

Harriott Valentine Engineers Inc.

STRUCTURAL CALCULATIONS

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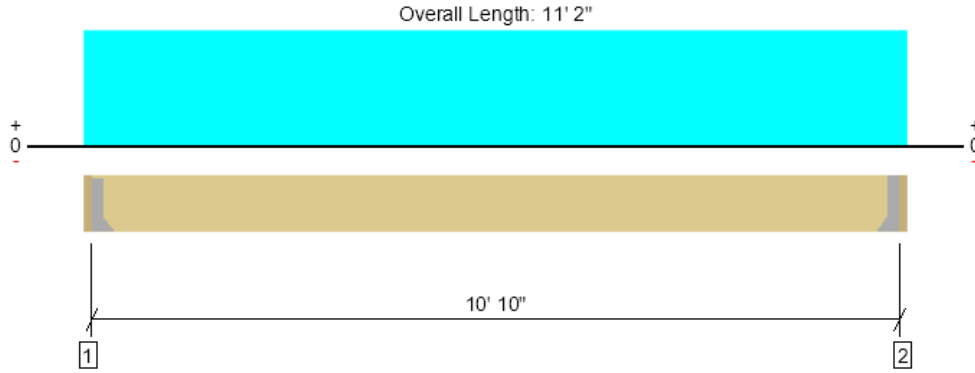


Level			
Member Name	Results (Max UTIL %)	Current Solution	Comments
01	Passed (79% ΔL)	1 piece(s) 2 x 6 HF No.2 @ 18" OC	
02	Passed (44% M)	1 piece(s) W14X26 (A992) ASTM Steel	
03	Passed (27% M)	1 piece(s) 2 x 6 HF No.2 @ 18" OC	
04	Failed (13% R)	1 piece(s) 5 1/4" x 16" 2.0E Parallam® PSL	Multiple Failures/Errors
05	Passed (6% M)	1 piece(s) W14X26 (A992) ASTM Steel	
06	Passed (6% R)	1 piece(s) 5 1/4" x 16" 2.0E Parallam® PSL	
07	Passed (11% R)	1 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL @ 24" OC	
08	Passed (8% R)	1 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
09	Passed (100% R)	1 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
09.5	Passed (39% ΔT)	1 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
10	Passed (86% ΔL)	1 piece(s) 7" x 11 7/8" 2.0E Parallam® PSL	
11, skye closed	Passed (100% R)	1 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
11, skye open	Passed (71% R)	1 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL	
12	Passed (85% R)	1 piece(s) 3 1/2" x 11 7/8" 2.0E Parallam® PSL	
13	Passed (100% R)	1 piece(s) 5 1/4" x 11 7/8" 2.0E Parallam® PSL	
14	Passed (100% ΔT)	1 piece(s) 7" x 11 7/8" 2.0E Parallam® PSL	
15	Passed (37% M)	1 piece(s) W14X26 (A992) ASTM Steel	
16	Passed (88% M)	1 piece(s) W14X26 (A992) ASTM Steel	
17	Passed (83% M)	1 piece(s) W16X40 (A992) ASTM Steel	
18	Failed (87% ΔT)	1 piece(s) 8 3/4" x 16 1/2" 24F-V4 DF Glulam	Left cantilever exceeds the maximum braced cantilever length of 7'.
19	Passed (3% R)	1 piece(s) W14X26 (A992) ASTM Steel	
20	Passed (23% M)	1 piece(s) 2 x 6 HF No.2 @ 18" OC	
21	Passed (4% R)	1 piece(s) W14X26 (A992) ASTM Steel	
22	Passed (34% M)	1 piece(s) W14X26 (A992) ASTM Steel	
23	Passed (12% M)	1 piece(s) W14X26 (A992) ASTM Steel	
24	Passed (34% M)	1 piece(s) W14X26 (A992) ASTM Steel	
25	Passed (43% R)	1 piece(s) 3 1/2" x 14" 2.0E Parallam® PSL	

ForteWEB Software Operator Kevin Tsuchida Harriott Valentine Engineers (206) 624-4760 ktsuchida@harriottvalentine.com	Job Notes
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Level, 01
1 piece(s) 2 x 6 HF No.2 @ 18" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	219 @ 2"	911 (1.50")	Passed (24%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	201 @ 7 1/2"	949	Passed (21%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	594 @ 5' 7"	921	Passed (65%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.430 @ 5' 7"	0.542	Passed (L/302)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.464 @ 5' 7"	0.722	Passed (L/280)	--	1.0 D + 1.0 S (All Spans)

Member Length : 10' 10"
System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 0/12

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

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Hanger on 5 1/2" HF beam	2.00"	Hanger ¹	1.50"	17	209	109	226	See note ¹
2 - Hanger on 5 1/2" HF beam	2.00"	Hanger ¹	1.50"	17	209	109	226	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)	10' 2" o/c	
Bottom Edge (Lu)	10' 10" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie							
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories	
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)	Snow (1.15)	Wind (1.60)	Comments
1 - Uniform (PSF)	0 to 11' 2"	18"	2.0	25.0	13.0	Trellis

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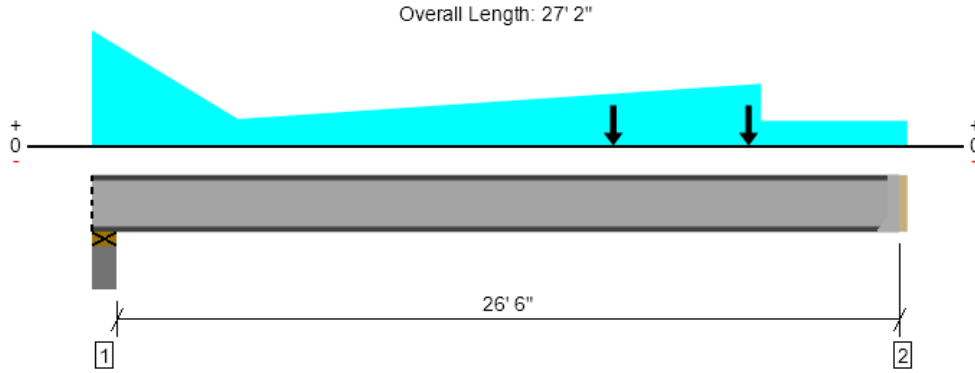
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

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Level, 02
1 piece(s) W14X26 (A992) ASTM Steel



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1278 @ 4 1/2"	12827 (6.00")	Passed (10%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1195 @ 6"	70890	Passed (2%)	--	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	7854 @ 14' 8 7/16"	17783	Passed (44%)	--	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.082 @ 13' 9 11/16"	0.887	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.141 @ 13' 10 3/8"	1.331	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 27'
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Applicable calculations are based on ANSI/AISC 360-16.
- A lateral-torsional buckling factor (C_b) of 1.0 has been assumed.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Plate on concrete - SPF	6.00"	6.00"	6.00"	465	813	423	1278	Blocking
2 - Hanger on 13 7/8" HF beam	2.00"	Hanger ¹	1.50" / - ²	516	647	336	1162	See note ¹

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.
- ² Required Bearing Length / Required Bearing Length with Web Stiffeners

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

Connector: Simpson Strong-Tie

Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	0 to 27'	N/A	26.0	--	--	
1 - Tapered (PSF)	0 to 4' 11" (Front)	5' 5" to 1' 3"	2.0	25.0	13.0	Trellis
2 - Tapered (PSF)	4' 11" to 22' 5" (Front)	1' 3" to 2' 11"	2.0	25.0	13.0	Trellis
3 - Uniform (PSF)	22' 5" to 27' 2" (Front)	1' 2"	2.0	25.0	13.0	Trellis
4 - Point (lb)	17' 6" (Front)	N/A	81	-	-	Open WF
5 - Point (lb)	22' (Front)	N/A	81	-	-	Open WF

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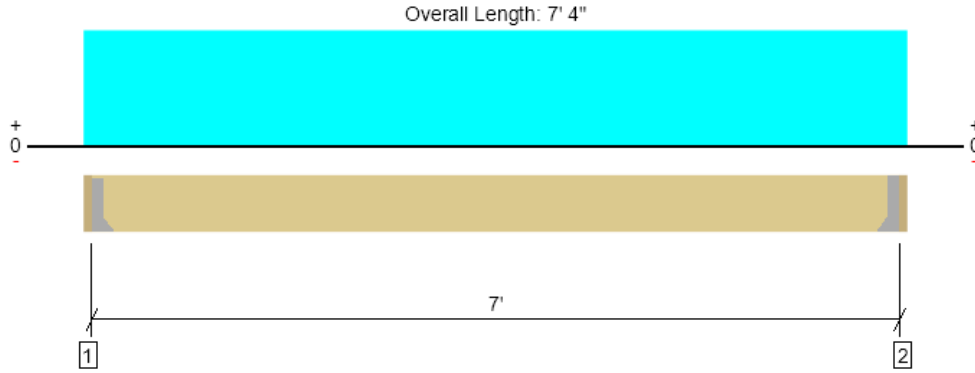
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Level, 03
1 piece(s) 2 x 6 HF No.2 @ 18" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	142 @ 2"	911 (1.50")	Passed (16%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	123 @ 7 1/2"	949	Passed (13%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	248 @ 3' 8"	921	Passed (27%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.075 @ 3' 8"	0.350	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.081 @ 3' 8"	0.467	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

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

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

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Hanger on 5 1/2" HF beam	2.00"	Hanger ¹	1.50"	11	138	72	148	See note ¹
2 - Hanger on 5 1/2" HF beam	2.00"	Hanger ¹	1.50"	11	138	72	148	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' 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	
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)	Snow (1.15)	Wind (1.60)	Comments
1 - Uniform (PSF)	0 to 7' 4"	18"	2.0	25.0	13.0	Trellis

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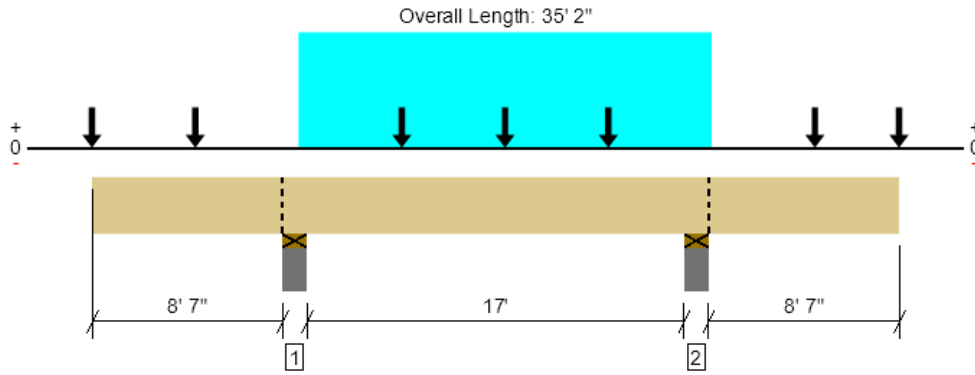


Level, 04

1 piece(s) 5 1/4" x 16" 2.0E Parallam® PSL

Left cantilever exceeds the maximum braced cantilever length of 7'.

Right cantilever exceeds the maximum braced cantilever length of 7'.



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1692 @ 26' 4"	12758 (6.00")	Passed (13%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1032 @ 24' 9"	18676	Passed (6%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-2160 @ 26' 4"	35392	Passed (6%)	0.90	1.0 D (All Spans)
Live Load Defl. (in)	0.059 @ 17' 6 15/16"	0.583	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.057 @ 35' 2"	0.883	Passed (2L/999+)	--	1.0 D + 0.6 W (Alt Spans)

Member Length : 35' 2"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Moment capacity over cantilever support 3 has been reduced by 25% to lessen the effects of buckling.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Plate on concrete - HF	6.00"	6.00"	1.50"	799	789	412/-1	1588	Blocking
2 - Plate on concrete - HF	6.00"	6.00"	1.50"	824	867	453	1692	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)	35' 2" o/c	
Bottom Edge (Lu)	35' 2" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	0 to 35' 2"	N/A	26.3	--	--	
1 - Point (lb)	0 (Front)	N/A	81	-	-	Open WF
2 - Point (lb)	4' 6" (Front)	N/A	81	-	-	Open WF
3 - Point (lb)	13' 6" (Front)	N/A	81	-	-	Open WF
4 - Point (lb)	18' (Front)	N/A	81	-	-	Open WF
5 - Point (lb)	22' 6" (Front)	N/A	81	-	-	Open WF
6 - Point (lb)	31' 6" (Front)	N/A	81	-	-	Open WF
7 - Point (lb)	35' 2" (Front)	N/A	81	-	-	Open WF
8 - Uniform (PLF)	9' to 27' (Front)	N/A	7.3	92.0	48.0	Linked from: 03, Support 1

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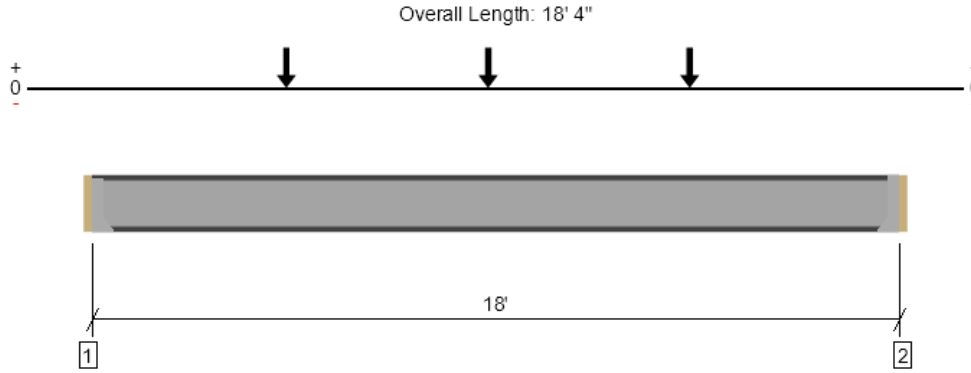
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Level, 05
1 piece(s) W14X26 (A992) ASTM Steel



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	358 @ 2"	23176 (1.50")	Passed (2%)	--	1.0 D (All Spans)
Shear (lbs)	358 @ 2"	70890	Passed (1%)	--	1.0 D (All Spans)
Moment (Ft-lbs)	1781 @ 9'	29547	Passed (6%)	--	1.0 D (All Spans)
Live Load Defl. (in)	0.000 @ 2"	0.600	Passed (L/999+)	--	1.0 D (All Spans)
Total Load Defl. (in)	0.014 @ 9' 1 15/16"	0.900	Passed (L/999+)	--	1.0 D (All Spans)

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

- Deflection criteria: LL (L/360) and TL (L/240).
- Applicable calculations are based on ANSI/AISC 360-16.
- A lateral-torsional buckling factor (C_b) of 1.0 has been assumed.

