



12810 NE 178TH ST STE 218  
WOODINVILLE, WA 98072 ▲ (425) 481-6601

PROJECT: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

JOB#: 9107  
BY: EIKR  
DATE: 12/10/19 1 of 24

Job Name: Xu Remodel

Site Address: 5850 W. Mercer Way  
Mercer Island , WA 90840

Jurisdiction: City of Mercer Island

Plans By: air.mod architecture  
Plan Number/Job ID: 9107

Design Specifications: 2015 IBC

Building Type: Low-Rise, Simple Diaphragm

Importance Factor: 1.00

Basic Wind Velocity: 110 mph (ASCE 7-10 Fig 26-1A )

Wind Exposure: B (Strength Design Value)

Roof Snow Load: 25 psf Kzt=1.6

Occupancy Category: II

R: 6.5

% of Snow Incl. w/ Seismic: 0

Soil Site Class: D

Allowable Soil Bearing: 1500 psf

Analysis Procedure: Wind: ASCE 7-10 Envelope Procedure

Seismic: ASCE 7-10 Equiv.Lateral Force Procedure

Spectral Response Accelerations, Ss: 146 % g S1 56 %g

Load Combinations: ASD Basic

Building Design Parameters:

Roof DL: 15 psf (Use 20 psf at

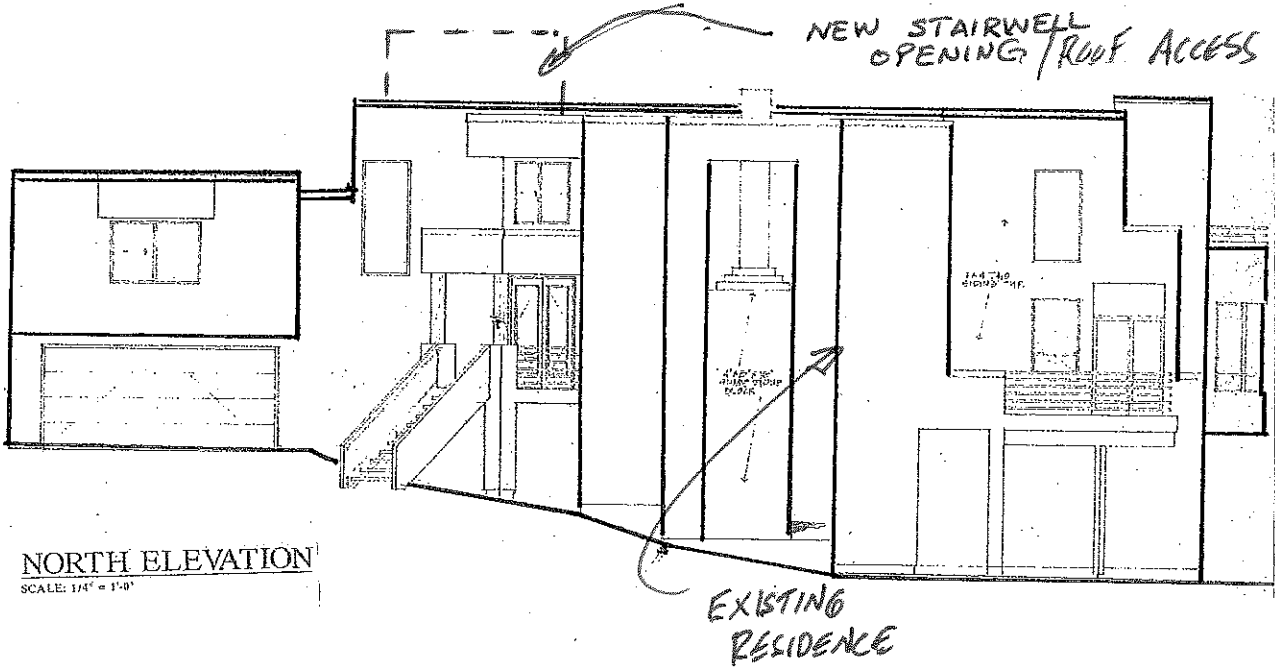
Floor DL: 12 psf rooftop deck)

Wall DL: 12 psf

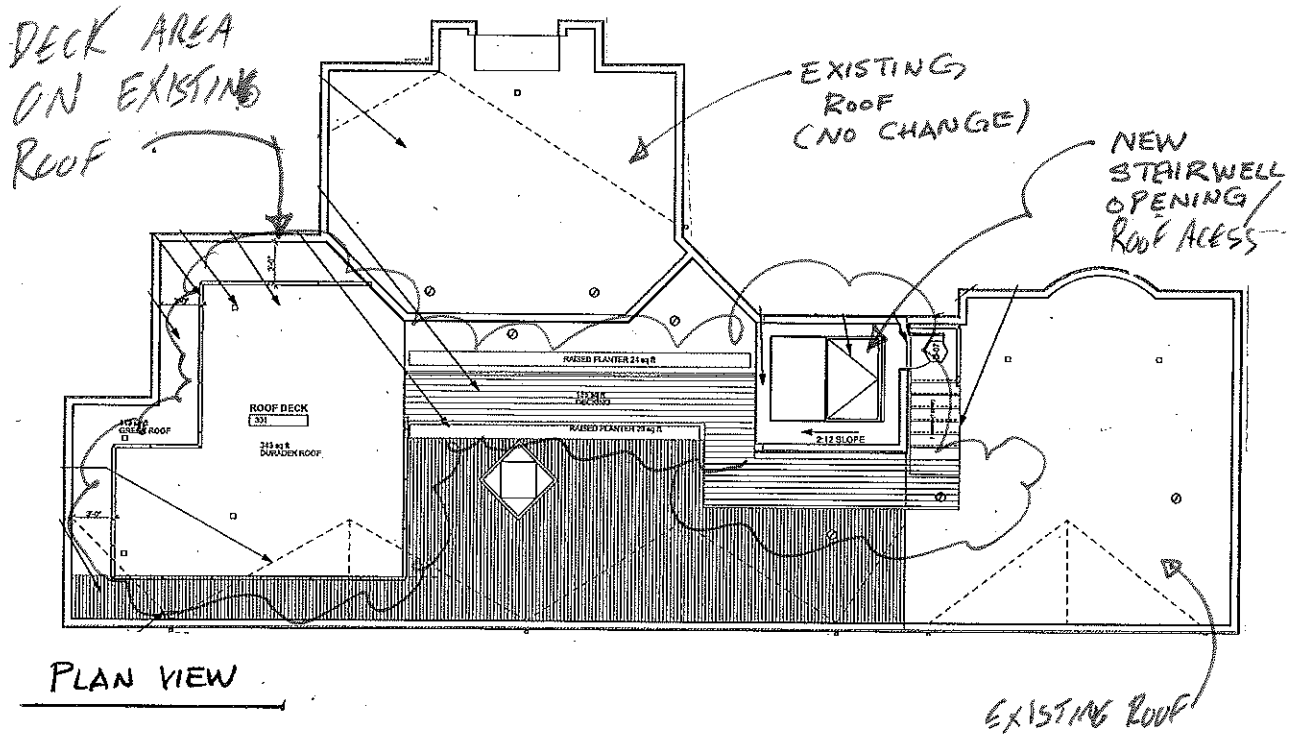


ENGINEER'S SEAL IS FOR GRAVITY LOAD  
DESIGN OF ALL NEW BEAMS, COLUMNS,  
AND FOOTINGS. DESIGN OF THE  
UNALTERED PORTION OF THE EXISTING  
BUILDING IS BY OTHERS.  
EXCEPTIONS: NONE

