SOLUTIONS 4 STRUCTURES Inc.

Page: 1 of 49
Date: 2023 06 16
Design by: OGK

Structural Calculations for Vertical and Lateral Design of Rec Building

Project & Location:

Structural Calculations

Bradley Heights Apartments
(Lat 47.1652, Long -122.2921)
202 27th Avenue SE, Puyallup, WA

Client:
Timberlane Partners
Attn: Dave Enslow
dave@timberlanepartners.com

Professional Engineer:
Solutions 4 Structures, Inc
11605 135th St Ct E
Puyallup, WA 98374
Attn: Tom Chase, PE
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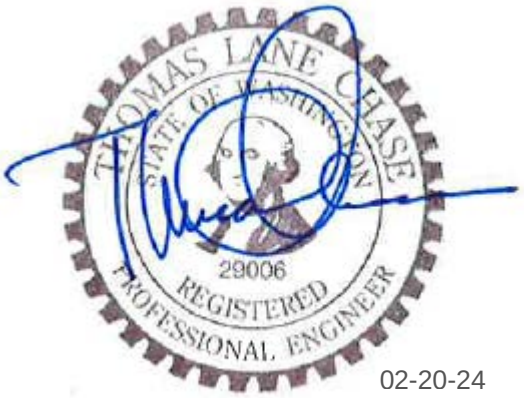
(253) 314 - 9822



02-20-24

Project Number: 23.007

Code / Location: 2018 IBC

PRCNC20240278

Loads:

1. Vertical Loads	Dead	Live
Roof	22 PSF	25 PSF (Snow)
Floor	26 PSF	40 PSF (Apartments)
Floor	25 PSF	60 PSF (Decks)
Exits	47 PSF	100 PSF (Stairs & Landings)

2. Lateral Loads
   Wind Criteria
      Basic Wind Speed = 97 MPH
      Exposure B
      Iw = 1.0, Kzt = 1.0
   Seismic Criteria
      Seismic Design Category "D"
      Site Class C
      I_E= 1.0, Ss = 1.263, S1 = 0.435
      SDS = 1.010, SD1 = 0.435
      Building Response R = 5, Cs = 0.111 (ASD)

3. Soils Data (per GeoResources Inc. dated 02/10/2022)
      Bearing Capacity = 2,000 PSF

City of Puyallup
Building
ACCEPTED
JMontgomery
05/16/2024
10:50:42 AM
CITY OF PUYALLUP
STATE OF WASHINGTON

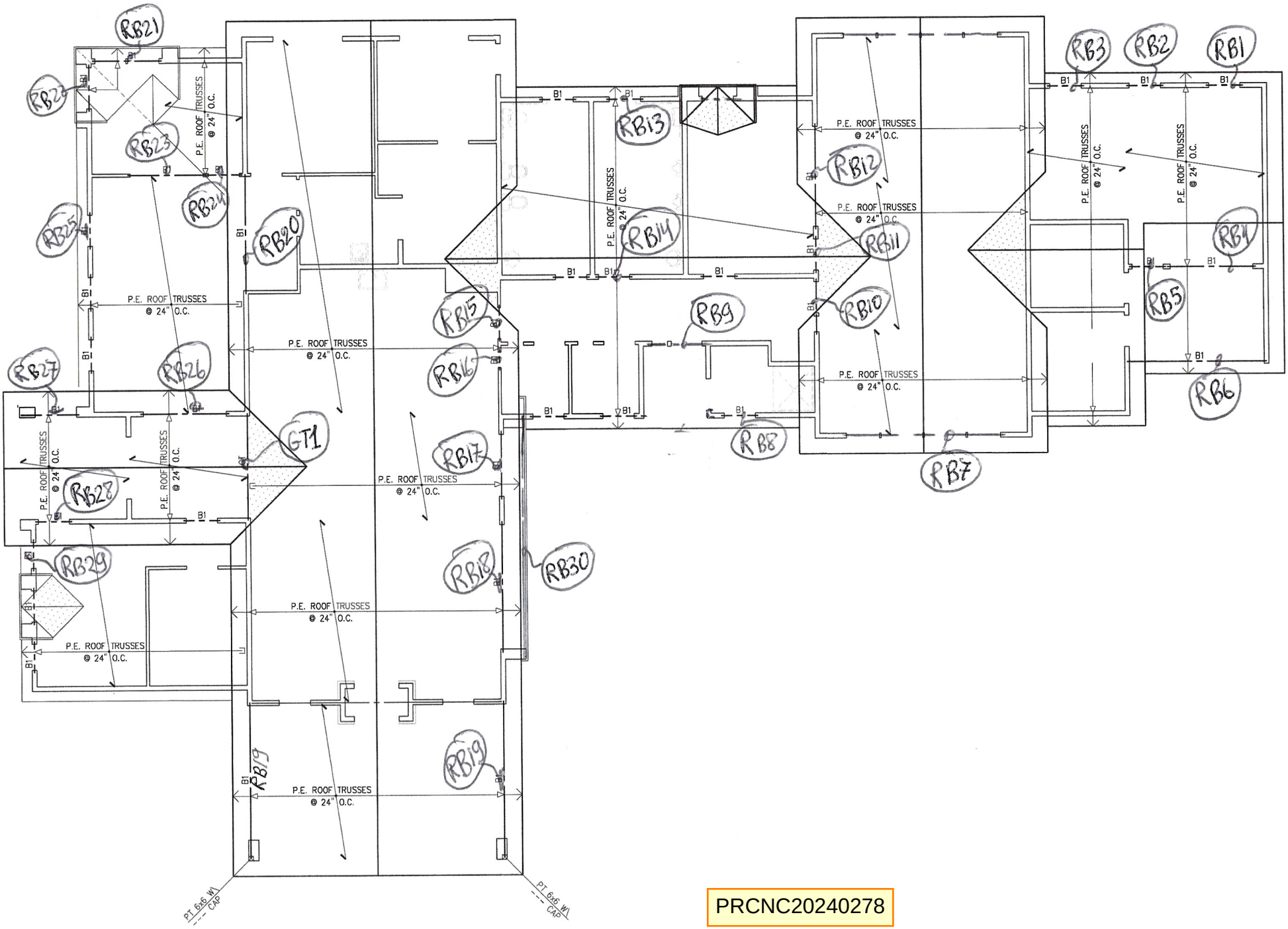
FULL SIZED LEDGIBLE COLOR REPORT IS REQUIRED TO BE PROVIDED BY THE PERMITTEE ON SITE FOR ALL INSPECTIONS

SOLUTIONS 4 STRUCTURES Inc.

VERTICAL DESIGN

By: OGK

PRCNC20240278



PRCNC20240278

SOLUTIONS 4 STRUCTURES Inc.

Page #:
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ROOF LOADS:		
Rood Dead Loads:		
Comp Shingles	3.00	PSF
#30 Felt	0.20	PSF
APA Rated Plywood/OSB	1.70	PSF
PE Trusses @ 24"o.c.	3.50	PSF
Insulation	1.50	PSF
(2) Layer of 5/8" Gypsum Board	5.60	PSF
Mechanical & Electrical	1.50	PSF
Miscellaneous	1.00	PSF
Solar Panels	4.00	PSF
Total Roof Dead Load:	22.00	PSF
Total Live / Snow Load:	25.00	PSF
Total Roof Load:	**47.00**	**PSF**

WALL LOADS:		
Wall Dead Loads: INT. Wall Assembly		
5/8" Gypsum Board	2.80	PSF
Fiberglass insulation	0.70	PSF
2x6 or 2x4 Studs @ 16" o.c.	1.70	PSF
Top & Bottom Wall Plates	0.30	PSF
5/8" Gypsum Board	2.80	PSF
Miscellaneous	0.70	PSF
Total Wall Dead Load:	9.00	PSF
Total Wall Load:	**9.00**	**PSF**

WALL LOADS:		
Wall Dead Loads: EXT. Wall Assembly		
Exterior siding	3.00	PSF
Moisture barrier	0.20	PSF
1/2" Plywood/OSB	1.70	PSF
2 x 6 or 2 x 4 Studs @ 16" o.c.	1.70	PSF
Top & Bottom Wall Plates	0.30	PSF
Insulation	1.00	PSF
(1) Layer of 5/8" Gypsum Board	2.80	PSF
Miscellaneous	1.30	PSF
Total Wall Dead Load:	12.00	PSF
Total Wall Load:	**12.00**	**PSF**

Multiple Simple Beam

Lic. # : KW-06013765

Solutions 4 Structures, Inc

Description : Roof Beams_RB1-RB12

Wood Beam Design : RB1

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x8, Sawn, Fully Unbraced**
Using Allowable Stress Design with IBC 2018 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 = 0.0220, S = 0.0250 k/ft, Trib= 10.0 ft

Design Summary

Max fb/Fb Ratio = **0.192** : 1
fb : Actual : 242.86 psi at 1.625 ft in Span # 1
Fb : Allowable : 1,263.22 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.262** : 1
fv : Actual : 45.15 psi at 0.000 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	0.36			0.41			
Right Support	0.36			0.41			

Max Deflections

Transient Downward	0.004 in	Total Downward	0.008 in
Ratio	8931	Ratio	4751
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB2

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x8, Sawn, Fully Unbraced**
Using Allowable Stress Design with IBC 2018 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 = 0.0220, S = 0.0250 k/ft, Trib= 10.0 ft

Design Summary

Max fb/Fb Ratio = **0.192** : 1
fb : Actual : 242.86 psi at 1.625 ft in Span # 1
Fb : Allowable : 1,263.22 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.262** : 1
fv : Actual : 45.15 psi at 0.000 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	0.36			0.41			
Right Support	0.36			0.41			

Max Deflections

Transient Downward	0.004 in	Total Downward	0.008 in
Ratio	8931	Ratio	4751
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB3

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x8, Sawn, Fully Unbraced**
Using Allowable Stress Design with IBC 2018 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 = 0.0220, S = 0.0250 k/ft, Trib= 17.0 ft

Design Summary

Max fb/Fb Ratio = **0.327** : 1
fb : Actual : 412.87 psi at 1.625 ft in Span # 1
Fb : Allowable : 1,263.22 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.445** : 1
fv : Actual : 76.75 psi at 0.000 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	0.61			0.69			
Right Support	0.61			0.69			

Max Deflections

Transient Downward	0.007 in	Total Downward	0.014 in
Ratio	5254	Ratio	2794
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB4

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **3.125x10.5, GLB, Fully Unbraced**
Using Allowable Stress Design with IBC 2018 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

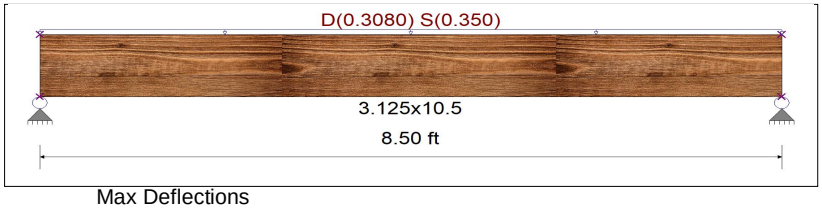
Unif Load: D = 0.0220, S = 0.0250 k/ft, Trib= 14.0 ft

Design Summary

Max fb/Fb Ratio = **0.472** : 1
fb : Actual : 1,241.87 psi at 4.250 ft in Span # 1
Fb : Allowable : 2,632.96 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.419** : 1
fv : Actual : 127.84 psi at 0.000 ft in Span # 1
Fv : Allowable : 304.75 psi
Load Comb : +D+S+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	1.31			1.49			
Right Support	1.31			1.49			



Max Deflections

Transient Downward	0.076 in	Total Downward	0.143 in
Ratio	1339	Ratio	712
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Multiple Simple Beam

Wood Beam Design : RB5

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x8, Sawn, Fully Unbraced**
Using Allowable Stress Design with IBC 2018 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 = 0.0220, S = 0.0250 k/ft, Trib= 14.0 ft

