BEYLER CONSULTING
5920 100th Street, Suite 25, Lakewood, WA 98499
(253) 984-2900
beylerconsulting.com
Plan. Design. Manage.

Date: 09/16/2019
Design by: AEL

Structural calculations for vertical and lateral design

Project & Location:

Structural Calculations for

Ebert Residence

13238 Hadfield Rd SE
Olalla, WA 98359
Kitsap County

Must Comply With All Washington State Codes

Client:

Coval Homes, LLC
2023 125th St E
Tacoma, WA 98445

Structural Engineer:

Beyler Consulting, LLC.
5920 100th Street SW, Suite 25
Lakewood, WA 98499
Elizabeth Emerick, P.E.
elizabeth@beylerconsulting.com

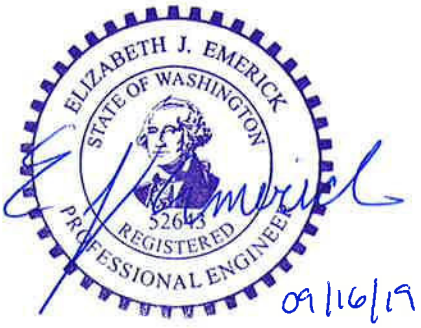
Project Number: 19.00315.00

Code: 2015 IBC

Loads:

I. Vertical Loads:
- Roof (Snow) 25 PSF
- Floor (Live) 40 PSF

II. Lateral Loads:
- Wind: Exposure "B"
  Speed: 110 mph
  Kzt = 1.00
- Seismic: Site Class: D
  Seismic Spectral Response: Sds = 0.9660
  Sd1= 0.5600
  Va= 0.1062 (ASD)



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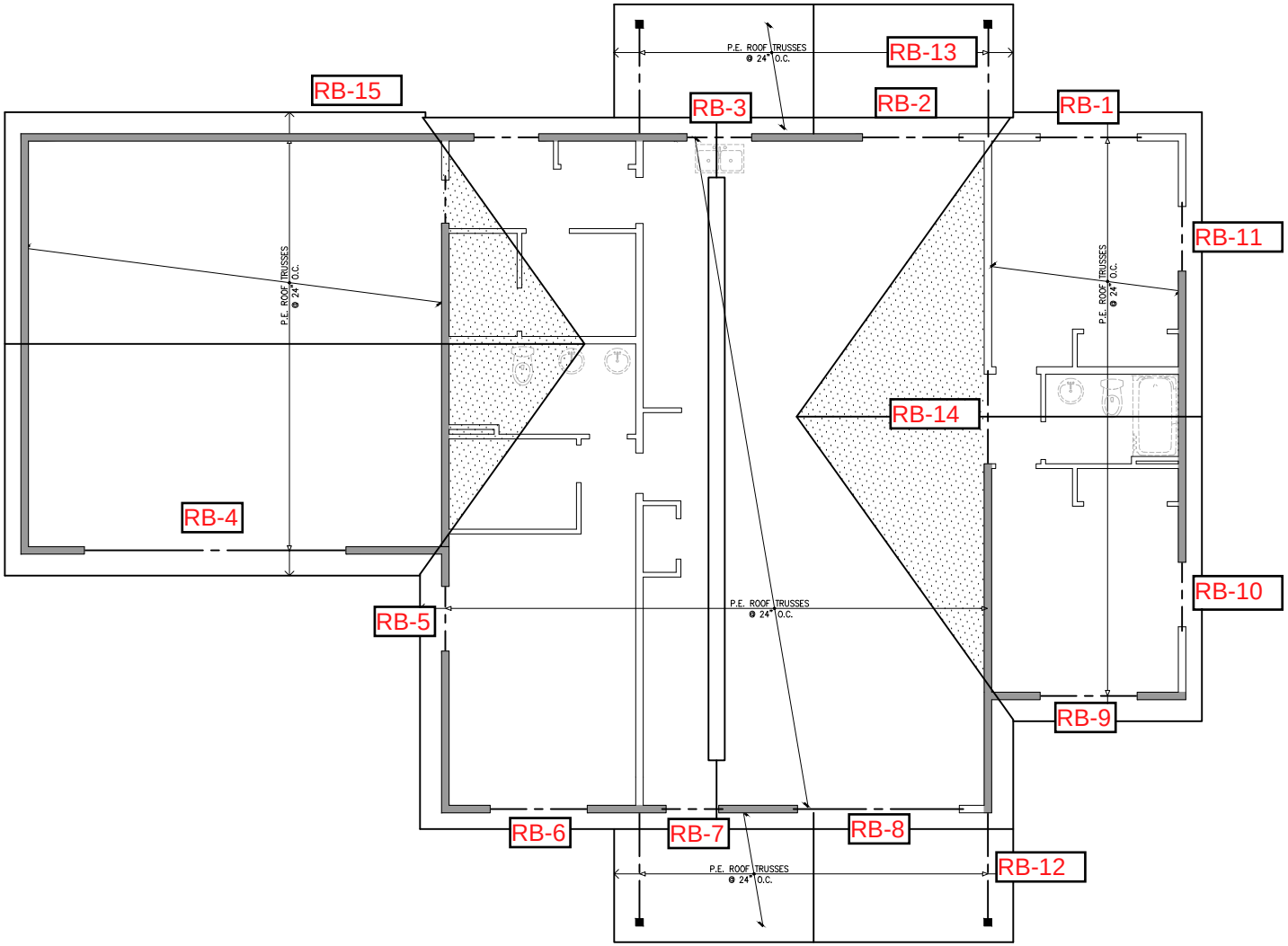
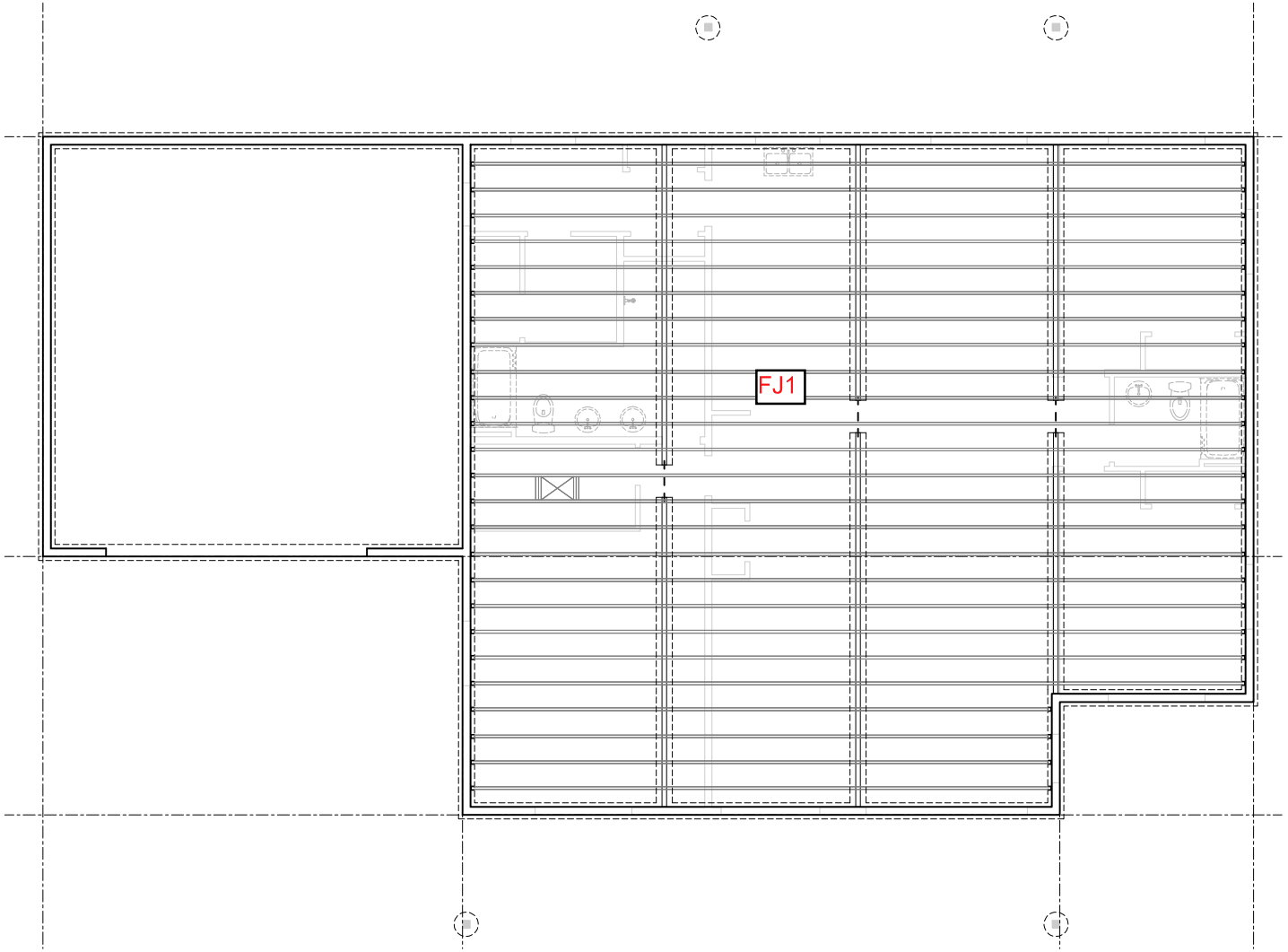
VERTICAL DESIGN


RB-15
RB-13
RB-3
RB-2
RB-1
RB-11
RB-14
RB-4
RB-10
RB-5
RB-9
RB-6
RB-7
RB-8
RB-12
P.E. ROOF TRUSSES @ 24" O.C.


FJ1

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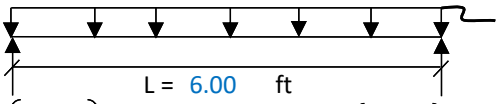
LOADS ONLY

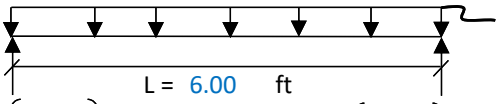
RB-1



	Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 = DL	15	18.96	+ DL 0 Wall +	DL 0	0.00	= DL	284
SL	25	18.96		SL 0	0.00	SL	474
						∑	759

R_1 = DL 0.85, SL 1.42, ∑ 2.28 k R_2 = DL 0.85, SL 1.42, ∑ 2.28 k

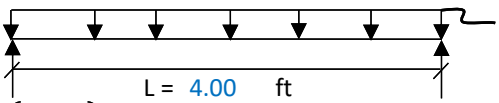
RB-2



	Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 = DL	15	2.00	+ DL 0 Wall +	DL 0	0.00	= DL	30
SL	25	2.00		SL 0	0.00	SL	50
						∑	80

R_1 = DL 0.09, SL 0.15, ∑ 0.24 k R_2 = DL 0.09, SL 0.15, ∑ 0.24 k

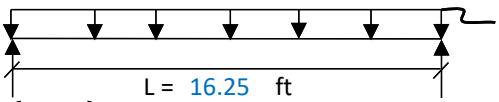
RB-3



	Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 = DL	15	2.00	+ DL 0 Wall +	DL 0	0.00	= DL	30
SL	25	2.00		SL 0	0.00	SL	50
						∑	80

R_1 = DL 0.06, SL 0.10, ∑ 0.16 k R_2 = DL 0.06, SL 0.10, ∑ 0.16 k

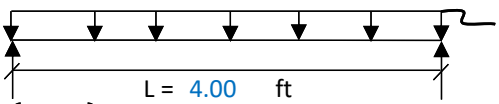
RB-4



	Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 = DL	15	14.46	+ DL 0 Wall +	DL 0	0.00	= DL	217
SL	25	14.46		SL 0	0.00	SL	362
						∑	579

R_1 = DL 1.76, SL 2.94, ∑ 4.70 k R_2 = DL 1.76, SL 2.94, ∑ 4.70 k

RB-5

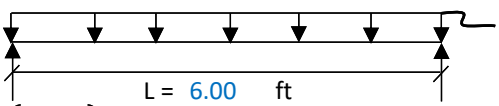


	Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 = DL	15	18.46	+ DL 0 Wall +	DL 0	0.00	= DL	277
SL	25	18.46		SL 0	0.00	SL	462
						∑	739

R_1 = DL 0.55, SL 0.92, ∑ 1.48 k R_2 = DL 0.55, SL 0.92, ∑ 1.48 k

k

RB-6



	Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 = DL	15	2.46	+ DL 0 Wall +	DL 0	0.00	= DL	37
SL	25	2.46		SL 0	0.00	SL	62
						∑	99

R_1 = DL 0.11, SL 0.18, ∑ 0.30 k R_2 = DL 0.11, SL 0.18, ∑ 0.30 k

k

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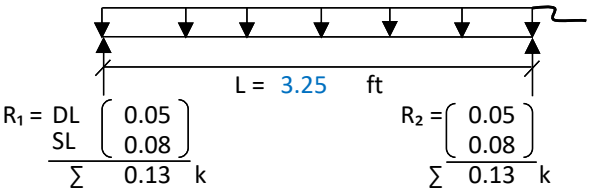
LOADS ONLY

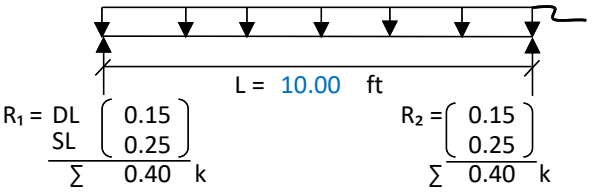
RB-7



		Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 =	DL	15	2.00	+ DL 0 Wall +	DL 0	0.00	= DL	30
	SL	25	2.00		SL 0	0.00	SL	50
							∑	80

R_1 =	DL	0.05	R_2 = DL 0.05
	SL	0.08	SL 0.08
	∑	0.13 k	∑ 0.13 k

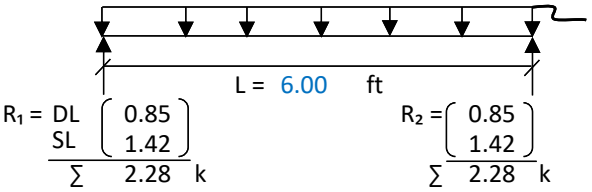
RB-8



		Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 =	DL	15	2.00	+ DL 0 Wall +	DL 0	0.00	= DL	30
	SL	25	2.00		SL 0	0.00	SL	50
							∑	80

R_1 =	DL	0.15	R_2 = DL 0.15
	SL	0.25	SL 0.25
	∑	0.40 k	∑ 0.40 k

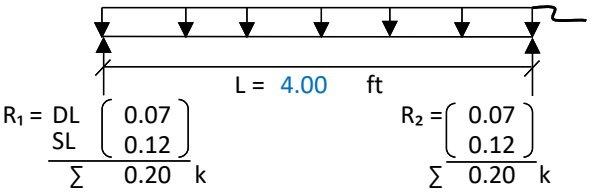
RB-9



		Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 =	DL	15	18.96	+ DL 0 Wall +	DL 0	0.00	= DL	284
	SL	25	18.96		SL 0	0.00	SL	474
							∑	759

R_1 =	DL	0.85	R_2 = DL 0.85
	SL	1.42	SL 1.42
	∑	2.28 k	∑ 2.28 k

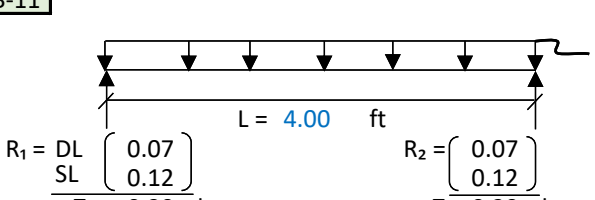
RB-10



		Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 =	DL	15	2.46	+ DL 0 Wall +	DL 0	0.00	= DL	37
	SL	25	2.46		SL 0	0.00	SL	62
							∑	99

R_1 =	DL	0.07	R_2 = DL 0.07
	SL	0.12	SL 0.12
	∑	0.20 k	∑ 0.20 k

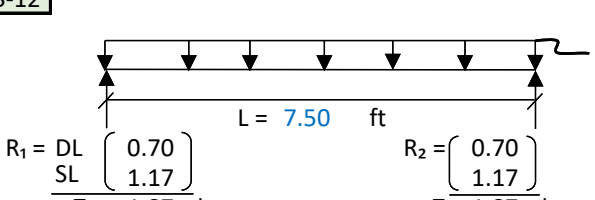
RB-11



		Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 =	DL	15	2.46	+ DL 0 Wall +	DL 0	0.00	= DL	37
	SL	25	2.46		SL 0	0.00	SL	62
							∑	99