ELEVATION/PLAN VIEW



**NORTH ELEVATION**  
 SCALE: 1/4" = 1'-0"



**PLAN VIEW**

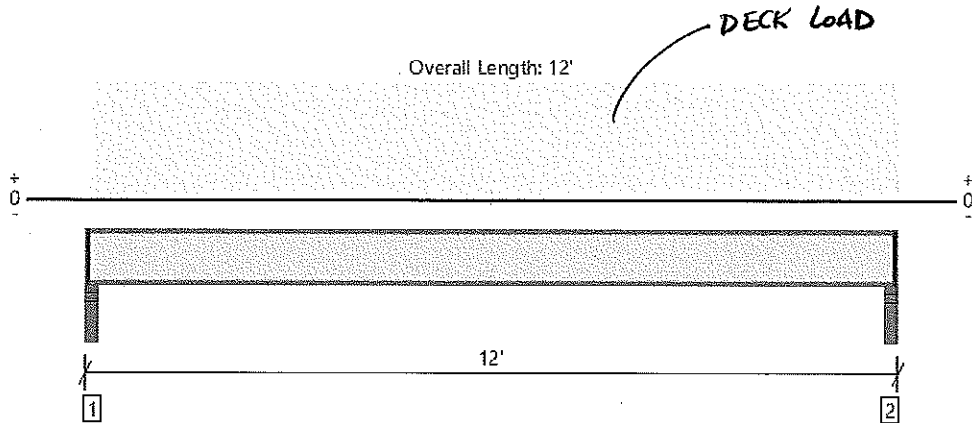


**MEMBER REPORT**

Level, Floor: Joist  
**1 piece(s) 11 7/8" TJI @ 110 @ 24" OC**

*EXISTING*

*pg 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)	943 @ 2 1/2"	1041 (2.25")	Passed (91%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	913 @ 3 1/2"	1560	Passed (59%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2683 @ 6'	3160	Passed (85%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.184 @ 6'	0.386	Passed (L/755)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.242 @ 6'	0.579	Passed (L/575)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
TJ-Pro™ Rating	50	40	Passed	--	--

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 3' 4" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 11' 10" o/c unless detailed otherwise.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

*VERIFY EXISTING TJI AT 24" O.C SUPPORTS LOAD*

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Stud wall - SPF	3.50"	2.25"	1.88"	240	720	300	1260	1 1/4" Rim Board
2 - Stud wall - SPF	3.50"	2.25"	1.88"	240	720	300	1260	1 1/4" Rim Board

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

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 12'	24"	20.0	60.0	25.0	Default Load

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

*ADDED LIVE LOAD*



ForteWEB Software Operator	Job Notes
elisee ilunga Tse Engineering (425) 481-6601 ELISEEILUNGA@GMAIL.COM	

**Header**

<u>INPUT:</u>	Uniform Loading		Span Length		
	w (DL)	w (LL)		L	
Roof (psf)	15	18.75		3	0
Tributary (ft)		6		ft	
Wall (psf)	10	0			
Tributary (ft)		0			
Deck (psf)	20	45			
Tributary (ft)	6	6			
Other (plf)	10	0			
	130	382.5	w (TL)		0
	plf	plf	512.5		0
			plf		

*DL + 0.75(SL+LL)*

RESULTS:

VI (DL)	Vr (DL)	VI (LL)	Vr (LL)	VI (TL)	Vr (TL)	M (DL)	M (LL)	M (TL)
195	195	574	574	769	769	146	430	577
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	ft.lbs.	ft.lbs.	ft.lbs.

DESIGN:

MATERIAL	Fb	Fv	Fc(perp)	E x 10 <sup>6</sup>			
Manuf.Lbr.						Cd	1.15
Timber						CH	1
Dimen. Lbr.	DFL#2	990	180	625	1.6	Cr	1
		psi	psi	psi	psi	Ci	1
b	d	A	S	I			
3	9.25	27.75	42.8	198			
in.	in.	in. <sup>2</sup>	in. <sup>3</sup>	in. <sup>4</sup>			

fv =	20 psi	Brg.Lgth.=	0.034 ft.	CL =	1.000
fb =	160 psi	GL Cv =	N/A	R =	N/A
Δ (DL) =	0.00 in.	Δ (LL) =	0.00 in.	Δ (TL) =	0.00 in.

RATIOS OF ACTUAL TO ALLOWABLE		RATIOS OF SPAN TO DEFLECTION	
fv / Fv' =	0.10	L /	16349 for LL
fb / Fb' =	0.14	L /	12202 for TL

**USE (2)2x10 DFL#2**

*EXISTING OK*

6

DL+0.75(SL+LL)

**HEADER**

<u>INPUT:</u>	Uniform Loading		Span Length		
	w (DL)	w (LL)	L		
Roof (psf)		18.75	6		0
Tributary (ft)		13.5	ft		
Wall (psf)	10	0			
Tributary (ft)	0	0			
Floor (psf)	20	45			
Tributary (ft)	13.5	13.5			
Other (plf)	10	0			
			w (TL)		0
	280	860.625	1140.625		0
	plf	plf	plf		

RESULTS:

VI (DL)	Vr (DL)	VI (LL)	Vr (LL)	VI (TL)	Vr (TL)	M (DL)	M (LL)	M (TL)
840	840	2582	2582	3422	3422	1260	3873	5133
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	ft.lbs.	ft.lbs.	ft.lbs.

DESIGN:

MATERIAL	Fb	Fv	Fc(perp)	E x 10 <sup>6</sup>			
Manuf. Lbr.							Cd 1.15
Timber	DFL#2	875	170	625	1.3		Ch 1
Dimen. Lbr.							Cr 1
		psi	psi	psi	psi		Ci 1
b	d	A	S	I			
3.5	11.25	39.38	73.8	415			
in.	in.	in. <sup>2</sup>	in. <sup>3</sup>	in. <sup>4</sup>			
fv =	90 psi	Brg. Lgth. =	0.130 ft.	CL =	1.000		
fb =	830 psi	GL Cv =	N/A	R =	N/A		
Δ (DL) =	0.02 in.	Δ (LL) =	0.05 in.	Δ (TL) =	0.06 in.		

**RATIOS OF ACTUAL TO ALLOWABLE**

fv / Fv' =	0.46
fb / Fb' =	0.82

**RATIOS OF SPAN TO DEFLECTION**

L /	1549	for LL
L /	1169	for TL

**USE 4x12 DFL#2**

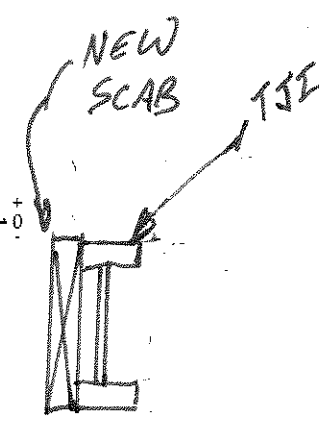
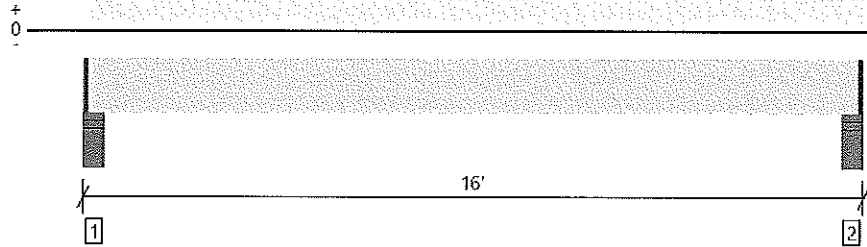
Level, Floor: Joist 7

7

1 piece(s) 2 x 12 Douglas Fir-Larch No. 2 @ 12" OC  
 ATTACHED TO EXISTING  
 RAFTER

Overall Length: 16'

NOTES: THE SCAB  
 WILL SUPPORT  
 HALF OF THE LOAD  
 OR 12" OF  
 DECK LOAD



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

Design Results	Actual @ Location	Allowed	Result	LDf	Load: Combination (Pattern)
Member Reaction (lbs)	661 @ 4 1/2"	2709 (4.25")	Passed (24%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	528 @ 1' 4 3/4"	2025	Passed (26%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2326 @ 8'	2729	Passed (85%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (In)	0.272 @ 8'	0.381	Passed (L/672)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (In)	0.358 @ 8'	0.762	Passed (L/511)	--	1.0 D + 0.75 L + 0.75 S (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/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 5' 2" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 15' 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	Snow	Total	
1 - Stud wall - SPF	5.50"	4.25"	1.50"	160	480	200	840	1 1/4" Rim Board
2 - Stud wall - SPF	5.50"	4.25"	1.50"	160	480	200	840	1 1/4" Rim Board

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

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 16'	12"	20.0	60.0	25.0	Default Load

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



ForTEWEB Software Operator	Job Notes
elisee ilunga Tse Engineering (425) 481-6601 ELISEEILUNGA@GMAIL.COM	

12/6/2019 8:23:10 PM UTC  
 ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2