Supports	Bearing Length			Loads to Supports (lbs)		Accessories
	Total	Available	Required	Dead	Factored	
1 - Hanger on 13 7/8" HF beam	2.00"	Hanger ¹	1.50" / - ²	358	358	See note ¹
2 - Hanger on 13 7/8" HF beam	2.00"	Hanger ¹	1.50" / - ²	353	353	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)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

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

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Comments
0 - Self Weight (PLF)	2" to 18' 2"	N/A	26.0	
1 - Point (lb)	4' 6" (Front)	N/A	81	Open WF
2 - Point (lb)	9' (Front)	N/A	81	Open WF
3 - Point (lb)	13' 6" (Front)	N/A	81	Open WF

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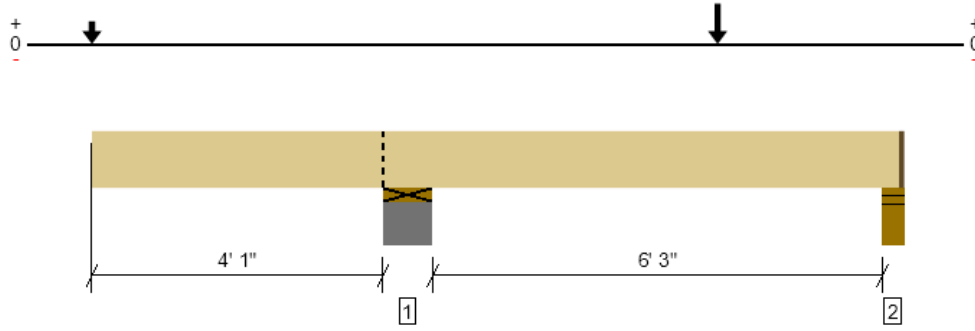
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Level, 06

1 piece(s) 5 1/4" x 16" 2.0E Parallam® PSL

Overall Length: 11' 9 1/2"



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Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	579 @ 11' 5 1/2"	9037 (4.25")	Passed (6%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	723 @ 6' 5"	18676	Passed (4%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-1917 @ 4' 7"	47189	Passed (4%)	0.90	1.0 D (All Spans)
Live Load Defl. (in)	0.003 @ 9' 1"	0.229	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.015 @ 0	0.458	Passed (2L/999+)	--	1.0 D (All Spans)

Member Length : 11' 8 1/4"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- 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.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Plate on concrete - HF	12.00"	12.00"	1.50"	1026	224	116	1249	Blocking
2 - Stud wall - HF	5.50"	4.25"	1.50"	155	423	220	579	1 1/4" Rim Board

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

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

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	0 to 11' 8 1/4"	N/A	26.3	--	--	
1 - Point (lb)	9' 1" (Front)	N/A	516	647	336	Linked from: 02, Support 2
2 - Point (lb)	0 (Front)	N/A	358	-	-	Linked from: 05, Support 1

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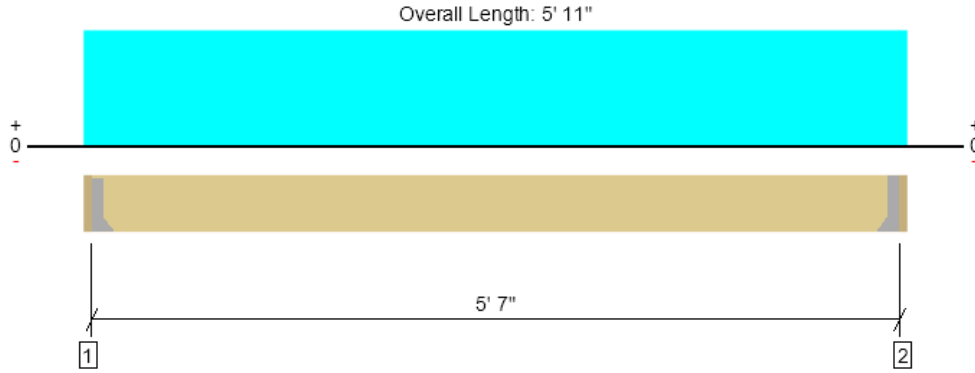
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Kevin Tsuchida Harriott Valentine Engineers (206) 624-4760 ktsuchida@harriottvalentine.com	



Level, 07

1 piece(s) 1 3/4" x 11 7/8" 2.OE Microllam® LVL @ 24" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	223 @ 2"	1969 (1.50")	Passed (11%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	144 @ 1' 1 7/8"	4541	Passed (3%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	312 @ 2' 11 1/2"	10673	Passed (3%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.003 @ 2' 11 1/2"	0.186	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.005 @ 2' 11 1/2"	0.279	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
TJ-Pro™ Rating	67	50	Passed	--	--

Member Length : 5' 7"
 System : Floor
 Member Type : Joist
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Span rating of 1' 8" o.c. for selected sheathing is less than design on center spacing of 2' o.c. for product.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 4% increase in the moment capacity has been added to account for repetitive member usage.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 19/32" Panel (20" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Hanger on 11 7/8" HF beam	2.00"	Hanger ¹	1.50"	89	148	77	237	See note ¹
2 - Hanger on 11 7/8" HF beam	2.00"	Hanger ¹	1.50"	89	148	77	237	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)	5' 7" o/c	
Bottom Edge (Lu)	5' 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	IUS1.81/9.5	2.00"	N/A	8-10dx1.5	2-10dx1.5	
2 - Face Mount Hanger	IUS1.81/9.5	2.00"	N/A	8-10dx1.5	2-10dx1.5	

• 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)	Wind (1.60)	Comments
1 - Uniform (PSF)	0 to 5' 11"	24"	15.0	25.0	13.0	Soffited trellis

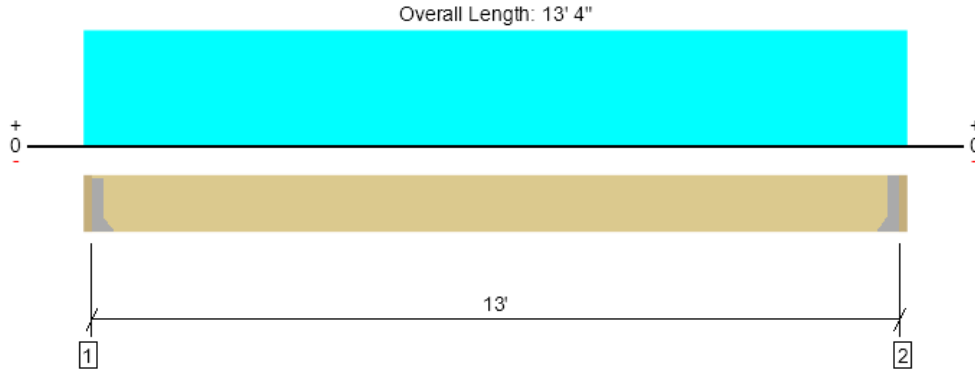
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ForteWEB Software Operator	Job Notes
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Level, 08

1 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDf	Load: Combination (Pattern)
Member Reaction (lbs)	148 @ 2"	1969 (1.50")	Passed (8%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	125 @ 1' 1 7/8"	4541	Passed (3%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	480 @ 6' 8"	10263	Passed (5%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.015 @ 6' 8"	0.433	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.033 @ 6' 8"	0.650	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 13'
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Hanger on 11 7/8" HF beam	2.00"	Hanger ¹	1.50"	81	69	36	151	See note ¹
2 - Hanger on 11 7/8" HF beam	2.00"	Hanger ¹	1.50"	81	69	36	151	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)	13' o/c	
Bottom Edge (Lu)	13' 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	IUS1.81/9.5	2.00"	N/A	8-10dx1.5	2-10dx1.5	
2 - Face Mount Hanger	IUS1.81/9.5	2.00"	N/A	8-10dx1.5	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)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	2" to 13' 2"	N/A	6.1	--	--	
1 - Uniform (PSF)	0 to 13' 4" (Front)	5"	15.0	25.0	13.0	Soffited trellis

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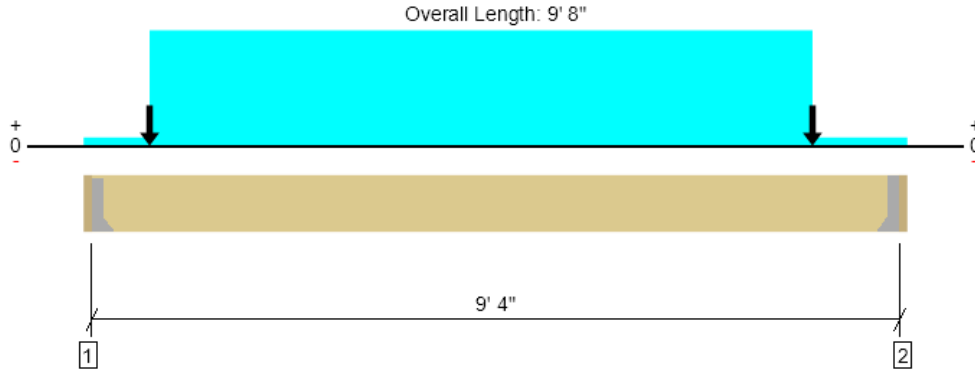
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ForteWEB Software Operator	Job Notes
Kevin Tsuchida Harriott Valentine Engineers (206) 624-4760 ktsuchida@harriottvalentine.com	



Level, 09

1 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2246 @ 2"	2246 (1.71")	Passed (100%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2064 @ 8' 6 1/8"	4541	Passed (45%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	5609 @ 4' 9 13/16"	10263	Passed (55%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.082 @ 4' 9 15/16"	0.311	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.211 @ 4' 9 7/8"	0.467	Passed (L/531)	--	1.0 D + 1.0 S (All Spans)

Member Length : 9' 4"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Hanger on 11 7/8" HF beam	2.00"	Hanger ¹	1.71"	1368	883	460	2251	See note ¹
2 - Hanger on 11 7/8" HF beam	2.00"	Hanger ¹	1.60"	1279	830	431	2109	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)	9' 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	HUS1.81/10	3.00"	N/A	30-10dx1.5	10-10d	
2 - Face Mount Hanger	HUS1.81/10	3.00"	N/A	30-10dx1.5	10-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	2" to 9' 6"	N/A	6.1	--	--	
1 - Uniform (PSF)	0 to 9' 8" (Front)	10"	15.0	25.0	13.0	Soffitted trellis
2 - Uniform (PSF)	10" to 8' 6" (Front)	7' 2"	42.0	25.0	13.0	Renson Aero 98"x172" 600 lb
3 - Point (lb)	10" (Front)	N/A	81	69	36	Linked from: 08, Support 1
4 - Point (lb)	8' 6" (Front)	N/A	81	69	36	Linked from: 08, Support 1

ForteWEB Software Operator	Job Notes
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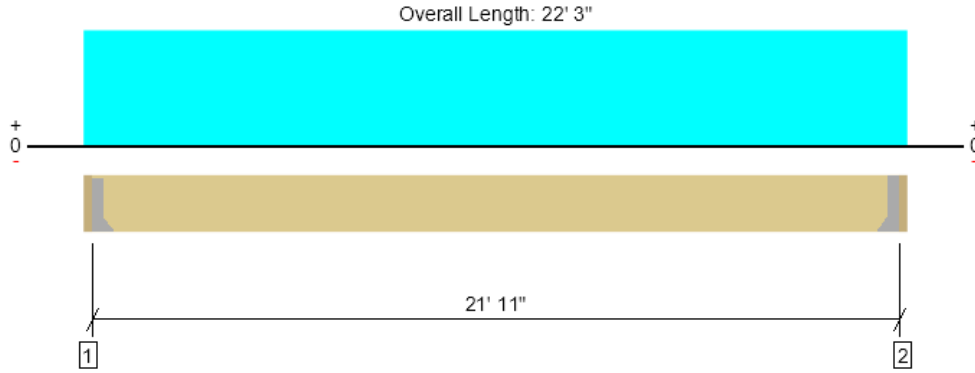
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ForteWEB Software Operator	Job Notes
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Level, 09.5

1 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDf	Load: Combination (Pattern)
Member Reaction (lbs)	432 @ 2"	1969 (1.50")	Passed (22%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	393 @ 1' 1 7/8"	4541	Passed (9%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2365 @ 11' 1 1/2"	10263	Passed (23%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.228 @ 11' 1 1/2"	0.731	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.432 @ 11' 1 1/2"	1.096	Passed (L/609)	--	1.0 D + 1.0 S (All Spans)

Member Length : 21' 11"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Hanger on 11 7/8" HF beam	2.00"	Hanger ¹	1.50"	205	232	121	437	See note ¹
2 - Hanger on 11 7/8" HF beam	2.00"	Hanger ¹	1.50"	205	232	121	437	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)	20' 4" o/c	
Bottom Edge (Lu)	21' 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
1 - Face Mount Hanger	IUS1.81/9.5	2.00"	N/A	8-10dx1.5	2-10dx1.5	
2 - Face Mount Hanger	IUS1.81/9.5	2.00"	N/A	8-10dx1.5	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)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	2" to 22' 1"	N/A	6.1	--	--	
1 - Uniform (PSF)	0 to 22' 3" (Front)	10"	15.0	25.0	13.0	Soffited trellis

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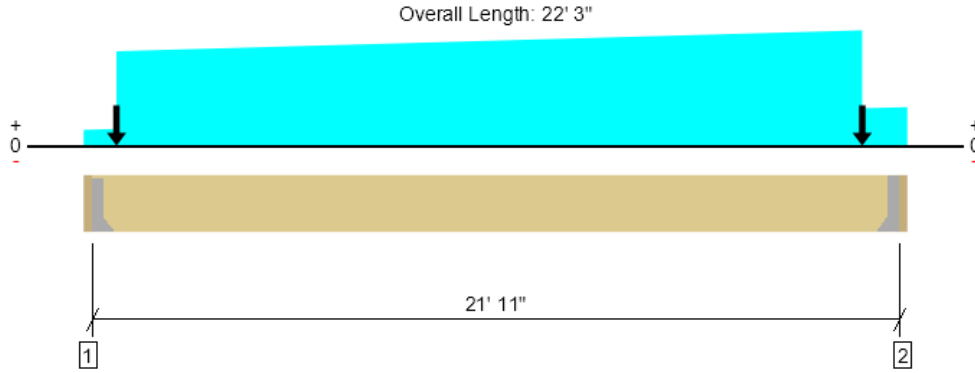
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ForteWEB Software Operator	Job Notes
Kevin Tsuchida Harriott Valentine Engineers (206) 624-4760 ktsuchida@harriottvalentine.com	



Level, 10

1 piece(s) 7" x 11 7/8" 2.0E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3509 @ 22' 1"	6563 (1.50")	Passed (53%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3373 @ 21' 1 1/8"	18481	Passed (18%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	18943 @ 11' 3 3/4"	45776	Passed (41%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.628 @ 11' 1 15/16"	0.731	Passed (L/419)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.865 @ 11' 2"	1.096	Passed (L/304)	--	1.0 D + 1.0 S (All Spans)