R_1 =	DL	0.07	R_2 = DL 0.07
	SL	0.12	SL 0.12
	∑	0.20 k	∑ 0.20 k

RB-12



		Roof PSF	Tributary		Roof PSF	Tributary		PLF
W_1 =	DL	15	12.46	+ DL 0 Wall +	DL 15	0.00	= DL	187
	SL	25	12.46		SL 25	0.00	SL	312
							∑	499

R_1 =	DL	0.70	R_2 = DL 0.70
	SL	1.17	SL 1.17
	∑	1.87 k	∑ 1.87 k

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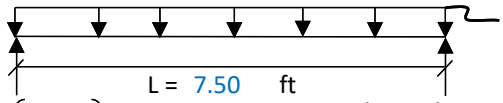
LOADS ONLY

RB-13

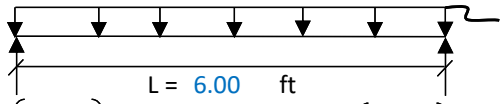


R_1 = DL 0.70, SL 1.17, ∑ 1.87 k

R_2 = DL 0.70, SL 1.17, ∑ 1.87 k

W_1 = DL (Roof PSF 15 × Tributary 12.46) + DL (Wall 0) + DL (Roof PSF 0 × Tributary 0.00) = DL 187, SL 312, ∑ 499 PLF

RB-14

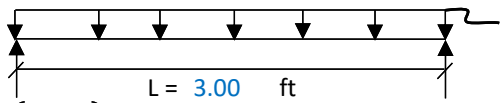


R_1 = DL 0.81, SL 1.35, ∑ 2.16 k

R_2 = DL 0.81, SL 1.35, ∑ 2.16 k

W_1 = DL (Roof PSF 15 × Tributary 18.00) + DL (Wall 0) + DL (Roof PSF 0 × Tributary 0.00) = DL 270, SL 450, ∑ 720 PLF

RB-15



R_1 = DL 0.33, SL 0.54, ∑ 0.87 k

R_2 = DL 0.33, SL 0.54, ∑ 0.87 k

W_1 = DL (Roof PSF 15 × Tributary 14.46) + DL (Wall 0) + DL (Roof PSF 0 × Tributary 0.00) = DL 217, SL 362, ∑ 578 PLF

Beyler Consulting
5920 100th St SW, Suite 25
Lakewood, WA 98499
(253) 984-2900

Project Title: Sitka 1949
Engineer:
Project ID:
Project Descr:

Printed: 6 AUG 2019, 7:30AM

Multiple Simple Beam

Lic. # : KW-06011448 — Beyler Consulting, LLC

Description : ROOF BEAMS

Wood Beam Design : RB-1

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : **4x10, Sawn, Fully Unbraced**
Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species :	Hem Fir					Wood Grade :	No.2				
Fb - Tension	850.0 psi	Fc - Prll	1,300.0 psi	Fv	150.0 psi	Ebend- xx	1,300.0 ksi	Density	26.840 pcf		
Fb - Compr	850.0 psi	Fc - Perp	405.0 psi	Ft	525.0 psi	Eminbend - xx	470.0 ksi				

Applied Loads

Unif Load: D = 0.2840, L = 0.4740 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.814** : 1
fb : Actual : 820.09 psi at 3.000 ft in Span # 1
Fb : Allowable : 1,007.73 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.524** : 1
fv : Actual : 78.67 psi at 5.240 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.85	1.42					
Right Support	0.85	1.42					

Max Deflections

Transient Downward	0.046 in	Total Downward	0.074 in
Ratio	1554 >360	Ratio	972 >240
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB-2

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : **4x8, Sawn, Fully Unbraced**
Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species :	Hem Fir					Wood Grade :	No.2				
Fb - Tension	850.0 psi	Fc - Prll	1,300.0 psi	Fv	150.0 psi	Ebend- xx	1,300.0 ksi	Density	26.840 pcf		
Fb - Compr	850.0 psi	Fc - Perp	405.0 psi	Ft	525.0 psi	Eminbend - xx	470.0 ksi				

Applied Loads

Unif Load: D = 0.030, L = 0.050 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.129** : 1
fb : Actual : 140.89 psi at 3.000 ft in Span # 1
Fb : Allowable : 1,094.59 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.076** : 1
fv : Actual : 11.35 psi at 5.400 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.09	0.15					
Right Support	0.09	0.15					

Max Deflections

Transient Downward	0.010 in	Total Downward	0.016 in
Ratio	7097 >360	Ratio	4435 >240
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Multiple Simple Beam

Lic. # : KW-06011448 — Beyler Consulting, LLC

Wood Beam Design : RB-3

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : **4x8, Sawn, Fully Unbraced**
Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species :	Hem Fir					Wood Grade :	No.2		
Fb - Tension	850.0 psi	Fc - Prll	1,300.0 psi	Fv	150.0 psi	Ebend- xx	1,300.0 ksi	Density	26.840 pcf
Fb - Compr	850.0 psi	Fc - Perp	405.0 psi	Ft	525.0 psi	Eminbend - xx	470.0 ksi		

Applied Loads

Unif Load: D = 0.030, L = 0.050 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.057** : 1
fb : Actual : 62.62 psi at 2.000 ft in Span # 1
Fb : Allowable : 1,097.94 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.044** : 1
fv : Actual : 6.62 psi at 0.000 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.06	0.10					
Right Support	0.06	0.10					

Max Deflections

Transient Downward	0.002 in	Total Downward	0.003 in
Ratio	9999 >360	Ratio	9999 >240
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB-4

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : **3-1.75x11.87, Microllam LVL, Fully Unbraced**
Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species :	Trus Joist					Wood Grade :	MicroLam LVL 2.0 E		
Fb - Tension	2,600.0 psi	Fc - Prll	2,510.0 psi	Fv	285.0 psi	Ebend- xx	2,000.0 ksi	Density	42.010 pcf
Fb - Compr	2,600.0 psi	Fc - Perp	750.0 psi	Ft	1,555.0 psi	Eminbend - xx	1,016.54 ksi		

Applied Loads

Unif Load: D = 0.2170, L = 0.3620 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.732** : 1
fb : Actual : 1,858.67 psi at 8.125 ft in Span # 1
Fb : Allowable : 2,539.73 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.349** : 1
fv : Actual : 99.61 psi at 15.275 ft in Span # 1
Fv : Allowable : 285.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	1.76	2.94					
Right Support	1.76	2.94					

Max Deflections

Transient Downward	0.390 in	Total Downward	0.623 in
Ratio	500 >360	Ratio	312 >240
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Multiple Simple Beam

Wood Beam Design : RB-5

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : **4x8, Sawn, Fully Unbraced**
Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species :	Hem Fir				Wood Grade :	No.2			
Fb - Tension	850.0 psi	Fc - Prll	1,300.0 psi	Fv	150.0 psi	Ebend- xx	1,300.0 ksi	Density	26.840 pcf
Fb - Compr	850.0 psi	Fc - Perp	405.0 psi	Ft	525.0 psi	Eminbend - xx	470.0 ksi		

Applied Loads

Unif Load: D = 0.2770, L = 0.4620 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.527** : 1
fb : Actual : 578.45 psi at 2.000 ft in Span # 1
Fb : Allowable : 1,097.94 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.408** : 1
fv : Actual : 61.16 psi at 0.000 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.55	0.92					
Right Support	0.55	0.92					

Max Deflections

Transient Downward	0.019 in	Total Downward	0.030 in
Ratio	2592 >360	Ratio	1620 >240
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB-6

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : **4x8, Sawn, Fully Unbraced**
Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species :	Hem Fir				Wood Grade :	No.2			
Fb - Tension	850.0 psi	Fc - Prll	1,300.0 psi	Fv	150.0 psi	Ebend- xx	1,300.0 ksi	Density	26.840 pcf
Fb - Compr	850.0 psi	Fc - Perp	405.0 psi	Ft	525.0 psi	Eminbend - xx	470.0 ksi		

Applied Loads

Unif Load: D = 0.0370, L = 0.0620 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.159** : 1
fb : Actual : 174.36 psi at 3.000 ft in Span # 1
Fb : Allowable : 1,094.59 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.094** : 1
fv : Actual : 14.05 psi at 5.400 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.11	0.19					
Right Support	0.11	0.19					

Max Deflections

Transient Downward	0.013 in	Total Downward	0.020 in
Ratio	5723 >360	Ratio	3584 >240
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Multiple Simple Beam

Lic. # : KW-06011448 — Beyler Consulting, LLC

Wood Beam Design : RB-7

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : **4x8, Sawn, Fully Unbraced**
Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species :	Hem Fir				Wood Grade :	No.2			
Fb - Tension	850.0 psi	Fc - Prll	1,300.0 psi	Fv	150.0 psi	Ebend- xx	1,300.0 ksi	Density	26.840 pcf
Fb - Compr	850.0 psi	Fc - Perp	405.0 psi	Ft	525.0 psi	Eminbend - xx	470.0 ksi		

Applied Loads

Unif Load: D = 0.030, L = 0.050 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.038** : 1
fb : Actual : 41.34 psi at 1.625 ft in Span # 1
Fb : Allowable : 1,099.38 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.032** : 1
fv : Actual : 4.87 psi at 0.000 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)

	D	L	Lr	S	W	E	H
Left Support	0.05	0.08					
Right Support	0.05	0.08					

Max Deflections

Transient Downward	0.001 in	Total Downward	0.001 in
Ratio	9999 >360	Ratio	9999 >240
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB-8

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : **4x8, Sawn, Fully Unbraced**
Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species :	Hem Fir				Wood Grade :	No.2			
Fb - Tension	850.0 psi	Fc - Prll	1,300.0 psi	Fv	150.0 psi	Ebend- xx	1,300.0 ksi	Density	26.840 pcf
Fb - Compr	850.0 psi	Fc - Perp	405.0 psi	Ft	525.0 psi	Eminbend - xx	470.0 ksi		

Applied Loads

Unif Load: D = 0.030, L = 0.050 k/ft, Trib= 1.0 ft

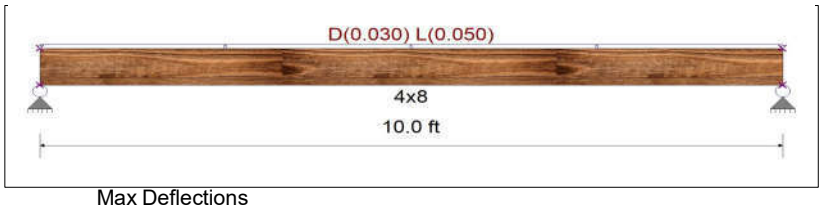
Design Summary

Max fb/Fb Ratio = **0.360** : 1
fb : Actual : 391.37 psi at 5.000 ft in Span # 1
Fb : Allowable : 1,086.71 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.139** : 1
fv : Actual : 20.81 psi at 9.400 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)

	D	L	Lr	S	W	E	H
Left Support	0.15	0.25					
Right Support	0.15	0.25					



Max Deflections

Transient Downward	0.078 in	Total Downward	0.125 in
Ratio	1533 >360	Ratio	958 >240
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Multiple Simple Beam

Lic. # : KW-06011448 — Beyler Consulting, LLC

Wood Beam Design : RB-9

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : **4x10, Sawn, Fully Unbraced**
Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species :	Hem Fir				Wood Grade :	No.2			
Fb - Tension	850.0 psi	Fc - Prll	1,300.0 psi	Fv	150.0 psi	Ebend- xx	1,300.0 ksi	Density	26.840 pcf
Fb - Compr	850.0 psi	Fc - Perp	405.0 psi	Ft	525.0 psi	Eminbend - xx	470.0 ksi		

Applied Loads

Unif Load: D = 0.2840, L = 0.4740 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.814** : 1
fb : Actual : 820.09 psi at 3.000 ft in Span # 1
Fb : Allowable : 1,007.73 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.524** : 1
fv : Actual : 78.67 psi at 5.240 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.85	1.42					
Right Support	0.85	1.42					

Max Deflections

Transient Downward	0.046 in	Total Downward	0.074 in
Ratio	1554 >360	Ratio	972 >240
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB-10

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : **2-2x8, Sawn, Fully Unbraced**
Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species :	Hem Fir				Wood Grade :	No.2			
Fb - Tension	850.0 psi	Fc - Prll	1,300.0 psi	Fv	150.0 psi	Ebend- xx	1,300.0 ksi	Density	26.840 pcf
Fb - Compr	850.0 psi	Fc - Perp	405.0 psi	Ft	525.0 psi	Eminbend - xx	470.0 ksi		

Applied Loads

Unif Load: D = 0.0370, L = 0.0620 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.089** : 1
fb : Actual : 90.41 psi at 2.000 ft in Span # 1
Fb : Allowable : 1,011.57 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.064** : 1
fv : Actual : 9.56 psi at 0.000 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.07	0.12					
Right Support	0.07	0.12					

Max Deflections

Transient Downward	0.003 in	Total Downward	0.005 in
Ratio	9999 >360	Ratio	9999 >240
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Beyler Consulting
5920 100th St SW, Suite 25
Lakewood, WA 98499
(253) 984-2900

Project Title: Sitka 1949
Engineer:
Project ID:
Project Descr:

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Multiple Simple Beam

Lic. # : KW-06011448 — Beyler Consulting, LLC

Wood Beam Design : RB-11

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : **2-2x8, Sawn, Fully Unbraced**
Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species :	Hem Fir				Wood Grade :	No.2			
Fb - Tension	850.0 psi	Fc - Prll	1,300.0 psi	Fv	150.0 psi	Ebend- xx	1,300.0 ksi	Density	26.840 pcf
Fb - Compr	850.0 psi	Fc - Perp	405.0 psi	Ft	525.0 psi	Eminbend - xx	470.0 ksi		

Applied Loads

Unif Load: D = 0.0370, L = 0.0620 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.089** : 1
fb : Actual : 90.41 psi at 2.000 ft in Span # 1
Fb : Allowable : 1,011.57 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.064** : 1
fv : Actual : 9.56 psi at 0.000 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.07	0.12					
Right Support	0.07	0.12					

Max Deflections

Transient Downward	0.003 in	Total Downward	0.005 in
Ratio	9999 >360	Ratio	9999 >240
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB-12

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : **3.125x9, GLB, Fully Unbraced**
Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species :	DF/DF				Wood Grade :	24F - V4			
Fb - Tension	2400 psi	Fc - Prll	1650 psi	Fv	265 psi	Ebend- xx	1800 ksi	Density	31.21 pcf
Fb - Compr	1850 psi	Fc - Perp	650 psi	Ft	1100 psi	Eminbend - xx	950 ksi		

Applied Loads

Unif Load: D = 0.1870, L = 0.3120 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.426** : 1
fb : Actual : 998.00 psi at 3.750 ft in Span # 1
Fb : Allowable : 2,342.58 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.304** : 1
fv : Actual : 80.51 psi at 6.775 ft in Span # 1
Fv : Allowable : 265.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.70	1.17					
Right Support	0.70	1.17					

Max Deflections

Transient Downward	0.065 in	Total Downward	0.105 in
Ratio	1377 >360	Ratio	861 >240
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Beyler Consulting
5920 100th St SW, Suite 25
Lakewood, WA 98499
(253) 984-2900

Project Title: Sitka 1949
Engineer:
Project ID:
Project Descr:

Printed: 6 AUG 2019, 7:30AM

Multiple Simple Beam

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Lic. # : KW-06011448 Beyler Consulting, LLC

Description : ROOF BEAMS

Wood Beam Design : RB-13

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : **3.125x9, GLB, Fully Unbraced**
Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species :	DF/DF					Wood Grade :	24F - V4				
Fb - Tension	2,400.0 psi	Fc - Prll	1,650.0 psi	Fv	265.0 psi	Ebend- xx	1,800.0 ksi	Density	31.210 pcf		
Fb - Compr	1,850.0 psi	Fc - Perp	650.0 psi	Ft	1,100.0 psi	Eminbend - xx	950.0 ksi				