File Name: Xu Remodel

Level, Floor: Joist

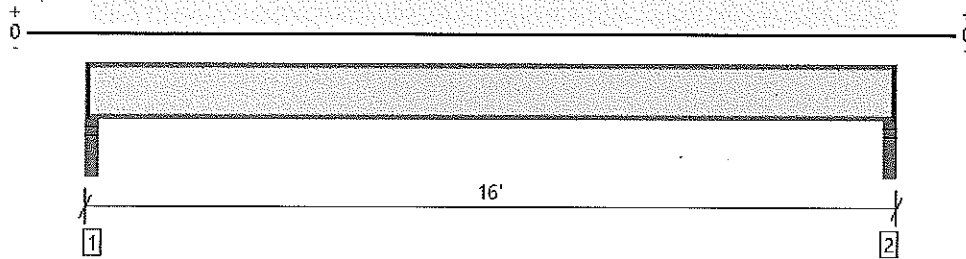
1 piece(s) 11 7/8" TJI @ 12" OC

(EXISTING TJI w/ 12" TRIB)

7A

(EXISTING JOIST CAN SUPPORT 12" TRIB LOAD)

Overall Length: 16'



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)	632 @ 2 1/2"	1041 (2.25")	Passed (61%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	617 @ 3 1/2"	1560	Passed (40%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2428 @ 8'	3160	Passed (77%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.296 @ 8'	0.390	Passed (L/632)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.389 @ 8'	0.779	Passed (L/481)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
TJ-Pro™ Rating	50	40	Passed	--	--

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

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 3' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 15' 10" o/c unless detailed otherwise.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Stud wall - SPF	3.50"	2.25"	1.75"	160	480	200	840	1 1/4" Rim Board
2 - Stud wall - SPF	3.50"	2.25"	1.75"	160	480	200	840	1 1/4" Rim Board

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

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 16'	12"	20.0	60.0	25.0	Default Load

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



ForteWEB Software Operator	Job Notes
ellsee llunga Tse Engineering (425) 481-6601 ELISEFILUNGA@GMAIL.COM	

12/3/2019 10:14:01 PM UTC

ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2

File Name: Bach-Smart



Header *(EXISTING)*

8

<u>INPUT:</u>	Uniform Loading		Span Length		
	w (DL)	w (LL)		L	
Roof (psf)	15	18.75		5	0
Tributary (ft)		8		ft	
Wall (psf)	10	0			
Tributary (ft)		0			
Deck (psf)	20	45			
Tributary (ft)	8	8			
Other (plf)	10	0			
			w (TL)		0
	170	510	680		0
	plf	plf	plf		

*DL + 0.75 (SCHEDULE)*

RESULTS:

VI (DL)	Vr (DL)	VI (LL)	Vr (LL)	VI (TL)	Vr (TL)	M (DL)	M (LL)	M (TL)
425	425	1275	1275	1700	1700	531	1594	2125
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	ft.lbs.	ft.lbs.	ft.lbs.

DESIGN:

<u>MATERIAL</u>	Fb	Fv	Fc(perp)	E x 10 <sup>6</sup>			
Manuf. Lbr.						Cd	1.15
Timber						Ch	1
Dimen. Lbr.	DFL#2	990	180	625	1.6	Cr	1
		psi	psi	psi	psi	Ci	1
b	d	A	S	I			
3	9.25	27.75	42.8	198			
in.	in.	in. <sup>2</sup>	in. <sup>3</sup>	in. <sup>4</sup>			
fv =	64 psi	Brg. Lgth. =	0.076 ft.	CL =	1.000		
fb =	600 psi	GL Cv =	N/A	R =	N/A		
Δ (DL) =	0.01 in.	Δ (LL) =	0.02 in.	Δ (TL) =	0.03 in.		

RATIOS OF ACTUAL TO ALLOWABLE

fv / Fv' =	0.31
fb / Fb' =	0.53

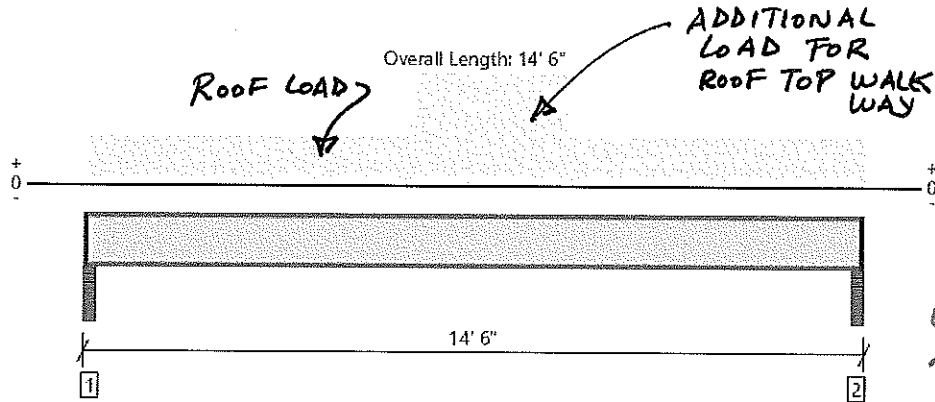
RATIOS OF SPAN TO DEFLECTION

L /	2649	for LL
L /	1986	for TL

USE (2)2x10 DFL#2

Level, Deck /roof: Joist 9  
 1 piece(s) 11 7/8" TJI @ 110 @ 24" OC

9



VERIFICATION  
 OF EXISTING  
 TJI FOR  
 ADDED LOAD

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)	694 @ 14' 3 1/2"	1198 (2.25")	Passed (58%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	679 @ 14' 2 1/2"	1794	Passed (38%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	2769 @ 7' 4 1/4"	3634	Passed (76%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.200 @ 7' 3 5/16"	0.352	Passed (L/844)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.318 @ 7' 3 3/16"	0.704	Passed (L/531)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
TJ-Pro™ Rating	41	40	Passed	--	--

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

- Deflection criteria: LL (L/480) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 3' 4" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 14' 4" o/c unless detailed otherwise.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Stud wall - SPF	3.50"	2.25"	1.75"	290	174	363	827	1 1/4" Rim Board
2 - Stud wall - SPF	3.50"	2.25"	1.75"	290	186	363	839	1 1/4" Rim Board

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

Vertical Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 14' 6"	24"	20.0	-	25.0	Default Load
2 - Uniform (PSF)	6' to 9'	24"	-	60.0	-	

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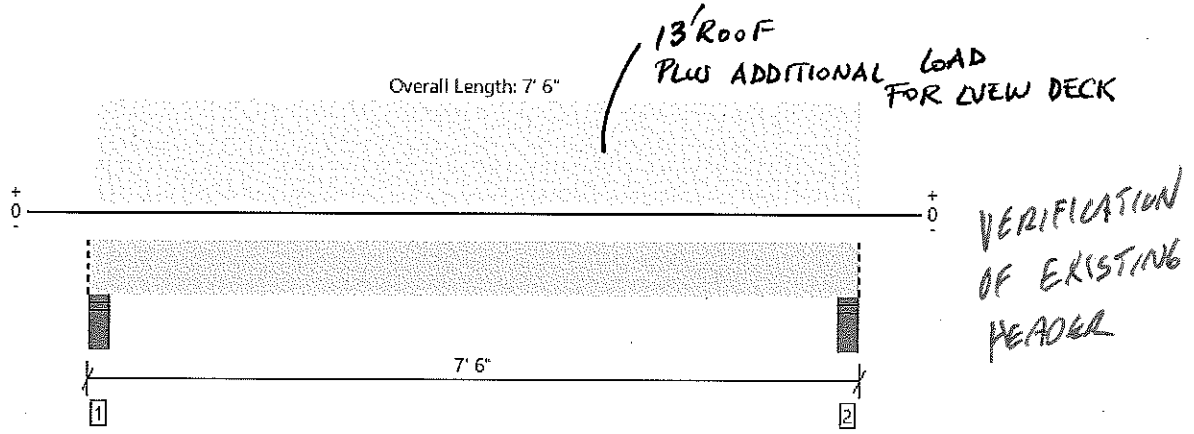
ForteWEB Software Operator	Job Notes
elisee ilunga Tse Engineering (425) 481-6601 ELISEEILUNGA@GMAIL.COM	