Design Summary

Max fb/Fb Ratio = **0.269** : 1
fb : Actual : 340.01 psi at 1.625 ft in Span # 1
Fb : Allowable : 1,263.22 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.366** : 1
fv : Actual : 63.21 psi at 0.000 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			0.57			
Right Support	0.50			0.57			

Max Deflections

Transient Downward	0.006 in	Total Downward	0.011 in
Ratio	6379	Ratio	3393
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB6

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **3.125x10.5, GLB, Fully Unbraced**
Using Allowable Stress Design with IBC 2018 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

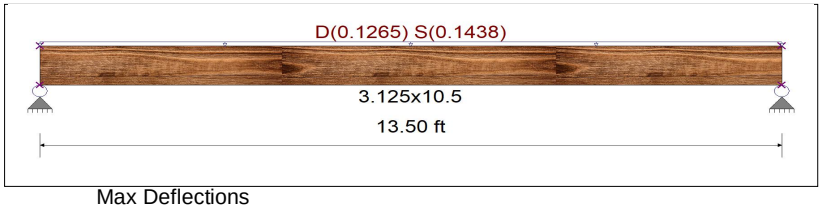
Unif Load: D = 0.0220, S = 0.0250 k/ft, Trib= 5.750 ft

Design Summary

Max fb/Fb Ratio = **0.520** : 1
fb : Actual : 1,286.61 psi at 6.750 ft in Span # 1
Fb : Allowable : 2,476.29 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.274** : 1
fv : Actual : 83.39 psi at 0.000 ft in Span # 1
Fv : Allowable : 304.75 psi
Load Comb : +D+S+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.85			0.97			
Right Support	0.85			0.97			



Max Deflections

Transient Downward	0.199 in	Total Downward	0.374 in
Ratio	813	Ratio	432
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Multiple Simple Beam

Lic. # : KW-06013765

Solutions 4 Structures, Inc

Wood Beam Design : RB7

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x10, Sawn, Fully Unbraced**

Using Allowable Stress Design with IBC 2018 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

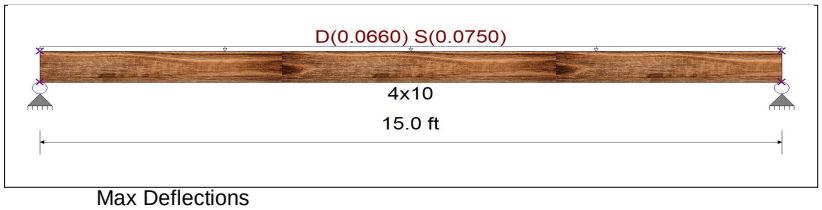
Unif Load: D = 0.0220, S = 0.0250 k/ft, Trib= 3.0 ft

Design Summary

Max fb/Fb Ratio = **0.853** : 1
fb : Actual : 953.44 psi at 7.500 ft in Span # 1
Fb : Allowable : 1,118.04 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.284** : 1
fv : Actual : 49.00 psi at 0.000 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			0.56			
Right Support	0.50			0.56			



Max Deflections

Transient Downward	0.286 in	Total Downward	0.538 in
Ratio	628	Ratio	334
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB8

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x8, Sawn, Fully Unbraced**

Using Allowable Stress Design with IBC 2018 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 = 0.0220, S = 0.0250 k/ft, Trib= 17.0 ft

Design Summary

Max fb/Fb Ratio = **0.327** : 1
fb : Actual : 412.87 psi at 1.625 ft in Span # 1
Fb : Allowable : 1,263.22 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.445** : 1
fv : Actual : 76.75 psi at 0.000 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	0.61			0.69			
Right Support	0.61			0.69			

Max Deflections

Transient Downward	0.007 in	Total Downward	0.014 in
Ratio	5254	Ratio	2794
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Multiple Simple Beam

Wood Beam Design : RB9

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x10, Sawn, Fully Unbraced**
Using Allowable Stress Design with IBC 2018 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

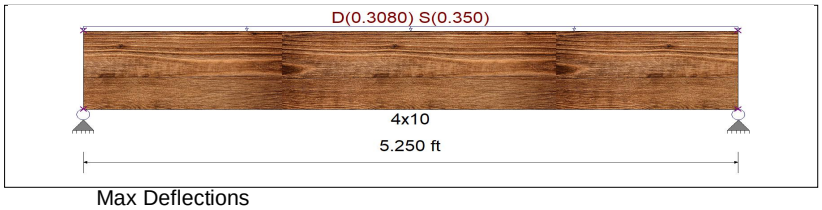
Unif Load: D = 0.0220, S = 0.0250 k/ft, Trib= 14.0 ft

Design Summary

Max fb/Fb Ratio = **0.471** : 1
fb : Actual : 545.05 psi at 2.625 ft in Span # 1
Fb : Allowable : 1,158.40 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.464** : 1
fv : Actual : 80.03 psi at 0.000 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	0.81			0.92			
Right Support	0.81			0.92			



Max Deflections

Transient Downward	0.020 in	Total Downward	0.038 in
Ratio	3143	Ratio	1672
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB10

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x10, Sawn, Fully Unbraced**
Using Allowable Stress Design with IBC 2018 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 = 0.0220, S = 0.0250 k/ft, Trib= 14.0 ft
Unif Load: D = 0.10 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.542** : 1
fb : Actual : 627.88 psi at 2.625 ft in Span # 1
Fb : Allowable : 1,158.40 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.534** : 1
fv : Actual : 92.19 psi at 0.000 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	1.07			0.92			
Right Support	1.07			0.92			

Max Deflections

Transient Downward	0.020 in	Total Downward	0.043 in
Ratio	3143	Ratio	1451
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Multiple Simple Beam

Lic. # : KW-06013765

Solutions 4 Structures, Inc

Wood Beam Design : RB11

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x8, Sawn, Fully Unbraced**

Using Allowable Stress Design with IBC 2018 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 = 0.0220, S = 0.0250 k/ft, Trib= 14.0 ft

Unif Load: D = 0.10 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.360** : 1 at 1.750 ft in Span # 1

fb : Actual : 454.26 psi

Fb : Allowable : 1,262.61 psi

Load Comb : +D+S+H

Max fv/FvRatio = **0.455** : 1 at 0.000 ft in Span # 1

fv : Actual : 78.41 psi

Fv : Allowable : 172.50 psi

Load Comb : +D+S+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.71			0.61			
Right Support	0.71			0.61			

Max Deflections

Transient Downward	0.008 in	Total Downward	0.018 in
Ratio	5108	Ratio	2358
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB12

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **3.125x10.5, GLB, Fully Unbraced**

Using Allowable Stress Design with IBC 2018 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 = 0.0220, S = 0.0250 k/ft, Trib= 14.0 ft

Unif Load: D = 0.10 k/ft, Trib= 1.0 ft

Design Summary

Max fb/Fb Ratio = **0.803** : 1 at 5.125 ft in Span # 1

fb : Actual : 2,080.32 psi

Fb : Allowable : 2,590.52 psi

Load Comb : +D+S+H

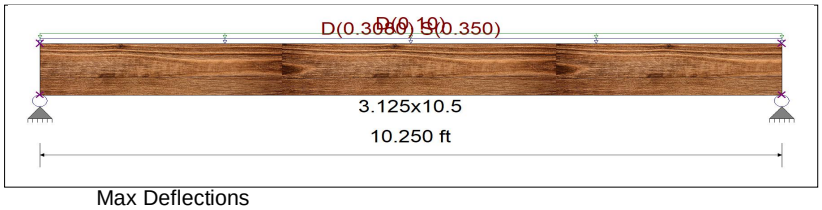
Max fv/FvRatio = **0.583** : 1 at 0.000 ft in Span # 1

fv : Actual : 177.59 psi

Fv : Allowable : 304.75 psi

Load Comb : +D+S+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	2.09			1.79			
Right Support	2.09			1.79			



Max Deflections

Transient Downward	0.161 in	Total Downward	0.349 in
Ratio	763	Ratio	352
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Multiple Simple Beam

Lic. # : KW-06013765 — Solutions 4 Structures, Inc

Description : Roof Beams_RB13-RB24

Wood Beam Design : RB13

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x8, Sawn, Fully Unbraced**
Using Allowable Stress Design with IBC 2018 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 = 0.0220, S = 0.0250 k/ft, Trib= 9.750 ft

Design Summary

Max fb/Fb Ratio = **0.187** : 1
fb : Actual : 236.79 psi at 1.625 ft in Span # 1
Fb : Allowable : 1,263.22 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.255** : 1
fv : Actual : 44.02 psi at 0.000 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	0.35			0.40			
Right Support	0.35			0.40			

Max Deflections

Transient Downward	0.004 in	Total Downward	0.008 in
Ratio	9160	Ratio	4872
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB14

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x8, Sawn, Fully Unbraced**
Using Allowable Stress Design with IBC 2018 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 = 0.0220, S = 0.0250 k/ft, Trib= 15.50 ft

Design Summary

Max fb/Fb Ratio = **0.298** : 1
fb : Actual : 376.44 psi at 1.625 ft in Span # 1
Fb : Allowable : 1,263.22 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.406** : 1
fv : Actual : 69.98 psi at 3.250 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	0.55			0.63			
Right Support	0.55			0.63			

Max Deflections

Transient Downward	0.007 in	Total Downward	0.013 in
Ratio	5762	Ratio	3065
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Multiple Simple Beam

Lic. # : KW-06013765

Solutions 4 Structures, Inc

Wood Beam Design : RB15

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x8, Sawn, Fully Unbraced**

Using Allowable Stress Design with IBC 2018 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 = 0.0220, S = 0.0250 k/ft, Trib= 15.0 ft

Design Summary

Max fb/Fb Ratio = **0.288** : 1
fb : Actual : 364.30 psi at 1.625 ft in Span # 1
Fb : Allowable : 1,263.22 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.393** : 1
fv : Actual : 67.72 psi at 0.000 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	0.54			0.61			
Right Support	0.54			0.61			

Max Deflections

Transient Downward	0.007 in	Total Downward	0.012 in
Ratio	5954	Ratio	3167
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB16

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x8, Sawn, Fully Unbraced**

Using Allowable Stress Design with IBC 2018 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 = 0.0220, S = 0.0250 k/ft, Trib= 15.0 ft

Design Summary

Max fb/Fb Ratio = **0.288** : 1
fb : Actual : 364.30 psi at 1.625 ft in Span # 1
Fb : Allowable : 1,263.22 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.393** : 1
fv : Actual : 67.72 psi at 0.000 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	0.54			0.61			
Right Support	0.54			0.61			

Max Deflections

Transient Downward	0.007 in	Total Downward	0.012 in
Ratio	5954	Ratio	3167
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Multiple Simple Beam

Lic. # : KW-06013765

Solutions 4 Structures, Inc

Wood Beam Design : RB17

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x10, Sawn, Fully Unbraced**

Using Allowable Stress Design with IBC 2018 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 = 0.0220, S = 0.0250 k/ft, Trib= 14.0 ft

Unif Load: D = 0.0180, S = 0.0350 k/ft, Trib= 2.0 ft

Design Summary

Max fb/Fb Ratio = **0.840** : 1 at 3.250 ft in Span # 1

fb : Actual : 970.09 psi

Fb : Allowable : 1,154.82 psi

Load Comb : +D+S+H

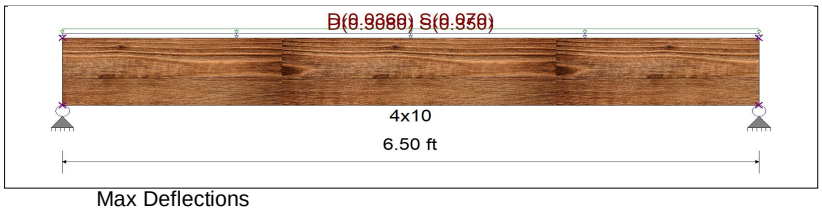
Max fv/FvRatio = **0.667** : 1 at 6.500 ft in Span # 1

fv : Actual : 115.04 psi

Fv : Allowable : 172.50 psi

Load Comb : +D+S+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	1.12			1.37			
Right Support	1.12			1.37			