Applied Loads

Unif Load: D = 0.1870, L = 0.3120 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.426** : 1
fb : Actual : 998.00 psi at 3.750 ft in Span # 1
Fb : Allowable : 2,342.58 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.304** : 1
fv : Actual : 80.51 psi at 6.775 ft in Span # 1
Fv : Allowable : 265.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.70	1.17					
Right Support	0.70	1.17					

Max Deflections

Transient Downward	0.065 in	Total Downward	0.105 in
Ratio	1377 >360	Ratio	861 >240
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB-14

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : **4x10, Sawn, Fully Unbraced**
Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species :	Hem Fir					Wood Grade :	No.2				
Fb - Tension	850.0 psi	Fc - Prll	1,300.0 psi	Fv	150.0 psi	Ebend- xx	1,300.0 ksi	Density	26.840 pcf		
Fb - Compr	850.0 psi	Fc - Perp	405.0 psi	Ft	525.0 psi	Eminbend - xx	470.0 ksi				

Applied Loads

Unif Load: D = 0.270, L = 0.450 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.773** : 1
fb : Actual : 778.98 psi at 3.000 ft in Span # 1
Fb : Allowable : 1,007.73 psi
Load Comb : +D+L+H

Max fv/FvRatio = **0.498** : 1
fv : Actual : 74.72 psi at 5.240 ft in Span # 1
Fv : Allowable : 150.00 psi
Load Comb : +D+L+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.81	1.35					
Right Support	0.81	1.35					

Max Deflections

Transient Downward	0.044 in	Total Downward	0.070 in
Ratio	1637 >360	Ratio	1023 >240
	LC: L Only		LC: +D+L+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Multiple Simple Beam

Wood Beam Design : RB-15

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : **4x8, Sawn, Fully Unbraced**
Using Allowable Stress Design with ASCE 7-16 Load Combinations, Major Axis Bending

Wood Species : Hem Fir
Wood Grade : No.2

Fb - Tension	850.0 psi	Fc - Prll	1,300.0 psi	Fv	150.0 psi	Ebend- xx	1,300.0 ksi	Density	26.840 pcf
Fb - Compr	850.0 psi	Fc - Perp	405.0 psi	Ft	525.0 psi	Eminbend - xx	470.0 ksi		

Applied Loads

Unif Load: D = 0.330, S = 0.540 k/ft, Trib= 1.0 ft

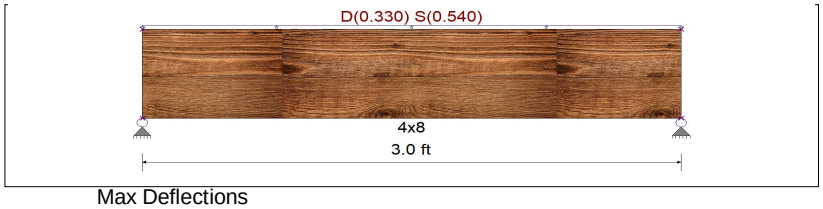
Design Summary

Max fb/Fb Ratio = **0.303** : 1
fb : Actual : 383.05 psi at 1.500 ft in Span # 1
Fb : Allowable : 1,263.86 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.268** : 1
fv : Actual : 46.29 psi at 2.400 ft in Span # 1
Fv : Allowable : 172.50 psi
Load Comb : +D+S+H

Max Reactions (k)

	D	L	Lr	S	W	E	H
Left Support	0.50			0.81			
Right Support	0.50			0.81			

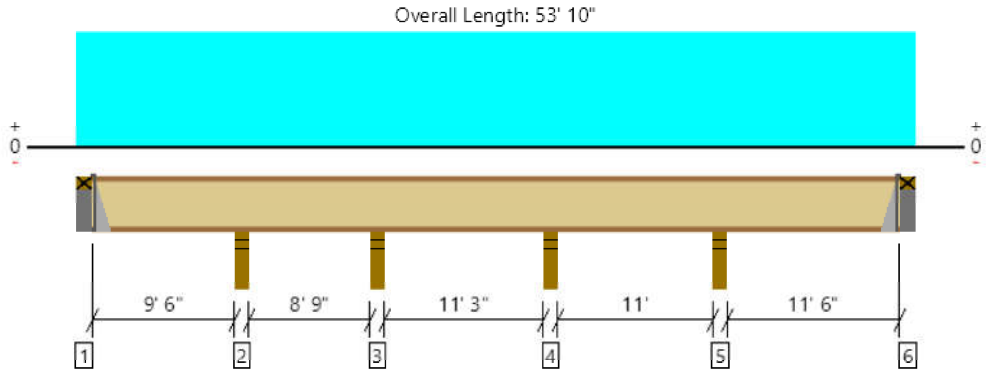


Max Deflections

Transient Downward	0.007 in	Total Downward	0.011 in
Ratio	5257 >360	Ratio	3263 >240
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Level, Floor: Joist

1 piece(s) 11 7/8" TJI® 110 @ 19.2" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1200 @ 41' 10 1/4"	1935 (3.50")	Passed (62%)	1.00	1.0 D + 1.0 L (Adj Spans)
Shear (lbs)	579 @ 42'	1716	Passed (34%)	1.00	1.0 D + 1.0 L (Adj Spans)
Moment (Ft-lbs)	-1332 @ 41' 10 1/4"	3160	Passed (42%)	1.00	1.0 D + 1.0 L (Adj Spans)
Live Load Defl. (in)	0.076 @ 47' 11 3/16"	0.388	Passed (L/999+)	–	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.099 @ 48' 1/4"	0.582	Passed (L/999+)	–	1.0 D + 1.0 L (Alt Spans)
TJ-Pro™ Rating	56	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 5' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 4' 11" 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 - Hanger on Single 2X HF plate	4.00"	Hanger[1]	1.75" / - [2]	102	301/-8	403/-8	See note [1]
2 - Stud wall - HF	3.50"	3.50"	3.50"	246	744	990	None
3 - Stud wall - HF	3.50"	3.50"	3.50"	244	784	1028	None
4 - Stud wall - HF	3.50"	3.50"	3.50"	271	841	1112	None
5 - Stud wall - HF	3.50"	3.50"	3.50"	311	889	1200	None
6 - Hanger on Single 2X HF plate	4.00"	Hanger[1]	1.75" / - [2]	119	353/-14	472/-14	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

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Top Mount Hanger	ITS1.81/11.88	2.00"	4-10dx1.5	2-10dx1.5	2-Strong-Grip	
6 - Top Mount Hanger	ITS1.81/11.88	2.00"	4-10dx1.5	2-10dx1.5	2-Strong-Grip	

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 53' 10"	19.2"	15.0	40.0	Default Load

Weyerhaeuser Notes

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

ForteWEB Software Operator	Job Notes
Amanda Lange Beyler Consulting alange@beylerconsulting.com	

Permit Number: 20-00723

BEYLER CONSULTING
5920 100th Street, Suite 25, Lakewood, WA 98499
(253) 984-2900
beylerconsulting.com
Plan. Design. Manage.

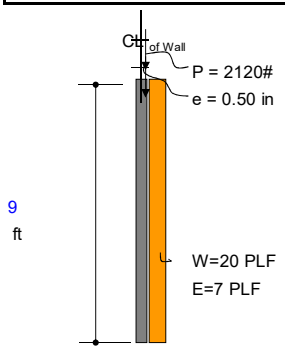
Page#:

DESIGNED: AEL

PROJECT:

STUD WALL DESIGN

2x6 Stud Capacity — 2015 NDS/2015 IBC



9 ft

AXIAL LOADS P	
P_{DL} (#/ft) =	596
P_{SL} (#/ft) =	994
P_{LL} (#/ft) =	0
P_{TOT} (#/ft) =	1590
e (IN) =	0.5
TRIB. (IN) =	16

LATERAL LOADS W	
W (PSF) =	15.00
E (PSF) =	5.00
TRIB. (IN) =	16

DESIGN VALUES		
F_b (psi) =	675	Hem Fir
F_v (psi) =	150	Stud Grade
F_c (psi) =	800	Bending X-X axis
$F_{c\perp}$ (psi) =	405	405
E (psi) =	1.20E+06	Incised, No
E_{min} (psi) =	4.40E+05	Wet Use, No
C_r =	1	Repetive, No
L_u (in) =	48	Full Bracing, Yes
c =	0.8	(Sawn Lumber)
K_e =	1	(Appendix G)
C_b =	1.00	(Bearing Area Factor)

Bearing wall Fire rated ? No

Fire Retardant FirePRO? No

Header Bearing Area (in^2) = 5.25 405 = $F_{c\perp}$ (psi

Use: (1) 2" X 6" @ 16" O.C. OK

MEMBER SIZE		SECTION PROPERTIES	
QUANITY	1	A =	8.25 in^2
b =	1.5 in	S =	7.56 in^3
d =	5.5 in	I =	20.80 in^4

	(Eq. 16-9)	(Eq. 16-10)	(Eq. 16-11)	(Eq. 16-12)	(Eq. 16-13)	
LOAD CASES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)	
L_u (ft) =	9	9	9	9	9	
$V_{applied}$ (#) =	4	10	8	94	76	
$M_{applied}$ (ft-#) =	17	44	37	227	202	
$P_{applied}$ (#) =	795	2120	1789	795	1789	
C_D =	1	1.15	1.15	1.6	1.6	
BENDING STESS CALCS		F_{bE} (psi)= 17476		C_{bF} = 1		(Table 4a Bending)
F_b* (psi)=	675	776	776	1080	1080	(Eq 3.7-1)
C_L =	1	1	1	1	1	(Eq 3.7-1)
F'$_b$ (psi)=	675	776	776	1080	1080	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 938		C_{cF} = 1		(Table 4a Compression)
L_e/d =	19.64	19.64	19.64	19.64	19.64	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	800	920	920	1280	1280	(Eq 3.7-1)
C_P =	0.742970896	0.697636299	0.697636299	0.576163928	0.576163928	(Eq 3.7-1)
F'c (psi)=	594	642	642	737	737	(Table 4.3.1)
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)	
V_{allow} (#) =	825	949	949	1320	1320	$V_{allow} = A * F_v * C_D / 1.5$
M_{allow} (ft - #) =	425	489	489	681	681	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	4904	5295	5295	6084	6084	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.07	0.28	0.21	0.39	0.47	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.10	0.27	0.23	0.10	0.23	(Eq 3.9-4)
$P_{c\perp allow}$ on PL (#) =	3341	3341	3341	3341	3341	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	2126	2126	2126	2126	2126	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/913	L/1217	$L/(I * E / 15 * L * M_{applied})$
240	0.00	0.00	0.00	0.12	0.09	(1.0) x W Table 1604.3(f)
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)	Actual △
SHEAR V	OK	OK	OK	OK	OK	
$V_{applied}/V_{allow}$	0.4%	1.0%	0.9%	7.1%	5.7%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	3.9%	9.0%	7.6%	33.3%	29.7%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	16.2%	40.0%	33.8%	13.1%	29.4%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	7.0%	28.5%	21.3%	38.9%	47.3%	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	10.3%	27.4%	23.1%	10.3%	23.1%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	23.8%	63.4%	53.5%	23.8%	53.5%	
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	37.4%	99.7%	84.1%	37.4%	84.1%	
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	26.3%	19.7%	
Overall Check	OK	OK	OK	OK	OK	

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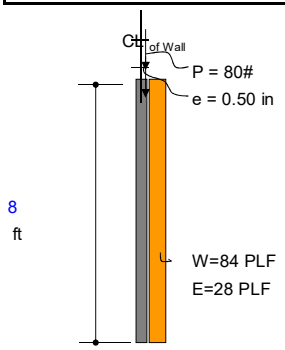
STUD WALL DESIGN

Opening jamb_(1)2x6

2015 NDS/2015 IBC



AXIAL LOADS P	
P_{DL} (#/ft) =	30
P_{SL} (#/ft) =	50
P_{LL} (#/ft) =	0
P_{TOT} (#/ft) =	80
e (IN) =	0.5
TRIB. (IN) =	12

LATERAL LOADS W	
W (PSF) =	15.00
E (PSF) =	5.00
TRIB. (IN) =	67

DESIGN VALUES		
F_b (psi) =	675	Hem Fir
F_v (psi) =	150	Stud Grade
F_c (psi) =	800	Bending X-X axis
$F_{c\perp}$ (psi) =	405	405
E (psi) =	1.20E+06	Incised, No
E_{min} (psi) =	4.40E+05	Wet Use, No
C_r =	1	Repetive, No
L_u (in) =	48	Full Bracing, Yes
c =	0.8	(Sawn Lumber)
K_e =	1	(Appendix G)
C_b =	1.00	(Bearing Area Factor)

Bearing wall Fire rated ? No

Fire Retardant FirePRO? No

Header Bearing Area (in^2) = 5.25 405 = $F_{c\perp}$ (psi

Use: (1) 2" X 6" @ 67" O.C. OK

MEMBER SIZE		SECTION PROPERTIES	
QUANITY	1	A =	8.25 in^2
b =	1.5 in	S =	7.56 in^3
d =	5.5 in	I =	20.80 in^4

	(Eq. 16-9)	(Eq. 16-10)	(Eq. 16-11)	(Eq. 16-12)	(Eq. 16-13)	
LOAD CASES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)	
L_u (ft) =	8	8	8	8	8	
$V_{applied}$ (#) =	0	0	0	335	252	
$M_{applied}$ (ft-#) =	1	2	1	671	505	
$P_{applied}$ (#) =	30	80	68	30	68	
C_D =	1	1.15	1.15	1.6	1.6	
BENDING STESS CALCS		F_{bE} (psi)= 17476		C_{bF} = 1		(Table 4a Bending)
F_b* (psi)=	675	776	776	1080	1080	(Eq 3.7-1)
C_L =	1	1	1	1	1	(Eq 3.7-1)
F'$_b$ (psi)=	675	776	776	1080	1080	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 1187		C_{cF} = 1		(Table 4a Compression)
L_e/d =	17.45	17.45	17.45	17.45	17.45	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	800	920	920	1280	1280	(Eq 3.7-1)
C_P =	0.807335714	0.771048404	0.771048404	0.664398931	0.664398931	(Eq 3.7-1)
F'c (psi)=	646	709	709	850	850	(Table 4.3.1)
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)	
V_{allow} (#) =	825	949	949	1320	1320	$V_{allow} = A * F_v * C_D / 1.5$
M_{allow} (ft - #) =	425	489	489	681	681	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	5328	5852	5852	7016	7016	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.00	0.00	0.00	0.99	0.75	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.00	0.01	0.01	0.00	0.01	(Eq 3.9-4)
$P_{c\perp allow}$ on PL (#) =	3341	3341	3341	3341	3341	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	2126	2126	2126	2126	2126	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/310	L/414	L/(I * E / 15 * L *$M_{applied}$)
240	0.00	0.00	0.00	0.31	0.23	(1.0) x W Table 1604.3(f)
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)	Actual △
SHEAR V	OK	OK	OK	OK	OK	
$V_{applied}/V_{allow}$	0.0%	0.0%	0.0%	25.4%	19.1%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	0.1%	0.3%	0.3%	98.6%	74.2%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	0.6%	1.4%	1.2%	0.4%	1.0%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	0.2%	0.4%	0.3%	98.9%	74.8%	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	0.3%	0.8%	0.7%	0.3%	0.7%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	0.9%	2.4%	2.0%	0.9%	2.0%	
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	1.4%	3.8%	3.2%	1.4%	3.2%	
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	77.3%	58.0%	
Overall Check	OK	OK	OK	OK	OK	

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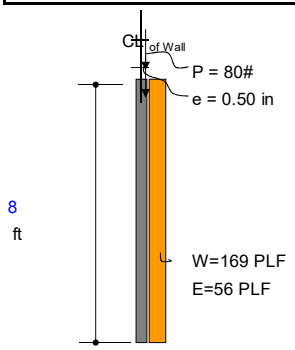
STUD WALL DESIGN

Opening jamb_(2)2x6

2015 NDS/2015 IBC



AXIAL LOADS P	
P_{DL} (#/ft) =	30
P_{SL} (#/ft) =	50
P_{LL} (#/ft) =	0
P_{TOT} (#/ft) =	80
e (IN) =	0.5
TRIB. (IN) =	12

