Structural Calculations for

Banbury - Single Family Residence Addition

8275 SE 61st Street
Mercer Island, WA

Prepared by:
Johnson Structural Engineering, Inc.

Larry P. Johnson, PE

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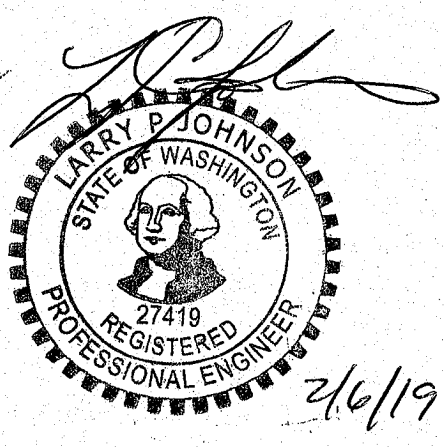

2/6/19

DESIGN DATA
INFORMATION SHEET

Banbury - Single Family Residence Addition
8275 SE 61st Street
Mercer Island, WA

JN 19-446
DATE 2/6/2019

PREPARED BY Larry P. Johnson, PE

REFERENCES **IBC/IRC 2015** **ASCE 7 2010**

Allowable Stress Design - Basic Load Combinations Used:

For Soils Loadings — Allowable Design
For Concrete Design — Strength Design, Factored Loads

DEAD LOADS	Roof	15	psf	LIVE LOADS	Roof	20	psf
	Floor	12	psf		Floor	40	psf
	Int. Walls	10	psf		Deck	60	psf
	Ext. Walls	12	psf				

SNOW:	Pg	25	Psf
	Ce	1.0	
	Ct	1.0	
	I	1.0	
	Pf min = 20 I	20	Psf
	pf = 0.7 Pg Ce Ct I	25.0	Psf

WIND	Basic Wind Speed	**110**	MPH
	Exposure Category	**B**	
	Enclosed Structure		
	Structure Category	**II**	
	Importance Factor	**1.00**	
	Internal Pressure Coeff.	**N/A**	

SEISMIC	Structure Category	**II**	
	Importance Factor	**1.00**	
	Seismic Use Group	**II**	
	Site Soil Profile	**D**	'D' if unknown
	Seismic Design Category	**D**	
	Basic Seismic System	Wood Framed Shear Wall	
	Analysis Procedure	Equivalent Lateral Force Procedure, ASCE 7, Chap 9.5.5	

SOILS — Soils Bearing Capacity, per Table 1806.2 — 1,500 psf

Responsibility of Contractor and/or Owner to verify soil condition suitable to support foundation.

CONCRETE — Fc = 2500 psi

REBAR — Grade 40, 40 ksi, #3 bar
Grade 60, 60 ksi, all others

TABLE OF CONTENTS

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Project: Banburg - SFR Addition
Job No.: 19-446
Date: 2-5-19
Sheet No.: 4

A. Vertical Analysis

Proj. Location: 8275 SE 61st Street
Mercer Island, WA
Roof Snow = 25 PSF

1. Kitchen Bay Window - H1

span = 6.5'
roof trib. = $\frac{3'}{2}$ = 1.5'

Use (2) 1¾"x7¼" LVL ←

2. South Window header - H2

span = 6.5'
roof trib. = 4'
wall ht. = 5'

Use 4x8 DF #2 ←

3. Dining West door header - H3

span = 12.5'
roof trib. = 15.5'

Use 5½x12 24F-V4 GLB ←

4. Main level floor joist - FJ1

span = 8'-3"

Use 2x8 DF #2 @ 16" O.C. ←

5. Main level floor beam at South Addition - FB1

FB1
span = 12'
floor trib. = $\frac{4'}{2}$ = 2' to $\frac{8'}{2}$ = 4' 2 to 4'
wall height = 8' to 11'
roof trib. = cos 60 (14') = 7' to cos 60 (8') = 4'

Use 5½x10½ Glulam ←

FB1a
span = 7.5 to 7.75
floor trib. = 4'
wall ht = 12'
roof trib = 4'

Use 5½x10½ Glulam ←

FB1 R_{+L} = 3112#
FB1a R_{+L} = 1627#
4739#
use 2'x2'x8" ftg

FB1a mid span = 5003#
use 2'x2'x8" ftg

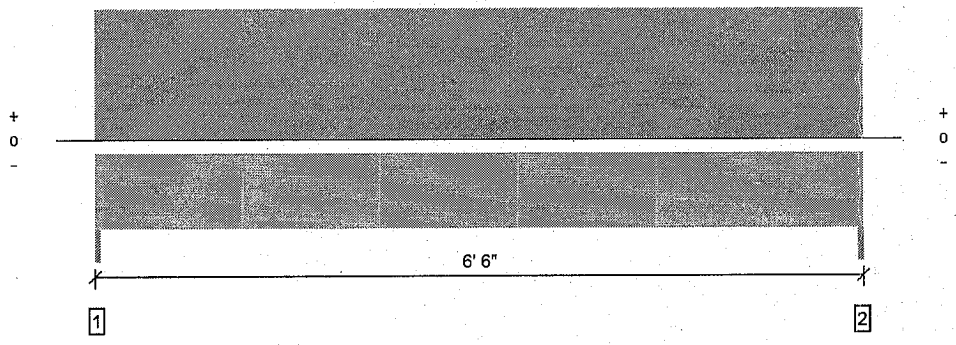
FORTE® MEMBER REPORT *Level, Wall: Header - H1*

PASSED

5

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

Overall Length: 6' 6"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2190 @ 0	3806 (1.50")	Passed (58%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1699 @ 8 3/4"	5544	Passed (31%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3559 @ 3' 3"	8182	Passed (43%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.079 @ 3' 3"	0.217	Passed (L/984)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.138 @ 3' 3"	0.313	Passed (L/566)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (5/16").
- Top Edge Bracing (Lu): Top compression edge must be braced at 6' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 6' 6" o/c unless detailed otherwise.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	931	1259	2190	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	931	1259	2190	None

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 6"	N/A	7.4		
1 - Uniform (PSF)	0 to 6' 6"	15' 6"	18.0	25.0	Roof snow load

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

Forte Software Operator	Job Notes
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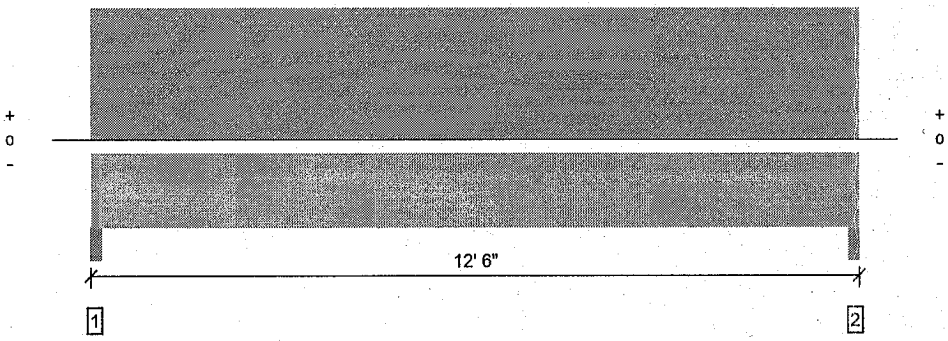
MEMBER REPORT *Level, Wall: Header - H3*