Member Length : 21' 11"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- 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	Wind	Factored	
1 - Hanger on 11 7/8" HF beam	2.00"	Hanger ¹	1.50"	956	2389	1243	3346	See note ¹
2 - Hanger on 11 7/8" HF beam	2.00"	Hanger ¹	1.50"	1039	2489	1294	3528	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)	21' 11" o/c	
Bottom Edge (Lu)	21' 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
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)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	2" to 22' 1"	N/A	26.0	--	--	
1 - Tapered (PSF)	0 to 22' 3" (Front)	1' 2" to 2' 10"	15.0	25.0	13.0	Soffitted trellis
2 - Uniform (PSF)	10" to 21' 1" (Front)	7' 2"	4.1	25.0	13.0	Renson Aero 245"x172" 1192 lb
3 - Point (lb)	10" (Front)	N/A	81	69	36	Linked from: 08, Support 2
4 - Point (lb)	21' 1" (Front)	N/A	81	69	36	Linked from: 08, Support 2

ForTEWEB Software Operator	Job Notes
Kevin Tsuchida Harriott Valentine Engineers (206) 624-4760 ktsuchida@harriottvalentine.com	



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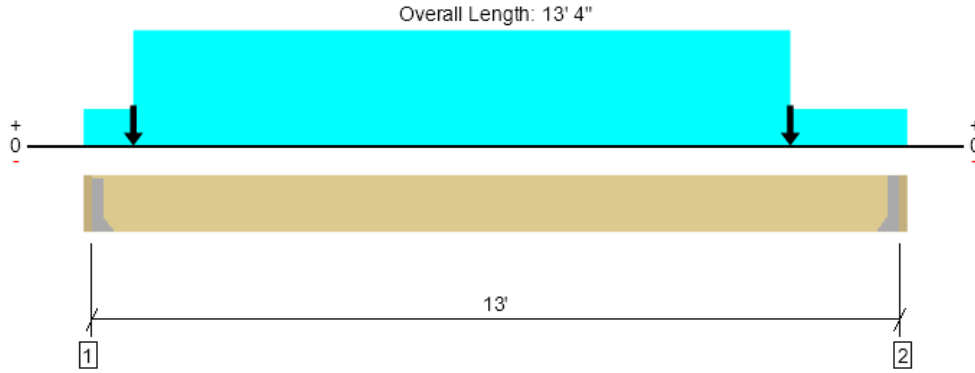
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ForteWEB Software Operator	Job Notes
Kevin Tsuchida Harriott Valentine Engineers (206) 624-4760 ktsuchida@harriottvalentine.com	



Level, 11, skye closed
 1 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDf	Load: Combination (Pattern)
Member Reaction (lbs)	2237 @ 2"	2237 (1.70")	Passed (100%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1999 @ 1' 1 7/8"	4541	Passed (44%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	7289 @ 6' 7 5/8"	10263	Passed (71%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.352 @ 6' 7 7/8"	0.433	Passed (L/443)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.494 @ 6' 7 15/16"	0.650	Passed (L/316)	--	1.0 D + 1.0 S (All Spans)

Member Length : 13'
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Hanger on 11 7/8" HF beam	2.00"	Hanger ¹	1.70"	682	1574	819	2256	See note ¹
2 - Hanger on 11 7/8" HF beam	2.00"	Hanger ¹	1.53"	626	1405	730	2031	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)	5' 4" o/c	
Bottom Edge (Lu)	13' o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HUS1.81/10	3.00"	N/A	30-10dx1.5	10-10d	
2 - Face Mount Hanger	HUS1.81/10	3.00"	N/A	30-10dx1.5	10-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	2" to 13' 2"	N/A	6.1	--	--	
1 - Uniform (PSF)	0 to 13' 4" (Front)	2' 10"	15.0	25.0	13.0	Soffitted trellis
2 - Uniform (PSF)	10" to 11' 5" (Front)	7' 2"	6.6	25.0	13.0	Renson Aero Skye 122"x172" 951 lb
3 - Point (lb)	10" (Front)	N/A	81	69	36	Linked from: 08, Support 1
4 - Point (lb)	11' 5" (Front)	N/A	81	69	36	Linked from: 08, Support 1

ForteWEB Software Operator	Job Notes
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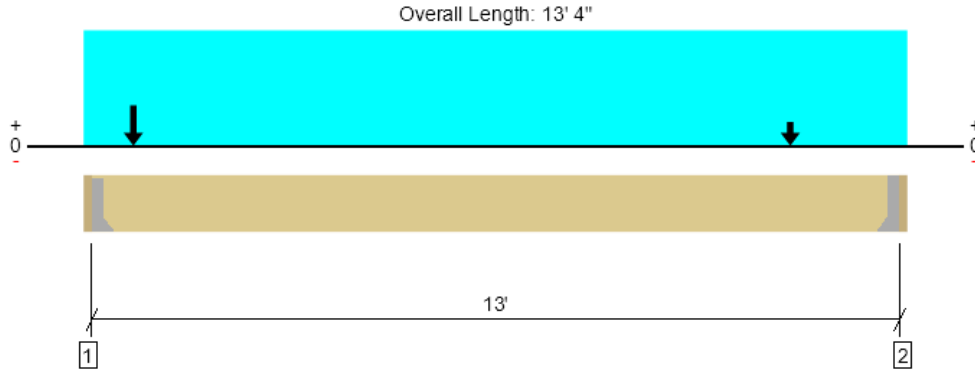
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Level, 11, skye open
 1 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1390 @ 2"	1969 (1.50")	Passed (71%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1078 @ 1' 1 7/8"	4541	Passed (24%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2863 @ 6' 6 13/16"	10263	Passed (28%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.108 @ 6' 8 5/16"	0.433	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.198 @ 6' 7 11/16"	0.650	Passed (L/788)	--	1.0 D + 1.0 S (All Spans)

Member Length : 13'
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Hanger on 11 7/8" HF beam	2.00"	Hanger ¹	1.50"	862	547	285	1409	See note ¹
2 - Hanger on 11 7/8" HF beam	2.00"	Hanger ¹	1.50"	421	535	279	957	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)	13' o/c	
Bottom Edge (Lu)	13' 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	U14	2.00"	N/A	14-10d	6-10dx1.5	
2 - Face Mount Hanger	IUS1.81/11.88	2.00"	N/A	10-10dx1.5	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)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	2" to 13' 2"	N/A	6.1	--	--	
1 - Uniform (PSF)	0 to 13' 4" (Front)	2' 10"	15.0	25.0	13.0	Soffitted trellis
2 - Point (lb)	10" (Front)	N/A	476	-	-	Renson Aero Skye 122"x172" 951 lb
3 - Point (lb)	10" (Front)	N/A	81	69	36	Linked from: 08, Support 1
4 - Point (lb)	11' 5" (Front)	N/A	81	69	36	Linked from: 08, Support 1

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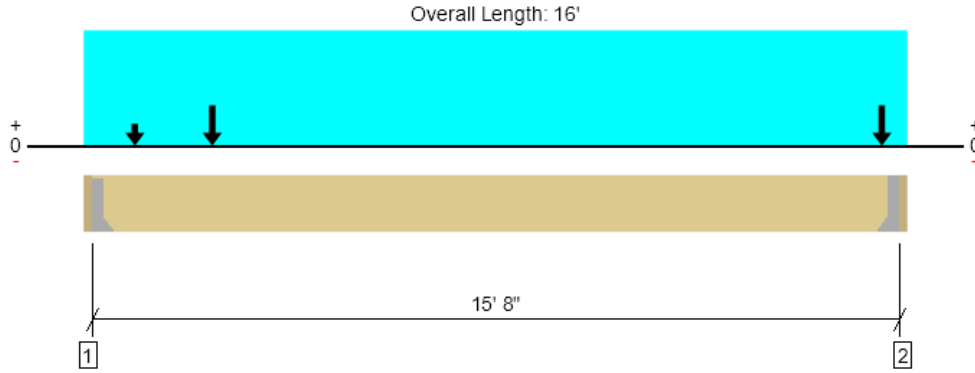
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Level, 12

1 piece(s) 3 1/2" x 11 7/8" 2.0E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2794 @ 15' 10"	3281 (1.50")	Passed (85%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2515 @ 1' 1 7/8"	9241	Passed (27%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	5353 @ 2' 6"	22888	Passed (23%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.087 @ 7' 3 9/16"	0.522	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.223 @ 7' 3 13/16"	0.783	Passed (L/842)	--	1.0 D + 1.0 S (All Spans)

Member Length : 15' 8"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Hanger on 11 7/8" HF beam	2.00"	Hanger ¹	1.50"	1539	1073	559	2612	See note ¹
2 - Hanger on 11 7/8" HF beam	2.00"	Hanger ¹	1.50"	1705	1091	568	2796	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)	15' 8" o/c	
Bottom Edge (Lu)	15' 8" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HHUS48	3.00"	N/A	22-10d	8-10d	
2 - Face Mount Hanger	HHUS48	3.00"	N/A	22-10d	8-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	2" to 15' 10"	N/A	13.0	--	--	
1 - Uniform (PSF)	0 to 16' (Front)	5"	15.0	25.0	13.0	Soffitted trellis
2 - Point (lb)	2' 6" (Front)	N/A	1368	883	460	Linked from: 09, Support 1
3 - Point (lb)	15' 6" (Front)	N/A	1368	883	460	Linked from: 09, Support 1
4 - Point (lb)	1' (Front)	N/A	205	232	121	Linked from: 09.5, Support 1

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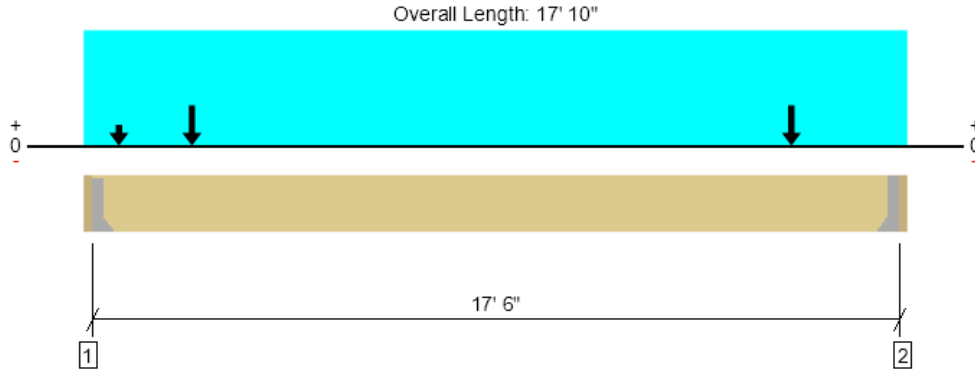
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Kevin Tsuchida Harriott Valentine Engineers (206) 624-4760 ktsuchida@harriottvalentine.com	



Level, 13

1 piece(s) 5 1/4" x 11 7/8" 2.0E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	6813 @ 2"	6813 (2.08")	Passed (100%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	6414 @ 1' 1 7/8"	13861	Passed (46%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	14554 @ 9' 4 3/16"	34332	Passed (42%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.371 @ 8' 11 3/16"	0.583	Passed (L/566)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.656 @ 8' 11 1/8"	0.875	Passed (L/320)	--	1.0 D + 1.0 S (All Spans)

Member Length : 17' 6"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Hanger on 11 7/8" HF beam	2.00"	Hanger ¹	2.08"	2935	3884	2020	6819	See note ¹
2 - Hanger on 11 7/8" HF beam	2.00"	Hanger ¹	1.80"	2509	3390	1763	5899	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)	17' 6" o/c	
Bottom Edge (Lu)	17' 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	HGUS5.50/10	4.00"	N/A	46-16d	16-16d	
2 - Face Mount Hanger	HGUS5.50/10	4.00"	N/A	46-10d	16-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	2" to 17' 8"	N/A	19.5	--	--	
1 - Uniform (PSF)	0 to 17' 10" (Front)	10"	15.0	25.0	13.0	Soffitted trellis
2 - Point (lb)	2' 4" (Front)	N/A	1279	830	431	Linked from: 09, Support 2
3 - Point (lb)	15' 4" (Front)	N/A	1279	830	431	Linked from: 09, Support 2
4 - Point (lb)	9" (Front)	N/A	205	232	121	Linked from: 09.5, Support 2
5 - Point (lb)	9" (Front)	N/A	205	232	121	Linked from: 09.5, Support 1
6 - Point (lb)	2' 4" (Front)	N/A	956	2389	1243	Linked from: 10, Support 1
7 - Point (lb)	15' 4" (Front)	N/A	956	2389	1243	Linked from: 10, Support 1

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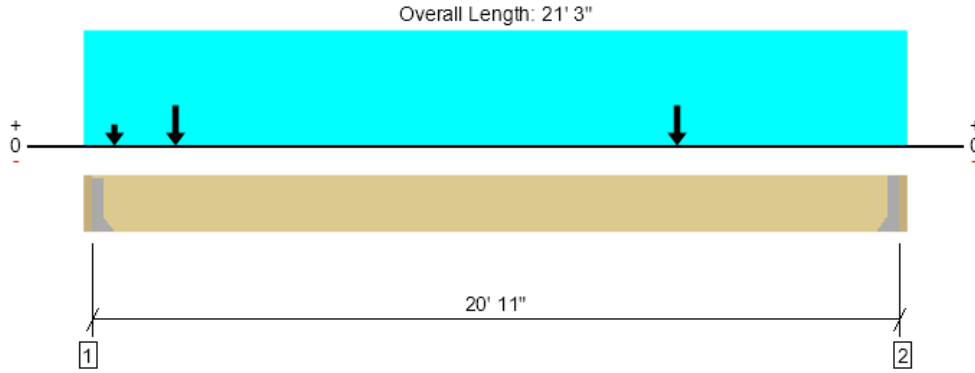
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Level, 14

1 piece(s) 7" x 11 7/8" 2.0E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	7253 @ 2"	7253 (1.66")	Passed (100%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	6846 @ 1' 1 7/8"	18481	Passed (37%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	26253 @ 15' 4"	45776	Passed (57%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.608 @ 10' 11 3/4"	0.697	Passed (L/413)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	1.049 @ 10' 11 1/2"	1.046	Passed (L/239)	--	1.0 D + 1.0 S (All Spans)

Member Length : 20' 11"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- 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	Wind	Factored	
1 - Hanger on 11 7/8" HF beam	2.00"	Hanger ¹	1.66"	3030	4229	2200	7259	See note ¹
2 - Hanger on 11 7/8" HF beam	2.00"	Hanger ¹	1.50"	1992	2750	1430	4742	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)	20' 11" o/c	
Bottom Edge (Lu)	20' 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
1 - Face Mount Hanger	HGUS7.25/10	4.00"	N/A	46-16d	16-16d	
2 - Face Mount Hanger	HHUS7.25/10	3.31"	N/A	30-16d	10-16d	