LATERAL LOADS W	
W (PSF) =	15.00
E (PSF) =	5.00
TRIB. (IN) =	135

DESIGN VALUES		
F_b (psi) =	675	Hem Fir
F_v (psi) =	150	Stud Grade
F_c (psi) =	800	Bending X-X axis
$F_{c\perp}$ (psi) =	405	405
E (psi) =	1.20E+06	Incised, No
E_{min} (psi) =	4.40E+05	Wet Use, No
C_r =	1	Repetive, No
L_u (in) =	48	Full Bracing, Yes
c =	0.8	(Sawn Lumber)
K_e =	1	(Appendix G)
C_b =	1.00	(Bearing Area Factor)

Bearing wall Fire rated ? No

Fire Retardant FirePRO? No

Header Bearing Area (in^2) = 10.5 405 = $F_{c\perp}$ (psi

Use: (2) 2" X 6" @ 135" O.C. OK

MEMBER SIZE		SECTION PROPERTIES	
QUANITY	2	A =	16.50 in^2
b =	1.5 in	S =	15.13 in^3
d =	5.5 in	I =	41.59 in^4

	(Eq. 16-9)	(Eq. 16-10)	(Eq. 16-11)	(Eq. 16-12)	(Eq. 16-13)	
LOAD CASES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)	
L_u (ft) =	8	8	8	8	8	
$V_{applied}$ (#) =	0	0	0	675	507	
$M_{applied}$ (ft-#) =	1	2	1	1351	1015	
$P_{applied}$ (#) =	30	80	68	30	68	
C_D =	1	1.15	1.15	1.6	1.6	
BENDING STESS CALCS		F_{bE} (psi)= 17476		C_{bF} = 1		(Table 4a Bending)
F_b* (psi)=	675	776	776	1080	1080	(Eq 3.7-1)
C_L =	1	1	1	1	1	(Eq 3.7-1)
F'$_b$ (psi)=	675	776	776	1080	1080	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 1187		C_{cF} = 1		(Table 4a Compression)
L_e/d =	17.45	17.45	17.45	17.45	17.45	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	800	920	920	1280	1280	(Eq 3.7-1)
C_P =	0.807335714	0.771048404	0.771048404	0.664398931	0.664398931	(Eq 3.7-1)
F'c (psi)=	646	709	709	850	850	(Table 4.3.1)
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)	
V_{allow} (#) =	1650	1898	1898	2640	2640	$V_{allow} = A * F_v * C_D / 1.5$
M_{allow} (ft - #) =	851	978	978	1361	1361	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	21314	23409	23409	28064	28064	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.00	0.00	0.00	0.99	0.75	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.00	0.00	0.00	0.00	0.00	(Eq 3.9-4)
$P_{c\perp allow}$ on PL (#) =	6683	6683	6683	6683	6683	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	4253	4253	4253	4253	4253	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/308	L/411	$L/(I * E / 15 * L * M_{applied})$
240	0.00	0.00	0.00	0.31	0.23	(1.0) x W Table 1604.3(f)
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)	Actual △
SHEAR V	OK	OK	OK	OK	OK	
$V_{applied}/V_{allow}$	0.0%	0.0%	0.0%	25.6%	19.2%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	0.1%	0.2%	0.1%	99.3%	74.6%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	0.1%	0.3%	0.3%	0.1%	0.2%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	0.1%	0.2%	0.1%	99.4%	74.8%	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	0.2%	0.4%	0.3%	0.2%	0.3%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	0.4%	1.2%	1.0%	0.4%	1.0%	
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	0.7%	1.9%	1.6%	0.7%	1.6%	
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	77.9%	58.4%	
Overall Check	OK	OK	OK	OK	OK	

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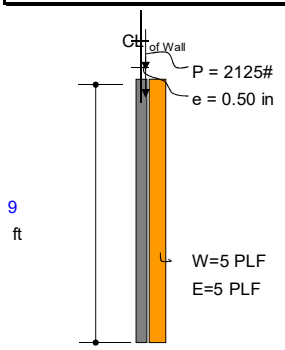
STUD WALL DESIGN

4x_Header_(1)Bearing Stud — 2015 NDS/2015 IBC



9 ft

AXIAL LOADS P	
P_{DL} (#/ft) =	797
P_{SL} (#/ft) =	1328
P_{LL} (#/ft) =	0
P_{TOT} (#/ft) =	2125
e (IN) =	0.5
TRIB. (IN) =	12

LATERAL LOADS W	
W (PSF) =	5.00
E (PSF) =	5.00
TRIB. (IN) =	12

DESIGN VALUES		
F_b (psi) =	675	Hem Fir
F_v (psi) =	150	Stud Grade
F_c (psi) =	800	Bending X-X axis
$F_{c\perp}$ (psi) =	405	405
E (psi) =	1.20E+06	Incised, No
E_{min} (psi) =	4.40E+05	Wet Use, No
C_r =	1	Repetive, No
L_u (in) =	48	Full Bracing, Yes
c =	0.8	(Sawn Lumber)
K_e =	1	(Appendix G)
C_b =	1.00	(Bearing Area Factor)

Bearing wall Fire rated ? No

Fire Retardant FirePRO? No

Header Bearing Area (in^2) = 5.25 405 = $F_{c\perp}$ (psi

Use: (1) 2" X 6" @ 12" O.C. OK

MEMBER SIZE		SECTION PROPERTIES	
QUANITY	1	A =	8.25 in^2
b =	1.5 in	S =	7.56 in^3
d =	5.5 in	I =	20.80 in^4

	(Eq. 16-9)	(Eq. 16-10)	(Eq. 16-11)	(Eq. 16-12)	(Eq. 16-13)	
LOAD CASES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W or E	.+0.75(LL+SL+WorE)	
L_u (ft) =	9	9	9	9	9	
$V_{applied}$ (#) =	4	10	8	26	25	
$M_{applied}$ (ft-#) =	17	44	37	69	79	
$P_{applied}$ (#) =	797	2125	1793	797	1793	
C_D =	1	1.15	1.15	1.6	1.6	
BENDING STESS CALCS		F_{bE} (psi)= 17476		C_{bF} = 1		(Table 4a Bending)
F_b* (psi)=	675	776	776	1080	1080	(Eq 3.7-1)
C_L =	1	1	1	1	1	(Eq 3.7-1)
F'$_b$ (psi)=	675	776	776	1080	1080	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 938		C_{cF} = 1		(Table 4a Compression)
L_e/d =	19.64	19.64	19.64	19.64	19.64	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	800	920	920	1280	1280	(Eq 3.7-1)
C_P =	0.742970896	0.697636299	0.697636299	0.576163928	0.576163928	(Eq 3.7-1)
F'c (psi)=	594	642	642	737	737	(Table 4.3.1)
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W or E	.+0.75(LL+SL+WorE)	
V_{allow} (#) =	825	949	949	1320	1320	$V_{allow} = A * F_v * C_D / 1.5$
M_{allow} (ft - #) =	425	489	489	681	681	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	4904	5295	5295	6084	6084	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.07	0.29	0.21	0.13	0.24	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.10	0.27	0.23	0.10	0.23	(Eq 3.9-4)
$P_{c\perp allow}$ on PL (#) =	3341	3341	3341	3341	3341	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	2126	2126	2126	2126	2126	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/3652	L/4869	$L/(I * E / 15 * L * M_{applied})$
240	0.00	0.00	0.00	0.03	0.02	(1.0) x W or E Table 1604.3(f)
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W or E	.+0.75(LL+SL+Wor	Actual △
SHEAR V	OK	OK	OK	OK	OK	
$V_{applied}/V_{allow}$	0.4%	1.0%	0.9%	2.0%	1.9%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	3.9%	9.0%	7.6%	10.2%	11.6%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	16.3%	40.1%	33.9%	13.1%	29.5%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	7.0%	28.6%	21.4%	13.0%	23.7%	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	10.3%	27.5%	23.2%	10.3%	23.2%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	23.8%	63.6%	53.7%	23.8%	53.7%	
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	37.5%	99.9%	84.3%	37.5%	84.3%	
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	6.6%	4.9%	
Overall Check	OK	OK	OK	OK	OK	

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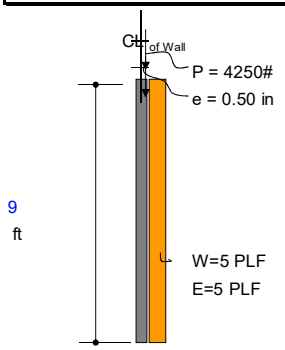
STUD WALL DESIGN

4x_Header_(2)Bearing Stud — 2015 NDS/2015 IBC



9 ft

AXIAL LOADS P	
P_{DL} (#/ft) =	1594
P_{SL} (#/ft) =	2656
P_{LL} (#/ft) =	0
P_{TOT} (#/ft) =	4250
e (IN) =	0.5
TRIB. (IN) =	12

LATERAL LOADS W	
W (PSF) =	5.00
E (PSF) =	5.00
TRIB. (IN) =	12

DESIGN VALUES		
F_b (psi) =	675	Hem Fir
F_v (psi) =	150	Stud Grade
F_c (psi) =	800	Bending X-X axis
$F_{c\perp}$ (psi) =	405	405
E (psi) =	1.20E+06	Incised, No
E_{min} (psi) =	4.40E+05	Wet Use, No
C_r =	1	Repetive, No
L_u (in) =	48	Full Bracing, Yes
c =	0.8	(Sawn Lumber)
K_e =	1	(Appendix G)
C_b =	1.00	(Bearing Area Factor)

Bearing wall Fire rated ? No

Fire Retardant FirePRO? No

Header Bearing Area (in^2) = 10.5 405 = $F_{c\perp}$ (psi

Use: (2) 2" X 6" @ 12" O.C. OK

MEMBER SIZE		SECTION PROPERTIES	
QUANITY	2	A =	16.50 in^2
b =	1.5 in	S =	15.13 in^3
d =	5.5 in	I =	41.59 in^4

	(Eq. 16-9)	(Eq. 16-10)	(Eq. 16-11)	(Eq. 16-12)	(Eq. 16-13)	
LOAD CASES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W or E	+0.75(LL+SL+WorE)	
L_u (ft) =	9	9	9	9	9	
$V_{applied}$ (#) =	7	20	17	30	33	
$M_{applied}$ (ft-#) =	33	89	75	86	116	
$P_{applied}$ (#) =	1594	4250	3586	1594	3586	
C_D =	1	1.15	1.15	1.6	1.6	
BENDING STESS CALCS		F_{bE} (psi)= 17476		C_{bF} = 1		(Table 4a Bending)
F_b* (psi)=	675	776	776	1080	1080	(Eq 3.7-1)
C_L =	1	1	1	1	1	(Eq 3.7-1)
F'$_b$ (psi)=	675	776	776	1080	1080	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 938		C_{cF} = 1		(Table 4a Compression)
L_e/d =	19.64	19.64	19.64	19.64	19.64	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	800	920	920	1280	1280	(Eq 3.7-1)
C_P =	0.742970896	0.697636299	0.697636299	0.576163928	0.576163928	(Eq 3.7-1)
F'c (psi)=	594	642	642	737	737	(Table 4.3.1)
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W or E	+0.75(LL+SL+WorE)	
V_{allow} (#) =	1650	1898	1898	2640	2640	$V_{allow} = A * F_v * C_D / 1.5$
M_{allow} (ft - #) =	851	978	978	1361	1361	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	19614	21180	21180	24337	24337	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.05	0.17	0.13	0.07	0.13	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.10	0.27	0.23	0.10	0.23	(Eq 3.9-4)
$P_{c\perp allow}$ on PL (#) =	6683	6683	6683	6683	6683	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	4253	4253	4253	4253	4253	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/7303	L/9738	L/(I * E / 15 * L *$M_{applied}$)
240	0.00	0.00	0.00	0.01	0.01	(1.0) x W or E Table 1604.3(f)
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W or E	+0.75(LL+SL+Wor	Actual △
SHEAR V	OK	OK	OK	OK	OK	
$V_{applied}/V_{allow}$	0.4%	1.0%	0.9%	1.1%	1.3%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	3.9%	9.0%	7.6%	6.3%	8.5%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	8.1%	20.1%	16.9%	6.5%	14.7%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	5.0%	16.5%	12.8%	7.5%	13.3%	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	10.3%	27.5%	23.2%	10.3%	23.2%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	23.8%	63.6%	53.7%	23.8%	53.7%	
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	37.5%	99.9%	84.3%	37.5%	84.3%	
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	3.3%	2.5%	
Overall Check	OK	OK	OK	OK	OK	

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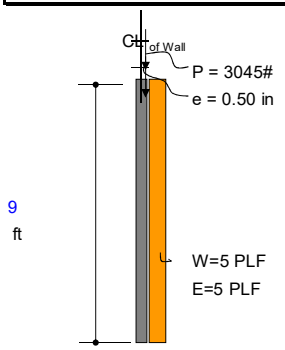
PROJECT:

STUD WALL DESIGN

3-1/8 GLB_Header_(1)Bearing Stud — 2015 NDS/2015 IBC



9 ft

AXIAL LOADS P	
P_{DL} (#/ft) =	1142
P_{SL} (#/ft) =	1903
P_{LL} (#/ft) =	0
P_{TOT} (#/ft) =	3045
e (IN) =	0.5
TRIB. (IN) =	12

LATERAL LOADS W	
W (PSF) =	5.00
E (PSF) =	5.00
TRIB. (IN) =	12

DESIGN VALUES			
F_b (psi) =	675	Hem Fir	
F_v (psi) =	150	Stud Grade	
F_c (psi) =	800	Bending X-X axis	
$F_{c\perp}$ (psi) =	405		405
E (psi) =	1.20E+06	Incised, No	
E_{min} (psi) =	4.40E+05	Wet Use, No	
C_r =	1	Repetive, No	
L_u (in) =	48	Full Bracing, Yes	
c =	0.8	(Sawn Lumber)	
K_e =	1	(Appendix G)	
C_b =	1.00	(Bearing Area Factor)	

Bearing wall Fire rated ? No

Fire Retardant FirePRO? No

Header Bearing Area (in^2) = 4.6875 — 650 = $F_{c\perp}$ (psi

Use: (1) 2" X 6" @ 12" O.C. OK

MEMBER SIZE		SECTION PROPERTIES	
QUANITY	1	A =	8.25 in^2
b =	1.5 in	S =	7.56 in^3
d =	5.5 in	I =	20.80 in^4

	(Eq. 16-9)	(Eq. 16-10)	(Eq. 16-11)	(Eq. 16-12)	(Eq. 16-13)	
LOAD CASES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W or E	+0.75(LL+SL+WorE)	
L_u (ft) =	9	9	9	9	9	
$V_{applied}$ (#) =	5	14	12	28	29	
$M_{applied}$ (ft-#) =	24	63	54	77	96	
$P_{applied}$ (#) =	1142	3045	2569	1142	2569	
C_D =	1	1.15	1.15	1.6	1.6	
BENDING STESS CALCS		F_{bE} (psi)= 17476		C_{bF} = 1		(Table 4a Bending)
F_b* (psi)=	675	776	776	1080	1080	(Eq 3.7-1)
C_L =	1	1	1	1	1	(Eq 3.7-1)
F'$_b$ (psi)=	675	776	776	1080	1080	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 938		C_{cF} = 1		(Table 4a Compression)
L_e/d =	19.64	19.64	19.64	19.64	19.64	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	800	920	920	1280	1280	(Eq 3.7-1)
C_P =	0.742970896	0.697636299	0.697636299	0.576163928	0.576163928	(Eq 3.7-1)
F'c (psi)=	594	642	642	737	737	(Table 4.3.1)
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W or E	+0.75(LL+SL+WorE)	
V_{allow} (#) =	825	949	949	1320	1320	$V_{allow} = A * F_v * C_D / 1.5$
M_{allow} (ft - #) =	425	489	489	681	681	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	4904	5295	5295	6084	6084	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.12	0.54	0.40	0.17	0.39	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.15	0.39	0.33	0.15	0.33	(Eq 3.9-4)
$P_{c\perp allow}$ on PL (#) =	3341	3341	3341	3341	3341	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	3047	3047	3047	3047	3047	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/3652	L/4869	$L/(I * E / 15 * L * M_{applied})$
240	0.00	0.00	0.00	0.03	0.02	(1.0) x W or E Table 1604.3(f)
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W or E	+0.75(LL+SL+Wor	Actual △
SHEAR V	OK	OK	OK	OK	OK	
$V_{applied}/V_{allow}$	0.6%	1.5%	1.3%	2.1%	2.2%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	5.6%	13.0%	10.9%	11.3%	14.1%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	23.3%	57.5%	48.5%	18.8%	42.2%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	12.0%	54.5%	39.9%	16.8%	39.0%	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	14.8%	39.3%	33.2%	14.8%	33.2%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	34.2%	91.1%	76.9%	34.2%	76.9%	
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	37.5%	99.9%	84.3%	37.5%	84.3%	
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	6.6%	4.9%	
Overall Check	OK	OK	OK	OK	OK	