1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam

PASSED

7

Overall Length: 12' 6"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4266 @ 1 1/2"	10725 (3.00")	Passed (40%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3413 @ 1' 3"	13409	Passed (25%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	12803 @ 6' 3"	30360	Passed (42%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.138 @ 6' 3"	0.408	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.243 @ 6' 3"	0.613	Passed (L/606)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 12' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' 6" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 12' 3".
- 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	Total	
1 - Trimmer - SPF	3.00"	3.00"	1.50"	1844	2422	4266	None
2 - Trimmer - SPF	3.00"	3.00"	1.50"	1844	2422	4266	None

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 12' 6"	N/A	16.0		
1 - Uniform (PSF)	0 to 12' 6"	15' 6"	18.0	25.0	Roof snow load

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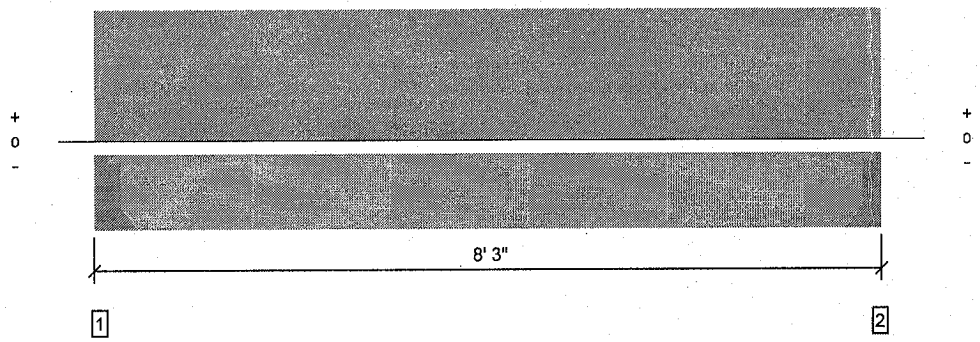
FORTE® **MEMBER REPORT** *Level, Floor: Joist - FJ1*

1 piece(s) 2 x 8 Douglas Fir-Larch No. 2 @ 16" OC

PASSED

Overall Length: 8' 3"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	272 @ 3 1/2"	1406 (1.50")	Passed (19%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	230 @ 10 3/4"	1305	Passed (18%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	532 @ 4' 2 1/2"	1360	Passed (39%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.059 @ 4' 2 1/2"	0.261	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.077 @ 4' 2 1/2"	0.392	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	N/A	N/A	--	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 7' 10" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 7' 10" o/c unless detailed otherwise.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 7 1/4" SPF beam	3.50"	Hanger[1]	1.50"	67	224	291	See note [1]
2 - Hanger on 7 1/4" SPF beam	1.50"	Hanger[1]	1.50"	65	216	281	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.

Connector: Simpson Strong-Tie Connectors						
Support	Model	Seat Length	Top Nails	Face Nails	Member Nails	Accessories
1 - Face Mount Hanger	LU26	1.50"	N/A	6-10d	4-10dx1.5	None
2 - Face Mount Hanger	LU26	1.50"	N/A	6-10d	4-10dx1.5	None

Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 8' 3"	16"	12.0	40.0	Residential - Living Areas

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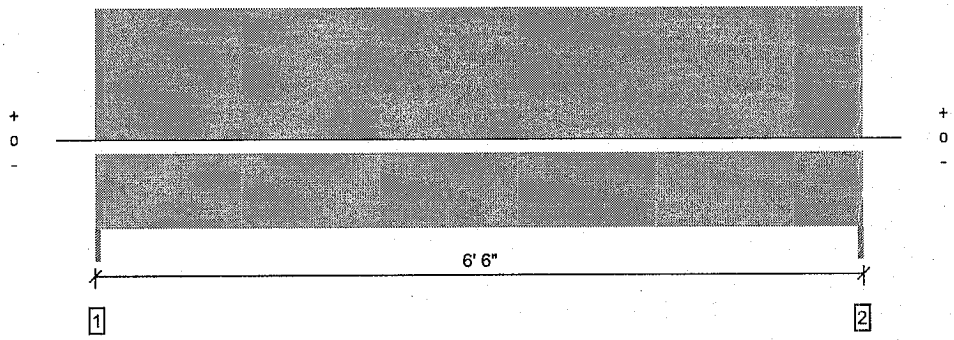
FORTE® **MEMBER REPORT** *Level, Wall: Header - H2*

PASSED

6

1 piece(s) 4 x 8 Douglas Fir-Larch No. 2

Overall Length: 6' 6"



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Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	775 @ 0	3281 (1.50")	Passed (24%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	601 @ 8 3/4"	3502	Passed (17%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1259 @ 3' 3"	3438	Passed (37%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.023 @ 3' 3"	0.217	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.054 @ 3' 3"	0.313	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (5/16").
- Top Edge Bracing (Lu): Top compression edge must be braced at 6' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 6' 6" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - SPF	1.50"	1.50"	1.50"	450	325	775	None
2 - Trimmer - SPF	1.50"	1.50"	1.50"	450	325	775	None

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 6"	N/A	6.4		
1 - Uniform (PSF)	0 to 6' 6"	4'	18.0	25.0	Roof snow load
2 - Uniform (PSF)	0 to 6' 6"	5'	12.0	-	Wall load

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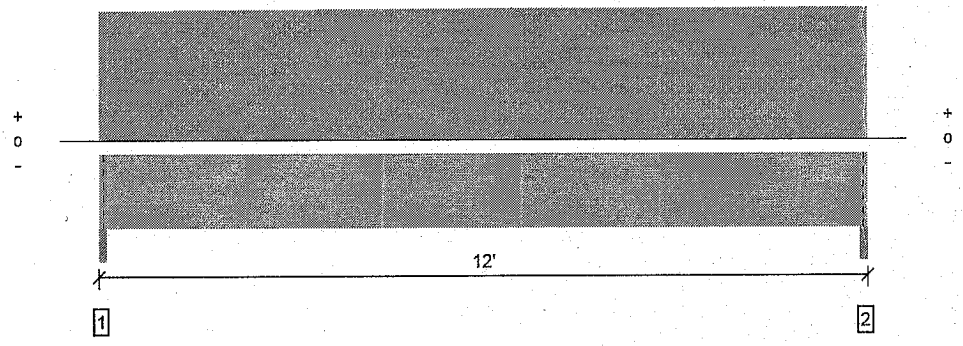
FORTE® **MEMBER REPORT** *Level, Floor: Flush Beam - FB1*