12/5/2019 9:30:09 PM UTC  
 ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2

File Name: Xu Remodel

Level, Floor: header 10

1 piece(s) 4 x 12 Douglas Fir-Larch No. 1



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)	2231 @ 4"	8181 (5.50")	Passed (27%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1401 @ 1' 4 3/4"	5434	Passed (26%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3473 @ 3' 9"	7783	Passed (45%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.023 @ 3' 9"	0.228	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.041 @ 3' 9"	0.342	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Floor  
 Member Type : Drop 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' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 7' 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	Snow	Total	
1 - Stud wall - SPF	5.50"	5.50"	1.50"	1012	338	1219	2569	Blocking
2 - Stud wall - SPF	5.50"	5.50"	1.50"	1012	338	1219	2569	Blocking

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 7' 6"	N/A	10.0	--	--	
1 - Uniform (PSF)	0 to 7' 6" (Front)	13'	20.0	-	25.0	Default Load
2 - Uniform (PSF)	0 to 7' 6" (Front)	1' 6"	-	60.0	-	

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

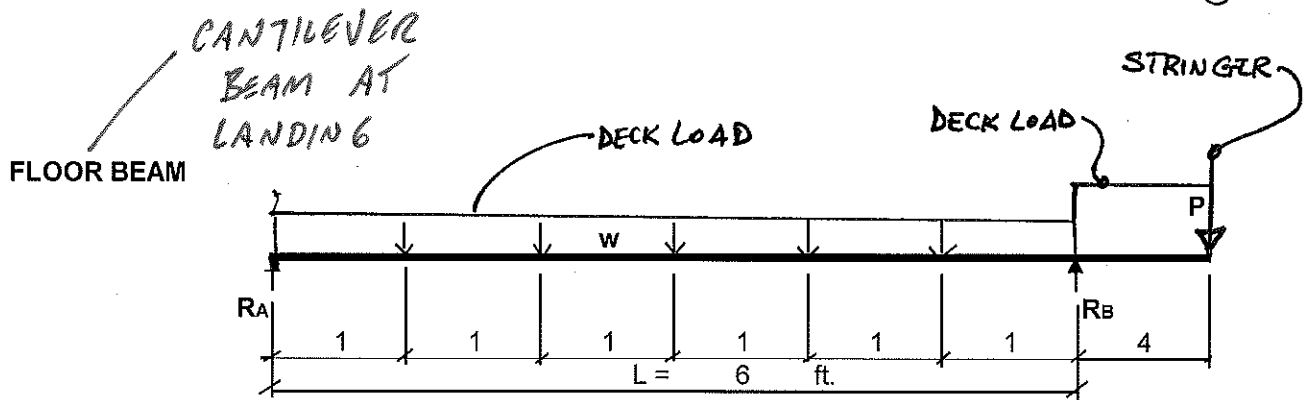


ForteWEB Software Operator	Job Notes
elisee ilunga Tse Engineering (425) 481-6601 ELISEEILUNGA@GMAIL.COM	

12/5/2019 9:45:47 PM UTC  
 ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2

File Name: Xu Remodel

E/R  
pg 10A



**INPUT:**

w (DL) plf	25	25	25	25	25	25	40
w (LL) plf	80	80	80	80	80	80	120
w (TL) plf	105	105	105	105	105	105	160
P (DL) lbs							120
P (LL) lbs							360
P (TL) lbs	0	0	0	0	0		480

**RESULTS:**

RA (TL) =	-218 lbs.	RB (TL) =	1968 lbs.
VA (TL) =	0 lbs.(max.)	VB (TL) =	1120 lbs.(max.)
MA (TL) =	0 ft.lbs.	MA-B (TL) =	-271 ft.lbs.(max.)
Δ (DL) =		Δ (DL) =	-0.005 in.
Δ (LL) =		Δ (LL) =	-0.015 in.
Δ (TL) =		Δ (TL) =	-0.021 in.
		MB (TL) =	-3200 ft.lbs.
		Δ (DL) =	0.088 in.
		Δ (LL) =	0.261 in.
		Δ (TL) =	0.348 in.

**BEAM PROPERTIES:**

MATERIAL	Fb	Fv	Fc(perp)	E x 10 <sup>6</sup>			
Manuf.Lbr. ML	2891	285	750	1.9			
Timber							
Dimen. Lbr.	psi	psi	psi	psi			
b	d	A	S	I	Brg. Lgth.	Cd	1.15
7	5.5	38.50	35.3	97.1	0.01	Ch	1
in.	in.	in. <sup>2</sup>	in. <sup>3</sup>	in. <sup>4</sup>	ft.	Cr	1
						Ci	1

**STRESSES:**

fv =	0 psi	fv =	41 psi
		fb =	-1088 psi
		fb =	-92 psi

**RATIOS OF ACTUAL TO ALLOWABLE STRESSES:**

fv / Fv' =	0.00	fv / Fv' =	0.12
		fb / Fb' =	0.33
	fb / Fb' =		0.03

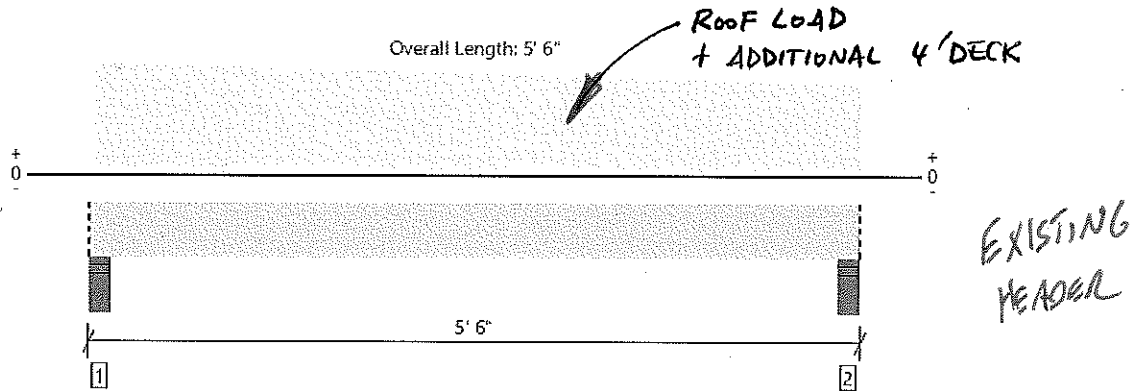
**RATIOS OF SPAN TO DEFLECTION:**

L /	4657	for LL	L /	184	for LL
L /	3470	for TL	L /	138	for TL

USE MICROLLAM LVL (4)1-3/4"x5-1/2" 1.9E



Level, Deck: Beam 11  
 2 piece(s) 2 x 10 Douglas Fir-Larch No. 2



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1283 @ 4"	7013 (5.50")	Passed (18%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	685 @ 1' 2 3/4"	3830	Passed (18%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	1310 @ 2' 8 9/16"	4059	Passed (32%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.012 @ 2' 8 15/16"	0.161	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.017 @ 2' 8 15/16"	0.242	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

System : Floor  
 Member Type : Drop 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 5' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 5' 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	Snow	Total	
1 - Stud wall - SPF	5.50"	5.50"	1.50"	416	660	496	1572	Blocking
2 - Stud wall - SPF	5.50"	5.50"	1.50"	365	660	432	1457	Blocking

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 5' 6"	N/A	7.0	--	--	
1 - Tapered (PSF)	0 to 5' 6" (Front)	8' to 5' 6"	20.0	-	25.0	Default Load
2 - Uniform (PSF)	0 to 5' 6" (Front)	4'	-	60.0	-	

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



FortaWEB Software Operator	Job Notes
elisee llunga Tse Engineering (425) 481-6601 ELISEEILUNGA@GMAIL.COM	

12/5/2019 9:49:00 PM UTC  
 ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2

File Name: Xu Remodel

*NEW BEAM UNDER WALL*

**FLOOR BEAM 11A**

<u>INPUT:</u>	Uniform Loading		Span Length				
	w (DL)	w (LL)		L			
Roof (psf)	15	25		8.5	0		
Tributary (ft)	6	6		ft			
Wall (psf)	12	0					
Tributary (ft)	9	0					
Deck (psf)	20	60					
Tributary (ft)	1.33	1.33					
Other (plf)	10	0					
			Concentrated Loading				
			Load	Xc	P (DL)	P (LL)	P (TL)
			1	4.25	265	720	985
	234.6	229.8	2				0
	plf	plf		ft	lbs	lbs	lbs

*STRINGER*

RESULTS:

VI (DL)	Vr (DL)	VI (LL)	Vr (LL)	VI (TL)	Vr (TL)	M (DL)	M (LL)	M (TL)
1130	1130	1337	1337	2466	2466	2682	3605	6287
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	ft.lbs.	ft.lbs.	ft.lbs.