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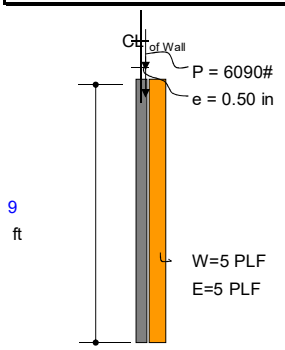
STUD WALL DESIGN

3-1/8 GLB_Header_(2)Bearing Stud — 2015 NDS/2015 IBC



9 ft

AXIAL LOADS P	
P_{DL} (#/ft) =	2284
P_{SL} (#/ft) =	3806
P_{LL} (#/ft) =	0
P_{TOT} (#/ft) =	6090
e (IN) =	0.5
TRIB. (IN) =	12

LATERAL LOADS W	
W (PSF) =	5.00
E (PSF) =	5.00
TRIB. (IN) =	12

DESIGN VALUES		
F_b (psi) =	675	Hem Fir
F_v (psi) =	150	Stud Grade
F_c (psi) =	800	Bending X-X axis
$F_{c\perp}$ (psi) =	405	405
E (psi) =	1.20E+06	Incised, No
E_{min} (psi) =	4.40E+05	Wet Use, No
C_r =	1	Repetive, No
L_u (in) =	48	Full Bracing, Yes
c =	0.8	(Sawn Lumber)
K_e =	1	(Appendix G)
C_b =	1.00	(Bearing Area Factor)

Bearing wall Fire rated ? No

Fire Retardant FirePRO? No

Header Bearing Area (in^2) = 9.375 — 650 = $F_{c\perp}$ (psi

Use: (2) 2" X 6" @ 12" O.C. OK

MEMBER SIZE		SECTION PROPERTIES	
QUANITY	2	A =	16.50 in^2
b =	1.5 in	S =	15.13 in^3
d =	5.5 in	I =	41.59 in^4

	(Eq. 16-9)	(Eq. 16-10)	(Eq. 16-11)	(Eq. 16-12)	(Eq. 16-13)	
LOAD CASES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W or E	DL+0.75(LL+SL+WorE)	
L_u (ft) =	9	9	9	9	9	
$V_{applied}$ (#) =	11	28	24	33	41	
$M_{applied}$ (ft-#) =	48	127	107	101	150	
$P_{applied}$ (#) =	2284	6090	5138	2284	5138	
C_D =	1	1.15	1.15	1.6	1.6	
BENDING STESS CALCS		F_{bE} (psi)= 17476		C_{bF} = 1		(Table 4a Bending)
F_b* (psi)=	675	776	776	1080	1080	(Eq 3.7-1)
C_L =	1	1	1	1	1	(Eq 3.7-1)
F'$_b$ (psi)=	675	776	776	1080	1080	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 938		C_{cF} = 1		(Table 4a Compression)
L_e/d =	19.64	19.64	19.64	19.64	19.64	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	800	920	920	1280	1280	(Eq 3.7-1)
C_P =	0.742970896	0.697636299	0.697636299	0.576163928	0.576163928	(Eq 3.7-1)
F'c (psi)=	594	642	642	737	737	(Table 4.3.1)
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W or E	DL+0.75(LL+SL+WorE)	
V_{allow} (#) =	1650	1898	1898	2640	2640	$V_{allow} = A * F_v * C_D / 1.5$
M_{allow} (ft - #) =	851	978	978	1361	1361	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	19614	21180	21180	24337	24337	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.08	0.30	0.22	0.10	0.21	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.15	0.39	0.33	0.15	0.33	(Eq 3.9-4)
$P_{c\perp allow}$ on PL (#) =	6683	6683	6683	6683	6683	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	6094	6094	6094	6094	6094	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/7303	L/9738	L/(I * E / 15 * L *$M_{applied}$)
240	0.00	0.00	0.00	0.01	0.01	(1.0) x W or E Table 1604.3(f)
CHECKS	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W or E	DL+0.75(LL+SL+Wor	Actual △
SHEAR V	OK	OK	OK	OK	OK	
$V_{applied}/V_{allow}$	0.6%	1.5%	1.3%	1.3%	1.5%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	5.6%	13.0%	10.9%	7.4%	11.0%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	11.6%	28.8%	24.3%	9.4%	21.1%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	7.9%	29.6%	22.3%	9.6%	20.9%	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	14.8%	39.3%	33.2%	14.8%	33.2%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	34.2%	91.1%	76.9%	34.2%	76.9%	
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	37.5%	99.9%	84.3%	37.5%	84.3%	
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	3.3%	2.5%	
Overall Check	OK	OK	OK	OK	OK	

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LATERAL DESIGN

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Job #
Designed: AEL
Date: 8/14/19

Project:

WIND ANALYSIS:

IBC 2015 / ASCE 7-10

Risk Category II I, II, III or IV Figure 26.5-1A I_W= 1.00 (ASCE Table 1.5-2)

110 Typical

Basic Wind Speed, V= 110 mph Section 26.5.1 **Exposure Category:** B Section 26.7.2
Mean Roof Height, h= 18.00 feet Alpha = 7
Parapet Height above roof, p= - feet Z_g = 1200
Building Width, B= 81.00 feet
Building Length, L= 42.00 feet Enclosed Building
Natural Period = 0.1409 sec GCpi =+/- 0.18 Table 26.11-1
Natural Frequency = 7.0972 Hz >= 1 Hz Therefore, Rigid Structure per Section 26.9
G = 0.8500 gust effect factor defined in section 26.9
$K_z = 2.01\ (z/z_g)^{2/alpha}$ (ASCE 7-10 **Table 27.3-1**) Section 27.3.1
$K_{zt} = (1 + K_1 K_2 K_3)^2$ = 1.00 (ASCE 7-10 **Eq. 26.8-1**) Section 26.8.2
K_d = 0.85 (ASCE 7-10 **Table 26-1**) Section 26.6
I = 1.00 (ASCE 7-10 **Table 1.5-2**)

Windward: P = qGCp - qi(GCpi) (ASCE 7-10) **(Eq. 27.4-1)**
C_p = 0.8 (windward) Figure 27.4-1

	Table 27.3-1	Eq. 27.3-1	Eq. 27.4-1a	Eq. 27.4-1b	Eq. 27.4-1	Eq. 27.4-1	**Totals**	
h	Sec. 27.3.1	Sec. 27.3.2	External	Internal	Total	Total	**Windward + Leeward**	h
feet	K_z	q_z (psf)	$q_z GC_p$	$-q_i(GC_{pi})$	q G Cp + qi	q G Cp - qi(GCpi)	Along B	Along L	feet
15	0.57	15.13	10.29	2.87	13.16	7.42	17.1 (10.2)	14.5 (8.7)	15
18	0.61	15.94	10.84	2.87	13.71	7.97	17.6 (10.6)	15.1 (9.1)	18
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
18	$q=q_h=q_i$=	15.94	10.84	2.87	13.71	7.97	17.6 (10.6)	15.1 (9.1)	18
0	$q=q_p$=	0.00	-	-	-	Parapet	0.0 (0.0)	0.0 (0.0)	Parapet

( ) values are ASD = ULT x 0.6

Leeward: P = qGCp - qi(GCpi) (ASCE 7-10) **(Eq.27.4-1)** Figure 27.4-1

	External	Internal	Total	Total	
q_h (psf)	$q_h GC_p$	$-q_i(GC_{pi})$	q G Cp - qi(	q G Cp + qi(GCpi)	
15.94	-4.26	2.87	-1.39	-7.13	Along L
15.94	-6.78	2.87	-3.91	-9.64	Along B

C_p = -0.314286 (Leeward along L)
C_p = -0.50 (Leeward along B)

Parapet: $P_p = q_p GC_{pn}$ (ASCE 7-10) **(Eq. 27.4-4)** Section 27.4.5

	Windward	Leeward
q_p(psf)	$q_p GC_{pn}$	$q_p GC_{pn}$
0.00	0.00	0.00

GC_{pn} = 1.5 (Windward Parapet)
GC_{pn} = -1.0 (Leeward Parapet)

Walls: P = q_h [(GC_p)-(GC_{pi})] (ASCE 7-10) **(Eq. 30.4-1)** h ≤ 60 ft Table 26.11-1

Area (ft^2)	GC_p(4&5)	Windward	GC_p(4)	Leeward	GC_p(5)	Leeward
10	1.00	18.8 (11.3)	-1.10	-20.4 (-12.2)	-1.40	-25.2 (-15.1)
25	0.93	17.7 (10.6)	-1.03	-19.3 (-11.6)	-1.26	-23.0 (-13.8)
50	0.88	16.9 (10.1)	-0.98	-18.5 (-11.1)	-1.16	-21.3 (-12.8)
200	0.77	15.2 (9.1)	-0.87	-16.7 (-10.0)	-0.94	-17.9 (-10.7)

GC_{pi} = 0.18 (Windward)
GC_{pi} = -0.18 (Leeward)
q_h(psf) = 15.94

( ) values are ASD = ULT x 0.6

Hazards by Location

Search Information

Address: 13238 Hadfield Rd SE, Olalla, WA 98359, USA

Coordinates: 47.43024399999999, -122.60680300000001

Elevation: ft

Timestamp: 2019-09-06T16:41:52.361Z

Hazard Type: Wind

ASCE 7-16

MRI 10-Year	67 mph
MRI 25-Year	73 mph
MRI 50-Year	78 mph
MRI 100-Year	83 mph
Risk Category I	92 mph
Risk Category II	98 mph
Risk Category III	104 mph
Risk Category IV	108 mph

ASCE 7-10

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

ASCE 7-05

ASCE 7-05 Wind Speed	85 mph

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

Disclaimer

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

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

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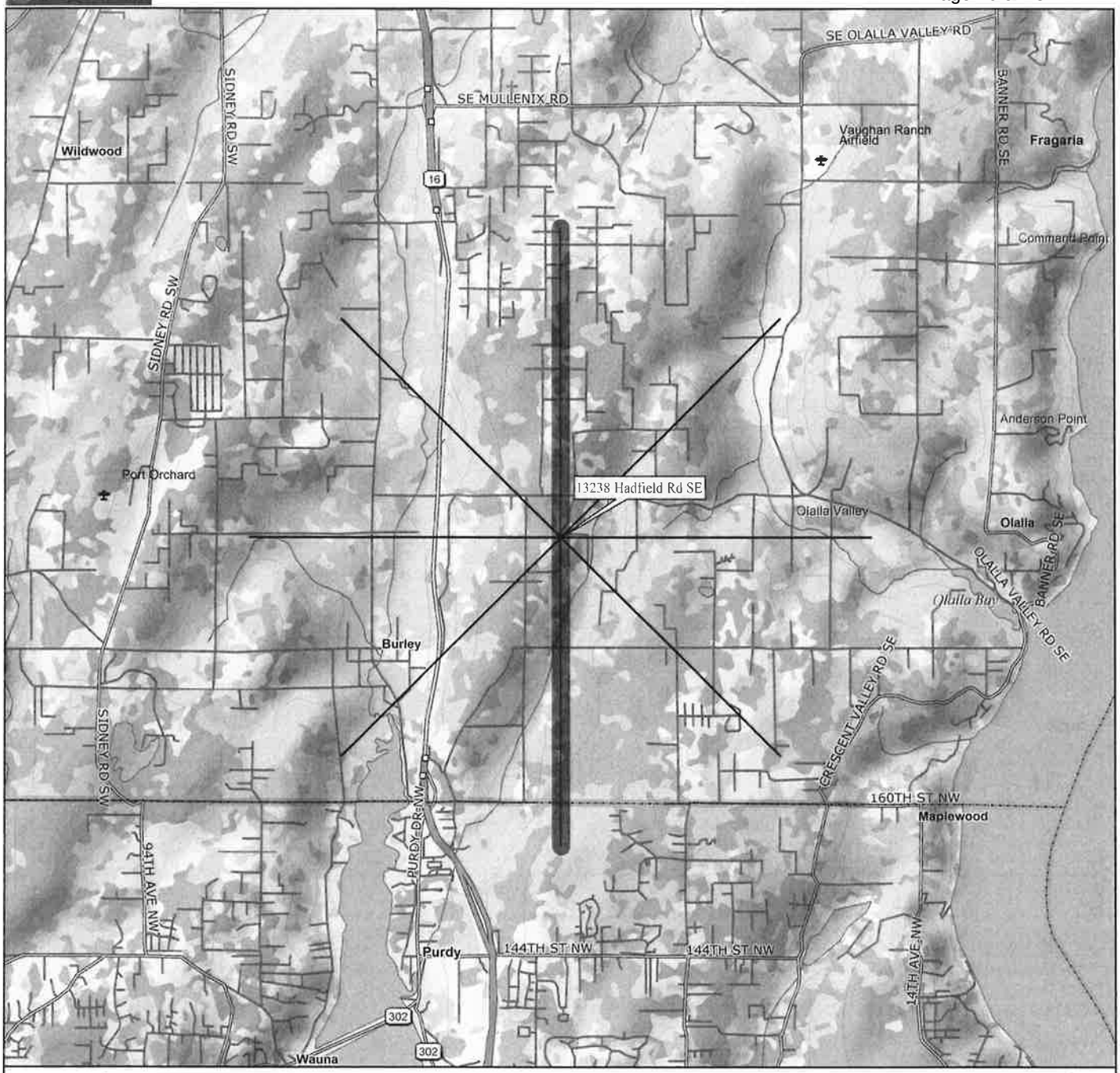
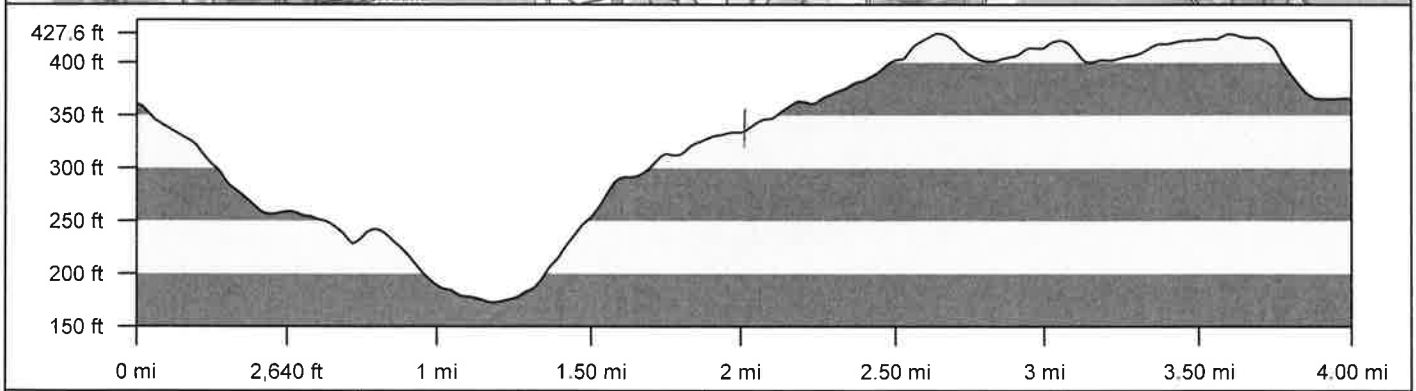




Lin Dist: 4.0 mi	Terr Dist: 4.0 mi	Elev Gain: 4.2 ft	Avg Grade: 3
Climb Elev: 324.0 ft	Desc Elev: 319.8 ft	Max. Elev: 427.6 ft	Min. Elev: 172.4 ft
Climb Dist: 2.2 mi	Desc Dist: 1.8 mi		

TN
MN (15.2°E)

Scale 1 : 62,500
1" = 5,208.3 ft Data Zoom 11-6

Permit Number: 20-00723

K_{ZT} Check 1

26.8 TOPOGRAPHIC EFFECTS

26.8.1 Wind Speed-Up over Hills, Ridges, and Escarpments

Wind speed-up effects at isolated hills, ridges, and escarpments constituting abrupt changes in the general topography, located in any exposure category, shall be included in the determination of the wind loads when buildings and other site conditions and locations of structures meet all of the following conditions:

Y	N	
☐	☒	1. The hill, ridge, or escarpment is isolated and unobstructed upwind by other similar topographic features of comparable height for 100 times the height of the topographic feature ($100H$) or 2 mi (3.22 km), whichever is less. This distance shall be measured horizontally from the point at which the height H of the hill, ridge, or escarpment is determined.
☐	☐	2. The hill, ridge, or escarpment protrudes above the height of upwind terrain features within a 2-mi (3.22-km) radius in any quadrant by a factor of two or more.
☐	☐	3. The structure is located as shown in Fig. 26.8-1 in the upper one-half of a hill or ridge or near the crest of an escarpment.
☐	☐	4. $H/L_h \geq 0.2$.
☐	☐	5. H is greater than or equal to 15 ft (4.5 m) for Exposure C and D and 60 ft (18 m) for Exposure B.