PASSED

9

1 piece(s) 5 1/2" x 10 1/2" 24F-V4 DF Glulam

Overall Length: 12'



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)	2747 @ 11' 11 1/2"	7150 (2.00")	Passed (38%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	2267 @ 10' 11 1/2"	11733	Passed (19%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Pos Moment (Ft-lbs)	8097 @ 6' 1/8"	23244	Passed (35%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.092 @ 6'	0.397	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.217 @ 6'	0.596	Passed (L/660)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 12' o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 11' 11".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Column - SPF	2.00"	2.00"	1.50"	1572	639	901	3112	Blocking
2 - Column - SPF	2.00"	2.00"	1.50"	1584	801	749	3134	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 12'	N/A	14.0			
1 - Tapered (PSF)	0 to 12' (Front)	2' to 4'	12.0	40.0	-	Residential - Living Areas
2 - Tapered (PSF)	0 to 12' (Top)	8' to 11'	12.0	-	-	Wall load
3 - Tapered (PSF)	0 to 12' (Top)	7' to 4'	18.0	-	25.0	Roof snow load

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SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
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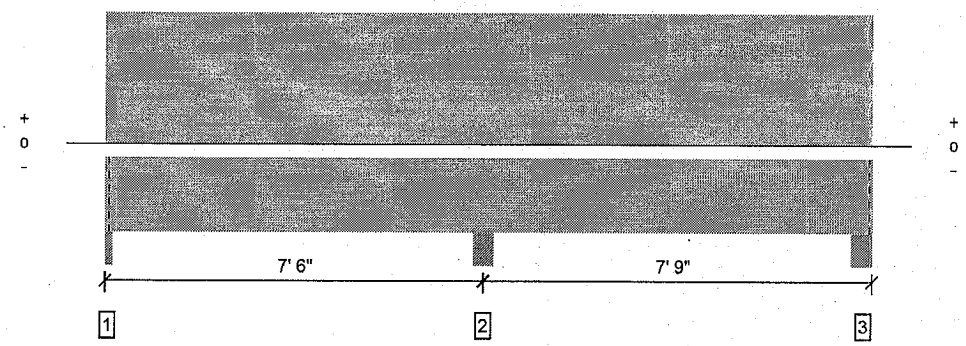
FORTE® **MEMBER REPORT** *Level, Floor: Flush Beam - FB1a* **PASSED**

1 piece(s) 5 1/2" x 10 1/2" 24F-V4 DF Glulam

10

Overall Length: 15' 3"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4398 @ 7' 6"	19663 (5.50")	Passed (22%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1556 @ 6' 4 3/4"	10203	Passed (15%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	1932 @ 3' 1/8"	20213	Passed (10%)	1.00	1.0 D + 1.0 L (Alt Spans)
Neg Moment (Ft-lbs)	-3029 @ 7' 6"	15580	Passed (19%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.009 @ 3' 6 7/16"	0.249	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.018 @ 3' 4 1/2"	0.373	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 15' 3" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 15' 3" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 5' 11 1/4".
- Critical negative moment adjusted by a volume factor of 1.00 that was calculated using length L = 3' 8 5/8".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Column - SPF	2.00"	2.00"	1.50"	791	529/-74	307	1627/-74	Blocking
2 - Column - SPF	5.50"	5.50"	1.50"	2585	1488	930	5003	None
3 - Column - SPF	5.50"	5.50"	1.50"	865	573/-75	334	1772/-75	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 15' 3"	N/A	14.0			
1 - Uniform (PSF)	0 to 15' 3" (Front)	4'	12.0	40.0	-	Residential - Living Areas
2 - Uniform (PSF)	0 to 15' 3" (Top)	12'	12.0	-	-	Wall load
3 - Uniform (PSF)	0 to 15' 3" (Top)	4'	18.0	-	25.0	Roof snow load

Weyerhaeuser Notes

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

SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
Larry Johnson Johnson Structural Engineering (406) 585-2939 larry@johnsonengineer.com	

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Forte v5.4, Design Engine: V7.1.1.3
Banbury Framing.4te

Johnson Structural Engineering, Inc.
440 North Grand Ave.
Bozeman, MT 59715

PROJECT: **Banbury - SFR Addition** JN 19-446
Mercer Island, WA

FOOTING DESIGN F2.0

ITEM	VALUE		NOTES	FB1a Column			
Soils Bearing Capacity		1500	psf	Post Area Req'd,	Full	@ .73*	
Uplift, U =		0	lbs	DF2 Beam	7.58	10.39	in^2
Footing Load	P =	4739	lbs	HF2 Beam	11.70	16.03	in^2
Footing Depth	D =	8	in	Post =	**6**	X	**6**
Post Dimensions	b=	5.50	in	Area Provided =		**30.25**	in^2
	w=	5.50	in	Contact Pressure		157	psi
Approximate Bearing	B =	1480	psf	(Footing wt removed)			
Estimated Area	A =	3.20	sf	(P / B)			
Estimated base	Be =	1.79	Ft	(Sq. Root of A)			
Trial Footing Base	b =	2.00	Ft				
Footing Weight =		387	lbs	UPLIFT OKAY			
Total Load	Pt =	5.14	Kips	(P + Conc. Wt.)			
Allowable Bearing =		**1.50**	ksf				
Actual bearing	q =	1.28	ksf	**OKAY** (Pt / b^2)			
Bending Moment	M =	0.36	K-ft	(q *(b- 0.5)^2 /8)			
Embedment Depth	d =	5	in	(D - 3")			
Min Stl Area	Amin =	0.05	in^2/ft	(M*12/(Fb*0.875*d))			
Reinforcing Bar Size (#) =		**4**					
USE 2'-0" x 2'-0" x 8" w /		**2**	- # 4's E.W.				

Johnson Structural Engineering, Inc.
440 North Grand Ave.
Bozeman, MT 59715

PROJECT: **Banbury - SFR Addition** JN 19-446
Mercer Island, WA

FOOTING DESIGN F2.0

ITEM	VALUE	NOTES	FB1a Column		
Soils Bearing Capacity	1500 psf	Post Area Req'd,	Full	@ .73*	
Uplift, U =	0 lbs	DF2 Beam	8.00	10.97	in^2
Footing Load P =	5003 lbs	HF2 Beam	12.35	16.92	in^2
Footing Depth D =	8 in	Post =	6	X	6
Post Dimensions b=	5.50 in	Area Provided =		**30.25**	in^2
w=	5.50 in	Contact Pressure		165	psi
Approximate Bearing B =	1480 psf	(Footing wt removed)			
Estimated Area A =	3.38 sf	(P / B)			
Estimated base Be =	1.84 Ft	(Sq. Root of A)			
Trial Footing Base b =	2.00 Ft				
Footing Weight =	387 lbs	UPLIFT OKAY			
Total Load Pt =	5.40 Kips	(P + Conc. Wt.)			
Allowable Bearing =	**1.50** ksf				
Actual bearing q =	1.35 ksf	**OKAY** (Pt / b^2)			
Bending Moment M =	0.38 K-ft	(q *(b- 0.5)^2 /8)			
Embedment Depth d =	5 in	(D - 3")			
Min Stl Area Amin =	0.05 in^2/ft	(M*12/(Fb*0.875*d))			
Reinforcing Bar Size (#) =	**4**				
USE 2'-0" x 2'-0" x 8" w /	**2**	- # 4's E.W.			