Max Deflections

Transient Downward	0.057 in	Total Downward	0.103 in
Ratio	1380	Ratio	758
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB18

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **5.125x10.5, GLB, Fully Unbraced**

Using Allowable Stress Design with IBC 2018 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 = 0.0220, S = 0.0250 k/ft, Trib= 14.0 ft

Unif Load: D = 0.0180, S = 0.0350 k/ft, Trib= 2.0 ft

Design Summary

Max fb/Fb Ratio = **0.701** : 1 at 6.250 ft in Span # 1

fb : Actual : 1,901.44 psi

Fb : Allowable : 2,711.75 psi

Load Comb : +D+S+H

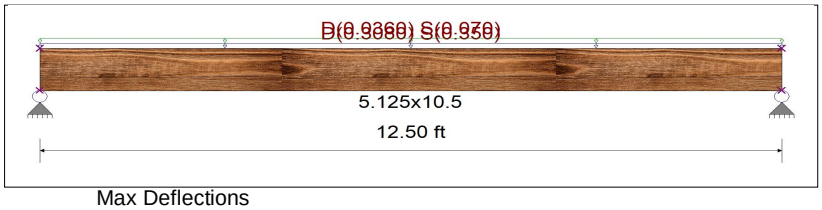
Max fv/FvRatio = **0.437** : 1 at 12.500 ft in Span # 1

fv : Actual : 133.10 psi

Fv : Allowable : 304.75 psi

Load Comb : +D+S+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	2.15			2.63			
Right Support	2.15			2.63			



Max Deflections

Transient Downward	0.261 in	Total Downward	0.474 in
Ratio	575	Ratio	316
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB19

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **5.125x12, GLB, Fully Braced**
Using Allowable Stress Design with IBC 2018 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

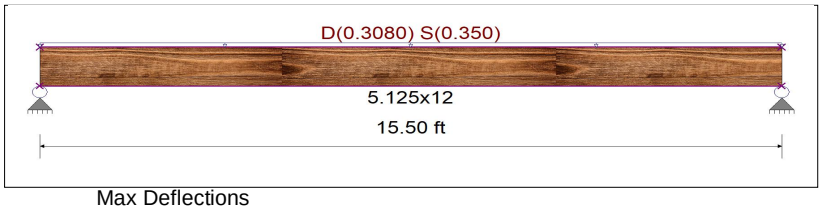
Unif Load: D = 0.0220, S = 0.0250 k/ft, Trib= 14.0 ft

Design Summary

Max fb/Fb Ratio = **0.698** : 1
fb : Actual : 1,927.86 psi at 7.750 ft in Span # 1
Fb : Allowable : 2,760.00 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.408** : 1
fv : Actual : 124.38 psi at 0.000 ft in Span # 1
Fv : Allowable : 304.75 psi
Load Comb : +D+S+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	2.39			2.71			
Right Support	2.39			2.71			



Max Deflections

Transient Downward	0.344 in	Total Downward	0.647 in
Ratio	540	Ratio	287
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB20

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **5.125x12, GLB, Fully Braced**
Using Allowable Stress Design with IBC 2018 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 = 0.0220, S = 0.0250 k/ft, Trib= 14.0 ft
Unif Load: D = 0.0220, S = 0.040 k/ft, Trib= 7.50 ft

Design Summary

Max fb/Fb Ratio = **0.656** : 1
fb : Actual : 1,811.18 psi at 5.750 ft in Span # 1
Fb : Allowable : 2,760.00 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.517** : 1
fv : Actual : 157.49 psi at 0.000 ft in Span # 1
Fv : Allowable : 304.75 psi
Load Comb : +D+S+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	2.72			3.74			
Right Support	2.72			3.74			

Max Deflections

Transient Downward	0.194 in	Total Downward	0.334 in
Ratio	712	Ratio	412
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Multiple Simple Beam

Lic. # : KW-06013765

Solutions 4 Structures, Inc

Wood Beam Design : RB21

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x8, Sawn, Fully Unbraced**

Using Allowable Stress Design with IBC 2018 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

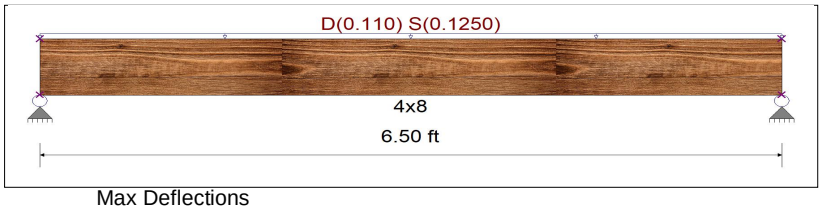
Unif Load: D = 0.0220, S = 0.0250 k/ft, Trib= 5.0 ft

Design Summary

Max fb/Fb Ratio = **0.387** : 1
fb : Actual : 485.73 psi at 3.250 ft in Span # 1
Fb : Allowable : 1,255.43 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.262** : 1
fv : Actual : 45.15 psi at 6.500 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	0.36			0.41			
Right Support	0.36			0.41			



Max Deflections

Transient Downward	0.035 in	Total Downward	0.066 in
Ratio	2232	Ratio	1187
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB22

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x8, Sawn, Fully Unbraced**

Using Allowable Stress Design with IBC 2018 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

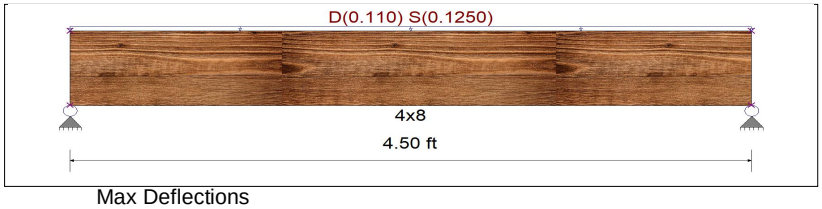
Unif Load: D = 0.0220, S = 0.0250 k/ft, Trib= 5.0 ft

Design Summary

Max fb/Fb Ratio = **0.185** : 1
fb : Actual : 232.80 psi at 2.250 ft in Span # 1
Fb : Allowable : 1,260.05 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.181** : 1
fv : Actual : 31.26 psi at 0.000 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	0.25			0.28			
Right Support	0.25			0.28			



Max Deflections

Transient Downward	0.008 in	Total Downward	0.015 in
Ratio	6729	Ratio	3579
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Multiple Simple Beam

Lic. # : KW-06013765

Solutions 4 Structures, Inc

Wood Beam Design : RB23

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x10, Sawn, Fully Unbraced**

Using Allowable Stress Design with IBC 2018 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

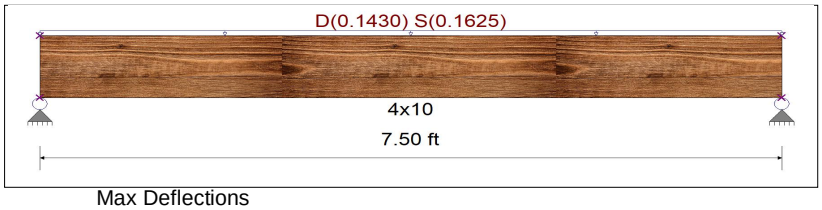
Unif Load: D = 0.0220, S = 0.0250 k/ft, Trib= 6.50 ft

Design Summary

Max fb/Fb Ratio = **0.448** : 1
fb : Actual : 516.45 psi at 3.750 ft in Span # 1
Fb : Allowable : 1,151.81 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.308** : 1
fv : Actual : 53.08 psi at 0.000 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	0.54			0.61			
Right Support	0.54			0.61			



Max Deflections

Transient Downward	0.039 in	Total Downward	0.073 in
Ratio	2322	Ratio	1235
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB24

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x8, Sawn, Fully Unbraced**

Using Allowable Stress Design with IBC 2018 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 = 0.0220, S = 0.0250 k/ft, Trib= 6.50 ft

Design Summary

Max fb/Fb Ratio = **0.145** : 1
fb : Actual : 183.08 psi at 1.750 ft in Span # 1
Fb : Allowable : 1,262.61 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.183** : 1
fv : Actual : 31.60 psi at 0.000 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	0.25			0.28			
Right Support	0.25			0.28			

Max Deflections

Transient Downward	0.004 in	Total Downward	0.007 in
Ratio	9999	Ratio	5852
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Multiple Simple Beam

Description : Roof Beams_RB25-RBxx

Wood Beam Design : RB25

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x8, Sawn, Fully Unbraced**
Using Allowable Stress Design with IBC 2018 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 = 0.0220, S = 0.0450 k/ft, Trib= 8.50 ft

Design Summary

Max fb/Fb Ratio = **0.270** : 1
fb : Actual : 341.29 psi at 1.750 ft in Span # 1
Fb : Allowable : 1,262.61 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.342** : 1
fv : Actual : 58.91 psi at 0.000 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	0.33			0.67			
Right Support	0.33			0.67			

Max Deflections

Transient Downward	0.009 in	Total Downward	0.013 in
Ratio	4674	Ratio	3139
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB26

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x10, Sawn, Fully Unbraced**
Using Allowable Stress Design with IBC 2018 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

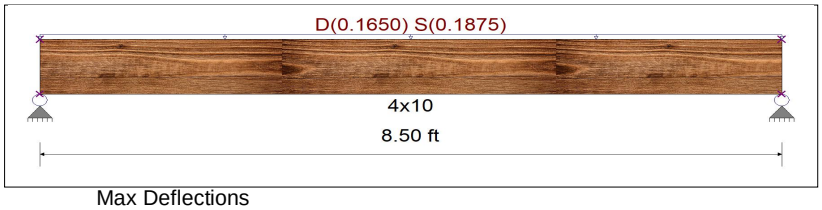
Unif Load: D = 0.0220, S = 0.0250 k/ft, Trib= 7.50 ft

Design Summary

Max fb/Fb Ratio = **0.666** : 1
fb : Actual : 765.40 psi at 4.250 ft in Span # 1
Fb : Allowable : 1,148.58 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.402** : 1
fv : Actual : 69.41 psi at 0.000 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	0.70			0.80			
Right Support	0.70			0.80			



Max Deflections

Transient Downward	0.074 in	Total Downward	0.139 in
Ratio	1382	Ratio	735
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Multiple Simple Beam

Lic. # : KW-06013765

Solutions 4 Structures, Inc

Wood Beam Design : RB27

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x10, Sawn, Fully Unbraced**

Using Allowable Stress Design with IBC 2018 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

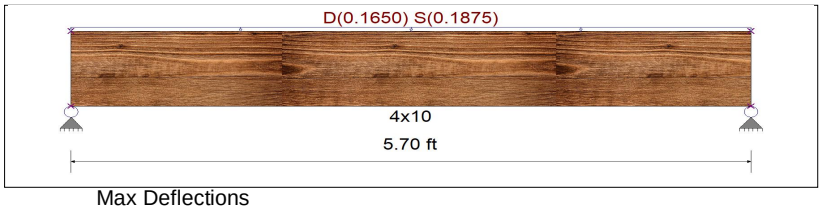
Unif Load: D = 0.0220, S = 0.0250 k/ft, Trib= 7.50 ft

Design Summary

Max fb/Fb Ratio = **0.297** : 1
fb : Actual : 344.19 psi at 2.850 ft in Span # 1
Fb : Allowable : 1,157.09 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.270** : 1
fv : Actual : 46.55 psi at 5.700 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	0.47			0.53			
Right Support	0.47			0.53			



Max Deflections

Transient Downward	0.015 in	Total Downward	0.028 in
Ratio	4584	Ratio	2438
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB28

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x8, Sawn, Fully Unbraced**

Using Allowable Stress Design with IBC 2018 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 = 0.0220, S = 0.0250 k/ft, Trib= 7.50 ft

Design Summary

Max fb/Fb Ratio = **0.167** : 1
fb : Actual : 211.25 psi at 1.750 ft in Span # 1
Fb : Allowable : 1,262.61 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.211** : 1
fv : Actual : 36.47 psi at 0.000 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	0.29			0.33			
Right Support	0.29			0.33			

Max Deflections

Transient Downward	0.004 in	Total Downward	0.008 in
Ratio	9535	Ratio	5071
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB29

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **4x8, Sawn, Fully Unbraced**
Using Allowable Stress Design with IBC 2018 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 = 0.0220, S = 0.0450 k/ft, Trib= 11.50 ft

Design Summary

Max fb/Fb Ratio = **0.366** : 1
fb : Actual : 461.75 psi at 1.750 ft in Span # 1
Fb : Allowable : 1,262.61 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.462** : 1
fv : Actual : 79.71 psi at 0.000 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	0.44			0.91			
Right Support	0.44			0.91			

Max Deflections

Transient Downward	0.012 in	Total Downward	0.018 in
Ratio	3454	Ratio	2320
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : RB30

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

BEAM Size : **3.125x15, GLB, Fully Unbraced**
Using Allowable Stress Design with IBC 2018 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

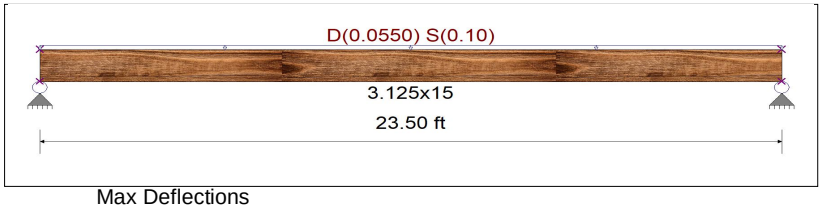
Unif Load: D = 0.0220, S = 0.040 k/ft, Trib= 2.50 ft

Design Summary

Max fb/Fb Ratio = **0.803** : 1
fb : Actual : 1,095.66 psi at 11.750 ft in Span # 1
Fb : Allowable : 1,363.76 psi
Load Comb : +D+S+H

Max fv/FvRatio = **0.191** : 1
fv : Actual : 58.28 psi at 0.000 ft in Span # 1
Fv : Allowable : 304.75 psi
Load Comb : +D+S+H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.65			1.18			
Right Support	0.65			1.18			



Max Deflections

Transient Downward	0.436 in	Total Downward	0.676 in
Ratio	646	Ratio	417
	LC: S Only		LC: +D+S+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007

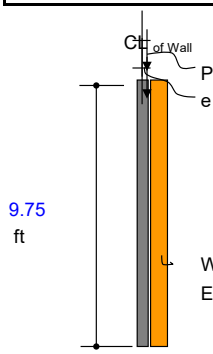
DESIGNED: OGK

DATE: 06/15/23

PROJECT:

STUD WALL DESIGN

E1 - Exterior 10ft Walls — 2018 NDS/2018 IBC



AXIAL LOADS P	
P_{DL} (#/ft) =	385
P_{SL} (#/ft) =	438
P_{LL} (#/ft) =	0
P_{TOT} (#/ft) =	823
e (IN) =	0.5
TRIB. (IN) =	16

LATERAL LOADS W	
W (PSF) =	14.00
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 =	1.15	Repetive, Yes
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) = 8.25 — 625 = $F_{c\perp}$ (ps

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) =	9.75	9.75	9.75	9.75	9.75	
$V_{applied}$ (#) =	2	5	4	93	72	
$M_{applied}$ (ft-#) =	11	23	20	239	195	
$P_{applied}$ (#) =	513	1097	951	513	951	
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)=	776	893	893	1242	1242	(Eq 3.7-1)
C_L =	1	1	1	1	1	(Eq 3.7-1)
F'b (psi)=	776	893	893	1242	1242	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 799		C_{cF} = 1		(Table 4a Compression)
L_e/d =	21.27	21.27	21.27	21.27	21.27	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	800	920	920	1280	1280	(Eq 3.7-1)
C_P =	0.690655283	0.640505441	0.640505441	0.515022096	0.515022096	(Eq 3.7-1)
F'c (psi)=	553	589	589	659	659	(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 - #) =	489	563	563	783	783	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	4558	4861	4861	5439	5439	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.04	0.10	0.08	0.34	0.32	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.08	0.17	0.14	0.08	0.14	(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 (#) =	5156	5156	5156	5156	5156	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/769	L/1026	$L/(I * E / 15 * L * M_{applied})$
240	0.00	0.00	0.00	0.15	0.11	(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	
$V_{applied}/V_{allow}$	0.3%	0.5%	0.4%	7.1%	5.5%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	2.2%	4.1%	3.5%	30.5%	24.9%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	11.3%	22.6%	19.6%	9.4%	17.5%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	3.6%	10.0%	7.9%	34.0%	32.2%	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	7.8%	16.6%	14.4%	7.8%	14.4%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	15.4%	32.8%	28.5%	15.4%	28.5%	
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	10.0%	21.3%	18.5%	10.0%	18.5%	
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	31.2%	23.4%	
Overall Check	OK	OK	OK	OK	OK	

PRCNC20240278

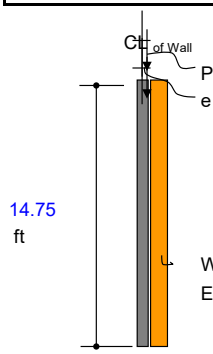
SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007
DESIGNED: OGK
DATE: 06/15/23

PROJECT:

STUD WALL DESIGN

E2 - Exterior 15ft Walls — 2018 NDS/2018 IBC



AXIAL LOADS P	
P_{DL} (#/ft) =	439
P_{SL} (#/ft) =	609
P_{LL} (#/ft) =	0
P_{TOT} (#/ft) =	1048
e (IN) =	0.5
TRIB. (IN) =	16

LATERAL LOADS W	
W (PSF) =	14.00
E (PSF) =	5.00
TRIB. (IN) =	16

DESIGN VALUES		
F_b (psi) =	900	Doug Fir
F_v (psi) =	180	#2
F_c (psi) =	1350	Bending X-X axis
$F_{c\perp}$ (psi) =	625	625
E (psi) =	1.60E+06	Incised, No
E_{min} (psi) =	5.80E+05	Wet Use, No
C_r =	1.15	Repetive, Yes
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^) = 16.5 — 625 = $F_{c\perp}$ (ps

Use: (2) 2" X 6" @ 16" 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

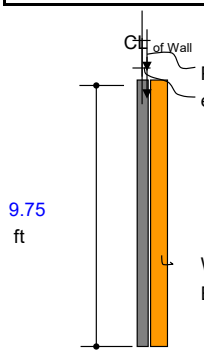
	(Eq. 16-9)	(Eq. 16-10)	(Eq. 16-11)	(Eq. 16-12)	(Eq. 16-13)	
LOAD CASES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)	
L_u (ft) =	14.75	14.75	14.75	14.75	14.75	
$V_{applied}$ (#) =	2	4	3	139	107	
$M_{applied}$ (ft-#) =	12	29	25	534	428	
$P_{applied}$ (#) =	585	1397	1194	585	1194	
C_D =	1	1.15	1.15	1.6	1.6	
BENDING STESS CALCS		F_{bE} (psi)= 23036		C_{bF} = 1.3		(Table 4a Bending)
F_b* (psi)=	1346	1547	1547	2153	2153	(Eq 3.7-1)
C_L =	1	1	1	1	1	(Eq 3.7-1)
F'b (psi)=	1346	1547	1547	2153	2153	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 460		C_{cF} = 1.1		(Table 4a Compression)
L_e/d =	32.18	32.18	32.18	32.18	32.18	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	1485	1708	1708	2376	2376	(Eq 3.7-1)
C_P =	0.286906413	0.25250069	0.25250069	0.185315099	0.185315099	(Eq 3.7-1)
F'c (psi)=	426	431	431	440	440	(Table 4.3.1)
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)	
V_{allow} (#) =	1980	2277	2277	3168	3168	$V_{allow} = A * F_v * C_D / 1.5$
M_{allow} (ft - #) =	1696	1950	1950	2713	2713	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	14060	14230	14230	14530	14530	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.01	0.03	0.02	0.22	0.19	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.08	0.18	0.16	0.08	0.16	(Eq 3.9-4)
$P_{c\perp allow}$ on PL (#) =	10313	10313	10313	10313	10313	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	10313	10313	10313	10313	10313	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/593	L/790	$L/(I * E / 15 * L * M_{applied})$
240	0.00	0.00	0.00	0.30	0.22	(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	
$V_{applied}/V_{allow}$	0.1%	0.2%	0.1%	4.4%	3.4%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	0.7%	1.5%	1.3%	19.7%	15.8%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	4.2%	9.8%	8.4%	4.0%	8.2%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	1.0%	2.8%	2.2%	21.5%	19.4%	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	7.7%	18.4%	15.7%	7.7%	15.7%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	5.7%	13.5%	11.6%	5.7%	11.6%	
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	5.7%	13.5%	11.6%	5.7%	11.6%	
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	40.5%	30.4%	
Overall Check	OK	OK	OK	OK	OK	

SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007
DESIGNED: OGK
DATE: 06/15/23

PROJECT:

STUD WALL DESIGN (1) 2x6 2018 NDS/2018 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) =	14.00
E (PSF) =	5.00
TRIB. (IN) =	55

DESIGN VALUES		
F_b (psi) =	850	Hem Fir
F_v (psi) =	150	#2
F_c (psi) =	1300	Bending X-X axis
$F_{c\perp}$ (psi) =	405	405
E (psi) =	1.30E+06	Incised, No
E_{min} (psi) =	4.70E+05	Wet Use, No
C_r =	1.15	Repetive, Yes
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^) = 8.25 405 = $F_{c\perp}$ (ps

Use: (1) 2" X 6" @ 55" 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) =	9.75	9.75	9.75	9.75	9.75	
$V_{applied}$ (#) =	0	0	0	313	235	
$M_{applied}$ (ft-#) =	1	2	1	764	575	
$P_{applied}$ (#) =	30	80	68	30	68	
C_D =	1	1.15	1.15	1.6	1.6	
BENDING STESS CALCS		F_{bE} (psi)= 18667		C_{bF} = 1.3		(Table 4a Bending)
F_b* (psi)=	1271	1461	1461	2033	2033	(Eq 3.7-1)
C_L =	1	1	1	1	1	(Eq 3.7-1)
F'b (psi)=	1271	1461	1461	2033	2033	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 854		C_{cF} = 1.1		(Table 4a Compression)
L_e/d =	21.27	21.27	21.27	21.27	21.27	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	1430	1645	1645	2288	2288	(Eq 3.7-1)
C_P =	0.498132663	0.44691903	0.44691903	0.338494413	0.338494413	(Eq 3.7-1)
F'c (psi)=	712	735	735	774	774	(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 - #) =	801	921	921	1281	1281	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	5877	6063	6063	6389	6389	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.00	0.00	0.00	0.60	0.45	(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 (#) =	3341	3341	3341	3341	3341	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/242	L/323	$L/(I * E / 15 * L * M_{applied})$
240	0.00	0.00	0.00	0.48	0.36	(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%	23.7%	17.8%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	0.1%	0.2%	0.2%	59.6%	44.9%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	0.5%	1.3%	1.1%	0.5%	1.1%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	0.1%	0.2%	0.2%	59.9%	45.3%	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	0.4%	1.1%	1.0%	0.4%	1.0%	
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	
$P_{c\perp applied}/P_{c\perp allow}$	0.9%	2.4%	2.0%	0.9%	2.0%	
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	99.0%	74.2%	
Overall Check	OK	OK	OK	OK	OK	

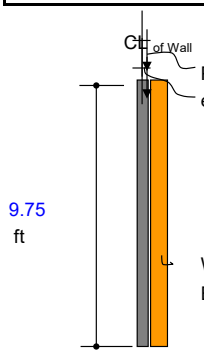
PRCNC20240278

SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007
DESIGNED: OGK
DATE: 06/15/23

PROJECT:

STUD WALL DESIGN (2) 2x6 2018 NDS/2018 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) =	14.00
E (PSF) =	5.00
TRIB. (IN) =	110

DESIGN VALUES		
F_b (psi) =	850	Hem Fir
F_v (psi) =	150	#2
F_c (psi) =	1300	Bending X-X axis
$F_{c\perp}$ (psi) =	405	405
E (psi) =	1.30E+06	Incised, No
E_{min} (psi) =	4.70E+05	Wet Use, No
C_r =	1.15	Repetive, Yes
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^) = 16.5 405 = $F_{c\perp}$ (ps

Use: (2) 2" X 6" @ 110" 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) =	9.75	9.75	9.75	9.75	9.75	
$V_{applied}$ (#) =	0	0	0	626	470	
$M_{applied}$ (ft-#) =	1	2	1	1527	1147	
$P_{applied}$ (#) =	30	80	68	30	68	
C_D =	1	1.15	1.15	1.6	1.6	
BENDING STESS CALCS		F_{bE} (psi)= 18667		C_{bF} = 1.3		(Table 4a Bending)
F_b* (psi)=	1271	1461	1461	2033	2033	(Eq 3.7-1)
C_L =	1	1	1	1	1	(Eq 3.7-1)
F'b (psi)=	1271	1461	1461	2033	2033	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 854		C_{cF} = 1.1		(Table 4a Compression)
L_e/d =	21.27	21.27	21.27	21.27	21.27	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	1430	1645	1645	2288	2288	(Eq 3.7-1)
C_P =	0.498132663	0.44691903	0.44691903	0.338494413	0.338494413	(Eq 3.7-1)
F'c (psi)=	712	735	735	774	774	(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 - #) =	1602	1842	1842	2563	2563	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	23507	24254	24254	25558	25558	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.00	0.00	0.00	0.60	0.45	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.00	0.01	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 (#) =	6683	6683	6683	6683	6683	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/242	L/323	$L/(I * E / 15 * L * M_{applied})$
240	0.00	0.00	0.00	0.48	0.36	(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%	23.7%	17.8%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	0.0%	0.1%	0.1%	59.6%	44.8%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	0.1%	0.3%	0.3%	0.1%	0.3%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	0.0%	0.1%	0.1%	59.7%	45.0%	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	0.2%	0.6%	0.5%	0.2%	0.5%	
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	
$P_{c\perp applied}/P_{c\perp allow}$	0.4%	1.2%	1.0%	0.4%	1.0%	
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	99.0%	74.2%	
Overall Check	OK	OK	OK	OK	OK	

PRCNC20240278

SOLUTIONS 4 STRUCTURES Inc.

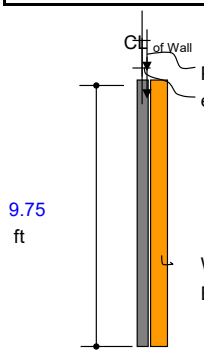
JOB #: 23.007

DESIGNED: OGK

DATE: 06/15/23

PROJECT:

STUD WALL DESIGN (3) 2x6 2018 NDS/2018 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) =	14.00
E (PSF) =	5.00
TRIB. (IN) =	166

DESIGN VALUES		
F_b (psi) =	850	Hem Fir
F_v (psi) =	150	#2
F_c (psi) =	1300	Bending X-X axis
$F_{c\perp}$ (psi) =	405	405
E (psi) =	1.30E+06	Incised, No
E_{min} (psi) =	4.70E+05	Wet Use, No
C_r =	1.15	Repetive, Yes
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) = 24.75 405 = $F_{c\perp}$ (ps

Use: (3) 2" X 6" @ 166" O.C. OK

MEMBER SIZE		SECTION PROPERTIES	
QUANITY	3	A =	24.75 in^2
b =	1.5 in	S =	22.69 in^3
d =	5.5 in	I =	62.39 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) =	9.75	9.75	9.75	9.75	9.75	
$V_{applied}$ (#) =	0	0	0	944	708	
$M_{applied}$ (ft-#) =	1	2	1	2303	1729	
$P_{applied}$ (#) =	30	80	68	30	68	
C_D =	1	1.15	1.15	1.6	1.6	
BENDING STESS CALCS		F_{bE} (psi)= 18667		C_{bF} = 1.3		(Table 4a Bending)
F_b* (psi)=	1271	1461	1461	2033	2033	(Eq 3.7-1)
C_L =	1	1	1	1	1	(Eq 3.7-1)
F'b (psi)=	1271	1461	1461	2033	2033	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 854		C_{cF} = 1.1		(Table 4a Compression)
L_e/d =	21.27	21.27	21.27	21.27	21.27	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	1430	1645	1645	2288	2288	(Eq 3.7-1)
C_P =	0.498132663	0.44691903	0.44691903	0.338494413	0.338494413	(Eq 3.7-1)
F'c (psi)=	712	735	735	774	774	(Table 4.3.1)
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)	
V_{allow} (#) =	2475	2846	2846	3960	3960	$V_{allow} = A * F_v * C_D / 1.5$
M_{allow} (ft - #) =	2403	2763	2763	3844	3844	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	52890	54571	54571	57505	57505	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.00	0.00	0.00	0.60	0.45	(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 (#) =	10024	10024	10024	10024	10024	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	10024	10024	10024	10024	10024	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/241	L/321	$L/(I * E / 15 * L * M_{applied})$
240	0.00	0.00	0.00	0.49	0.36	(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%	23.8%	17.9%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	0.0%	0.1%	0.1%	59.9%	45.0%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	0.1%	0.1%	0.1%	0.1%	0.1%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	0.0%	0.1%	0.1%	60.0%	45.1%	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	0.1%	0.4%	0.3%	0.1%	0.3%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	0.3%	0.8%	0.7%	0.3%	0.7%	
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	0.3%	0.8%	0.7%	0.3%	0.7%	
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	99.6%	74.7%	
Overall Check	OK	OK	OK	OK	OK	

PRCNC20240278

SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007

DESIGNED: OGK

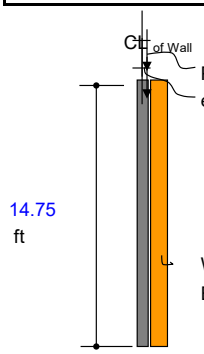
DATE: 06/15/23

PROJECT:

STUD WALL DESIGN

(1) 2x6

2018 NDS/2018 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) =	14.00
E (PSF) =	5.00
TRIB. (IN) =	19

DESIGN VALUES		
F_b (psi) =	900	Doug Fir
F_v (psi) =	180	#2
F_c (psi) =	1350	Bending X-X axis
$F_{c\perp}$ (psi) =	625	625
E (psi) =	1.60E+06	Incised, No
E_{min} (psi) =	5.80E+05	Wet Use, No
C_r =	1.15	Repetive, Yes
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^) = 8.25 405 = $F_{c\perp}$ (ps

Use: (1) 2" X 6" @ 19" 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) =	14.75	14.75	14.75	14.75	14.75	
$V_{applied}$ (#) =	0	0	0	164	123	
$M_{applied}$ (ft-#) =	1	2	1	605	457	
$P_{applied}$ (#) =	30	80	68	30	68	
C_D =	1	1.15	1.15	1.6	1.6	
BENDING STESS CALCS		F_{bE} (psi)= 23036		C_{bF} = 1.3		(Table 4a Bending)
F_b* (psi)=	1346	1547	1547	2153	2153	(Eq 3.7-1)
C_L =	1	1	1	1	1	(Eq 3.7-1)
F'b (psi)=	1346	1547	1547	2153	2153	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 460		C_{cF} = 1.1		(Table 4a Compression)
L_e/d =	32.18	32.18	32.18	32.18	32.18	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	1485	1708	1708	2376	2376	(Eq 3.7-1)
C_P =	0.286906413	0.25250069	0.25250069	0.185315099	0.185315099	(Eq 3.7-1)
F'c (psi)=	426	431	431	440	440	(Table 4.3.1)
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)	
V_{allow} (#) =	990	1139	1139	1584	1584	$V_{allow} = A * F_v * C_D / 1.5$
M_{allow} (ft - #) =	848	975	975	1357	1357	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	3515	3557	3557	3633	3633	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.00	0.00	0.00	0.45	0.34	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.01	0.02	0.02	0.01	0.02	(Eq 3.9-4)
$P_{c\perp allow}$ on PL (#) =	5156	5156	5156	5156	5156	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	3341	3341	3341	3341	3341	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/249	L/333	$L/(I * E / 15 * L * M_{applied})$
240	0.00	0.00	0.00	0.71	0.53	(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%	10.3%	7.8%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	0.1%	0.2%	0.1%	44.6%	33.6%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	0.9%	2.2%	1.9%	0.8%	1.9%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	0.1%	0.2%	0.2%	45.0%	34.3%	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	0.8%	2.1%	1.8%	0.8%	1.8%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	0.6%	1.6%	1.3%	0.6%	1.3%	
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	0.9%	2.4%	2.0%	0.9%	2.0%	
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	96.2%	72.1%	
Overall Check	OK	OK	OK	OK	OK	

PRCNC20240278

SOLUTIONS 4 STRUCTURES Inc.

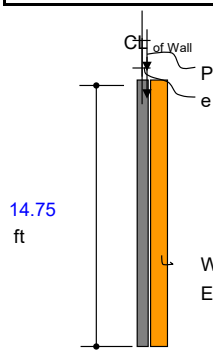
JOB #: 23.007

DESIGNED: OGK

DATE: 06/15/23

PROJECT:

STUD WALL DESIGN (2) 2x6 2018 NDS/2018 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) =	14.00
E (PSF) =	5.00
TRIB. (IN) =	39

DESIGN VALUES			
F_b (psi) =	900	Doug Fir	
F_v (psi) =	180	#2	
F_c (psi) =	1350	Bending X-X axis	
$F_{c\perp}$ (psi) =	625		625
E (psi) =	1.60E+06	Incised, No	
E_{min} (psi) =	5.80E+05	Wet Use, No	
C_r =	1.15	Repetive, Yes	
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^) = 16.5 405 = $F_{c\perp}$ (ps

Use: (2) 2" X 6" @ 39" 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) =	14.75	14.75	14.75	14.75	14.75	
$V_{applied}$ (#) =	0	0	0	336	252	
$M_{applied}$ (ft-#) =	1	2	1	1240	933	
$P_{applied}$ (#) =	30	80	68	30	68	
C_D =	1	1.15	1.15	1.6	1.6	
BENDING STESS CALCS		F_{bE} (psi)= 23036		C_{bF} = 1.3		(Table 4a Bending)
F_b* (psi)=	1346	1547	1547	2153	2153	(Eq 3.7-1)
C_L =	1	1	1	1	1	(Eq 3.7-1)
F'b (psi)=	1346	1547	1547	2153	2153	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 460		C_{cF} = 1.1		(Table 4a Compression)
L_e/d =	32.18	32.18	32.18	32.18	32.18	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	1485	1708	1708	2376	2376	(Eq 3.7-1)
C_P =	0.286906413	0.25250069	0.25250069	0.185315099	0.185315099	(Eq 3.7-1)
F'c (psi)=	426	431	431	440	440	(Table 4.3.1)
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)	
V_{allow} (#) =	1980	2277	2277	3168	3168	$V_{allow} = A * F_v * C_D / 1.5$
M_{allow} (ft - #) =	1696	1950	1950	2713	2713	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	14060	14230	14230	14530	14530	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.00	0.00	0.00	0.46	0.35	(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 (#) =	10313	10313	10313	10313	10313	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	6683	6683	6683	6683	6683	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/243	L/324	$L/(I * E / 15 * L * M_{applied})$
240	0.00	0.00	0.00	0.73	0.55	(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%	10.6%	8.0%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	0.0%	0.1%	0.1%	45.7%	34.4%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	0.2%	0.6%	0.5%	0.2%	0.5%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	0.0%	0.1%	0.1%	45.9%	34.7%	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	0.4%	1.1%	0.9%	0.4%	0.9%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	0.3%	0.8%	0.7%	0.3%	0.7%	
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	0.4%	1.2%	1.0%	0.4%	1.0%	
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	98.7%	74.0%	
Overall Check	OK	OK	OK	OK	OK	

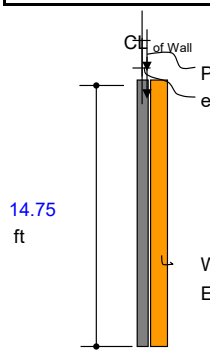
PRCNC20240278

SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007
DESIGNED: OGK
DATE: 06/15/23

PROJECT:

STUD WALL DESIGN (3) 2x6 2018 NDS/2018 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) =	14.00
E (PSF) =	5.00
TRIB. (IN) =	59

DESIGN VALUES		
F_b (psi) =	900	Doug Fir
F_v (psi) =	180	#2
F_c (psi) =	1350	Bending X-X axis
$F_{c\perp}$ (psi) =	625	625
E (psi) =	1.60E+06	Incised, No
E_{min} (psi) =	5.80E+05	Wet Use, No
C_r =	1.15	Repetive, Yes
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^) = 24.75 405 = $F_{c\perp}$ (ps

Use: (3) 2" X 6" @ 59" O.C. OK

MEMBER SIZE		SECTION PROPERTIES	
QUANITY	3	A =	24.75 in^2
b =	1.5 in	S =	22.69 in^3
d =	5.5 in	I =	62.39 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) =	14.75	14.75	14.75	14.75	14.75	
$V_{applied}$ (#) =	0	0	0	508	381	
$M_{applied}$ (ft-#) =	1	2	1	1874	1408	
$P_{applied}$ (#) =	30	80	68	30	68	
C_D =	1	1.15	1.15	1.6	1.6	
BENDING STESS CALCS		F_{bE} (psi)= 23036		C_{bF} = 1.3		(Table 4a Bending)
F_b* (psi)=	1346	1547	1547	2153	2153	(Eq 3.7-1)
C_L =	1	1	1	1	1	(Eq 3.7-1)
F'b (psi)=	1346	1547	1547	2153	2153	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 460		C_{cF} = 1.1		(Table 4a Compression)
L_e/d =	32.18	32.18	32.18	32.18	32.18	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	1485	1708	1708	2376	2376	(Eq 3.7-1)
C_P =	0.286906413	0.25250069	0.25250069	0.185315099	0.185315099	(Eq 3.7-1)
F'c (psi)=	426	431	431	440	440	(Table 4.3.1)
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)	
V_{allow} (#) =	2970	3416	3416	4752	4752	$V_{allow} = A * F_v * C_D / 1.5$
M_{allow} (ft - #) =	2544	2925	2925	4070	4070	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	31635	32017	32017	32693	32693	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.00	0.00	0.00	0.46	0.35	(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 (#) =	15469	15469	15469	15469	15469	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	10024	10024	10024	10024	10024	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/241	L/321	$L/(I * E / 15 * L * M_{applied})$
240	0.00	0.00	0.00	0.73	0.55	(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%	10.7%	8.0%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	0.0%	0.1%	0.0%	46.1%	34.6%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	0.1%	0.2%	0.2%	0.1%	0.2%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	0.0%	0.1%	0.0%	46.2%	34.8%	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	0.3%	0.7%	0.6%	0.3%	0.6%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	0.2%	0.5%	0.4%	0.2%	0.4%	
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	0.3%	0.8%	0.7%	0.3%	0.7%	
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	99.6%	74.7%	
Overall Check	OK	OK	OK	OK	OK	

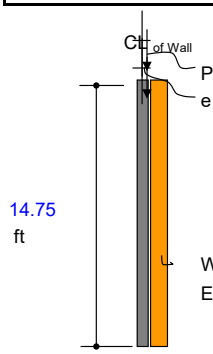
PRCNC20240278

SOLUTIONS 4 STRUCTURES Inc.

JOB #: 23.007
DESIGNED: OGK
DATE: 06/15/23

PROJECT:

STUD WALL DESIGN (4) 2x6 2018 NDS/2018 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) =	12.00
E (PSF) =	5.00
TRIB. (IN) =	92

DESIGN VALUES			
F_b (psi) =	900	Doug Fir	
F_v (psi) =	180	#2	
F_c (psi) =	1350	Bending X-X axis	
$F_{c\perp}$ (psi) =	625		625
E (psi) =	1.60E+06	Incised, No	
E_{min} (psi) =	5.80E+05	Wet Use, No	
C_r =	1.15	Repetive, Yes	
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^) = 33 405 = $F_{c\perp}$ (ps

Use: (4) 2" X 6" @ 92" O.C. OK

MEMBER SIZE		SECTION PROPERTIES	
QUANITY	4	A =	33.00 in^2
b =	1.5 in	S =	30.25 in^3
d =	5.5 in	I =	83.19 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) =	14.75	14.75	14.75	14.75	14.75	
$V_{applied}$ (#) =	0	0	0	679	509	
$M_{applied}$ (ft-#) =	1	2	1	2504	1881	
$P_{applied}$ (#) =	30	80	68	30	68	
C_D =	1	1.15	1.15	1.6	1.6	
BENDING STESS CALCS		F_{bE} (psi)= 23036		C_{bF} = 1.3		(Table 4a Bending)
F_b* (psi)=	1346	1547	1547	2153	2153	(Eq 3.7-1)
C_L =	1	1	1	1	1	(Eq 3.7-1)
F'b (psi)=	1346	1547	1547	2153	2153	(Table 4.3.1)
AXIAL STESS CALCS		F_{cE} = 460		C_{cF} = 1.1		(Table 4a Compression)
L_e/d =	32.18	32.18	32.18	32.18	32.18	(3.7.1.4) <50 Le = (Ke)L
F_c* (psi)=	1485	1708	1708	2376	2376	(Eq 3.7-1)
C_P =	0.286906413	0.25250069	0.25250069	0.185315099	0.185315099	(Eq 3.7-1)
F'c (psi)=	426	431	431	440	440	(Table 4.3.1)
ALLOWABLES	DL + LL	DL + SL	DL+0.75(LL+SL)	DL + W	DL+0.75(LL+SL+W)	
V_{allow} (#) =	3960	4554	4554	6336	6336	$V_{allow} = A * F_v * C_D / 1.5$
M_{allow} (ft - #) =	3392	3901	3901	5427	5427	$M_{allow} = S*F_b*C_D*C_F*C_L*C_r$
P_{allow} (#) =	56239	56919	56919	58121	58121	$P_{allow} = A * F_c * C_D * C_F * C_P$
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$ =	0.00	0.00	0.00	0.46	0.35	(Eq 3.9-3)
$(f_c/F_{cE}) + (f_b/F_{bE})^2$ =	0.00	0.01	0.00	0.00	0.00	(Eq 3.9-4)
$P_{c\perp allow}$ on PL (#) =	20625	20625	20625	20625	20625	$P_{c\perp allow} = A * Fc * C_b$
$P_{c\perp allow}$ on Beam (#) =	13365	13365	13365	13365	13365	$P_{c\perp allow} = A * Fc$
Deflection L/	NA	NA	NA	L/240	L/321	$L/(I * E / 15 * L * M_{applied})$
240	0.00	0.00	0.00	0.74	0.55	(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%	10.7%	8.0%	
MOMENT M	OK	OK	OK	OK	OK	
$M_{applied}/M_{allow}$	0.0%	0.0%	0.0%	46.1%	34.7%	
AXIAL P	OK	OK	OK	OK	OK	
$P_{applied}/P_{allow}$	0.1%	0.1%	0.1%	0.1%	0.1%	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	OK	OK	OK	OK	OK	
$(f_c/F_c')^2 + f_b/(F_b(1-(f_c/F_{cE})$	0.0%	0.0%	0.0%	46.2%	34.8%	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	OK	OK	OK	OK	OK	
$(f_c/F_{cE}) + (f_b/F_{bE})^2$	0.2%	0.5%	0.4%	0.2%	0.4%	
AXIAL $P_\perp$ on PL	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	0.1%	0.4%	0.3%	0.1%	0.3%	
AXIAL $P_\perp$ on Beam	OK	OK	OK	OK	OK	
$P_{c\perp applied}/P_{c\perp allow}$	0.2%	0.6%	0.5%	0.2%	0.5%	
DEFLECTION	OK	OK	OK	OK	OK	
$D_{actual}/D_{allowed}$	0.0%	0.0%	0.0%	99.8%	74.9%	
Overall Check	OK	OK	OK	OK	OK	

PRCNC20240278

SOLUTIONS 4 STRUCTURES Inc.

LATERAL DESIGN

By: OGK

PRCNC20240278

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007 **Sheet:**

Designed: OGK **Date:** 6/14/23

Checked: **Date:**

Project: Bradley Heights Apartments Rec Bld

WIND ANALYSIS:

IBC 2018 / ASCE 7-16

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

100 Typical

Basic Wind Speed, V= 97 mph Section 26.5.1 **Exposure Category:** B Section 26.7.2

Mean Roof Height, h= 25.00 feet Alpha = 7

Parapet Height above roof, p= - feet Z_g = 1200

Building Width, B= 80.00 feet

Building Length, L= 124.00 feet Enclosed Building

Ground Elevation factor: 386 Elev. (ft) Section 26.9 GCpi =+/- 0.18 Table 26.13-1

G = 0.8500 gust effect factor defined in section 26.11.1

$K_z = 2.01\ (z/z_g)^{2/alpha}$ (ASCE 7-16 **Table 27.3-1**) Section 26.10.1

$K_{zt} = (1 + K_1 K_2 K_3)^2$ = 1.00 (ASCE 7-16 **Eq. 26.8-1**) Section 26.8.2

K_e = 0.99 (ASCE 7-16 **Table 26.9-1**) Section 26.9

K_d = 0.85 (ASCE 7-16 **Table 26-1**) Section 26.6

I = 1.00 (ASCE 7-16 **Table 1.5-2**)

Windward: P = qGCp - qi(GCpi) (ASCE 7-16) **(Eq. 27.3-1)**

C_p = 0.8 (windward) Figure 27.3-1

	Table 27.3-1	Eq. 27.3-1	Eq. 27.4-1a	Eq. 27.4-1b	Eq. 27.4-1	Eq. 27.4-1
h	Sec. 27.3.1	Sec. 27.3.2	External	Internal	Total	Total
feet	K_z	q_z (psf)	$q_z GC_p$	$-q_i(GC_{pi})$	q G Cp + qi(GC	q G Cp - qi(GCpi)
10	0.51	10.33	7.03	2.42	9.44	4.61
20	0.62	12.60	8.57	2.42	10.98	6.15
30	0.70	14.14	9.62	2.42	12.04	7.20
25	0.67	13.43	9.13	2.42	11.55	6.71
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
25	$q=q_h=q_i$=	13.43	9.13	2.42	11.55	6.71
0	$q=q_p$=	0.00	-	-	-	Parapet

Totals

Windward + Leeward		h
Along B	Along L	feet
11.5 (6.9)	12.7 (7.6)	10
13.0 (7.8)	14.3 (8.6)	20
14.1 (8.4)	15.3 (9.2)	30
13.6 (8.1)	14.8 (8.9)	25
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
13.6 (8.1)	14.8 (8.9)	25
0.0 (0.0)	0.0 (0.0)	Parapet

( ) values are ASD = ULT x 0.6

Leeward: P = qGCp - qi(GCpi) (ASCE 7-16) **(Eq.27.3-1)**

Figure 27.3-1

	External	Internal	Total	Total	
q_h (psf)	$q_h GC_p$	$-q_i(GC_{pi})$	q G Cp - qi(GC	q G Cp + qi(GCpi)	
13.43	-5.71	2.42	-3.29	-8.12	Along L
13.43	-4.45	2.42	-2.03	-6.87	Along B

C_p = -0.5 (Leeward along L)

C_p = -0.39 (Leeward along B)

Parapet: $P_p = q_p GC_{pn}$ (ASCE 7-16) **(Eq. 27.3-3)**

Section 27.3.4

	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 7-16) **(Eq. 30.3-1)** h ≤ 60 ft

Table 26.13-1

Area (ft²)	GC_p(4&5)	Windward	GC_p(4)	Leeward	GC_p(5)	Leeward
10	1.00	15.8 (9.5)	-1.10	-17.2 (-10.3)	-1.40	-21.2 (-12.7)
25	0.93	14.9 (8.9)	-1.03	-16.2 (-9.7)	-1.26	-19.3 (-11.6)
50	0.88	14.2 (8.5)	-0.98	-15.5 (-9.3)	-1.15	-17.9 (-10.7)
200	0.77	12.8 (7.7)	-0.87	-14.1 (-8.5)	-0.94	-15.0 (-9.0)

GC_{pi} = 0.18 (Windward)

GC_{pi} = -0.18 (Leeward)

q_h(psf) = 13.43

( ) values are ASD = ULT x 0.6

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007 **Sheet:**

Designed: MRO **Date:** 6/14/23

Checked: **Date:**

Project: Bradley Heights Apartments

SEISMIC ANALYSIS:

IBC 2018 / ASCE 7-16

Site Class:

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

Site Location:

Latitude: 47.1652 Longitude: -122.2921

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

S_S =	1.263	F_a = 1.20
S_1 =	0.435	F_V = 1.50

$S_{MS} = F_a * S_S$ = 1.516 (IBC Eq.16-37)

$S_{M1} = F_V * S_1$ = 0.653 (IBC Eq.16-38)

Spectral Response Parameters:

$S_{DS} = 2/3 * S_{MS}$ = 1.010 (IBC Eq.16-39)

$S_{D1} = 2/3 * S_{M1}$ = 0.435 (IBC Eq.16-40)

Structure Period:

$T_a = C_t * (h_n)^x$ = 0.3817 (ASCE Eq. 12.8-7)

h_n = 51 Ft. Structural Height Section 11.2

C_t = 0.02 (ASCE Table 12.8-2)

x = 0.75 (ASCE Table 12.8-2) All other structural system

C_u = 1.4 (ASCE Table 12.8-1)

$T_{(MAX)} = C_u * T_a$ = 0.5344 (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

$C_S = S_{DS}/(R/I_E)$ = 0.155 (ASCE Eg 12.8-2)

R = 6.5 (ASCE 7 Table 12.2-1) wood shear wall

I_E = 1.00 (ASCE Table 1.5-2)

CS(Max) = 0.175

$S_{D1} / ((R / I_E) * Ta)$ = 0.175 (ASCE Eq 12.8-3) for T <= T_L OK T_L= 4

$S_{D1} * T_L / ((R / I_E) * Ta^2)$= 1.837 (ASCE Eq 12.8-4) for T > T_L OK ASCE Section 12.8 & 11.4.6

CS(Min) = 0.044 (ASCE fig. 22-14 thru 22-17)

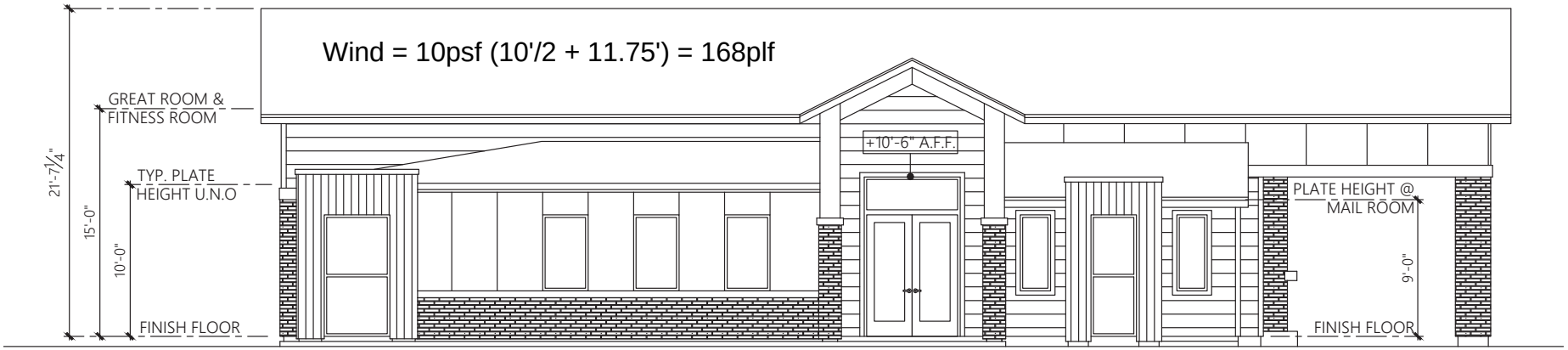
0.044 S_{DS} I >=.01 = 0.044 (ASCE Eq 12.8-5)

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

$V = C_S * W$ =	0.1554	W (Ultimate Strength)
$V_a = C_S/1.4 * W$ =	0.1110	W (Allowable Stress)

CLUBHOUSE EAST ELEVATION

1/8" = 1'-0"



CLUBHOUSE WEST ELEVATION

1/8" = 1'-0"

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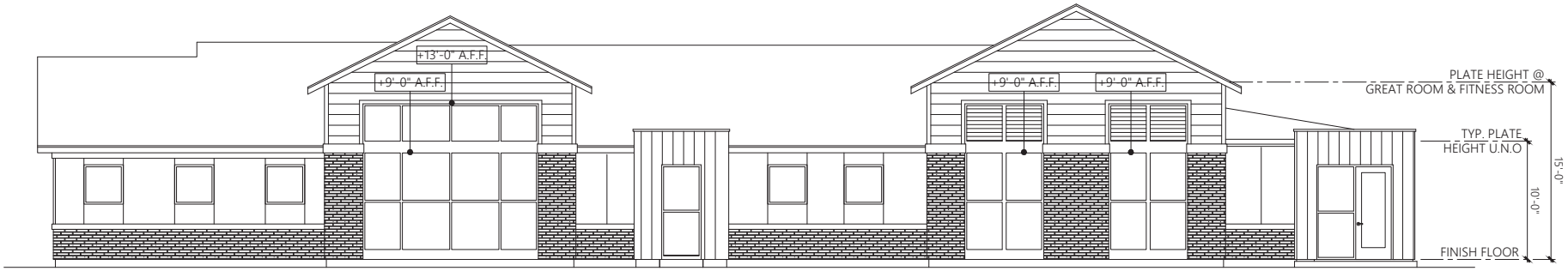


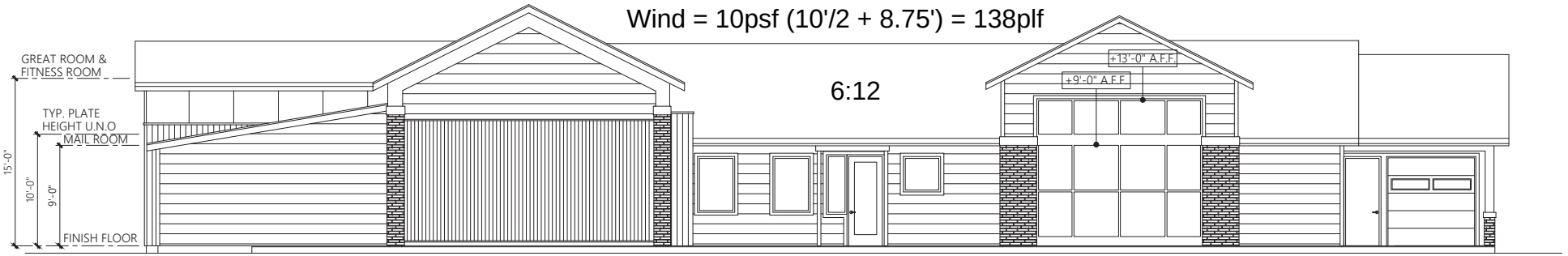
CLUBHOUSE

NORTH (27TH AVE) ELEVATION

1/8" = 1'-0"

WINDOW HEADER HEIGHT
@ 8'-0" A.F.F. UNO

Wind = 10psf (10'/2 + 8.75') = 138plf



CLUBHOUSE

SOUTH ELEVATION

1/8" = 1'-0"

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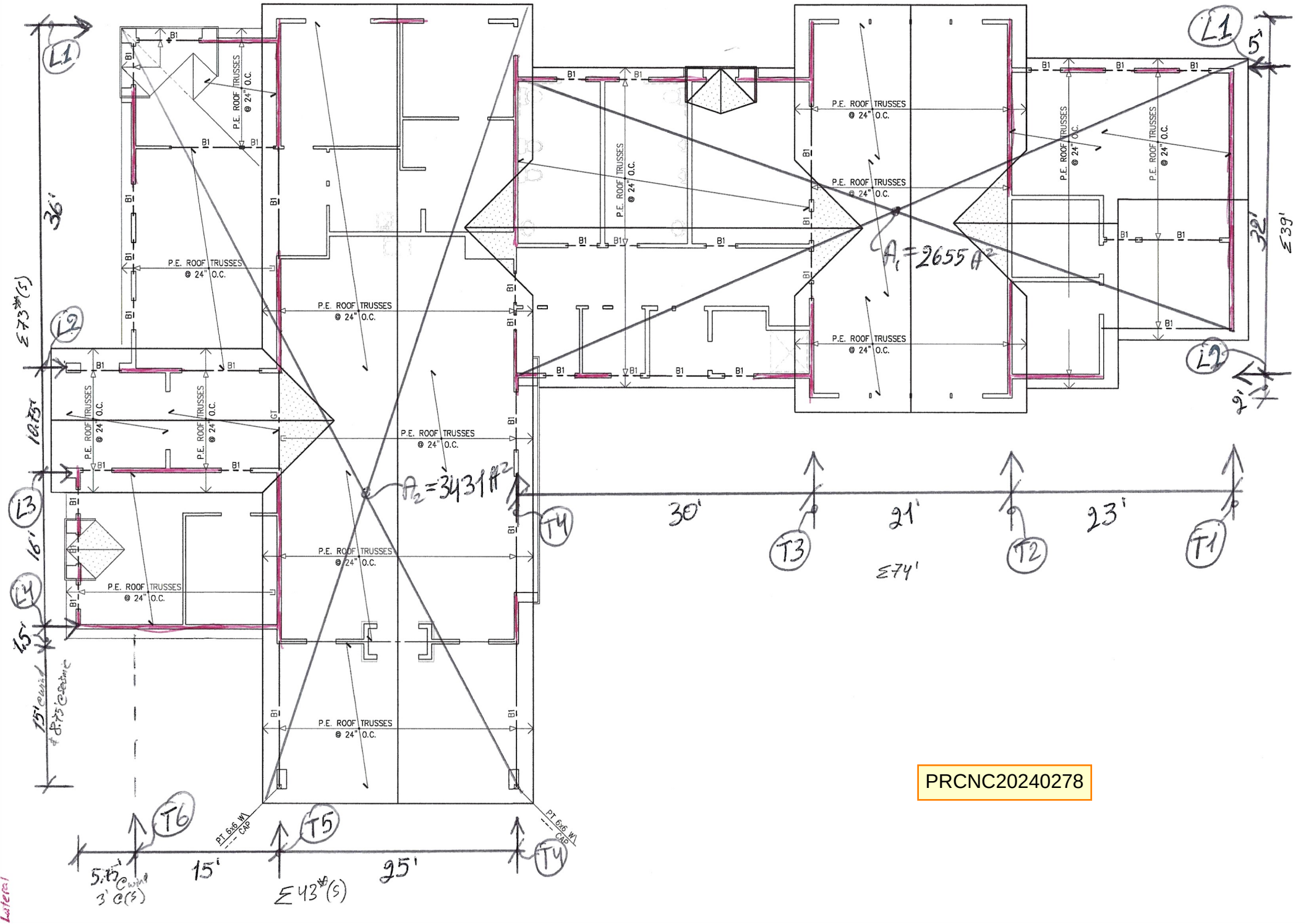

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Unit
Rec Bld

Seismic Weights

A1	DL(PSF)	∑Area (ft^2)		W(kips)	∑Total W (kips)	
Roof:	18.0	2655.0		47.8		
				0.0		
		∑L(ft)	H/2(ft)	W(kips)		
Walls:	10.0	145.0	6.3	9.1		
Below →				0.0	**56.9**	
					x 0.1110 =	**5.01**
	10.0	175.0	6.3	10.9	/ 39' =	**129**
Below →				0.0	**58.7**	
					x 0.1110 =	**5.18**
					/ 74' =	**70**

A2	DL(PSF)	∑Area (ft^2)		W(kips)	∑Total W (kips)	
Roof:	18.0	3431.0		61.8		
				0.0		
		∑L(ft)	H/2(ft)	W(kips)		
Walls:	10.0	160.0	6.3	10.0		
Below →				0.0	**71.8**	
					x 0.1110 =	**6.33**
	10.0	169.0	6.3	10.6	/ 73' =	**87**
Below →				0.0	**72.3**	
					x 0.1110 =	**6.38**
					/ 43' =	**148**

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	70	11.50									805	**0.81**
T1												
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	138	11.50									1587	**1.59**

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	70	22.00									1540	**1.54**
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	138	22.00									3036	**3.04**

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	70	25.50									1785	**1.79**
T3												
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	138	25.50									3519	**3.52**

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	70	15.00	148	12.50							2900	**2.90**
T4												
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	138	15.00	168	12.50							4170	**4.17**

T5												
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	148	20.00									2960	**2.96**
T5												
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	138	7.50	168	12.50							3135	**3.14**

T6												
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	148	10.50									1554	**1.55**
T6												
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	138	13.25									1829	**1.83**

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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	129	21.00	87	18.00							4275	**4.28**
L1												
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	0	21.00	168	18.00							3024	**3.02**

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	129	18.00	87	23.38							4356	**4.36**
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	0	18.00	168	23.38							3927	**3.93**

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	87	13.38									1164	**1.16**
L3												
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	168	13.38									2247	**2.25**

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	87	16.75									1457	**1.46**
L4												
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	168	9.50	118	16.50							3543	**3.54**

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SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007

Designed: OGK **Date:** 6/15/23

Checked: **Date:**

Project: Project Name

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0.5 (ft) holdown dist from end

Roof: W1																						
	Wind (ASD): 1.59 kips						59 #/ft														59 #/ft	
	Seismic (ASD): 0.81 kips						30 #/ft														30 #/ft	
																			10 ft	
	27 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		27	Actual
Distribution L	27 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		27	Distribu
h/b_s =	0.37	W1																		
DL w (plf) =	145		0		0		0		0		0		0		0		0			
$0.6M_R$ (#-ft) =	31712		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	59	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
M_{ot} (#-ft) =	15900	8100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
F (#) =	-597	-891	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			

PRCNC20240278

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007

Designed: OGK **Date:** 6/15/23

Checked: **Date:**

Project: Project Name

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0.5 (ft) holdown dist from end

Roof:																						
W1	Wind (ASD): 3.04 kips 101 #/ft																				101 #/ft	
	Seismic (ASD): 1.54 kips 51 #/ft																				51 #/ft	
	 18 ft		 12 ft		 0 ft		 0 ft		 0 ft		 0 ft		 0 ft		 0 ft		 0 ft		15 ft 30	Actual
Distribution L	18 ft		12 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		30	Distribu
h/b_s =	0.833 W1		1.25 W1																	
DL w (plf) =	366		0		0		0		0		0		0		0		0			
$0.6M_R$ (#-ft) =	35575		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	101	51	101	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
M_{ot} (#-ft) =	27360	13860	18240	9240	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
F (#) =	-469	-1241	1586	803	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 NG		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK			

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007

Designed: OGK **Date:** 6/15/23

Checked: **Date:**

Project: Project Name

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0.5 (ft) holdown dist from end

Roof:					Wind (ASD):	3.52 kips	183 #/ft														183 #/ft	
W1					Seismic (ASD):	1.79 kips	93 #/ft														93 #/ft	
	9 ft		10.25 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		15 ft	
																					19.25	Actual
Distribution L	9 ft		10.25 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		19.25	Distribu
h/b_s =	1.667	W1	1.463	W1																		
DL w (plf) =	366		366		0		0		0		0		0		0		0					
$0.6M_R$ (#-ft) =	8894		11536		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	183	93	183	93	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
M_{ot} (#-ft) =	24686	12553	28114	14297	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
F (#) =	1858	431	1700	283	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Holdown	2215	h1	2215	h1	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-				
1.05	HDU2 OK		HDU2 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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SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007

Designed: OGK **Date:** 6/15/23

Checked: **Date:**

Project: Project Name

).xlsx]T4

0.5 (ft) holdown dist from end

Roof:																						
W1	Wind (ASD): 4.17 kips						132 #/ft														144 #/ft	
	Seismic (ASD): 2.9 kips						92 #/ft														100 #/ft	
																			15 ft	
	5.25 ft		6.5 ft		19.75 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		31.5	Actual
Distribution L	3.675 ft		5.633 ft		19.75 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		29.06	Distribu
h/b_s =	2.857 W1		2.308 W1		0.759 W1															
DL w (plf) =	402		402		402		0		0		0		0		0		0			
$0.6M_R$ (#-ft) =	3324		5095		47042		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	100	70	124	86	144	100	0	0	0	0	0	0	0	0	0	0	0	0		
M_{ot} (#-ft) =	7911	5501	12126	8433	42513	29566	0	0	0	0	0	0	0	0	0	0	0	0		
F (#) =	966	458	1172	556	-235	-908	0	0	0	0	0	0	0	0	0	0	0	0		
Holdown	2215	h1	2215	h1	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-		
1.05	HDU2 OK		HDU2 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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SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007

Designed: OGK **Date:** 6/15/23

Checked: **Date:**

Project: Project Name

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0.5 (ft) holdown dist from end

Roof:			Wind (ASD):	3.14 kips	72 #/ft													72 #/ft	
W1			Seismic (ASD):	2.96 kips	68 #/ft													68 #/ft	
	18 ft		12 ft		13.5 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft	15 ft	
																		43.5	Actual
Distribution L	18 ft		12 ft		13.5 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft	43.5	Distribu
h/b_s =	0.833	W1	1.25	W1	1.111	W1													
DL w (plf) =	402		402		402		0		0		0		0		0		0		
$0.6M_R$ (#-ft) =	39074		17366		21979		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	72	68	72	68	72	68	0	0	0	0	0	0	0	0	0	0	0	0	
M_{ot} (#-ft) =	19490	18372	12993	12248	14617	13779	0	0	0	0	0	0	0	0	0	0	0	0	
F (#) =	-1119	-1183	-380	-445	-566	-631	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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SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007

Designed: OGK **Date:** 6/15/23

Checked: **Date:**

Project: Project Name

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0.5 (ft) holdown dist from end

Roof:					Wind (ASD):	1.83 kips	100 #/ft														100 #/ft	
W1					Seismic (ASD):	1.55 kips	85 #/ft														85 #/ft	
	10.25 ft		8 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		10 ft	
Distribution L	10.25 ft		8 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		18.25	Actual
h/b_s =	0.976	W1	1.25	W1																	18.25	Distribu
DL w (plf) =	262		262		0		0		0		0		0		0		0					
$0.6M_R$ (#-ft) =	8258		5030		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	100	85	100	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
M_{ot} (#-ft) =	10278	8705	8022	6795	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
F (#) =	207	46	399	235	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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SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007

Designed: OGK **Date:** 6/15/23

Checked: **Date:**

Project: Project Name

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0.5 (ft) holdown dist from end

Roof: W1	Wind (ASD): 3.02 kips 74 #/ft Seismic (ASD): 4.28 kips 105 #/ft																77 #/ft 109 #/ft	
	4.7 ft		4.7 ft		7.5 ft		6 ft		4 ft		5.5 ft		8.25 ft		0 ft		0 ft		10 ft	15
Distribution L	4.418 ft		4.418 ft		7.5 ft		6 ft		3.2 ft		5.5 ft		8.25 ft		0 ft		0 ft		40.65	Actual
h/b_s =	2.128 W1		2.128 W1		1.333 W1		1.667 W1		2.5 W1		1.818 W1		1.212 W1						39.29	Distribu
DL w (plf) =	284.5		284.5		284.5		284.5		284.5		145		145		0		0			
$0.6M_R$ (#-ft) =	1885		1885		4801		3073		1366		1316		2961		0		0			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	72	102	72	102	77	109	77	109	61	87	77	109	77	109	0	0	0	0		
M_{ot} (#-ft) =	3396	4813	3396	4813	5765	8171	4612	6537	2460	3486	6342	5992	6342	8988	0	0	0	0		
F (#) =	360	697	360	697	138	481	280	630	313	606	1005	935	436	778	0	0	0	0		
Holdown	1000	-	1000	-	1000	-	1000	-	1000	-	2215	h1	1000	-	1000	-	1000	-		
1.05	No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		HDU2 OK		No Holdown OK		No Holdown OK		No Holdown OK			

PRCNC20240278

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007

Designed: OGK **Date:** 6/15/23

Checked: **Date:**

Project: Project Name

).xlsx]L2

0.5 (ft) holdown dist from end

Roof:																						
W1	Wind (ASD): 3.93 kips						138 #/ft														138 #/ft	
	Seismic (ASD): 4.36 kips						153 #/ft														153 #/ft	
																			10 ft	15
	9.5 ft		6 ft		6.55 ft		6.5 ft		0 ft		0 ft		0 ft		0 ft		0 ft		28.55	Actual
Distribution L	9.5 ft		6 ft		6.55 ft		6.5 ft		0 ft		0 ft		0 ft		0 ft		0 ft		28.55	Distribu
h/b_s =	1.053	W1	1.667	W1	1.527	W1	1.538	W1												
DL w (plf) =	248.5		248.5		248.5		223.8		0		0		0		0		0			
$0.6M_R$ (#-ft) =	6728		2684		3198		2836		0		0		0		0		0			
	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E		
PLF	138	153	138	153	138	153	138	153	0	0	0	0	0	0	0	0	0	0		
M_{ot} (#-ft) =	13077	14508	8259	9163	9016	10003	13421	9926	0	0	0	0	0	0	0	0	0	0		
F (#) =	705	864	1014	1178	962	1125	1764	1182	0	0	0	0	0	0	0	0	0	0		
Holdown	1000	-	1000	-	1000	-	2215	h1	1000	-	1000	-	1000	-	1000	-	1000	-		
1.05	No Holdown OK		No Holdown NG		No Holdown NG		HDU2 OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK		No Holdown OK			

PRCNC20240278

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007

Designed: OGK **Date:** 6/15/23

Checked: **Date:**

Project: Project Name

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0.5 (ft) holdown dist from end

Roof:			Wind (ASD):	2.25 kips	200 #/ft														200 #/ft	
W1			Seismic (ASD):	1.16 kips	103 #/ft														103 #/ft	
																			15 ft	
	11.25 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		11.25	Actual
Distribution L	11.25 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		11.25	Distribu
h/b_s =	1.333	W1																		
DL w (plf) =	223.8		0		0		0		0		0		0		0		0			
$0.6M_R$ (#-ft) =	8496		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	200	103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
M_{ot} (#-ft) =	33750	17400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
F (#) =	2349	828	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Holdown	3285	h2	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-		
1.05	HDU4 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			

PRCNC20240278

SOLUTIONS 4 STRUCTURES Inc.

Job # 23.007

Designed: OGK ***Date:*** 6/15/23

Checked: ***Date:***

Project: Project Name

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0.5 (ft) holdown dist from end

Roof: W1			Wind (ASD): 3.54 kips		171 #/ft														171 #/ft	
			Seismic (ASD): 1.46 kips		70 #/ft														70 #/ft	
																			10 ft	
	20.75 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		20.75	Actual
Distribution L	20.75 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		0 ft		20.75	Distribu
h/b_s =	0.482	W1																		
DL w (plf) =	145		0		0		0		0		0		0		0		0			
$0.6M_R$ (#-ft) =	18729		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	171	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
M_{ot} (#-ft) =	35400	14600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
F (#) =	823	-204	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Holdown	3285	h2	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-	1000	-		
1.05	HDU4 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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