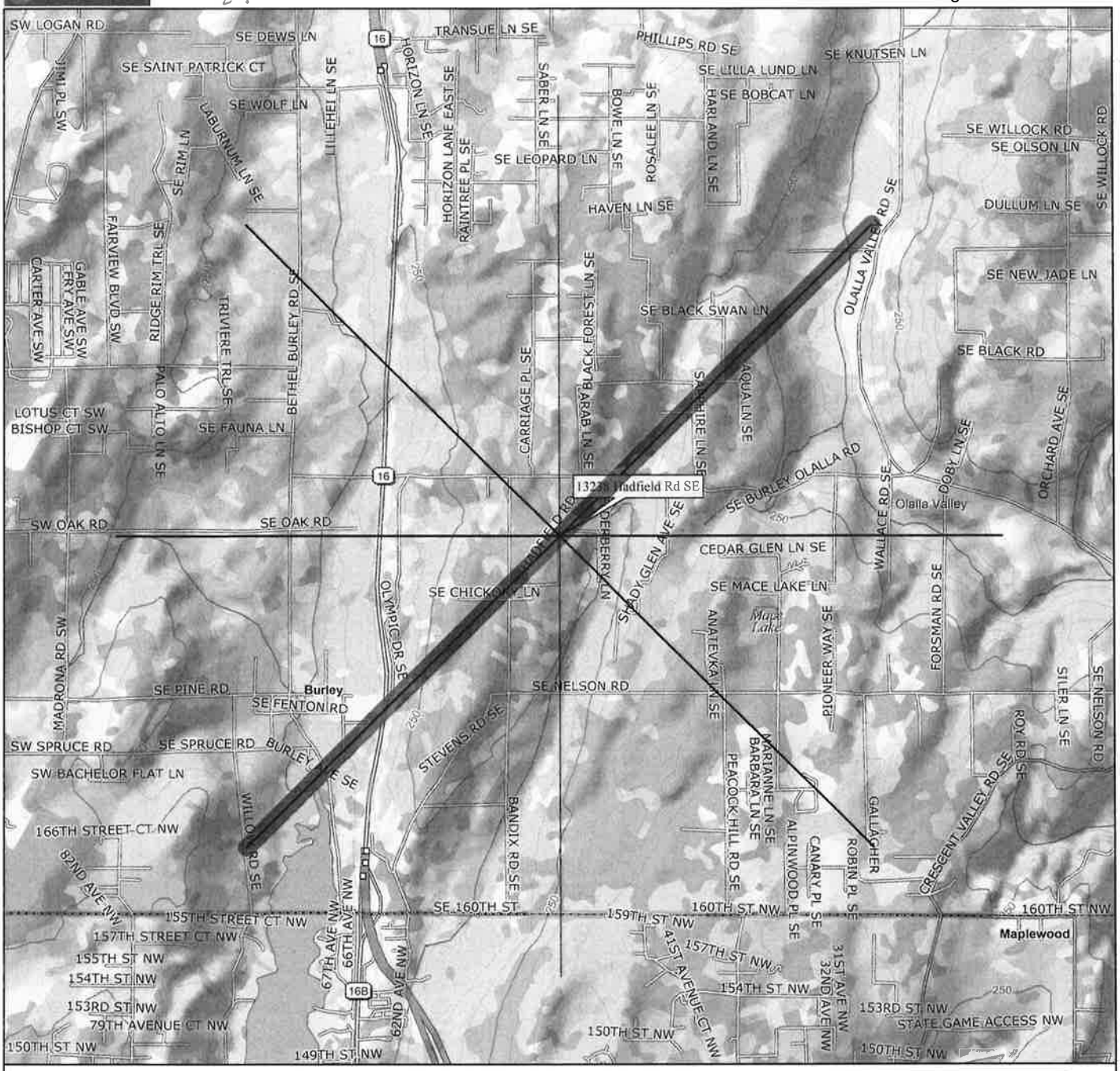
26.8.2 Topographic Factor

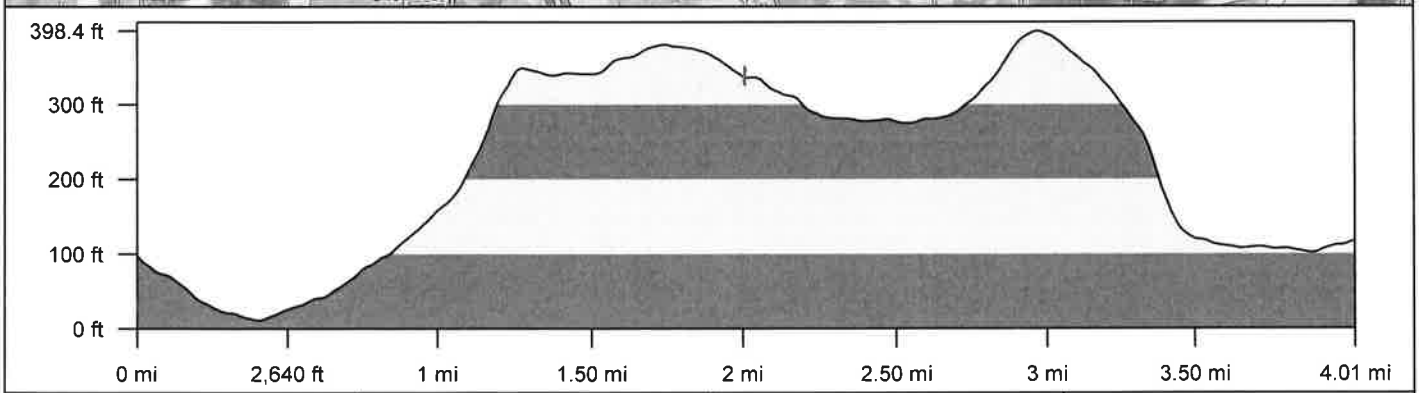
The wind speed-up effect shall be included in the calculation of design wind loads by using the factor K_{zt}:

$$K_{zt} = (1 + K_1K_2K_3)^2 \qquad (26.8\text{-}1)$$

where K_1, K_2, and K_3 are given in Fig. 26.8-1.

If site conditions and locations of buildings and other structures do not meet all the conditions specified in Section 26.8.1 then $K_{zt} = 1.0$.





Lin Dist: 4.0 mi	Terr Dist: 4.0 mi	Elev Gain: 20.4 ft	Avg Grade: 4
Climb Elev: 526.4 ft	Desc Elev: 506.1 ft	Max. Elev: 398.4 ft	Min. Elev: 11.1 ft
Climb Dist: 1.9 mi	Desc Dist: 2.1 mi		

TN
MN (15.2°E)

Scale 1 : 43,750
1" = 3,645.8 ft Data Zoom 12-2

Permit Number: 20-00723

K_{ZT} Check 2

26.8 TOPOGRAPHIC EFFECTS

26.8.1 Wind Speed-Up over Hills, Ridges, and Escarpments

Wind speed-up effects at isolated hills, ridges, and escarpments constituting abrupt changes in the general topography, located in any exposure category, shall be included in the determination of the wind loads when buildings and other site conditions and locations of structures meet all of the following conditions:

Y	N	
☐	☒	1. The hill, ridge, or escarpment is isolated and unobstructed upwind by other similar topographic features of comparable height for 100 times the height of the topographic feature ($100H$) or 2 mi (3.22 km), whichever is less. This distance shall be measured horizontally from the point at which the height H of the hill, ridge, or escarpment is determined.
☐	☐	2. The hill, ridge, or escarpment protrudes above the height of upwind terrain features within a 2-mi (3.22-km) radius in any quadrant by a factor of two or more.
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☐	☐	4. $H/L_h \geq 0.2$.
☐	☐	5. H is greater than or equal to 15 ft (4.5 m) for Exposure C and D and 60 ft (18 m) for Exposure B.

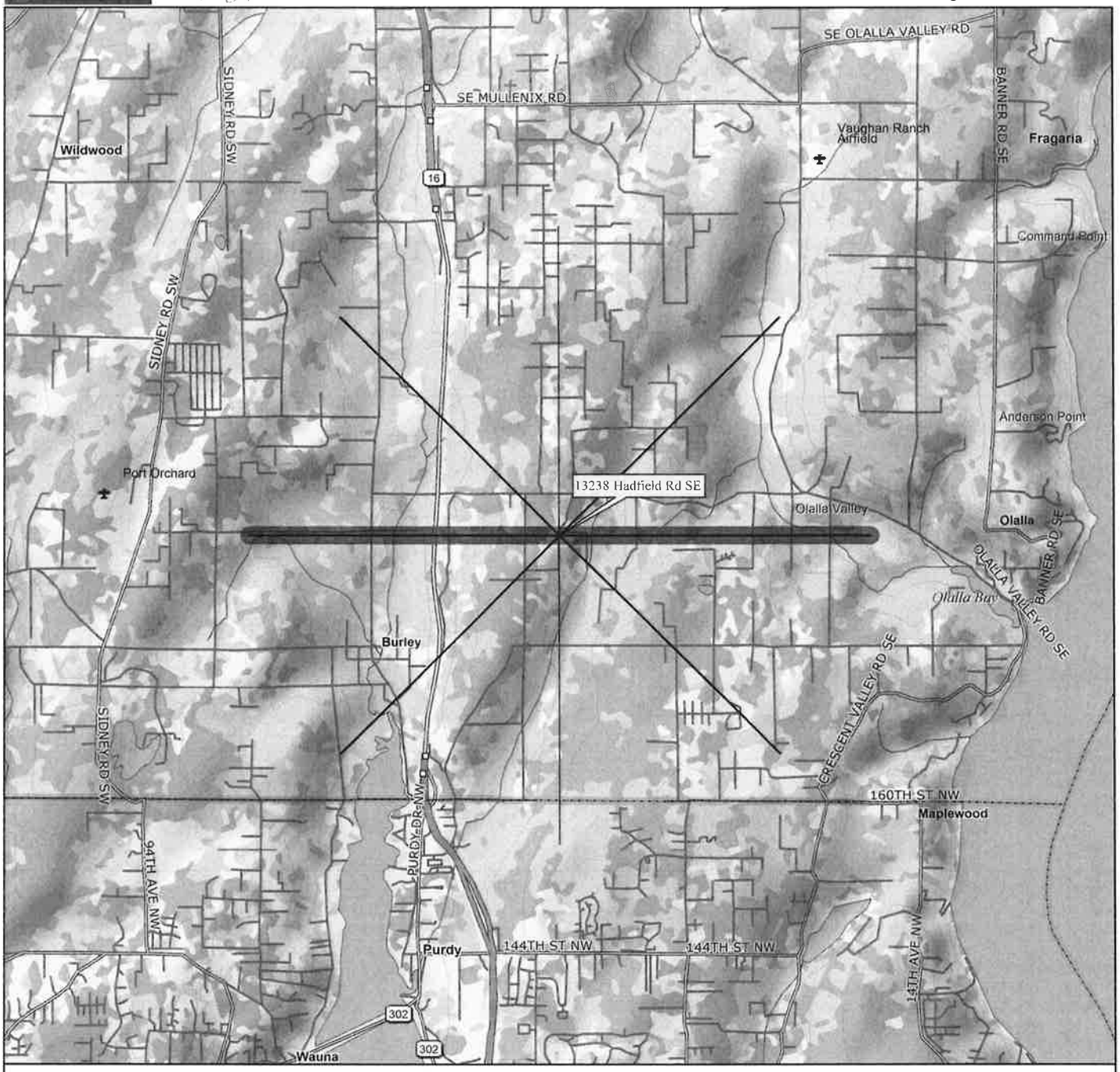
26.8.2 Topographic Factor

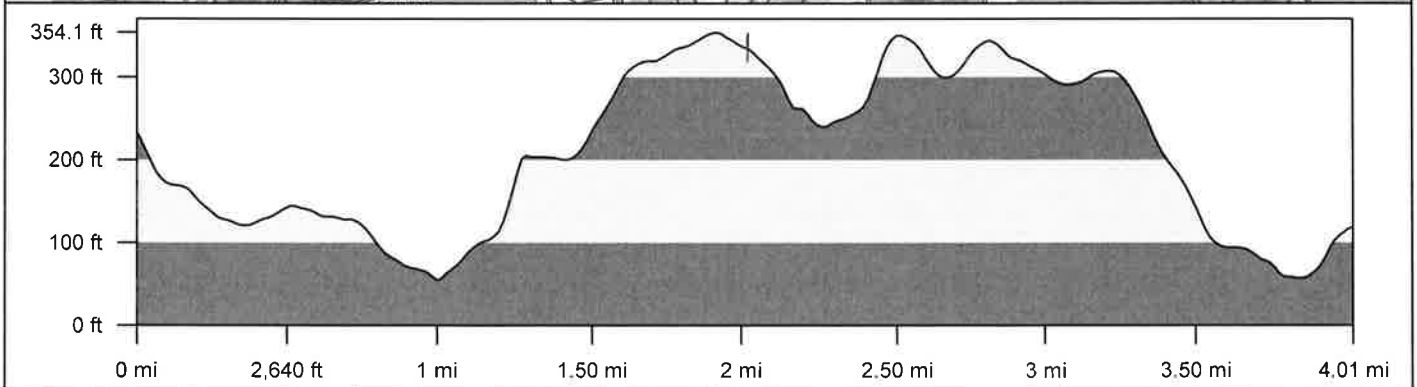
The wind speed-up effect shall be included in the calculation of design wind loads by using the factor K_{zt}:

$$K_{zt} = (1 + K_1 K_2 K_3)^2 \qquad (26.8\text{-}1)$$

where K_1, K_2, and K_3 are given in Fig. 26.8-1.

If site conditions and locations of buildings and other structures do not meet all the conditions specified in Section 26.8.1 then $K_{zt} = 1.0$.





Lin Dist: 4.0 mi	Terr Dist: 4.0 mi	Elev Gain: -114.5 ft	Avg Grade: 5
Climb Elev: 563.1 ft	Desc Elev: 677.6 ft	Max. Elev: 354.1 ft	Min. Elev: 54.9 ft
Climb Dist: 1.7 mi	Desc Dist: 2.3 mi		

TN
MN (15.2°E)

Scale 1 : 62,500
1" = 5,208.3 ft
Data Zoom 11-6

Permit Number: 20-00723

K_{ZT} Check 3

26.8 TOPOGRAPHIC EFFECTS

26.8.1 Wind Speed-Up over Hills, Ridges, and Escarpments

Wind speed-up effects at isolated hills, ridges, and escarpments constituting abrupt changes in the general topography, located in any exposure category, shall be included in the determination of the wind loads when buildings and other site conditions and locations of structures meet all of the following conditions:

Y	N	
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☐	☐	2. The hill, ridge, or escarpment protrudes above the height of upwind terrain features within a 2-mi (3.22-km) radius in any quadrant by a factor of two or more.
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☐	☐	5. H is greater than or equal to 15 ft (4.5 m) for Exposure C and D and 60 ft (18 m) for Exposure B.

26.8.2 Topographic Factor

The wind speed-up effect shall be included in the calculation of design wind loads by using the factor K_{zt}:

$$K_{zt} = (1 + K_1K_2K_3)^2 \qquad (26.8\text{-}1)$$

where K_1, K_2, and K_3 are given in Fig. 26.8-1.