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Project: Banbury - SFR Addition
Job No.: 19-946
Date: 2-5-19
Sheet No.: 13

6. East Floor beam - FB2

span = 4'
floor trib = 1'
wall height = 8'
roof trib = 15.5'

Use 4x10 P&T ←

FB1 R_{TL} = 3134#
FB2 R_{TL} = 1748#
4882#
Use 2'x2'x8" ftg

7. West Floor beam - FB3

span = 8'
floor trib = 1'
deck trib. = 16/2 = 8'
wall ht = 8'
roof trib = 15.5'

Use 5½" x 10½" 24F-V4 GLB ←

FB3 R_{TL} = 5727#
FB1a R_{TL} = 1772#
7499#
Use 2'-6"x2'-6"x 8" ftg

8. Deck floor joist - FJ2

span = 16' 14'

Use 2x10 HF #1 P.T @ 16" O.C. ←

9. Deck floor beam West - FB4

span: 8.5'
floor trib = 7'

LLRed = .08(13x14-150) =

Use 6x10 PT- HF #2 ←

FB4a
span = 13'-6"
floor trib = 8'/2 = 4'
Use 6x10 P.T. HF #2

10. Spiral Stairway

$\pi\left(\frac{6.5^2}{4}\right) \times 1.5 \times (40+20) = 1990\# \rightarrow 3000\#$ TL

FB4b
span = 15'
floor trib. = 4' to 2' 6" x 6'
floor trib = 2' 6" x 15'
Use 6x10 P.T. HF #2

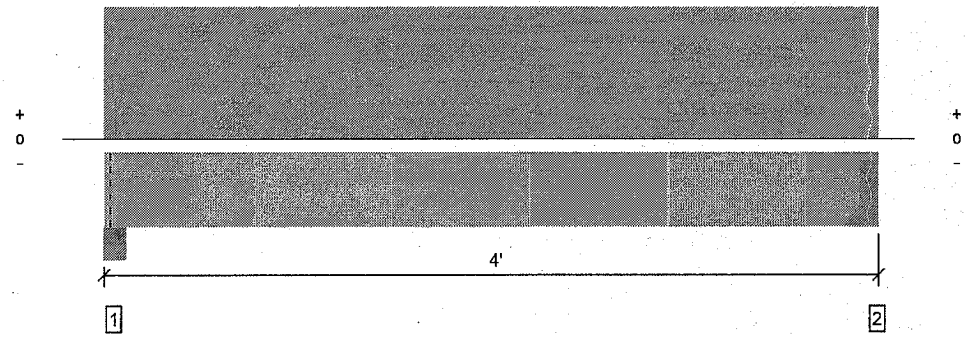
-234

FORTE® **MEMBER REPORT** *Level, Floor: Flush Beam - FB2*

PASSED

1 piece(s) 4 x 10 Hem-Fir No. 2

Overall Length: 4'



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1370 @ 3' 10 1/2"	2126 (1.50")	Passed (64%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	766 @ 3' 1 1/4"	3723	Passed (21%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1199 @ 2' 1 1/2"	4879	Passed (25%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.004 @ 2' 1 1/2"	0.117	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.009 @ 2' 1 1/2"	0.175	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 3' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 3' 11" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Column - SPF	6.00"	6.00"	1.50"	840	85	823	1748	Blocking
2 - Hanger on 9 1/4" SPF beam	1.50"	Hanger[1]	1.50"	740	75	727	1542	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.

Connector: Simpson Strong-Tie Connectors						
Support	Model	Seat Length	Top Nails	Face Nails	Member Nails	Accessories
2 - Face Mount Hanger	LUS410	2.00"	N/A	8-16d	6-16d	None

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 10 1/2"	N/A	8.2			
1 - Uniform (PSF)	0 to 4' (Front)	1'	12.0	40.0	-	Residential - Living Areas
2 - Uniform (PSF)	0 to 4' (Top)	8'	12.0	-	-	Wall load
3 - Uniform (PSF)	0 to 4' (Top)	15' 6"	18.0	-	25.0	Roof snow load

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SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
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2/5/2019 3:44:37 PM
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Banbury Framing.4te

Johnson Structural Engineering, Inc.
440 North Grand Ave.
Bozeman, MT 59715

PROJECT: **Banbury - SFR Addition** JN 19-446
Mercer Island, WA

FOOTING DESIGN F2.0

ITEM	VALUE		NOTES	FB2 Column			
Soils Bearing Capacity		1500	psf	Post Area Req'd,	Full	@ .73*	
Uplift, U =		0	lbs	DF2 Beam	7.81	10.70	in^2
Footing Load P =		4882	lbs	HF2 Beam	12.05	16.51	in^2
Footing Depth D =		8	in	Post =	**6**	X	**6**
Post Dimensions	b=	5.50	in	Area Provided =		**30.25**	in^2
	w=	5.50	in	Contact Pressure		161	psi
Approximate Bearing B =		1480	psf	(Footing wt removed)			
Estimated Area A =		3.30	sf	(P / B)			
Estimated base Be =		1.82	Ft	(Sq. Root of A)			
Trial Footing Base b =		2.00	Ft				
Footing Weight =		387	lbs	UPLIFT OKAY			
Total Load Pt =		5.28	Kips	(P + Conc. Wt.)			
Allowable Bearing =		**1.50**	ksf				
Actual bearing q =		1.32	ksf	**OKAY** (Pt / b^2)			
Bending Moment M =		0.37	K-ft	(q *(b- 0.5)^2 /8)			
Embedment Depth d =		5	in	(D - 3")			
Min Stl Area Amin =		0.05	in^2/ft	(M*12/(Fb*0.875*d))			
Reinforcing Bar Size (#) =		**4**					
USE 2'-0" x 2'-0" x 8" w /		**2**	- # 4's E.W.				