- 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)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	2" to 21' 1"	N/A	26.0	--	--	
1 - Uniform (PSF)	0 to 21' 3" (Front)	10"	15.0	25.0	13.0	Soffitted trellis
2 - Point (lb)	9" (Front)	N/A	205	232	121	Linked from: 09.5, Support 2
3 - Point (lb)	9" (Front)	N/A	205	232	121	Linked from: 09.5, Support 1
4 - Point (lb)	2' 4" (Front)	N/A	1039	2489	1294	Linked from: 10, Support 2
5 - Point (lb)	15' 4" (Front)	N/A	1039	2489	1294	Linked from: 10, Support 2
6 - Point (lb)	2' 4" (Front)	N/A	862	547	285	Linked from: 11, skye open, Support 1
7 - Point (lb)	15' 4" (Front)	N/A	862	547	285	Linked from: 11, skye open, Support 1

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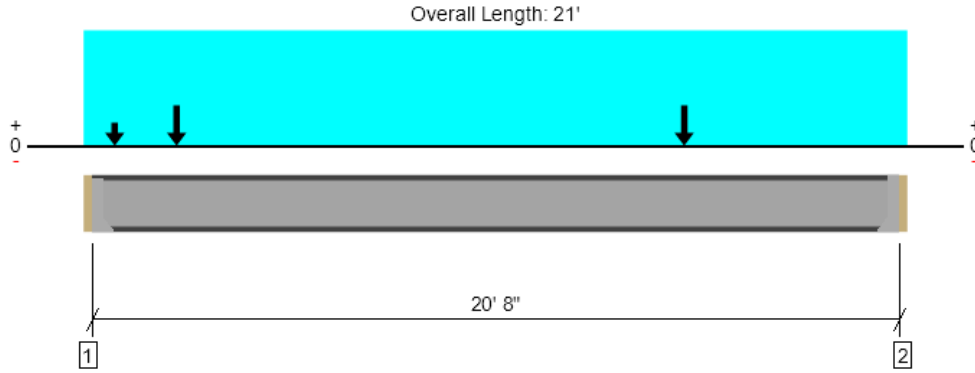
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Level, 15
1 piece(s) W14X26 (A992) ASTM Steel



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2680 @ 2"	23176 (1.50")	Passed (12%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2674 @ 2"	70890	Passed (4%)	--	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	9086 @ 14' 1 7/16"	24519	Passed (37%)	--	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.038 @ 10' 8 3/4"	0.689	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.101 @ 10' 8 3/4"	1.033	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 20' 8"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Applicable calculations are based on ANSI/AISC 360-16.
- A lateral-torsional buckling factor (C_b) of 1.0 has been assumed.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Hanger on 13 7/8" HF beam	2.00"	Hanger ¹	1.50" / - ²	1600	1079	562	2680	See note ¹
2 - Hanger on 13 7/8" HF beam	2.00"	Hanger ¹	1.50" / - ²	1129	684	356	1813	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)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

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

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	2" to 20' 10"	N/A	26.0	--	--	
1 - Uniform (PSF)	0 to 21' (Front)	10"	15.0	25.0	13.0	Soffitted trellis
2 - Point (lb)	9" (Front)	N/A	205	232	121	Linked from: 09.5, Support 2
3 - Point (lb)	2' 4" (Front)	N/A	862	547	285	Linked from: 11, skye open, Support 1
4 - Point (lb)	15' 4" (Front)	N/A	862	547	285	Linked from: 11, skye open, Support 1

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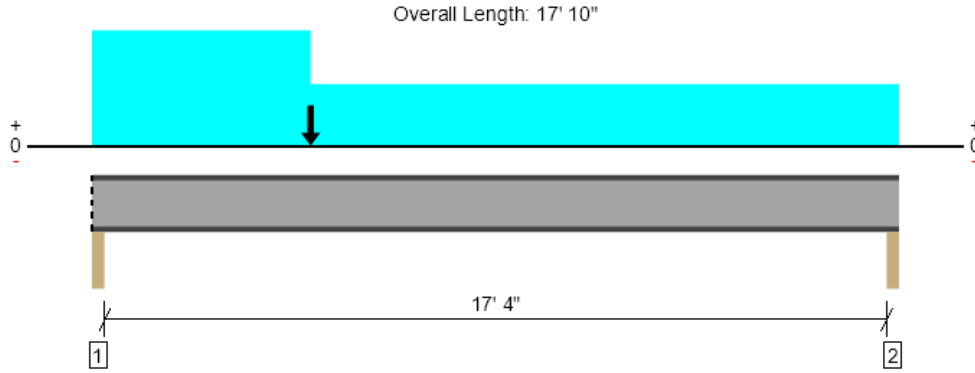
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Kevin Tsuchida Harriott Valentine Engineers (206) 624-4760 ktsuchida@harriottvalentine.com	



Level, 16
1 piece(s) W14X26 (A992) ASTM Steel



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	6309 @ 1 1/2"	10940 (3.00")	Passed (58%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	6250 @ 3"	70890	Passed (9%)	--	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	26946 @ 4' 10"	30523	Passed (88%)	--	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.105 @ 8' 1 13/16"	0.586	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.176 @ 8' 2 1/4"	0.879	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 17' 10"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Applicable calculations are based on ANSI/AISC 360-16.
- A lateral-torsional buckling factor (C_b) of 1.0 has been assumed.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Column - HF	3.00"	3.00"	3.00"	2447	3862	2012	6309	Blocking
2 - Column - HF	3.00"	3.00"	3.00"	1288	1754	913	3041	None

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

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	0 to 17' 10"	N/A	26.0	--	--	
1 - Uniform (PLF)	0 to 4' 10" (Front)	N/A	6.7	85.3	44.7	Linked from: 20, Support 1
2 - Uniform (PLF)	0 to 17' 10" (Front)	N/A	44.5	74.0	38.5	Linked from: 07, Support 2
3 - Point (lb)	4' 10" (Front)	N/A	1992	2750	1430	Linked from: 14, Support 2
4 - Point (lb)	4' 10" (Front)	N/A	453	1134	593	Linked from: 22, Support 1

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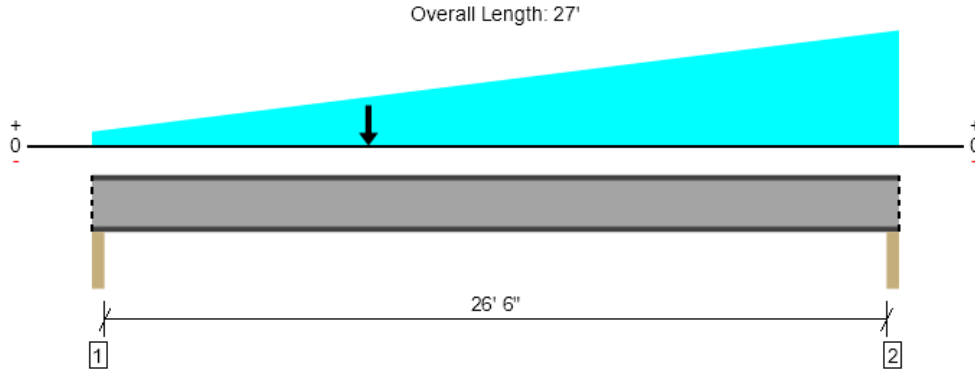
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ForteWEB Software Operator	Job Notes
Kevin Tsuchida Harriott Valentine Engineers (206) 624-4760 ktsuchida@harriottvalentine.com	



Level, 17
1 piece(s) W16X40 (A992) ASTM Steel



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5040 @ 1' 1/2"	15225 (3.00")	Passed (33%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	5026 @ 3"	97600	Passed (5%)	--	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	43234 @ 9' 3"	52279	Passed (83%)	--	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.165 @ 12' 7 1/2"	0.892	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.313 @ 12' 8 5/16"	1.337	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 27'
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Applicable calculations are based on ANSI/AISC 360-16.
- A lateral-torsional buckling factor (C_b) of 1.0 has been assumed.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Column - HF	3.00"	3.00"	3.00"	2423	2617	1361	5040	Blocking
2 - Column - HF	3.00"	3.00"	3.00"	1790	1814	943	3604	Blocking

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

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	0 to 27'	N/A	40.0	--	--	
1 - Tapered (PSF)	0 to 27' (Front)	4" to 2' 9"	15.0	25.0	13.0	Soffitted trellis
2 - Point (lb)	9' 3" (Front)	N/A	2509	3390	1763	Linked from: 13, Support 2

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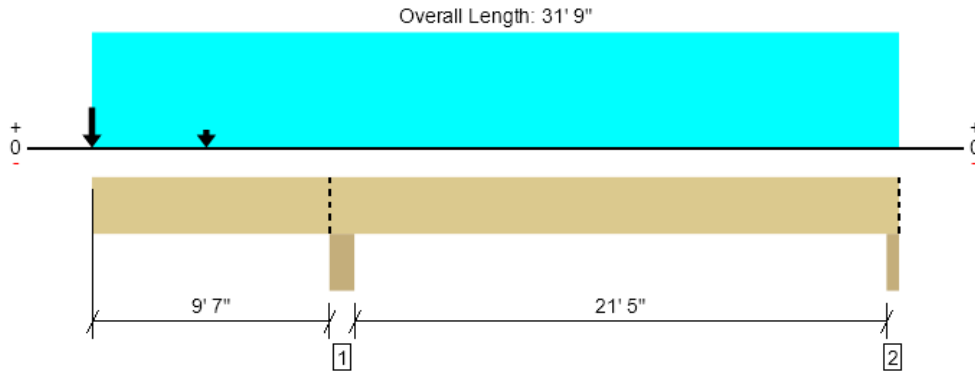
ForteWEB Software Operator	Job Notes
Kevin Tsuchida Harriott Valentine Engineers (206) 624-4760 ktsuchida@harriottvalentine.com	



Level, 18

1 piece(s) 8 3/4" x 16 1/2" 24F-V4 DF Glulam

Left cantilever exceeds the maximum braced cantilever length of 7'.



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

Design Results	Actual @ Location	Allowed	Result	LDf	Load: Combination (Pattern)
Member Reaction (lbs)	5391 @ 9' 10"	34125 (6.00")	Passed (16%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3307 @ 8' 2 1/2"	29332	Passed (11%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	0 @ N/A	N/A	Passed (N/A)	--	N/A
Neg Moment (Ft-lbs)	-30373 @ 9' 10"	46530	Passed (65%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.330 @ 0	0.656	Passed (2L/716)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.854 @ 0	0.983	Passed (2L/276)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 31' 9"
 System : Floor
 Member Type : Flush Beam
 Building Use : Residential
 Building Code : IBC 2021
 Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Moment capacity over cantilever support 1 has been reduced by 25% to lessen the effects of buckling.
- Critical negative moment adjusted by a volume/size factor of 0.88 that was calculated using length L = 31' 7 1/2".
- -856 lbs uplift at support located at 31' 7 1/2". Strapping or other restraint may be required.
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Column - HF	6.00"	6.00"	1.50"	3547	1844	811	5391	Blocking
2 - Column - HF	3.00"	3.00"	1.50"	-412	-443	-252	-858	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)	31' 9" o/c	
Bottom Edge (Lu)	31' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	0 to 31' 9"	N/A	35.1	--	--	
1 - Point (lb)	0 (Front)	N/A	81	-	-	Open WF
2 - Point (lb)	0 (Front)	N/A	81	-	-	Open WF
3 - Point (lb)	4' 6" (Front)	N/A	81	-	-	Open WF
4 - Uniform (PSF)	0 to 31' 9" (Front)	6"	15.0	25.0	-	Soffitted trellis
5 - Point (lb)	0 (Front)	N/A	1539	1073	559	Linked from: 12, Support 1

ForteWEB Software Operator	Job Notes
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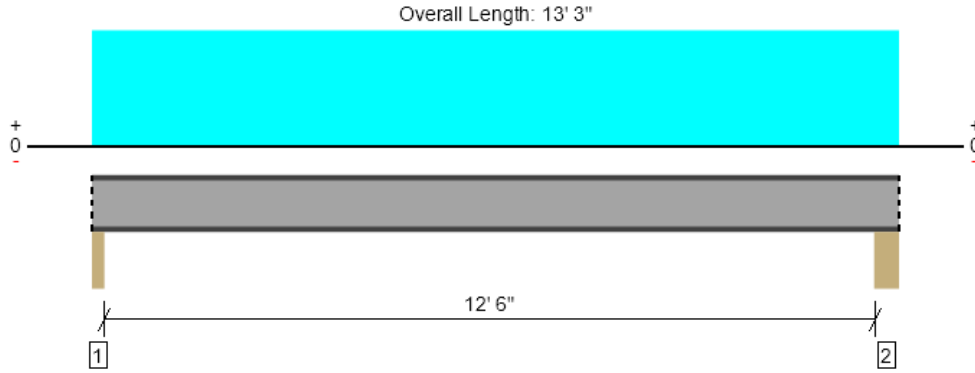
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Level, 19
1 piece(s) W14X26 (A992) ASTM Steel



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	299 @ 1 1/2"	10940 (3.00")	Passed (3%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	288 @ 3"	70890	Passed (0%)	--	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	935 @ 6' 6"	48991	Passed (2%)	--	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.001 @ 6' 6"	0.425	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.004 @ 6' 6"	0.637	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 13' 3"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Applicable calculations are based on ANSI/AISC 360-16.
- A lateral-torsional buckling factor (C_b) of 1.0 has been assumed.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Column - HF	3.00"	3.00"	3.00"	218	81	42	299	Blocking
2 - Column - HF	6.00"	6.00"	6.00"	226	84	44	311	Blocking

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

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	0 to 13' 3"	N/A	26.0	--	--	
1 - Uniform (PSF)	0 to 13' 3" (Front)	6"	15.0	25.0	13.0	Soffitted trellis

Weyerhaeuser Notes

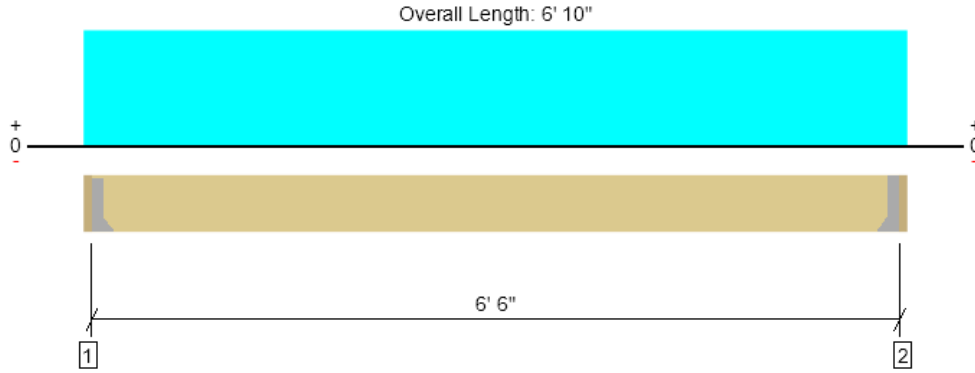
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Kevin Tsuchida Harriott Valentine Engineers (206) 624-4760 ktsuchida@harriottvalentine.com	