DESIGN:

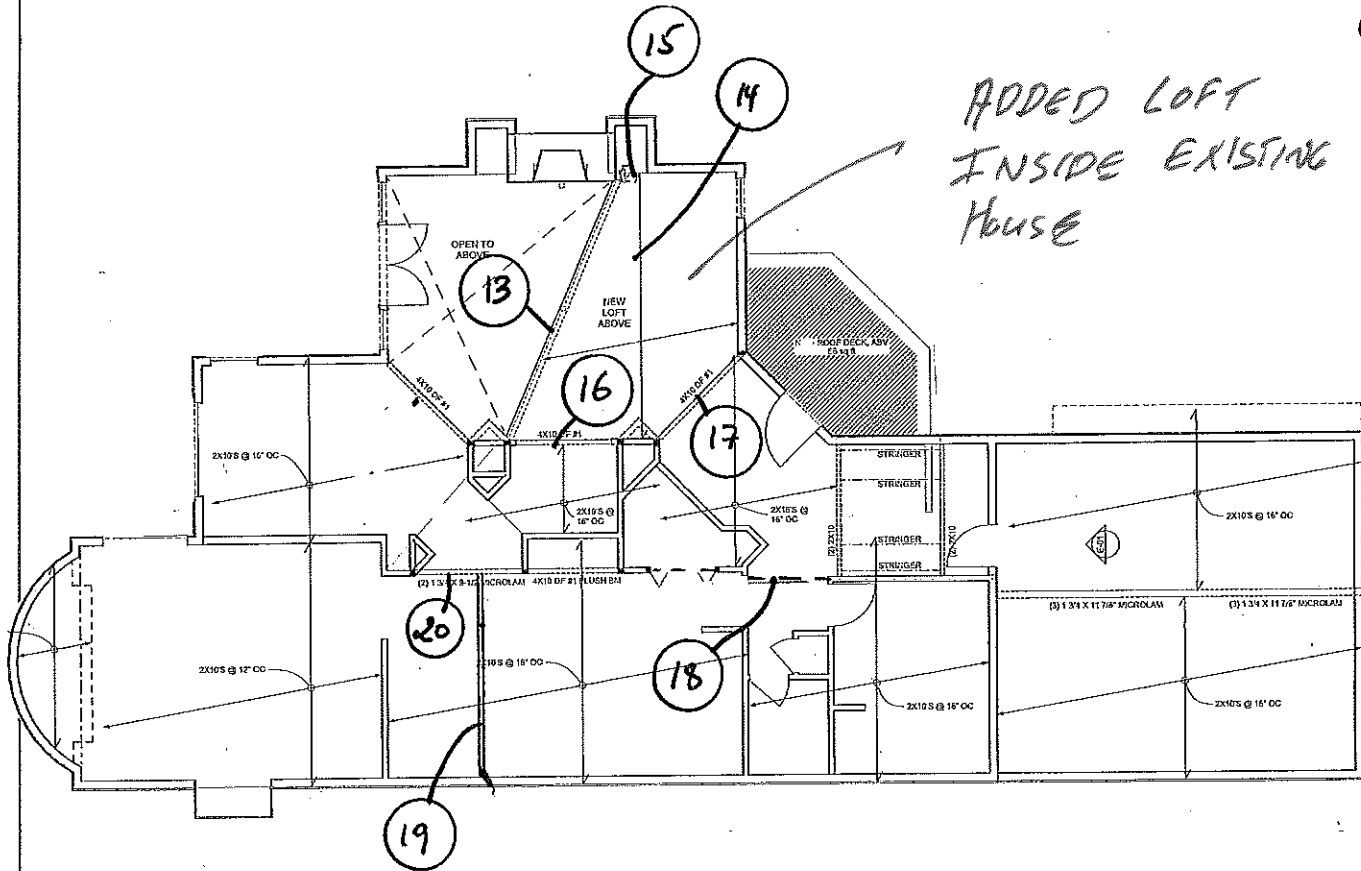
MATERIAL	Fb	Fv	FC(perp)	E x 10 <sup>6</sup>			
Manuf.Lbr. TS	2252	285	650	1.5		Cd	1.15
Timber						Ch	1
Dimen. Lbr.						Cr	1
	psi	psi	psi	psi		Ci	1
b	d	A	S	I			
3.5	11.875	41.56	82.3	488			
in.	in.	in. <sup>2</sup>	in. <sup>3</sup>	in. <sup>4</sup>			
fv =	72 psi	Brg.Lgth. =	0.090 ft.	CL =	1.000		
fb =	920 psi	GL Cv =	N/A	R =	N/A		
Δ (DL) =	0.05 in.	Δ (LL) =	0.06 in.	Δ (TL) =	0.10 in.		

<b>RATIOS OF ACTUAL TO ALLOWABLE</b>	<b>RATIOS OF SPAN TO DEFLECTION</b>
fv / Fv' = 0.22	L / 1742 for LL
fb / Fb' = 0.36	L / 979 for TL

**USE TIMBERSTRAND LSL 3-1/2x11-7/8**

UPPER FLOOR

ADDED LOFT  
 INSIDE EXISTING  
 HOUSE

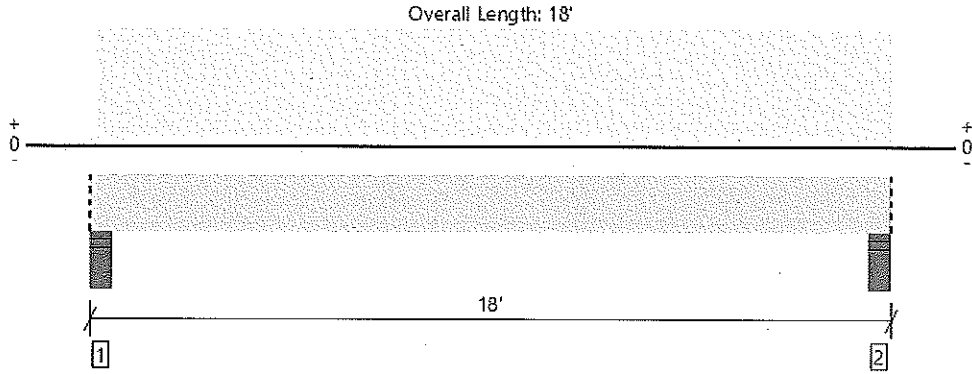


NOTE: "X" INDICATE PAGE  
 NUMBER FOR BEAM  
 OR COLUMN CALC

**MEMBER REPORT**

Level, Floor: Drop Beam  
**1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam**

*E/KE  
pg 13*



*NEW BEAM*

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)	2952 @ 4"	12856 (5.50")	Passed (23%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2474 @ 1' 5 1/2"	11660	Passed (21%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	12320 @ 9'	26400	Passed (47%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.342 @ 9'	0.578	Passed (L/608)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.467 @ 9'	0.867	Passed (L/445)	--	1.0 D + 1.0 L (All Spans)

System : Floor  
 Member Type : Drop 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 18' o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 18' o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 1.00 that was calculated using length L = 17' 4".
- 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	Total	
1 - Stud wall - SPF	5.50"	5.50"	1.50"	792	2160	2952	Blocking
2 - Stud wall - SPF	5.50"	5.50"	1.50"	792	2160	2952	Blocking

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 18'	N/A	16.0	--	
1 - Uniform (PSF)	0 to 18' (Front)	6'	12.0	40.0	Default Load

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



ForteWEB Software Operator	Job Notes
ellsee ilunga Tse Engineering (425) 481-6601 ELISEEILUNGA@GMAIL.COM	

12/3/2019 10:23:32 PM UTC  
 ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2