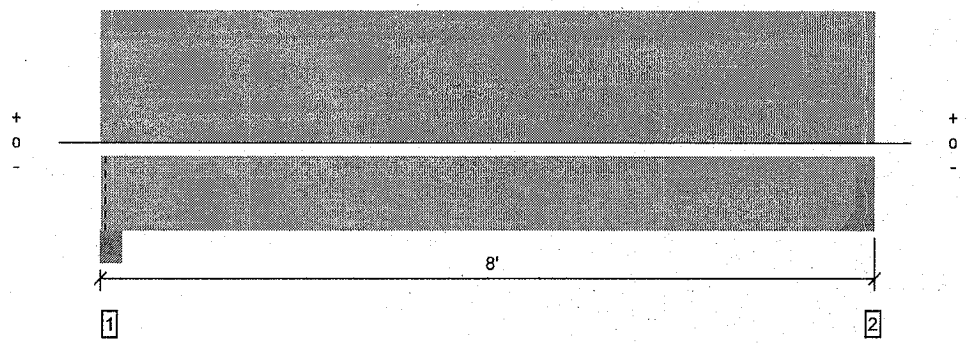
FORTE® MEMBER REPORT *Level, Floor: Flush Beam - FB3*

PASSED

16

1 piece(s) 5 1/2" x 10 1/2" 24F-V4 DF Glulam

Overall Length: 8'



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)	4356 @ 7' 10 1/2"	5363 (1.50")	Passed (81%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	3340 @ 7'	11733	Passed (28%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Pos Moment (Ft-lbs)	8168 @ 4' 1 1/2"	23244	Passed (35%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.051 @ 4' 1 1/2"	0.250	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.087 @ 4' 1 1/2"	0.375	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 7' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 7' 11" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 7' 6".
- 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)				
	Total	Available	Required	Dead	Floor Live	Snow	Total	Accessories
1 - Column - SPF	6.00"	6.00"	1.50"	1984	2145	1598	5727	Blocking
2 - Hanger on 10 1/2" SPF beam	1.50"	Hanger[1]	1.50"	1862	2015	1502	5379	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.

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 7' 10 1/2"	N/A	14.0			
1 - Uniform (PSF)	0 to 8' (Front)	1'	12.0	40.0	-	Residential - Living Areas
2 - Uniform (PSF)	0 to 8' (Top)	8'	12.0	-	-	Wall load
3 - Uniform (PSF)	0 to 8' (Top)	15' 6"	18.0	-	25.0	Roof snow load
4 - Uniform (PSF)	0 to 8' (Back)	8'	10.0	60.0	-	Deck floor load

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SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
Larry Johnson Johnson Structural Engineering (406) 585-2939 larry@johnsonengineer.com	

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Forte v5.4, Design Engine: V7.1.1.3
Banbury Framing.4te

Johnson Structural Engineering, Inc.
440 North Grand Ave.
Bozeman, MT 59715

PROJECT: **Banbury - SFR Addition** JN 19-446
Mercer Island, WA

FOOTING DESIGN F2.5

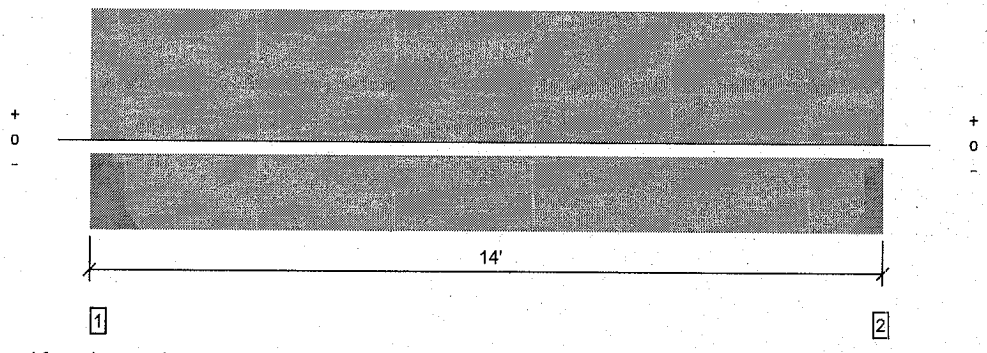
ITEM	VALUE		NOTES	FB1a end + FB3 Column			
Soils Bearing Capacity		1500	psf	Post Area Req'd,	Full	@ .73*	
Uplift, U =		0	lbs	DF2 Beam	12.00	16.44	in^2
Footing Load	P =	7499	lbs	HF2 Beam	18.52	25.36	in^2
Footing Depth	D =	8	in	Post =	**6**	X	**6**
Post Dimensions	b=	5.50	in	Area Provided =		**30.25**	in^2
	w=	5.50	in	Contact Pressure		248	psi
Approximate Bearing	B =	1480	psf	(Footing wt removed)			
Estimated Area	A =	5.07	sf				
Estimated base	Be =	2.25	Ft				
Trial Footing base	=	2.50	Ft				
Footing Weight =		604	lbs	UPLIFT OKAY			
Total Load	Pt =	8.12	Kips				
Allowable Bearing =		**1.50**	ksf				
Actual bearing	q =	1.30	ksf	**OKAY**			
Bending Moment	M =	0.65	K-ft				
Embedment Depth	d =	5	in				
Min Stl Area	Amin =	0.09	in^2/ft				
Reinforcing Bar Size (#) =		**4**					
USE 2'-6" x 2'-6" x 8" w /		**3**	- # 4's E.W.				

FORTE® **MEMBER REPORT** *Level, Floor: Joist - FJ2* **PASSED**

1 piece(s) 2 x 10 Hem-Fir No. 1 @ 16" OC

18

Overall Length: 14'



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)	626 @ 5 1/2"	911 (1.50")	Passed (69%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	554 @ 1' 2 3/4"	1388	Passed (40%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2100 @ 7' 2"	2199	Passed (96%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.393 @ 7' 2"	0.447	Passed (L/410)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.459 @ 7' 2"	0.671	Passed (L/351)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	N/A	N/A	--	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 2' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 13' 5" o/c unless detailed otherwise.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 9 1/4" SPF beam	5.50"	Hanger[1]	1.50"	96	573	669	See note [1]
2 - Hanger on 9 1/4" SPF beam	1.50"	Hanger[1]	1.50"	91	547	638	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.

Connector: Simpson Strong-Tie Connectors						
Support	Model	Seat Length	Top Nails	Face Nails	Member Nails	Accessories
1 - Face Mount Hanger	LU28	1.50"	N/A	8-10d	6-10dx1.5	None
2 - Face Mount Hanger	LU28	1.50"	N/A	8-10d	6-10dx1.5	None

Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 14'	16"	10.0	60.0	Deck floor load

Weyerhaeuser Notes

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

SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
Larry Johnson Johnson Structural Engineering (406) 585-2939 larry@johnsonengineer.com	