Level, 20
1 piece(s) 2 x 6 HF No.2 @ 18" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	132 @ 2"	911 (1.50")	Passed (14%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	113 @ 7 1/2"	949	Passed (12%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	214 @ 3' 5"	921	Passed (23%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.056 @ 3' 5"	0.325	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.060 @ 3' 5"	0.433	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 6' 6"
System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 0/12

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

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Hanger on 5 1/2" HF beam	2.00"	Hanger ¹	1.50"	10	128	67	138	See note ¹
2 - Hanger on 5 1/2" HF beam	2.00"	Hanger ¹	1.50"	10	128	67	138	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	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)	Snow (1.15)	Wind (1.60)	Comments
1 - Uniform (PSF)	0 to 6' 10"	18"	2.0	25.0	13.0	Trellis

Weyerhaeuser Notes

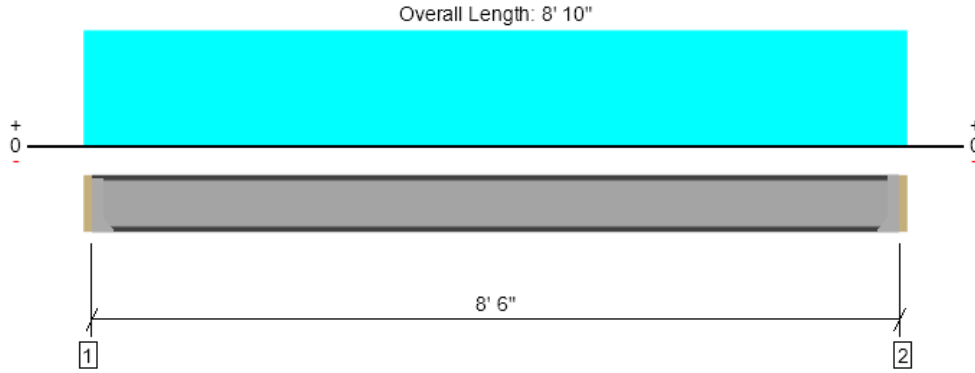
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Level, 21
1 piece(s) W14X26 (A992) ASTM Steel



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	923 @ 2"	23176 (1.50")	Passed (4%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	893 @ 2"	70890	Passed (1%)	--	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1897 @ 4' 5"	75236	Passed (3%)	--	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.003 @ 4' 5"	0.283	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.003 @ 4' 5"	0.425	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 8' 6"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Applicable calculations are based on ANSI/AISC 360-16.
- A lateral-torsional buckling factor (C_b) of 1.0 has been assumed.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Hanger on 13 7/8" HF beam	2.00"	Hanger ¹	1.50" / - ²	169	754	395	923	See note ¹
2 - Hanger on 13 7/8" HF beam	2.00"	Hanger ¹	1.50" / - ²	169	754	395	923	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)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

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

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	2" to 8' 8"	N/A	26.0	--	--	
1 - Uniform (PLF)	0 to 8' 10" (Front)	N/A	6.7	85.3	44.7	Linked from: 20, Support 2
2 - Uniform (PLF)	0 to 8' 10" (Front)	N/A	6.7	85.3	44.7	Linked from: 20, Support 1

Weyerhaeuser Notes

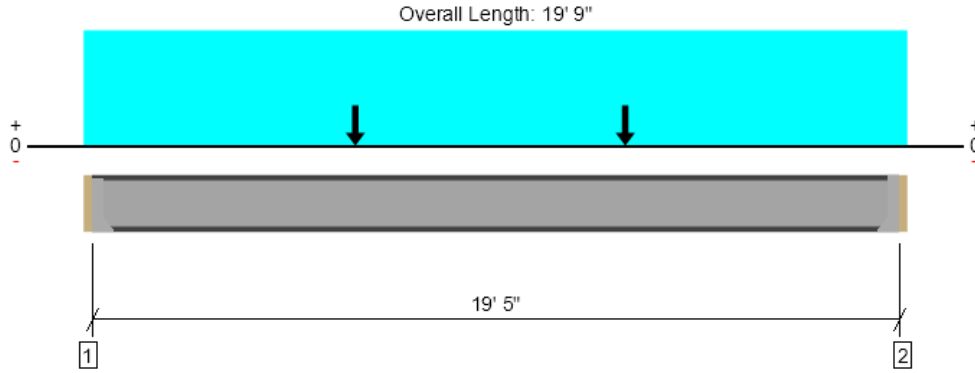
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Level, 22
1 piece(s) W14X26 (A992) ASTM Steel



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1587 @ 2"	23176 (1.50")	Passed (7%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1580 @ 2"	70890	Passed (2%)	--	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	9096 @ 10' 5/8"	26645	Passed (34%)	--	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.064 @ 9' 10 7/16"	0.647	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.088 @ 9' 10 7/16"	0.971	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 19' 5"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Applicable calculations are based on ANSI/AISC 360-16.
- A lateral-torsional buckling factor (C_b) of 1.0 has been assumed.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Hanger on 13 7/8" HF beam	2.00"	Hanger ¹	1.50" / - ²	453	1134	593	1587	See note ¹
2 - Hanger on 13 7/8" HF beam	2.00"	Hanger ¹	1.50" / - ²	449	1115	582	1563	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)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

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

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

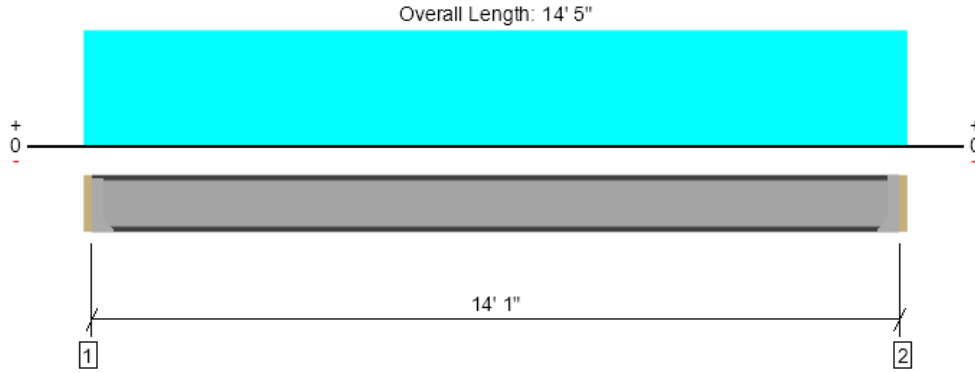
Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	2" to 19' 7"	N/A	26.0	--	--	
1 - Uniform (PSF)	0 to 19' 9" (Front)	1' 6"	2.0	25.0	13.0	Open trellis
2 - Point (lb)	6' 6" (Front)	N/A	169	754	395	Linked from: 21, Support 2
3 - Point (lb)	13' (Front)	N/A	169	754	395	Linked from: 21, 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
Kevin Tsuchida Harriott Valentine Engineers (206) 624-4760 ktsuchida@harriottvalentine.com	



Level, 23
1 piece(s) W14X26 (A992) ASTM Steel



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1509 @ 2"	23176 (1.50")	Passed (7%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1479 @ 2"	70890	Passed (2%)	--	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	5206 @ 7' 2 1/2"	42087	Passed (12%)	--	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.021 @ 7' 2 1/2"	0.469	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.026 @ 7' 2 1/2"	0.704	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 14' 1"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Applicable calculations are based on ANSI/AISC 360-16.
- A lateral-torsional buckling factor (C_b) of 1.0 has been assumed.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Hanger on 13 7/8" HF beam	2.00"	Hanger ¹	1.50" / - ²	279	1230	644	1509	See note ¹
2 - Hanger on 13 7/8" HF beam	2.00"	Hanger ¹	1.50" / - ²	279	1230	644	1509	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)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

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

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	2" to 14' 3"	N/A	26.0	--	--	
1 - Uniform (PLF)	0 to 14' 5" (Front)	N/A	6.7	85.3	44.7	Linked from: 20, Support 2
2 - Uniform (PLF)	0 to 14' 5" (Front)	N/A	6.7	85.3	44.7	Linked from: 20, Support 1

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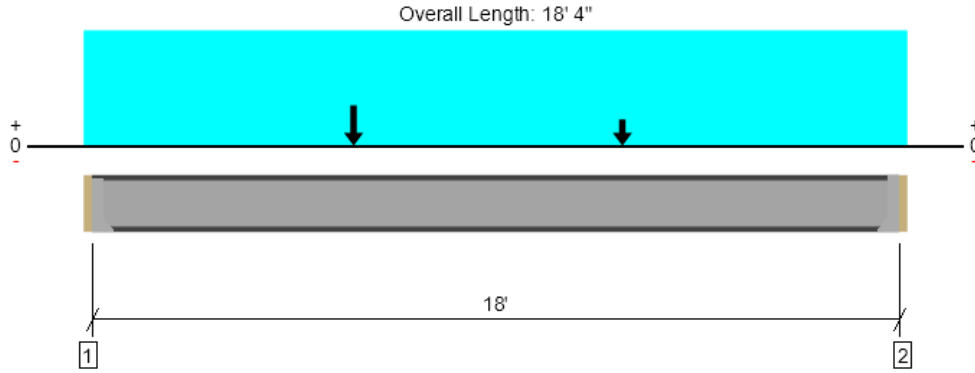
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ForteWEB Software Operator	Job Notes
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Level, 24
1 piece(s) W14X26 (A992) ASTM Steel



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1941 @ 2"	23176 (1.50")	Passed (8%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1935 @ 2"	70890	Passed (3%)	--	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	10165 @ 6' 6 13/16"	29547	Passed (34%)	--	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.062 @ 8' 11 15/16"	0.600	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.083 @ 9' 1/8"	0.900	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

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

- Deflection criteria: LL (L/360) and TL (L/240).
- Applicable calculations are based on ANSI/AISC 360-16.
- A lateral-torsional buckling factor (C_b) of 1.0 has been assumed.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Hanger on 13 7/8" HF beam	2.00"	Hanger ¹	1.50" / - ²	508	1433	749	1941	See note ¹
2 - Hanger on 13 7/8" HF beam	2.00"	Hanger ¹	1.50" / - ²	463	1238	647	1701	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)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

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

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

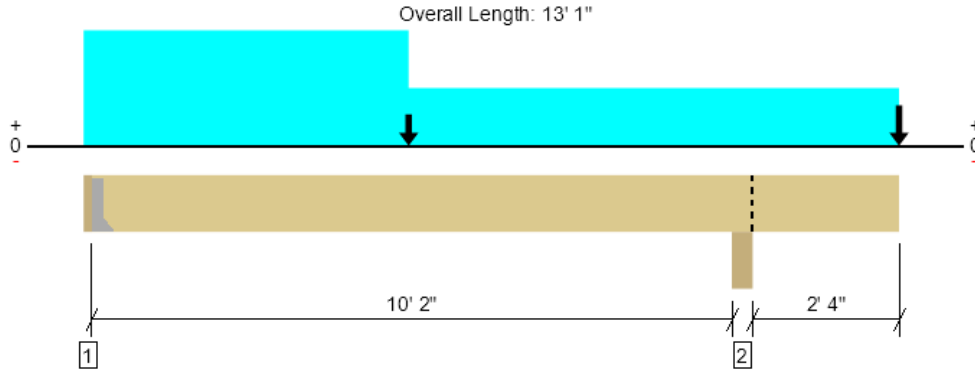
Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	2" to 18' 2"	N/A	26.0	--	--	
1 - Uniform (PSF)	0 to 18' 4" (Front)	1' 6"	2.0	25.0	13.0	Open trellis
2 - Point (lb)	12' (Front)	N/A	169	754	395	Linked from: 21, Support 2
3 - Point (lb)	6' (Front)	N/A	279	1230	644	Linked from: 23, Support 2

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ForteWEB Software Operator	Job Notes
Kevin Tsuchida Harriott Valentine Engineers (206) 624-4760 ktsuchida@harriottvalentine.com	



Level, 25
1 piece(s) 3 1/2" x 14" 2.0E Parallam® PSL



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1423 @ 2"	3281 (1.50")	Passed (43%)	--	1.0 D + 0.45 W + 0.75 L + 0.75 S (Alt Spans)
Shear (lbs)	2066 @ 11' 11"	10894	Passed (19%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-5280 @ 10' 6 1/2"	31236	Passed (17%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.041 @ 13' 1"	0.200	Passed (2L/999+)	--	1.0 D + 0.45 W + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.049 @ 13' 1"	0.254	Passed (2L/999+)	--	1.0 D + 0.45 W + 0.75 L + 0.75 S (Alt Spans)

Member Length : 12' 11"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (0.2") 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	Wind	Factored	
1 - Hanger on 14" HF beam	2.00"	Hanger ¹	1.50"	243	1184	718/-183	1454	See note ¹
2 - Column - HF	5.00"	5.00"	1.89"	1033	3110	1626	4144	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)	12' 11" o/c	
Bottom Edge (Lu)	12' 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	
1 - 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)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	2" to 13' 1"	N/A	15.3	--	--	
1 - Uniform (PLF)	0 to 5' 2" (Front)	N/A	6.7	85.3	44.7	Linked from: 20, Support 2
2 - Uniform (PLF)	0 to 13' 1" (Front)	N/A	6.7	85.3	44.7	Linked from: 20, Support 1
3 - Point (lb)	5' 2" (Front)	N/A	449	1115	582	Linked from: 22, Support 2
4 - Point (lb)	13' 1" (Front)	N/A	508	1433	749	Linked from: 24, Support 1

Forteweb Software Operator	Job Notes
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Criteria