File Name: Bach-Smart

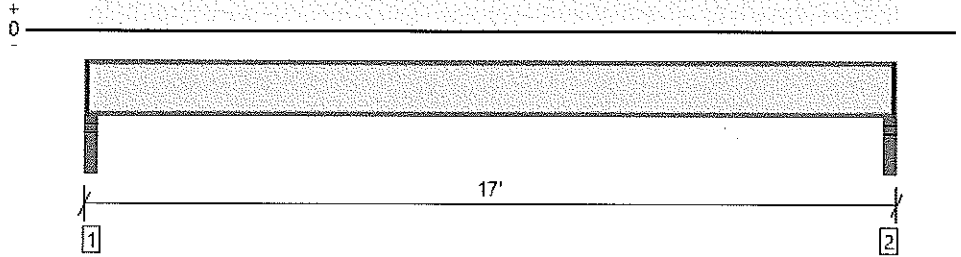


**MEMBER REPORT**

Level, Floor: Joist  
**1 piece(s) 9 1/2" TJI® 210 @ 16" OC**

*EJ/KR  
pg 14*

Overall Length: 17'



*NEW JOIST*

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)	582 @ 2 1/2"	1134 (2.25")	Passed (51%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	569 @ 3 1/2"	1330	Passed (43%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2383 @ 8' 6"	3000	Passed (79%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.431 @ 8' 6"	0.553	Passed (L/462)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.560 @ 8' 6"	0.829	Passed (L/355)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	31	Any	Passed	--	--

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 4' 1" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lb): Bottom compression edge must be braced at 16' 10" o/c unless detailed otherwise.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - SPF	3.50"	2.25"	1.75"	136	453	589	1 1/4" Rim Board
2 - Stud wall - SPF	3.50"	2.25"	1.75"	136	453	589	1 1/4" Rim Board

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

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 17'	16"	12.0	40.0	Default Load

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



ForteWEB Software Operator	Job Notes
elisee ilunga Tse Engineering (425) 481-6601 ELISEEILUNGA@GMAIL.COM	

12/3/2019 10:19:49 PM UTC  
 ForteWEB v2.1, Engine: V7.3.2.309, Data: V7.2.0.2

File Name: Bach-Smart

**Header**

<u>INPUT:</u>	Uniform Loading		Span Length					
	w (DL)	w (LL)		L				
Roof (psf)	15	25		5	0			
Tributary (ft)	10	10		ft				
Wall (psf)	12	0						
Tributary (ft)	8	0						
Floor (psf)	12	40						
Tributary (ft)	8.5	8.5						
Other (plf)	10	0						
			w (TL)	Load	Xc	Concentrated Loading		
				1	0.5	P (DL)	P (LL)	P (TL)
	358	590	948	2		795	2160	2955
	plf	plf	plf		ft	lbs	lbs	lbs

*P = BEAM # 13*

RESULTS:

VI (DL)	Vr (DL)	VI (LL)	Vr (LL)	VI (TL)	Vr (TL)	M (DL)	M (LL)	M (TL)
1611	975	3419	1691	5030	2666	1477	2816	4292
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	ft.lbs.	ft.lbs.	ft.lbs.

DESIGN:

<b>MATERIAL</b>	Fb	Fv	Fc(perp)	E x 10 <sup>6</sup>			
Manuf.Lbr.						Cd	1.15
Timber						Ch	1
Dimen. Lbr.	DFL#2	1080	180	625	1.6	Cr	1
		psi	psi	psi	psi	Ci	1
b	d	A	S	I			
3.5	9.25	32.38	49.9	231			
in.	in.	in. <sup>2</sup>	in. <sup>3</sup>	in. <sup>4</sup>			
fv =	90 psi	Brg.Lgth. =	0.147 ft.	CL =	1.000		
fb =	1030 psi	GL Cv =	N/A	R =	N/A		
Δ (DL) =	0.02 in.	Δ (LL) =	0.03 in.	Δ (TL) =	0.05 in.		

**RATIOS OF ACTUAL TO ALLOWABLE**

fv / Fv' =	0.43
fb / Fb' =	0.83

**RATIOS OF SPAN TO DEFLECTION**

L /	1971	for LL
L /	1276	for TL

**USE 4x10 DFL#2**

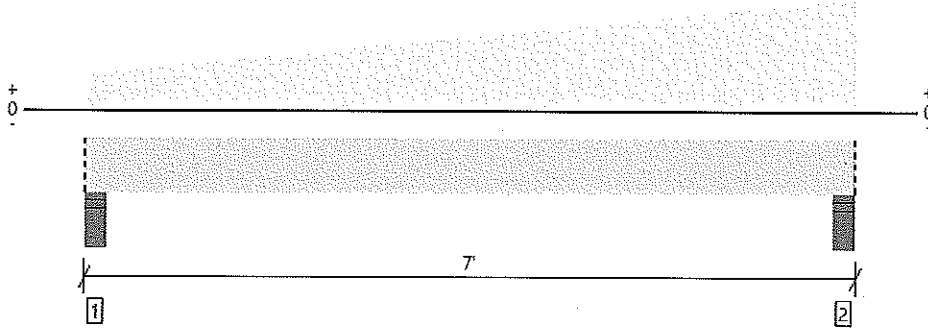
**MEMBER REPORT**

Level, Floor: Beam 16  
 1 piece(s) 4 x 12 Douglas Fir-Larch No. 1

FIELD VERIFY EXISTING BEAM

EI/KL  
 pg 16

Overall Length: 7'



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

Design Results	Actual @ Location	Allowed	Result	LDf	Load: Combination (Pattern)
Member Reaction (lbs)	1636 @ 6' 8"	8181 (5.50")	Passed (20%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	860 @ 5' 7 1/4"	4725	Passed (18%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1987 @ 3' 8 7/8"	6768	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.015 @ 3' 6 3/4"	0.211	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.020 @ 3' 6 3/4"	0.317	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Floor  
 Member Type : Drop 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' o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 7' 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 - Stud wall - SPF	5.50"	5.50"	1.50"	286	836	1122	Blocking
2 - Stud wall - SPF	5.50"	5.50"	1.50"	404	1231	1635	Blocking

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 7'	N/A	10.0	--	
1 - Tapered (PSF)	0 to 7' (Front)	3' 6" to 11' 3"	12.0	40.0	Default Load

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ForteWEB Software Operator	Job Notes
elisee ilunga Tse Engineering (425) 481-6601 ELISEEILUNGA@GMAIL.COM	

**Beam**

<u>INPUT:</u>	Uniform Loading		Span Length		
	w (DL)	w (LL)		L	
Roof (psf)	15	25		7.5	0
Tributary (ft)		0		ft	
Wall (psf)	12	0			
Tributary (ft)		0			
Floor (psf)	12	40	<i>NEW + EXISTING</i>		
Tributary (ft)	12.5	12.5			
Other (plf)	10	0			
			w (TL)		0
	160	500	660		0
	plf	plf	plf		

<u>RESULTS:</u>	VI (DL)	Vr (DL)	VI (LL)	Vr (LL)	VI (TL)	Vr (TL)	M (DL)	M (LL)	M (TL)
	600	600	1875	1875	2475	2475	1125	3516	4641
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	ft.lbs.	ft.lbs.	ft.lbs.

<u>DESIGN:</u>	MATERIAL	Fb	Fv	Fc(perp)	E x 10^6				
	Manuf.Lbr.							Cd	1
	Timber							Ch	1
	Dimen. Lbr.	DFL#1	1200	180	625	1.7		Cr	1
			psi	psi	psi	psi		Ci	1
	b	d	A	S	I				
	3.5	9.25	32.38	49.9	231				
	in.	in.	in.^2	in.^3	in.^4				

fv =	91 psi	Brg.Lgth. =	0.094 ft.	CL =	1.000
fb =	1120 psi	GL Cv =	N/A	R =	N/A
Δ (DL) =	0.03 in.	Δ (LL) =	0.09 in.	Δ (TL) =	0.12 in.