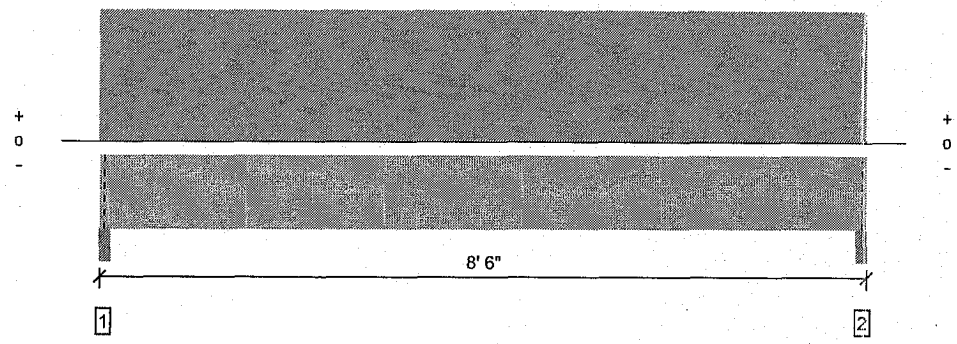
2/8/2019 9:25:32 AM
Forte v5.4, Design Engine: V7.1.1.3
Banbury Framing.4te

FORTE® MEMBER REPORT *Level, Floor: Flush Beam - FB4* **PASSED**

1 piece(s) 6 x 10 Hem-Fir No. 2

19

Overall Length: 8' 6"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2139 @ 1 1/2"	6683 (3.00")	Passed (32%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1615 @ 1' 1/2"	4877	Passed (33%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	4281 @ 4' 3"	4654	Passed (92%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.101 @ 4' 3"	0.275	Passed (L/978)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.121 @ 4' 3"	0.412	Passed (L/816)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 8' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 8' 6" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - SPF	3.00"	3.00"	1.50"	354	1785	2139	Blocking
2 - Beam - SPF	3.00"	3.00"	1.50"	354	1785	2139	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 8' 6"	N/A	13.2		
1 - Uniform (PSF)	0 to 8' 6" (Back)	7'	10.0	60.0	Deck floor load

Weyerhaeuser Notes

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

SUSTAINABLE FORESTRY INITIATIVE

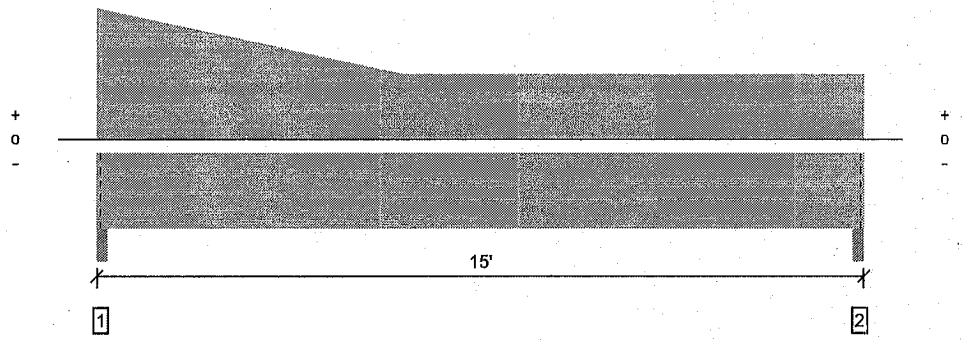
Forte Software Operator	Job Notes
Larry Johnson Johnson Structural Engineering (406) 585-2939 larry@johnsonengineer.com	

2/8/2019 9:10:08 AM
Forte v5.4, Design Engine: V7.1.1.3
Banbury Framing.4te

FORTE® **MEMBER REPORT** *Level, Floor: Flush Beam - FB4a* **PASSED**

1 piece(s) 6 x 10 Hem-Fir No. 2

Overall Length: 15'



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)	1516 @ 1 1/2"	6683 (3.00")	Passed (23%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1223 @ 1' 1/2"	4877	Passed (25%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	4571 @ 7' 1 13/16"	4654	Passed (98%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.330 @ 7' 4 7/8"	0.492	Passed (L/536)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.418 @ 7' 4 15/16"	0.738	Passed (L/424)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 15' o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 15' o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - SPF	3.00"	3.00"	1.50"	302	1214	1516	Blocking
2 - Beam - SPF	3.00"	3.00"	1.50"	257	946	1203	Blocking

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

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 15'	N/A	13.2		
1 - Tapered (PSF)	0 to 6' (Back)	4' to 2'	10.0	60.0	Deck floor load
2 - Tapered (PSF)	6' to 15' (Back)	2'	10.0	60.0	Deck floor load

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SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
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2/7/2019 3:46:05 PM
Forte v5.4, Design Engine: V7.1.1.3
Banbury Framing.4te

FORTE® **MEMBER REPORT** *Level, Floor: Flush Beam - FB4b*

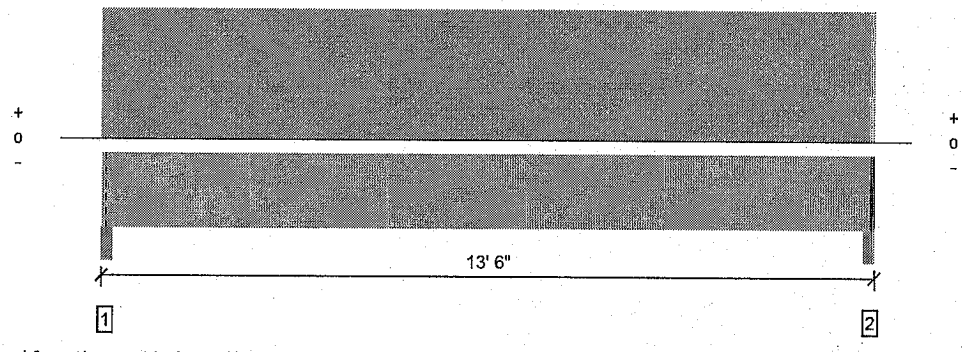
PASSED

21

(no p. 22)

1 piece(s) 6 x 10 Hem-Fir No. 1

Overall Length: 13' 6"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1949 @ 13' 4 1/2"	3898 (1.75")	Passed (50%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1674 @ 1' 1/2"	4877	Passed (34%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	6435 @ 6' 9"	7239	Passed (89%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.362 @ 6' 9"	0.442	Passed (L/439)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.442 @ 6' 9"	0.663	Passed (L/359)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 13' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 13' 5" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - SPF	3.00"	3.00"	1.50"	359	1620	1979	Blocking
2 - Beam - SPF	3.00"	1.75"	1.50"	358	1620	1978	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.