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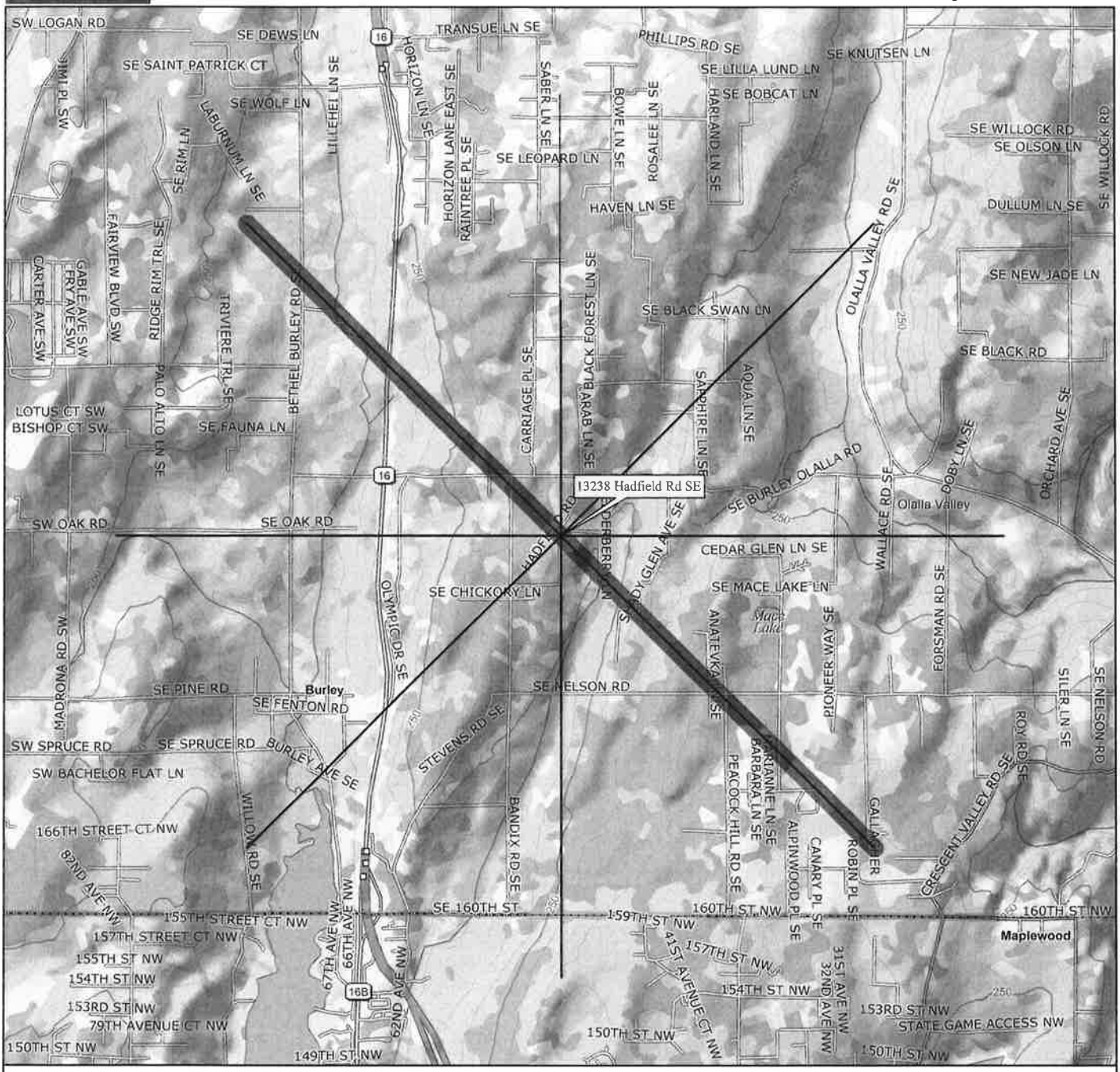

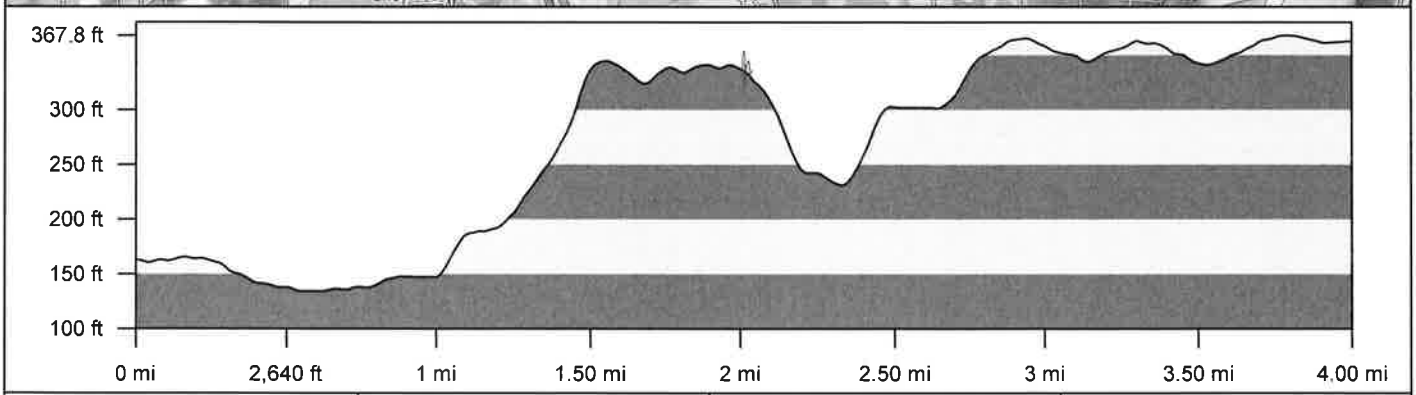

Lin Dist: 4.0 mi	Terr Dist: 4.0 mi	Elev Gain: 199.5 ft	Avg Grade: 3
Climb Elev: 430.0 ft	Desc Elev: 230.5 ft	Max. Elev: 367.8 ft	Min. Elev: 134.1 ft
Climb Dist: 2.2 mi	Desc Dist: 1.8 mi		

TN
MN (15.2°E)

Scale 1 : 43,750
1" = 3,645.8 ft Data Zoom 12-2

Permit Number: 20-00723

K_{ZT} Check

26.8 TOPOGRAPHIC EFFECTS

26.8.1 Wind Speed-Up over Hills, Ridges, and Escarpments

Wind speed-up effects at isolated hills, ridges, and escarpments constituting abrupt changes in the general topography, located in any exposure category, shall be included in the determination of the wind loads when buildings and other site conditions and locations of structures meet all of the following conditions:

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☐	☒	1. The hill, ridge, or escarpment is isolated and unobstructed upwind by other similar topographic features of comparable height for 100 times the height of the topographic feature ($100H$) or 2 mi (3.22 km), whichever is less. This distance shall be measured horizontally from the point at which the height H of the hill, ridge, or escarpment is determined.
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☐	☐	3. The structure is located as shown in Fig. 26.8-1 in the upper one-half of a hill or ridge or near the crest of an escarpment.
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$$K_{zt} = (1 + K_1K_2K_3)^2 \qquad (26.8\text{-}1)$$

where K_1, K_2, and K_3 are given in Fig. 26.8-1.

If site conditions and locations of buildings and other structures do not meet all the conditions specified in Section 26.8.1 then $K_{zt} = 1.0$.

BEYLER CONSULTING
5920 100th Street, Suite 25, Lakewood, WA 98499
(253) 984-2900
beylerconsulting.com
Plan. Design. Manage

Job # ***Sheet:***

Designed: AEL ***Date:*** 9/13/19

Checked: ***Date:***

Project:

SEISMIC ANALYSIS:

IBC 2015 / ASCE 7-10

Site Class:

Site Class: D (IBC 1613.3.2, ASCE Table 20.3-1)

Site Location:

Latitude: 47.43024 Longitude: -122.60680

Site Coefficients: (USGS Open-File Report 01-437)

S_S = 1.449 F_a = 1.00

S_1 = 0.56 F_V = 1.50

$S_{MS} = F_a * S_S$ = 1.449 (IBC Eq.16-37)

$S_{M1} = F_V * S_1$ = 0.84 (IBC Eq.16-38)

Spectral Response Parameters:

$S_{DS} = 2/3 * S_{MS}$ = 0.9660 (IBC Eq.16-39)

$S_{D1} = 2/3 * S_{M1}$ = 0.5600 (IBC Eq.16-40)

Structure Period:

$T_a = C_t * (h_n)^x$ = 0.1409 (ASCE Eq. 12.8-7)

h_n = 13.5 Ft.

C_t = 0.02 (ASCE Table 12.8-2)

x = 0.75 (ASCE Table 12.8-2)

C_u = 1.4 (ASCE Table 12.8-1)

$T_{(MAX)} = C_u * T_a$ = 0.1972 (ASCE 12.8.2)

Seismic Use Group:

Risk Category: I or II I or II, III, IV (ASCE7 11.5.1) I = 1.00 (ASCE Table 1.5-2)

Seismic Design Category:

Seismic Design Category: D (IBC 1613.3.5, ASCE 11.6)

Seismic Design Category(S_{DS}): D IBC Table 1613.3.5(1), ASCE Table 11.6-1 Short Period (S_{DS})

Seismic Design Category(S_{D1}): D IBC Table 1613.3.5(2), ASCE Table 11.6-2 1 Second Period (S_{D1})

Seismic Response Coefficients

$C_S = S_{DS}/(R/I_E)$ = 0.1486 (ASCE Eg 12.8-2)

R = 6.50 (ASCE 7 Table 12.2-1) wood shear wall

I_E = 1.00 (ASCE Table 1.5-2)

CS(Max) = 0.6116

$S_{D1} / ((R / I_E) * Ta)$ = 0.6116 (ASCE Eq 12.8-3) for T <= T_L OK T_L= 4

$S_{D1} * T_L / ((R / I_E) * Ta^2)$= 17.3690 (ASCE Eq 12.8-4) for T <= T_L OK ASCE Section 12.8 & 11.4.5

CS(Min) = 0.04 (ASCE fig. 22-12 thru 22-16)

0.044 S_{DS} I >=.01 = 0.04 (ASCE Eq 12.8-5)

Not Required S1<=0.6g (ASCE Eq 12.8-6)

$V = C_S * W$ = 0.1486 W (Ultimate Strength)

$V_a = C_S/1.4 * W$ = 0.1062 W (Allowable Stress)

Hazards by Location

Search Information

Address: 13238 Hadfield Rd SE, Olalla, WA 98359, USA

Coordinates: 47.43024399999999, -122.60680300000001

Elevation: ft

Timestamp: 2019-09-06T16:43:27.083Z

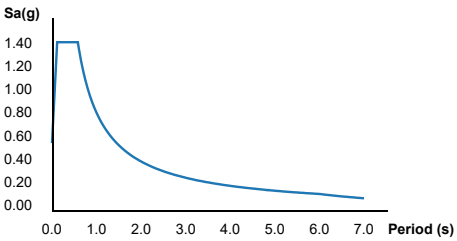
Hazard Type: Seismic

Reference Document: ASCE7-10

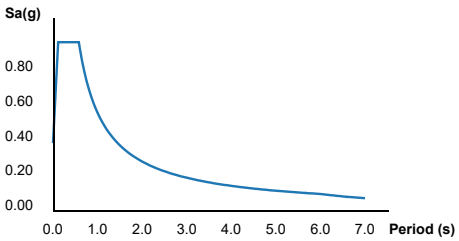
Risk Category: II

Site Class: D

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

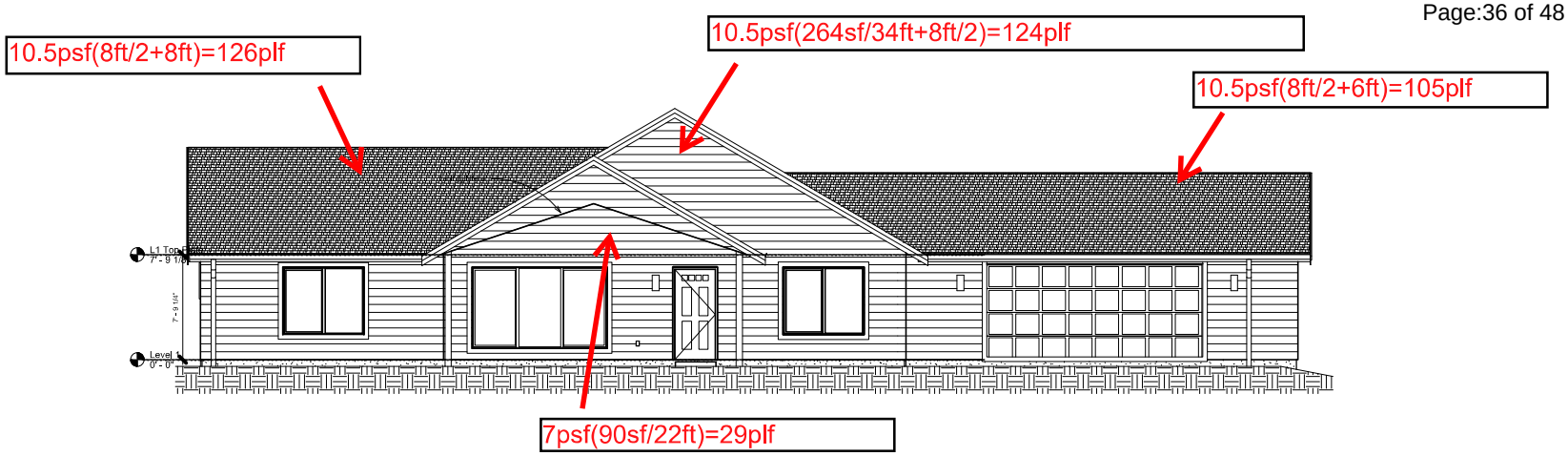
Name	Value	Description
S_S	1.449	MCE_R ground motion (period=0.2s)
S_1	0.56	MCE_R ground motion (period=1.0s)
S_{MS}	1.449	Site-modified spectral acceleration value
S_{M1}	0.84	Site-modified spectral acceleration value
S_{DS}	0.966	Numeric seismic design value at 0.2s SA
S_{D1}	0.56	Numeric seismic design value at 1.0s SA

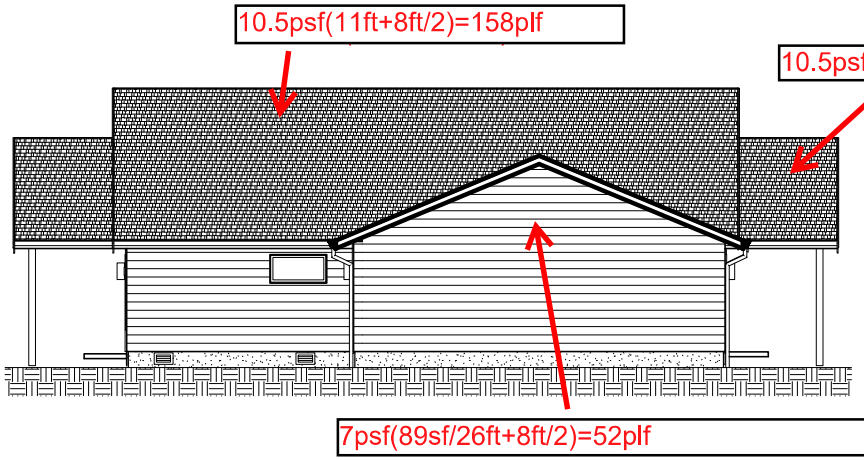
Additional Information

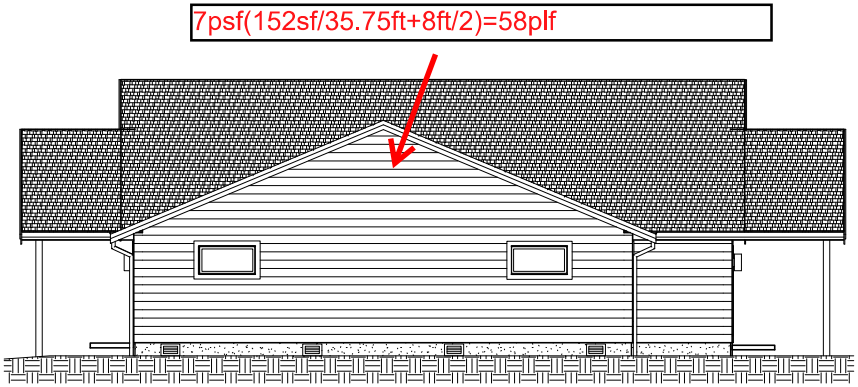
Name	Value	Description
SDC	D	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.966	Coefficient of risk (0.2s)
CR_1	0.938	Coefficient of risk (1.0s)
PGA	0.594	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.594	Site modified peak ground acceleration
T_L	6	Long-period transition period (s)
SsRT	1.449	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.499	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.679	Factored deterministic acceleration value (0.2s)
S1RT	0.56	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.597	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.856	Factored deterministic acceleration value (1.0s)
PGAd	0.959	Factored deterministic acceleration value (PGA)