Dead load, open trellis weight = $1.3 * 1.1 = 2$ psf

2x6 @ 18 in oc = 1.3 psf

Dead load, soffited trellis weight = $13.7 * 1.1 = 15$ psf

Shiplap = 1.7 psf

LVL 1.75x14 @ 24"oc = 3.6 psf

$\frac{3}{4}$ in plywood = 2.4 psf

4 in rigid insulation = 6.0 psf

Snow load = 25 psf

Wind load = 13 psf

Wind loads, components and cladding, roof overhangs

V = 100 mph

Kd = .85

Exposure C

Kzt = 1.0

Open

GCpi = 0

Kz = 0.85

$qz = .00256KzKztKdV^2 = .00256*0.85*1.0*.85*100*100 = 18.5$ psf

GCp = -1.1, using $\theta < 7$ deg, zone 3, and effective wind area = 500 ft²

$p = qz(GCp - GCpi) = 18.5(-1.1) = 20.4$ psf

$0.6W = 20.4 * 0.6 = 13$ psf

Beam design

Beam 04, Use W14x26

$$V = 1032 \text{ lb}$$

$$M = 2160 \text{ lb-ft}$$

$$V_r = 70900 \text{ lb}$$

$$M_r = 28000 \text{ lb-ft}$$

$$\text{Defl} = .048 \text{ in, } 2L/4290$$

Beam 06, Use W14x26

$$V = 829 \text{ lb}$$

$$M = 2329 \text{ lb-ft}$$

$$V_r = 70900 \text{ lb}$$

$$M_r = 86000 \text{ lb-ft}$$

$$\text{Defl} = .004 \text{ in, } L/24480$$

Beam 18, Use W14x30

$$V = 3347 \text{ lb}$$

$$M = 30767 \text{ lb-ft}$$

$$V_r = 74500 \text{ lb}$$

$$M_r = 40000 \text{ lb-ft}$$

$$\text{Defl} = .664 \text{ in, } 2L/346$$

Beam 25, Use W14x26

$$V = 2219 \text{ lb}$$

$$M = 5669 \text{ lb-ft}$$

$$V_r = 70900 \text{ lb}$$

$$M_r = 67000 \text{ lb-ft}$$

$$\text{Defl} = .008 \text{ in, } L/15255$$

Beams 01, 03, 20

Replace HF #2 with Alaskan Yellow Cedar #2

Parallel to grain shear F_v

$$\text{HF \#2} = 150 \text{ psi}$$

Alaskan Yellow Cedar #2 = 225 psi

Forte design using hem fir is conservative

Bending Fb

HF #2 = 850 psi

Alaskan Yellow Cedar #2 = 800 psi

Forte design using hem fir capacity adjusted by $800/850=94\%$

Fireplace wall design

Wind loads, components and cladding, walls

$$V = 100 \text{ mph}$$

$$K_d = .85$$

Exposure C

$$K_{zt} = 1.0$$

Open

$$G_{Cpi} = 0$$

$$K_z = 0.85$$

$$q_z = .00256 K_z K_{zt} K_d V^2 = .00256 * 0.85 * 1.0 * .85 * 100 * 100 = 18.5 \text{ psf}$$

$$G_{Cp} = -1.3, \text{ zone 5, and effective wind area} = 2.5 * 6.5 = 16.25 \text{ ft}^2$$

$$p = q_z(G_{Cp} - G_{Cpi}) = 18.5(-1.3) = 24.1 \text{ psf}$$

$$0.6W = 24.1 * 0.6 = 14.5 \text{ psf}$$

Floating counter design, Use HSS 5x5x.25

$$L = 19.25 \text{ ft}$$

$$P = 200 \text{ lb, } L = 0, 2, 4, 6, 8, 10, 12, 14, 16, 18 \text{ ft}$$

$$V = 936 \text{ lb}$$

$$M = 4649 \text{ lb-ft}$$

$$V_r = .6 * 46 * 2 * 5 * .25 * 1 / 1.5 = 46000 \text{ lb}$$

$$M_r = 17500 \text{ lb-ft}$$

$$\text{Defl} = .67 \text{ in, } L/344$$

Connection design

$$V = 1065 \text{ lb} + 15.62 \text{ plf} * 18.83 \text{ ft} = 1366 \text{ lb}$$

$$\text{Use } 3/16'' \times 5 \text{ in fillet weld both sides, } V_r = 13920 \text{ lb}$$

$$\text{Use (2) } 1/2'' \text{ thru-bolts, } V_r = 5300 \text{ lb}$$

$$\text{Use } 1/4'' \text{ kerf plate, } V_r = .6 * 58 * (.25 * 5 - (.5 + 1/16)) < .6 * 36 * (.25 * 5) / 2 = 13500 \text{ lb}$$

$$\text{Use } 3/4'' \text{ threaded rod, } V_r = 2700 \text{ lb}$$

Elevated deck design

$$L = 12.5 \text{ ft}$$

$$w, \text{ paver} = 50/4 \text{ psf} * 1 \text{ ft trib for one flute} = 12.5 \text{ plf}$$

$$w, \text{ slab on metal deck} = 150 \text{ pcf} * (.42 + .17/2) \text{ ft depth} * 1 \text{ ft trib for one flute} = 44.3 \text{ plf}$$

$$w = 60 \text{ psf LL} * 1 \text{ ft trib for one flute} = 60 \text{ plf}$$

$$V = 730 \text{ lb}$$

$$M = 2282 \text{ lb-ft}$$

$$V_r = \phi * 2 * \sqrt{f'c} * b * d = .75 * 2 * \sqrt{2500} * 6 * 3.5 = 1575 \text{ lb}$$

$$d = 3 + 2 - 1.5 = 3.5 \text{ in}$$

$$M_r = \phi * A_s * F_y * (d - a/2) = .9 * .2 * 60000 * (3.5 - .94/2) = 32724 \text{ lb-in} = 2727 \text{ lb-ft}$$

$$d = 3 + 2 - 1.5 = 3.5 \text{ in}$$

$$a = A_s * F_y / (.85 * f'c * b) = .2 * 60000 / (.85 * 2500 * 6) = .94$$

Wisteria support design

When wisteria catches any snow on the south side of the beam, snow will also accumulate on the framing on the north side of the beam, essentially negating any torsional effects due to the cantilevered wisteria



Rosen Trellis

3009 60th Ave SE, Mercer Island, WA 98040, USA

Latitude, Longitude: 47.58342, -122.2521186



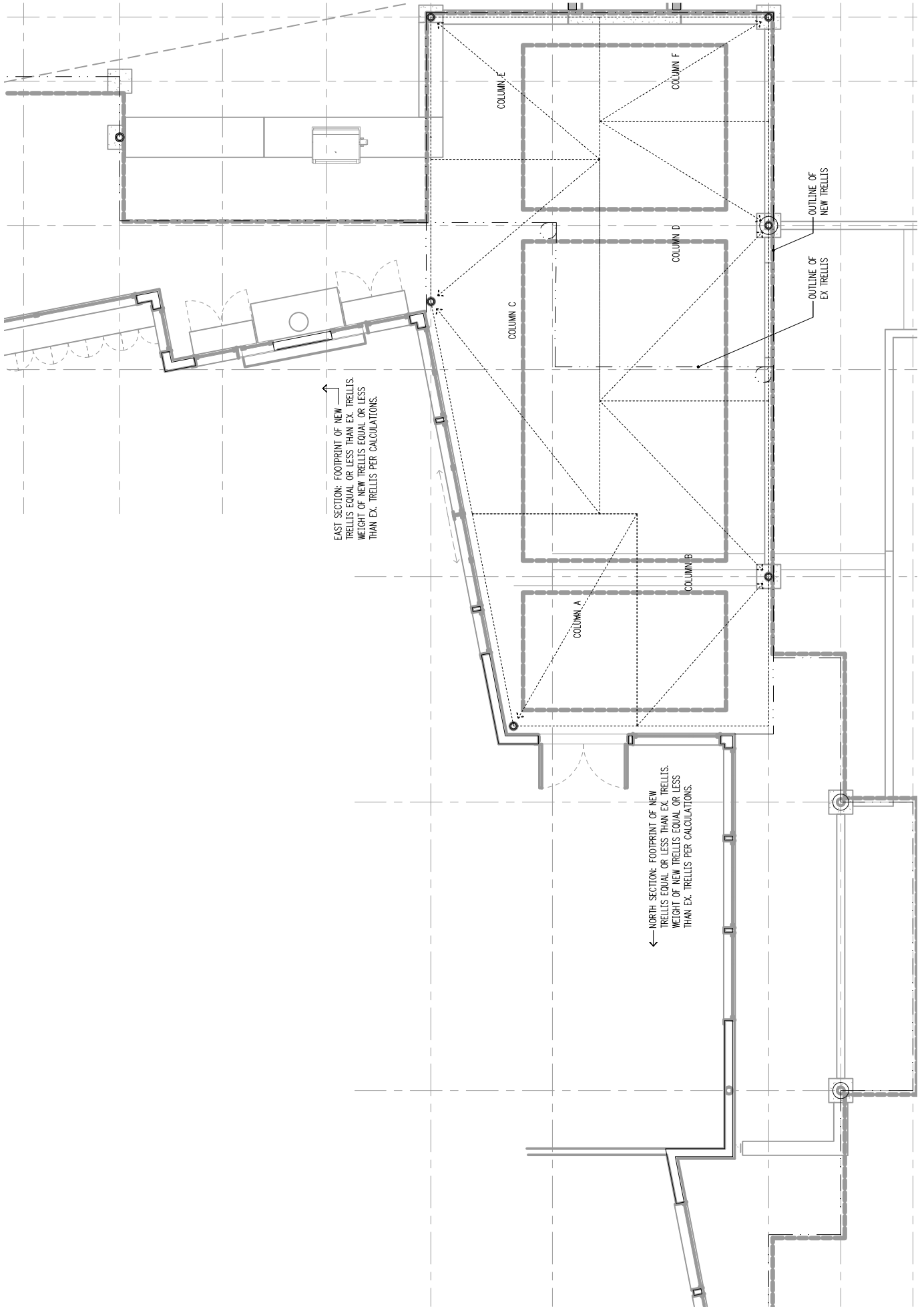
Date	2/9/2021, 10:02:20 AM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Default (See Section 11.4.3)

Type	Value	Description
S_S	1.408	MCE_R ground motion. (for 0.2 second period)
S_1	0.49	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.69	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.127	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.602	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.723	Site modified peak ground acceleration
T_L	6	Long-period transition period in seconds
S_{sRT}	1.408	Probabilistic risk-targeted ground motion. (0.2 second)
S_{sUH}	1.561	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
S_{sD}	3.298	Factored deterministic acceleration value. (0.2 second)
S_{1RT}	0.49	Probabilistic risk-targeted ground motion. (1.0 second)
S_{1UH}	0.547	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S_{1D}	1.339	Factored deterministic acceleration value. (1.0 second)
PGA_d	1.135	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.902	Mapped value of the risk coefficient at short periods
C_{R1}	0.896	Mapped value of the risk coefficient at a period of 1 s

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Ex trellis section north = 5341 lb

Existing GL 5.125x18 = 21.78 plf, using 34 pcf density conservatively from web

$$9+4.5+18+4.5+18+36+11.25+11.25+11.25+18+4.5 = 146.25 \text{ ft} * 21.78 \text{ plf} = 3185 \text{ lb}$$

Existing 3.125x15 = 11.06 plf, using 34 pcf

$$4.5+4.5+4.5+4.5+9+9+11.25+9+11.25+9+6.75+4.5 = 87.75 \text{ ft} * 11.06 \text{ plf} = 970 \text{ lb}$$

Existing 2x6 = 1.89 plf, using 33 pcf

$$4.5*9*15.5 = 627.75 \text{ ft} * 1.89 \text{ plf} = 1186 \text{ lb}$$

New trellis section north = 4251 lb, within 10% increase on existing structures

W14x26

$$9.83+26.5+4.5+4.5+36+11.25+18+4.5+4.5+4.5+11.25+4.5+4.5+4.5=148.83 \text{ ft}*26=3870 \text{ lb}$$

2x6

$$(10.83*5.42/1.5) + (5.83*17.5/1.5) + (2.25*(4.17+4.75)/1.5) + (6.75*18/1.5)$$

$$39.13 + 68.01 + 13.38 + 81 = 201.52 \text{ ft} * 1.89 \text{ plf} = 381 \text{ lb}$$

Ex trellis section east = 3866 lb

Existing GL 5.125x18 = 21.78 plf, using 34 pcf density conservatively from web

$$4.5+27+9+13.5+13.5+18+4.5 = 90 \text{ ft} * 21.78 \text{ plf} = 1960 \text{ lb}$$

Existing 3.125x15 = 11.06 plf, using 34 pcf

$$4.5+9+9+9+4.5+9+9+13.5+4.5+4.5 = 117 \text{ ft} * 11.06 \text{ plf} = 1294 \text{ lb}$$

Existing 2x6 = 1.89 plf, using 33 pcf

$$4.5*9*8 = 324 \text{ ft} * 1.89 \text{ plf} = 612 \text{ lb}$$

New trellis section east = 2692 lb, within 10% increase on existing structures

W14x26

$$7+8.5+12.92+14.08+2.75+3.92+19.42+18 = 86.58 \text{ ft} * 26 = 2252 \text{ lb}$$

2x6

$$(6.5*7/1.5) + (6.5*8.5/1.5) + (6.5*8.5/1.5) + (6*14.08/1.5) + (6*14.08/1.5) + (6*3.92/1.5)$$

$$30.33 + 36.83 + 36.83 + 56.32 + 56.32 + 15.68 = 232.31 \text{ ft} * 1.89 \text{ plf} = 440 \text{ lb}$$

Column A = 1639 lb

W16x40 = 540 lb

13.5 ft

PSL 3.5x11.875 = 98

7.5 ft

PSL 5.25x11.875 = 187

9.58 ft

PSL 7x11.875 = 102

3.92 ft

LVL 1.75x11.875 = 262 lb

$7.33+7.33+7.33+9.33+((.5+3)/2*13.25/2) = 42.92 \text{ ft}$

Renson = $600 \text{ lb} * .57 = 342 \text{ lb}$

$7.33 \text{ ft} * 7.17 \text{ ft} / 7.33 \text{ ft} * 12.66 \text{ ft} = .57$

Renson = $1192 * .09 = 108 \text{ lb}$

$2.92 \text{ ft} * 7.17 \text{ ft} / 19.92 \text{ ft} * 12.66 \text{ ft} = .09$

Column B = 2182 lb

W14x30 = 625 lb

20.83 ft

PSL 3.5x11.875 = 108

8.25 ft

PSL 5.25x11.875 = 156

8 ft

PSL 7x11.875 = 286

11 ft

LVL 1.75x11.875 = 391 lb

$5.75+5.75+5.75+9.33+9.33+11+(1.58*20.83/2) = 64 \text{ ft}$

Renson = $600 \text{ lb} * .45 = 270 \text{ lb}$

$7.33 \text{ ft} * 5.58 \text{ ft} / 7.33 \text{ ft} * 12.66 \text{ ft} = .45$

Renson = $1192 * .29 = 346 \text{ lb}$

$$2.92 \text{ ft} * 5.58 \text{ ft} + 7.08 \text{ ft} * 7.92 \text{ ft} / 19.92 \text{ ft} * 12.66 \text{ ft} = .29$$

Column C = 2380 lb

$$W16x40 = 534 \text{ lb}$$

$$13.33 \text{ ft}$$

$$W14x26 = 226 \text{ lb}$$

$$8.66 \text{ ft}$$

$$PSL 7x11.875 = 744$$

$$18 + 10.58 \text{ ft}$$

$$LVL 1.75x11.875 = 379 \text{ lb}$$

$$5+5+4.17+((3+5.58)/2*22.17/2) = 62 \text{ ft}$$

$$\text{Renson} = 1192 * .32 = 382 \text{ lb}$$

$$17 \text{ ft} * 4.83 \text{ ft} / 19.92 \text{ ft} * 12.66 \text{ ft} = .32$$

$$\text{Renson} = 951 * .12 = 115 \text{ lb}$$

$$3.17 \text{ ft} * 4.83 \text{ ft} / 10.25 \text{ ft} * 12.66 \text{ ft} = .12$$