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 13' 4 3/4"	N/A	13.2		
1 - Uniform (PSF)	0 to 13' 6" (Top)	4'	10.0	60.0	Deck floor load

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

SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
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2/7/2019 3:48:02 PM
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Banbury Framing.4te

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Project: Banburg - SFR Addition
Job No.: 19-496
Date: 2-5-19
Sheet No.: 23

B. Lateral Design

Wind - Per ASCE Chapter 28.5

Step 1: Risk Group 2, Step 2: V = 110 mph Step 3: Exp B, K_{zt} = 1.0

Step 4: $P_A = 25.4^{psf}$, $P_B = -4.0$, $P_C = 17.5^{psf}$, $P_D = 0$ → min 8.0 psf

Step 5: $\lambda = 1.0$

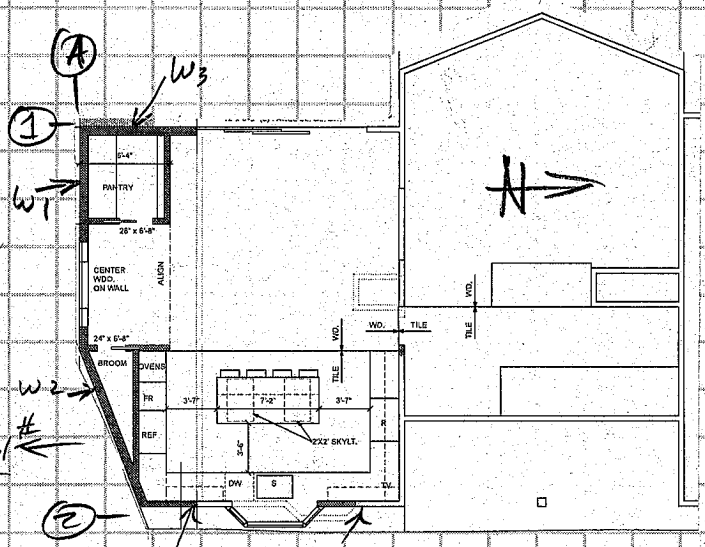
Step 6: $P_A = 25.4^{psf}$, $P_B = 8.0$, $P_C = 17.5^{psf}$, $P_D = 8.0$, $2a = 2(2.7) = 5.4'$

- E/W Wind

V_A main level

$V_A = 25.4^{psf}(5.5' \times 3.75') + 17.5(5.5 \times 3.75') + 8.0(12.5 \times 6.5) = 1,535^{\#}$

V_A (ASD level) = .6(1535#) = 921#



V_A Lower = 25.4(5.5 × 5') + 17.5(5.5 × 5')

= 1180# + 921#

V_A base = 2101#

V_A ASD base = .6(2101#) = 1,261# ←

- N/S Wind main level

$V_1 = 25.4(5.5 \times \frac{4.5+7}{2}) + 17.5(8 \times \frac{7+10}{2}) =$

= 1,993# → ASD level = .6(1993#) = 1,196#

V_2 = 1,993# → ASD level = .6(1993#) = 1,196#

2,392# ←

- Seismic

$V_{seismic\ base\ of\ Addition}$ = 1759# → ASD level = .7(1,759#) = 1,231#

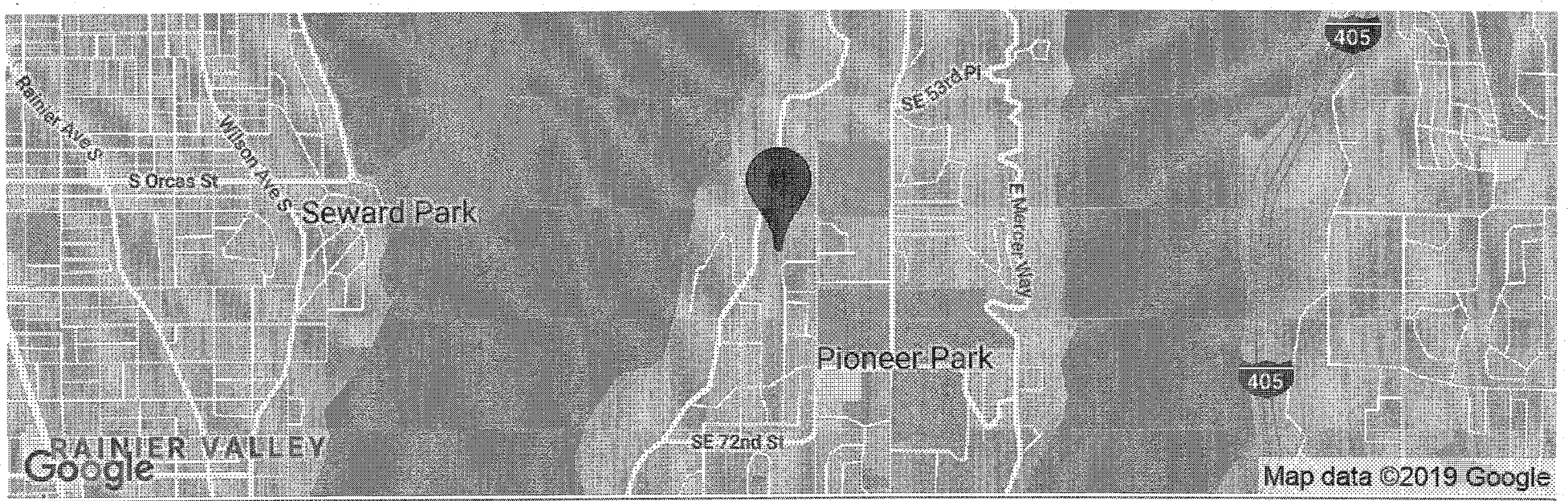
Wind Controls N/S & E/W

OSHPD

Banbury - SFR Addition

8275 SE 61st St, Mercer Island, WA 98040, USA

Latitude, Longitude: 47.5476169, -122.22968839999999



Date	2/5/2019, 4:52:21 PM
Design Code Reference Document	ASCE7-10
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.46	MCE_R ground motion. (for 0.2 second period)
S_1	0.56	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.46	Site-modified spectral acceleration value
S_{M1}	0.84	Site-modified spectral acceleration value
S_{DS}	0.973	Numeric seismic design value at 0.2 second SA
S_{D1}	0.56	Numeric seismic design value at 1.0 second SA