RATIOS OF ACTUAL TO ALLOWABLE		RATIOS OF SPAN TO DEFLECTION	
fv / Fv' =	0.51	L / 992	for LL
fb / Fb' =	0.93	L / 752	for TL

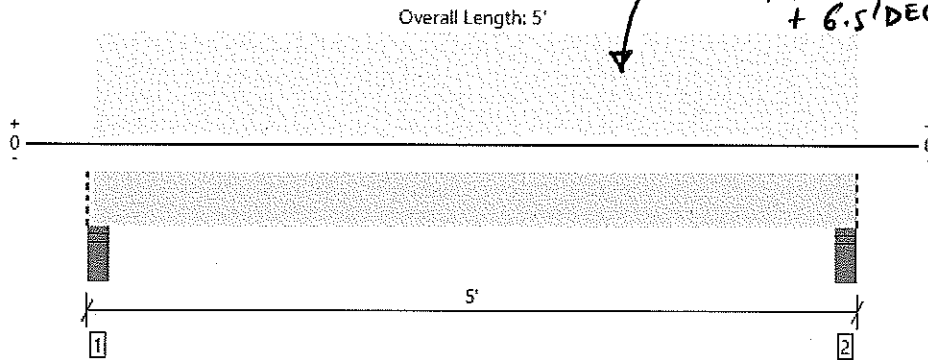
USE 4x10 DFL#1

*(FIELD VERIFY EXISTING BEAM)*

**MEMBER REPORT**

Level, Floor: Drop Beam 18  
 1 piece(s) 4 x 10 Douglas Fir-Larch No. 1

*ELI/KE  
 pg 18*



*FIELD VERIFY  
 EXISTING  
 HEADER*

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)	3346 @ 4"	8181 (5.50')	Passed (41%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1694 @ 1' 2 3/4"	3885	Passed (44%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3129 @ 2' 6"	4991	Passed (63%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.017 @ 2' 6"	0.144	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.027 @ 2' 6"	0.217	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

System : Floor  
 Member Type : Drop 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 5' o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 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	Snow	Total	
1 - Stud wall - SPF	5.50"	5.50"	2.25"	1208	2125	725	4058	Blocking
2 - Stud wall - SPF	5.50"	5.50"	2.25"	1208	2125	725	4058	Blocking

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 5'	N/A	8.2	--	--	
1 - Uniform (PLF)	0 to 5' (Front)	N/A	475.0	460.0	290.0	Default Load
2 - Uniform (PSF)	0 to 5' (Front)	6' 6"	-	60.0	-	Roof deck load

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



ForteWEB Software Operator	Job Notes
elisee ilunga Tse Engineering (425) 481-6601 ELISEEILUNGA@GMAIL.COM	

**Foor Beam**

<u>INPUT:</u>	Uniform Loading		Span Length					
	w (DL)	w (LL)		L				
Roof (psf)	15	25		12.75	0			
Tributary (ft)		0		ft				
Wall (psf)	12	0						
Tributary (ft)		0						
Floor (psf)	12	40						
Tributary (ft)	1.33	1.33						
Other (plf)		0						
			Concentrated Loading					
			w (TL)	Load	Xc	P (DL)	P (LL)	P (TL)
	15.96	53.2	69.16	1	3	440	690	1130
	plf	plf	plf	2	ft	lbs	lbs	lbs

HEADER ABOVE

<u>RESULTS:</u>	VI (DL)	Vr (DL)	VI (LL)	Vr (LL)	VI (TL)	Vr (TL)	M (DL)	M (LL)	M (TL)
	438	205	867	502	1305	707	1334	2664	3998
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	ft.lbs.	ft.lbs.	ft.lbs.

<u>DESIGN:</u>	MATERIAL	Fb	Fv	Fc(perp)	E x 10 <sup>6</sup>			
	Manuf. Lbr.						Cb	1
	Timber						Ch	1
	Dimen. Lbr.	DFL#2	990	180	625	1.6	Cr	1.15
			psi	psi	psi	psi	Ci	1
	b	d	A	S	I			
	3	9.25	27.75	42.8	198			
	in.	in.	in. <sup>2</sup>	in. <sup>3</sup>	in. <sup>4</sup>			

fv =	68 psi	Brg. Lgth. =	0.045 ft.	CL =	1.000
fb =	1120 psi	GL Cv =	N/A	R =	N/A
Δ (DL) =	0.10 in.	Δ (LL) =	0.21 in.	Δ (TL) =	0.31 in.

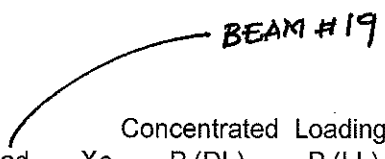
RATIOS OF ACTUAL TO ALLOWABLE		RATIOS OF SPAN TO DEFLECTION	
fv / Fv' =	0.38	L / 735	for LL
fb / Fb' =	0.98	L / 498	for TL

USE (2)2x10 DFL#2

EXISTING PLAN NOT CLEAR ON WHAT OCCURS HERE - ADD UNDER POINT LOAD IF NEEDED

**Foor Beam (EXISTING)**

<b>INPUT:</b>	Uniform Loading		Span Length					
	w (DL)	w (LL)		L				
Roof (psf)	15	25		7	0			
Tributary (ft)		0		ft				
Wall (psf)	12	0						
Tributary (ft)		0						
Floor (psf)	12	40						
Tributary (ft)	10.5	10.5						
Other (plf)	10	0						
	136	420	w (TL)	Load	Xc	P (DL)	P (LL)	P (TL)
	plf	plf	plf	1	5	440	870	1310
				2				0
					ft	lbs	lbs	lbs



**RESULTS:**

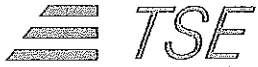
VI (DL)	Vr (DL)	VI (LL)	Vr (LL)	VI (TL)	Vr (TL)	M (DL)	M (LL)	M (TL)
602	790	1719	2091	2320	2882	1462	3815	5277
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	ft.lbs.	ft.lbs.	ft.lbs.

**DESIGN:**

<b>MATERIAL</b>	Fb	Fv	Fc(perp)	E x 10^6			
Manuf.Lbr.	ML	2684	285	750	1.9		
Timber						Cd	1
Dimen. Lbr.						Ch	1
						Cr	1
	psi	psi	psi	psi		Ci	1
b	d	A	S	I			
3.75	9.5	35.63	56.4	268			
in.	in.	in.^2	in.^3	in.^4			
fv =	103 psi	Brg.Lgth. =	0.077 ft.	CL =	1.000		
fb =	1120 psi	GL Cv =	N/A	R =	N/A		
Δ (DL) =	0.02 in.	Δ (LL) =	0.06 in.	Δ (TL) =	0.08 in.		

<b>RATIOS OF ACTUAL TO ALLOWABLE</b>	<b>RATIOS OF SPAN TO DEFLECTION</b>
fv / Fv' = 0.36	L / 1379 for LL
fb / Fb' = 0.42	L / 1005 for TL

USE MICROLLAM LVL (2)1-3/4x9-1/2



Engineering

12810 NE 178TH ST STE 218  
WOODINVILLE, WA 98072 (425) 481-6601

PROJECT: \_\_\_\_\_

GRAVITY LOAD

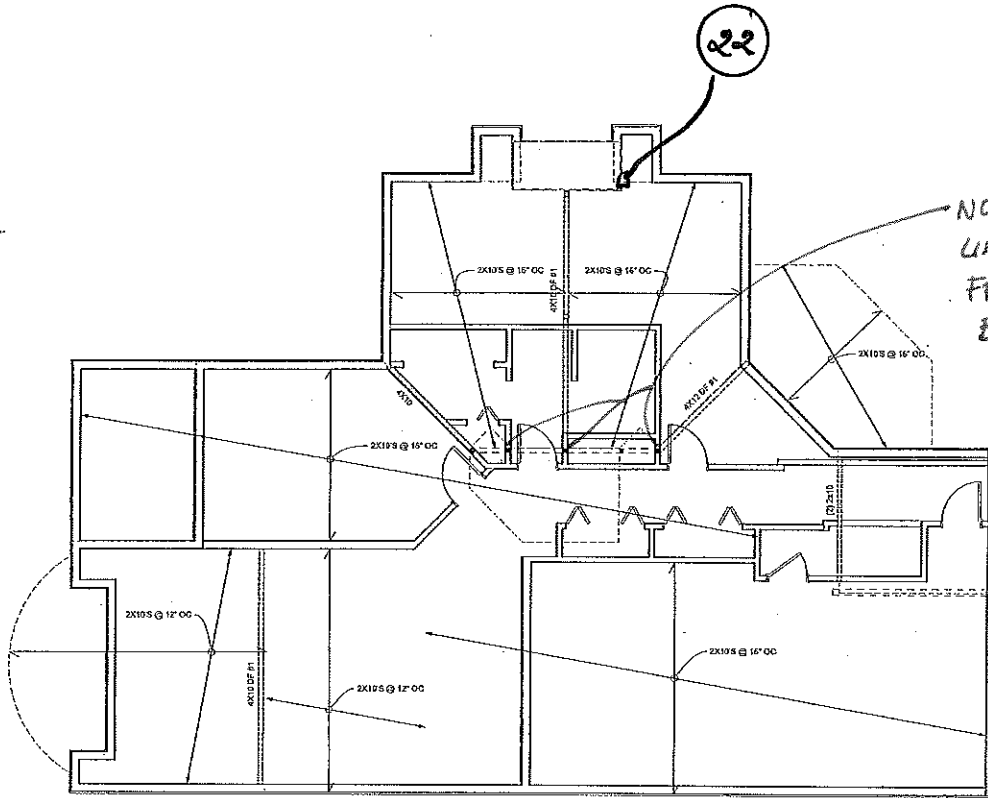
ANALYSIS

JOB#: \_\_\_\_\_

BY: EIK

DATE: \_\_\_\_\_ 21

LOWER FLOOR



NOTE: COLUMNS  
UNDER NEW LOAD  
FROM ABOVE HAVE  
BEEN LIPSIZED.  
SEE PLAN FOR  
CHANGES.  
(TYP)

NOTE: "X" INDICATE PAGE NUMBER  
FOR COLUMN CALC.



COLUMN

Overall Length	End Conditions		Intermediate Supports		Loading		
	K <sub>xx</sub>	K <sub>yy</sub>	xx axis	yy axis	P axial	W <sub>xx</sub>	W <sub>yy</sub>
9 ft.	1	1	0	0	lbs.	plf	0 plf
Column Size		Duration		Plate Properties			
b	d	Cd		Specie	F <sub>c(perp)</sub>	C <sub>b</sub> ?	C <sub>b</sub>
3.5 in.	5.5 in.	1.15		HF	405 psi	YES	1.107

MATERIAL	Type/Specie	Grade	F <sub>bxx</sub>	F <sub>byy</sub>	F <sub>c</sub>	E <sub>xx</sub> (10) <sup>6</sup>	E <sub>yy</sub> (10) <sup>6</sup>
Manuf.Lbr.							
Timber							
Dimen.Lbr	DFL #2		1170 psi	1170 psi	1485 psi	1.6 psi	1.6 psi

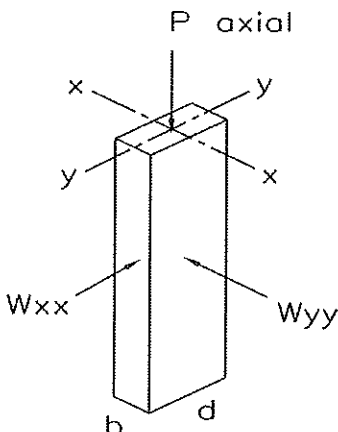
f <sub>c</sub>	0 psi
SR <sub>xx</sub> (l <sub>e</sub> /d)	19.64
SR <sub>yy</sub> (l <sub>e</sub> /b)	30.86
F <sub>c</sub> *	1708 psi
K <sub>cE</sub>	0.3
F <sub>cE</sub>	504 psi
c	0.8
k <sub>1</sub>	0.809461
k <sub>2</sub>	0.368922
C <sub>p</sub>	0.274386
F <sub>c</sub> '	469 psi
M <sub>xx</sub>	0 ft.lbs
S <sub>xx</sub>	17.65 in <sup>3</sup>
0	0 psi
	1244 psi
F <sub>bxx</sub> '	1346 psi
+	0
M <sub>yy</sub>	0 ft.lbs
S <sub>yy</sub>	11.23 in <sup>3</sup>
f <sub>byy</sub>	0 psi
F <sub>cE yy</sub>	504 psi
K <sub>bE</sub>	0.438
R <sub>B</sub>	6.963
F <sub>bE</sub>	14453 psi
k <sub>4</sub>	0

RESULTS

COLUMN CSI = 1.0

ALLOWABLE AXIAL LOAD = 9020 lbs.  
And For F<sub>c(perp)</sub>' Controlling = 8632 lbs.

FROM BEAM #13 + HEADER 15  
P = 2955 + 5030 lbs  
= 7985 lbs < 8930 lbs  
OK



USE: 4x6 DFL #2



Engineering

12810 NE 178TH ST STE 218  
WOODINVILLE, WA 98072 (425) 481-6601

PROJECT: PARTIAL

LATERAL ANALYSIS

AT ROOF ACCESS

JOB#:

BY: EI/KR

DATE:

23

NOTE: ADDED LATERAL FORCES FROM THE PENTHOUSE ARE MINIMAL COMPARED TO THE SIZE OF THE EXISTING STRUCTURE.

\* WIND

ADDED AREA FROM PENTHOUSE:

$$\text{AREA} = 6' \times 10' = 60 \text{ ft}^2$$

$$\text{WIND FORCE: } V_T = 7020 \text{ lbs (TOTAL) \& } 360 \text{ lbs EACH SIDE}$$

TO BE RESISTED BY PENTHOUSE WALLS  
WITH OSB SHEATHING, NAILED WITH  
8d AT 6" O.C EDGE / 12" O.C FIELD

\* SEISMIC

ADDED WEIGHT FROM PENTHOUSE

$$W = 2360 \text{ lbs}$$

$$SDS = 0.973$$

$$R = 6.5$$

$$I = 1$$

$$C_s = \frac{SDS}{(R/I)}$$

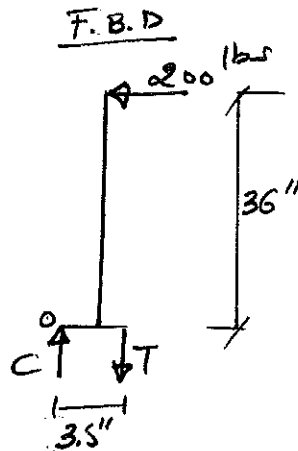
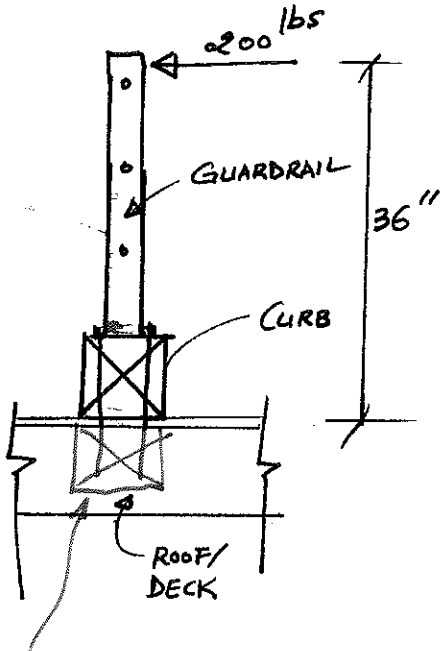
$$= \frac{0.973}{(6.5/1)} = 0.15$$

$$\text{BASE SHEAR} = V = C_s \cdot W = 0.15 \times 2360 \text{ lbs} = 355 \text{ lbs}$$

$$\text{SEISMIC DESIGN FORCES} = V_T = C_s \cdot W \cdot f(0.7) \quad f = 1.3$$
$$= 325 \text{ lbs}$$

TO BE RESISTED BY PENTHOUSE WALLS  
WITH OSB SHEATHING, NAILED WITH  
8d AT 6" O.C EDGE / 12" O.C FIELD.

CURB CONNECTION UNDER GUARDRAIL



$$\sum M_0 = 0 \Rightarrow 200 \text{ lbs} \cdot 36'' - T \cdot 3.5'' = 0$$

$$C = T = 2060 \text{ lbs}$$

TRY  $\frac{5}{16}$ " DIA X 10" LAG SCREW

ALLOW WITHDRAW = 265 lbs / INCH OF PENETRATION

FOR 4" OF PENETRATION

$$P_{\text{ALLOW}} = 265 \text{ lbs/in} \times 4'' \times 1.6 = 1695 \text{ lbs PER SCREW}$$

THEREFORE USE (4) SCREWS ADJACENT TO GUARDRAIL POST (TYP)