Column D = 2079 lb

$$W14x30 = 323 \text{ lb}$$

$$10.75 \text{ ft}$$

$$W14x26 = 165 \text{ lb}$$

$$6.33 \text{ ft}$$

$$PSL 7x11.875 = 555 \text{ lb}$$

$$11 + 10.33 \text{ ft}$$

$$LVL 1.75x11.875 = 330 \text{ lb}$$

$$8.08+8.08+11+6.5+6.5+(1.58*17.5/2) = 54 \text{ ft}$$

$$\text{Renson} = 1192 * .33 = 382 \text{ lb}$$

$$10 \text{ ft} * 7.92 \text{ ft} / 19.92 \text{ ft} * 12.66 \text{ ft} = .32$$

$$\text{Renson} = 951 * .34 = 324 \text{ lb}$$

$$5.5 \text{ ft} * 7.92 \text{ ft} / 10.25 \text{ ft} * 12.66 \text{ ft} = .34$$

Column E = 989 lb

$$W14x26 = 494 \text{ lb}$$

$$8.66+10.33 \text{ ft}$$

$$\text{LVL } 1.75 \times 11.875 = 238 \text{ lb}$$

$$8.92+5+(5.58 \times 8.92/2) = 39 \text{ ft}$$

$$\text{Renson} = 951 * .27 = 257 \text{ lb}$$

$$7.17 \text{ ft} * 4.83 \text{ ft} / 10.25 \text{ ft} * 12.66 \text{ ft} = .27$$

Column F = 875 lb

$$\text{W}14 \times 26 = 434 \text{ lb}$$

$$6.33+10.33 \text{ ft}$$

$$\text{LVL } 1.75 \times 11.875 = 165 \text{ lb}$$

$$8.08+6.5+6.5+(1.58 \times 6.5/2) = 27 \text{ ft}$$

$$\text{Renson} = 951 * .29 = 276 \text{ lb}$$

$$4.75 \text{ ft} * 7.92 \text{ ft} / 10.25 \text{ ft} * 12.66 \text{ ft} = .29$$

Seismic base shear (ASCE 7 12.8)

$$V = C_s W$$

$$C_s = S_d s / R / I = 0.91$$

$$S_d s = 1.127$$

$$R = 1.25, \text{ steel ordinary cantilever column systems}$$

$$I = 1$$

Column design

Column C, Use 5" dia sch. 160 pipe

$$V = 0.7 * 0.91 * 2380 = 1517 \text{ lb}$$

$$M = 1517 * 8.83 \text{ ft} = 13396 \text{ lb-ft}$$

$$V_r = F_{cr} A_g / 2 / 1.67 = 2403047 \text{ lb}$$

$$F_{cr} = .78 E / (D/t)^3 / 2 = 1008314 \text{ psi}$$

$$M_r = 29100 \text{ lb-ft}$$

$$\text{Defl} = PL^3 / 3EI = .65 \text{ in}$$

Column A, Use 5" dia sch. 160 pipe

$$V = 0.7 * 0.91 * 1639 = 1045 \text{ lb}$$

$$M = 1045 * 10.42 \text{ ft} = 10889 \text{ lb-ft}$$

$$V_r = F_{cr}A_g/2/1.67 = 2403047 \text{ lb}$$

$$F_{cr} = .78E/(D/t)^{3/2} = 1008314 \text{ psi}$$

$$M_r = 29100 \text{ lb-ft}$$

$$\text{Defl} = PL^3/3EI = .73 \text{ in}$$

Footing with moment design

Column C

$$V = 0.7*0.91*2380 = 1517 \text{ lb}$$

$$M = 1517*8.83 \text{ ft} = 13396 \text{ lb-ft}$$

$$R = \text{beam 16} + \text{beam 17} = 2447 + 1790 = 4237 \text{ lb}$$

Column B

$$V = 0.7*0.91*2182 = 1390 \text{ lb}$$

$$M = 1390*8.83 \text{ ft} = 12274 \text{ lb-ft}$$

$$R = \text{beam 13} + \text{beam 18} = 2935 + 3547 = 6482 \text{ lb}$$

Column D

$$V = 0.7*0.91*2079 = 1325 \text{ lb}$$

$$M = 1325*8.83 \text{ ft} = 11700 \text{ lb-ft}$$

$$R = \text{beam 14} + \text{beam 18} + \text{beam 19} = 3030 - 412 + 218 = 2836 \text{ lb}$$

Column A

$$V = 0.7*0.91*1639 = 1045 \text{ lb}$$

$$M = 1045*10.42 \text{ ft} = 10889 \text{ lb-ft}$$

$$R = \text{beam 12} + \text{beam 17} = 1705 + 2423 = 4128 \text{ lb}$$

Column E

$$V = 0.7*0.91*989 = 630 \text{ lb}$$

$$M = 630*8.83 \text{ ft} = 5563 \text{ lb-ft}$$

$$R = \text{beam 15} + \text{beam 16} + \text{HSS counter} = 1129 + 1288 + 1065 = 3482 \text{ lb}$$

Column F

$$V = 0.7*0.91*875 = 558 \text{ lb}$$

$$M = 558*8.83 \text{ ft} = 4928 \text{ lb-ft}$$

$$R = \text{beam 15} + \text{beam 19} = 1600 + 226 = 1826 \text{ lb}$$

Total load pad footing design

Column C, Use 4.66 ft sq footing x 1 ft deep below 1 ft of soil

$$R = \text{beam 16} + \text{beam 17} = 6309 + 3604 = 9913 \text{ lb}$$

Column B, Use 4.17 ft sq footing x 1 ft deep below 1 ft of soil

$$R = \text{beam 13} + \text{beam 18} = 6819 + 5391 = 12210 \text{ lb}$$

Column D, Use 4.66 ft sq footing x 1 ft deep below 1 ft of soil

$$R = \text{beam 14} + \text{beam 18} + \text{beam 19} = 7259 - 858 + 299 = 6700 \text{ lb}$$

Column A, Use 4.17 ft sq footing x 1 ft deep below 1 ft of soil

$$R = \text{beam 12} + \text{beam 17} = 2796 + 5040 = 7836 \text{ lb}$$

Column E, Use 3.17 ft sq footing x 1 ft deep below 1 ft of soil

$$R = \text{beam 15} + \text{beam 16} + \text{HSS counter} = 1813 + 3041 + 1065 = 5919 \text{ lb}$$

Column F, Use 3.5 ft sq footing x 1 ft deep below 1 ft of soil

$$R = \text{beam 15} + \text{beam 19} = 2680 + 311 = 2991 \text{ lb}$$

Column on grid 4, Verify ex strip footing 12" min x 18" deep

$$P = \text{beam 25} + \text{HSS counter} = 4144 + 1065 = 5209 \text{ lb}$$

Column on grid 4.3, Verify ex strip footing 12" min x 18" deep

$$P = \text{beam 24} = 1701 \text{ lb}$$

FOOTING WITH COMBINED AXIAL AND FLEXURAL LOADS

Rosen Trellis Column A

Sizes and Loads:

superstructure:

frame **4,128** lb (input as 1.0D)

footing:

length **4.17** ft (along same axis as applied moment)

width **4.17** ft (perpendicular to applied moment)

depth **1.00** ft

weight 2,608 lb

soil abv. 2,087 lb

total R = 8,823 lb

M = **10,889** lbft (input as 0.7E)

e = 1.23 ft

B/6 = 0.70 ft

Bearing Pressures:

Reaction is OUTSIDE kern.

(Use these results)

(Do not use these results)

x = 0.85 ft

fa = 507 psf

fb = 901 psf

fp = 1658 psf

fp = 1408 psf

Fa = **2,000** psf

Fa = **2,000** psf

Stability:

Mot = 10,889 lbft (using 0.6W, per ASD Load Combinations)

Mr = 11,038 lbft (using 0.6D, per ASD Load Combinations)

FOOTING WITH COMBINED AXIAL AND FLEXURAL LOADS

Rosen Trellis Column B

Sizes and Loads:

superstructure:

frame **6,482** lb (input as 1.0D)

footing:

length **4.17** ft (along same axis as applied moment)

width **4.17** ft (perpendicular to applied moment)

depth **1.00** ft

weight 2,608 lb

soil abv. 2,087 lb

total R = 11,177 lb

M = **12,274** lbft (input as 0.7E)

e = 1.10 ft

B/6 = 0.70 ft

Bearing Pressures:

Reaction is OUTSIDE kern.

(Use these results)

(Do not use these results)

x = 0.99 ft

fa = 643 psf

fb = 1016 psf

fp = 1811 psf

fp = 1658 psf

Fa = **2,000** psf

Fa = **2,000** psf

Stability:

Mot = 12,274 lbft (using 0.6W, per ASD Load Combinations)

Mr = 13,982 lbft (using 0.6D, per ASD Load Combinations)

FOOTING WITH COMBINED AXIAL AND FLEXURAL LOADS

Rosen Trellis Column C

Sizes and Loads:

superstructure:

frame **4,237** lb (input as 1.0D)

footing:

length **4.66** ft (along same axis as applied moment)

width **4.66** ft (perpendicular to applied moment)

depth **1.00** ft

weight 3,257 lb

soil abv. 2,606 lb

total R = 10,100 lb

M = **13,396** lbft (input as 0.7E)

e = 1.33 ft

B/6 = 0.78 ft

Bearing Pressures:

Reaction is OUTSIDE kern.

(Use these results)

(Do not use these results)

x = 1.00 ft

fa = 465 psf

fb = 794 psf

fp = 1440 psf

fp = 1259 psf

Fa = **2,000** psf

Fa = **2,000** psf

Stability:

Mot = 13,396 lbft (using 0.6W, per ASD Load Combinations)

Mr = 14,120 lbft (using 0.6D, per ASD Load Combinations)

FOOTING WITH COMBINED AXIAL AND FLEXURAL LOADS

Rosen Trellis Column D

Sizes and Loads:

superstructure:

frame **2,836** lb (input as 1.0D)

footing:

length **4.66** ft (along same axis as applied moment)

width **4.66** ft (perpendicular to applied moment)

depth **1.00** ft

weight 3,257 lb

soil abv. 2,606 lb

total R = 8,699 lb

M = **11,700** lbft (input as 0.7E)

e = 1.34 ft

B/6 = 0.78 ft

Bearing Pressures:

Reaction is OUTSIDE kern.

(Use these results)

(Do not use these results)

x = 0.99 ft

fa = 401 psf

fb = 694 psf

fp = 1263 psf

fp = 1094 psf

Fa = **2,000** psf

Fa = **2,000** psf

Stability:

Mot = 11,700 lbft (using 0.6W, per ASD Load Combinations)

Mr = 12,161 lbft (using 0.6D, per ASD Load Combinations)

FOOTING WITH COMBINED AXIAL AND FLEXURAL LOADS

Rosen Trellis Column E

Sizes and Loads:

superstructure:

frame **3,482** lb (input as 1.0D)

footing:

length **3.17** ft (along same axis as applied moment)

width **3.17** ft (perpendicular to applied moment)

depth **1.00** ft

weight 1,507 lb

soil abv. 1,206 lb

total R = 6,195 lb

M = **5,563** lbft (input as 0.7E)

e = 0.90 ft

B/6 = 0.53 ft

Bearing Pressures:

Reaction is OUTSIDE kern.

(Use these results)

(Do not use these results)

x = 0.69 ft

fa = 617 psf

fb = 1048 psf

fp = 1896 psf

fp = 1664 psf

Fa = **2,000** psf

Fa = **2,000** psf

Stability:

Mot = 5,563 lbft (using 0.6W, per ASD Load Combinations)

Mr = 5,892 lbft (using 0.6D, per ASD Load Combinations)

FOOTING WITH COMBINED AXIAL AND FLEXURAL LOADS

Rosen Trellis Column F

Sizes and Loads:

superstructure:

frame **1,826** lb (input as 1.0D)

footing:

length **3.50** ft (along same axis as applied moment)

width **3.50** ft (perpendicular to applied moment)

depth **1.00** ft

weight 1,838 lb

soil abv. 1,470 lb

total R = 5,134 lb

M = **4,928** lbft (input as 0.7E)

e = 0.96 ft

B/6 = 0.58 ft

Bearing Pressures:

Reaction is OUTSIDE kern.

(Use these results)

(Do not use these results)

x = 0.79 ft

fa = 419 psf

fb = 690 psf

fp = 1238 psf

fp = 1109 psf

Fa = **2,000** psf

Fa = **2,000** psf

Stability:

Mot = 4,928 lbft (using 0.6W, per ASD Load Combinations)

Mr = 5,390 lbft (using 0.6D, per ASD Load Combinations)

WF to WF shear tab

Max load = 1941 lb from beam 24

Assume single shear for one-sided connections

Use (3) ½ in dia A307 thru bolts

$$V_r = 2650 * 3 = 7950 \text{ lb}$$

.75 in min edge distance

1.5 in min spacing

Use 8 in x 3/8 in shear tab

$$V_r = .6F_u A_n v < .6F_y A_g v / 2 = .6 * 58 * .375 * (8 - 3(.5 + 1/16)) < .6 * 36 * .375 * 8 / 2 = 32400 \text{ lb}$$

$$V_r = .928 * 3 * 8 = 22272 \text{ lb}$$

Open trellis plate ledger to ex knife plates, Use C15x33.9

Existing knife plates occur on existing soffit @ 4.5 ft oc

$$L = 4.5 \text{ ft}$$

$$w = 226 \text{ lb} / 1.5 \text{ ft trib} = 151 \text{ plf}$$

$$P, \text{ beam 23} = 1509 \text{ lb}, L = 2.25 \text{ ft}$$

$$V = 1095 \text{ lb}$$

$$M = 2080 \text{ lb-ft}$$

$$V_r = 77600 \text{ lb}$$

$$M_r = 88500 \text{ lb-ft}$$



Company:		Date:	1/10/2024
Engineer:		Page:	1/5
Project:			
Address:			
Phone:			
E-mail:			

1. Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

General

Design method: ACI 318-14
Units: Imperial units

Anchor Information:

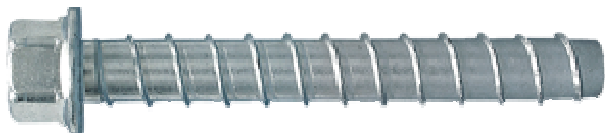
Anchor type: Concrete screw
Material: Carbon Steel
Diameter (inch): 0.500
Nominal Embedment depth (inch): 3.750
Effective Embedment depth, h_{ef} (inch): 2.780
Code report: ICC-ES ESR-2713
Anchor category: 1
Anchor ductility: No
 h_{min} (inch): 5.83
 c_{ac} (inch): 4.19
 C_{min} (inch): 1.75
 S_{min} (inch): 3.00

Base Material

Concrete: Normal-weight
Concrete thickness, h (inch): 6.00
State: Cracked
Compressive strength, f'_c (psi): 2500
 $\Psi_{c,v}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Recommended Anchor

Anchor Name: Titen HD® - 1/2"Ø Titen HD, h_{nom} : 3.75" (95mm)
Code Report: ICC-ES ESR-2713





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Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: No

Anchors subjected to sustained tension: Not applicable

Apply entire shear load at front row: No

Anchors only resisting wind and/or seismic loads: No

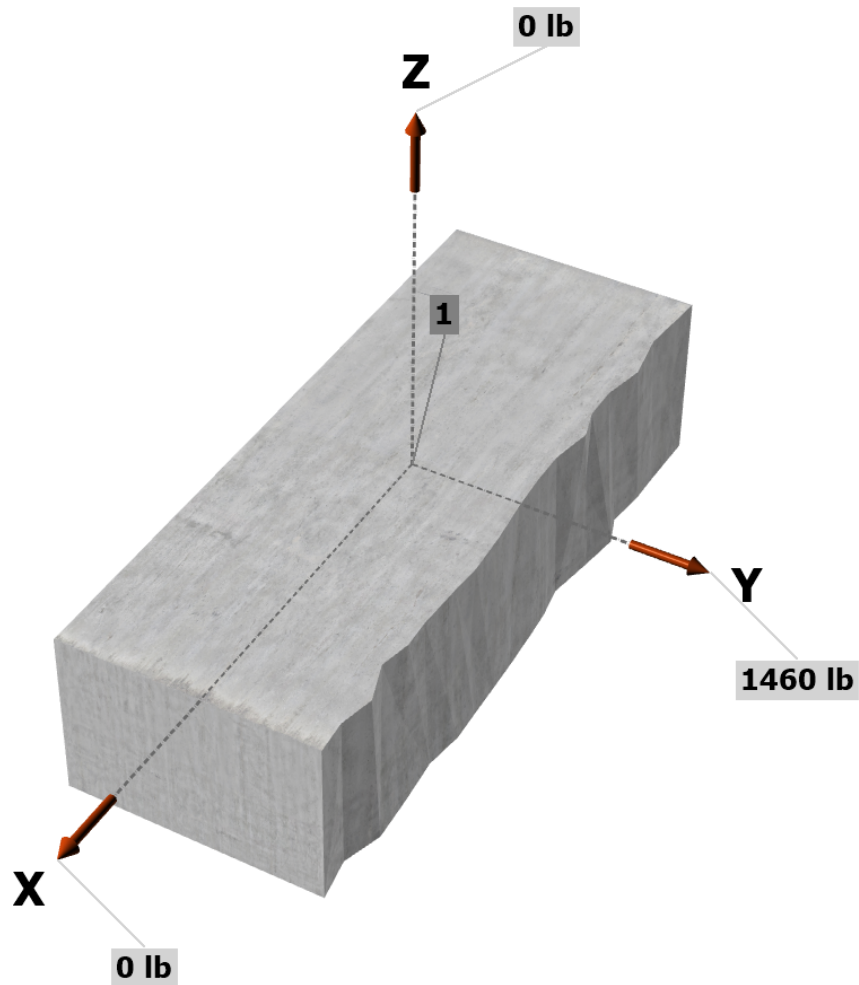
Strength level loads:

N_{ua} [lb]: 0

V_{uax} [lb]: 0

V_{uay} [lb]: 1460

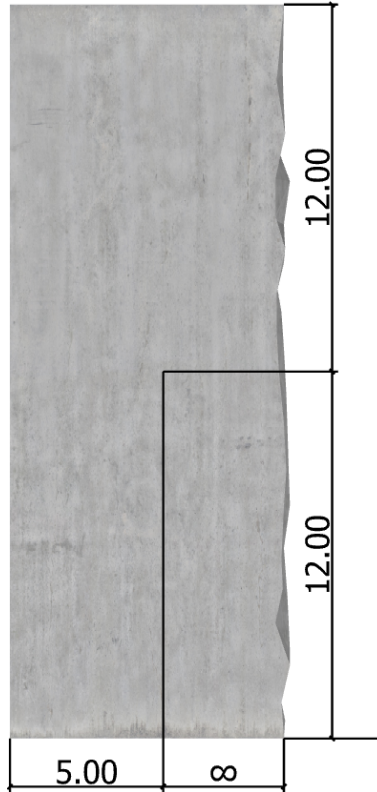
<Figure 1>





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<Figure 2>





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3. Resulting Anchor Forces

Anchor	Tension load, N _{ua} (lb)	Shear load x, V _{uax} (lb)	Shear load y, V _{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	0.0	0.0	1460.0	1460.0
Sum	0.0	0.0	1460.0	1460.0

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

8. Steel Strength of Anchor in Shear (Sec. 17.5.1)

V _{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
7455	1.0	0.60	4473

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.5.2)

Shear parallel to edge in x-direction:

$V_{by} = \min[7(l_e / d_a)^{0.2} \sqrt{d_a} \lambda_a \sqrt{f_c} c_{a1}^{1.5}; 9 \lambda_a \sqrt{f_c} c_{a1}^{1.5}]$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l _e (in)	d _a (in)	λ_a	f _c (psi)	c _{a1} (in)	V _{by} (lb)
2.78	0.500	1.00	2500	12.00	14499

$\phi V_{cbx} = \phi (2)(A_{Vc} / A_{Vco}) \Psi_{ed,V} \Psi_{c,V} \Psi_{h,V} V_{by}$ (Sec. 17.3.1, 17.5.2.1(c) & Eq. 17.5.2.1a)

A _{Vc} (in ²)	A _{Vco} (in ²)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V _{by} (lb)	ϕ	ϕV_{cbx} (lb)
138.00	648.00	1.000	1.000	1.732	14499	0.70	7487

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.5.3)

$\phi V_{cp} = \phi K_{cp} N_{cb} = \phi K_{cp} (A_{Nc} / A_{Nco}) \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (Sec. 17.3.1 & Eq. 17.5.3.1a)

K _{cp}	A _{Nc} (in ²)	A _{Nco} (in ²)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N _b (lb)	ϕ	ϕV_{cp} (lb)
2.0	69.56	69.56	1.000	1.000	1.000	3940	0.70	5516

11. Results

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

Shear	Factored Load, V _{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status

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



Anchor Designer™
Software
Version 3.0.7947.0

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Steel	1460	4473	0.33	Pass (Governs)
Concrete breakout x-	1460	7487	0.19	Pass
Pryout	1460	5516	0.26	Pass

1/2"Ø Titen HD, hnom:3.75" (95mm) meets the selected design criteria.

12. Warnings

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

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 License : KW-06055874
 License To : HARRIOTT VALENTINE

Cantilevered Retaining Wall

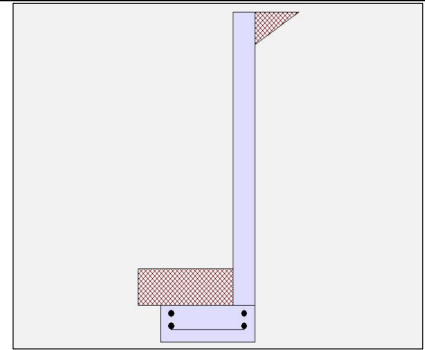
Code: IBC 2018,ACI 318-14,TMS 402-16

Criteria

Retained Height	=	6.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	9.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	0.0 psf/ft
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	0.00 pcf
Soil Density, Toe	=	0.00 pcf
Footings Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

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

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 (Service 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	=	54.000
Total Seismic Force	=	364.500

Design Summary

Wall Stability Ratios

Overturning	=	1.30 Ratio < 1.5!
Sliding	=	1.70 OK
Total Bearing Load	=	693 lbs
...resultant ecc.	=	8.44 in
Soil Pressure @ Toe	=	1,228 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,719 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	9.6 psi OK
Footing Shear @ Heel	=	0.0 psi OK
Allowable	=	75.0 psi

Sliding Calcs

Lateral Sliding Force	=	255.2 lbs
less 100% Passive Force	= -	156.3 lbs
less 100% Friction Force	= -	277.2 lbs
Added Force Req'd	=	0.0 lbs OK
....for 1.5 Stability	=	0.0 lbs OK

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

Load Factors

Building Code	IBC 2018,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Stem Construction

Design Height Above Ftg	ft =	0.00
Wall Material Above "Ht"	=	Concrete
Design Method	=	LRFD
Thickness	=	6.00
Rebar Size	=	# 4
Rebar Spacing	=	12.00
Rebar Placed at	=	Center

Design Data

fb/FB + fa/Fa	=	0.390
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Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	324.0

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	972.0
Moment.....Allowable	=	2,487.6

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	9.0
Shear.....Allowable	psi =	75.0
Anet (Masonry)	in2 =	
Rebar Depth 'd'	in =	3.00

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

Bottom

Stem OK

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.0806 in2/ft		
(4/3) * As :	0.1074 in2/ft	Min Stem T&S Reinf Area 0.864 in2	
200bd/fy : 200(12)(3)/60000 :	0.12 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.144 in2/ft	
0.0018bh : 0.0018(12)(6) :	0.1296 in2/ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.1296 in2/ft	#4@ 16.67 in	#4@ 33.33 in
Provided Area :	0.2 in2/ft	#5@ 25.83 in	#5@ 51.67 in
Maximum Area :	0.4064 in2/ft	#6@ 36.67 in	#6@ 73.33 in

Footing Data

Toe Width	=	1.66 ft
Heel Width	=	0.50
Total Footing Width	=	2.16
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	F _y = 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	= 1,719	0 psf
Mu' : Upward	= 14,945	0 ft-#
Mu' : Downward	= 2,232	0 ft-#
Mu: Design	= 433	0 ft-#
Actual 1-Way Shear	= 9.62	0.00 psi
Allow 1-Way Shear	= 40.00	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: Not req'd: $\mu < \phi * 5 * \lambda * \sqrt{f_c} * S_m$
 Heel: Not req'd: $\mu < \phi * 5 * \lambda * \sqrt{f_c} * S_m$
 Key: No key defined

Min footing T&S reinf Area	0.42	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

Summary of Overturning & Resisting Forces & Moments

ItemOVERTURNING.....		RESISTING.....		
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)				Soil Over HL (ab. water tbl)		
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		
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 =		0.83
Seismic Earth Load =	255.2	3.38	861.1	Surcharge Over Toe =		
				Stem Weight(s) =	450.0	1.91
				Earth @ Stem Transitions =		
				Footing Weight =	243.0	1.08
				Key Weight =		
				Vert. Component =		
Total	= 255.2	O.T.M.	= 861.1	Total =	693.0 lbs	R.M.= 1,121.9
Resisting/Overturning Ratio		=	1.30			
Vertical Loads used for Soil Pressure =		693.0 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 250.0 pci
 Horizontal Defl @ Top of Wall (approximate only) 0.095 in

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

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Cantilevered Retaining Wall

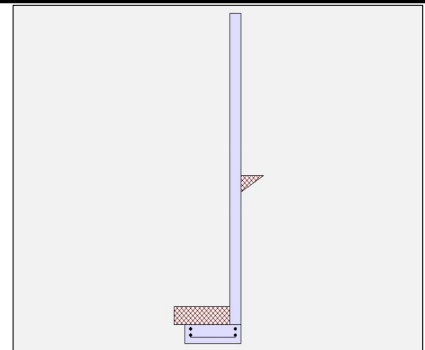
Code: IBC 2018,ACI 318-14,TMS 402-16

Criteria

Retained Height	=	6.00 ft
Wall height above soil	=	6.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	9.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	0.0 psf/ft
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	0.00 pcf
Soil Density, Toe	=	0.00 pcf
Footings Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

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

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	=	14.5 psf (Service 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	=	54.000
Total Seismic Force	=	364.500

Design Summary

Wall Stability Ratios

Overturning	=	1.36 Ratio < 1.5!
Sliding	=	1.84 OK
Total Bearing Load	=	1,219 lbs
...resultant ecc.	=	8.53 in
Soil Pressure @ Toe	=	1,507 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	2,109 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	22.6 psi OK
Footing Shear @ Heel	=	0.0 psi OK
Allowable	=	75.0 psi

Sliding Calcs

Lateral Sliding Force	=	349.4 lbs
less 100% Passive Force	= -	156.3 lbs
less 100% Friction Force	= -	487.5 lbs
Added Force Req'd	=	0.0 lbs OK
....for 1.5 Stability	=	0.0 lbs OK

Stem Construction

Design Height Above Ftg	ft =	0.00
Wall Material Above "Ht"	=	Concrete
Design Method	=	LRFD
Thickness	=	6.00
Rebar Size	=	# 4
Rebar Spacing	=	12.00
Rebar Placed at	=	Center

Design Data

fb/FB + fa/Fa	=	0.740
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Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	418.3

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	1,843.8
Moment.....Allowable	=	2,487.6

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	11.6
Shear.....Allowable	psi =	75.0

Anet (Masonry)	in2 =	
Rebar Depth 'd'	in =	3.00

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

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1528 in2/ft		
(4/3) * As :	0.2038 in2/ft	Min Stem T&S Reinf Area 1.800 in2	
200bd/fy : 200(12)(3)/60000 :	0.12 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.144 in2/ft	
0.0018bh : 0.0018(12)(6) :	0.1296 in2/ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.1528 in2/ft	#4@ 16.67 in	#4@ 33.33 in
Provided Area :	0.2 in2/ft	#5@ 25.83 in	#5@ 51.67 in
Maximum Area :	0.4064 in2/ft	#6@ 36.67 in	#6@ 73.33 in

Footing Data

Toe Width	=	2.00 ft
Heel Width	=	0.50
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 = 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	= 2,109	0 psf
Mu' : Upward	= 29,907	0 ft-#
Mu' : Downward	= 3,240	0 ft-#
Mu: Design	= 1,095	0 ft-#
Actual 1-Way Shear	= 22.64	0.00 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@ 27.15 in, #7@ 37.03 in, #8@ 48.76 in, #9@ 6
 Heel: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*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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Cantilevered Retaining Wall

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

Summary of Overturning & Resisting Forces & Moments

ItemOVERTURNING.....		RESISTING.....		
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)						
HL Act Pres (be water tbl)						
Hydrostatic Force						
Buoyant Force =						
Surcharge over Heel =						
Surcharge Over Toe =						
Adjacent Footing Load =						
Added Lateral Load =						
Load @ Stem Above Soil =	94.3	10.00	942.5			
Seismic Earth Load =	255.2	3.38	861.1			
Total =	349.4	O.T.M.	= 1,803.6			
Resisting/Overturning Ratio =			1.36			
Vertical Loads used for Soil Pressure =		1,218.8	lbs			
				Total =	1,218.8	lbs R.M.= 2,460.9

* 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 250.0 pci
 Horizontal Defl @ Top of Wall (approximate only) 0.209 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.