Type	Value	Description

2/5/2019 | Johnson Structural Engineering, Inc. Bozeman, MT 59715 | SHEET

PROJECT: **Banbury - SFR Addition** | JN 19-446
LOCATION: Bozeman, MT

SEISMIC LOADING CALCULATIONS PER ASCE 7-10

STRUC CATEGORY = II TABLE 1.5-1 IMPORTANCE, I = **1.00** TABLE 1.5-2

DETERMINE FREQUENCY OF STRUCTURE

SOIL PROFILE **D** 'D' IF UNKNOWN

Ss	**1.460**	Fa	1.000
S1	**0.560**	Fv	1.500

FROM USGS HAZARDS, ZIPCODE DIRECTORY

Sms = Fa*Ss = **1.460**
Sm1 = Fv*S1 = **0.840**

Sds = 2/3 Sms = 0.973 g
Sd1 = 2/3 Sm1 = 0.560 g

SEISMIC DESIGN CATEGORY
PER SHORT PERIOD RESPONSE **D** TABLE 9.4.2.1a
PER 1-SEC PERIOD RESPONSE **D**

USE MAXIMUM SEISMIC DESIGN CATEGORY **D**

RESPONSE SPECTRUM
To = .2Sd1 / Sds = 0.115
Ts = Sd1 / Sds = 0.575

APPROXIMATE PERIOD
Ta = Ct*hn^x 0.210 SEC EQN 9.5.5.3.2

Cu = 1.40
Ct = 0.020
x = 0.75
hn = hridge = 23.0 FT

T' I STHE UPPER LIMIT FOR THE STRUCTURE'S PERIOD
FUNDAMENTAL PERIOD
T = Cu * Ta 0.294 SEC

STRUCTURE FREQUENCY (f) IS THE INVERSE OF 'Ta'
f = 4.76 Hz **RIGID** STRUCTURE

COMMENTARY TO SECTION 6 OFFERS AN ALTERNATIVE METHOD FOR ESTIMATING IF THE STRUCTURE IS RIGID -

IF h / LEAST WIDTH, B OR L, IS < 4.0, STRUCTURE IS DEEMED RIGID C6.2

h =	23.0	FT	RIDGE
heave =	16.0	FT	EAVE
hmn =	19.5	FT	MEAN
B =	66.0	FT	WIDTH OF STRUCTURE
L =	27.0	FT	DEPTH OF STRUCTURE

PROJECT **Banbury - SFR Addition** JN 19-446
LOCATION: Bozeman, MT

SEISMIC LOADING CALCULATIONS PER ASCE 7-10

h / LEAST WIDTH = 0.85 RIGID

EQUIVALENT LATERAL FORCE PROCEDURE

V = Cs * W

Sds =	0.973	Sd1 =	0.560
I =	1.000	T =	0.210
R =	**6.5**	Wood Framed Shear Wall	

Cs = Sds / (R / I)	0.150	
Cs <= Sd1 / T (R / I)	0.410	USE MIN 0.150
Cs > 0.044 Sds I	0.043	USE MAX
Cs > 0.5 S1 / (R / I)	0.043	
Cs =	**0.150**	

DETERMINE WEIGHT OF STRUCTURE

	PSF	HEIGHT	LENGTH	AREA	WEIGHT		
Upper Roofing @	15			343	5145		5145
2nd Level Ext Walls @	12	8	45	360	4320		2160
2nd Level Int Walls @	10	0	0	0	0		0
Lower Roofing @	15				0		0
2nd Level Floor @	12			190	2280		2280
			TOTAL WEIGHT		**11745**	LBS	

RECALL, V = Cs * W

Base shear, V = **1759** Lbs

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Project: Bamberg - SFR Addition
Job No.: 19-446
Date: 2-5-19
Sheet No.: 27

Panel Design

E/W Wind

main level

(A) $f_{w1,w2} = \frac{921^{\#}}{8' + 12'} = 46^{\#/'} < 255^{\#/'}$ (S1) 7/16" OSB/CDX w/ 8d @ 6" O.C.

N/S Wind

(1) $f_{w3} = \frac{1196^{\#}}{8'} = 150^{\#/'} < 255^{\#/'}$ (S1)

(2) $f_{w4,w5} = \frac{1196^{\#}}{7 + 5.5} = 96^{\#/'} < 255^{\#/'}$ (S1)

Strap Design

(A) $T_{w1,w2} = [46^{\#/'}(8')(8) - .6(18(4) + 12(8))]\frac{8^2}{2}\frac{1}{8} = -35^{\#}$ No Strap Req'd

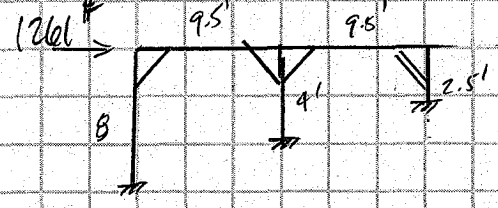
(1) $T_{w3} = [1196^{\#}(7.75) - .6(18(15.5) + 12(8))]\frac{8^2}{2}\frac{1}{8} = 258^{\#}$ — disregard, no strap req'

(2) $T_{w4,w5} = [96^{\#/'}(7)(7.75) - .6(18(15.5) + 12(8))]\frac{7^2}{2}\frac{1}{7} = -43^{\#}$ No strap req'd

Lower Level Knee Brace Design

$V_{A\ base} = 1261^{\#}$

$\Delta_{w1} = .03"$

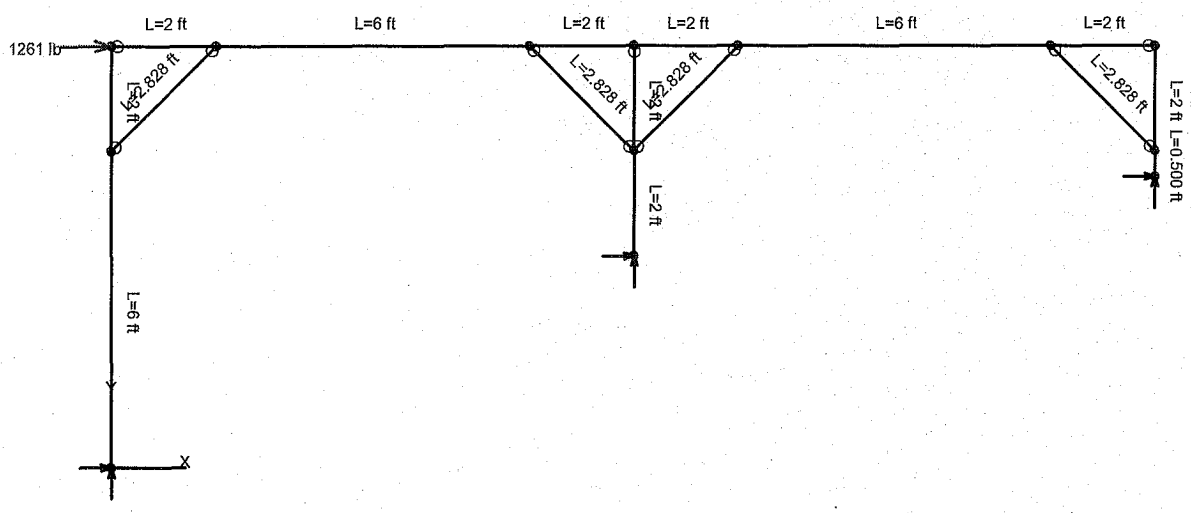


Max. Knee brace force = $1731^{\#}$ Comp.

$Z_{\perp}$ (5/8" ϕ SS Lag) = $610^{\#}(1.6) = 976^{\#} \times 2$ Lags $= 1952^{\#} > 1731$

Use (2) 5/8" ϕ Lag Screw each end

28


1261 lb
L=2 ft
L=6 ft
L=2 ft
L=2 ft
L=6 ft
L=2 ft
L=2.828 ft
L=2.828 ft
L=2.828 ft
L=2.828 ft
L=2 ft
L=2 ft L=0.500 ft
L=6 ft
X

Axial Force, Fx

All Members:
Max = 853 lb (M11)
Min = -1731 lb (M16)