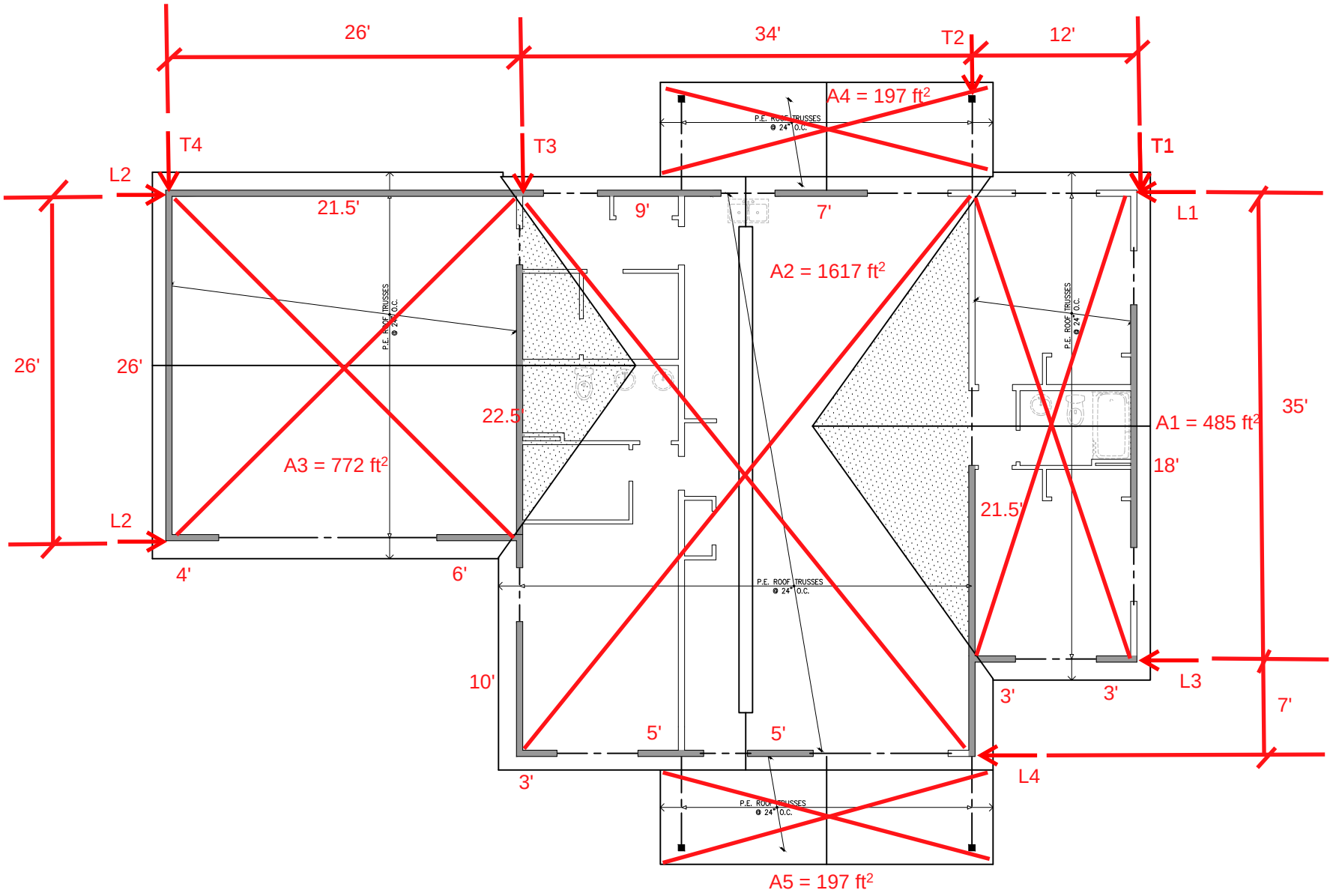
The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer


10.5psf(8ft/2+8ft)=126plf
10.5psf(264sf/34ft+8ft/2)=124plf
10.5psf(8ft/2+6ft)=105plf
7psf(90sf/22ft)=29plf


10.5psf(11ft+8ft/2)=158plf
10.5psf(7ft)=74plf
7psf(89sf/26ft+8ft/2)=52plf


7psf(152sf/35.75ft+8ft/2)=58plf


26'
34'
T2
12'
T4
T3
T1
L2
L1
A4 = 197 ft²
P.E. ROOF TRUSSES @ 24" O.C.
21.5'
9'
7'
A2 = 1617 ft²
26'
26'
22.5'
A1 = 485 ft²
35'
18'
A3 = 772 ft²
21.5'
L2
4'
6'
10'
3'
3'
L3
7'
5'
5'
3'
L4
A5 = 197 ft²

Seismic Weights

1 Story *Sitka* | *1884*

	DL(PSF)	∑Area (ft^2)	∑L(ft)	H/2(ft)	W(kips)	∑Total W (kips)	Va=Cs/1.4*W	/ L(ft) =	PLF	
A1										
Roof:	15.0	485.0			7.3					
					0.0					
Walls:	12.0		70.0	4.0	3.4	Cs/1.4=	0.1062			"L"
Below →					0.0	**10.6**	***1.13***	35.00	***32***	
	12.0		48.0	4.0	2.3					
Below →					0.0	**9.6**	***1.02***	12.00	***85***	"T"
A2	DL(PSF)	∑Area (ft^2)	∑L(ft)	H/2(ft)	W(kips)	∑Total W (kips)				
Roof:	15.0	1617.0			24.3					
					0.0					
Walls:	12.0		126.0	4.0	6.0					"L"
Below →					0.0	**30.3**	***3.22***	42.00	***77***	
	12.0		102.0	4.0	4.9					
Below →					0.0	**29.2**	***3.10***	34.00	***91***	"T"
A3	DL(PSF)	∑Area (ft^2)	∑L(ft)	H/2(ft)	W(kips)	∑Total W (kips)				
Roof:	15.0	772.0			11.6					
					0.0					
Walls:	12.0		52.0	4.0	2.5					"L"
Below →					0.0	**14.1**	***1.49***	26.00	***57***	
	12.0		52.0	4.0	2.5					
Below →					0.0	**14.1**	***1.49***	26.00	***57***	"T"
A4	DL(PSF)	∑Area (ft^2)	∑L(ft)	H/2(ft)	W(kips)	∑Total W (kips)				
Roof:	15.0	197.0			3.0					
					0.0					
Walls:	12.0		0.0	0.0	0.0					"L"
Below →					0.0	**3.0**	***0.31***	7.00	***45***	
	12.0		22.0	4.0	1.1					
Below →					0.0	**4.0**	***0.43***	22.00	***19***	"T"
A5	DL(PSF)	∑Area (ft^2)	∑L(ft)	H/2(ft)	W(kips)	∑Total W (kips)				
Roof:	15.0	197.0			3.0					
					0.0					
Walls:	12.0		0.0	0.0	0.0					"L"
Below →					0.0	**3.0**	***0.31***	7.00	***45***	
	12.0		22.0	4.0	1.1					
Below →					0.0	**4.0**	***0.43***	22.00	***19***	"T"

L1	1 Story											
Level	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Vw Each	**Vw Total(k)**
Roof	158	21.00	74	7.00							3836	**3.84**
L1												
Level	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Vs Each	**Vs Total (k)**
Roof	32	17.50	77	21.00	57	13.00	45	7.00			3233	**3.23**

L2												
Level	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Vw Each	**Vw Total(k)**
Roof	52	13.00									676	**0.68**
L2												
Level	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Vs Each	**Vs Total (k)**
Roof	57	13.00									741	**0.74**

L3	1 Story											
Level	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Vw Each	**Vw Total(k)**
Roof	58	17.50									1015	**1.02**
L3												
Level	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Vs Each	**Vs Total (k)**
Roof	32	17.50									560	**0.56**

L4	1 Story											
Level	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Vw Each	**Vw Total(k)**
Roof	158	21.00	45	7.00							3633	**3.63**
L4												
Level	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Vs Each	**Vs Total (k)**
Roof	77	21.00	45	7.00							1932	**1.93**

T1	1 Story											
Level	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Vw Each	**Vw Total(k)**
Roof	126	6.00									756	**0.76**
T1												
Level	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Vs Each	**Vs Total (k)**
Roof	85	6.00									510	**0.51**

T2												
Level	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Vw Each	**Vw Total(k)**
Roof	126	6.00	124	17.00							2864	**2.86**
T2												
Level	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Vs Each	**Vs Total (k)**
Roof	85	6.00	91	17.00	19	22.00	19	22.00			2893	**2.89**

T3	1 Story											
Level	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Vw Each	**Vw Total(k)**
Roof	124	17.00	105	13.00							3473	**3.47**
T3												
Level	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Vs Each	**Vs Total (k)**
Roof	91	17.00	57	13.00							2288	**2.29**

T4	1 Story											
Level	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Wind PLF	Trib (ft)	Vw Each	**Vw Total(k)**
Roof	105	13.00									1365	**1.37**
T4												
Level	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Seismic PLF	Trib (ft)	Vs Each	**Vs Total (k)**
Roof	57	13.00									741	**0.74**

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0.5 (ft) holdown dist from end

Roof:			Wind (ASD):	3.84 kips	102 #/ft												102 #/ft	
W1			Seismic (ASD):	3.23 kips	86 #/ft												86 #/ft	
																			8 ft
	21.5 ft		9 ft		7 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		37.5	Actual
Distribution L	21.5 ft		9 ft		7 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		37.5	Distribu
h/b_s =	0.37209 W1		0.889 W1		1.143 W1															
DL w (plf) =	275		95		95		0		0		0		0		0		0			
$0.6M_R$ (#-ft) =	38136		2309		1397		0		0		0		0		0		0			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	102	86	102	86	102	86	0	0	0	0	0	0	0	0	0	0	0	0		
M_{ot} (#-ft) =	17613	14815	7373	6202	5734	4823	0	0	0	0	0	0	0	0	0	0	0	0		
F (#) =	-977	-1111	596	458	667	527	0	0	0	0	0	0	0	0	0	0	0	0		
Holdown	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-		
1.05	No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK			

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0.5 (ft) holdown dist from end

Roof:				Wind (ASD):	0.68 kips		68 #/ft												68 #/ft	
W1				Seismic (ASD):	0.74 kips		74 #/ft												74 #/ft	
																			8 ft	
	4 ft		6 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		10	Actual
Distribution L	4 ft		6 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		10	Distribu
h/b_s =	2	W1	1.333	W1																
DL w (plf) =	275		275		0		0		0		0		0		0		0			
$0.6M_R$ (#-ft) =	1320		2970		0		0		0		0		0		0		0			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	68	74	68	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
M_{ot} (#-ft) =	2176	2368	3264	3552	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
F (#) =	245	299	53	106	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Holdown	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-		
1.05	No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK			

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0.5 (ft) holdown dist from end

Roof:					Wind (ASD):	1.02 kips	170 #/ft														227 #/ft	
W1					Seismic (ASD):	0.56 kips	93 #/ft														124 #/ft	
	 3 ft		 3 ft		 0 ft		 0 ft		 0 ft		 0 ft		 0 ft		 0 ft		 0 ft		8 ft 6	Actual
Distribution L	2.25 ft		2.25 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		4.5	Distribu
h/b_s =	2.667	W1	2.667	W1																
DL w (plf) =	342.5		342.5		0		0		0		0		0		0		0			
$0.6M_R$ (#-ft) =	925		925		0		0		0		0		0		0		0			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	170	93	170	93	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
M_{ot} (#-ft) =	4080	2240	4080	2240	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
F (#) =	1262	526	1262	526	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Holdown	2640	ST1	2640	ST1	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-		
1.05	STHD10 OK		STHD10 OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK			

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0.5 (ft) holdown dist from end

Roof:					Wind (ASD):	3.63 kips	279 #/ft												296 #/ft	
W2					Seismic (ASD):	1.93 kips	148 #/ft												158 #/ft	
	3 ft		5 ft		5 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		8 ft 13	Actual
Distribution L	2.25 ft		5 ft		5 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		12.25	Distribu
h/b_s =	2.667	W2	1.6	W2	1.6	W2														
DL w (plf) =	95		95		95		0		0		0		0		0		0			
$0.6M_R$ (#-ft) =	257		713		713		0		0		0		0		0		0			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	222	118	296	158	296	158	0	0	0	0	0	0	0	0	0	0	0	0		
M_{ot} (#-ft) =	5334	2836	11853	6302	11853	6302	0	0	0	0	0	0	0	0	0	0	0	0		
F (#) =	2031	1032	2476	1242	2476	1242	0	0	0	0	0	0	0	0	0	0	0	0		
Holdown	2640	ST1	2640	ST1	2640	ST1	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-		
1.05	STHD10 OK		STHD10 OK		STHD10 OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK			

W1 IS OK FOR WIND

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0.5 (ft) holdown dist from end

Roof:			Wind (ASD):	0.76 kips	42 #/ft													42 #/ft	
W1			Seismic (ASD):	0.51 kips	28 #/ft													28 #/ft	
	 18 ft		 0 ft		 0 ft		 0 ft		 0 ft		 0 ft		 0 ft		 0 ft		 0 ft		8 ft 18	Actual
Distribution L	18 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft	18	Distribu
h/b_s =	0.444	W1																	
DL w (plf) =	95		0		0		0		0		0		0		0		0		
$0.6M_R$ (#-ft) =	9234		0		0		0		0		0		0		0		0		
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	
PLF	42	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
M_{ot} (#-ft) =	6080	4080	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
F (#) =	-180	-295	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Holdown	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	
1.05	No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		

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0.5 (ft) holdown dist from end

Roof:			Wind (ASD):	2.86 kips	133 #/ft													133 #/ft	
W1			Seismic (ASD):	2.89 kips	134 #/ft													134 #/ft	
																			8 ft	
	21.5 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft	21.5	Actual
Distribution L	21.5 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft	21.5	Distribu
h/b_s =	0.372	W1																	
DL w (plf) =	335		0		0		0		0		0		0		0				
$0.6M_R$ (#-ft) =	46456		0		0		0		0		0		0		0				
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E			
PLF	133	134	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
M_{ot} (#-ft) =	22880	23120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
F (#) =	-1123	-1111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Holdown	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	
1.05	No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		

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0.5 (ft) holdown dist from end

Roof:			Wind (ASD):	3.47 kips	107 #/ft													107 #/ft	
W1			Seismic (ASD):	2.29 kips	70 #/ft													70 #/ft	
																			8 ft	
	10 ft		22.5 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft	32.5	Actual
Distribution L	10 ft		22.5 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft	32.5	Distribu
h/b_s =	0.8	W1	0.356	W1															
DL w (plf) =	335		335		0		0		0		0		0		0				
$0.6M_R$ (#-ft) =	10050		50878		0		0		0		0		0		0				
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E			
PLF	107	70	107	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
M_{ot} (#-ft) =	8542	5637	19218	12683	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
F (#) =	-159	-465	-1439	-1736	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Holdown	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	
1.05	No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		

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0.5 (ft) holdown dist from end

Roof:			Wind (ASD):	1.37 kips	53 #/ft														53 #/ft	
W1			Seismic (ASD):	0.74 kips	28 #/ft														28 #/ft	
																			8 ft	
	26 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		26	Actual
Distribution L	26 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		26	Distribu
h/b_s =	0.308	W1																		
DL w (plf) =	110		0		0		0		0		0		0		0		0			
$0.6M_R$ (#-ft) =	22308		0		0		0		0		0		0		0		0			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	53	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
M_{ot} (#-ft) =	10960	5920	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
F (#) =	-445	-643	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Holdown	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-		
1.05	No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK			