min footing T&S reinf Area	1.63	in ²
Min footing T&S reinf Area per foot	0.30	in ² /ft
If one layer of horizontal bars:	If two layers of horizontal bars:	
#4@ 7.94 in	#4@ 15.87 in	
#5@ 12.30 in	#5@ 24.60 in	
#6@ 17.46 in	#6@ 34.92 in	

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Project Name/Number : RETAINING WAL

Title 8 ft wall (seismic)
Dsgnr: jtw
Description....

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Cantilevered Retaining Wall

Code: IBC 2018, ACI 318-14, TMS 402-16

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	1,680.6	3.06	5,135.0	Soil Over HL (ab. water tbl)	346.7	5.23	1,814.2
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		5.23	1,814.2
Hydrostatic Force				Watre Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =	190.7	2.20	419.5
Seismic Earth Load =	470.6	4.58	2,156.7	Surcharge Over Toe =			
=				Stem Weight(s) =	850.0	4.73	4,023.3
Total =	2,151.1	O.T.M. =	7,291.7	Earth @ Stem Transitions =			
				Footing Weight =	945.0	2.70	2,551.5
				Key Weight =			
				Vert. Component =			
Resisting/Overturning Ratio =			1.21	Total =	2,332.3 lbs	R.M.=	8,808.5
Vertical Loads used for Soil Pressure =		2,332.3 lbs					

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

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 Modulus 200.0 pci

Horizontal Defl @ Top of Wall (approximate only) 0.131 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.

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Project Name/Number : RETAINING WAL

Title 8 ft wall (seismic)

Dsgnr: jtw

Description....

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Rebar Lap & Embedment Lengths Information

(Applying TMS 402 provisions) or (Applying IBC modifications to TMS 402 provisions)

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment = 23.40 in

Development length for #5 bar specified in this stem design segment = 18.00 in

Hooked embedment length into footing for #5 bar specified in this stem design segment = 10.01 in

As Provided = 0.3100 in²/ft

As Required = 0.2957 in²/ft

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Description....

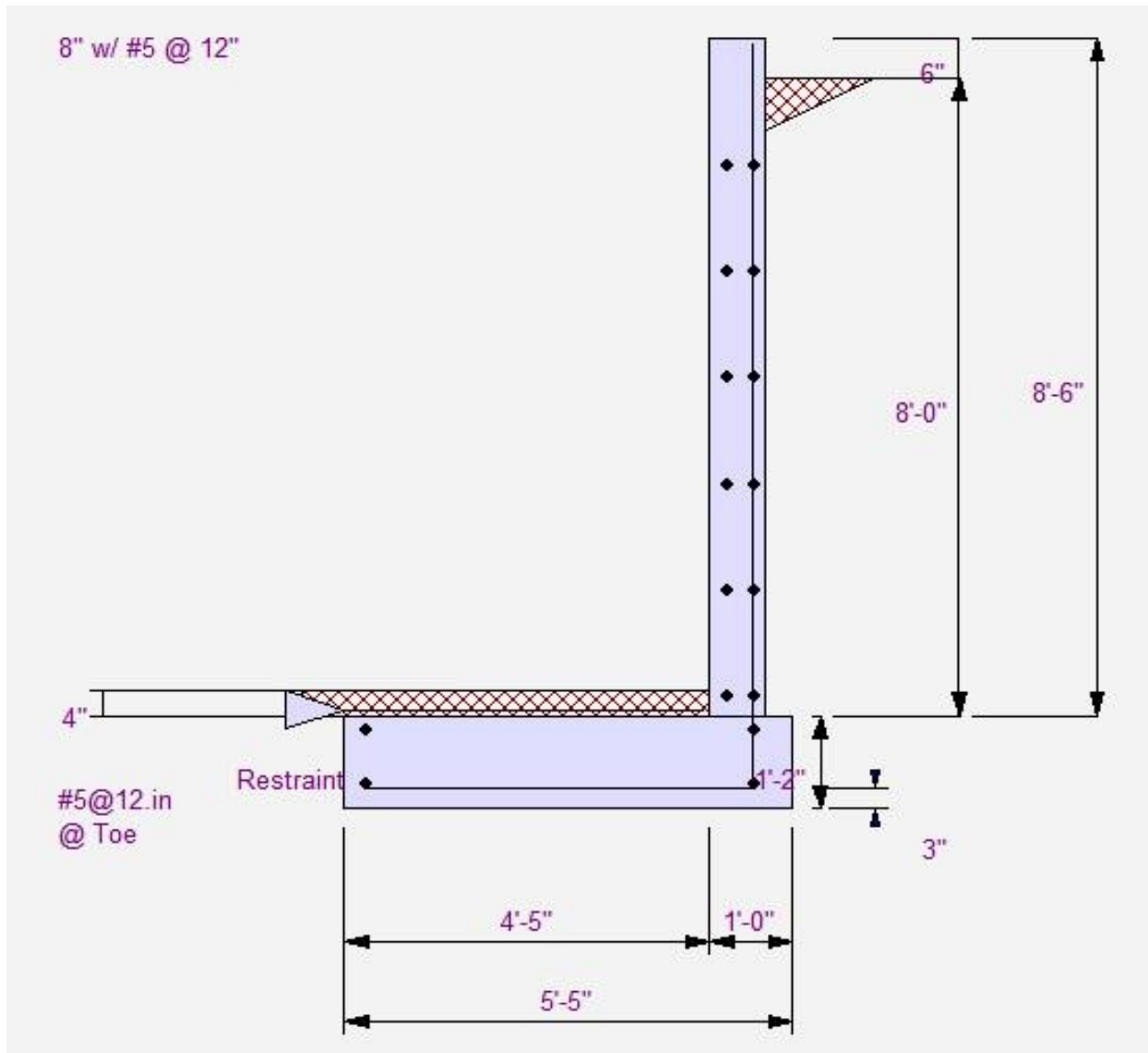
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